State of Utah

GARY R. HERBERT
*Governor*

SPENCER J. COX
*Lieutenant Governor*

Department of
Environmental Quality

Alan Matheson
*Executive Director*

DIVISION OF AIR QUALITY
Bryce C. Bird
*Director*

DAQE-IN154900001-15

November 23, 2015

Troy Mckinley
Revolution Fuels, LLC
P.O. Box 746
Tooele, UT 84074

Dear Mr. Mckinley:

Re: Intent to Approve: New Coal to Liquids Facility
Project Number: N15490-0001

The attached document is the Intent to Approve for the above-referenced project. The Intent to Approve is subject to public review. Any comments received shall be considered before an Approval Order is issued. The Division of Air Quality is authorized to charge a fee for reimbursement of the actual costs incurred in the issuance of an Approval Order. An invoice will follow upon issuance of the final Approval Order.

Future correspondence on this Intent to Approve should include the engineer's name as well as the DAQE number as shown on the upper right-hand corner of this letter. The project engineer for this action is Tad Anderson, who may be reached at (801) 536-4456.

Sincerely,

Martin D. Gray, Manager
New Source Review Section

MDG:TA:kw

cc: Southeastern UT District Health Department

# STATE OF UTAH

## Department of Environmental Quality

## Division of Air Quality

# INTENT TO APPROVE: New Coal to Liquids Facility

**Prepared by: Tad Anderson, Engineer**
**Phone: (801) 536-4456**
**Email: tdanderson@utah.gov**

**INTENT TO APPROVE NUMBER**

**DAQE-IN154900001-15**

**Date: November 23, 2015**

**Revolution Fuels, LLC**
**Coal to Liquids Facility**
**Source Contact:**
**Troy Mckinley**
**Phone: (801) 633-2742**

**Martin D. Gray, Manager**
**New Source Review Section**

## ABSTRACT

Revolution Fuels, LLC (Revolution) has requested a permit for a new coal to liquids facility near Wellington, Utah. The coal to liquids facility operations will include coal handling, coal gasification, ash handling, syngas treatment, and product upgrading. The liquids produced are diesel fuel, jet fuel, liquefied petroleum gas (LPG), and naphtha with a maximum coal throughput of 750 tons per day. The proposed potential to emit emissions for this facility are as follows (in TPY): 20.2 of $PM_{10}$, 20.2 of $PM_{2.5}$ (Subset of $PM_{10}$), 23.3 of $NO_x$, 83.8 of CO, 9.2 of VOC, 1.9 of $SO_2$, 8.9 of combined HAPs and 295,445 of $CO_2$e.

The new coal to liquids facility is located in an attainment area for all criteria pollutants. This source is classified as a minor Title V source. This source is subject to 40 CFR 60 Subparts A and Dc, Y and IIII, 40 CFR 63 Subparts A and ZZZZ. The estimated emissions exceed the emissions levels in R307-410 for $PM_{10}$ and $PM_{2.5}$ so modeling was conducted for $PM_{10}$ and $PM_{2.5}$. A 30-day public comment period is required.

The NOI for the above-referenced project has been evaluated and has been found to be consistent with the requirements of UAC R307. Air pollution producing sources and/or their air control facilities may not be constructed, installed, established, or modified prior to the issuance of an AO by the Director.

A 30-day public comment period will be held in accordance with UAC R307-401-7. A notification of the intent to approve will be published in the Sun Advocate on November 26, 2015. During the public comment period the proposal and the evaluation of its impact on air quality will be available for the public to review and provide comment. If anyone so requests a public hearing within 15 days of publication, it will be held in accordance with UAC R307-401-7. The hearing will be held as close as practicable to the location of the source. Any comments received during the public comment period and the hearing will be evaluated. The proposed conditions of the AO may be changed as a result of the comments received.

| **Name of Permittee:** | **Permitted Location:** |
|---|---|
| Revolution Fuels, LLC<br>P.O. Box 746<br>Tooele, UT 84074 | Coal to Liquids Facility<br>near Wellington<br>Carbon County, UT |

**UTM coordinates**: 526,825 m Easting, 4,376,397 m Northing, UTM Zone 12
**SIC code**: 1311 (Crude Petroleum & Natural Gas)

## Section I: GENERAL PROVISIONS

I.1 All definitions, terms, abbreviations, and references used in this AO conform to those used in the UAC R307 and 40 CFR. Unless noted otherwise, references cited in these AO conditions refer to those rules. [R307-101]

I.2 The limits set forth in this AO shall not be exceeded without prior approval. [R307-401]

I.3 Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved. [R307-401-1]

I.4 All records referenced in this AO or in other applicable rules, which are required to be kept by the owner/operator, shall be made available to the Director or Director's representative upon request, and the records shall include the two-year period prior to the date of the request. Unless otherwise specified in this AO or in other applicable state and federal rules, records shall be kept for a minimum of two (2) years. [R307-401-8]

I.5 At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this AO, including associated air pollution control equipment, in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Director which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded. [R307-401-4]

I.6 The owner/operator shall comply with UAC R307-107. General Requirements: Breakdowns. [R307-107]

I.7 The owner/operator shall comply with UAC R307-150 Series. Inventories, Testing and Monitoring. [R307-150]

## Section II: SPECIAL PROVISIONS

**II.A The approved installations shall consist of the following equipment:**

II.A.1 **Coal to Liquids Facility**

II.A.2 **Reaction Chamber**

One (1) Reaction Chamber
Pyrolysis Burner System
Three (3) burners
Capacity: 11.2 MMBtu/hr (each)
Control: Selective Catalytic Reduction on the common stack for the gasification flue gas

Gasification Burner System
Six (6) burners
Capacity: 60 MMBtu/hr (each)
Control: Selective Catalytic Reduction on the common stack for the gasification flue gas

II.A.3 **Coal Handling System**

Coal Hopper
Radial Stacker
Coal Crusher
Silo Day Bin
Capacity: 100 tons per hour
Coal Handling Baghouse
Two (2) Coal Lock Hoppers

II.A.4 **Ash Removal System**

Three (3) Vortex Coils*
Two (2) Cyclones*
* Internal to the reaction chamber

Vibrating Conveyors with Water Jackets

Ash Silo with Baghouse

II.A.5 **Syngas Treatment**

Gas Scrubber
Electric gas compression unit*
Amine $CO_2$ removal unit
Guard bed unit
Water/solution treatment unit*
* informational purpose

II.A.6 **Fischer Tropsch Unit**

Two (2) activation/regeneration heaters with Low $NO_x$ burners
Capacity: 1.12 MMBtu/hr
Capacity: 0.60 MMBtu/hr

Four (4) FT Trains each comprised of:
Two(2) syngas filters
Two (2) Fischer-Tropsch reactors
One (1) steam drum
Two (2) coolant filters
Electric coolant circulation pumps*
* informational purpose

II.A.7 **Product Upgrading**

Two (2) upgrade heaters with Low $NO_x$ burners
Capacity: 4.85 MMBtu/hr
Capacity: 10.25 MMBtu/hr

II.A.8 **Flare**

1 MMBtu/hr continuous flare pilot

II.A.9 **Cooling Tower**

Capacity: 10 MMBtu/hr cooling duty

II.A.10 **Auxiliary Boiler with Low NOX burners**

Capacity: 73.88 MMBtu/hr

II.A.11 **Fire Pump**

Capacity: 220 Hp
Fuel: Diesel

II.A.12 **Emergency Generator**

Capacity: 1,482 Hp
Fuel: Diesel

II.A.13 **Storage Tanks**

Liquefied Petroleum Gas pressurized bullet tank

Naphtha fixed cone roof storage tank
Capacity: 1,853 bbl

Diesel fixed cone roof storage tank
Capacity: 4,021 bbl

Jet Fuel fixed cone roof storage tank
Capacity: 4,406 bbl

Off Specification fuel fixed cone roof storage tank
Capacity: 4,406 bbl

Lean Amine fixed cone roof storage tank
Capacity: 340 bbl

Amine Solvent fixed cone roof storage tank
Capacity: 214 bbl

**II.B Requirements and Limitations**

II.B.1 **Site Wide Requirements**

II.B.1.a The owner/operator shall notify the Director in writing when the installation of the equipment listed in Condition II.A of this AO have been completed and are operational. To ensure proper credit when notifying the Director, send your correspondence to the Director, attn: Compliance Section.

If installation has not been completed within 18 months from the date of this AO, the Director shall be notified in writing on the status of the construction and/or installation. At that time, the Director shall require documentation of the continuous installation of the operation and may revoke the AO. [R307-401]

II.B.1.b Visible emissions from the following emission points shall not exceed the following values:

A. Flare and combustor - no visible emissions

B. Crusher - 15% opacity

C. Coal Handling Baghouse - 10% opacity

D. Ash Removal Baghouse - 10% opacity

E. All natural gas/syngas operated equipment - 10% opacity

F. Paved Haul Roads - 20% opacity

G. All other points - 20% opacity

Opacity observations of emissions from stationary sources shall be conducted according to 40 CFR 60, Appendix A, Method 9. [R307-401-8]

II.B.1.c The facility shall not exceed the following production/consumption limits:

Production

A. Liquefied petroleum gas: 37,960 barrels per rolling 12 month total

B. Naphtha: 95,630 barrels per rolling 12 month total

C. Diesel: 209,145 barrels per rolling 12 month total

D. Jet fuel: 202,940 barrels per rolling 12 month total

E. Off specification diesel and jet fuel: 135,050 barrels per rolling 12 month total

F. Ash: 57,378 tons per rolling 12 month total

Consumption

G. 273,750 tons of coal per rolling 12 month total

To determine compliance with a rolling 12-month total the owner/operator shall calculate a new 12-month total by the twentieth day of each month using data from the previous 12 months. Records of production shall be kept for all periods when the plant is in operation. The records of production shall be kept on a daily basis. [R307-401-8]

II.B.1.d The Emergency Generator shall be used for electricity production only during periods when electric power from the public utilities is interrupted, or for regular maintenance of the emergency equipment. The emergency generator will be limited to 500 hours of combined testing and maintenance operations per year. Records documenting all emergency equipment usage shall be kept in a log. The log will identify the date when the emergency equipment was used, the duration in hours of the event, and the reason for each equipment usage. There is no time limit on the use of emergency stationary internal combustion engine in emergency situations. [R307-401]

II.B.1.e The owner/operator shall use only natural gas or syngas as fuel for all heaters and boilers and diesel fuel for emergency equipment. [R307-401-8]

II.B.1.f The auxiliary boiler shall be limited to 500 hours of operation per rolling 12 month total. Records documenting operation shall be kept in a log. The log will identify the date when the auxiliary boiler was used and the duration in hours. [R307-401]

II.B.2 **Reaction Chamber/Pyrolysis Vessel**

II.B.2.a Emissions to the atmosphere from the indicated emission points shall not exceed the following rates and concentrations.

Source: Gasification Flue Gas Exhaust Stack (Reaction Chamber/Pyrolysis operations)

| Pollutant | lb/hr |
|---|---|
| $NO_x$ | 3.67 |
| CO | 14.68 |

[R307-401-8]

II.B.2.a.1 Stack testing to show compliance with the emission limitations stated in the above condition shall be performed as specified below:

Testing
Emissions Point
Gasification Flue Gas Exhaust Stack (Reaction Chamber/Pyrolysis operations)

| Pollutant | Test Frequency |
|---|---|
| $NO_x$ | #, ## |
| CO | #, ## |

B. Testing Status

# Initial compliance testing is required. The initial test date shall be performed as soon as possible and in no case later than180 days after the start up of a new emission source. A compliance testis required on the modified emission point that has an emission rate limit.

## Compliance test at least annually subsequent to the initial compliance test. The Director may require testing at any time.

C. Notification

The Director shall be notified at least 30 days prior to conducting any required emission testing. A source test protocol shall be submitted to DAQ when the testing notification is submitted to the Director. The source test protocol shall be approved by the Director prior to performing the test(s). The source test protocol shall outline the proposed test methodologies, stack to be tested, and procedures to be used. A pretest conference shall be held, if directed by the Director.

D. Sample Location

The emission point shall be designed to conform to the requirements of 40 CFR 60, Appendix A, Method 1, or other methods as approved by the Director. An Occupational Safety and Health Administration (OSHA) or Mine Safety and Health Administration (MSHA) approved access shall be provided to the test location.

E. Volumetric Flow Rate

40 CFR 60, Appendix A, Method 2, Method 19 or other EPA approved methods acceptable to the
Director.

F. $NO_x$

40 CFR 60, Appendix A, Method 7, 7A, 7B, 7C, 7D or 7E, or other EPA approved methods acceptable to the Director.

G. CO

40 CFR 60, Appendix A, Method 10, or other EPA approved methods acceptable to the Director.

H. Calculations

To determine mass emission rates (lb/hr, etc.) the pollutant concentration as determined by the appropriate methods above shall be multiplied by the volumetric flow rate and any necessary conversion factors determined by the Director, to give the results in the specified units of the emission limitation. [R307-401-8]

II.B.2.a.2 New Source Operation

For a new source/emission point, the production rate during all compliance testing shall be no less than 90% of the production rate listed in this AO. If the maximum AO allowable production rate has not been achieved at the time of the test, the following procedure shall be followed:

1) Testing shall be at no less than 90% of the production rate achieved to date.

2) If the test is passed, the new maximum allowable production rate shall be 110% of the tested achieved rate, but not more than the maximum allowable production rate. This new allowable maximum production rate shall remain in effect until successfully tested at a higher rate.

3) The owner/operator shall request a higher production rate when necessary. Testing at no less than 90% of the higher rate shall be conducted. A new maximum production rate (110% of the new rate) will then be allowed if the test is successful. This process may be repeated until the maximum AO production rate is achieved.

Existing Source Operation

For an existing source/emission point, the production rate during all compliance testing shall be no less than 90% of the maximum production achieved in the previous three (3) years. [R307-401-8]

II.B.3 **Fugitive Emissions**

II.B.3.a The vibrating conveyors for the ash removal operation shall be covered and routed to a baghouse. [R307-401-8]

II.B.3.b The coal handling, radial stacker conveyor shall be covered and fugitive emissions shall be controlled by water sprays. The coal handling crushing, conveying and drop points shall be covered and controlled by a baghouse. [R307-401-8]

II.B.3.c All haul roads shall be paved. [R307-401-8]

II.B.3.c.1 The haul road shall be paved and shall be water flushed, sprayed clean or swept as dry conditions warrant or as determined necessary by the Director in order to meet the opacity requirement listed in this AO. [R307-401-8]

II.B.4 **Flare Requirements**

II.B.4.a All exhaust gas/vapors from startup, shutdown and upset conditions shall be routed to the flare operating with a continuous pilot. [R307-401]

II.B.4.b The flare shall operate with no visible emissions. [R307-401-8]

II.B.4.b.1 Visual determination of smoke emissions from flare shall be conducted according to 40 CFR

60, Appendix A, Method 22. [R307-401-8]

## Section III: APPLICABLE FEDERAL REQUIREMENTS

In addition to the requirements of this AO, all applicable provisions of the following federal programs have been found to apply to this installation. This AO in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including UAC R307.

NSPS (Part 60), A: General Provisions
NSPS (Part 60), Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units
NSPS (Part 60), Y: Standards of Performance for Coal Preparation and Processing Plants
NSPS (Part 60), IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
MACT (Part 63), A: General Provisions
MACT (Part 63), ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

## PERMIT HISTORY

The final AO will be based on the following documents:

| | |
|---|---|
| Is Derived From | NOI dated May 8, 2015 |
| Incorporates | Additional Information dated November 12, 2015 |
| Incorporates | Additional Information dated October 27, 2015 |
| Incorporates | Additional Information dated September 17, 2015 |
| Incorporates | Additional Information dated July 21, 2015 |

## ADMINISTRATIVE CODING

The following information is for UDAQ internal classification use only:

Carbon County
CDS B
MACT (Part 63), Attainment Area, NSPS (Part 60)

## ACRONYMS

The following lists commonly used acronyms as they apply to this document:

| | |
|---|---|
| 40 CFR | Title 40 of the Code of Federal Regulations |
| AO | Approval Order |
| BACT | Best Available Control Technology |
| CAA | Clean Air Act |
| CAAA | Clean Air Act Amendments |
| CDS | Classification Data System (used by EPA to classify sources by size/type) |
| CEM | Continuous emissions monitor |
| CEMS | Continuous emissions monitoring system |
| CFR | Code of Federal Regulations |
| CMS | Continuous monitoring system |
| CO | Carbon monoxide |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | Carbon Dioxide Equivalent - 40 CFR Part 98, Subpart A, Table A-1 |
| COM | Continuous opacity monitor |
| DAQ/UDAQ | Division of Air Quality |
| DAQE | This is a document tracking code for internal UDAQ use |
| EPA | Environmental Protection Agency |
| FDCP | Fugitive Dust Control Plan |
| GHG | Greenhouse Gas(es) - 40 CFR 52.21 (b)(49)(i) |
| GWP | Global Warming Potential - 40 CFR Part 86.1818-12(a) |
| HAP or HAPs | Hazardous air pollutant(s) |
| ITA | Intent to Approve |
| LB/HR | Pounds per hour |
| MACT | Maximum Achievable Control Technology |
| MMBTU | Million British Thermal Units |
| NAA | Nonattainment Area |
| NAAQS | National Ambient Air Quality Standards |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| NOI | Notice of Intent |
| $NO_x$ | Oxides of nitrogen |
| NSPS | New Source Performance Standard |
| NSR | New Source Review |
| $PM_{10}$ | Particulate matter less than 10 microns in size |
| $PM_{2.5}$ | Particulate matter less than 2.5 microns in size |
| PSD | Prevention of Significant Deterioration |
| PTE | Potential to Emit |
| R307 | Rules Series 307 |
| R307-401 | Rules Series 307 - Section 401 |
| $SO_2$ | Sulfur dioxide |
| Title IV | Title IV of the Clean Air Act |
| Title V | Title V of the Clean Air Act |
| TPY | Tons per year |
| UAC | Utah Administrative Code |
| VOC | Volatile organic compounds |

State of Utah
GARY R. HERBERT
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Department of
Environmental Quality
Alan Matheson
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Bryce C. Bird
*Director*

DAQE-NN154900001-15

November 23, 2015

Sun Advocate
Legal Adverting Department
845 East Main
Price, Utah 84050

RE: Legal Notice of Intent to Approve

This letter will confirm the authorization to publish the attached NOTICE in the Sun Advocate on November 26, 2015.

Please mail the invoice and affidavit of publication to the Utah State Department of Environmental Quality, Division of Air Quality, P.O. Box 144820, Salt Lake City, Utah 84114-4820. If you have any questions contact Kimberly Wilcox, who may be reached at (801) 536-4068.

Sincerely,

Kimberly Wilcox
Office Technician

Enclosure

cc: Carbon County
Southeastern Association of Governments

# NOTICE

A Notice of Intent for the following project submitted in accordance with R307-401-1, Utah Administrative Code (UAC), has been received for consideration by the Director:

**Company Name:** Revolution Fuels, LLC

**Location:** Revolution Fuels, LLC-Coal to Liquids Facility – Outside of Wellington, Carbon County, UT, Carbon County

**Project Description:** Revolution Fuels, LLC (Revolution) has requested a permit for a new coal to liquids facility near Wellington, Utah. The coal to liquids facility operations will include coal handling, coal gasification, ash handling, syngas treatment, and product upgrading. The liquids produced are diesel fuel, jet fuel, liquefied petroleum gas (LPG), and naphtha with a maximum coal throughput of 750 tons per day. The proposed potential to emit emissions for this facility are as follows (in tons per year): 20.2 of $PM_{10}$, 20.2 of $PM_{2.5}$ (Subset of $PM_{10}$), 23.3 of $NO_x$, 83.8 of CO, 9.2 of VOC, 1.9 of $SO_2$, 8.9 of combined HAPs and 295,445 of $CO_2$e.

The new coal to liquids facility is located in an attainment area for all criteria pollutants. This source is classified as a minor Title V source. This source is subject to 40 CFR 60 Subparts A and Dc, Y and IIII, 40 CFR 63 Subparts A and ZZZZ. The estimated emissions exceed the emissions levels in R307-410 for $PM_{10}$ and $PM_{2.5}$ so modeling was conducted for $PM_{10}$ and $PM_{2.5}$. A 30-day public comment period is required.

The completed engineering evaluation and air quality impact analysis showed that the proposed project meets the requirements of federal air quality regulations and the State air quality rules. The Director intends to issue an Approval Order pending a 30-day public comment period. The project proposal, estimate of the effect on local air quality and draft Approval Order are available for public inspection and comment at the Utah Division of Air Quality, 195 North 1950 West, Salt Lake City, UT 84116. Written comments received by the Division at this same address on or before December 26, 2015 will be considered in making the final decision on the approval/disapproval of the proposed project. Email comments will also be accepted at tdanderson@utah.gov. If anyone so requests to the Director in writing within 15 days of publication of this notice, a hearing will be held in accordance with R307-401-7, UAC.

Under Section 19-1-301.5, a person who wishes to challenge a Permit Order may only raise an issue or argument during an adjudicatory proceeding that was raised during the public comment period and was supported with sufficient information or documentation to enable the Director to fully consider the substance and significance of the issue.

**Date of Notice: November 26, 2015**

# UTAH DIVISION OF AIR QUALITY
# SOURCE PLAN REVIEW

Troy Mckinley
Revolution Fuels, LLC
P.O. Box 746
Tooele, UT 84074

Project Number: N154900001

| | |
|---|---|
| RE: | New Coal to Liquids Facility<br>Carbon County; CDS B; MACT (Part 63), Attainment Area, NSPS (Part 60) |
| Review Engineer: | Tad Anderson |
| Date: | December 7, 2015 |
| Notice of Intent Submitted: | May 8, 2015 |
| Plant Contact: | Troy Mckinley |
| Phone Number: | (801) 633-2742 |
| Source Location: | 2 miles East of Wellington, Carbon County, UT<br>Carbon County<br>4,376,397 m Northing, 526,825 m Easting, UTM Zone 12<br>UTM Datum: NAD83 |

DAQ requests that a company/corporation official read the attached draft/proposed Plan Review with Recommended Approval Order Conditions. If this person does not understand or does not agree with the conditions, the review engineer should be contacted within five days after receipt of the Plan Review. If this person agrees with the Plan Review and Recommended Approval Order Conditions, this person should sign below and return (FAX # 801-536-4099) within 10 days after receipt of the conditions. If the review engineer is not contacted within 10 days, the review engineer shall assume that the company/corporation official agrees with this Plan Review and will process the Plan Review towards final approval. A public comment period will be required before the Approval Order can be issued.

Applicant Contact ____________________________________________________________
*(Signature & Date)*

## ABSTRACT

Revolution Fuels, LLC (Revolution) has requested a permit for a new coal to liquids facility near Wellington, Utah. The coal to liquids facility operations will include coal handling, coal gasification, ash handling, syngas treatment, and product upgrading. The liquids produced are diesel fuel, jet fuel, liquefied petroleum gas (LPG), and naphtha with a maximum coal throughput of 750 tons per day. The proposed potential to emit emissions for this facility are as follows (in tons per year): 20.2 of $PM_{10}$, 20.2 of $PM_{2.5}$ (Subset of $PM_{10}$), 23.3 of $NO_x$, 83.8 of CO, 9.2 of VOC, 1.9 of $SO_2$, 8.9 of combined HAP's and 295,445 of $CO_2$e.

The new coal to liquids facility is located in an attainment area for all criteria pollutants. This source is classified as a minor Title V source. This source is subject to 40 CFR 60 Subparts A and Dc, Y and IIII, 40 CFR 63 Subparts A and ZZZZ. The estimated emissions did exceed the emissions levels in R307-410 for $PM_{10}$ and $PM_{2.5}$ so modeling was conducted for $PM_{10}$ and $PM_{2.5}$. A 30-day public comment period is required.

## SOURCE SPECIFIC DESIGNATIONS

**Applicable Programs:**

NSPS (Part 60), Subpart A: General Provisions applies to Coal to Liquids Facility
NSPS (Part 60), Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units applies to Coal to Liquids Facility
NSPS (Part 60), Subpart Y: Standards of Performance for Coal Preparation and Processing Plants applies to Coal to Liquids Facility
NSPS (Part 60), Subpart IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines applies to Coal to Liquids Facility
MACT (Part 63), Subpart A: General Provisions applies to Coal to Liquids Facility
MACT (Part 63), Subpart ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines applies to Coal to Liquids Facility
Attainment Area applies to Coal to Liquids Facility

**Permit History:**

When issued, the approval order shall supersede or will be based on the following documents:

| | |
|---|---|
| Incorporates | Additional Information dated July 21, 2015 |
| Is Derived From | NOI dated May 8, 2015 |
| Incorporates | Additional Information dated September 17, 2015 |
| Incorporates | Additional Information dated October 27, 2015 |
| Incorporates | Addtional Information dated November 12, 2015 |

## SUMMARY OF NOTICE OF INTENT INFORMATION

**Description of Proposal:**

Process Description
Coal will be delivered to the facility and stored in a storage area. The coal will be transferred to a crusher by a conveyor. After crushing, the coal will be transferred to a pyrolysis and gasification system.

Carbonaceous material that has not been gasified is removed and handled in the ash handling system. Syngas produced from the gasification system is scrubbed to remove contaminants and then is pressurized and sent for further processing to remove additional contaminants including carbon dioxide and sulfur. The syngas then goes through a Fischer Tropsch (FT) reactor where the output is a liquid phase (wax) and hydrocarbon condensate which are then upgraded to transportation liquids. The FT reactor also produces a tail gas that is recycled back into the process and used as a fuel in other areas of the plant. Product upgrading includes a hydrotreating and fractionation process that produces diesel fuel, jet fuel, LPG, and naphtha.

**Coal Handling**

Coal is delivered to the plant on paved haul roads by belly dump trucks which have a capacity of 44 tons. Coal will be unloaded from the belly dumps into a hopper which feeds a radial stacker. The radial stacker has a covered conveyor and water sprays to minimize fugitive dust emissions. The radial stacker feeds into a coal storage pile. The coal moisture content is estimated to be at 10 percent. As per New Source Performance Standards Subpart Y requirements, a fugitive coal dust control plan will be submitted for the coal storage pile. Coal is transferred from the coal storage pile to a crusher by a enclosed conveyor. The coal loading rate through the coal handling and crushing circuit will be a maximum of 100 tons per hour and 273,750 tons per year. A baghouse controls fugitive dust emissions from all coal conveying and transfer from the coal storage pile to a silo day bin prior to being fed into the gasification process.

Once broken down to size, a series of two lockhoppers will deliver a maximum of 750 tons per day of prepared gasifier fuel to the pyrolysis tube entrance. Coal enters the first lockhopper from a conveyor above, where it is sealed and pressurized using an inert gas. Once at pressure, the lockhopper drops the coal into the second lockhopper via gravity, where the pressure is further raised using an inert gas. From this lockhopper the coal enters the pyrolysis and gasification process.

**Pyrolysis and Gasification**

The pyrolysis system is pressurized at approximately 125 psig. The latter 75% of the pyrolysis vessel is contained in a heated environment known as the reaction chamber. Depending on the amount and type of feed, the residence time of the feedstock is from 3 to 20 minutes, and is determined based on the rate of speed of the track feeder.

The temperature of the gasifier feedstaock entering the pyrolysis vessel is around 60 degrees Fahrenheit. Upon exiting, the constituents of the feed are approximately 800 degrees Fahrenheit. This is accomplished with the injection of superheated water into the vessel and/or external burners heating the ambient surroundings of the reaction chamber to 1800 degrees Fahrenheit. The pyrolysis burner system consists of (3) 6-inch Kinedizer LE low $NO_x$ burners each providing a maximum of 11.2 MMBtu/hr.

Carbonaceous reformation takes place inside a series of coils designed to allow a residence time of 4 to 10 seconds. The design includes primary, secondary and tertiary reformation coils which heat the gaseous components up to 1750 degrees Fahrenheit using a second set of burners. The gasification burner system will include (5) 14-inch Kinemax LE burners each providing a maximum of 60 MMBtu/hr.

Steam is injected into the gasification section to control the hydrogen and carbon monoxide (H2:CO) ratio for the product syngas through the steam reforming process.

Once through the primary coil, twenty-five percent of the carbonaceous materials that have not been altered to their gaseous state will be removed via a vortex-like action in a cyclone. The first of two cyclonic methods will redirect particles that are 80 to 150 microns in size to a 2-inch pipe that leads back to the front half of the pyrolysis vessel along.

Once through the secondary coil, more carbonaceous materials that are 50 to 130 microns in size are removed with a second cyclonic removal method. A 2-inch pipe combines this material with that collected in the first cyclonic removal and redirects it back to the front portion of the pyrolysis vessel.

A final cyclonic ash removal sequence takes place following the three coils. The flow stream is sent through two cyclones in series which will remove any remaining carbonaceous material and ash carry-through. An estimated 10% of 1-micron particles, 25% of 2-micron particles, 35% of 3-micron particles and as much as 100% of 15-microns and above particles will be removed during this final polish phase. All removed materials are sent to a screw auger that carries them to an ash handling system.

The pyrolysis vessel, carbonaceous reforming coils, and cyclones are housed inside a reactor house lined with refractory. The temperature inside of the reactor house will reach over 1800 degrees Fahrenheit. Upon exiting the reactor house, the syngas enters a heat exchanger to reduce the gas temperature and pressure. After leaving the heat exchanger the gas goes through a scrubbing system which further removes contaminants by spraying negatively charged and electronegativity enhanced water into the system.

**Ash Removal and Handling**

In the gasification system, there are two areas of residual solids removal that remove particles of varying sizes and make-up. Multiple stages of particle removal allow progressive refinement of the carbonaceous material to create a higher quality syngas.

The first area of solids removal utilizes a high-powered magnetic separator to draw metallically charged objects out of the conveyor stream. The excess material is transported out of the reaction chamber onto a vibrating conveyor with a water jacket for cooling. Once cooled, the material falls into an encosed steel hopper and is ready for disposal.

The final ash removal process takes place while the syngas is in the cyclones. Once the ash has been pulled from the flow of gas, it is dropped onto a water-cooled vibrating conveyor. The vibrating conveyor cools the ash and transports it into an enclosed silo. The conveyor is enclosed and uses a baghouse for particulate control. Ash loading rate through the ash removal system will be a maximum of 6.6 tons per hour and 57,378 tons per year. Ash is transferred from the silo through an enclosed auger in to pneumatic trucks to be hauled offsite.

**Syngas Treatment**

From the gasifier, the raw syngas flows through heat exchangers to the gas scrubbers where the syngas is sprayed with free electron “saturated” ionized water to remove any organics, particulates, ash, sulfur, and metals still in the syngas stream. Sulfur removal is accomplished from the electrically charged negative ions produced in the proprietary water processes. The negatively charged ions are highly reactive and are attracted to the positive ions of the sulfur species. The ions attract and coagulate into elemental sulfur which is then filtered out through the water system with other elements that have also been coagulated. The clean dry syngas exits the gasification unit and enters the syngas compression unit where it is compressed in multiple stages to reach the designated outlet pressure. The hot interstage syngas is cooled by interstage coolers, and the condensed liquid is knocked out.

The compressed syngas is routed to an amine $CO_2$ removal unit to remove the bulk of the $CO_2$. The syngas will be contacted against a lean amine solution that chemically absorbs the $CO_2$. The amine used is a methyldiethanolamine (MDEA) based solvent formulated to provide deep removal of $CO_2$. The treated syngas is routed to a guard bed unit where additional contaminants are removed. The $CO_2$ laden amine solution is degassed at a moderate pressure to release gases like $H_2$, CO, and $CH_4$. These gases are routed to the fuel gas system. The amine is then preheated and sent into a regeneration column to remove the $CO_2$ and produce a lean amine for reuse. The $CO_2$ from the top of the regeneration is vented to the atmosphere.

**Fischer-Tropsch Unit**
The clean dry syngas that has undergone treatment for removal of contaminants enters the FT unit which is supplied by the Velocys Corporation. Compressed fresh syngas enters the FT unit and is divided among several operating trains and preheated in heat exchangers. Each FT train is identical and comprised of a set of two syngas filters, two FT catalytic reactors, one steam drum, three coolant circulation pumps, and a set of two coolant filters. Each FT train is arranged such that it may be removed from service for periodic catalyst regeneration. The syngas filters remove particulates prior to entering the FT reactors. Each FT reactor is made up of an outer shell containing microchannel cores. Each core is made up of multiple vertical and cross-flow microchannels. The vertical microchannels contain the Velocys proprietary cobalt-based catalyst. The combined FT feed flows down through the vertical catalyst loaded microchannels. FT products exit from the bottom of each reactor and flow to a common reactor outlet wax separator.

The reactor outlet stream is a 2-phase stream (vapor and liquid). The liquid phase at reactor temperature is called wax, and is collected in the reactor outlet. The vapor phase leaving the reactor outlet is cooled before entering the FT liquid separator. Three phases are separated in the FT liquid separator: liquid product, process water, and tail gas. The FT liquid product (hydrocarbon) is sent to degassing and subsequent processing. Process water is routed to a water flash drum to separate dissolved gases. Vapor from the FT liquid separator is recycled back into the FT reactors as tail gas and also used as fuel in other areas of the plant.

Three emission points are associated with the FT unit. Two activation/regeneration heaters which are equipped with natural gas fired low NOx burners and combust natural gas and one purge gas stream. The emissions are intermittent and dependent on the catalyst activation/regeneration procedures.

**Product Upgrading**
Wax and hydrocarbon condensate are upgraded to transportation liquids through this process. Product upgrading includes hydrotreating and fractionation. Two emission points are associated with the product upgrading process: two product upgrading natural gas fired heaters equipped with low NOx burners.

Wax and condensate are degassed, heated, and routed to the reactors in the hydrotreating section to be converted into “lighter” hydrocarbons. A single natural gas fired heater heats the liquid feed into the reactors. The reactors convert the wax and condensate into a crude oil like mixture of hydrocarbons. This crude is cooled, degassed, and routed to the fractionation section.

Fractionation is a set of distillation columns that separates out and purifies the LPG, naphtha, diesel, and jet fuel. The reactor effluent is heated by a single natural gas fired low NOx heater before entering the main fractionation column. Side strippers pull slipstreams of product from the main column and purify the product. The side stripper overheads are returned to the main column. Products are cooled and sent to storage.  The residual gases are sent to the fuel gas system.  Main column bottoms are recycled to the feed for reprocessing.

The facility will process the following amounts:

• Liquefied petroleum gas: 104 barrels per day
• Naphtha: 262 barrels per day
• Diesel: 573 barrels per day
• Jet fuel: 556 barrels per day
• Off specification diesel and jet fuel: 370 barrels per day

The facility will have the following storage tanks onsite.  Product load out will be conducted at a different site by rail or truck.

• Liquefied petroleum gas: 30,000 gal pressurized bullet tank
• Naphtha: 1,853 barrel fixed cone roof tank
• Diesel: 4,021 barrel fixed cone roof tank
• Jet fuel: 4,406 barrel fixed cone roof tank
• Off specification diesel and jet fuel: 4,406 barrel fixed cone roof tank
• Lean amine: 340 barrel fixed cone roof tank
• Amine solvent: 214 barrel fixed cone roof tank

**Support Equipment and Operations**
The facility utilizes superheated steam created from waste heat from each of the plant's units to drive a steam operated turbine.  The turbine is then connected to a generator to produce electrical power for the facility. The facility will also have the following emission sources:

• 1 MMBtu/hr continuous natural gas fired flare pilot
• 1,482 Hp diesel emergency generator for backup power
• 220 Hp diesel fired fire pump
• Cooling tower with 10 MMBtu/hr cooling duty
• 73.88 MMBtu/hr natural gas fired auxiliary boiler equipped with low NOx burners

**Summary of Emission Totals:**

The emissions listed below are an estimate of the total potential emissions from the source.  Some rounding of emissions is possible.

Estimated Criteria Pollutant Potential Emissions

| | | |
|---|---|---|
| $CO_2$ Equivalent | 295445.00 | tons/yr |
| Carbon Monoxide | 83.80 | tons/yr |
| Nitrogen Oxides | 23.30 | tons/yr |
| Particulate Matter - $PM_{10}$ | 20.20 | tons/yr |
| Particulate Matter - $PM_{2.5}$ | 20.20 | tons/yr |
| Sulfur Oxides | 1.90 | tons/yr |
| Volatile Organic Compounds | 9.20 | tons/yr |

Estimated Hazardous Air Pollutant Potential Emissions

| | | |
|---|---|---|
| 1,3-Butadiene (CAS #106990) | 0 | lbs/yr |
| Acetaldehyde (CAS #75070) | 1 | lbs/yr |
| Acrolein (CAS #107028) | 0 | lbs/yr |
| Benzene (Including Benzene From Gasoline) (CAS #71432) | 520 | lbs/yr |
| Dichlorobenzene (CAS #25321226) | 4 | lbs/yr |
| Formaldehyde (CAS #50000) | 244 | lbs/yr |
| Generic HAPs (CAS #GHAPS) | 200 | lbs/yr |
| Hexane (CAS #110543) | 4.93 | tons/yr |
| Naphthalene (CAS #91203) | 604 | lbs/yr |
| Toluene (CAS #108883) | 1.16 | tons/yr |
| Xylenes (Isomers And Mixture) (CAS #1330207) | 2.03 | tons/yr |
| | | |
| Total hazardous air pollutants | 8.91 | tons/yr |

**Review of Best Available Control Technology:**

1. BACT review regarding BACT Analysis
A BACT evaluation has been conducted for the proposed coal to liquids facility. BACT evaluation provides information on feasibility of control options for NOX, PM10/PM2.5, CO and VOC emissions. The BACT analyses for the coal to liquids facility covers control operations for the following processes NOX, CO, and VOC emissions from combustion devices (burner systems, process heaters, auxiliary boiler and internal combustion engines) and fugitive PM10/PM2.5 emissions for coal and ash material handling operations. This analysis also discusses the feasibility of control options for PM10/PM2.5 from fugitive emissions resulting from coal and ash material handling operations.

Combustion Devices, the Pyrolysis and Gasification Process
Two natural gas burner systems are associated with the pyrolysis and gasification process. Each burner system is fueled with a combination of recycled tail gas from the FT process and pipeline quality natural gas. The two burner systems are routed through a common stack and the combined emissions are identified as gasification flue gas.

Pollutant emission of interest from the pyrolysis and gasification burner systems is NOx. The annual operation of the burners is 8,400 hours per year.

• The pyrolysis burner system are (3) 6-inch Kinedizer LE burners each providing a maximum of 11.2 MMBtu/hr (33.6 MMBtu/hr total).
• The gasification burner system are (5) 14-inch Kinedizer LE burners each providing a maximum of 60 MMBtu/hr (300 MMBtu/hr).

BACT Review for NOX on the Gasification Burner System
All Available Control Technologies
The following potential technologies have been identified for controlling emissions of NOx:
1. Good combustion practices
2. Low NOx burners
3. Selective Non-Catalytic Reduction (SNCR)
4. Selective Catalytic Reduction (SCR)

The exhaust gas temperatures of the gasification flue gas are not high enough for the effective operation of Selective Non-Catalytic Reduction (SNCR). The gasification flue gas is approximately 600 degrees Fahrenheit. The NOx reduction reaction occurs at temperatures between 1600 degrees Fahrenheit to 2100 degrees Fahrenheit. Therefore, SNCR is considered to be infeasible for application to this flue gas.

The Selective Catalytic Reduction (SCR) process is based on chemical reduction of the NOx molecule. A nitrogen-based reducing agent (reagent), such as ammonia or urea, is injected into the post combustion flue gas. The reagent reacts selectively with the flue gas NOx within a specific temperature range and in the presence of the catalyst and oxygen to reduce the NOx to molecular nitrogen (N2) and water vapor (H2O). SCR catalysts are composed of active metals or ceramics with a highly porous structure. Within the pores of the catalyst are activated sites. These sites have an acid group on the end of the compound structure where the reduction reaction occurs. Control for an SCR system is typically 70-90% reduction of NOx.

Vendor data has been obtained for the addition of a SCR combined with an oxidation catalyst to control NOx emissions. The data demonstrates that NOX emissions can be reduced by 82% from 0.061 lb/MMBtu to a rate of 0.011 lb/MMBtu.

The estimated capital costs associated with the installation, startup, and equipment costs of an SCR at this removal rate is approximately $935,000.

UDAQ has reviewed the BACT analysis on the gasification burner system and determined that at a cost of $3,935 per ton of NOx emissions removed due to the addition of the SCR system on the gasification flue gas meets BACT.

BACT Review for NOX on the Auxiliary Boiler
The Auxiliary Boiler is a 73.88 MMBtu/hr natural gas fired auxiliary boiler equipped with low NOX burners. The boiler is used to produce steam for use in various processes throughout the facility.

Pollutant emission of interest from the auxiliary boiler is NOX. The annual operation of the auxiliary boiler is 500 hours per year.

The BACT for NOx emissions from the natural gas-fired auxiliary boiler is good combustion practices with low NOX burners. Burner vendor information indicates that the hourly emissions for this unit with these technologies will be about 0.054 lb/MMBtu NOx. This rate, or a corresponding lb/hour emission rate, is considered BACT for the auxiliary boiler.

Due to the limited operating hours (500 hours or less) of the auxiliary boiler and low NOX emissions rate using good combustion practices with low NOx burners, additional add-on controls would not be cost effective for the auxiliary boiler with limited use. However, due to the lower emissions from the auxiliary boiler, additional add-on controls would have a prohibitively higher cost per ton of emissions removed. The cost for the addition of a SCR (85% removal efficiency) per ton of NOX removed for the auxiliary boiler is $369,627.

BACT Review for NOX on the Natural Gas Fired Process Heaters
Four natural gas process heaters (no one unit larger than 10.25 MMBtu/hr, 17 MMBtu/hr total

capacities for all process heaters) are used at various steps in the coal to liquids process. Each heater will be fueled by a combination of pipeline quality natural gas or syngas produced in the facility. Each process heater is also equipped with low NOx burners.

BACT for NOx emissions from the natural gas-fired process heaters is good combustion practices with low NOx burners. Burner vendor information indicates that the hourly emissions for this unit with these technologies will be about 0.054 lb/MMBtu NOx. This rate, or a corresponding lb/hour emission rate, is proposed as the BACT NOx for emissions from the process heaters. The process heaters have a capacity in which emission testing is not practical. BACT will be determined with a 10% opacity limit.

BACT Review for NOX on the Internal Combustion Engines
BACT has been done on two Internal Combustion Engines (ICE's) one 1,482 Hp diesel emergency engine and one 220 Hp diesel driven fire water pump used for emergency purposes at the facility.

Pollutant emission of interest from the ICE's is NOx. The annual operation of the ICE's is 500 hours per year.

Due to the limited annual operating hours (500 hours or less for each ICE) of the ICE's and low NOX emissions rate using good combustion practices, additional add-on controls would not be cost effective for the ICE's with limited use. The ICE's have a low emission rate and limited hours of operation for maintenance and testing, BACT is 20% opacity limitation.

BACT Review for PM10 Emissions from Coal Handling
This section addresses BACT for PM10 fugitive and point emissions from coal handling operations including truck unloading, crushing, conveying, and a coal storage pile, and associated haul roads. PM10 non-fugitive emissions result from coal conveyor transfer and silo loading, as well as ash handling operations which include conveying of ash into a storage bin.

Listed below are the BACT alternatives to control emissions of fugitive PM10 from the facility.

All Available Control Technologies
The following potential technologies have been identified for controlling emissions of fugitive PM10 emissions from haul roads:
1. Water Spray & Paving
2. Surfactant Spray
3. Water Spray
4. Paving

Haul roads
Water spray and paving provides the highest level of control of PM10 emissions. All roads on site are paved to control fugitive emissions, and no further analysis is required. BACT for this operation is a 20% opacity limit.

The following potential technologies have been identified for controlling emissions of fugitive PM10 emissions from truck unloading and storage piles:

1. Water Spray/Surfactant

2. Inherent Moisture
3. Enclosures

Watering and the use of chemical wetting agents are the principal means for control of coal storage pile emissions and can reduce total particulate emissions from the storage operations by up to 90 percent. Inherent moisture content of the raw material is also considered as an effective means to control fugitive dust emissions.

Enclosure or covering of inactive piles to reduce wind erosion can also reduce emissions. Although enclosing storage piles can be an effective means to reduce wind erosion emissions enclosing stockpiles that are actively used is not feasible.

The coal storage pile is subject to NSPS Subpart Y (Standards of Performance for Coal Preparation and Processing Plant). This source will operate according to a fugitive coal dust emissions control plan in using water sprays as a control measure to minimize fugitive coal dust. The moisture content of the coal is expected to be 10 percent. The moisture content of the coal along with regular water sprays will reduce the emissions from the storage piles and truck loading/unloading. BACT for this operation is a 20% opacity limit.

Crushing conveyors and material transfer
PM10/PM2.5 point emissions result from coal conveyor transfer and silo loading, as well as ash handling operations including conveying and transfer of ash into a storage bin.

The following potential technologies have been identified for controlling emissions of PM10 emissions from the crushing conveyors and material transfer operations;

1. Enclosure with Fabric Filter/Baghouse
2. Enclosure with Electrostatic Precipitator (ESP)
3. Enclosure with Wet Scrubber
4. Enclosure with Cyclone Collection
5. Enclosure

This source is using covered conveyors to convey coal from the storage pile to the crusher and into a silo day bin and into lock hoppers. Wet suppression systems (spray nozzles) are an effective and technologically feasible control option for crushers and associated conveyors. Wet suppression systems assist in maintaining high material moisture content throughout the processes and thus effectively control particulate emissions.

The high moisture content of the coal along with covered conveyors and water sprays meets BACT for coal crushing and conveying operations.

In addition, Revolution will utilize a baghouse to control emissions from all coal conveyor transfer points and crushing operations.

High moisture content of the coal along with covered conveyors, water sprays, and a baghouse meets BACT for coal crushing and conveying operations. BACT limit for this operation is a 10% opacity limit.

Ash Handling

The ash removal system uses a vibrating conveyor to cool the ash and transport it into an enclosed silo. The conveyor will be covered and use a baghouse for particulate control.

The use of a baghouse provides the highest level of control of PM10 emissions which is technologically feasible for the ash handling operations. Since the source is using the top ranked technology, it is not necessary to evaluate any remaining control technologies with lower PM10/PM2.5 control efficiencies for the ash handling operations. BACT limit for this operation is a 10% opacity limit. [Last updated October 30, 2015]

**Modeling Results:**

A dispersion modeling analysis was performed for the following source:
Company: Revolution Fuels
Site: Coal to Liquid Facility

The individual criteria emission increases triggered the requirement to model under R307-410-4 for the following pollutants:
-$NO_2$
-$PM_{10}$
-$PM_{2.5}$

The following table provides a comparison of the predicted impact plus background (total) with the National Ambient Air Quality Standards (NAAQS). The predicted total concentrations are less than their respective NAAQS.

| Pollutant | Average | Impact ug/cu.m | Total ug/cu.m | NAAQS ug/cu.m | Percent NAAQS |
|---|---|---|---|---|---|
| $NO_2$ | 1-Hour | 84.0 | 148.0 | 188 | 78.7% |
| $NO_2$ | Annual | 2.9 | 22.9 | 100 | 22.9% |
| $PM_{10}$ | 24-Hour | 39.5 | 86.5 | 150 | 57.7% |
| $PM_{2.5}$ | 24-Hour | 10.8 | 21.8 | 35 | 62.3% |
| $PM_{2.5}$ | Annual | 2.9 | 9.5 | 12 | 78.9% |

[Last updated November 13, 2015]

## RECOMMENDED APPROVAL ORDER CONDITIONS

The intent is to issue an air quality Approval Order (AO) authorizing the project with the following recommended conditions and that failure to comply with any of the conditions may constitute a violation of the AO. The AO will be issued to and will apply to the following:

| **Name of Permittee:** | **Permitted Location:** |
|---|---|
| Revolution Fuels, LLC<br>P.O. Box 746<br>Tooele, UT 84074 | Revolution Fuels, LLC-Coal to Liquids Facility<br>Outside of Wellington<br>Carbon County, UT |

**UTM coordinates:** 526,825 m Easting, 4,376,397 m Northing, UTM Zone 12
**SIC code:** 1311 (Crude Petroleum & Natural Gas)

### Section I: GENERAL PROVISIONS

I.1 All definitions, terms, abbreviations, and references used in this AO conform to those used in the UAC R307 and 40 CFR. Unless noted otherwise, references cited in these AO conditions refer to those rules. [R307-101]

I.2 The limits set forth in this AO shall not be exceeded without prior approval. [R307-401]

I.3 Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved. [R307-401-1]

I.4 All records referenced in this AO or in other applicable rules, which are required to be kept by the owner/operator, shall be made available to the Director or Director's representative upon request, and the records shall include the two-year period prior to the date of the request. Unless otherwise specified in this AO or in other applicable state and federal rules, records shall be kept for a minimum of two (2) years. [R307-401-8]

I.5 At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this AO, including associated air pollution control equipment, in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Director which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded. [R307-401-4]

I.6 The owner/operator shall comply with UAC R307-107. General Requirements: Breakdowns. [R307-107]

I.7 The owner/operator shall comply with UAC R307-150 Series. Inventories, Testing and Monitoring. [R307-150]

## Section II: SPECIAL PROVISIONS

**II.A The approved installations shall consist of the following equipment:**

II.A.1 **Coal to Liquids Facility**

II.A.2 **Reaction Chamber**
One (1) Reaction Chamber
Pyrolysis Burner System
Three (3) burners
Capacity: 11.2 MMBtu/hr (each)
Control: Selective Catalytic Reduction on the common stack for the gasification flue gas

Gasification Burner System
Six (6) burners
Capacity: 60 MMBtu/hr (each)
Control: Selective Catalytic Reduction on the common stack for the gasification flue gas

II.A.3 **Coal Handling System**
Coal Hopper
Radial Stacker
Coal Crusher
Silo Day Bin
Capacity: 100 tons per hour
Coal Handling Baghouse
Two (2) Coal Lock Hoppers

II.A.4 **Ash Removal System**
Three (3) Vortex Coils*
Two (2) Cyclones*
*Internal to the reaction chamber

Vibrating Conveyors with Water Jackets

Ash Silo with Baghouse

II.A.5 **Syngas Treatment**
Gas Scrubber
Electric gas compression unit*
Amine $CO_2$ removal unit
Guard bed unit
Water/solution treatment unit*
*informational purpose

II.A.6 **Fischer Tropsch Unit**
Two (2) activation/regeneration heaters with Low $NO_x$ burners
Capacity: 1.12 MMBtu/hr

Capacity:  0.60 MMBtu/hr

Four (4) FT Trains each comprised of:
Two(2) syngas filters
Two (2) Fischer-Tropsch reactors
One (1) steam drum
Two (2) coolant filters
Electric coolant circulation pumps*
*informational purpose

II.A.7 **Product Upgrading**
Two (2) upgrade heaters with Low $NO_x$ burners
Capacity:  4.85 MMBtu/hr
Capacity:  10.25 MMBtu/hr

II.A.8 **Flare**
1 MMBtu/hr continuous flare pilot

II.A.9 **Cooling Tower**
Capacity:  10 MMBtu/hr cooling duty

II.A.10 **Auxiliary Boiler with Low NOX burners**
Capacity:  73.88 MMBtu/hr

II.A.11 **Fire Pump**
Capacity:  220 Hp
Fuel:  Diesel

II.A.12 **Emergency Generator**
Capacity:  1,482 Hp
Fuel:  Diesel

II.A.13 **Storage Tanks**
Liquefied Petroleum Gas pressurized bullet tank

Naphtha fixed cone roof storage tank
Capacity:  1,853 bbl

Diesel fixed cone roof storage tank
Capacity:  4,021 bbl

Jet Fuel fixed cone roof storage tank
Capacity:  4,406 bbl

Off Specification fuel fixed cone roof storage tank
Capacity:  4,406 bbl

Lean Amine fixed cone roof storage tank
Capacity:  340 bbl

Amine Solvent fixed cone roof storage tank
Capacity:  214 bbl

## II.B Requirements and Limitations

### II.B.1 <u>Site Wide Requirements</u>

II.B.1.a The owner/operator shall notify the Director in writing when the installation of the equipment listed in Condition II.A of this AO have been completed and are operational.  To ensure proper credit when notifying the Director, send your correspondence to the Director, attn: Compliance Section.

If installation has not been completed within 18 months from the date of this AO, the Director shall be notified in writing on the status of the construction and/or installation.  At that time, the Director shall require documentation of the continuous installation of the operation and may revoke the AO. [R307-401]

II.B.1.b Visible emissions from the following emission points shall not exceed the following values:

A. Flare and combustor - no visible emissions
B. Crusher - 15% opacity
C. Coal Handling Baghouse - 10% opacity
D. Ash Removal Baghouse - 10% opacity
E. All natural gas/syngas operated equipment - 10% opacity
F.  Paved Haul Roads - 20% opacity
F. All other points - 20% opacity

Opacity observations of emissions from stationary sources shall be conducted according to 40 CFR 60, Appendix A, Method 9. [R307-401-8]

II.B.1.c The facility shall not exceed the following production/consumption limits:

Production
A. Liquefied petroleum gas: 37,960 barrels per rolling 12 month total
B. Naphtha: 95,630 barrels per rolling 12 month total
C. Diesel: 209,145 barrels per rolling 12 month total
D. Jet fuel: 202,940 barrels per rolling 12 month total
E. Off specification diesel and jet fuel: 135,050 barrels per rolling 12 month total
F. Ash: 57,378 tons per rolling 12 month total

Consumption
G. 273,750 tons of coal per rolling 12 month total

To determine compliance with a rolling 12-month total the owner/operator shall calculate a new 12-month total by the twentieth day of each month using data from the previous 12 months. Records of production shall be kept for all periods when the plant is in operation. The records of production shall be kept on a daily basis. [R307-401-8]

II.B.1.d The Emergency Generator shall be used for electricity production only during periods when electric power from the public utilities is interrupted, or for regular maintenance of the emergency equipment. The emergency generator will be limited to 500 hours of combined testing and maintenance operations per year. Records documenting all emergency equipment usage shall be kept in a log. The log will identify the date when the emergency equipment was used, the duration in hours of the event, and the reason for each equipment usage. There is no time limit on the use of emergency stationary internal combustion engine in emergency situations. [R307-401]

II.B.1.e The owner/operator shall use only natural gas or syngas as fuel for all heaters and boilers and diesel fuel for emergency equipment. [R307-401-8]

II.B.1.f The auxiliary boiler shall be limited to 500 hours of operation per rolling 12 month total. Records documenting operation shall be kept in a log. The log will identify the date when the auxiliary boiler was used and the duration in hours. [R307-401]

II.B.2 **Reaction Chamber/Pyrolysis Vessel**

II.B.2.a Emissions to the atmosphere from the indicated emission points shall not exceed the following rates and concentrations.

Source: Gasification Flue Gas Exhaust Stack (Reaction Chamber/Pyrolysis operations)

| Pollutant | lb/hr | |
|---|---|---|
| $NO_x$ | 3.67 | |
| CO | 14.68 | . [R307-401-8] |

II.B.2.a.1 Stack testing to show compliance with the emission limitations stated in the above condition shall be performed as specified below:

Testing

Test
Emissions Point
Gasification Flue Gas Exhaust Stack (Reaction Chamber/Pyrolysis operations)

| Pollutant | Frequency |
|---|---|
| $NO_x$ | #, ## |
| CO | #,## |

B. Testing Status

\# Initial compliance testing is required. The initial test date shall be performed as soon as possible and in no case later than180 days after the startup of a new emission source. A compliance testis required on the modified emission point that has an emission rate limit.

## Compliance test at least annually subsequent to the initial compliance test. The Director may require testing at any time.

C. Notification
The Director shall be notified at least 30 days prior to conducting any required emission testing. A source test protocol shall be submitted to DAQ when the testing notification is submitted to the Director. The source test protocol shall be approved by the Director prior to performing the test(s). The source test protocol shall outline the proposed test methodologies, stack to be tested, and procedures to be used. A pretest conference shall be held, if directed by the Director.

D. Sample Location
The emission point shall be designed to conform to the requirements of 40 CFR 60, Appendix A, Method 1, or other methods as approved by the Director. An Occupational Safety and Health Administration (OSHA) or Mine Safety and Health Administration (MSHA) approved access shall be provided to the test location.

E. Volumetric Flow Rate
40 CFR 60, Appendix A, Method 2, Method 19 or other EPA approved methods acceptable to the
Director.

F. Nitrogen Oxides ($NO_x$)
40 CFR 60, Appendix A, Method 7, 7A, 7B, 7C, 7D or 7E, or other EPA approved methods acceptable to the Director.

G. Carbon Monoxide (CO)
40 CFR 60, Appendix A, Method 10, or other EPA approved methods acceptable to the Director.

H. Calculations
To determine mass emission rates (lb/hr, etc.) the pollutant concentration as determined by the appropriate methods above shall be multiplied by the volumetric flow rate and any necessary conversion factors determined by the Director, to give the results in the specified units of the emission limitation. [R307-401-8]

II.B.2.a.2 New Source Operation
For a new source/emission point, the production rate during all compliance testing shall be no less than 90% of the production rate listed in this AO. If the maximum AO allowable production rate has not been achieved at the time of the test, the following procedure shall be followed:

1) Testing shall be at no less than 90% of the production rate achieved to date.

2) If the test is passed, the new maximum allowable production rate shall be 110% of the tested achieved rate, but not more than the maximum allowable production rate. This new

allowable maximum production rate shall remain in effect until successfully tested at a higher rate.

3) The owner/operator shall request a higher production rate when necessary. Testing at no less than 90% of the higher rate shall be conducted. A new maximum production rate (110% of the new rate) will then be allowed if the test is successful. This process may be repeated until the maximum AO production rate is achieved.

Existing Source Operation
For an existing source/emission point, the production rate during all compliance testing shall be no less than 90% of the maximum production achieved in the previous three (3) years. [R307-401-8]

II.B.3 **Fugitive Emissions**

II.B.3.a The vibrating conveyors for the ash removal operation shall be covered and routed to a baghouse. [R307-401-8]

II.B.3.b The coal handling, radial stacker conveyor shall be covered and fugitive emissions shall be controlled by water sprays. The coal handling crushing, conveying and drop points shall be covered and controlled by a baghouse. [R307-401-8]

II.B.3.c The haul road shall be paved and shall be water flushed, sprayed clean or swept as dry conditions warrant or as determined necessary by the Director in order to meet the opacity requirement listed in this AO. [R307-401-8]

II.B.4 **Flare Requirements**

II.B.4.a All exhaust gas/vapors from startup, shutdown and upset conditions shall be routed to the flare operating with a continuous pilot. [R307-401]

II.B.4.b The flare shall operate with no visible emissions. [R307-401-8]

II.B.4.b.1 Visual determination of smoke emissions from flare shall be conducted according to 40 CFR 60, Appendix A, Method 22. [R307-401-8]

## Section III: APPLICABLE FEDERAL REQUIREMENTS

In addition to the requirements of this AO, all applicable provisions of the following federal programs have been found to apply to this installation. This AO in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including UAC R307.

NSPS (Part 60), A: General Provisions
NSPS (Part 60), Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units
NSPS (Part 60), Y: Standards of Performance for Coal Preparation and Processing Plants
NSPS (Part 60), IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
MACT (Part 63), A: General Provisions
MACT (Part 63), ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

## **REVIEWER COMMENTS**

The AO will be based on the following documents:

| | |
|---|---|
| Incorporates | Additional Information dated July 21, 2015 |
| Is Derived From | NOI dated May 8, 2015 |
| Incorporates | Additional Information dated September 17, 2015 |
| Incorporates | Additional Information dated October 27, 2015 |
| Incorporates | Addtional Information dated November 12, 2015 |

1. Comment regarding Emissions Estimates:
   Emissions Estimates
   Emissions estimates were conducted on the site which was broken down into coal handling, gasification/pyrolysis operation, ash handling, syngas treatment, product upgrading, and operation support equipment.

   Coal handling involves truck unloading, roads, coal storage piles, coal handling and silo baghouse. The truck unloading consist a throughput of 273,750 tons of coal being dumped with a 20 mph wind speed and 10% moisture content from coal. AP-42, section 13.2.4 was used in the truck unloading calculations. All haul roads on site are paved and used roundtrip miles per hour of 2 and miles per year of 6,360. AP-42, table 13.2.1.3 was used in the haul road emissions estimates. The coal storage piles consist of acres being 0.04 acres. AP-42, table 11.9-1 was used in the calculations with particle size multipliers from section 13.2.5. Coal handling consist of conveyors to crusher, hoppers, lockhopper and silo with all conveyors being enclosed and emissions being routed to a baghouse. The emissions for the coal handling and silo used AP-42, section 13.2.4 with a throughput of 273,750 tons of coal per year. The baghouse controlling the conveyors has the control efficiency of 95%. The estimated emissions for the coal handling are as follows in tons per year; 1.56 of PM10 and 0.26 of PM2.5.

   Gasification/pyrolysis consist of mainly combustion of natural gas from the reformer/reaction chamber and pyrolysis vessel. The reformer/reaction chamber consists of burners capacity equaling 333.6 MMBtu per hour with an operations time of 8,400 hours per year. The estimated btu rating of the fuel being used is 913 btu/scf. The emissions for the gasification/pyrolysis uses burner manufacturer (Maxon) emissions data with SCR manufacturer (Nationwide) control efficiency data for NOx and CO and AP-42 table 1.4-2 for all other emissions. The estimated emissions for the Gasification/pyrolysis are as follows in tons per year; 15.41 of NOx, 61.65 of CO, 8.44 of VOC, 1.63 of SOx, 11.66 of PM10/PM2.5.

   Ash handling consists of vibrating conveyors to bin all conveyors being enclosed and emissions being routed to a baghouse. The emissions for the ash handling used AP-42, section 13.2.4 with a throughput of 52,560 tons of ash per year. The baghouse controlling the conveyors has the control efficiency of 95%. The estimated emissions for the ash handling are below 0.01 tons per year of PM10 or PM2.5.

   Syngas treatment consists of a CO2 removal system using amine in the syngas and then using heaters to reclaim amine. The emissions resulting from reclaiming the amine used manufactures data with an hour of operations of 8,400 hours per year. The heaters to be used to reclaim the amine are estimated to be 1.12 MMBtu/hr and 0.6 MMBtu/hr with operation times of 4,032 and

2,016 hours per year. The estimated btu rating of the fuel being used is 918 btu/scf. The emissions were estimated using AP-42 table 1.4-2. Gas scrubbing is involved in this process but it is assumed that any emissions will be entrapped in the liquid exiting the scrubbers. An electric generator is to be used in the compress the gas to aid in the condensate removal process. The estimated emission from the syngas treatment is 14.1 tons per year of CO.

Product upgrading consists of a FT unit and heaters to convert syngas to liquids. The FT unit has an emission of only CO2. The heaters to be used in the product upgrade process are estimated to be 4.85 MMBtu/hr and 10.25 MMBtu/hr with operation time of 8,400. The estimated btu rating of the fuel being used is 1020 btu/scf. The emissions estimates for the heater used AP-42 table 1.4-2 for all other emissions. The estimated emissions for the product upgrade heaters are as follows in tons per year; 3.1 of NOx, 5.2 of CO, 0.34 of VOC, 0.04 of SOx, 0.47 of PM10/PM2.5.

Operation support equipment consists of; 1 MMBtu/hr continuous flare pilot, 1,482 Hp diesel emergency generator for backup power, 220 Hp diesel fired fire pump, Cooling tower with 10 MMBtu/hr cooling duty and a 73.88 MMBtu/hr natural gas fired auxiliary boiler equipped with low NOx burners. The emergency generator and fire pump are fired on diesel and the emissions were estimated using manufacturer data and 500 hours of operation for maintenance and testing. The cooling tower emissions were estimated using AP-42 table 13.4-1 and assuming 8,400 hours of operation and a total dissolved solids content of 380 ppm and a water vapor emission of 10,308 lb per hour. The auxiliary boiler used AP-42 table 1.4-1 to estimate emissions for NOx and CO for all other pollutants AP-42 table 1.4-2 was used. The flare used AP-42 table 1.4-2 for all emission estimates.

[Last updated November 2, 2015]

2. Comment regarding Power Generation:
The Revolution Fuels coal to liquid facility is not a power generation facility by definition; an Electric utility steam-generating unit which is defined as any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW net-electrical output to any utility power distribution system for sale. Also, any steam supplied to a steam distribution system for the purpose of providing steam to a steam electric generator that would produce electrical energy for sale is considered in determining the electrical energy output capacity of the affected facility.

The reaction chamber is not an electric generating unit and the purpose of the steam produced is not to supply a steam-electric generator. The steam produced in the reaction chamber is solely to be used for gasification of the feedstock. In order to provide the correct H2:CO ratio for the Fischer-Tropsch process, water must be added to the reaction. Also, any steam supplied to a steam distribution system for the purpose of providing steam to a steam electric generator that would produce electrical energy for sale is considered in determining the electrical energy output capacity of the affected facility. Based on the initial evaluation of the facility's overall power requirements and power generation capability, the facility will be a net exporter of approximately 6 MW of electricity with a total internal usage of 11 MW. These numbers are subject to update based upon final heat recovery optimization in the gasification Island. The steam turbine at the Revolution facility will not produce more than 25 MW net-electrical output to any utility power distribution system for sale.
[Last updated November 17, 2015]

3. Comment regarding Coal Handling Subpart Y applicable:
Revolution Fuels will process more than 200 tons per day of coal and is subject to Subpart Y (Standards of Performance for Coal Preparation and Processing Plant). Revolution Fuels will prepare and submit a fugitive coal dust emissions control plan to the Administrator. Revolution's coal storage pile and processing and conveying equipment will operate in accordance with the fugitive coal dust emissions control plan. Revolution Fuels will use water sprays as a control measure to minimize fugitive coal dust. In addition, Revolution Fuels will utilize a baghouse to control emissions from coal conveying, transfer and crushing operation.

The steam turbine does not meet the definition of a thermal dryer or any other applicable unit under this subpart Y. Thermal dryers as defined under Subpart Y reduces the moisture content of coal by either contact with a heated gas stream which is exhausted to the atmosphere or through indirect heating of the coal through contact with a heated heat transfer medium. The steam turbine system receives steam from the heat recovery systems throughout the facility to drive an electrical generator and the steam is not used to reduce the moisture content in the coal.
[Last updated November 17, 2015]

4. Comment regarding Subpart D Applicability:
Reaction chamber/pyrolysis operations
The primary purpose of the large-diameter coiled Inconel pipe in the reaction chamber is to facilitate the gasification of the feedstock. In order to provide the correct H2:CO ratio for the Fischer-Tropsch process, water must be added to the reaction. The water turns to steam as a result of the surrounding high temperatures. There is waste heat recovered from the stream, but the main purpose of the water/steam is to drive a chemical reaction and not power generation. This also explains why the reactor chamber is not being defined as a boiler.

The small-diameter coiled pipe above the reactor coils is used to pre-heat the ionized water entering the system; it would also not fit the definition of a boiler since it uses waste heat from the flue gas to pre-heat the water.

Auxiliary boiler
The auxiliary boiler is subject to Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units. Revolution Fuels boiler is 73.88 MMBtu/hr and is fired on pipeline natural gas and is used to produce steam which is used in various processes throughout the facility. The boiler is limited to 500 hours of operation.
[Last updated November 17, 2015]

5. Comment regarding Subpart Q Applicability:
40 CFR 63 Subpart Q, National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers does not apply to Revolution fuel cooling tower as they do not use chromium based water treatment chemicals. [Last updated November 17, 2015]

6. Comment regarding Subpart UUUU Applicability:
40 CFR 63 UUUUU, National Emissions Standards for Hazardous Air Pollutant: Coal and Oil Fired Electric Utility Steam Generating Units does not apply to Revolution Fuel's facility. This subpart establishes national emission limitations and work practice standards for hazardous air pollutants (HAP) emitted from coal- and oil-fired electric utility steam generating units (EGUs) as defined in §63.10042 of this subpart. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations.

The steam turbine at the Revolution Fuels facility does not combust fuel: it will receive steam from the heat recovery systems within each of the plant's units. The exhaust from the turbine will be wet steam that will be fully condensed in a vacuum condenser and pumped back to the plant's boiler feed water system for reuse.
[Last updated November 17, 2015]

7. Comment regarding Product Unloading:
The Revolution Fuel's facility has storage tanks onsite to store the final product, but will be pumped from the storage tanks to the Price River Terminal (PRT) for distribution. An agreement with PRT has been made to take liquids to be unloaded and distributed depending on market conditions. Revolution Fuel has the option to distribute its products to multiple end users dependent on the most favorable market conditions. Revolution will also not be the sole supplier to the PRT facility and is anticipated to supply approximately 25% of PRT's product volume. [Last updated October 30, 2015]

8. Comment regarding HAPs:
HAP Emissions:
Modeling level is based upon source located less than 50 meters from fence line and vertically unrestricted stack.

| HAP | Source (lb/hr) | Modeling Level/ETV (lb/hr) |
|---|---|---|
| Benzene | 0.0766 | 0.3163 |
| Dichorobenzene | 0.000547 | 11.905 |
| 1, 3 Butadiene | 0.00006 | 0.292 |
| Formaldehyde | 0.0351 | 0.0567 |
| Hexane | 1.28 | 34.89 |
| Napthalene | 0.0696 | 10.381 |
| Toluene | 0.269 | 14.92 |
| Xylene | 0.467 | 85.97 |
| Acetaldehyde | 0.00144 | 6.936 |
| Acrolein | 0.000224 | 0.0353 |

No modeling was triggered as per UAC R307-410-5.
[Last updated November 2, 2015]

9. Comment regarding Sulfur :

Sulfur is removed in this operation in two different processes; the particulate sulfur will be removed in the ash removal process, entrained sulfur in the syngas will be scrubbed out and small amounts of sulfur will reside in the liquid products being generated.

Ash removal
Multiple stages of particle removal allow progressive refinement of the carbonaceous material to create a higher quality syngas.

The first area of solids removal utilizes a high-powered magnetic separator to draw metallically charged objects out of the conveyor stream. The excess material is transported out of the reaction chamber onto a vibrating conveyor with a water jacket for cooling. Once cooled, the ash material will fall into a steel hopper and is ready for disposal.

A secondary separation of carbonaceous materials using a vortex-like action occurs after the secondary coil and just prior to the tertiary coil.

The final ash removal process takes place while the syngas is in the cyclones. Once the ash has been pulled from the flow of gas, it is dropped onto a vibrating conveyor. The vibrating conveyor will cool the ash and transport it into an enclosed silo. The conveyor will be covered and use a baghouse for particulate control. Ash loading rate through the ash removal system will be a maximum of 6.6 tons per hour and 57,378 tons per year. Ash will be transferred from the silo through an enclosed auger in to pneumatic trucks to be hauled offsite.

Gas scrubbing

Sulfur removal in the syngas scrubbing process of the operation is accomplished from the attraction of electrically charged negative ions produced in the proprietary water processes in the scrubber effluent. The negatively charged ions are highly reactive and are attracted to the positive ions of the sulfur species. Those ions attract and coagulate into elemental sulfur that is then filtered out through the water system with other elements that have also been coagulated. The non-hazardous sulfur coagulated elements are then filtered out of the gas scrubbing water and sent to a filter press for collection and transported to a landfill for disposal. The ash material can be mixed with cement for additional stabilization. [Last updated December 7, 2015]

## ACRONYMS

The following lists commonly used acronyms and associated translations as they apply to this document:

| | |
|---|---|
| 40 CFR | Title 40 of the Code of Federal Regulations |
| AO | Approval Order |
| BACT | Best Available Control Technology |
| CAA | Clean Air Act |
| CAAA | Clean Air Act Amendments |
| CDS | Classification Data System (used by EPA to classify sources by size/type) |
| CEM | Continuous emissions monitor |
| CEMS | Continuous emissions monitoring system |
| CFR | Code of Federal Regulations |
| CMS | Continuous monitoring system |
| CO | Carbon monoxide |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | Carbon Dioxide Equivalent - 40 CFR Part 98, Subpart A, Table A-1 |
| COM | Continuous opacity monitor |
| DAQ/UDAQ | Division of Air Quality |
| DAQE | This is a document tracking code for internal UDAQ use |
| EPA | Environmental Protection Agency |
| FDCP | Fugitive dust control plan |
| GHG | Greenhouse Gas(es) - 40 CFR 52.21 (b)(49)(i) |
| GWP | Global Warming Potential - 40 CFR Part 86.1818-12(a) |
| HAP or HAPs | Hazardous air pollutant(s) |
| ITA | Intent to Approve |
| LB/HR | Pounds per hour |
| MACT | Maximum Achievable Control Technology |
| MMBTU | Million British Thermal Units |
| NAA | Nonattainment Area |
| NAAQS | National Ambient Air Quality Standards |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| NOI | Notice of Intent |
| $NO_x$ | Oxides of nitrogen |
| NSPS | New Source Performance Standard |
| NSR | New Source Review |
| $PM_{10}$ | Particulate matter less than 10 microns in size |
| $PM_{2.5}$ | Particulate matter less than 2.5 microns in size |
| PSD | Prevention of Significant Deterioration |
| PTE | Potential to Emit |
| R307 | Rules Series 307 |
| R307-401 | Rules Series 307 - Section 401 |
| $SO_2$ | Sulfur dioxide |
| Title IV | Title IV of the Clean Air Act |
| Title V | Title V of the Clean Air Act |
| TPY | Tons per year |
| UAC | Utah Administrative Code |
| VOC | Volatile organic compounds |

# Notice of Intent

Revolution Fuels, LLC
Coal to Liquid Project

Prepared for:
Utah Dept. of Environmental Quality
Division of Air Quality
P.O. Box 144820
Salt Lake City, UT 84114-482
Phone: 801.536.4000

Prepared by:
Stantec Consulting Services Inc.
7669 W Riverside Drive, Ste. 101
Boise, ID 83714
Contact: Melissa Armer
Phone: 208.853.0883

**May 8, 2015**

# Sign-off Sheet

This document entitled **Notice of Intent** was prepared by **Stantec Consulting Services** ("Stantec") for the account of **Revolution Fuels, LLC** ("Revolution" or the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Melissa Armer

Prepared by: **Melissa Armer, P.E.**
**Project Engineer**

Eric E. Clark

Technical Reviewer: **Eric Clark, P.E.**
**Project Engineer**

Stantec

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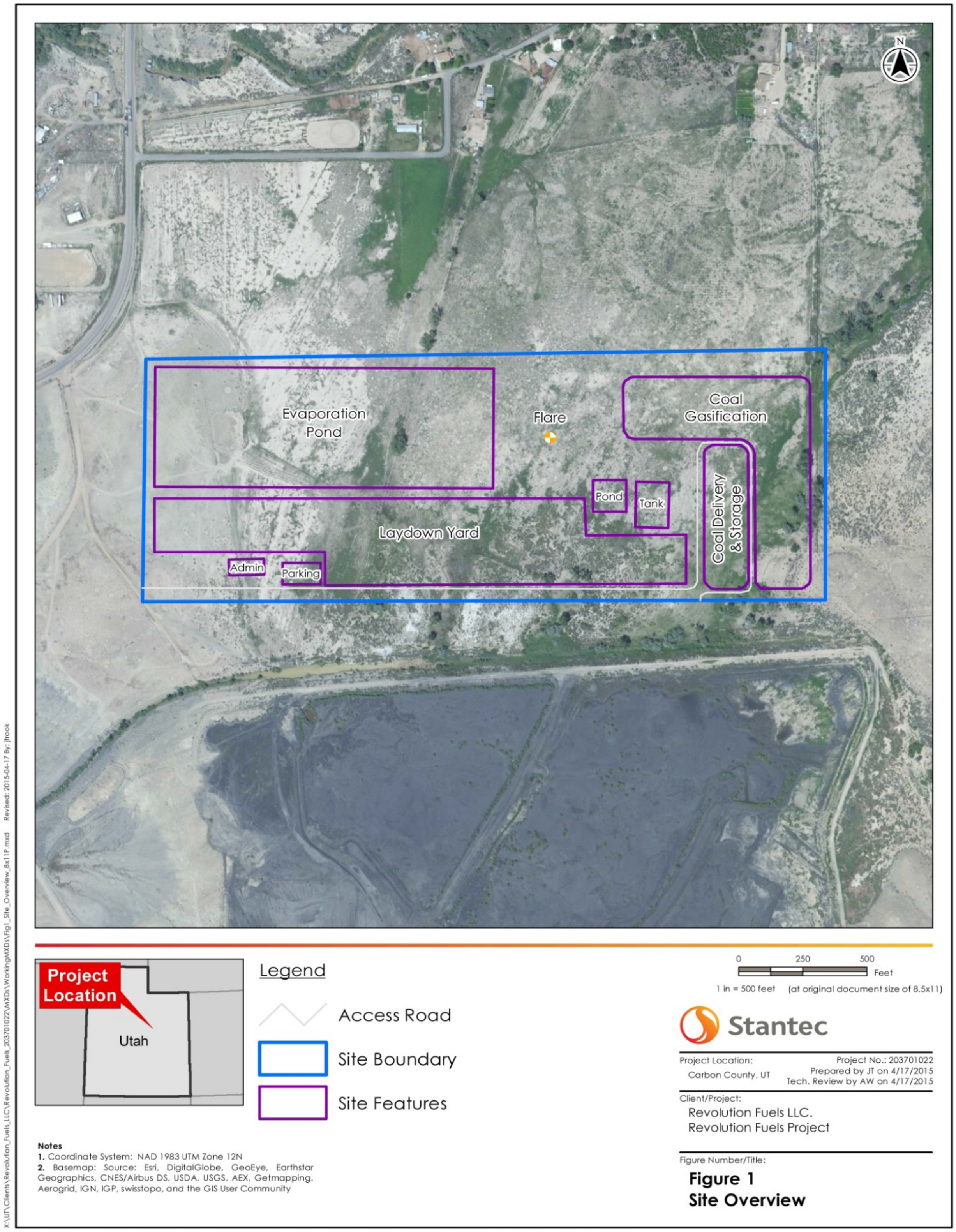
# 1.0 INTRODUCTION

Revolution Fuels, LLC (Revolution) is submitting a Notice of Intent application for the construction of a new coal to liquids facility outside of Wellington, Utah. The facility operations will include coal handling, coal gasification, ash handling, syngas treatment and product upgrading. The facility is expected to produce diesel fuel, jet fuel, liquefied petroleum gas (LPG), and naphtha as products with a coal throughput of 500 tons per day. Figure 1.1, below, presents the general location and Public Access Boundary (PAB) of the facility. The proposed facility plot plan is provided in Appendix B.

## Figure 1.1 General Location Map and Facility Public Access Boundary

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# 2.0 PROCESS DESCRIPTION

Coal will be delivered to the facility and stored in a storage area. From the storage area, the coal will be transferred to a crusher via a conveyor. After crushing, the coal will be transferred to a pyrolysis and gasification system. Carbonaceous material that has not been gasified is removed and handled in the ash handling system. Syngas produced from the gasification system is scrubbed to remove contaminants and then is pressurized to remove additional contaminants including carbon dioxide and sulfur. The syngas then goes through a Fischer Tropsch reactor where the output is a liquid phase (wax) and hydrocarbon condensate which is then upgraded to transportation liquids. The Fischer Tropsch reactor also produces a tail gas that is recycled back into the process and used as a fuel in other areas of the plant. Product upgrading includes a hydrotreating and fractionation process that produces diesel fuel, jet fuel, LPG, and naphtha. The facility is designed to operate for 8,400 hours per year.

## 2.1 COAL HANDLING

Coal will be delivered to the plant on paved haul roads by belly dump trucks which are expected to have a capacity of 44 tons. Coal will be unloaded from the belly dumps into a hopper which will feed a radial stacker. The radial stacker will have a covered conveyor and water sprays to minimize fugitive dust emissions. The radial stacker will feed into a coal storage pile. The coal moisture content is estimated to be at 10 percent. See Appendix I.4.2 for New Source Performance Standards Subpart Y requirements and fugitive coal dust control plan requirements for the coal storage pile. Coal will be transferred from the coal storage pile to a crusher via a covered conveyor. Coal loading rate through the coal handling and crushing circuit will be a maximum of 100 tons per hour and 273,750 tons per year. A baghouse will control fugitive dust emissions from all coal conveying and transfer from the coal storage pile to a silo day bin prior to being fed into the gasification process.

Once broken down to size, a series of two lockhoppers will deliver a maximum of 750 tons per day of prepared gasifier fuel to the pyrolysis tube entrance. Coal enters the first lockhopper from a conveyor above, where it is sealed and pressurized using an inert gas. Once at pressure, the lockhopper drops the coal into the second lockhopper via gravity, where the pressure is further raised using an inert gas. From this lockhopper the coal enters the pyrolysis and gasification process.

Complete emissions calculations are included in Appendix C.

## 2.2 PYROLYSIS AND GASIFICATION

The pyrolysis system is pressurized at approximately 125 psig. The latter 75% of the pyrolysis vessel is contained in a heated environment known as the reaction chamber. Depending on the amount and type of feed, the residence time of the feedstock is from 3 to 20 minutes, and is determined based on the rate of speed of the track feeder (Wiley, 2011).

The temperature of the gasifier fuel entering the pyrolysis vessel is around 60 degrees Fahrenheit. Upon exiting, the constituents of the feed are approximately 800 degrees Fahrenheit. This is accomplished with the injection of superheated water into the vessel and/or external burners heating the ambient surroundings of the reaction chamber to 1800 degrees Fahrenheit. The pyrolysis burner system will included (3) 6-inch Kinemax LE burners each providing a maximum of 11.2 MMBtu/hr.

Carbonaceous reformation takes place inside a series of coils designed to allow a residence time of 4 to 10 seconds. The design includes primary, secondary and tertiary reformation coils which heat the gaseous components up to 1750 degrees Fahrenheit using a second set of burners. The gasification burner system will include (5) 14-inch Kinemax LE burners each providing a maximum of 60 MMBtu/hr.

Steam is injected into the gasification section to control the hydrogen and carbon monoxide $H_2$:CO ratio for the product syngas through the steam reforming process. The distance traveled by the gaseous mixtures has a combined length of over 800-feet (Wiley, 2011).

Once through the preliminary coil, or about twenty-five percent of the of the carbonaceous reformation stage, carbonaceous materials that have not been altered to their gaseous state will be removed via a vortex-like action. The first of two cyclonic removal methods will redirect particles that are 80 to 150 microns in size to a 2-inch pipe that leads back to the front half of the pyrolysis vessel. This path is carried through with a stream of flue gas.

A final vortex-like ash removal sequence takes place following the three coils. The flow stream is sent through two cyclones in series which will remove any remaining carbonaceous material and ash carry-through. An estimated 10% of 1-micron particles, 25% of 2-micron particles, 35% of 3-micron particles and as much as 100% of 15-microns (and above) particles will be removed during this final polish phase. All removed materials are sent to a screw auger that carries them to an ash handling system (Wiley, 2011).

The pyrolysis vessel, carbonaceous reforming coils and cyclones are housed inside a reactor house lined with refractory. The temperature inside of the reactor house will reach over 1800 degrees Fahrenheit.

Upon exiting the reactor house, the syngas enters a heat exchanger to reduce the gas temperature and pressure. After leaving the heat exchanger the gas goes through a scrubbing system which further removes contaminants by spraying negatively charged and electronegativity enhanced water into the system.

## 2.3 ASH REMOVAL AND HANDLING

Within the gasification system, there are three areas of residual removal aimed at removing particles of varying size and make-up. Multiple stages of particle removal allow progressive refinement of the carbonaceous material to create a higher quality syngas.

The first area of solids removal utilizes a high-powered magnetic separator to draw metallically charged objects out of the conveyor stream. The excess material is transported out of the reaction chamber onto a vibrating conveyor with a water jacket for cooling. Once cooled, the material will fall into a steel hopper and is ready for disposal.

A secondary separation of carbonaceous materials using a vortex-like action occurs after the secondary coil and just prior to the tertiary coil.

The final ash removal process takes place while the syngas is in the cyclones (see above for description). Once the ash has been pulled from the flow of gas, it is dropped onto a vibrating conveyor. The vibrating conveyor will cool the ash and transport it into an enclosed silo. The conveyor will be covered and use a baghouse for particulate control. Ash loading rate through the ash removal system will be a maximum of 6.6 tons per hour and 57,378 tons per year. Ash will be transferred from the silo through an enclosed auger in to pneumatic trucks to be hauled offsite. Complete emissions calculations are included in Appendix C.

## 2.4 SYNGAS TREATMENT

From the gasifier, the raw syngas will flow through heat exchangers to the gas scrubbers, where the syngas is sprayed with free electron "saturated" ionized water to remove any organics, particulates, ash, sulfur, and metals still in the syngas stream. Sulfur removal is this step is accomplished from the electrically charged negative ions produced in the proprietary water processes. The negatively charged ions are highly reactive and are attracted to the positive ions of the sulfur species. Those ions attract and coagulate into elemental sulfur that is then filtered out through the water system with other elements that have also been coagulated. At this point, a clean dry syngas exits the gasification unit and enters the syngas compression unit where it is compressed in multiple stages to reach the designated outlet pressure. The hot interstage syngas will be cooled by interstage coolers and the condensed liquid will be knocked out.

The compressed syngas is then routed to the amine $CO_2$ removal unit to remove bulk $CO_2$ from the syngas. The syngas will be contacted against a lean amine solution that will chemically absorb the $CO_2$. The amine that is used is a methyldiethanolamine (MDEA) based solvent formulated to provide deep removal of $CO_2$. The treated syngas is routed to the guard bed unit where additional contaminants are removed. The $CO_2$ laden amine solution is degassed at a moderate pressure to release gases like $H_2$, CO, and $CH_4$. Those gases are routed to the fuel gas system. The amine is then preheated and sent into a regeneration column to remove the $CO_2$ and produce a lean amine for reuse. The $CO_2$ from the top of the regeneration is vented to the atmosphere.

## 2.5 FISCHER-TROPSCH UNIT

Syngas that has undergone treatment for removal of contaminants enters the Fischer-Tropsch (FT) unit. Compressed fresh syngas enters the FT unit and is divided among several operating trains and preheated in heat exchangers. Each FT train is identical comprising of a set of two syngas filters, two FT reactors, one steam drum, three coolant circulation pumps, and a set of two coolant filters. Each FT train is arranged such that it may be removed from service for periodic catalyst regeneration. The syngas filters remove particulate prior to entering the FT reactors. Each FT reactor is made up of an outer shell containing microchannel cores. Each core is made up of multiple vertical and cross-flow microchannels. The vertical microchannels contain the Velocys proprietary cobalt-based catalyst. The combined FT feed flows down through these vertical catalyst loaded microchannels. FT products exit from the bottom of each reactor and flow to a common reactor outlet wax separator.

The reactor outlet stream is a 2-phase stream (vapor and liquid). The liquid phase at reactor temperature is called wax, and is collected in the reactor outlet. The vapor phase leaving the reactor outlet is cooled before entering the FT liquid separator. Three phases are separated in the FT liquid separator: liquid product, process water, and tail gas.

The FT liquid product (hydrocarbon) is sent to degassing and subsequent processing. Process water is routed to a water flash drum to separate dissolved gases. Uncondensed vapor from the FT liquid separator is recycled back into the FT reactors as tail gas and used as fuel in other areas of the plant.

Three emission points are associated with the FT unit. Two activation/regeneration heaters which are equipped with low-$NO_x$ burners and combust natural gas and one purge gas stream. The emissions are intermittent and dependent on the catalyst activation/regeneration procedures.

Complete emissions calculations are included in Appendix C.

## 2.6 PRODUCT UPGRADING

Wax and hydrocarbon condensate are upgraded to transportation liquids through this process. Product upgrading includes hydrotreating and fractionation. Two emission points are associated with the product upgrading process; two product upgrading heaters which are equipped with low-$NO_x$ burners and combust natural gas. Complete emissions calculations are included in Appendix C.

Wax and condensate are degassed, heated, and routed to the reactors in the hydrotreating section to be converted into “lighter” hydrocarbons. A single fired heater heats the liquid feed into the reactors. The reactors convert the wax and condensate into a crude oil like mixture of hydrocarbons. This crude is cooled, degassed, and routed to the fraction section.

Fractionation is a set of distillation columns that separate out and purifies the LPG, naphtha, diesel, and jet fuel. The reactor effluent is heated by a single fired heater before entering the main fractionation column. Side strippers pull slipstreams of product from the main column and purify the product. The side stripper overheads are returned to the main column. Products are cooled and set to storage. The residual gases are sent to the fuel gas system. Main column bottoms are recycled to the feed for reprocessing.

The facility is anticipated to produce the following products in amounts shown below:

- Liquefied petroleum gas: 104 barrels per day
- Naphtha: 262 barrels per day
- Diesel: 573 barrels per day
- Jet fuel: 556 barrels per day
- Off specification diesel and jet fuel: 370 barrels per day

The facility will have the following storage tanks onsite. Product load out will be conducted via rail or truck.

- Liquefied petroleum gas: 30,000 pressurized bullet tank
- Naphtha: 1,853 barrel fixed cone roof tank
- Diesel: 4,021 barrel fixed cone roof tank
- Jet fuel: 4,406 barrel fixed cone roof tank
- Off specification diesel and jet fuel: 4,406 barrel fixed cone roof tank
- Lean amine: 340 barrel fixed cone roof tank
- Amine solvent: 214 barrel fixed cone roof tank

## 2.7 AUXILIARY SYSTEMS

The facility will utilize superheated steam from the gasification process to drive a steam turbine which is connected to a generator to produce power for the facility. The facility will also have the following emission sources:

- 1 mmBtu/hr continuous flare pilot
- 1,482 Hp diesel emergency generator for backup power
- 220 Hp diesel fired fire pump
- Cooling tower with 10 mmBtu/hr cooling duty
- 73.88 mmBtu/hr natural gas fired auxiliary boiler equipped with low $NO_x$ burners

## 2.8 STARTUP, SHUTDOWN, AND UPSET CONDITIONS

The facility will be equipped with a flare which will have a continuous pilot and will be used to combust any syngas or vent gas during startup, shutdown or upset conditions.

During a startup all vessels and equipment will contain a nitrogen purge until the necessary amount of syngas has been introduced into the system. During this period, syngas may be routed to the flare. After startup and during normal operations all process equipment is routed to the flare so that during upset conditions all syngas or vent gas will be combusted in the flare and not released to the atmosphere. During a shutdown, syngas that remains in the process equipment will be routed to the flare.

# 3.0 SOURCE SIZE DETERMINATION AND OFFSET REQUIREMENTS

The Revolution coal to liquid facility is located in an attainment area and classified as a minor source with controlled potential emissions below 100 tons per year for criteria pollutants. Greenhouse gas emissions are estimated to be greater than 100,000 tons per year $CO_2e$. On June 23, 2014, the U.S. Supreme Court issued its decision in Utility Air Regulatory Group v. EPA (No. 12-1146). The ruling stated that EPA may not treat greenhouse gases as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or title V permit. Based on this decision the Revolution facility would remain a minor source. No offsets are required as part of this permitting action since the facility is located in a designated attainment area.

A complete summary of the facility-wide emissions is included on Form 1a and provided in Appendix D. Complete emissions calculations are included in Appendix C. Table 3-1 and 3-2 summarize the facility-wide potential to emit (PTE).

Preliminary discussions with UDAQ indicated that an evaluation of the feasibility of adding a Selective Catalytic Reduction (SCR) to the gasification flue gas was necessary. Revolution is presenting two separate facility wide PTE emission estimates; one which includes the use of SCR controls and one without SCR controls. Included in Appendix G is the complete Best Available Control Technology (BACT) analysis which indicates that an SCR may be required for the gasification flue gas. Revolution is requesting UDAQ's review prior to making a final determination on whether an SCR system will be included for the gasification flue gas.

**Table 3-1: Project Potential to Emit**

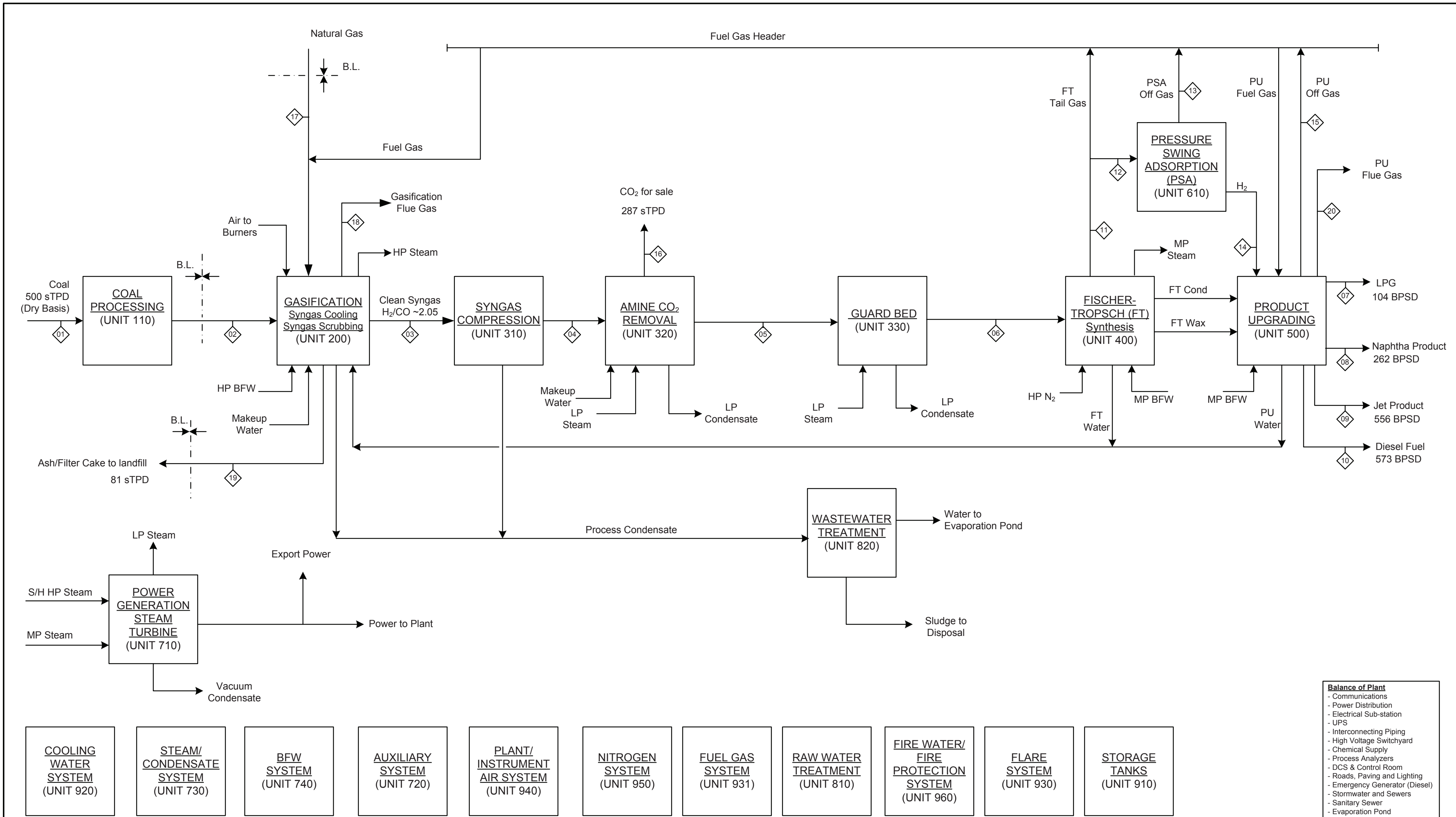
| Source Category | $PM_{10}$ Fugitive | $PM_{10}$ Non-fugitive | $PM_{2.5}$ | $NO_x$ | $SO_x$ | VOC | CO | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|
| | TPY | TPY | TPY | TPY | TPY | TPY | TPY | TPY |
| Facility-Wide PTE Without SCR | 1.5 | 28.9 | 28.9 | 93.4 | 1.9 | 9.2 | 95.0 | 295,876 |
| Facility-Wide PTE With SCR | 1.5 | 28.9 | 28.9 | 23.3 | 1.9 | 9.2 | 83.8 | 295,876 |

In addition, since the proposed operating scenario contains natural gas combustion, hazardous air pollutant (HAP) emissions were calculated.

**Table 3-2: Project HAP Emissions**

| Pollutant | Emissions (lb/hr) | Emissions (tpy) |
|---|---|---|
| Benzene | 1.05E-02 | 5.78E-03 |
| Dichlorobenzene | 5.47E-04 | 1.95E-03 |
| 1,3 butadiene | 6.02E-05 | 1.51E-05 |
| Formaldehyde | 3.51E-02 | 1.22E-01 |
| Hexane | 8.20E-01 | 2.92E+00 |
| Naphthalene | 9.37E-04 | 1.02E-03 |
| Toluene | 5.18E-03 | 6.40E-03 |
| Xylene | 2.97E-03 | 6.10E-04 |
| Acetaldehyde | 1.44E-03 | 3.61E-04 |
| Acrolein | 2.24E-04 | 5.60E-05 |
| **TOTAL** | **0.877** | **3.1** |

# Appendix A Process Information Forms and Flow Diagrams




| REV | DATE | REVISION DESCRIPTION | DSGN | CHKD. |
|---|---|---|---|---|
| 0A | | REISSUED FOR AIR PERMIT | DWL | RR |

INTER DISCIPLINE CHECK: PROC | PIPE | ELEC | CIVIL

DWG NO.

REFERENCE DRAWINGS: Heat & Material Balance

FLUOR

**Fluor Confidential**



| | | | |
|---|---|---|---|
| DESIGNED BY | D.Li | | |
| CHECKED BY | R. Ravikumar | | |
| SUPERVISOR | | DATE | |
| ENGR | | DATE | |
| PROJECT A6SF | | DATE | |
| SCALE | NONE | | |
| CONTRACT/JOB NO. | A6SF | | |

COAL TO LIQUID
REVOLUTION FUEL
UTAH, USA
BLOCK FLOW DIAGRAM

DRAWING NUMBER | REV 0A


TCG GLOBAL

PO BOX 4027
ENGLEWOOD, CO 80155-4027
OFFICE: (303) 267-0791
FAX: (720) 529-9057

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**PROPRIETARY AND CONFIDENTIAL**



REVISIONS

| REV | DESCRIPTION | BY | DATE | BY | DATE |
|---|---|---|---|---|---|
| A | UPDATED EMISSION NUMBERS | LS | 03-27-15 | DS | 03-27-15 |

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/8"
ANGULAR: MACH ± 2°
BEND ± NA
TWO PLACE DECIMAL ± NA
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL SEE BOM

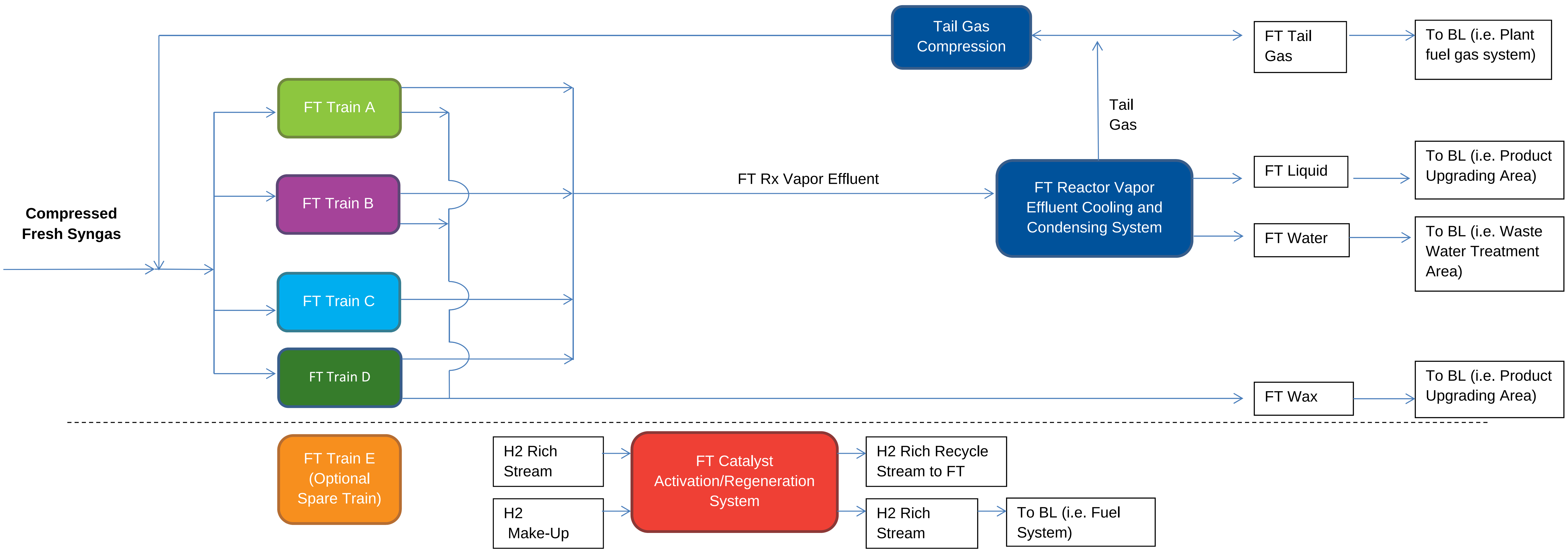
| | NAME | INITIAL | DATE |
|---|---|---|---|
| DRAWN | LS | | 02-25-2015 |
| REVIEWED | MW | | |
| REVIEWED | DS | | 03-04-2015 |
| REVIEWED | | | |
| REVIEWED | | | |
| REVIEWED | | | |

COMMENTS:

**GASIFICATION PLANT TCG 01**
SIZE D
DWG. NO. PFD-3000 VIEWABLE
DATE: 02-25-2015
REVISION DATE: 03-27-2015
SCALE: 1:1
SHEET 1 OF 1

## Velocys FT Island – Typical Block Flow Diagram
## For nominal 1,400 BPD $C_5$+ in FT Liquids

| | |
|---|---|
| BL – Battery Limits | FT – Fischer Tropsch |
| LP – Low Pressure | TG – Tail Gas |




**Equipment on each train**

***2 FT Reactors***
1 Heat exchanger
2 Set of Filters
1 Steam Drum
1 Set of Pumps
1 Separator Drum

**Equipment on the FT Catalyst Activation/Regeneration System**

2 Knock Out Drums
3 Heat Exchangers
1 Hydrogen Dryer Package
1 Regen Recycle Compressor Package (Include Knock Out Drum and Cooler)
3 Filters
2 Fired Heaters

**Equipment on the FT Rx Vapor Effluent Cooling and Condensing System**

1 FT liquid Hot Condenser (LP System Generator)
2 Air Coolers
1 Trim Cooler
1 FT Liquid Separator
3 FT Liquid Product Streams Flash Drums

**Utah Division of Air Quality**
**New Source Review Section**

**Form 19**
**Natural Gas Boilers and Liquid Heaters**

Company Revolution Fuels, LLC
Site/Source Pyrolysis burner system
Date May 8, 2015

## Boiler Information

1. Boiler Manufacturer: ______
2. Model Number: ______ 3. Serial Number: ______
4. Boiler Rating: ______ ($10^6$ Btu per Hour)
5. Operating Schedule: ______ hours per day ______ days per week ______ weeks per year
6. Use: ☐ steam: psig ______ ☐ hot water ☐ other hot liquid: ______
7. Fuels: ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol
   ☐ Process Gas - $H_2S$ content in process gas ______ grain/100cu.ft.
   ☐ Fuel Oil - specify grade: ______ ☐ Other, specify: ______
   Sulfur content ______ % by weight Days per year during which unit is oil fired: ______
   Backup Fuel: ☐ Diesel ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol ☐ Other ______
8. Is unit used to incinerate waste gas liquid stream? ☐ yes ☐ no
   (Submit drawing of method of waste stream introduction to burners)

## Gas Burner Information

9. Gas Burner Manufacturer: Maxon
10. No. of Burners: 3
11. Minimum rating per burner: 10.3 MMBtu/hr cu. ft/hr
12. Average Load: 92 %
13. Maximum rating per burner: 11.2 MMBtu/hr cu. ft/hr
14. Performance Guarantee (ppm dry corrected to 3% Oxygen):
    $NO_x$: 0.061 lb/MMBtu CO: 0.052 lb/MMBtu Hydrocarbons: ______
15. Gas burner mode of control: ☒ Manual ☐ Automatic on-off ☐ Automatic hi-low ☐ Automatic full modulation

## Oil Burner Information

16. Oil burner manufacturer:
17. Model: ______ number of burners: ______ Size number: ______
18. Minimum rating per burner: ______ gal/hr
19. Maximum rating per burner: ______ gal/hr

# Form 11 - Natural Gas Boiler and Liquid Heater
# (Continued)

## Modifications for Emissions Reduction

20. Type of modification: ☒ Low $NO_X$ Burner ☐ Flue Gas Recirculation (FGR)
☐ Oxygen Trim ☐ Other (specify) ______

### For Low-$NO_X$ Burners

21. Burner Type: ☐ Staged air ☐ Staged fuel ☐ Internal flue gas recirculation
☐ Ceramic ☐ Other (specify): ______

22. Manufacturer and Model Number: Maxon, Kinemax LE

23. Rating: 3 @ 11.2 $10^6$ BTU/HR

24. Combustion air blower horsepower: ______

### For Flue Gas Recirculation (FGR)

25. Type: ☐ Induced ☐ Forced Recirculation fan horsepower: ______

26. FGR capacity at full load: ______ scfm ______%FGR

27. FGR gas temperature or load at which FGR commences: ______ °F ______% load

28. Where is recirculation flue gas reintroduced? ______

### For Oxygen Trim Systems

29. Manufacturer and Model Number: ______

30. Recorder: ☐ yes ☐ no Describe: ______

## Stack or Vent Data

31. Inside stack diameter or dimensions 2.5 ft
Stack height above the ground 30.67 ft
Stack height above the building 20.67

32. Gas exit temperature: 250 °F

33. Stack serves: ☐ this equipment only, ☒ other equipment (submit type and rating of all other equipment exhausted through this stack or vent)
Pyrolysis and gasification burner systems

34. Stack flow rate: 0.113 acfm Vertically restricted? ☐ Yes ☒ No

## Emissions Calculations (PTE)

35. Calculated emissions for this device

$PM_{10}$ 0.28 Lbs/hr 1.17 Tons/yr | $PM_{2.5}$ 0.28 Lbs/hr 1.17 Tons/yr
$NO_x$ 2.05 Lbs/hr 8.61 Tons/yr | $SO_x$ 0.04 Lbs/hr 0.16 Tons/yr
CO 1.75 Lbs/hr 7.34 Tons/yr | VOC 0.20 Lbs/hr 0.85 Tons/yr
$CO_2$ 18,548 Tons/yr | $CH_4$ 0.4 Tons/yr
$N_2O$ 0.1 Tons/yr
HAPs 0.014 Lbs/hr (speciate) 0.25 Tons/yr (speciate)

Submit calculations as an appendix. If other pollutants are emitted, include the emissions in the appendix.

# Utah Division of Air Quality
**New Source Review Section**

# Form 19
# Natural Gas Boilers and Liquid Heaters

Company Revolution Fuels, LLC
Site/Source Gasification burner system
Date May 8, 2015

## Boiler Information

1. Boiler Manufacturer: ______
2. Model Number: ______ 3. Serial Number: ______
4. Boiler Rating: ______ ($10^6$ Btu per Hour)
5. Operating Schedule: ______ hours per day ______ days per week ______ weeks per year
6. Use: ☐ steam: psig ______ ☐ hot water ☐ other hot liquid: ______
7. Fuels: ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol
   ☐ Process Gas - $H_2S$ content in process gas ______ grain/100cu.ft.
   ☐ Fuel Oil - specify grade: ______ ☐ Other, specify: ______
   Sulfur content ______ % by weight Days per year during which unit is oil fired: ______
   Backup Fuel: ☐ Diesel ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol ☐ Other ______
8. Is unit used to incinerate waste gas liquid stream? ☐ yes ☐ no
   (Submit drawing of method of waste stream introduction to burners)

## Gas Burner Information

9. Gas Burner Manufacturer: Maxon
10. No. of Burners: 5 11. Minimum rating per burner: 277 MMBtu/hr cu. ft/hr
12. Average Load: 92 % 13. Maximum rating per burner: 300 MMBtu/hr cu. ft/hr
14. Performance Guarantee (ppm dry corrected to 3% Oxygen):
    $NO_x$: 0.061 lb/MMBtu CO: 0.052 lb/MMBtu Hydrocarbons: ______
15. Gas burner mode of control: ☒ Manual ☐ Automatic on-off ☐ Automatic hi-low ☐ Automatic full modulation

## Oil Burner Information

16. Oil burner manufacturer:
17. Model: ______ number of burners: ______ Size number: ______
18. Minimum rating per burner: ______ gal/hr 19. Maximum rating per burner: ______ gal/hr

## Form 11 - Natural Gas Boiler and Liquid Heater (Continued)

### Modifications for Emissions Reduction

20. Type of modification: ☒ Low $NO_X$ Burner ☐ Flue Gas Recirculation (FGR) ☐ Oxygen Trim ☐ Other (specify) ____

**For Low-$NO_X$ Burners**

21. Burner Type: ☐ Staged air ☐ Staged fuel ☐ Internal flue gas recirculation ☐ Ceramic ☐ Other (specify): ____

22. Manufacturer and Model Number: Maxon, Kinemax LE

23. Rating: 5 @ 60 $10^6$ BTU/HR

24. Combustion air blower horsepower: ____

**For Flue Gas Recirculation (FGR)**

25. Type: ☐ Induced ☐ Forced Recirculation fan horsepower: ____

26. FGR capacity at full load: ____ scfm ____%FGR

27. FGR gas temperature or load at which FGR commences: ____ °F ____% load

28. Where is recirculation flue gas reintroduced? ____

**For Oxygen Trim Systems**

29. Manufacturer and Model Number: ____

30. Recorder: ☐ yes ☐ no Describe: ____

### Stack or Vent Data

31. Inside stack diameter or dimensions 2.5 ft
Stack height above the ground 30.67 ft
Stack height above the building 20.67 ft

32. Gas exit temperature: 250 °F

33. Stack serves: ☐ this equipment only, ☒ other equipment (submit type and rating of all other equipment exhausted through this stack or vent)
Pyrolysis and gasification burner systems

34. Stack flow rate: 0.113 acfm Vertically restricted? ☐ Yes ☒ No

### Emissions Calculations (PTE)

35. Calculated emissions for this device

| | | | | | |
|---|---|---|---|---|---|
| $PM_{10}$ | 2.50 Lbs/hr | 10.49 Tons/yr | $PM_{2.5}$ | 2.50 Lbs/hr | 10.49 Tons/yr |
| $NO_x$ | 18.30 Lbs/hr | 76.86 Tons/yr | $SO_x$ | 0.35 Lbs/hr | 1.47 Tons/yr |
| CO | 15.60 Lbs/hr | 65.52 Tons/yr | VOC | 1.81 Lbs/hr | 7.59 Tons/yr |
| $CO_2$ | | 165,608 Tons/yr | $CH_4$ | | 3.2 Tons/yr |
| $N_2O$ | | 0.9 Tons/yr | | | |

HAPs 0.62 Lbs/hr (speciate) 2.2 Tons/yr (speciate)

Submit calculations as an appendix. If other pollutants are emitted, include the emissions in the appendix.

# Utah Division of Air Quality
## New Source Review Section

## Form 19
## Natural Gas Boilers and Liquid Heaters

Company Revolution Fuels, LLC
Site/Source Activation/Regen Heater #1
Date May 8, 2015

### Boiler Information

1. Boiler Manufacturer: ______
2. Model Number: ______ 3. Serial Number: ______
4. Boiler Rating: ______ ($10^6$ Btu per Hour)
5. Operating Schedule: ______ hours per day ______ days per week ______ weeks per year
6. Use: ☐ steam: psig ______ ☐ hot water ☐ other hot liquid: ______
7. Fuels:
   - ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol
   - ☐ Process Gas - $H_2S$ content in process gas ______ grain/100cu.ft.
   - ☐ Fuel Oil - specify grade: ______ ☐ Other, specify: ______
   - Sulfur content ______ % by weight Days per year during which unit is oil fired: ______

   Backup Fuel: ☐ Diesel ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol ☐ Other ______
8. Is unit used to incinerate waste gas liquid stream? ☐ yes ☐ no
   (Submit drawing of method of waste stream introduction to burners)

### Gas Burner Information

9. Gas Burner Manufacturer: ______
10. No. of Burners: 1 11. Minimum rating per burner: ______ cu. ft/hr
12. Average Load: ______% 13. Maximum rating per burner: 1.12 MMBtu/hr cu. ft/hr
14. Performance Guarantee (ppm dry corrected to 3% Oxygen):
    $NO_x$: ______ CO: ______ Hydrocarbons: ______
15. Gas burner mode of control: ☐ Manual ☐ Automatic on-off ☐ Automatic hi-low ☐ Automatic full modulation

### Oil Burner Information

16. Oil burner manufacturer:
17. Model: ______ number of burners: ______ Size number: ______
18. Minimum rating per burner: ______ gal/hr 19. Maximum rating per burner: ______ gal/hr

## Form 11 - Natural Gas Boiler and Liquid Heater (Continued)

### Modifications for Emissions Reduction

20. Type of modification: ☒ Low $NO_X$ Burner ☐ Flue Gas Recirculation (FGR)
☐ Oxygen Trim ☐ Other (specify) ______

| For Low-$NO_X$ Burners | |
|---|---|
| 21. Burner Type: ☐ Staged air ☐ Staged fuel ☐ Internal flue gas recirculation ☐ Ceramic ☐ Other (specify): ______ | |
| 22. Manufacturer and Model Number: ______ | |
| 23. Rating: 1.12 $10^6$ BTU/HR | 24. Combustion air blower horsepower: ______ |
| **For Flue Gas Recirculation (FGR)** | |
| 25. Type: ☐ Induced ☐ Forced Recirculation fan horsepower: ______ | |
| 26. FGR capacity at full load: ______ scfm ______%FGR | |
| 27. FGR gas temperature or load at which FGR commences: ______ $^{O}F$ ______% load | |
| 28. Where is recirculation flue gas reintroduced? ______ | |
| **For Oxygen Trim Systems** | |
| 29. Manufacturer and Model Number: ______ | |
| 30. Recorder: ☐ yes ☐ no Describe: ______ | |

| Stack or Vent Data | |
|---|---|
| 31. Inside stack diameter or dimensions 0.5 m<br>Stack height above the ground 7.62 m<br>Stack height above the building na | 32. Gas exit temperature: 700 $^{O}F$ |
| 33. Stack serves: ☒ this equipment only, ☐ other equipment (submit type and rating of all other equipment exhausted through this stack or vent) | |
| 34. Stack flow rate: 1,331 acfm Vertically restricted? ☐ Yes ☒ No | |

### Emissions Calculations (PTE)

35. Calculated emissions for this device

$PM_{10}$ 0.01 Lbs/hr 0.02 Tons/yr; $PM_{2.5}$ 0.01 Lbs/hr 0.02 Tons/yr

$NO_x$ 0.06 Lbs/hr 0.12 Tons/yr; $SO_x$ 0.0007 Lbs/hr 0.001 Tons/yr

CO 0.10 Lbs/hr 0.21 Tons/yr; VOC 0.01 Lbs/hr 0.01 Tons/yr

$CO_2$ 295 Tons/yr; $CH_4$ 0.01 Tons/yr

$N_2O$ 0.002 Tons/yr

HAPs 0.002 Lbs/hr (speciate) 0.008 Tons/yr (speciate)

Submit calculations as an appendix. If other pollutants are emitted, include the emissions in the appendix.

# Utah Division of Air Quality
## New Source Review Section

Company Revolution Fuels, LLC
Site/Source Activation/Regen Heater #2
Date May 8, 2015

## Form 19
## Natural Gas Boilers and Liquid Heaters

### Boiler Information

1. Boiler Manufacturer: ______
2. Model Number: ______ 3. Serial Number: ______
4. Boiler Rating: ______ ($10^6$ Btu per Hour)
5. Operating Schedule: ______ hours per day ______ days per week ______ weeks per year
6. Use: ☐ steam: psig ______ ☐ hot water ☐ other hot liquid: ______
7. Fuels:
   - ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol
   - ☐ Process Gas - $H_2S$ content in process gas ______ grain/100cu.ft.
   - ☐ Fuel Oil - specify grade: ______ ☐ Other, specify: ______
   - Sulfur content ______ % by weight Days per year during which unit is oil fired: ______

   Backup Fuel: ☐ Diesel ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol ☐ Other ______
8. Is unit used to incinerate waste gas liquid stream? ☐ yes ☐ no
   (Submit drawing of method of waste stream introduction to burners)

### Gas Burner Information

9. Gas Burner Manufacturer: ______
10. No. of Burners: 1
11. Minimum rating per burner: ______ cu. ft/hr
12. Average Load: ______%
13. Maximum rating per burner: 0.06 MMBtu/hr cu. ft/hr
14. Performance Guarantee (ppm dry corrected to 3% Oxygen):
    $NO_x$: ______ CO: ______ Hydrocarbons: ______
15. Gas burner mode of control: ☐ Manual ☐ Automatic on-off ☐ Automatic hi-low ☐ Automatic full modulation

### Oil Burner Information

16. Oil burner manufacturer:
17. Model: ______ number of burners: ______ Size number: ______
18. Minimum rating per burner: ______ gal/hr
19. Maximum rating per burner: ______ gal/hr

# Form 11 - Natural Gas Boiler and Liquid Heater
# (Continued)

## Modifications for Emissions Reduction

20. Type of modification: ☒ Low $NO_X$ Burner ☐ Flue Gas Recirculation (FGR)
☐ Oxygen Trim ☐ Other (specify) ____________

| For Low-$NO_X$ Burners | |
|---|---|
| 21. Burner Type: ☐ Staged air ☐ Staged fuel ☐ Internal flue gas recirculation ☐ Ceramic ☐ Other (specify): ____________ | |
| 22. Manufacturer and Model Number: ____________ | |
| 23. Rating: 0.6 $10^6$ BTU/HR | 24. Combustion air blower horsepower: ______ |
| **For Flue Gas Recirculation (FGR)** | |
| 25. Type: ☐ Induced ☐ Forced Recirculation fan horsepower: ____________ | |
| 26. FGR capacity at full load: ______ scfm ______%FGR | |
| 27. FGR gas temperature or load at which FGR commences: ______ °F ______% load | |
| 28. Where is recirculation flue gas reintroduced? ____________ | |
| **For Oxygen Trim Systems** | |
| 29. Manufacturer and Model Number: ____________ | |
| 30. Recorder: ☐ yes ☐ no Describe: ____________ | |

## Stack or Vent Data

| | |
|---|---|
| 31. Inside stack diameter or dimensions 0.3 m<br>Stack height above the ground 7.62 m<br>Stack height above the building na | 32. Gas exit temperature: 649 °F |
| 33. Stack serves: ☒ this equipment only, ☐ other equipment (submit type and rating of all other equipment exhausted through this stack or vent) | |
| 34. Stack flow rate: 554 acfm | Vertically restricted? ☐ Yes ☒ No |

## Emissions Calculations (PTE)

35. Calculated emissions for this device

$PM_{10}$ 0.01 Lbs/hr 0.01 Tons/yr
$NO_x$ 0.03 Lbs/hr 0.03 Tons/yr
CO 0.05 Lbs/hr 0.06 Tons/yr
$CO_2$ 79 Tons/yr
$N_2O$ 0.000 Tons/yr

$PM_{2.5}$ 0.01 Lbs/hr 0.01 Tons/yr
$SO_x$ 0.0004 Lbs/hr 0.000 Tons/yr
VOC 0.00 Lbs/hr 0.00 Tons/yr
$CH_4$ 0.002 Tons/yr

HAPs 0.001 Lbs/hr (speciate) 0.004 Tons/yr (speciate)

Submit calculations as an appendix. If other pollutants are emitted, include the emissions in the appendix.

# Utah Division of Air Quality
## New Source Review Section

## Form 19
## Natural Gas Boilers and Liquid Heaters

Company Revolution Fuels, LLC
Site/Source Product Upgrading Heater #1
Date May 8, 2015

### Boiler Information

1. Boiler Manufacturer: ______
2. Model Number: ______ 3. Serial Number: ______
4. Boiler Rating: ______ ($10^6$ Btu per Hour)
5. Operating Schedule: ______ hours per day ______ days per week ______ weeks per year
6. Use: ☐ steam: psig ______ ☐ hot water ☐ other hot liquid: ______
7. Fuels: ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol
   ☐ Process Gas - $H_2S$ content in process gas ______ grain/100cu.ft.
   ☐ Fuel Oil - specify grade: ______ ☐ Other, specify: ______
   Sulfur content ______ % by weight Days per year during which unit is oil fired: ______
   Backup Fuel: ☐ Diesel ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol ☐ Other ______
8. Is unit used to incinerate waste gas liquid stream? ☐ yes ☐ no
   (Submit drawing of method of waste stream introduction to burners)

### Gas Burner Information

9. Gas Burner Manufacturer: ______
10. No. of Burners: 1 11. Minimum rating per burner: ______ cu. ft/hr
12. Average Load: ______% 13. Maximum rating per burner: 4,85 MMBtu/hr cu. ft/hr
14. Performance Guarantee (ppm dry corrected to 3% Oxygen):
    $NO_x$: ______ CO: ______ Hydrocarbons: ______
15. Gas burner mode of control: ☐ Manual ☐ Automatic on-off ☐ Automatic hi-low ☐ Automatic full modulation

### Oil Burner Information

16. Oil burner manufacturer:
17. Model: ______ number of burners: ______ Size number: ______
18. Minimum rating per burner: ______ gal/hr 19. Maximum rating per burner: ______ gal/hr

## Form 11 - Natural Gas Boiler and Liquid Heater
## (Continued)

### Modifications for Emissions Reduction

20. Type of modification: ☒ Low $NO_X$ Burner ☐ Flue Gas Recirculation (FGR)
☐ Oxygen Trim ☐ Other (specify) ____

| For Low-$NO_X$ Burners | |
|---|---|
| 21. Burner Type: ☐ Staged air ☐ Staged fuel ☐ Internal flue gas recirculation ☐ Ceramic ☐ Other (specify): ____ | |
| 22. Manufacturer and Model Number: ____ | |
| 23. Rating: 4.85 $10^6$ BTU/HR | 24. Combustion air blower horsepower: ____ |
| **For Flue Gas Recirculation (FGR)** | |
| 25. Type: ☐ Induced ☐ Forced Recirculation fan horsepower: ____ | |
| 26. FGR capacity at full load: ____ scfm ____%FGR | |
| 27. FGR gas temperature or load at which FGR commences: ____ °F ____% load | |
| 28. Where is recirculation flue gas reintroduced? ____ | |
| **For Oxygen Trim Systems** | |
| 29. Manufacturer and Model Number: ____ | |
| 30. Recorder: ☐ yes ☐ no Describe: ____ | |

### Stack or Vent Data

| | |
|---|---|
| 31. Inside stack diameter or dimensions 0.2032 m<br>Stack height above the ground 15.24 m<br>Stack height above the building na | 32. Gas exit temperature: 789.5 °F |
| 33. Stack serves: ☒ this equipment only, ☐ other equipment (submit type and rating of all other equipment exhausted through this stack or vent) | |
| 34. Stack flow rate: 723 acfm | Vertically restricted? ☐ Yes ☒ No |

### Emissions Calculations (PTE)

35. Calculated emissions for this device

$PM_{10}$ 0.04 Lbs/hr 0.15 Tons/yr   $PM_{2.5}$ 0.04 Lbs/hr 0.15 Tons/yr
$NO_x$ 0.24 Lbs/hr 1.0 Tons/yr   $SO_x$ 0.0029 Lbs/hr 0.01 Tons/yr
CO 0.40 Lbs/hr 1.68 Tons/yr   VOC 0.03 Lbs/hr 0.11 Tons/yr
$CO_2$ 2,396 Tons/yr   $CH_4$ 0.05 Tons/yr
$N_2O$ 0.01 Tons/yr
HAPs 0.0019 Lbs/hr (speciate) 0.0067 Tons/yr (speciate)

Submit calculations as an appendix. If other pollutants are emitted, include the emissions in the appendix.

# Utah Division of Air Quality
## New Source Review Section

Company Revolution Fuels, LLC
Site/Source Product Upgrading Heater #2
Date May 8, 2015

## Form 19
## Natural Gas Boilers and Liquid Heaters

| Boiler Information | |
|---|---|
| 1. Boiler Manufacturer: ______ | |
| 2. Model Number: ______ | 3. Serial Number: ______ |
| 4. Boiler Rating: ______ ($10^6$ Btu per Hour) | |
| 5. Operating Schedule: ______ hours per day ______ days per week ______ weeks per year | |
| 6. Use: ☐ steam: psig ______ ☐ hot water ☐ other hot liquid: ______ | |
| 7. Fuels: | ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol<br>☐ Process Gas - $H_2S$ content in process gas ______ grain/100cu.ft. |
| | ☐ Fuel Oil - specify grade: ______ ☐ Other, specify: ______<br>Sulfur content ______ % by weight Days per year during which unit is oil fired: ______ |
| Backup Fuel | ☐ Diesel ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol ☐ Other ______ |
| 8. Is unit used to incinerate waste gas liquid stream? ☐ yes ☐ no<br>(Submit drawing of method of waste stream introduction to burners) | |

| Gas Burner Information | |
|---|---|
| 9. Gas Burner Manufacturer: ______ | |
| 10. No. of Burners: 1 | 11. Minimum rating per burner: ______ cu. ft/hr |
| 12. Average Load: ______% | 13. Maximum rating per burner: 10.25 MMBtu/hr cu. ft/hr |
| 14. Performance Guarantee (ppm dry corrected to 3% Oxygen):<br>$NO_x$: ______ CO: ______ Hydrocarbons: ______ | |
| 15. Gas burner mode of control: ☐ Manual ☐ Automatic on-off<br>☐ Automatic hi-low ☐ Automatic full modulation | |

| Oil Burner Information | |
|---|---|
| 16. Oil burner manufacturer: | |
| 17. Model: ______ number of burners: ______ Size number: ______ | |
| 18. Minimum rating per burner: ______ gal/hr | 19. Maximum rating per burner: ______ gal/hr |

## Form 11 - Natural Gas Boiler and Liquid Heater (Continued)

### Modifications for Emissions Reduction

20. Type of modification: ☒ Low $NO_X$ Burner ☐ Flue Gas Recirculation (FGR)
☐ Oxygen Trim ☐ Other (specify) ____________

**For Low-$NO_X$ Burners**

21. Burner Type: ☐ Staged air ☐ Staged fuel ☐ Internal flue gas recirculation
☐ Ceramic ☐ Other (specify): ____________

22. Manufacturer and Model Number: ____________

23. Rating: 10.25 $10^6$ BTU/HR

24. Combustion air blower horsepower: ____________

**For Flue Gas Recirculation (FGR)**

25. Type: ☐ Induced ☐ Forced Recirculation fan horsepower: ____________

26. FGR capacity at full load: ______ scfm ______%FGR

27. FGR gas temperature or load at which FGR commences: ______ °F ______% load

28. Where is recirculation flue gas reintroduced? ____________

**For Oxygen Trim Systems**

29. Manufacturer and Model Number: ____________

30. Recorder: ☐ yes ☐ no Describe: ____________

### Stack or Vent Data

31. Inside stack diameter or dimensions 0.305 m
Stack height above the ground 15.24 m
Stack height above the building na

32. Gas exit temperature: 704 °F

33. Stack serves: ☐ this equipment only, ☐ other equipment (submit type and rating of all other equipment exhausted through this stack or vent)

34. Stack flow rate: 2,356 acfm Vertically restricted? ☐ Yes ☒ No

### Emissions Calculations (PTE)

35. Calculated emissions for this device

$PM_{10}$ 0.08 Lbs/hr 0.32 Tons/yr
$PM_{2.5}$ 0.08 Lbs/hr 0.32 Tons/yr
$NO_x$ 0.5 Lbs/hr 2.11 Tons/yr
$SO_x$ 0.006 Lbs/hr 0.03 Tons/yr
CO 0.84 Lbs/hr 3.55 Tons/yr
VOC 0.06 Lbs/hr 0.23 Tons/yr
$CO_2$ 5,065 Tons/yr
$CH_4$ 0.1 Tons/yr
$N_2O$ 0.03 Tons/yr
HAPs 0.019 Lbs/hr (speciate) 0.067 Tons/yr (speciate)

Submit calculations as an appendix. If other pollutants are emitted, include the emissions in the appendix.

**Utah Division of Air Quality**
**New Source Review Section**

Company Revolution Fuels, LLC
Site/Source Auxiliary Boiler
Date May 8, 2015

## Form 19
## Natural Gas Boilers and Liquid Heaters

### Boiler Information

1. Boiler Manufacturer: TBD

2. Model Number: TBD | 3. Serial Number: ______

4. Boiler Rating: 73.88 ($10^6$ Btu per Hour)

5. Operating Schedule: 1.5 hours per day 7 days per week 47 weeks per year

6. Use: ☒ steam: psig 700 ☐ hot water ☐ other hot liquid: ______

7. Fuels: ☒ Natural Gas ☐ LPG ☐ Butane ☐ Methanol

☐ Process Gas - $H_2S$ content in process gas ______ grain/100cu.ft.

☐ Fuel Oil - specify grade: ______ ☐ Other, specify: ______

Sulfur content ______ % by weight Days per year during which unit is oil fired: ______

Backup Fuel: ☐ Diesel ☐ Natural Gas ☐ LPG ☐ Butane ☐ Methanol ☐ Other ______

8. Is unit used to incinerate waste gas liquid stream? ☐ yes ☒ no

(Submit drawing of method of waste stream introduction to burners)

### Gas Burner Information

9. Gas Burner Manufacturer: ______

10. No. of Burners: ______ | 11. Minimum rating per burner: ______ cu. ft/hr

12. Average Load: ______% | 13. Maximum rating per burner: ______ cu. ft/hr

14. Performance Guarantee (ppm dry corrected to 3% Oxygen):

$NO_x$: ______ CO: ______ Hydrocarbons: ______

15. Gas burner mode of control: ☐ Manual ☐ Automatic on-off ☐ Automatic hi-low ☐ Automatic full modulation

### Oil Burner Information

16. Oil burner manufacturer:

17. Model: ______ number of burners: ______ Size number: ______

18. Minimum rating per burner: ______ gal/hr | 19. Maximum rating per burner: ______ gal/hr

## Form 11 - Natural Gas Boiler and Liquid Heater
## (Continued)

### Modifications for Emissions Reduction

20. Type of modification: ☒ Low $NO_X$ Burner ☐ Flue Gas Recirculation (FGR)
☐ Oxygen Trim ☐ Other (specify) ____

| For Low-$NO_X$ Burners | |
|---|---|
| 21. Burner Type: ☐ Staged air ☐ Staged fuel ☐ Internal flue gas recirculation ☐ Ceramic ☐ Other (specify): ____ | |
| 22. Manufacturer and Model Number: TBD | |
| 23. Rating: 73.88 $10^6$ BTU/HR | 24. Combustion air blower horsepower: ____ |
| **For Flue Gas Recirculation (FGR)** | |
| 25. Type: ☐ Induced ☐ Forced Recirculation fan horsepower: ____ | |
| 26. FGR capacity at full load: ____ scfm ____%FGR | |
| 27. FGR gas temperature or load at which FGR commences: ____ $^OF$ ____% load | |
| 28. Where is recirculation flue gas reintroduced? ____ | |
| **For Oxygen Trim Systems** | |
| 29. Manufacturer and Model Number: ____ | |
| 30. Recorder: ☐ yes ☐ no Describe: ____ | |

### Stack or Vent Data

| 31. Inside stack diameter or dimensions 0.92 m<br>Stack height above the ground 15.24 m<br>Stack height above the building na | 32. Gas exit temperature: 348.5 $^OF$ |
|---|---|
| 33. Stack serves: ☒ this equipment only, ☐ other equipment (submit type and rating of all other equipment exhausted through this stack or vent) | |
| 34. Stack flow rate: 6,543 acfm | Vertically restricted? ☐ Yes ☒ No |

### Emissions Calculations (PTE)

35. Calculated emissions for this device

$PM_{10}$ 0.55 Lbs/hr 0.14 Tons/yr
$PM_{2.5}$ 0.55 Lbs/hr 0.14 Tons/yr
$NO_x$ 3.62 Lbs/hr 0.91 Tons/yr
$SO_x$ 0.04 Lbs/hr 0.01 Tons/yr
CO 6.08 Lbs/hr 1.52 Tons/yr
VOC 0.40 Lbs/hr 0.10 Tons/yr
$CO_2$ 2,173 Tons/yr
$CH_4$ 0.04 Tons/yr
$N_2O$ 0.01 Tons/yr
HAPs 0.136 Lbs/hr (speciate) 0.034 Tons/yr (speciate)

Submit calculations as an appendix. If other pollutants are emitted, include the emissions in the appendix.

# Power Generation

# Exhaust Emission Data Sheet
# 1000DQFAD
## 60 Hz Diesel Generator Set

**Engine Information:**

| | | | |
|---|---|---|---|
| Model: | Cummins Inc. QST30-G5 NR2 | Bore: | 5.51 in. (139 mm) |
| Type: | 4 Cycle, 50°V, 12 Cylinder Diesel | Stroke: | 6.5 in. (165 mm) |
| Aspiration: | Turbocharged and Low Temperature aftercooled | Displacement: | 1860 cu. in. (30.4 liters) |
| Compression Ratio: | 14.7:1 | | |
| Emission Control Device: | Aftercooled (Air-to-Air) | | |

| PERFORMANCE DATA | 1/4 Standby | 1/2 Standby | 3/4 Standby | Full Standby | Full Prime | |
|---|---|---|---|---|---|---|
| BHP @ 1800 RPM (60 Hz) | 371 | 741 | 1112 | 1482 | 1322 | |
| Fuel Consumption (gal/Hr) | 19.1 | 35.8 | 54.1 | 72.2 | 63.9 | |
| Exhaust Gas Flow (CFM) | 2780 | 4500 | 6370 | 7540 | 6950 | |
| Exhaust Gas Temperature (°F) | 620 | 760 | 814 | 890 | 873 | |
| | | | | | | |
| **EXHAUST EMISSION DATA** | | | | | | |
| | | | | | | |
| HC (Total Unburned Hydrocarbons) | 0.12 | 0.10 | 0.08 | 0.07 | 0.08 | |
| NOx (Oxides of Nitrogen as NO2) | 4.17 | 5.20 | 3.87 | 3.95 | 4.00 | |
| CO (carbon Monoxide) | 0.66 | 0.36 | 0.48 | 0.66 | 0.58 | |
| PM (Particular Matter) | 0.19 | 0.15 | 0.12 | 0.11 | 0.11 | |
| SO2 (Sulfur Dioxide) | 0.11 | 0.10 | 0.10 | 0.11 | 0.10 | |
| Smoke (Bosch) | 0.88 | 0.80 | 0.79 | 0.73 | 0.75 | |
| All Values are Grams/HP-Hour, Smoke is Bosch # | | | | | | |

**TEST CONDITIONS**

Data was recorded during steady-state rated engine speed (± 25 RPM) with full load (±2%). Pressures, temperatures, and emission rates were stabilized.

| | |
|---|---|
| Fuel Specification: | 46.5 Cetane Number, 0.035 Wt.% Sulfur; Reference ISO8178-5, 40CFR86.1313-98 Type 2-D and ASTM D975 No. 2-D. |
| Fuel Temperature: | 99 ± 9 °F (at fuel pump inlet) |
| Intake Air Temperature: | 77 ± 9 °F |
| Barometric Pressure: | 29.6 ± 1 in. Hg |
| Humidity: | NOx measurement corrected to 75 grains H2O/lb dry air |
| Reference Standard: | ISO 8178 |

The NOx, HC, CO and PM emission data tabulated here were taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

# Utah Division of Air Quality
## New Source Review Section

## Form 11
## Internal Combustion Engines

Company Revolution Fuels, LLC
Site/Source Fire Pump Engine
Date May 8, 2015

| Equipment Information | |
|---|---|
| 1. Manufacturer: Cummins<br>Model no.: CFP7E-F50<br>The date the engine was constructed or reconstructed June 2014 | 2. Operating time of Emission Source:<br>average: ______ Hours/day, ______ Days/week, ______ Weeks/year<br>maximum: ______ Hours/day, ______ Days/week, ______ Weeks/year |
| 3. Manufacturer's rated output at baseload, ISO 220 hp or ____ Kw<br>Proposed site operating range 220 hp or ____ Kw | |
| **Gas Firing** | |
| 4. Are you operating site equipment on pipeline quality natural gas: ☐ Yes ☐ No | |
| 5. Are you on an interruptible gas supply:<br>☐ Yes ☐ No<br>If "yes", specify alternate fuel: ______________ | 6. Annual consumption of fuel:<br>______________ MMSCF/Year |
| 7. Maximum firing rate:<br>______________ BTU/hr | 8. Average firing rate:<br>______________ BTU/hr |
| **Oil Firing** | |
| 9. Type of oil:<br>Grade number ☐ 1 ☒ 2 ☐ 4 ☐ 5 ☐ 6 Other specify ________ | |
| 10. Annual consumption: 5,474 gallons | 11. Heat content: ________ BTU/lb or<br>137,000 BTU/gal |
| 12. Sulfur content: 0.015 % by weight<br>14. Average firing rate: 10.95 gal/hr | 13. Ash content: ________ % by weight<br>15. Maximum firing rate: ________ gal/hr |
| 16. Direction of firing: ☐ horizontal ☐ tangential ☐ other: (specify) | |

## Internal Combustion Engine
## Form 11 (Continued)

### Operation

17. Application:

- ☐ Electric generation
  ______ Base load ______ Peaking
- ☐ Emergency Generator
- ☒ Driving pump/compressor
- ☐ Exhaust heat recovery
- ☐ Other (specify) ________________________

18. Cycle

- ☒ Simple cycle
- ☐ Regenerative cycle
- ☐ Cogeneration
- ☐ Combined cycle

### Emissions Data

19. Manufacturer's Emissions in grams per hour (gr/hp-hr): 2.475 $NO_X$ 1.193 CO 0.062 VOC
_______ Formaldehyde

20. Attach manufacturer's information showing emissions of $NO_x$, CO, VOC, $SO_x$, $CH_2O$, $PM_{10}$, $PM_{2.5}$, $CO_2$, $CH_4$ and $N_2O$ for each proposed fuel at engine loads and site ambient temperatures representative of the range of proposed operation. The information must be sufficient to determine maximum hourly and annual emission rates. Annual emissions may be based on a conservatively low approximation of site annual average temperature. Provide emissions in pounds per hour and except for $PM_{10}$ and $PM_{2.5}$ parts per million by volume (ppmv) at actual conditions and corrected to dry, 15% oxygen conditions.

**Method of Emission Control:**

- ☐ Lean premix combustors
- ☐ Oxidation catalyst
- ☐ Water injection
- ☐ Other (specify) Turbocharged
- ☐ Other low-$NO_x$ combustor
- ☐ SCR catalyst
- ☐ Steam injection

### Additional Information

21. On separate sheets provide the following:

A. Details regarding principle of operation of emission controls. If add-on equipment is used, provide make and model and manufacturer's information. Example details include: controller input variables and operational algorithms for water or ammonia injection systems, combustion mode versus engine load for variable mode combustors, etc.

B. Exhaust parameter information on attached form.

C. All calculations used for the annual emission estimates must be submitted with this form to be deemed complete.

D. All formaldehyde emissions must be modeled as per Utah Administrative Code R307-410-5 using SCREEN3.

E. If this form is filled out for a new source, forms 1 and 2 must be submitted also.

EPA Tier 3 Emission Data
Fire Pump NSPS Compliant

# CFP7E-F50 Fire Pump Driver

**Type: 4 Cycle; In-Line; 6 Cylinder**
**Aspiration: Turbocharged, Charge Air Cooled**

| 15 PPM Diesel Fuel | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Fuel Consumption** | | **D2 Cycle Exhaust Emissions** | | | | | | | | | | **Exhaust** | | | |
| | | | | **Grams per BHP - HR** | | | | | **Grams per kW - HR** | | | | | Temperature | | Gas Flow | |
| RPM | BHP | Gal/Hr | L/hr | NMHC | NOx | NMHC+NOx | CO | PM | NMHC | NOx | NMHC+NOx | CO | PM | °F | °C | CFM | L/sec |
| 1470 | 205 | 10.6 | 40.1 | | | | | | | | | | | 978 | 526 | 1117 | 527 |
| 1760 | 235 | 12.1 | 45.8 | | | | | | | | | | | 957 | 514 | 1280 | 604 |
| 1900 | 218 | 11.3 | 42.8 | | | | | | | | | | | 887 | 475 | 1263 | 596 |
| 2100 | 229 | 12.0 | 45.4 | 0.062 | 2.475 | 2.537 | 1.193 | 0.111 | 0.083 | 3.319 | 3.402 | 1.600 | 0.149 | 902 | 483 | 1390 | 656 |
| 2350 | 231 | 12.4 | 46.9 | | | | | | | | | | | 925 | 496 | 1538 | 726 |
| 2600 | 234 | 13.2 | 50.0 | | | | | | | | | | | 1018 | 548 | 1692 | 799 |
| 2700 | 171 | 9.6 | 36.3 | | | | | | | | | | | 1007 | 542 | 1556 | 734 |

The emissions values above are based on CARB approved calculations for converting EPA (500 ppm) fuel to CARB (15 ppm) fuel.

| 300-4000 PPM Diesel Fuel | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Fuel Consumption** | | **D2 Cycle Exhaust Emissions** | | | | | | | | | | **Exhaust** | | | |
| | | | | **Grams per BHP - HR** | | | | | **Grams per kW - HR** | | | | | Temperature | | Gas Flow | |
| RPM | BHP | Gal/Hr | L/hr | NMHC | NOx | NMHC+NOx | CO | PM | NMHC | NOx | NMHC+NOx | CO | PM | °F | °C | CFM | L/sec |
| 1470 | 205 | 10.6 | 40.1 | | | | | | | | | | | 978 | 526 | 1117 | 527 |
| 1760 | 235 | 12.1 | 45.8 | | | | | | | | | | | 957 | 514 | 1280 | 604 |
| 1900 | 218 | 11.3 | 42.8 | | | | | | | | | | | 887 | 475 | 1263 | 596 |
| 2100 | 229 | 12.0 | 45.4 | 0.075 | 2.685 | 2.759 | 1.193 | 0.127 | 0.1 | 3.600 | 3.700 | 1.600 | 0.170 | 902 | 483 | 1390 | 656 |
| 2350 | 231 | 12.4 | 46.9 | | | | | | | | | | | 925 | 496 | 1538 | 726 |
| 2600 | 234 | 13.2 | 50.0 | | | | | | | | | | | 1018 | 548 | 1692 | 799 |
| 2700 | 171 | 9.6 | 36.3 | | | | | | | | | | | 1007 | 542 | 1556 | 734 |

**QSB6.7** Base Model Manufactured by Cummins Inc.
- Using fuel rating 91422

**Reference EPA Standard Engine Family: ECEXL0409AAB**

**No special options needed to meet current regulation emissions for all 50 states**

**Test Methods:**
EPA/CARB Nonroad emissions recorded per 40CFR89 (ref. ISO8178-1) and weighted at load points prescribed in Subpart E, Appendix A, for Constant Speed Engines (ref. ISO8178-4, D2).

**Diesel Fuel Specifications:**
Cetane Number: 40-48
Reference: ASTM D975 No. 2-D

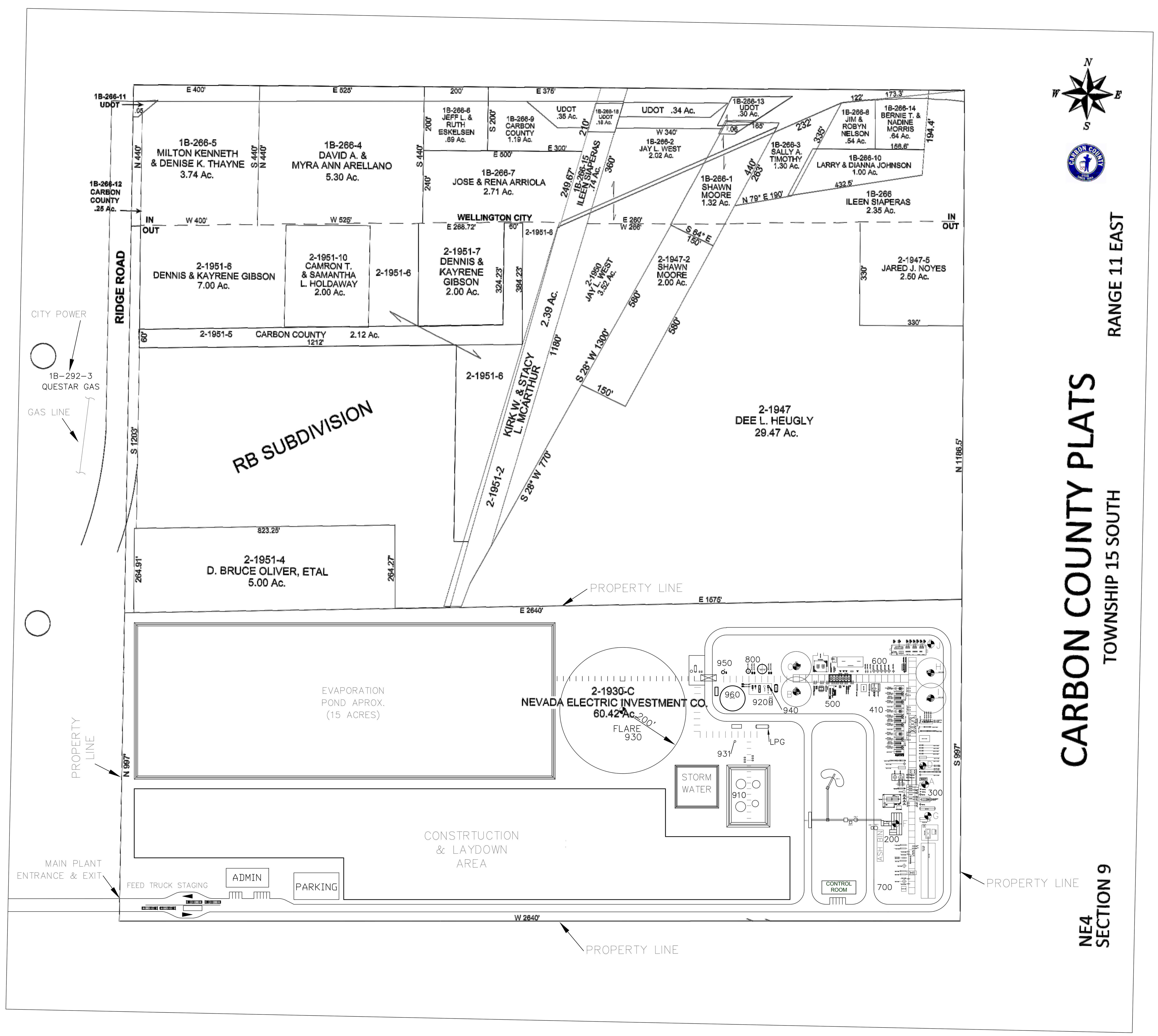
**Reference Conditions:**
Air Inlet Temperature: 25°C (77°F)
Fuel Inlet Temperature: 40°C (104°F)
Barometric Pressure: 100 kPa (29.53 in Hg)
Humidity: 10.7 g/kg (75 grains $H_2O$/lb) of dry air; required for NOx correction

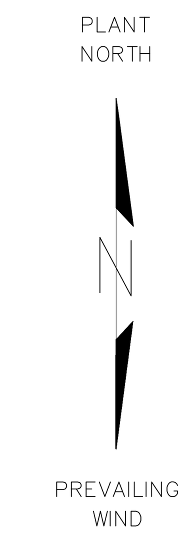
Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to maximum allowable limit.

**Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results.**

Revision:
June 2014: Document Review & Approved

# Appendix B Facility Plot Plan




| UNIT NO. | DESCRIPTION | RESPONSIBILTY | DRAWING NO. |
|---|---|---|---|
| 000 | COMMON | FLUOR | TBD |
| 110 | FEED RECEIVING/ STORAGE/RECLAIM & TRANSFER | TCG GLOBAL | TBD |
| 210 | GASIFICATION SYSTEM– STEAM AND PYROLYSIS | TCG GLOBAL | P1–FLOORPLAN |
| 220 | GASIFICATION SYSTEM– STEAM REFORMER | TCG GLOBAL | P1–FLOORPLAN |
| 230 | WATER SCRUBBING/IONIZED WATER SYSTEM/FILTRATION | TCG GLOBAL | P1–FLOORPLAN |
| 240 | ASH HANDLING AND STORAGE | FLUOR | TBD |
| 310 | SYNGAS COMPRESSION | FLUOR | TBD |
| 320 | CO2 REMOVAL | FLUOR | TBD |
| 330 | GUARD BED | FLUOR | TBD |
| 410 | FISCHER–TROPSCH (FT) SYNTHESIS | VELOCYS | TBD |
| 510 | HYDRO–PROCESSING | HALDOR TOPSOE | M71090–00 |
| 520 | DISTILLATION | HALDOR TOPSOE | M71090–00 |
| 610 | PRESSURE SWING ADSORPTION (PSA) | FLUOR | TBD |
| 630 | TAIL GAS COMPRESSION | FLUOR | TBD |
| 710 | STEAM TURBINE GENERATOR | FLUOR | TBD |
| 720 | AUXILIARY BOILER | FLUOR | THIS DWG |
| 730 | STEAM/CONDENSATE SYSTEM | FLUOR | TBD |
| 740 | BOILER FEEDWATER (BFW) SYSTEM | FLUOR | TBD |
| 750 | EMERGENCY GENERATOR(DIESEL) | FLUOR | THIS DWG |
| 810 | RAW WATER TREATMENT | FLUOR | TBD |
| 820 | WASTEWATER TREATMENT | FLUOR | TBD |
| 900 | INTERCONNECTING PIPERACK | FLUOR | THIS DWG |
| 910 | STORAGE TANKS | FLUOR | THIS DWG |
| 920 | COOLING WATER SYSTEM | FLUOR | TBD |
| 930 | FLARE SYSTEM | FLUOR | THIS DWG |
| 931 | FUEL GAS | FLUOR | THIS DWG |
| 940 | PLANT/INSTRUMENT AIR SYSTEM | FLUOR | THIS DWG |
| 950 | NITROGEN SYSTEM | FLUOR | THIS DWG |
| 960 | FIRE WATER/ FIRE PROTECTION SYSTEM | FLUOR | TBD |
| 970 | OILY WATER SEWER | FLUOR | TBD |
| 980 | CONTROL SYTEMS | FLUOR | TBD |
| 990 | ELECTRICAL | FLUOR | THIS DWG |
| 991 | BUILDINGS | FLUOR | THIS DWG |
| 992 | COMMUNICATIONS | FLUOR | NA |
| 993 | SITE PREPERATION/ SITE IMPROVEMENT | FLUOR | NA |

| EMISSION POINTS | DESCRIPTION | NORTH | EAST | ELEV. |
|---|---|---|---|---|
| A | CO2 VENT | | | |
| B | H–311 | | | |
| C | H–321 | | | |
| D | REGENERATOR AIR VENT | | | |
| E | FLARE | | | |
| F | GASIFICATION | | | |
| G | AUX BOILER | | | |
| H | OXIDATION AIR HEATER | | | |
| I | REGENERATION HYDROGEN HEATER | | | |
| J | DIESEL GENERATOR | | | |

TCG Coal & Ash Handling
200-1: Coal storage pile
200-2: Truck unloading
200-3: Coal handling baghouse
200-4: Coal silo baghouse
240-1: Ash handling baghouse
240-2: Ash bin baghouse

LEGEND

EMISSION POINT

0 50 100 200 300 400

REDUCED PRINT SCALE 1"=200'-0"

HPFS EL. 100'-0"
ACTUAL EL. FT

| REV | DATE | REVISION DESCRIPTION | BY | CHK | APPV | REV | DATE | REVISION DESCRIPTION | BY | CHK | APPV | REFERENCE DWG NUMBER | REFERENCE DRAWINGS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 3MAR15 | ISSUED FOR CLIENT REVIEW | HB | MB | HB | | | | | | | | |

FLUOR



CONTRACT A6SF
DESIGNED BY H. BORGE
CHECKED BY M. BOWER
SUPERVISOR — APP DATE
LEAD ENGR/SPEC. H. BORGE — APP DATE
FLUOR P. NIH — APP DATE
CLIENT — APP DATE

# REVOLUTION FUELS PROJECT

## SITE PLAN

PRICE, UTAH

SCALE 1"=200'
DRAWING NUMBER A6SF–250–PP–003
REV B
CAD FILE NAME A6SF-250-PP-003.DGN

## Table B-1: Point Source Stack Parameters

| Source Description | Easting (x) | Northing (Y) | Base Elevation | Stack Height | Temperature | Exit Velocity | Stack Diameter |
|---|---|---|---|---|---|---|---|
| | (m) | (m) | (m) | (m) | (K) | (m/s) | (m) |
| Coal handling baghouse | 527072.00 | 4376334.00 | 1643.58 | 3.66 | 0.00 | 40.45 | 0.6096 |
| Coal silo baghouse | 527077.00 | 4376337.00 | 1643.64 | 17.98 | 0.00 | 40.45 | 0.6096 |
| Gasification flue gas | 527116.00 | 4376333.00 | 1643.92 | 9.35 | 394.26 | 116.59 | 0.76 |
| Ash handling baghouse | 527093.00 | 4376330.00 | 1643.65 | 3.6576 | 338.71 | 40.45 | 0.6096 |
| Ash bin baghouse | 527095.00 | 4376330.00 | 1643.66 | 17.983 | 338.71 | 40.45 | 0.6096 |
| Flare pilot | 526851.00 | 4376441.00 | 1645.03 | 15.24 | 699.82 | 61 | 0.61 |
| Activation/Regeneration Heater #1 | 527149.00 | 4376478.00 | 1645.27 | 7.62 | 644.26 | 3.2 | 0.5 |
| Activation/Regeneration Heater #2 | 527149.00 | 4376453.00 | 1644.87 | 7.62 | 616.48 | 3.7 | 0.3 |
| Product Upgrading Heater #1 | 527019.00 | 4376459.00 | 1645.53 | 15.24 | 694.26 | 10.5156 | 0.2032 |
| Product Upgrading Heater #2 | 527019.00 | 4376483.00 | 1646 | 15.24 | 647.04 | 10.668 | 0.3048 |
| Auxiliary boiler | 527147.00 | 4376340.00 | 1644.45 | 15.24 | 449.82 | 12.4968 | 0.9144 |
| Emergency generator (diesel) | 527149.00 | 4376505.00 | 1646.02 | 3.81 | 749.82 | 70.229 | 0.254 |
| Fire water pump (diesel) | 526942.00 | 4376455.00 | 1645.52 | 3.66 | 748.15 | 47.055 | 0.127 |
| Cooling Tower | 526995.00 | 4376450.00 | 1645.36 | 10.058 | 313.71 | 15.24 | 0.6096 |

**Table B-2: Building Dimensions**

| Building Description | Length | Width | Height |
|---|---|---|---|
| | (ft) | (ft) | (ft) |
| Administration | 80 | 32 | 15 |
| Compressor building N (N of 500) | 82 | 32 | 25 |
| Compressor building S (N of EU F) | 46 | 22 | 25 |
| MCC building and substation (N of 600) | 109 | 32 | 15 |
| Control room (S of coal pile) | 109 | 56 | 15 |
| Gasification footprint | 100 | 60 | 10 |

# Appendix C Emission Calculations and MSDS

**Operational Parameter Assumptions**

| Coal Feed and Crushing | Parameter | Units | Description/Comment |
|---|---|---|---|
| Coal feed conveyor throughput | 273,750 | ton/yr | Total coal feed throughput to crushing circuit; 500 tpd + 50% for 365 day/yr |
| Coal moisture content | 10 | % | |
| | | | |
| **Gasification- Gasifier Reactor** | | | |
| Coal Throughput | 500 | ton/day | Dry basis |
| Burner system #1 | 33.6 | MMBtu/hr | Pyrolysis burner system will included (3) 6-inch Kinemax LE burners each providing a maximum of 11.2 MMBtu/hr |
| Burner system #2 | 300 | MMBtu/hr | Coil burner system will include (5) 14-inch Kinemax LE burners each providing a maximum of 60 MMBtu/hr |
| Fuel heat content | 913 | Btu/scf | |
| Gasification system- operating hrs | 8,400 | hr/yr | |
| Flue gas- operating hrs | 8,400 | hr/yr | |
| | | | |
| **Syngas Compression and Amine $CO_2$ Removal** | | | |
| $CO_2$ vent- operating hours | 8,400 | hr/yr | |
| | | | |
| **Fischer-Tropsch (FT) Synthesis** | | | |
| FT Activation/Regeneration Heater #1- size | 1.12 | MMBtu/hr | Equipt with low NOx burner |
| FT Activation/Regeneration Heater #1- operating hrs | 4,032 | hr/yr | |
| FT Activation/Regeneration Heater #2- size | 0.60 | MMBtu/hr | Equipt with low NOx burner |
| FT Activation/Regeneration Heater #2- operating hrs | 2,016 | hr/yr | |
| FT Activation/Regeneration Heater Fuel Heat Content | 918 | Btu/scf | |
| Purge stream- min | 36,960 | min lb/yr | Air diluted with nitrogen, contains CO2 |
| Purge stream- max | 59,136 | max lb/yr | The Fischer-Tropsch Synthesis process is a closed loop system. There are fugitive VOCs via equipment leaks. |
| Purge stream- operating hrs | 1,344 | hr/yr | |
| | | | |
| **Product Upgrading (Hydrotreating and Fractionation)** | | | |
| Product Upgrading Fired Heater #1- size | 4.85 | MMBtu/hr | |
| Product Upgrading Fired Heater #1- operating hrs | 8,400 | hr/yr | |
| Product Upgrading Fired Heater #2- size | 10.25 | MMBtu/hr | |
| Product Upgrading Fired Heater #2- operating hrs | 8,400 | hr/yr | |
| Product Upgrading Fired Heater Fuel Heat Content | 1020 | Btu/scf | |
| | | | |
| **Flare Pilot** | | | |
| Burner size | 1 | MMBtu/hr | |
| Flare Pilot operating hours | 8,760 | hr/yr | |
| | | | |
| **Cooling Towers** | | | |
| Number of cooling towers | 1 | | |
| Water vapor emissions | 10,308 | lb/hr | Based on preliminary engineering design from Fluor |
| Water total dissolved solids content | 380 | ppm | Based on lower range of AP-42 Table 13.4-2; assuming reverse osmosis quality water |
| Cooling Tower- operating hours | 8,400 | hr/yr | |
| | | | |
| **Ash Handling** | | | |
| Pyrolysis ash vibrating conveyor throughput | 52,560 | ton/yr | Based on 6,000 lb/hr * 200% |
| Coil ash vibrating conveyor | 4,818 | ton/yr | Based on 550 lb/hr * 200% |
| Ash covered day bin | 57,378 | ton/yr | Sum of pyrolysis ash conveyor and ash day bin |
| | | | |
| **Auxillary Systems** | | | |
| Emergency generator (diesel)- size | 1,482 | Hp | |
| Emergency generator (diesel)- operating hours | 500 | hr/yr | |
| Auxillary boiler- size | 73.88 | MMBtu/hr | |
| Auxillary boiler- operating hours | 500 | hr/yr | |
| Fire water pump (diesel)- size | 220 | Hp | |
| Fire water pump (diesel)- operating hours | 500 | Hr/yr | |
| | | | |
| | | | |
| ac - acre (43,560 ft2, 4840 yd2) | | | |
| ft - feet | | | |
| gal - gallon | | | |
| Hp- Horsepower | | | |
| in - inch | | | |
| lb - pound | | | |
| mi - mile | | | |
| MMBtu/hr - million British Thermal Units per hour | | | |
| % - percent | | | |
| $yd^3$ - cubic yard | | | |
| hours/year - 8,760 | | | |
| pounds/ton - 2,000 | | | |

**FACILITY WIDE POTENTIAL TO EMIT**

| Source ID | Source Description | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | Lead | | $CO_2$ | | $N_2O$ | | $CH_4$ | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| | Truck unloading | | | | | | | | | 0.07 | 0.10 | 0.01 | 0.01 | | | | | | | | | | |
| | Coal storage pile- wind erosion | | | | | | | | | 0.36 | 1.36 | 0.05 | 0.20 | | | | | | | | | | |
| | Paved haul road | | | | | | | | | 0.04 | 0.07 | 0.01 | 0.02 | | | | | | | | | | |
| 200-3 | Coal handling baghouse | | | | | | | | | 0.01 | 0.01 | 0.00 | 0.00 | | | | | | | | | | |
| 200-4 | Coal silo baghouse | | | | | | | | | 0.02 | 0.03 | 0.01 | 0.02 | | | | | | | | | | |
| F | Gasification flue gas without SCR | 20.35 | 85.47 | 17.35 | 72.86 | 2.01 | 8.44 | 0.39 | 1.63 | 2.78 | 11.66 | 2.78 | 11.66 | 0.0002 | 0.0008 | 43,847 | 184,156 | 0.23 | 0.98 | 0.84 | 3.53 | 6.88E-01 | 2.6 |
| | Gasification flue gas with SCR | 3.67 | 15.41 | 14.68 | 61.65 | 0.00 | 0.00 | | | | | | | | | | | | | | | | |
| 240-1 | Ash handling baghouse | | | | | | | | | 0.000 | 0.001 | 0.000 | 0.000 | | | | | | | | | | |
| 240-2 | Ash bin baghouse | | | | | | | | | 0.000 | 0.001 | 0.000 | 0.000 | | | | | | | | | | |
| E | Flare Pilot | 0.05 | 0.21 | 0.08 | 0.36 | 0.01 | 0.02 | 0.00 | 0.00 | 0.01 | 0.03 | 0.01 | 0.03 | 4.9E-07 | 2.1E-06 | 118 | 515 | 0.001 | 0.003 | 0.002 | 0.010 | | |
| A | $CO_2$ Vent | | | 3.4 | 14.1 | | | | | | | | | | | 23,874 | 100,272 | | | | | | |
| H | Activation/Regeneration Heater #1 | 0.06 | 0.12 | 0.10 | 0.21 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.02 | 0.01 | 0.02 | 6.1E-07 | 1.2E-06 | 146 | 295 | 0.001 | 0.002 | 0.003 | 0.006 | | |
| I | Activation/Regeneration Heater #2 | 0.03 | 0.03 | 0.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 3.3E-07 | 3.3E-07 | 78 | 79 | 0.0004 | 0.0004 | 0.002 | 0.002 | | |
| D | Fischer Tropsch purge gas | | | | | | | | | | | | | | | 0.23 | 0.16 | | | | | | |
| B | Product Upgrading Heater #1 | 0.24 | 1.0 | 0.40 | 1.7 | 0.03 | 0.11 | 0.00 | 0.01 | 0.04 | 0.15 | 0.04 | 0.15 | 2.4E-06 | 1.0E-05 | 571 | 2,396 | 0.00 | 0.01 | 0.01 | 0.05 | | |
| C | Product Upgrading Heater #2 | 0.50 | 2.1 | 0.84 | 3.5 | 0.06 | 0.23 | 0.01 | 0.03 | 0.08 | 0.32 | 0.08 | 0.32 | 5.0E-06 | 2.1E-05 | 1,206 | 5,065 | 0.01 | 0.03 | 0.02 | 0.10 | | |
| G | Auxillary boiler | 3.6 | 0.91 | 6.1 | 1.5 | 0.40 | 0.10 | 0.04 | 0.01 | 0.55 | 0.14 | 0.55 | 0.14 | | | 8,692 | 2,173 | 0.05 | 0.01 | 0.17 | 0.04 | | |
| J | Emergency generator (diesel) | 12.91 | 3.23 | 2.16 | 0.54 | 0.23 | 0.06 | 0.36 | 0.09 | 0.36 | 0.09 | 0.36 | 0.09 | | | 1719.12 | 430 | 0.01 | 0.06 | 0.07 | 0.29 | | |
| 960 | Fire water pump (diesel) | 1.20 | 0.30 | 0.58 | 0.14 | 0.03 | 0.01 | 0.45 | 0.11 | 0.07 | 0.02 | 0.07 | 0.02 | | | 253.00 | 63 | 0.002 | 0.009 | 0.010 | 0.043 | | |
| 910 | Tanks | | | | | 0.05 | 0.21 | | | | | | | | | | | | | | | | |
| 920 | Cooling Tower | | | | | | | | | 3.9 | 16.5 | 3.9 | 16.5 | | | | | | | | | | |
| | **TOTAL POINT SOURCES (without SCR)** | | **93.4** | | **95.0** | | **9.2** | | **1.9** | | **28.9** | | **28.9** | | **0.001** | | **295,445** | | **1.1** | | **4.1** | | **5.9** |
| | **TOTAL POINT SOURCES (with SCR)** | | **23.3** | | **83.8** | | | | | | | | | | | | | | | | | | |

[1] Utilizes a global warming potential of 298 for $N_2O$ and 25 for $CH_4$ per updated ruling 11/29/13 78 FR 71904

**$CO_2e$[1] = 329.1 101.6**

**AIR DISPERSION MODELING DETERMINATION- WORST CASE WITHOUT SCR**

| Threshold | $NO_x$ tons/yr | CO tons/yr | $SO_2$ tons/yr | $PM_{10}$ tons/yr | $PM_{2.5}$ tons/yr |
|---|---|---|---|---|---|
| PTE non-fugitive sources | 93.4 | 95.0 | 1.9 | 28.9 | 28.91 |
| Modeling threshold | 40 | 100 | 40 | 15 | 15 |
| Exceeds modeling threshold (Y/N) | Y | N | N | Y | Y |

| Threshold | $PM_{10}$ tons/yr | $PM_{2.5}$ tons/yr |
|---|---|---|
| PTE fugitive sources | 1.5 | 0.2 |
| Modeling threshold | 5 | 5 |
| Exceeds modeling threshold (Y/N) | N | N |

| Pollutant | Emissions (lb/hr) | Emissions (tpy) | Ave. Time | ETV (lb/hr) | Modeling Required? |
|---|---|---|---|---|---|
| Benzene | 1.12E-02 | 9.00E-03 | Chronic, 8 Hour | 0.3163 | No |
| Dichlorobenzene | 9.85E-04 | 3.79E-03 | Chronic, 8 Hour | 11.905 | No |
| 1,3 butadiene | 6.02E-05 | 1.51E-05 | Chronic, 8 Hour | 0.292 | No |
| Formaldehyde | 6.25E-02 | 2.37E-01 | Acute, 1hour | 0.0567 | Yes |
| Hexane | 1.48E+00 | 5.68E+00 | Chronic, 8 Hour | 34.895 | No |
| Napthalene | 1.16E-03 | 1.96E-03 | Chronic, 8 Hour | 10.381 | No |
| Toluene | 6.42E-03 | 1.16E-02 | Chronic, 8 Hour | 14.922 | No |
| Xylene | 2.97E-03 | 6.10E-04 | Chronic, 8 Hour | 85.97 | No |
| Acetaldehyde | 1.44E-03 | 3.61E-04 | Acute, 1hour | 6.9363 | No |
| Acrolein | 2.24E-04 | 5.60E-05 | Chronic, 8 Hour | 0.0353 | No |

1 Assumes all emission points are vertically unrestricted and less than 50 m from property boundary

**FACILITY WIDE UNCONTROLLED POTENTIAL TO EMIT**

| Source ID | Source Description | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | Lead | | $CO_2$ | | $N_2O$ | | $CH_4$ | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| | Truck unloading | | | | | | | | | 0.07 | 0.10 | 0.01 | 0.01 | | | | | | | | | | |
| | Coal storage pile- wind erosion | | | | | | | | | 0.36 | 1.36 | 0.05 | 0.20 | | | | | | | | | | |
| | Paved haul road | | | | | | | | | 0.04 | 0.07 | 0.01 | 0.02 | | | | | | | | | | |
| 200-3 | Coal handling | | | | | | | | | 0.14 | 0.20 | 0.02 | 0.03 | | | | | | | | | | |
| 200-4 | Coal silo | | | | | | | | | 0.33 | 0.52 | 0.25 | 0.36 | | | | | | | | | | |
| F | Gasification flue gas | 20.35 | 85.47 | 17.35 | 72.86 | 2.01 | 8.44 | 0.39 | 1.63 | 2.78 | 11.66 | 2.78 | 11.66 | 0.0002 | 0.0008 | 43,847 | 184,156 | 0.23 | 0.98 | 0.84 | 3.53 | 6.88E-01 | 2.6 |
| 240-1 | Ash handling | | | | | | | | | 0.005 | 0.020 | 0.001 | 0.003 | | | | | | | | | | |
| 240-2 | Ash bin | | | | | | | | | 0.005 | 0.020 | 0.001 | 0.003 | | | | | | | | | | |
| E | Flare Pilot | 0.05 | 0.21 | 0.08 | 0.36 | 0.01 | 0.02 | 0.00 | 0.00 | 0.01 | 0.03 | 0.01 | 0.03 | 4.9E-07 | 2.1E-06 | 118 | 515 | 0.001 | 0.003 | 0.002 | 0.010 | | |
| A | $CO_2$ Vent | | | 3.4 | 14.1 | | | | | | | | | | | 23,874 | 100,272 | | | | | | |
| H | Activation/Regeneration Heater #1 | 0.06 | 0.12 | 0.10 | 0.21 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.02 | 0.01 | 0.02 | 6.1E-07 | 1.2E-06 | 146 | 295 | 0.001 | 0.002 | 0.003 | 0.006 | | |
| I | Activation/Regeneration Heater #2 | 0.03 | 0.03 | 0.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 3.3E-07 | 3.3E-07 | 78 | 79 | 0.0004 | 0.0004 | 0.002 | 0.002 | | |
| D | Fischer Tropsch purge gas | | | | | | | | | | | | | | | 0.23 | 0.16 | | | | | | |
| B | Product Upgrading Heater #1 | 0.24 | 1.0 | 0.40 | 1.7 | 0.03 | 0.11 | 0.00 | 0.01 | 0.04 | 0.15 | 0.04 | 0.15 | 2.4E-06 | 1.0E-05 | 571 | 2,396 | 0.00 | 0.01 | 0.01 | 0.05 | | |
| C | Product Upgrading Heater #2 | 0.50 | 2.1 | 0.84 | 3.5 | 0.06 | 0.23 | 0.01 | 0.03 | 0.08 | 0.32 | 0.08 | 0.32 | 5.0E-06 | 2.1E-05 | 1,206 | 5,065 | 0.01 | 0.03 | 0.02 | 0.10 | | |
| G | Auxillary boiler | 3.6 | 0.91 | 6.1 | 1.5 | 0.40 | 0.10 | 0.04 | 0.01 | 0.55 | 0.14 | 0.55 | 0.14 | | | 8,692 | 2,173 | 0.05 | 0.01 | 0.17 | 0.04 | | |
| J | Emergency generator (diesel) | 12.91 | 3.23 | 2.16 | 0.54 | 0.23 | 0.06 | 0.36 | 0.09 | 0.36 | 0.09 | 0.36 | 0.09 | | | 1719.12 | 430 | 0.01 | 0.06 | 0.07 | 0.29 | | |
| 960 | Fire water pump (diesel) | 1.20 | 0.30 | 0.58 | 0.14 | 0.03 | 0.01 | 0.45 | 0.11 | 0.07 | 0.02 | 0.07 | 0.02 | | | 253.00 | 63 | 0.002 | 0.009 | 0.010 | 0.043 | | |
| 910 | Tanks | | | | | 0.05 | 0.21 | | | | | | | | | | | | | | | | |
| 920 | Cooling Tower | | | | | | | | | 3.9 | 16.5 | 3.9 | 16.5 | | | | | | | | | | |
| | **TOTAL POINT SOURCES** | | **93.4** | | **95.0** | | **9.2** | | **1.9** | | **29.6** | | **29.3** | | **0.001** | | **295,445** | | **1.1** | | **4.1** | | **5.9** |
| | | | | | | | | | | | | | | | | | | **$CO_2e$[1] =** | **329.1** | | **101.6** | | |

[1] Utilizes a global warming potential of 298 for $N_2O$ and 25 for $CH_4$ per updated ruling 11/29/13 78 FR 71904

[2] Operating hours and throughputs limitted as identified in combustion and material handling calculations

**AIR DISPERSION MODELING DETERMINATION**

| Threshold | $NO_x$ tons/yr | CO tons/yr | $SO_2$ tons/yr | $PM_{10}$ tons/yr | $PM_{2.5}$ tons/yr |
|---|---|---|---|---|---|
| PTE non-fugitive sources | 93.4 | 95.0 | 1.9 | 29.6 | 29.28 |
| Modeling threshold | 40 | 100 | 40 | 15 | 15 |
| Exceeds modeling threshold (Y/N) | Y | N | N | Y | Y |

| Threshold | $PM_{10}$ tons/yr | $PM_{2.5}$ tons/yr |
|---|---|---|
| PTE fugitive sources | 1.5 | 0.2 |
| Modeling threshold | 5 | 5 |
| Exceeds modeling threshold (Y/N) | N | N |

| Pollutant | Emissions (lb/hr) | Emissions (tpy) | Ave. Time | ETV (lb/hr) | Modeling Required? |
|---|---|---|---|---|---|
| Benzene | 1.12E-02 | 9.00E-03 | Chronic, 8 Hour | 0.3163 | No |
| Dichlorobenzene | 9.85E-04 | 3.79E-03 | Chronic, 8 Hour | 11.905 | No |
| 1,3 butadiene | 6.02E-05 | 1.51E-05 | Chronic, 8 Hour | 0.292 | No |
| Formaldehyde | 6.25E-02 | 2.37E-01 | Acute, 1hour | 0.0567 | Yes |
| Hexane | 1.48E+00 | 5.68E+00 | Chronic, 8 Hour | 34.895 | No |
| Napthalene | 1.16E-03 | 1.96E-03 | Chronic, 8 Hour | 10.381 | No |
| Toluene | 6.42E-03 | 1.16E-02 | Chronic, 8 Hour | 14.922 | No |
| Xylene | 2.97E-03 | 6.10E-04 | Chronic, 8 Hour | 85.97 | No |
| Acetaldehyde | 1.44E-03 | 3.61E-04 | Acute, 1hour | 6.9363 | No |
| Acrolein | 2.24E-04 | 5.60E-05 | Chronic, 8 Hour | 0.0353 | No |

1 Assumes all emission points are vertically unrestricted and less than 50 m from property boundary

**EXTERNAL NATURAL GAS COMBUSTION UNIT CRITERIA POLLUTANTS EMISSION CALCULATIONS**

| Source ID# | Source Name | Heat Input (MMBtu/hr) | Average Gas Heating Value (btu/scf) | Annual Hours of Operation | $NO_x$ [1] | | $CO$ [1] | | VOC [2] | | $SO_2$ [7] | | $PM_{10}$ [3] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 50 | $lb/10^6$ scf | 84 | $lb/10^6$ scf | 5.5 | $lb/10^6$ scf | 0.6 | $lb/10^6$ scf | 7.6 | $lb/10^6$ scf |
| | | | | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| F | Gasification burner #1 [5] (without SCR) | 33.6 | 913 | 8,400 | 2.05 | 8.61 | 1.75 | 7.34 | 0.20 | 0.85 | 0.04 | 0.16 | 0.28 | 1.17 |
| F | Gasification burner #2 [5] (without SCR) | 300 | 913 | 8,400 | 18.30 | 76.86 | 15.60 | 65.52 | 1.81 | 7.59 | 0.35 | 1.47 | 2.50 | 10.49 |
| F | Gasification burner #1 [5] (with SCR) | 33.6 | 913 | 8,400 | 0.37 | 1.55 | 1.48 | 6.21 | | | | | | |
| F | Gasification burner #2 [5] (with SCR) | 300 | 913 | 8,400 | 3.30 | 13.86 | 13.20 | 55.44 | | | | | | |
| E | Gasifier flare pilot | 1.0 | 1,020 | 8,760 | 0.05 | 0.21 | 0.08 | 0.36 | 0.01 | 0.02 | 0.0006 | 0.003 | 0.01 | 0.03 |
| H | FT Activation/Regeneration Heater #1 | 1.12 | 918 | 4,032 | 0.06 | 0.12 | 0.10 | 0.21 | 0.01 | 0.01 | 0.0007 | 0.001 | 0.01 | 0.0187 |
| I | FT Activation/Regeneration Heater #2 | 0.60 | 918 | 2,016 | 0.03 | 0.03 | 0.05 | 0.06 | 0.00 | 0.00 | 0.0004 | 0.000 | 0.00 | 0.01 |
| B | Product upgrading heater #1 | 4.85 | 1,020 | 8,400 | 0.24 | 1.00 | 0.40 | 1.68 | 0.03 | 0.11 | 0.0029 | 0.01 | 0.04 | 0.15 |
| C | Product upgrading heater #2 | 10.25 | 1,020 | 8,400 | 0.50 | 2.11 | 0.84 | 3.55 | 0.06 | 0.23 | 0.0060 | 0.03 | 0.08 | 0.32 |
| G | Auxiliary boiler | 73.88 | 1,020 | 500 | 3.62 | 0.91 | 6.08 | 1.52 | 0.40 | 0.10 | 0.0435 | 0.01 | 0.55 | 0.14 |
| | **TOTAL WITHOUT SCR ON GASIFICATION FLUE GAS:** | | | | | **89.85** | | **80.22** | | **8.92** | | **1.69** | | **12.33** |
| | **TOTAL WITH SCR ON GASIFICATION FLUE GAS:** | | | | | **19.80** | | **69.02** | | | | | | |

| Source ID# | Source Name | $PM_{2.5}$ [3] | | Lead [2] | | $CO_2$ | | $N_2O$ | | $CH_4$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 7.6 | $lb/10^6$ scf | 0.0005 | $lb/10^6$ scf | 120,000 | $lb/10^6$ scf | 0.64 | $lb/10^6$ scf | 2.3 | $lb/10^6$ scf |
| | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| F | Gasification burner #1 [5] (without SCR) | 0.28 | 1.17 | 0.00 | 0.00 | 4,416 | 18,548 | 0.02 | 0.1 | 0.08 | 0.4 |
| F | Gasification burner #2 [5] (without SCR) | 2.50 | 10.49 | 0.00 | 0.00 | 39,430 | 165,608 | 0.21 | 0.9 | 0.76 | 3.2 |
| F | Gasification burner #1 [5] (with SCR) | | | | | | | | | | |
| F | Gasification burner #2 [5] (with SCR) | | | | | | | | | | |
| E | Gasifier flare pilot | 0.01 | 0.03 | 0.00 | 0.00 | 118 | 515 | 0.001 | 0.003 | 0.002 | 0.01 |
| H | FT Activation/Regeneration Heater #1 | 0.01 | 0.02 | 0.00 | 0.00 | 146 | 295 | 0.001 | 0.002 | 0.003 | 0.01 |
| I | FT Activation/Regeneration Heater #2 | 0.00 | 0.01 | 0.00 | 0.00 | 78 | 79 | 0.0004 | 0.000 | 0.002 | 0.002 |
| B | Product upgrading heater #1 | 0.04 | 0.15 | 0.00 | 0.00 | 571 | 2,396 | 0.003 | 0.01 | 0.01 | 0.05 |
| C | Product upgrading heater #2 | 0.08 | 0.32 | 0.00 | 0.00 | 1,206 | 5,065 | 0.01 | 0.03 | 0.02 | 0.1 |
| G | Auxiliary boiler | 0.55 | 0.14 | 0.00 | 0.00 | 8,692 | 2,173 | 0.05 | 0.01 | 0.17 | 0.04 |
| | **TOTAL WITHOUT SCR ON GASIFICATION FLUE GAS:** | | **12.33** | | **0.0008** | | **194,680** | | **1.04** | | **3.73** |

[1] AP-42 Tables 1.4-1 for low Nox burners
[2] AP-42 Tables 1.4-2
[3] AP-42 Tables 1.4-2. All PM is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factor is used to estimate PM10 and PM2.5 emissions.
[4] FT activation/regeneration heater emissions provided by Velocys
[5] Gasification burner emission factor without SCR provided by vendor (Maxon) NOx = 0.061 lb/MMBtu; CO = 0.052 lb/MMBtu
[6] Gasification burner emission factor with SCR provided by vendor (Nationwide) NOx = 0.011 lb/MMBtu; CO = 0.044 lb/MMBtu
[7] Gasification burner $SO_2$ emissions assume 6ppm sulfur content ~ 3,546 grains/10^6 scf based on manufacturer information

**EXTERNAL NATURAL GAS HAZARDOUS AIR POLLUTANT EMISSION CALCULATIONS**

| Pollutant | Emission Factor (lb/10^6 scf) | Emissions (lb/hr) | Emissions (tpy) |
|---|---|---|---|
| Benzene | 2.10E-03 | 1.72E-03 | 6.63E-03 |
| Dichlorobenzene | 1.20E-03 | 9.85E-04 | 3.79E-03 |
| Formaldehyde | 7.50E-02 | 6.16E-02 | 2.37E-01 |
| Hexane | 1.80E+00 | 1.48E+00 | 5.68E+00 |
| Naphthalene | 6.10E-04 | 5.01E-04 | 1.93E-03 |
| Toluene | 3.40E-03 | 2.79E-03 | 1.07E-02 |
| | | 1.55E+00 | 5.94E+00 |

[1] Emission factors per AP-42 Table 1.4-3
[2] Emissions threshold values assume vertically unrestricted releases
Emissions from all stacks were added together and the distance associated with the nearest stack to the property boundary was selected = <50 m

**INTERNAL DIESEL COMBUSTION UNIT EMISSION CALCULATIONS**

| Source ID# | Source Name | Size (hp/hr) | MMBtu/hr | Annual Hours of Operation | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | $CO_2$ [2] | | $N_2O$ | | $CH_4$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 3.95 | g/Hp-hr | 0.66 | g/Hp-hr | 0.07 | g/Hp-hr | 0.11 | g/Hp-hr | 0.11 | g/Hp-hr | 0.11 | g/Hp-hr | 1.16 | lb/Hp-hr | 0.60 | g/mmBtu | 3.0 | g/mmBtu |
| | | | | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| J | Emergency generator (diesel) [1] | 1,482 | 10.4 | 500 | 12.91 | 3.23 | 2.16 | 0.54 | 0.23 | 0.06 | 0.36 | 0.09 | 0.36 | 0.09 | 0.36 | 0.09 | 1,719 | 429.78 | 0.01 | 0.1 | 0.07 | 0.3 |
| | | | | TOTAL: | | 3.23 | | 0.54 | | 0.06 | | 0.09 | | 0.09 | | 0.09 | | | | | | |

[1] Emission factors based on manufacturer data. Cummins QST30-G5-NR2, Full standby g/Hp-hr.

[2] Emission factors based on AP-42 Table 3.4-1; diesel fuel

[3] $N_2O$ and $CH_4$ emission factors based on 40 CFR Part 98 Table C-2 Default $CH_4$ and $N_2O$ emissions factors

**LARGE DIESEL HAZARDOUS AIR POLLUTANT CALCULATIONS**

| Pollutant | Emission Factor (lb/MMBtu) | Emissions (lb/hr) | Emissions (tpy) |
|---|---|---|---|
| Benzene | 7.76E-04 | 8.05E-03 | 2.01E-03 |
| Formaldehyde | 7.89E-05 | 8.19E-04 | 2.05E-04 |
| Toluene | 2.81E-04 | 2.92E-03 | 7.29E-04 |
| Xylene | 1.93E-04 | 2.00E-03 | 5.01E-04 |
| Acetaldehyde | 2.52E-05 | 2.61E-04 | 6.54E-05 |
| Acrolein | 7.9E-06 | 8.17E-05 | 2.04E-05 |
| | | 1.41E-02 | 3.53E-03 |

[1] Emission factors per AP-42 Table 3.4-3

[2] Emissions threshold values assume vertically unrestricted releases

Emissions from all stacks were added together and the distance associated with the nearest stack to the property boundary was selected = <20 m

| Source ID# | Source Name | Size (hp/hr) | MMBtu/hr | Annual Hours of Operation | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | $CO_2$ | | $N_2O$ | | $CH_4$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.475 | g/Hp-hr | 1.193 | g/Hp-hr | 0.062 | g/Hp-hr | 0.930 | g/Hp-hr | 0.149 | g/Hp-hr | 0.149 | g/Hp-hr | 1.15 | lb/Hp-hr | 0.60 | g/mmBtu | 3.0 | g/mmBtu |
| | | | | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| 960 | Fire water pump engine (diesel) [1] | 220 | 1.5 | 500 | 1.20 | 0.30 | 0.58 | 0.14 | 0.03 | 0.01 | 0.45 | 0.11 | 0.07 | 0.02 | 0.07 | 0.02 | 253 | 63.25 | 0.00 | 0.01 | 0.01 | 0.043 |
| | | | | TOTAL: | | 0.30 | | 0.14 | | 0.01 | | 0.11 | | 0.02 | | 0.02 | | 63 | | | | |

[1] Emission factors based on manufacturer data. Cummins CFP7E-F50, 15 ppm diesel duel

[2] Emission factors based on AP-42 Table 3.4-1; diesel fuel

[3] $N_2O$ and $CH_4$ emission factors based on 40 CFR Part 98 Table C-2 Default $CH_4$ and $N_2O$ emissions factors

**SMALL DIESEL HAZARDOUS AIR POLLUTANT CALCULATIONS**

| Pollutant | Emission Factor (lb/MMBtu) | Emissions (lb/hr) | Emissions (tpy) |
|---|---|---|---|
| Benzene | 9.33E-04 | 1.44E-03 | 3.59E-04 |
| 1,3 butadiene | 3.91E-05 | 6.02E-05 | 1.51E-05 |
| Formaldehyde | 7.89E-05 | 1.22E-04 | 3.04E-05 |
| Naphthalene | 8.48E-05 | 1.31E-04 | 3.26E-05 |
| Toluene | 4.09E-04 | 6.30E-04 | 1.57E-04 |
| Xylene | 2.85E-04 | 4.39E-04 | 1.10E-04 |
| Acetaldehyde | 7.67E-04 | 1.18E-03 | 2.95E-04 |
| Acrolein | 9.3E-05 | 1.42E-04 | 3.56E-05 |

[1] Emission factors per AP-42 Table 3.3-2

[2] Emissions threshold values assume vertically unrestricted releases

Emissions from all stacks were added together and the distance associated with the nearest stack to the property boundary was selected = <20 m

| Source ID# | Source Name | Roundtrip Miles per hour[1] | Roundtrip Miles per year[2] | | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | $CO_2$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.7084 | g/mile | 0.6738 | g/mile | 0.2876 | g/mile | | g/mile | 0.0371 | g/mile | 0.0371 | g/mile | 22.20 | lb/gal |
| | | | | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| | Haul truck tailpipe emissions | 2 | 6,360 | | 0.01 | 0.02 | 0.00 | 0.005 | 0.00 | 0.002 | 0.00 | 0.0001 | 0.00 | 0.0003 | 0.00 | 0.0003 | 7.80 | 10.70 |
| | | | | TOTAL: | | 0.02 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 11 |

[1] Assumes a max hourly coal delivery throughput of 100 ton/hr in 43 ton haul trucks = 2.32 trucks per hr; Roundtrip distance each truck load = 1 miles

[2] Assumes a annual coal delivery throughput of 273,500 ton/year in 43 ton haul trucks =6,360 trucks per year; Roundtrip distance each truck load = 1 miles

[3] $SO_2$ Assumes a fuel consumption of 6.6 mpg and sulfur content of 15 ppm and diesel fuel density of 7.05 lb/gal

[4] Emission factors derived from Mobile 6 for heavy duty diesel vehicles

| | Clean Syngas |
|---|---|
| VapFrac | 0.999 |
| T [F] | 120.0 |
| P [psig] | 161.3 |
| Mole Flow [lbmol/h] | 5,917.3 |
| Mass Flow [lb/h] | 82,784.9 |
| Std Gas Volume Flow [MMSCFD] | 53.9 |
| Mole Fraction [Fraction] | |
| WATER | 0.01018 |
| OXYGEN | 0.00000 |
| NITROGEN | 0.00334 |
| HYDROGEN | 0.58786 |
| CARBON MONOXIDE | 0.28524 |
| CARBON DIOXIDE | 0.09602 |
| HYDROGEN SULFIDE | 0.00190 |
| ARGON | - |
| METHANE | 0.01547 |
| AMMONIA | 0.00000 |

**COAL AND ASH MATERIAL HANDLING EMISSION CALCULATIONS**

| Description | Baghouse Control Eff (%) | Max Hourly | Max Annual | Units | Emission Factors [1] (lbs/ton) PM | $PM_{10}$ | $PM_{2.5}$ | Emissions (lbs/hr) PM | $PM_{10}$ | $PM_{2.5}$ | Emissions (ton/yr) PM | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Truck unloading [2] | | 100 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.151 | 0.071 | 0.011 | 0.21 | 0.10 | 0.01 |
| Coal storage pile- wind erosion [8] | | | | | | | | 0.576 | 0.288 | 0.043 | 2.52 | 1.26 | 0.19 |
| Paved haul road [9] | | | | | 0.11 | 0.0211 | 0.0052 | 0.211 | 0.042 | 0.010 | 0.33 | 0.07 | 0.02 |
| Conveyor transfer to hopper [2,4] | 95 | 100 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.008 | 0.004 | 0.001 | 0.01 | 0.00 | 0.00 |
| Radial stacker to coal storage pile | | 100 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.151 | 0.071 | 0.011 | 0.21 | 0.10 | 0.01 |
| Conveyor transfer to crusher [2,4] | 95 | 100 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.008 | 0.004 | 0.001 | 0.01 | 0.00 | 0.00 |
| Coal crushing [1] | 95 | 100 | 273,750 | tons | 0.0054 | 0.00240 | 0.00240 | 0.027 | 0.012 | 0.012 | 0.04 | 0.02 | 0.02 |
| Conveyor transfer from crusher to silo day bin [2,4] | 95 | 100 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.008 | 0.004 | 0.001 | 0.01 | 0.00 | 0.00 |
| Conveyor transfer from silo day bin to lockhopper [2,4] | 95 | 31.3 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.002 | 0.001 | 0.000 | 0.01 | 0.00 | 0.00 |
| Pyrolysis ash vibrating conveyor transfer [2,4,5] | 95 | 6.0 | 52,560 | tons | 0.0015 | 0.0007 | 0.0001 | 0.000 | 0.0002 | 0.0000 | 0.002 | 0.001 | 0.000 |
| Coil ash vibrating conveyor transfer [2,4,6] | 95 | 0.6 | 4,818 | tons | 0.0015 | 0.0007 | 0.0001 | 0.00005 | 0.00002 | 0.00000 | 0.0002 | 0.0001 | 0.0000 |
| Ash covered day bin transfer [7] | 95 | 6.6 | 57,378 | tons | 0.0015 | 0.0007 | 0.0001 | 0.000 | 0.0002 | 0.0000 | 0.0022 | 0.0010 | 0.0002 |
| | | | | | | | **Total** | **1.141** | **0.497** | **0.089** | **3.353** | **1.562** | **0.255** |

[1] AP-42, Section 11.19.2-2 for uncontrolled sources with an applied control efficiency of 95% for baghouse control
[2] AP-42, Section 13.2.4 with 20 mph highest daily mean wind speed from weatherpark.com and 10% moisture from the coal analysis
[3] Assumes conservative loading rate of 100 tons per hour through day bin; Assumes gasifier operation at 500 tpd + 50%
[4] Assumes all conveyors are covered
[5] Based on 6,000 lb/hr * 200%
[6] Based on 550 lb/hr * 200%
[7] Sum of coil ash vibrating conveyor and pyrolysis ash vibrating conveyor
[8] AP-42, Table 11.9-1 Storage pile assumed to be ~0.04 acres; particle size multipliers from 13.2.5
[9] AP-42, Table 13.2.1.3 eqn 1; emission factors are in lb/VMT; Roundtrip miles per hour = 2; Roundtrip miles per year = 6,360

**$CO_2$ VENT GAS**

Venting hours: 8,400 hr/yr

| Component | lbmol/hr | MW | Emissions lb/hr | tpy |
|---|---|---|---|---|
| CO | 0.12 | 28 | 3.4 | 14.1 |
| $H_2$ | 0.29 | 2 | 0.6 | 2.4 |
| $CO_2$ | 542.6 | 44 | 23,874 | 100,272 |
| $H_2O$ | 32.76 | 18 | 590 | 2,477 |

[a] Emission rates provided by manufacturer

**GASIFICATION FLUE GAS**

Venting hours: 8,400 hr/yr
Release amount: 10,898 lbmol/hr

| Component | mol% | MW | Emissions lb/hr | tpy |
|---|---|---|---|---|
| $N_2$ | 72.5 | 28 | 221,229 | 929,163 |
| $CO_2$ | 8.4 | 44 | 40,279 | 169,172 |
| $H_2O$ | 16.1 | 18 | 31,582 | 132,646 |
| $O_2$ | 3.1 | 32 | 10,811 | 45,405 |

[a] Flue gas composition provided by manufacturer

[b] CO2 emissions from gasification burner emission calculations conservatively used since they were larger than the flue gas values provided by TCG below

**FISCHER TROPSCH PURGE GAS**

Venting hours: 1,344 hr/yr
Release amount: 1.6 lbmol/hr

| Component | mol% | MW | Emissions lb/hr | tpy |
|---|---|---|---|---|
| $N_2$ | 95.66 | 28 | 42.9 | 28.8 |
| $CO_2$ | 0.33 | 44 | 0.2 | 0.2 |
| Ar | 1.01 | 40 | 0.6 | 0.4 |
| $O_2$ | 3.0 | 32 | 1.5 | 1.0 |

[a] Vent gas composition provided by manufacturer

**Tank Emissions**

Operating hours: 8,760 hr/yr

| | | VOC Emissions | | Naphthalene | | Benzene | | Toluene | | Xylene | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tanks | Size | lb/hr | tpy | wt% | lb/hr | wt% | lb/hr | wt% | lb/hr | wt% | lb/hr |
| Diesel [a] | 4,021 bbl | 0.019 | 0.06 | 0.5 | 0.0001 | | 0 | | 0 | 1 | 0.00019 |
| Jet Fuel [b] | 4,406 bbl | 0.019 | 0.08 | 1.5 | 0.0003 | 0.1 | 2E-05 | 0.25 | 5E-05 | 1 | 0.00019 |
| Off Spec Storage [c] | 4,406 bbl | 0.015 | 0.06 | 1.0 | 0.0001 | 0.1 | 1E-05 | 0.3 | 4E-05 | 1.0 | 0.000148 |
| | | | | Total: | 0.0005 | | 0.0000 | | 0.0001 | | 0.0005 |

[a] Based on Tesoro MSDS

[b] Based on U.S. Oil and Rifining Co. MSDS

[c] Combination of off-spec diesel fuel and off-spec jet fuel

**COOLING TOWER EMISSION CALCULATIONS**

| | | | |
|---|---|---|---|
| Total liquid drift factor: | 1.7 | lb/10^3 gal | AP-42 Table 13.4-1 |
| Water vapor emissions: | 10,308 | lb/hr | Assume equal to total liquid drift |
| Total | | | |
| Water total dissolved solids content | 380 | ppm | Based on lower range of AP-42 Table 13.4-2; assuming reverse osmosis quality water |
| PM10 emissions | 3.92 | lb/hr | |
| Operating hours | 8,400 | hr/yr | |
| | 16.5 | ton/yr | |

**POINT SOURCES**

| Source ID | Stack Release Type (Beta) | FLAT (Non-Default) | Source Description | Easting (x) | Northing (Y) | Base Elevation | Stack Height | Temperature | Exit Velocity | Stack Diameter | PM10 | PM10_ANN | PM2.5 | PM2.5_AN | NO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (m) | (m) | (m) | (m) | (K) | (m/s) | (m) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) |
| COALBH | | | Coal handling baghouse | 527072.00 | 4376334.00 | 1643.58 | 3.66 | 0.00 | 40.45 | 0.6096 | 0.007134 | 0.009765 | 0.001080 | 0.001479 | |
| SILOBH | | | Coal silo baghouse | 527077.00 | 4376337.00 | 1643.64 | 17.98 | 0.00 | 40.45 | 0.6096 | 0.016684 | 0.026190 | 0.012709 | 0.017904 | |
| F | | | Gasification flue gas without SCR | 527116.00 | 4376333.00 | 1643.92 | 9.35 | 394.26 | 116.59 | 0.76 | 2.776955 | 11.663211 | 2.776955 | 11.663211 | 20.349600 |
| ASHBH | | | Ash handling baghouse | 527093.00 | 4376330.00 | 1643.65 | 3.6576 | 338.71 | 40.45 | 0.6096 | 0.0002354 | 0.00102335 | 3.565E-05 | 0.000155 | |
| BINBH | | | Ash bin baghouse | 527095.00 | 4376330.00 | 1643.66 | 17.983 | 338.71 | 40.45 | 0.6096 | 0.0002354 | 0.00102335 | 3.565E-05 | 0.000155 | |
| E | | | Flare Pilot | 526851.00 | 4376441.00 | 1645.03 | 15.24 | 699.82 | 61 | 0.61 | 0.01 | 0.03 | 0.01 | 0.03 | 0.05 |
| H | | | Activation/Regeneration Heater #1 | 527149.00 | 4376478.00 | 1645.27 | 7.62 | 644.26 | 3.2 | 0.5 | 0.01 | 0.02 | 0.01 | 0.02 | 0.06 |
| I | | | Activation/Regeneration Heater #2 | 527149.00 | 4376453.00 | 1644.87 | 7.62 | 616.48 | 3.7 | 0.3 | 0.00 | 0.01 | 0.00 | 0.01 | 0.03 |
| B | | | Product Upgrading Heater #1 | 527019.00 | 4376459.00 | 1645.53 | 15.24 | 694.26 | 10.5156 | 0.2032 | 0.04 | 0.15 | 0.04 | 0.15 | 0.24 |
| C | | | Product Upgrading Heater #2 | 527019.00 | 4376483.00 | 1646 | 15.24 | 647.04 | 10.668 | 0.3048 | 0.08 | 0.32 | 0.08 | 0.32 | 0.50 |
| G | | | Auxillary boiler | 527147.00 | 4376340.00 | 1644.45 | 15.24 | 449.82 | 12.4968 | 0.9144 | 0.55 | 0.14 | 0.55 | 0.14 | 3.62156863 |
| J | | | Emergency generator (diesel) | 527149.00 | 4376505.00 | 1646.02 | 3.81 | 749.82 | 70.229 | 0.254 | 0.36 | 0.09 | 0.36 | 0.09 | 12.91 |
| 960 | | | Fire water pump (diesel) | 526942.00 | 4376455.00 | 1645.52 | 3.66 | 748.15 | 47.055 | 0.127 | 0.07 | 0.02 | 0.07 | 0.02 | 1.20 |
| 920 | | | Cooling Tower | 526995.00 | 4376450.00 | 1645.36 | 10.058 | 313.71 | 15.24 | 0.6096 | 3.91704 | 16.451568 | 3.91704 | 16.451568 | |

**Area Sources**

| Source ID | FLAT (Non-Default) | Source Description | Easting (X) | Northing (Y) | Base Elevation | Release Height | Easterly Length | Northerly Length | Angle from North | Initial Vertical Dimension | PM10 | PM10_ANN | PM2.5 | PM2.5_AN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m) | (m) | (m) | (m) | (m) | (m) | | (m) | (lb/hr) | (tpy) | (lb/hr) | (tpy) |
| COAL_STORAGE | | Coal Storage Pile | 527047.00 | 4376373.00 | 1644.04 | 5 | 11 | 15 | | | 0.36 | 1.36 | 0.05 | 0.20 |

**Volume Sources**

| | | | | | | | | | | | | | | | Total For Paved Haul Road | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source ID | FLAT (Non-Default) | Source Description | Easting (x) | Northing (Y) | Base Elevation | Release Height | Init. Horizontal Dimension | Init. Vertical Dimension | PM10 | PM10_ANN | PM2.5 | PM2.5_AN | NO2 | Comments, assumptions made, etc. | PM10 | PM10_ANN | PM2.5 | PM2.5_AN | NO2 |
| | | | (m) | (m) | (m) | (m) | (m) | (m) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) |
| TRK_DMP | | Truck Unloading | 527031.00 | 4376329.00 | 1643.55 | 0.43 | 4.186 | 0.395 | 7.13E-02 | 9.76E-02 | 1.08E-02 | 1.48E-02 | 0.00E+00 | Assumes a drop height of 0.5 meters. | 0.07 | 0.10 | 0.01 | 0.01 | |
| HR1_0001 | | Paved Haul Road | 526372.44 | 4376247.32 | 1648.17 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | Total for access roads divided by 137 volume sources along road. | 0.015352 | 0.067242 | 0.003813 | 0.016701 | 0.013852 |
| HR1_0002 | | Paved Haul Road | 526380.81 | 4376247.30 | 1647.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0003 | | Paved Haul Road | 526389.18 | 4376247.29 | 1647.42 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0004 | | Paved Haul Road | 526397.55 | 4376247.27 | 1647.15 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0005 | | Paved Haul Road | 526405.92 | 4376247.26 | 1646.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0006 | | Paved Haul Road | 526414.29 | 4376247.24 | 1646.61 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0007 | | Paved Haul Road | 526422.66 | 4376247.22 | 1646.34 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0008 | | Paved Haul Road | 526431.03 | 4376247.21 | 1646.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0009 | | Paved Haul Road | 526439.40 | 4376247.19 | 1645.79 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0010 | | Paved Haul Road | 526447.77 | 4376247.18 | 1645.47 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0011 | | Paved Haul Road | 526456.14 | 4376247.16 | 1645.14 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0012 | | Paved Haul Road | 526464.51 | 4376247.14 | 1644.86 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0013 | | Paved Haul Road | 526472.88 | 4376247.13 | 1644.64 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0014 | | Paved Haul Road | 526481.25 | 4376247.11 | 1644.42 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0015 | | Paved Haul Road | 526489.62 | 4376247.10 | 1644.22 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0016 | | Paved Haul Road | 526497.99 | 4376247.08 | 1644.01 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0017 | | Paved Haul Road | 526506.36 | 4376247.06 | 1643.81 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0018 | | Paved Haul Road | 526514.73 | 4376247.05 | 1643.64 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0019 | | Paved Haul Road | 526523.10 | 4376247.03 | 1643.49 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0020 | | Paved Haul Road | 526531.47 | 4376247.02 | 1643.33 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0021 | | Paved Haul Road | 526539.84 | 4376247.00 | 1643.19 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0022 | | Paved Haul Road | 526548.21 | 4376246.98 | 1643.05 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0023 | | Paved Haul Road | 526556.58 | 4376246.97 | 1642.91 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0024 | | Paved Haul Road | 526564.95 | 4376246.95 | 1642.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0025 | | Paved Haul Road | 526573.32 | 4376246.94 | 1642.78 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0026 | | Paved Haul Road | 526581.69 | 4376246.92 | 1642.71 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0027 | | Paved Haul Road | 526590.06 | 4376246.90 | 1642.63 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0028 | | Paved Haul Road | 526598.43 | 4376246.89 | 1642.55 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0029 | | Paved Haul Road | 526606.80 | 4376246.87 | 1642.47 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0030 | | Paved Haul Road | 526615.17 | 4376246.86 | 1642.38 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0031 | | Paved Haul Road | 526623.54 | 4376246.84 | 1642.3 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0032 | | Paved Haul Road | 526631.91 | 4376246.82 | 1642.24 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0033 | | Paved Haul Road | 526640.28 | 4376246.81 | 1642.2 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0034 | | Paved Haul Road | 526648.65 | 4376246.79 | 1642.17 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0035 | | Paved Haul Road | 526657.02 | 4376246.78 | 1642.14 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0036 | | Paved Haul Road | 526665.39 | 4376246.76 | 1642.12 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0037 | | Paved Haul Road | 526673.76 | 4376246.74 | 1642.1 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0038 | | Paved Haul Road | 526682.13 | 4376246.74 | 1642.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0039 | | Paved Haul Road | 526690.50 | 4376246.78 | 1642.06 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0040 | | Paved Haul Road | 526698.87 | 4376246.81 | 1642.05 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0041 | | Paved Haul Road | 526707.24 | 4376246.85 | 1642.04 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0042 | | Paved Haul Road | 526715.61 | 4376246.89 | 1642.03 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0043 | | Paved Haul Road | 526723.97 | 4376246.93 | 1642.02 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0044 | | Paved Haul Road | 526732.34 | 4376246.97 | 1641.99 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0045 | | Paved Haul Road | 526740.71 | 4376247.00 | 1641.97 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0046 | | Paved Haul Road | 526749.08 | 4376247.04 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0047 | | Paved Haul Road | 526757.45 | 4376247.08 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0048 | | Paved Haul Road | 526765.82 | 4376247.12 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0049 | | Paved Haul Road | 526774.19 | 4376247.15 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0050 | | Paved Haul Road | 526782.56 | 4376247.19 | 1641.93 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0051 | | Paved Haul Road | 526790.93 | 4376247.23 | 1641.91 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0052 | | Paved Haul Road | 526799.30 | 4376247.27 | 1641.89 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0053 | | Paved Haul Road | 526807.67 | 4376247.31 | 1641.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0054 | | Paved Haul Road | 526816.04 | 4376247.34 | 1641.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0055 | | Paved Haul Road | 526824.41 | 4376247.38 | 1641.86 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0056 | | Paved Haul Road | 526832.78 | 4376247.42 | 1641.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0057 | | Paved Haul Road | 526841.15 | 4376247.46 | 1641.83 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0058 | | Paved Haul Road | 526849.52 | 4376247.49 | 1641.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0059 | | Paved Haul Road | 526857.89 | 4376247.53 | 1641.77 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0060 | | Paved Haul Road | 526866.26 | 4376247.57 | 1641.74 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0061 | | Paved Haul Road | 526874.63 | 4376247.61 | 1641.75 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0062 | | Paved Haul Road | 526883.00 | 4376247.65 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0063 | | Paved Haul Road | 526891.37 | 4376247.68 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0064 | | Paved Haul Road | 526899.74 | 4376247.72 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0065 | | Paved Haul Road | 526908.11 | 4376247.76 | 1641.75 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0066 | | Paved Haul Road | 526916.48 | 4376247.80 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0067 | | Paved Haul Road | 526924.85 | 4376247.84 | 1641.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0068 | | Paved Haul Road | 526933.22 | 4376247.87 | 1641.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0069 | | Paved Haul Road | 526941.59 | 4376247.91 | 1641.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0070 | | Paved Haul Road | 526949.96 | 4376247.95 | 1641.93 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0071 | | Paved Haul Road | 526958.33 | 4376247.99 | 1641.98 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0072 | | Paved Haul Road | 526966.70 | 4376248.02 | 1642.05 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0073 | | Paved Haul Road | 526975.07 | 4376248.06 | 1642.13 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0074 | | Paved Haul Road | 526983.44 | 4376248.10 | 1642.21 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HR1_0075 | | Paved Haul Road | 526991.81 | 4376248.14 | 1642.27 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0076 | | Paved Haul Road | 527000.18 | 4376248.18 | 1642.32 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0077 | | Paved Haul Road | 527008.55 | 4376248.21 | 1642.37 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0078 | | Paved Haul Road | 527016.92 | 4376248.25 | 1642.44 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0079 | | Paved Haul Road | 527025.29 | 4376248.29 | 1642.5 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0080 | | Paved Haul Road | 527033.29 | 4376248.69 | 1642.57 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0081 | | Paved Haul Road | 527033.21 | 4376257.06 | 1642.68 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0082 | | Paved Haul Road | 527033.13 | 4376265.43 | 1642.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0083 | | Paved Haul Road | 527033.05 | 4376273.80 | 1642.91 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0084 | | Paved Haul Road | 527032.97 | 4376282.17 | 1642.99 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0085 | | Paved Haul Road | 527032.89 | 4376290.54 | 1643.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0086 | | Paved Haul Road | 527032.81 | 4376298.91 | 1643.16 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0087 | | Paved Haul Road | 527032.73 | 4376307.28 | 1643.26 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0088 | | Paved Haul Road | 527032.64 | 4376315.65 | 1643.37 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0089 | | Paved Haul Road | 527032.56 | 4376324.02 | 1643.49 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0090 | | Paved Haul Road | 527032.48 | 4376332.39 | 1643.6 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0091 | | Paved Haul Road | 527032.40 | 4376340.76 | 1643.69 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0092 | | Paved Haul Road | 527032.32 | 4376349.13 | 1643.77 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0093 | | Paved Haul Road | 527032.24 | 4376357.50 | 1643.86 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0094 | | Paved Haul Road | 527032.16 | 4376365.87 | 1643.94 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0095 | | Paved Haul Road | 527032.08 | 4376374.24 | 1644.06 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0096 | | Paved Haul Road | 527032.00 | 4376382.61 | 1644.17 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0097 | | Paved Haul Road | 527031.92 | 4376390.98 | 1644.29 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0098 | | Paved Haul Road | 527031.84 | 4376399.35 | 1644.41 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0099 | | Paved Haul Road | 527031.76 | 4376407.72 | 1644.55 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0100 | | Paved Haul Road | 527031.68 | 4376416.09 | 1644.7 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0101 | | Paved Haul Road | 527031.60 | 4376424.45 | 1644.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0102 | | Paved Haul Road | 527031.52 | 4376432.82 | 1645 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0103 | | Paved Haul Road | 527038.93 | 4376433.87 | 1645 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0104 | | Paved Haul Road | 527047.30 | 4376433.97 | 1644.96 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0105 | | Paved Haul Road | 527055.67 | 4376434.08 | 1644.93 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0106 | | Paved Haul Road | 527064.04 | 4376434.19 | 1644.9 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0107 | | Paved Haul Road | 527072.40 | 4376434.29 | 1644.87 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0108 | | Paved Haul Road | 527080.41 | 4376433.41 | 1644.82 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0109 | | Paved Haul Road | 527086.73 | 4376427.92 | 1644.68 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0110 | | Paved Haul Road | 527090.69 | 4376421.35 | 1644.57 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0111 | | Paved Haul Road | 527090.77 | 4376412.98 | 1644.45 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0112 | | Paved Haul Road | 527090.85 | 4376404.61 | 1644.33 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0113 | | Paved Haul Road | 527090.93 | 4376396.24 | 1644.21 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0114 | | Paved Haul Road | 527091.01 | 4376387.87 | 1644.13 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0115 | | Paved Haul Road | 527091.09 | 4376379.50 | 1644.04 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0116 | | Paved Haul Road | 527091.17 | 4376371.13 | 1643.96 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0117 | | Paved Haul Road | 527091.25 | 4376362.76 | 1643.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0118 | | Paved Haul Road | 527091.33 | 4376354.39 | 1643.82 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0119 | | Paved Haul Road | 527091.42 | 4376346.02 | 1643.77 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0120 | | Paved Haul Road | 527091.50 | 4376337.65 | 1643.71 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0121 | | Paved Haul Road | 527091.58 | 4376329.28 | 1643.64 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0122 | | Paved Haul Road | 527091.66 | 4376320.91 | 1643.55 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0123 | | Paved Haul Road | 527091.74 | 4376312.54 | 1643.47 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0124 | | Paved Haul Road | 527091.82 | 4376304.17 | 1643.39 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0125 | | Paved Haul Road | 527091.90 | 4376295.80 | 1643.32 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0126 | | Paved Haul Road | 527091.98 | 4376287.43 | 1643.26 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0127 | | Paved Haul Road | 527092.06 | 4376279.06 | 1643.19 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0128 | | Paved Haul Road | 527092.14 | 4376270.69 | 1643.13 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0129 | | Paved Haul Road | 527092.22 | 4376262.32 | 1643.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0130 | | Paved Haul Road | 527092.30 | 4376253.95 | 1643.02 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0131 | | Paved Haul Road | 527088.99 | 4376248.92 | 1642.96 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0132 | | Paved Haul Road | 527080.62 | 4376248.89 | 1642.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0133 | | Paved Haul Road | 527072.25 | 4376248.86 | 1642.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0134 | | Paved Haul Road | 527063.88 | 4376248.83 | 1642.79 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0135 | | Paved Haul Road | 527055.52 | 4376248.80 | 1642.74 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0136 | | Paved Haul Road | 527047.15 | 4376248.77 | 1642.68 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0137 | | Paved Haul Road | 527038.78 | 4376248.74 | 1642.62 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |

| Revolution Fenceline | |
|---|---|
| East (X) | North (Y) |
| (m) | (m) |
| 526371 | 4376533 |
| 526365 | 4376237 |
| 527178 | 4376240 |
| 527179 | 4376547 |

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

**Identification**

| | |
|---|---|
| User Identification: | Revolution Off-Spec Fuel Tank |
| City: | Price |
| State: | Utah |
| Company: | Revolution Fuels, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | Atmospheric 4406 bbl Fixed Cone Roof Tank |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 32.00 |
| Diameter (ft): | 33.50 |
| Liquid Height (ft) : | 28.00 |
| Avg. Liquid Height (ft): | 28.00 |
| Volume (gallons): | 184,616.59 |
| Turnovers: | 28.47 |
| Net Throughput(gal/yr): | 5,256,000.00 |
| 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: | Cone |
| Height (ft) | 10.00 |
| Slope (ft/ft) (Cone Roof) | 0.60 |

**Breather Vent Settings**

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

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

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

**Revolution Off-Spec Fuel Tank - Vertical Fixed Roof Tank**
**Price, Utah**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jet kerosene | All | 53.92 | 47.99 | 59.86 | 51.98 | 0.0070 | 0.0056 | 0.0085 | 130.0000 | | | 162.00 | Option 1: VP50 = .006 VP60 = .0085 |

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

## Emissions Report for: Annual

### Revolution Off-Spec Fuel Tank - Vertical Fixed Roof Tank
### Price, Utah

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Jet kerosene | 113.57 | 16.15 | 129.72 |

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

**Identification**

| | |
|---|---|
| User Identification: | Revolution Jet Fuel Tank |
| City: | Price |
| State: | Utah |
| Company: | Revolution Fuels, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | Atmospheric 4406 bbl Fixed Cone Roof Tank |

**Tank Dimensions**

| | | |
|---|---|---|
| Shell Height (ft): | | 32.00 |
| Diameter (ft): | | 33.50 |
| Liquid Height (ft) : | | 28.00 |
| Avg. Liquid Height (ft): | | 28.00 |
| Volume (gallons): | | 184,616.59 |
| Turnovers: | | 46.17 |
| Net Throughput(gal/yr): | | 8,523,480.00 |
| 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: | Cone | |
| Height (ft) | | 10.00 |
| Slope (ft/ft) (Cone Roof) | | 0.60 |

**Breather Vent Settings**

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

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

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

**Revolution Jet Fuel Tank - Vertical Fixed Roof Tank**
**Price, Utah**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jet kerosene | All | 53.92 | 47.99 | 59.86 | 51.98 | 0.0070 | 0.0056 | 0.0085 | 130.0000 | | | 162.00 | Option 1: VP50 = .006 VP60 = .0085 |

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

## Emissions Report for: Annual

**Revolution Jet Fuel Tank - Vertical Fixed Roof Tank**
**Price, Utah**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Jet kerosene | 150.37 | 16.15 | 166.52 |

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

**Identification**

| | |
|---|---|
| User Identification: | Revolution Diesel Tank |
| City: | Price |
| State: | Utah |
| Company: | Revolution Fuels, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | Atmospheric 4,021 bbl Fixed Cone Roof Tank |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 32.00 |
| Diameter (ft): | 32.30 |
| Liquid Height (ft) : | 28.00 |
| Avg. Liquid Height (ft): | 28.00 |
| Volume (gallons): | 168,453.90 |
| Turnovers: | 52.15 |
| Net Throughput(gal/yr): | 8,784,090.00 |
| 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: | Cone |
| Height (ft) | 10.00 |
| Slope (ft/ft) (Cone Roof) | 0.62 |

**Breather Vent Settings**

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

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

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

**Revolution Diesel Tank - Vertical Fixed Roof Tank**
**Price, Utah**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Distillate fuel oil no. 2 | All | 53.92 | 47.99 | 59.86 | 51.98 | 0.0053 | 0.0042 | 0.0065 | 130.0000 | | | 188.00 | Option 1: VP50 = .0045 VP60 = .0065 |

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

## Emissions Report for: Annual

**Revolution Diesel Tank - Vertical Fixed Roof Tank**
**Price, Utah**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Distillate fuel oil no. 2 | 106.61 | 11.36 | 117.97 |

# MATERIAL SAFETY DATA SHEET
# Jet Fuel

**MSDS: 941**
**REVISION: 07/09/2013**

## SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** **Jet Fuel**

**SYNONYMS:** Jet Fuel, Kerosene, Jet A, Jet A-1, Jet A (DLA), JAA, JP-8, F-34, Petroleum Distillate Fuel

**PRODUCT CODE:**

| | | | |
|---|---|---|---|
| F-34 (212132) | Jet A-1 (50) (212111) | Jet A (DLA) (212113) | Jet A w/FSII (212116) |
| Jet A (212110) | Jet A-1 (212112) | Jet A w/ SDA (212114) | JP-8 (212130) |
| Kerosene 2-K (212115) | | JAA (212117) | |

**This Material Safety Data Sheet applies to the listed products and synonym descriptions for Hazard Communication purposes only. Technical specifications vary greatly depending on the product and are not reflected in this document. Consult specification sheets for technical information. This product contains ingredients that are considered to be hazardous as defined by the OSHA Hazard Communication Standard (29 CFR 1910.1200).**

**IMPORTANT: Read this MSDS before handling or disposing of this product. Pass this information on to employees, customers and product users.**

**MANUFACTURER:** **U.S. Oil & Refining Co.**
**ADDRESS:** **3001 Marshall Avenue**
**Tacoma, WA 98421**

**EMERGENCY:** **253-383-1651**
**FAX:** **253-272-2495**
**CHEMTREC:** **800-424-9300**
**NATIONAL RESPONSE:** **800-424-8802**

**CHEMICAL FAMILY:** **Hydrocarbon**

**PRODUCT USE:** **Jet Fuel is a complex blend of hydrocarbons derived from various refinery streams. This product is intended for us as a fuel or for use in an engineered process. Use in other applications may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.**

**PREPARED BY:** **U.S. Oil & Refining Co.**

**CAS #:** **8008-20-6**

## SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

| NAME | CAS NUMBER | CONCENTRATION % |
|---|---|---|
| Kerosene/Hydrocarbon mixture | 8008-20-6 | 90 - 100% |
| Cyclohexane | 110-82-7 | 0 - 1% |
| 1,2,4 Trimethylbenzene | 95-63-6 | 0 - 2% |
| Benzene | 71-43-2 | 0 - 0.2% |
| Toluene | 108-88-3 | 0 - 0.5% |
| Xylene | 1330-20-7 | 0 - 2% |
| Naphthalene | 91-20-3 | 0 - 3% |
| Ethylbenzene | 100-41-4 | 0 - 0.5% |

## SECTION 3: HAZARDS IDENTIFICATION

**Warning!** Combustible! Mist or vapors can cause a flash fire. Liquid, mist or vapors can cause eye, skin and respiratory tract irritation. Ingestion of liquid and aspiration into the lungs can result in chemical pneumonia.

| | |
|---|---|
| **PHYSICAL STATE:** | Liquid |
| **COLOR:** | Water white to light amber |
| **ODOR:** | Faint petroleum odor |
| **ROUTES OF ENTRY:** | Dermal Contact, Eye Contact, Inhalation, Ingestion |

**POTENTIAL HEALTH EFFECTS:**

| | |
|---|---|
| **EYES:** | Eye irritation may result from contact with liquid, mists and/or vapors. In severe cases, permanent eye damage may occur. |
| **SKIN:** | Contact with the skin may cause irritation. Skin irritation leading to dermatitis may occur upon prolonged or repeated contact. Symptoms include redness, itching and dermatitis. Repeated contact may cause harmful effects in other parts of the body. |
| **INGESTION:** | This material can irritate the mouth, throat, and/or stomach. Aspiration into the lungs may cause chemical pneumonia. Symptoms include burning sensation of the mouth, nausea and vomiting. In severe cases loss of consciousness may occur. |
| **INHALATION:** | Vapors or mists can irritate the nose, throat and/or lungs and can cause central nervous system depression. Symptoms include headache, nausea, fatigue and dizziness. In severe cases loss of consciousness or death may occur. |
| **MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:** | This product contains petroleum distillates similar to those shown to produce skin tumors on laboratory animals. Avoid prolonged or repeated skin contact.<br><br>Caution is recommended for personnel with pre-existing central nervous system diseases. Personnel with pre-existing central nervous system disease, skin disorders, or chronic respiratory diseases should avoid exposure to this product. |
| **OVER-EXPOSURE SIGNS/SYMPTOMS:** | Headache, nausea, vomiting, dizziness, central nervous system- respiratory depression, convulsions, loss of consciousness, coma or death. Eye or skin irritation. |

**See toxicological information (section 11)**

## SECTION 4: FIRST AID MEASURES

| | |
|---|---|
| **EYES:** | Flush eyes with plenty of water for a minimum of 15 minutes. Seek medical care if irritation persists. |
| **SKIN:** | Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if irritation or pain persists. Launder or dry-clean clothing prior to re-use. Discard contaminated leather goods. |
| **INGESTION:** | WARNING! DO NOT INDUCE VOMITING. If aspirated into the lungs, may cause chemical pneumonitis. Seek medical attention promptly. |
| **INHALATION:** | If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get immediate medical attention if breathing is difficult or stops. |
| **NOTES TO PHYSICIANS OR FIRST AID PROVIDERS:** | Ingestion/Inhalation of this product or subsequent vomiting may lead to aspiration, which may cause pneumonitis. |

## SECTION 5: FIRE-FIGHTING MEASURES

| | |
|---|---|
| **FLAMMABILTY OF THE PRODUCT:** | **Combustible liquid** |
| **Flammable limits in air (% by volume)** | LOWER: Approx 0.7<br>UPPER: Approx 5.0 |
| **FLASH POINT:** | Closed Cup >38°C (100°F) |
| **AUTOIGNITION TEMPERATURE:** | Not Determined |
| **PRODUCTS OF COMBUSTION:** | Normal combustion forms water vapor and carbon dioxide. Incomplete burning can produce carbon monoxide and particulate matter. |
| **FIRE/EXPLOSION HAZARDS IN THE PRESENCE OF VARIOUS SUBSTANCES:** | Combustible liquid. When heated above the flash point, this material will release vapors that can ignite when exposed to open flame, sparks and static discharge. Mists or sprays may be flammable at temperatures below the normal flash point. Keep away from heat and open flame. |
| **FIRE-FIGHTING MEDIA AND INSTRUCTIONS:** | Combustible Liquid. Use dry chemical, foam or carbon dioxide to extinguish the fire. Consult foam manufacturer for appropriate media, application rates and water/foam ratio. If a leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop a leak. Use water to flush spills away from sources of ignition. Do not flush down public sewers.<br><br>Collect contaminated fire-fighting water separately. It must not enter the municipal sewage system. Dike area of fire to prevent runoff. Decontaminate emergency personnel and equipment with soap and water.<br><br>Combustible liquid and vapor. Vapor may cause flash fire. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flashback. Runoff to sewer may create fire or explosion hazard. |
| **SPECIAL FIRE FIGHTING EQUIPMENT:** | Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Cool tanks, containers and exposed structures with water. |
| **UNUSUAL FIRE & EXPLOSION HAZARDS:** | Moderately combustible. When heated above the flash point, this material will release flammable vapors which if exposed to a source of ignition can burn or be explosive in confined spaces. Mists or sprays may be flammable at temperatures below the normal flash point. Keep away from heat and open flame. |

# SECTION 6: ACCIDENTAL RELEASE MEASURES

**PERSONAL PRECAUTIONS:**

Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Do not touch or walk through spilled material. Tanks, vessels or other confined spaces which have contained product should be freed of vapors before entering. The container should be checked to ensure a safe atmosphere before entry. Empty containers may contain toxic, flammable/combustible or explosive residues or vapors. Do not cut, grind, drill, weld or reuse empty containers that contained this product. Do not transfer this product to another container unless the container receiving the product is labeled with proper DOT shipping name, hazard class and other information that describes the product and its hazards.

**ENVIRONMENTAL PRECAUTIONS:**

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. If facility or operation has an "*oil or hazardous substance contingency plan*", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Review Fire Fighting Measures section before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) away from release. Contain spill in smallest possible area.

Recover as much product as possible (e.g., by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 800-424-8802. For highway or railway spills, contact Chemtrec at 800-424-9300.

**METHODS FOR CLEANING UP:**

If emergency personnel are unavailable, contain spilled material. For small spills, add absorbent (soil may be used in the absence of other suitable materials) and use a nonsparking or explosion-proof means to transfer material to a sealable, appropriate container for disposal. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal.

Water spill: Eliminate sources of ignition and warn other ships in the area to stay clear. Notify the proper authorities. Confine with skimming equipment if available or set booms to recover the spill.

## SECTION 7: HANDLING & STORAGE

**HANDLING:**

Do not ingest. Do not get in eyes, on skin or on clothing. Keep container closed. Use only with adequate ventilation. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. In case of fire, use water spray, foam, dry chemical or carbon dioxide as described in the Fire Fighting Measures section of the MSDS. Do not pressurize, cut, weld, braze, solder, drill on or near this container. "Empty" container contains residue (liquid and/or vapor) and may explode in heat of a fire. Use good personal hygiene practices. After handling this product, wash hands before eating, drinking or using toilet facilities. Keep out of reach of children. Failure to use caution may cause serious injury or illness. Do not use as a cleaning solvent or for other non-fuel uses. To prevent ingestion and exposure - Do not siphon by mouth to transfer product between containers.

**STORAGE:**

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

For information regarding transferring material refer to OSHA Standard 29 CFR 1910.106, “Flammable and Combustible Liquids”, National Fire Protection Association (NFPA) 77, “Recommended Practice on Static Electricity”, and/or the American Petroleum Institute (API) Recommended Practice 2003, “Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents”.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

**ENGINEERING CONTROLS:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits. Special ventilation may be required for handling conditions at elevated temperatures. Ensure that eyewash stations and safety showers are close to the workstation location.

**PERSONAL PROTECTION:**

**SKIN:**

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Flame retardant clothing is recommended. In case of skin contact, wash with mild soap and water or a waterless hand cleaner. Immediately remove soiled clothing and wash thoroughly before reuse. Discard oil-soaked leather goods.

**RESPIRATORY:**

Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION (continued)

| | |
|---|---|
| **HANDS:** | Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. |
| **EYE:** | Eye protection (chemical-type goggles and/or face shield) should be worn whenever there is a likelihood of splashing or spraying liquid. Contact lenses should not be worn. Eye wash water should be provided. |
| **OTHER:** | Use good personal hygiene practices. |
| **PROTECTIVE CLOTHING OR EQUIPMENT:** | Gloves, hardhat, face shield, boots, safety glasses, respirator, fire retardant clothing |
| **PERSONAL PROTECTIVE EQUIPMENT IN CASE OF A LARGE SPILL:** | Splash goggles, full suit, vapor respirator, boots, gloves. Suggested protective clothing might not be adequate. Consult a specialist before handling this product. |

**Established Occupational Exposure Limits**

| SUBSTANCE | VALUE | TIME/TYPE | SOURCE |
|---|---|---|---|
| **Stoddard Solvent** | **500 ppm** | **8 Hour PEL** | **OSHA** |
| **Stoddard Solvent** | **60 ppm** | **8 Hour PEL** | **NIOSH** |
| **Cyclohexane** | **300 ppm** | **8 Hour PEL** | **OSHA** |
| **Benzene** | **1 ppm** | **8 Hour PEL** | **OSHA** |
| **Benzene** | **5 ppm** | **STEL** | **OSHA** |
| **Toluene** | **50 ppm** | **8 Hour TWA** | **ACGIH** |
| **Xylene** | **100 ppm** | **8 Hour TWA** | **OSHA** |
| **Xylene** | **150 ppm** | **STEL** | **OSHA** |
| **Napthalene** | **10 ppm** | **8 Hour TWA** | **OSHA** |
| **Napthalene** | **15 ppm** | **STEL** | **NIOSH** |

**Consult local authorities for acceptable exposure limits.**

## SECTION 9: PHYSICAL & CHEMICAL PROPERTIES

| | |
|---|---|
| **PHYSICAL STATE:** | Liquid |
| **COLOR:** | Water white or light amber |
| **ODOR:** | Faint Petroleum Odor |
| **BOILING POINT:** | 160° to 300°C (320° to 572°F) |
| **FREEZING POINT:** | -50° to -40°C |
| **SPECIFIC GRAVITY:** | 0.775 TO 0.840 (Water=1) (@60°F) |
| **VISCOSITY:** | 1.3 – 2.2 cSt @ 100°F (D-445) |
| **VAPOR PRESSURE:** | 2.2 kPa @37.8°C (100°F) |
| **VAPOR DENSITY:** | >1 (Air=1) |
| **EVAPORATION RATE:** | Not Available |
| **MATERIALS TO AVOID:** | Reacts with strong oxidizing material and strong acids |
| **HAZARDOUS DECOMPOSITION PRODUCTS:** | Burning or excessive heating may produce carbon monoxide and other harmful gases and vapors including oxides and/or other compounds of sulfur and nitrogen. |

## SECTION 10: STABILITY & REACTIVITY

| | |
|---|---|
| **STABILITY & REACTIVITY:** | The product is stable |
| **INCOMPATABILITY WITH VARIOUS SUBSTANCES:** | Reactive with strong oxidizing agents & strong acids |
| **HAZARDOUS DECOMPOSITION PRODUCTS:** | None known |
| **HAZARDOUS POLYMERIZATION:** | Will not occur |
| **CONDITIONS TO AVOID (STABILITY):** | Heat, sparks and/or open flame<br>Strong oxidizers<br>Strong acids |

## SECTION 11: TOXICOLOGICAL INFORMATION

**TOXICITY DATA**

**Jet Fuel/Straight-run Kerosene CAS 8008-20-6**

**CARCINOGENICITY:** Application of petroleum hydrocarbons of similar composition and boiling range to mouse skin resulted in an increased incidence of skin tumors in some studies. Potential components which are listed by IARC as carcinogens or potential carcinogens are: benzene and ethylbenzene. Risk of cancer depends on duration and level of exposure.

**TARGET ORGANS:** Potential components which have demonstrated developmental and or target organ issues are: benzene, toluene, xylenes, naphthalene and ethylbenzene.

## SECTION 12: ECOLOGICAL INFORMATION

**ECOLOGICAL INFORMATION:** This product is potentially toxic to aquatic organisms and should be kept out of sewage and drainage systems and all bodies of water.

## SECTION 13: DISPOSAL CONSIDERATIONS

**WASTE DISPOSAL:** The generation of waste should be avoided or minimized wherever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

This material, if discarded as produced, is not a RCRA "listed" hazardous waste. However, conditions of use which results in chemical, physical changes or contamination, may subject it to regulation as a hazardous waste. Transportation, treatment, storage and disposal of waste material must be conducted in accordance with federal, state and local regulations.

Consult your local or regional authorities.

# SECTION 14: TRANSPORT INFORMATION

## Jet Fuel:

| REGULATORY INFORMATION | UN NUMBER | EMERGENCY RESPONSE GUIDEBOOK | PROPER SHIPPING NAME | CLASS | PACKING GROUP |
|---|---|---|---|---|---|
| **DOT Classification** | UN1863 | Guide 128 | Fuel, Aviation, Turbine Engine | 3 | III |
| **IATA** | UN1863 | Guide 128 | Fuel, Aviation, Turbine Engine | 3 | III |

Note: This material may be re-classified as a combustible liquid for domestic land transportation under 49 CFR 173.150 (f)

## Kerosene:

| REGULATORY INFORMATION | UN NUMBER | EMERGENCY RESPONSE GUIDEBOOK | PROPER SHIPPING NAME | CLASS | PACKING GROUP |
|---|---|---|---|---|---|
| **DOT Classification** | UN1223 | Guide 128 | Kerosene | 3 | III |
| **IATA** | UN1223 | Guide 128 | Kerosene | 3 | III |

# SECTION 15: REGULATORY INFORMATION

**U.S. FEDERAL REGULATIONS:**

**EPA SARA Sections 302, 304, & 313 and CERCLA:**
This material contains the following chemicals subject to the reporting requirements of SARA 302, SARA 304, SARA 313, CERCLA and 40 CFR 372:

| Chemical Name | CAS Number | Material Concentration | CERCLA/SARA Section 302 TPQ (lbs.) | CERCLA/SARA Section 304 RQ (lbs.) |
|---|---|---|---|---|
| | | | | |
| BENZENE | 71-43-2 | 0 - 0.2% | | 10 |
| 1,2,4 TRIMETHYLBENZENE | 95-63-6 | 0 - 2% | | N/A |
| NAPHTHALENE | 91-20-3 | 1 - 3% | | 100 |
| XYLENES | 1330-20-7 | 0 - 2% | | 100 |

CARCINOGEN **INDENTIFICATION:** This mixture may contain chemicals that have been identified as a carcinogen by NTP, IARC, or OSHA.

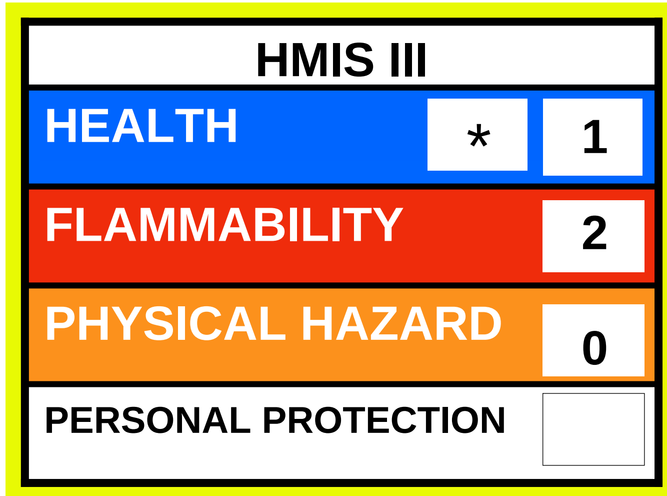
**EXTREMELY HAZARDOUS SUBSTANCES FOR EMERGENCY RESPONSE & PLANNING 40 CFR 355 & 40 CFR 370:** None

**EPA SARA 311/312 TITLE III HAZARD CATEGORIES:**

| | |
|---|---|
| **Acute Health Hazard:** | **Yes** |
| **Chronic Health Hazard:** | **Yes** |
| **Fire Hazard:** | **Yes** |
| **Pressure Hazard:** | **No** |
| **Reactive Hazard:** | **No** |

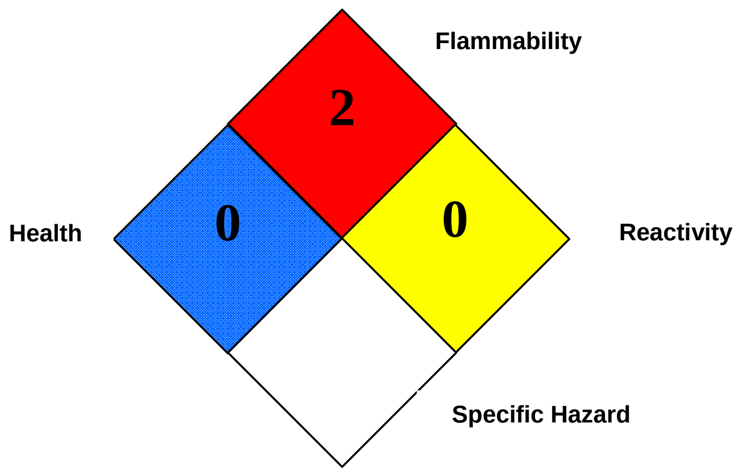
## SECTION 16: OTHER INFORMATION

**HAZARDOUS MATERIAL INFORMATION SYSTEM (USA):**




***Chronic Health Hazard**

**NATIONAL FIRE PROTECTION ASSOCIATION (USA):**



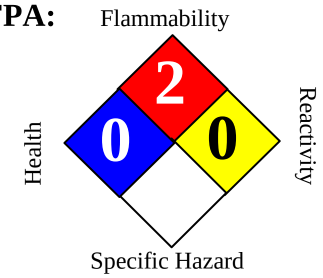

**DISCLAIMER:**

The information in this MSDS was obtained from sources which we believe are reliable. **HOWEVER, THE INFORMATION IS PROVIDED WITHOUT ANY REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, REGARDING ITS ACCURACY OR CORRECTNESS.**

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. **FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THE PRODUCT.**

# Safety Data Sheet
# Diesel Low Sulfur (LSD) and Ultra Low Sulfur Diesel (ULSD)

**NFPA:**




## SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

| | | | |
|---|---|---|---|
| **Product name** | : Diesel Low Sulfur (LSD) and Ultra Low Sulfur Diesel (ULSD) | | |
| **Synonyms** | : CARB Diesel, 888100004478 | | |
| **MSDS Number** | 888100004478 | **Version** | 2.31 |
| **Product Use Description** | | | |
| **Company** | For: Tesoro Refining & Marketing Co.<br>19100 Ridgewood Parkway, San Antonio, TX 78259 | | |
| **Tesoro Call Center** | (877) 783-7676 | **Chemtrec (Emergency Contact)** | (800) 424-9300 |

## SECTION 2. HAZARDS IDENTIFICATION

**Classifications**

Flammable Liquid – Category 3
Skin Irritation – Category 2
Eye Irritation – Category 2B
Aspiration Hazard – Category 1
Carcinogenicity – Category 2
Acute Toxicity - Inhalation – Category 4
Chronic Aquatic Toxicity – Category 2

**Pictograms**

**Signal Word** **Danger**

**Hazard Statements**

Flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon diesel by mouth.
Causes skin irritation.
Causes eye irritation.
Suspected of causing skin cancer if repeated and prolonged skin contact occurs.
Suspected of causing cancer in the respiratory system if repeated and prolonged over-exposure by inhalation occurs.
May cause damage to liver, kidneys and nervous system by repeated and prolonged inhalation.

Toxic if inhaled.
May cause drowsiness or dizziness by inhalation.
Toxic to aquatic life with long lasting effects.

**Precautionary statements**

**Prevention**

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools if tools are used in flammable atmosphere.
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection as needed to prevent skin and eye contact with liquid.
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Avoid breathing vapors or mists.
Use only outdoors or in a well-ventilated area.

**Response**

In case of fire: Use dry chemical, CO2, water spray or fire fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call or doctor or emergency medical provider. See Section 4 and Section 11 for medical treatment information.

**Storage**

Store in a well ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

**Disposal**

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

| Component | CAS-No. | Weight % |
|---|---|---|
| **Fuels, diesel, No 2; Gasoil - unspecified** | 68476-34-6 | 100% |
| **Nonane** | 111-84-2 | 0 - 5% |
| **Naphthalene** | 91-20-3 | 0 - 1% |

| | | |
|---|---|---|
| **1,2,4-Trimethylbenzene** | 95-63-6 | 0 - 2% |
| **Xylene** | 1330-20-7 | 0 - 2% |
| **Sulfur** | 7704-34-9 | 15 ppm maximum |

## SECTION 4. FIRST AID MEASURES

**Inhalation** : Move to fresh air. Give oxygen. If breathing is irregular or stopped, administer artificial respiration. Seek medical attention immediately.

**Skin contact** : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Wash contaminated clothing before re-use. If skin irritation persists, seek medical attention immediately.

**Eye contact** : Remove contact lenses. Rinse thoroughly with plenty of water for at least 15 minutes. If symptoms persist, seek medical attention.

**Ingestion** : Do not induce vomiting without medical advice. If a person vomits when lying on his back, place him in the recovery position. Seek medical attention immediately.

**Notes to physician** : Symptoms: Dizziness, Discomfort, Headache, Nausea, Disorder, Vomiting, Lung edema, Liver disorders, Kidney disorders. Aspiration may cause pulmonary edema and pneumonitis.

## SECTION 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media** : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray or fire fighting foam. LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers. Keep containers and surroundings cool with water spray.

**Specific hazards during fire fighting** : Fire Hazard Do not use a solid water stream as it may scatter and spread fire. Cool closed containers exposed to fire with water spray.

**Special protective equipment for fire-fighters** : Wear self-contained breathing apparatus and protective suit. Use personal protective equipment.

**Further information** : Exposure to decomposition products may be a hazard to health. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

## SECTION 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions** : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact. Ensure adequate ventilation. Use personal protective equipment.

**Environmental precautions** : Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection. Discharge into the environment must be avoided. If the product contaminates rivers and lakes or drains inform respective authorities.

**Methods for cleaning up** : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

## SECTION 7. HANDLING AND STORAGE

**Precautions for safe handling** : Keep away from fire, sparks and heated surfaces. No smoking near areas where material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.

: Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static-initated fire or explosion during transfer, storage or handling, include but are not limited to these examples:

(1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vapors that are static accumulators.
(2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such gasoline or naphtha).
(3) Storage tank level floats must be effectively bonded.

For more information on precautions to prevent static-initated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents (2008).

**Conditions for safe storage, including incompatibilities** : Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

: Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure.

Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

## SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

## Exposure Guidelines

| List | Components | CAS-No. | Type: | Value |
|---|---|---|---|---|
| **OSHA Z1** | Xylene | 1330-20-7 | PEL | 100 ppm 435 mg/m3 |
| | Naphthalene | 91-20-3 | PEL | 10 ppm 50 mg/m3 |
| **ACGIH** | Diesel Fuel | 68476-30-2 | TWA | 100 mg/m3 |
| | Xylene | 1330-20-7 | TWA | 100 ppm |
| | | 1330-20-7 | STEL | 150 ppm |
| | Naphthalene | 91-20-3 | TWA | 10 ppm |
| | | 91-20-3 | STEL | 15 ppm |
| | Nonane | 111-84-2 | TWA | 200 ppm |

**Engineering measures** : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use only intrinsically safe electrical equipment approved for use in classified areas.

**Eye protection** : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

**Hand protection** : Gloves constructed of nitrile, neoprene, or PVC are recommended. Consult manufacturer specifications for further information.

**Skin and body protection** : If needed to prevent skin contact, chemical protective clothing such as of DuPont TyChem®, Saranex or equivalent recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.

**Respiratory protection** : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

**Work / Hygiene practices** : Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Appearance** | Clear to straw colored liquid |
| **Odor** | Characteristic petroleum or kerosene-like odor |
| **Odor threshold** | 0.1 - 1 ppm typically reported |
| **pH** | Not applicable |
| **Melting point/freezing point** | Gel point can be about -15°F; freezing requires laboratory conditions |
| **Initial boiling point & range** | 154 - 372 °C (310° - 702 °F) |
| **Flash point** | 38°C Minimum for #1 Diesel, 52°C Minimum for #2 Diesel |
| **Evaporation rate** | Higher initially and declining as lighter components evaporate |
| **Flammability (solid, gas)** | Flammable vapor released by liquid |
| **Upper explosive limit** | 6.5 %(V) |
| **Lower explosive limit** | 0.6 %(V) |
| **Vapor pressure** | < 2 mm Hg at 20 °C |
| **Vapor density (air = 1)** | > 4.5 |
| **Relative density (water = 1)** | 0.86 g/mL |
| **Solubility (in water)** | 0.0005 g/100 mL |
| **Partition coefficient (n-octanol/water)** | > 3.3 as log Pow |
| **Auto-ignition temperature** | 257 °C (495 °F) |
| **Decomposition temperature** | Will evaporate or boil and possibly ignite before decomposition occurs. |
| **Kinematic viscosity** | 1 to 6 mm²/s range reported for No.1 or No.2 diesel at ambient temperatures |
| **Conductivity (conductivity can be reduced by environmental factors such as a decrease in temperature** | Diesel Fuel Oils at terminal load rack: At least 25 pS/m<br>Ultra Low Sulfur Diesel (ULSD) without conductivity additive: 0 pS/m to 5 pS/m<br>ULSD at terminal load rack with conductivity additive: At least 50 pS/m<br>JP-8 at terminal load rack: 150 pS/m to 600 pS/m |

## SECTION 10. STABILITY AND REACTIVITY

| | |
|---|---|
| **Reactivity** | : Vapors may form explosive mixture with air. Hazardous polymerization does not occur. |
| **Chemical stability** | Stable under normal conditions. |
| **Possibility of hazardous reactions** | Can react with strong oxidizing agents, peroxides, acids and alkalies. Do not use with Viton or Fluorel gaskets or seals. |
| **Conditions to avoid** | Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7). |
| **Hazardous decomposition products** | Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and, depending on formulation, trace amounts |

of sulfur dioxide. Diesel exhaust particals may be a lung hazard (see Section 11).

## SECTION 11. TOXICOLOGICAL INFORMATION

| | | |
|---|---|---|
| **Inhalation** | : | Vapors or mists from this material can irritate the nose, throat, and lungs, and can cause signs and symptoms of central nervous system depression, depending on the concentration and duration of exposure. |
| **Skin contact** | | Skin irritation leading to dermatitis may occur upon prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Long-term, repeated skin contact may cause skin cancer. |
| **Eye contact** | | Eye irritation may result from contact with liquid, mists, and/or vapors. |
| **Ingestion** | | Harmful or fatal if swallowed. Do NOT induce vomiting. This material can irritate the mouth, throat, stomach, and cause nausea, vomiting, diarrhea and restlessness Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. |
| **Target organs** | | Central nervous system, Eyes, Skin, Kidney, Liver |
| **Further information** | | Studies have shown that similar products produce skin cancer or skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.<br>Repeated over-exposure may cause liver and kidney injury<br>IARC classifies whole diesel fuel exhaust particulates as carcinogenic to humans (Group 1). NIOSH regards whole diesel fuel exhaust particulates as a potential cause of occupational lung cancer based on animal studies and limited evidence in humans. |

**Component**:

| | | |
|---|---|---|
| **Fuels, diesel, No 2; Gasoil - unspecified** | 68476-34-6 | Acute oral toxicity: LD50 rat<br>Dose: 5,001 mg/kg<br><br>Acute dermal toxicity: LD50 rabbit<br>Dose: 2,001 mg/kg<br><br>Acute inhalation toxicity: LC50 rat<br>Dose: 7.64 mg/l<br>Exposure time: 4 h<br><br>Skin irritation: Classification: Irritating to skin.<br>Result: Severe skin irritation<br><br>Eye irritation: Classification: Irritating to eyes.<br>Result: Mild eye irritation |
| **Nonane** | 111-84-2 | Acute oral toxicity: LD50 mouse<br>Dose: 218 mg/kg<br><br>Acute inhalation toxicity: LC50 rat<br>Exposure time: 4 h |
| **Naphthalene** | 91-20-3 | Acute oral toxicity: LD50 rat<br>Dose: 2,001 mg/kg<br><br>Acute dermal toxicity: LD50 rat<br>Dose: 2,501 mg/kg |

| | | |
|---|---|---|
| | | Acute inhalation toxicity: LC50 rat<br>Dose: 101 mg/l<br>Exposure time: 4 h<br><br>Skin irritation: Classification: Irritating to skin.<br>Result: Mild skin irritation<br><br>Eye irritation: Classification: Irritating to eyes.<br>Result: Mild eye irritation<br><br>Carcinogenicity: N11.00422130 |
| **1,2,4-Trimethylbenzene** | 95-63-6 | Acute inhalation toxicity: LC50 rat<br>Dose: 18 mg/l<br>Exposure time: 4 h<br><br>Skin irritation: Classification: Irritating to skin.<br>Result: Skin irritation<br><br>Eye irritation: Classification: Irritating to eyes.<br>Result: Eye irritation |
| **Xylene** | 1330-20-7 | Acute oral toxicity: LD50 rat<br>Dose: 2,840 mg/kg<br><br>Acute dermal toxicity: LD50 rabbit<br>Dose: ca. 4,500 mg/kg<br><br>Acute inhalation toxicity: LC50 rat<br>Dose: 6,350 mg/l<br>Exposure time: 4 h<br><br>Skin irritation: Classification: Irritating to skin.<br>Result: Mild skin irritation<br>Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.<br>Eye irritation: Classification: Irritating to eyes.<br>Result: Mild eye irritation |

**Carcinogenicity**

| | |
|---|---|
| **NTP** | Naphthalene (CAS-No.: 91-20-3) |
| **IARC** | Naphthalene (CAS-No.: 91-20-3) |
| **OSHA** | No component of this product which is present at levels greater than or equal to 0.1 % is identified as a carcinogen or potential carcinogen by OSHA. |
| **CA Prop 65** | WARNING! This product contains a chemical known to the State of California to cause cancer.<br>naphthalene (CAS-No.: 91-20-3) |

## SECTION 12. ECOLOGICAL INFORMATION

**Additional ecological information** : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

**Component:**

| | | |
|---|---|---|
| **Diesel** | 68476-34-6 | Toxicity to fish:<br>LC50<br>Species: Jordanella floridae<br>Dose: 54 mg/l |

Exposure time: 96 h

Toxicity to crustacia:
Species: Palaemonetes pugio
TLm (48 hour) = 3.4 mg/l

## SECTION 13. DISPOSAL CONSIDERATIONS

**Disposal** : Dispose of container and unused contents in accordance with federal, state and local requirements.

## SECTION 14. TRANSPORT INFORMATION

**CFR**

Proper shipping name : DIESEL FUEL
UN-No. : UN1202 (NA 1993)
Class : 3
Packing group : III

**TDG**

Proper shipping name : DIESEL FUEL
UN-No. : UN1202 (NA 1993)
Class : 3
Packing group : III

**IATA Cargo Transport**

UN UN-No. : UN1202 (NA 1993)
Description of the goods : DIESEL FUEL
Class : 3
Packaging group : III
ICAO-Labels : 3
Packing instruction (cargo aircraft) : 366
Packing instruction (cargo aircraft) : Y344

**IATA Passenger Transport**

UN UN-No. : UN1202 (NA 1993)
Description of the goods : DIESEL FUEL
Class : 3
Packaging group : III
ICAO-Labels : 3
Packing instruction (passenger aircraft) : 355
Packing instruction (passenger aircraft) : Y344

**IMDG-Code**

UN-No. : UN 1202 (NA 1993)
Description of the goods : DIESEL FUEL
Class : 3
Packaging group : III
IMDG-Labels : 3

EmS Number : F-E S-E
Marine pollutant : No

## SECTION 15. REGULATORY INFORMATION

: **CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)**
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

TSCA Status : On TSCA Inventory

DSL Status : All components of this product are on the Canadian DSL list.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA III US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

| Components | CAS-No. |
|---|---|
| **Xylene** | 1330-20-7 |
| **1,2,4-Trimethylbenzene** | 95-63-6 |
| **Naphthalene** | 91-20-3 |

PENN RTK US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

| Components | CAS-No. |
|---|---|
| **Nonane** | 111-84-2 |
| **Naphthalene** | 91-20-3 |
| **1,2,4-Trimethylbenzene** | 95-63-6 |
| **xylene** | 1330-20-7 |
| **Fuels, diesel, No 2; Gasoil - unspecified** | 68476-34-6 |

MASS RTK US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

| Components | CAS-No. |
|---|---|
| **Xylene** | 1330-20-7 |
| **1,2,4-Trimethylbenzene** | 95-63-6 |
| **Naphthalene** | 91-20-3 |
| **Nonane** | 111-84-2 |

NJ RTK US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

| Components | CAS-No. |
|---|---|
| **Nonane** | 111-84-2 |

| | |
|---|---|
| **Naphthalene** | 91-20-3 |
| **1,2,4-Trimethylbenzene** | 95-63-6 |
| **Xylene** | 1330-20-7 |
| **Fuels, diesel, No 2; Gasoil - unspecified** | 68476-34-6 |

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

| | |
|---|---|
| Naphthalene | 91-20-3 |

## SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

10/29/2012

1153, 1250, 1443, 1454, 1814, 1815, 1866, 1925

INEOS

# GAS/SPEC CS-1000

## Specialty Amine

GAS/SPEC* CS-1000 is a methyldiethanolamine (MDEA) based solvent formulated to provide deep removal of carbon dioxide ($CO_2$) from gas processing applications. GAS/SPEC CS-1000 allows for greater $CO_2$ removal capacity with superior chemical stability, lower corrosion and longer product life under extreme conditions than MEA (monoethanolamine) or DEA (diethanolamine). GAS/SPEC CS-1000 solvent should be considered mainly for applications in which the treated gas $CO_2$ specification is less than 1000 ppmv. GAS/SPEC CS-1000 can be used to replace MDEA - Piperazine blends in all applications.



### APPLICATIONS

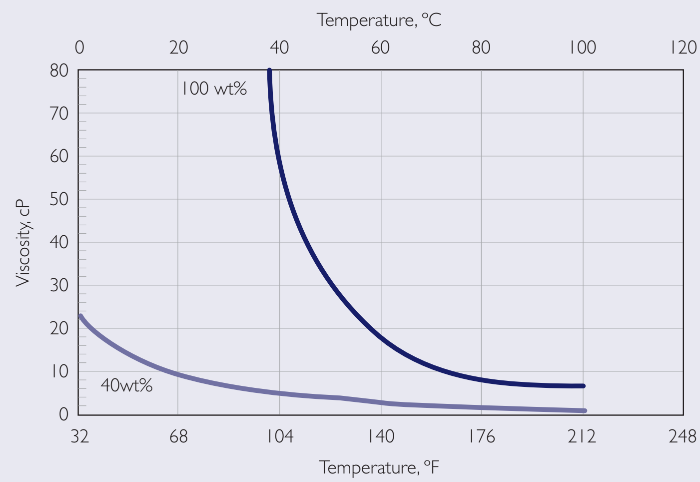
- Hydrogen Plants
- Cryogenic Systems
- Ammonia Plants
- Ethane Treating

### PHYSICAL PROPERTIES [1,2]

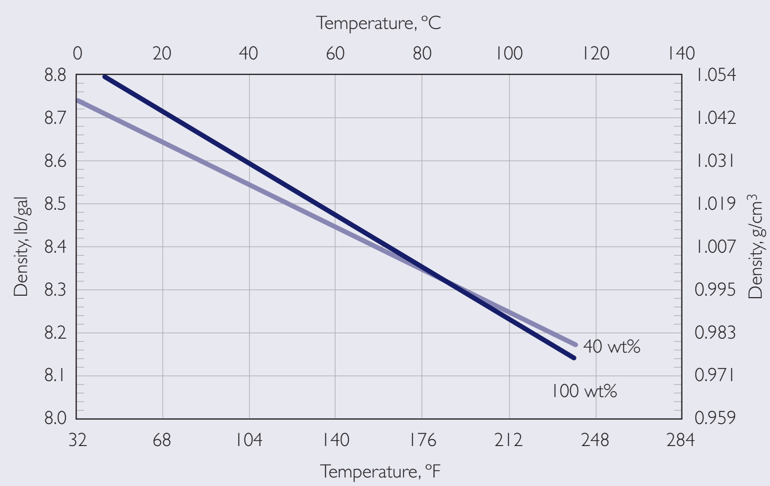
| | |
|---|---|
| Specific Gravity @ 25/25° C | 1.04 |
| Boiling Point @ 760 mmHg | 102.9-169.2 °C |
| | 217.2-336.2 °F |
| Freezing Point (100 Wt%) | < -25 °C |
| | < -13 °F |
| Latent Heat of Vaporization @ normal boiling point | 445.0 Btu/lb |
| | 247.2 Cal/g |
| Flash Point (PMCC) | None to boiling |

[1] GAS/SPEC CS-1000 concentrate. Typical properties, not to be construed as specifications
[2] 100 wt% indicate solvent concentrate as sold, and not a water-free solvent

**Viscosity**




**Density**




GAS/SPEC
Products, Technology and Service from INEOS

**PRODUCT SERVICES**

INEOS offers a broad line of services to our specialty amine customers, including:

- superior simulation capabilities
- troubleshooting consultations
- on-site start-up and optimization
- solvent analysis and interpretation
- local stocking and supply

**MATERIALS OF CONSTRUCTION**

The preferred material for storage of GAS/SPEC CS-1000 is 304L or 316L stainless steel. Carbon steel tanks are also satisfactory, although discoloration and iron in the amine may occur. Nitrogen padding of the tanks is recommended to prevent oxidation and discoloration of the amine during extended storage. The amine can also be stored in high-density polyethylene (HDPE) or polypropylene (HDPP).

Materials to avoid include:

- Aluminum
- Brass
- Copper
- Copper alloy

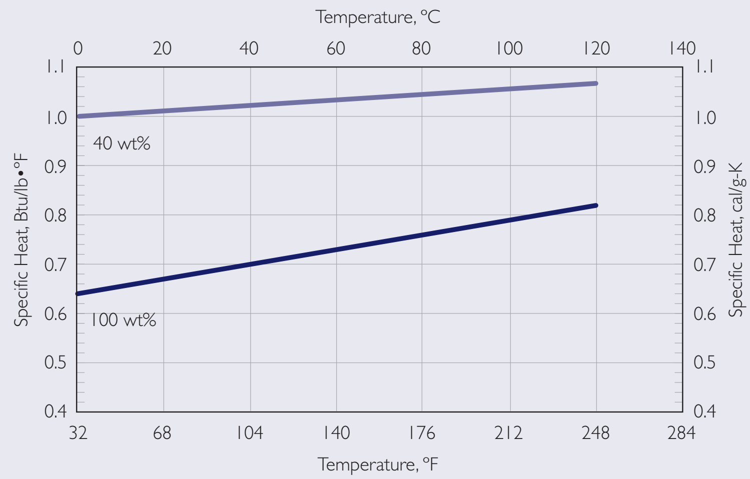
**STORAGE TEMPERATURE**

- The recommended minimum temperature for storing and pumping 100% GAS/SPEC CS-1000 is 20 °F (-7 °C).
- Steam tracing and insulation may be required in cold weather.

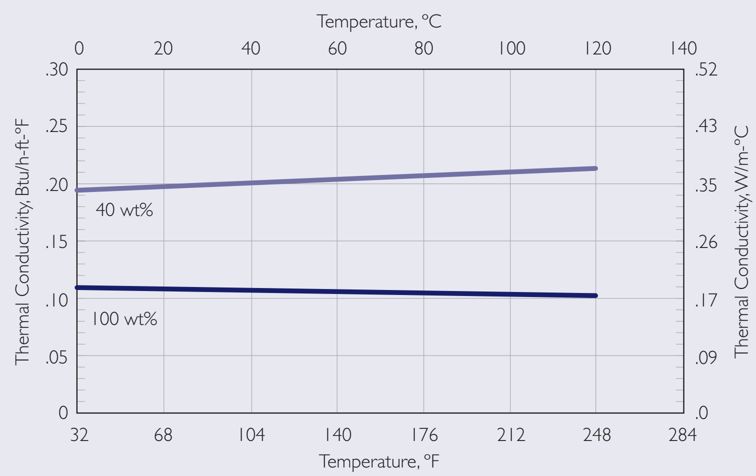
**HANDLING AND SAFETY**

- GAS/SPEC CS-1000 can cause serious injury to the eyes and may result in permanent eye damage. If accidental contact with the eyes occurs, flush eyes thoroughly for as long as possible with plenty of water and seek medical attention.
- Swallowing of GAS/SPEC CS-1000 may cause severe burns to the mouth, throat and digestive tract. May cause allergic respiratory reaction. People with asthma or other long-standing respiratory conditions should be protected from exposure to this product. In case of accidental ingestion, seek medical attention immediately.
- Brief contact may cause slight irritation to the skin. Occasional brief contact with the skin should be washed off immediately and should have little adverse effects. May cause allergic reaction in some individuals. Prolonged contact may result in severe irritation. Prolonged contact may also result in absorption in harmful amounts.

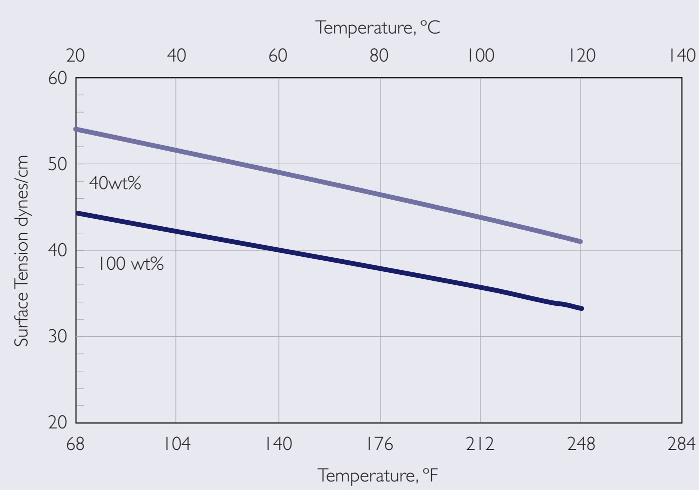
**Specific Heat**




**Thermal Conductivity**




**Surface Tension**



- Consult product Material Safety Data Sheet for more details.

The following precautions should be observed when the possibility of exposure exists:

- A safety shower and eyewash facility located nearby
- Chemical goggles
- Protective clothing, including chemically resistant gloves
- A well-ventilated work area

*Accidental Release*

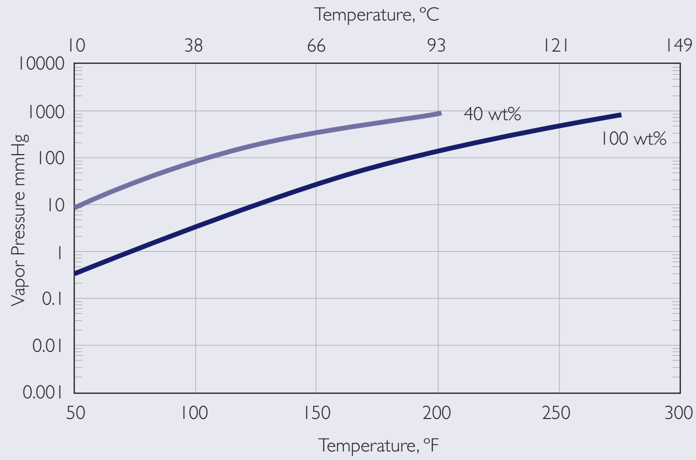
- Clear non emergency personnel from area.
- PROTECT THE ENVIRONMENT: Keep out of sewers, storm drains, surface waters and soil.
- Contain spill, if possible. Clean up with a non-combustible absorbent. Do not use sawdust.

## REGULATORY

Regulatory requirements may vary for different locations. Contact your INEOS representative for more information.

- GAS/SPEC CS-1000 is corrosive to skin and is considered hazardous according to the guidelines of the US Department of Transportation (DOT).
- GAS/SPEC CS-1000, as sold, contains no chemical subject to SARA Title III Section 313 supplier notification requirements.
- The export of this product is regulated under the provisions of the Chemical Weapons Convention.

**Vapor Pressure**



**GAS/SPEC**

*Since 1982, the GAS/SPEC name has represented a special focus on the products, technology and service to chemically remove acid gases from process streams. The GAS/SPEC business unit has been continuously headquartered in Houston, Texas, with its major technical facility in Freeport, Texas.*

*The family of specialty amines offered by the GAS/SPEC Technology Group, all based on MDEA technology, provides custom $H_2S$ and $CO_2$ removal in amine treating operations. The GAS/SPEC products and technology are exclusively offered by INEOS LLC and its specialized distributors.*

*The GAS/SPEC Technology Group is dedicated to achieving the highest degree of customer satisfaction globally through the application of the best available technology through the supply of cost-effective products and services. Other companies offer MDEA based products, some even attempting to emulate GAS/SPEC with similar sounding names… But only products with the GAS/SPEC name bring you the formulations, technology and service you are used to.*

*INEOS LLC is a part of INEOS Oxide.*

*INEOS Oxide manufactures a full range of products based on its production of ethylene oxide.*

INEOS Oxide

INEOS LLC
Head Office
2925 Briarpark Drive, Suite 870 • Houston, TX 77042
For more information on INEOS LLC products and services:
Phone: 713-243-6200 • Fax: 713-243-6220
Email us at: gastreating@ineos.com

**www.gasspec.com**
**www.gastreating.com**

Customer Service: 1-225-242-3005
or 866-865-4767 (toll free in USA and Canada).
Email us at: csr@ineos.com

GAS/SPEC
Products, Technology and Service from INEOS



GSSS008-4/02

# Appendix D Facility Wide Emissions Form 1a

# Utah Division of Air Quality
## New Source Review Section

## Form 1a
## Emissions Information

Company Revolution Fuels, LLC
Site/Source Facility wide emissions
Date May 8, 2015

Please print neatly or type all information requested. All information must be truthful, accurate and complete before we can process your application. If you have any questions, call (801) 536-4000 and ask to speak with a New Source Review engineer. Written inquiries may be addressed to: Division of Air Quality, NSR Section, P.O. Box 144820, Salt Lake City, Utah 84114-4820.

**Table 1. Proposed Emissions**

| Pollutants | Permitted Emissions (tons/year) | | Emissions Increases (tons/year) | | Proposed Emissions (tons/year) | |
|---|---|---|---|---|---|---|
| **Criteria Pollutants** | | | | | | |
| $PM_{10}$ | - | | | | 28.9 | |
| $PM_{2.5}$ | - | | | | 28.9 | |
| $NO_x$ | - | | | | 93.4 | |
| $SO_2$ | - | | | | 1.9 | |
| CO | - | | | | 95.0 | |
| VOC | - | | | | 9.2 | |
| **Greenhouse Gases** | **Mass basis** | **$CO_2e$** | **Mass basis** | **$CO_2e$** | **Mass basis** | **$CO_2e$** |
| Carbon dioxide ($CO_2$) | | | | | 295,445 | |
| Methane ($CH_4$) | | | | | 4.1 | 101.6 |
| Nitrous oxide ($N_2O$) | | | | | 1.1 | 329.1 |
| Hydrofluorocarbons (HFCs) | | | | | | |
| Perfluorocarbons (PFCs) | | | | | | |
| Sulfur hexafluoride ($SF_6$) | | | | | | |
| **Total Hazardous Air Pollutants** | | | | | 3.1 | |
| Hazardous Air Pollutants (list individually) (attach additional sheet if needed) | | | | | See emission calculations | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Use additional sheets for other pollutants if needed.

**Table 2. Controlled and Uncontrolled Emissions**

| Pollutant | Controlled Emissions (tons/year) | | Uncontrolled Emissions (tons/year) | |
|---|---|---|---|---|
| **Criteria Pollutants** | | | | |
| $PM_{10}$ | 28.9 | | 29.6 | |
| $PM_{2.5}$ | 28.9 | | 29.3 | |
| $NO_x$ | 93.4 | | 93.4 | |
| $SO_2$ | 1.9 | | 1.9 | |
| CO | 95.0 | | 95.0 | |
| VOC | 9.2 | | 9.2 | |
| **Greenhouse Gases (GHGs)** | **Mass basis** | **$CO_2e$** | **Mass basis** | **$CO_2e$** |
| Carbon dioxide ($CO_2$) | 295,445 | | 295,445 | 28.9 |
| Methane ($CH_4$) | 4.1 | 101.6 | 4.1 | 101.6 |
| Nitrous oxide ($N_2O$) | 1.1 | 329.1 | 1.1 | 329.1 |
| Hydrofluorocarbons (HFCs) | | | | |
| Perfluorocarbons (PFCs) | | | | |
| Sulfur hexafluoride ($SF_6$) | | | | |
| Total GHG Emissions | | | | |
| **Total Hazardous Air Pollutants** | 3.1 | | 3.1 | |
| Hazardous Air Pollutants (list individually) (attach additional sheet if needed) | | | | |
| | | | | |
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| | | | | |

Use additional sheets for other pollutants if needed

**Table 3. Hourly HAP Emissions**

| Hazardous Air Pollutants (list individually) | Maximum emission rate (lbs/hour) |
|---|---|
| Benzene | 1.05E-02 |
| Dichylorobenzene | 5.47E-04 |
| 1,3 butadiene | 6.02E-05 |
| Formaldehyde | 3.51E-02 |
| Hexane | 8.20E-01 |
| Naphthalene | 9.37E-04 |
| Toluene | 5.18E-03 |
| Xylene | 2.97E-03 |
| Acetaldehyde | 1.44E-03 |
| Acrolein | 2.24E-04 |
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**Utah Division of Air Quality**
**Approval Order Application**
**Form 1d**
**Emissions Information**

**Instructions**

**Table 1.** Fill out the table. Attach additional sheets if necessary. Provide potential emissions from your entire facility in units of tons per year, expressed to at least two decimal places. Emissions of individual Hazardous Air Pollutants may require more precision; contact a New Source Review Engineer. If you do not now have an Approval Order and you are applying for your first Approval Order, the emissions in “Existing Emissions” column will be zero and the “Emissions Increases” will be equal to the “Proposed “Emissions. If you do have an Approval Order, the emissions in the “Existing Emissions” column will be the emissions listed in your Approval Order. All emissions should be those emissions occurring **after** any air pollution control devices. Provide emissions that would result if you operated 24 hours per day, 8760 hours per year, **unless** you are also proposing operating hour limits. If you are proposing operating hour limits, state what these limits are and provide emissions based on these limits. Provide emissions that would result from your potential production or potential raw material consumption, **unless** you are also proposing production or raw material consumption limits. If you are proposing production or raw material consumption limits, state what these limits are and provide emissions based on these limits. **Attach additional sheets with detailed calculations or stack testing information showing how all of the above emission numbers were determined.**

There are six greenhouse gases currently regulated. USEPA has established a Global Warming Potential (GWP) for each of the six compounds: $CO_2$ - 1, $CH_4$ - 21, $N_2O$ - 310, HFCs - 12 - 11,700, PFCs - 6,500 - 9,200, and $SF_6$ - 23,900. The Carbon Dioxide Equivalent ($CO_2e$) is determined by multiplying the mass based emission rate in tpy by the GWP. The total $CO_2e$ for all six compounds becomes the $CO_2e$ at the source.

**Table 2.** Fill out the table. Attach additional sheets if necessary. Provide potential emissions from your entire facility in units of tons per year, expressed to at least two decimal places. Emissions of individual Hazardous Air Pollutants may require more precision; contact a New Source Review Engineer. The Hazardous Air Pollutants should be the same Hazardous Air Pollutants listed in Table 1. The emissions in the “Controlled Emissions” column should be those emissions occurring **after** any air pollution control devices. The emissions in the “Uncontrolled Emissions” should be those emissions occurring **before** any air pollution control devices (in other words, emissions that would result if you did not have any air pollution control devices at all. Provide emissions that would result if you operated 24 hours per day, 8760 hours per year, **unless** you are also proposing operating hour limits. If you are proposing operating hour limits, state what these limits are and provide emissions based on these limits. Provide emissions that would result from your potential production or potential raw material consumption, **unless** you are also proposing production or raw material consumption limits. If you are proposing production or raw material consumption limits, state what these limits are and provide emissions based on these limits. **Attach additional sheets with detailed calculations or stack testing information showing how all of the above emission numbers were determined.**

For GHG emission calculations, refer to the instructions to Table 1.

**Table 3.** List all Hazardous Air Pollutants emitted by your facility. They should be the same Hazardous Air Pollutants listed in tables 1 and 2. For each HAP provide its maximum emission rate in units of pounds per hour. The emission rates should be those rates occurring **after** any air pollution control devices. **Attach additional sheets with detailed calculations or stack testing information showing how all of the above emission numbers were determined.**

**Depending on other conditions unique to each facility, additional emissions information may be required.**

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Revised 5/16/11

# Appendix E Source Size Determination

See discussion in Section 3.0.

# Appendix F Offset Requirements

See discussion in Section 3.0.

# Appendix G Best Available Control Technology (BACT)

# G.1 INTRODUCTION

Utah regulation R301-401-5(2)(d) requires that Best Available Control Technology (BACT) be applied to all regulated air pollutants emitted from a facility. A BACT determination is made on a case-by-case basis, with consideration given to technological practicability and economic reasonableness. In all cases BACT must establish emission limitations or specific design characteristics at least as stringent as applicable New Source Performance Standards.

This BACT analysis provides a discussion on the feasibility of control options for $NO_X$, $PM_{10}$/$PM_{2.5}$, CO and VOC BACT analyses for burner systems, process heaters, auxiliary boiler and internal combustion engines. This analysis also discusses the feasibility of control options for $PM_{10}$/$PM_{2.5}$ from fugitive emissions resulting from coal and ash material handling operations.

# G.2 PYROLYSIS AND GASIFICATION BURNERS

Two natural gas burner systems are associated with the pyrolysis and gasification process. Each burner system will be fueled with a combination of recycled tail gas from the Fischer Tropsch process and pipeline quality natural gas. The two burner systems are routed through a common stack and the combined emissions are identified as gasification flue gas.

Pollutant emissions from the pyrolysis and gasification burner systems include $NO_x$, $PM_{10}$, $PM_{2.5}$, CO, $SO_2$, and VOCs. Annual operation of the burners will be 8,400 hours.

- The pyrolysis burner system will include (3) 6-inch Kinemax LE burners each providing a maximum of 11.2 MMBtu/hr.
- The gasification burner system will include (5) 14-inch Kinemax LE burners each providing a maximum of 60 MMBtu/hr.

The potential emissions from these burner systems are provided in Table G-1.

**Table G-1 Pyrolysis and Gasification Burner Emissions**

| Heater | Operating Hours | Size (MMBtu/hr) | $NO_x$ (tons/yr) | $PM_{10}$/$PM_{2.5}$ (tons/yr) | CO (tons/yr) | VOC (tons/yr) |
|---|---|---|---|---|---|---|
| Pyrolysis Burner System | 8,400 | 33.6 | 8.62 | 1.17 | 7.34 | 0.85 |
| Gasification Burner System | 8,400 | 300 | 76.86 | 10.49 | 65.52 | 7.59 |
| | | **Total:** | **85.48** | **11.66** | **72.86** | **8.44** |

## G.2.1 BACT SELECTION- $NO_X$ AND CARBON MONOXIDE

Based on research and engineering experience, the control technologies listed in Table G-2 were considered for this BACT analysis.

**Table G-2 Control Technologies**

| Pollutant | Control Technology |
|---|---|
| $NO_X$ | Selective Non-Catalytic Reduction (SNCR)<br>Selective Catalytic Reduction (SCR)<br>Low-$NO_x$ burners<br>Good Combustion Practices |
| CO | Oxidation Catalyst |

The exhaust gas temperatures of the gasification flue gas are not high enough for the effective operation of Selective Non-Catalytic Reduction (SNCR). The gasification flue gas is approximately 600 °F. The $NO_x$ reduction reaction occurs at temperatures between 1600 °F to 2100 °F (EPA, 2002). Therefore, SNCR is considered to be infeasible for application to this flue gas.

The Selective Catalytic Reduction (SCR) process is based on chemical reduction of the $NO_x$ molecule. A nitrogen-based reducing agent (reagent), such as ammonia or urea, is injected into the post combustion flue gas. The reagent reacts selectively with the flue gas $NO_x$ within a specific temperature range and in the presence of the catalyst and oxygen to reduce the $NO_x$ to molecular nitrogen ($N_2$) and water vapor ($H_2O$). SCR catalysts are composed of active metals or ceramics with a highly porous structure. Within the pores of the catalyst are activated sites. These sites have an acid group on the end of the compound structure where the reduction reaction occurs. Control for an SCR system is typically 70-90% reduction of $NO_x$ (EPA, Selective Catalytic Reduction (SCR) Fact Sheet, 2003).

Vendor data has been obtained for the addition of a SCR combined with an oxidation catalyst to control CO emission to the gasification flue gas. Vendor data shows that $NO_x$ can be reduced by 82% from 0.061 lb/MMBtu to a rate of 0.011 lb/MMBtu.

Catalytic oxidation is a control technology which employs a module containing an oxidation catalyst that is located in the exhaust path of the burner system. In the catalyst module, CO diffuses through the surfaces of a ceramic honeycomb structure coated with noble metal catalyst particles. Oxidation reactions on the catalyst surface forms carbon dioxide and water. Vendor indications are that 90 percent reduction in CO emissions can be achieved based on the gasification flue gas exhaust temperature.

The estimated capital costs associated with the installation, startup and equipment costs of an SCR/oxidation catalyst at this removal rate is approximately $935,000. The annualized costs including annual operating costs as well as capital cost recovery are outlined in Table G-3 below. Included as an Attachment to this Appendix is supporting documentation received from the vendor which was used to develop the costs. Table G-4 below outlines the estimated cost per ton of pollutant removed for the gasification flue gas using SCR and catalytic oxidation technology.

**Table G-3 Gasification Flue Gas SCR Cost**

| Direct Capital Costs (DCC) | Cost |
|---|---|
| Capital equipment cost | $380,000 |
| Installation cost | $555,000 |
| Total capital cost | $935,000 |
| Capital recovery factor [a,b] (CRF) | 0.0736 |
| | |
| **Annual Costs (AC)** | |
| Annual catalyst cost | $50,000 |
| Annual ammonia cost | $140,000 |
| Annual catalyst replacement labor | $17,000 |
| | |
| **Total Annual Cost = DCC*CRF + AC** | **$275,816** |

[a] Assumed life of unit is 20 years with an interest rate of 4%. (EPA02; EPA, EPA Air Pollution Control Cost Manual, 2002)

[b] Interest rate is AAA corporate bond rating from Federal Reserve publication H-15( (Board of Governors fo the Federal Reserve System)

**Table G-4 Gasification Flue Gas Emissions Reduction Cost**

| Heater | $NO_x$ Reduction (tons/yr) | CO Reduction (tons/yr) | $NO_x$ $ per ton removed | CO $ per ton removed |
|---|---|---|---|---|
| Gasification Flue Gas | 70.09 | 65.57 | $3,935 | $4,206 |

Revolution is requesting UDAQ's review prior to making a final determination on whether an SCR system will be included for the gasification flue gas.

## G.3 AUXILIARY BOILER

Revolution will have one 73.88 mmBtu/hr natural gas fired auxiliary boiler equipped with low $NO_x$ burners. The boiler is used to produce steam for use in various processes throughout the facility.

Pollutant emissions from the auxiliary boiler include $NO_x$, $PM_{10}$, $PM_{2.5}$, CO, $SO_2$, and VOCs. Annual operation of the burners will be limited to 500 hours. The potential emissions from this boiler are provided in Table G-5.

**Table G-5 Auxiliary Boiler Emissions**

| Heater | Operating Hours | Size (MMBtu/hr) | $NO_x$ (tons/yr) | $PM_{10}/PM_{2.5}$ (tons/yr) | CO (tons/yr) | VOC (tons/yr) |
|---|---|---|---|---|---|---|
| Auxiliary Boiler | 500 | 73.88 | 0.91 | 0.14 | 1.52 | 0.10 |

Revolution proposes BACT for $NO_x$ and PM emissions from the natural gas-fired auxiliary boiler as good combustion practices with Low-$NO_x$ burners. Burner vendor information indicates that the hourly emissions for this unit with these technologies will be about 0.054 lb/MMBtu $NO_x$ and 0.0083 lb/MMBtu $PM_{10}/PM_{2.5}$. This rate, or a corresponding lb/hour emission rate, is proposed as the BACT $NO_x$ and $PM_{10}/PM_{2.5}$ limit for emissions from the auxiliary boiler.

Due to the limited operating hours of the auxiliary boiler and low $NO_X$ and $PM_{10}/PM_{2.5}$ emissions as provided in Table G-5, Revolution believes that the installation of any add-on controls would not be cost effective for the auxiliary boiler. A complete cost analysis was completed in Section G.2 for the larger natural gas burner systems at the Revolution facility and additional add-on control devices were determined to be cost effective. However, due to the lower emissions from the auxiliary boiler, additional add-on controls would have a prohibitively higher cost per ton of emissions removed. Assuming the same total annual cost for the addition of a SCR and 85% removal efficiency, the cost per ton of NOx removed for the auxiliary boiler is $369,627.

## G.3.1 BACT SELECTION-CARBON MONOXIDE AND VOLATILE ORGANIC COMPOUNDS

Catalytic oxidation was evaluated as a control technology for the auxiliary boiler. Oxidation reactions on the catalyst surface forms carbon dioxide and water. Typical vendor indications are that 90 percent reduction in CO and 50 percent reduction in VOC emissions should be achieved. Annualized cost is estimated by the exhaust rate and an average annualized cost for the catalytic oxidation controls of $29/scfm (EPA, Catalytic Incinerator Fact Sheet, 1998). Table G-6 below outlines the estimated cost per ton of pollutant removed for the auxiliary boiler.

**Table G-6 Auxiliary Boiler Emissions Reduction Cost**

| Heater | scfm | Uncontrolled CO (tons/yr) | Uncontrolled VOC (tons/yr) | CO Reduction (tons/yr) | VOC Reduction (tons/yr) | $ per ton removed |
|---|---|---|---|---|---|---|
| Activation/Regeneration Heater #1 | 17,389 | 1.52 | 0.10 | 1.37 | 0.05 | $355,127 |

The cost effectiveness results are prohibitively high for the auxiliary boiler due to the limited operating hours.

## G.4 NATURAL GAS FIRED PROCESS HEATERS

Four small natural gas process heaters will be used at various steps in the coal to liquids process. Each heater will be fueled by a combination of pipeline quality natural gas or syngas produced in the facility. Each process heater is also equipped with low $NO_x$ burners.

Pollutant emissions from natural gas heaters include $NO_x$, $PM_{10}$, $PM_{2.5}$, CO, $SO_2$, and VOCs. Annual operation and emissions from each process heater are provided in Table G-7.

**Table G-7 Process Heater Emissions**

| Heater | Operating Hours | Size (MMBtu/hr) | $NO_x$ (tons/yr) | $PM_{10}/PM_{2.5}$ (tons/yr) | CO (tons/yr) | VOC (tons/yr) |
|---|---|---|---|---|---|---|
| Activation/Regeneration Heater #1 | 4,032 | 1.12 | 0.12 | 0.02 | 0.21 | 0.01 |
| Activation/Regeneration Heater #2 | 2,016 | 0.60 | 0.03 | 0.01 | 0.06 | 0.00 |
| Product Upgrading Heater #1 | 8,400 | 4.85 | 1.00 | 0.15 | 1.68 | 0.11 |
| Product Upgrading Heater #2 | 8,400 | 10.25 | 2.11 | 0.32 | 3.55 | 0.23 |

### G.4.1 BACT SELECTION- $NO_X$ AND PARTICULATE MATTER

Revolution proposes BACT for $NO_x$ and PM emissions from the natural gas-fired process heaters as good combustion practices with Low-$NO_x$ burners. Burner vendor information indicates that the hourly emissions for this unit with these technologies will be about 0.054 lb/MMBtu $NO_x$ and 0.0083 lb/MMBtu $PM_{10}/PM_{2.5}$. This rate, or a corresponding lb/hour emission rate, is proposed as the BACT $NO_x$ and $PM_{10}/PM_{2.5}$ limit for emissions from the process heaters.

Due to the relatively small sizes of these heaters and low $NO_x$ and $PM_{10}/PM_{2.5}$ emissions as provided in Table G-7, Revolution believes that the installation of any add-on controls would not be cost effective for these process heaters. A complete cost analysis was completed in Section G.2 for the larger natural gas burner systems at the Revolution facility and additional add-on control devices were determined to be cost effective. However, due to the smaller size of the process heaters, additional add-on controls would have a prohibitively higher cost per ton of emissions removed.

### G.4.2 BACT SELECTION-CARBON MONOXIDE AND VOLATILE ORGANIC COMPOUNDS

Catalytic oxidation was evaluated as a control technology for the process heaters. Oxidation reactions on the catalyst surface forms carbon dioxide and water. Typical vendor indications are that 90 percent reduction in CO and 50 percent reduction in VOC emissions should be achieved. Annualized cost is estimated by the exhaust rate and an average annualized cost for the catalytic oxidation controls of $29/scfm (EPA, Catalytic Incinerator Fact Sheet, 1998). Table G-8 below outlines the estimated cost per ton of pollutant removed for each process heater.

**Table G-8 Process Heater Emissions Reduction Cost**

| Heater | scfm | Uncontrolled CO (tons/yr) | Uncontrolled VOC (tons/yr) | CO Reduction (tons/yr) | VOC Reduction (tons/yr) | $ per ton removed |
|---|---|---|---|---|---|---|
| Activation/Regeneration Heater #1 | 1330.0 | 0.21 | 0.01 | 0.189 | 0.005 | $198,814 |
| Activation/Regeneration Heater #2 | 553.9 | 0.06 | 0.00 | 0.054 | 0.00 | $297,465 |
| Product Upgrading Heater #1 | 722.2 | 1.68 | 0.11 | 1.51 | 0.055 | $13,508 |
| Product Upgrading Heater #2 | 1648.5 | 3.55 | 0.23 | 3.195 | 0.115 | $14,482 |

The cost effectiveness results are prohibitively high for each of the process heaters due to the relatively small size of each heater and overall low annual emissions.

# G.5 INTERNAL COMBUSTION ENGINES

Revolution will have one 1,482 Hp diesel emergency engine and one 220 Hp diesel driven fire water pump used for emergency purposes at the facility.

Pollutant emissions from the internal combustion engines include $NO_x$, $PM_{10}$, $PM_{2.5}$, CO, $SO_2$, and VOCs. Annual operation of the engines will be limited to 500 hours. The potential emissions from these engines are provided in Table G-9.

**Table G-9 Internal Combustion Engine Emissions**

| Heater | Operating Hours | Size (Hp/hr) | $NO_x$ (tons/yr) | $PM_{10}$/$PM_{2.5}$ (tons/yr) | CO (tons/yr) | VOC (tons/yr) |
|---|---|---|---|---|---|---|
| Emergency Generator | 500 | 1,482 | 3.23 | 0.09 | 0.54 | 0.06 |
| Fire Pump Engine | 500 | 220 | 0.30 | 0.02 | 0.14 | 0.01 |

Based on research and engineering experience, the control technologies listed in Table G-10 were considered for this BACT analysis.

**Table G-10 Control Technologies for Internal Combustion Engines**

| Pollutant | Control Technology |
|---|---|
| $NO_X$ | Non-ammonia SCR (SCONO$_X$)<br>Selective Non-Catalytic Reduction (SNCR)<br>Selective Catalytic Reduction (SCR)<br>Turbocharger<br>Good Combustion Practices |
| $PM_{10}/PM_{2.5}$ | Fabric Filters<br>Dry Electrostatic Precipitator (ESP)<br>Wet ESP<br>Venturi Scrubber<br>Diesel Particulate Filter (DPF)<br>Good Combustion Practices |

Due to the low $NO_X$ emissions and limited use of the emergency generator and fire water pump engine, as provided in Table G-9, Revolution believes that the installation of any add-on controls would not be cost effective for these engines.

The exhaust gas temperatures of the above diesel engines are not high enough for the effective operation of Selective Non-Catalytic Reduction (SNCR). Therefore, SNCR is considered to be infeasible for application to these engines.

Due to the limited operating hours of the emergency generator and fire water pump engines Revolution believes that the installation of any add-on controls would not be cost effective for these engines. A complete cost analysis was completed in Section G.2 for the large natural gas burner systems at the Revolution facility and additional add-on control devices were determined to be not cost effective. Consequently, due to the lower emissions from the auxiliary boiler, additional add-on controls would have a prohibitively higher cost per ton of emissions removed.

Turbochargers and good combustion practices are the only remaining feasible options and are considered BACT for these engines. These engines are already equipped with turbochargers. Therefore, along with turbochargers, Revolution is proposing to apply good combustion practices as BACT for these engines. The proposed BACT will not have any adverse environmental impact.

# G.6 COAL AND ASH MATERIAL HANDLING

$PM_{10}/PM_{2.5}$ fugitive emissions from coal handling operations include truck unloading, crushing, conveying, and a coal storage pile, and associated haul roads. $PM_{10}/PM_{2.5}$ non-fugitive emissions result from coal conveyor transfer and silo loading, as well as ash handling operations include conveying of ash into a storage bin.

In reviewing the BACT alternatives to control emissions of fugitive $PM_{10}/PM_{2.5}$ from the facility, the control options listed in Table G-11 are considered.

**Table G-11 Control Options for Fugitive Sources**

| Pollutant | Source | Control Options |
|---|---|---|
| $PM_{10}/PM_{2.5}$ Fugitive | Haul Road | Water Spray & Paving |
| | | Surfactant Spray |
| | | Water Spray |
| | | Paving |
| | Truck Unloading and Storage Pile | Surfactant/Water Spray |
| | | Inherent Moisture |
| | | Enclosures |

The following discusses feasibility of control options identified in Table G-9 above for each emission source.

## G.6.1 HAUL ROAD

Water spray and paving provides the highest level of control (95 percent per Utah Department of Environmental Quality memorandum, November 3, 2008.) of $PM_{10}/PM_{2.5}$ emissions. Revolution plans to pave the onsite haul roads to adequately control fugitive emissions and no further analysis is required.

## G.6.2 COAL STORAGE PILE AND UNLOADING

Watering and the use of chemical wetting agents are the principal means for control of coal storage pile emissions and can reduce total particulate emissions from the storage operations by up to 90 percent (per WRAP Fugitive Dust Handbook). Inherent moisture content of the raw material is also considered as an effective means to control fugitive dust emissions.

Enclosure or covering of inactive piles to reduce wind erosion can also reduce emissions. Although enclosing storage piles can be an effective means to reduce wind erosion emissions enclosing stockpiles that are actively used is not economically feasible.

Revolutions coal storage pile is subject to NSPS Subpart Y (Standards of Performance for Coal Preparation and Processing Plant). Revolution will operate according to a fugitive coal dust emissions control plan in which Revolution plans to use water sprays as a control measure to minimize fugitive coal dust. Inherent moisture content of the coal is expected to be 10 percent. This inherent moisture content of the coal along with regular water sprays will reduce the emissions from the storage piles and truck loading/unloading and is proposed as BACT for this operation.

## G.6.3 CRUSHER CONVEYORS AND MATERIAL TRANSFER

$PM_{10}$/$PM_{2.5}$ emissions result from coal conveyor transfer and silo loading, as well as ash handling operations include conveying and transfer of ash into a storage bin.

In reviewing the BACT alternatives to control emissions of non-fugitive $PM_{10}$/$PM_{2.5}$ from the facility, the control options listed in Table G-12 are considered.

**Table G-12 Control Options for Non-Fugitive Sources**

| Pollutant | Source | Control Options |
|---|---|---|
| $PM_{10}$/$PM_{2.5}$ Non-Fugitive | Crusher and Conveyor Transfers<br>Silo and Day Bin Loading<br>Ash Conveying and Transfer | Fabric Filter (Baghouse) |
| | | Electrostatic Precipitator (ESP) |
| | | Wet Scrubber |
| | | Cyclone Collection |
| | | Enclosure |

Revolution will utilize covered conveyors to convey coal from the storage pile to the crusher and into a silo day bin and lock hoppers. Wet suppression systems (spray nozzles) are an effective and technologically feasible control option for crushers and associated conveyors. Wet suppression systems can maintain relatively high material moisture contents throughout the processes and thus effectively control particulate emissions.

The high moisture content of the coal along with covered conveyors, water sprays and baghouse control is proposed as BACT for coal crushing and conveying operations.

In addition, Revolution will utilize a baghouse to control emissions from all coal conveyor transfer points and crushing operations.

The ash removal system uses a vibrating conveyor to cool the ash and transport it into an enclosed silo. The conveyor will be covered and use a baghouse for particulate control.

Fabric filters (Baghouse) provide the highest level of control (above 99 percent per EPA-452/F-03-025) of PM10/PM2.5 emissions and are technologically feasible for the coal crushing and conveying operations. Since Revolution is applying the top ranked technologically feasible control, it is not necessary to evaluate any remaining control technologies with lower $PM_{10}$/$PM_{2.5}$ control efficiencies for the coal crushing and conveying operations as well as the ash conveying operations.

# Appendix H  Air Pollution Control Equipment

See BACT discussion in Appendix G.

# Appendix I Federal/State Applicable Requirements

A review of federal and state air quality regulations is provided in Table I-1. Each regulation is described in the following sections.

**Table I-13 Regulatory Applicability Summary**

| | Federal Regulations | Regulatory Citation | Applicable |
|---|---|---|---|
| I.1 | National Ambient Air Quality Standards (NAAQS)- (dispersion modeling) | 40 CFR Part 50 | Yes |
| I.2 | Title V Operating Permit | 40 CFR Part 70 | No |
| I.3 | New Source Review (NSR) | 40 CFR Part 52 | Yes |
| I.4 | New Source Performance Standards (NSPS) | 40 CFR Part 60 | Yes |
| I.5 | Air Pollutants (NESHAPs) | 40 CFR Parts 61, 63 | Yes |
| I.6 | Acid Rain Requirements | 40 CFR Parts 72–78 | No |
| I.7 | Risk Management Programs For Chemical Accidental Release Prevention | 40 CFR Part 68 | Yes |
| I.8 | **State Rules** | | |
| I.8.1 | General Requirements - Breakdowns | UAC [R307-107] | Yes |
| I.8.2 | Emission Inventories | UAC [R307-150] | Yes |
| I.8.3 | Permit Requirements for New and Modified Sources | UAC [R307-401] | Yes |

## I.1 NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Primary National Ambient Air Quality Standards (NAAQS) are identified in 40 CFR Part 50 and define levels of air quality, which the United States Environmental Protection Agency (USEPA) deems necessary to protect the public health. Secondary NAAQS define levels of air quality, which the USEPA judges necessary to protect public welfare from any known, or anticipated adverse effects of a pollutant. Examples of public welfare include protecting wildlife, buildings, national monuments, vegetation, visibility, and property values from degradation due to excessive emissions of criteria pollutants.

Specific standards for the following pollutants have been promulgated by USEPA: PM10, SO2, $NO_x$, CO, ozone, lead, and $PM_{2.5}$. Revolution emits $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_x$, CO, and VOCs, a precursor to ozone. The modeling report included in Appendix J evaluates all applicable NAAQS and demonstrates compliance.

## I.2 TITLE V (PART 70) OPERATING PERMIT

Title V of the Clean Air Act (CAA) created the federal operating permit program. These permitting requirements are codified in 40 CFR Part 70. These permits are required for major sources with a Potential to Emit (PTE) (considering federally enforceable limitations) greater than 100 tpy for any criteria pollutant, 25 tpy for all hazardous air pollutants (HAPs) in aggregate, or 10 tpy of any single HAP. Revolution is considered a minor source because the PTE of each criteria pollutant is less than 100 tons per year, and the HAPs thresholds are also not exceeded. Greenhouse gas emissions are estimated to be greater than 100,000 tons per year $CO_2e$. On June 23, 2014, the U.S. Supreme Court issued its decision in Utility Air Regulatory Group v. EPA (No. 12-1146). The ruling stated that EPA may not treat greenhouse gases as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. Based on this decision the Revolution facility would remain a minor source. Therefore, a Title V Operating permit is not needed for Revolution.

# I.3 NEW SOURCE REVIEW (NSR) REQUIREMENTS

Carbon County is designated as an attainment area for all criteria pollutants. As a result, an evaluation of the need for the use of offset emissions was not necessary.

The prevention of significant deterioration (PSD) regulations codified in 40 CFR Part 52 could potentially apply to the proposed facility. The PSD rule applies to: (1) a new major source that has the potential to emit 100 tons per year or more for any criteria pollutant for a facility that is one of the 28 industrial source categories listed in 40 CFR § 52.21(b)(1)(i)(a); or (2) a new major source that has the potential to emit 250 tons per year or more if the facility is not on the list of industrial source categories; or (3) a modification to an existing major source that results in a net emission increase greater than a PSD significant emission rate as specified in 40 CFR § 52.21 (b)(23)(i); or (4) a modification to an existing minor source that is major in itself. The proposed permitting action does not trigger any PSD actions.

# I.4 NEW SOURCE PERFORMANCE STANDARDS (NSPS)

New Source Performance Standards (NSPS) in 40 CFR Part 60 are applicable to new, modified, or reconstructed stationary sources that meet or exceed specified applicability thresholds. The following standards are applicable to the equipment proposed for the Revolution facility.

## I.4.1 SUBPART DC

Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units) is applicable to Revolution's 73.88 MMBtu/hr auxiliary boiler. The boiler is fired on pipeline natural gas and is used to produce steam which is used in various processes throughout the facility.

## I.4.2 SUBPART KB

Subpart Kb outlines the Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984. This standard does not apply to Revolution's storage tanks because all storage tanks are less than 1,589.874 $m^3$ and are used to store petroleum products prior to a custody transfer.

### I.4.3 SUBPART Y

Subpart Y (Standards of Performance for Coal Preparation and Processing Plant) is applicable to Revolution since the facility will process more than 200 tons per day of coal. Prior to startup, Revolution will prepare and submit a fugitive coal dust emissions control plan to the Administrator. Revolution's coal storage pile and processing and conveying equipment will operate in accordance with the fugitive coal dust emissions control plan. Revolution plans to use water sprays as a control measure to minimize fugitive coal dust. In addition, Revolution will utilize a baghouse to control emissions from coal conveying, transfer and crushing operation.

Revolution believes that their pyrolysis and gasification burner system do not meet the definition of a thermal dryer under this subpart. Thermal dryers as defined under this Subpart reduce the moisture content of coal by either contact with a heated gas stream which is exhausted to the atmosphere or through indirect heating of the coal through contact with a heated heat transfer medium. The burner systems at the coal to liquids facility reduce the moisture content in the coal but the exhaust is not vented to the atmosphere.

### I.4.4 SUBPART IIII

40 CFR Part 60, Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines) is applicable to Revolution's emergency generator engine and fire pump engine.

## I.5 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS)

Two sets of National Emissions Standards for Hazardous Air Pollutants (NESHAPs) may potentially apply to Revolution. The first NESHAP regulations were developed under the auspices of the original CAA. These standards are codified in 40 CFR Part 61, and address a limited number of pollutants and industries. 40 CFR Part 61 regulations do not apply to this facility.

Newer regulations are codified in 40 CFR Part 63 under the authority of the 1990 Clean Air Act Amendments (CAAA). These standards regulate HAP emissions from specific source categories and typically affect only major sources of HAPs, however some affect minor sources of HAPs. Part 63 regulations are frequently called Maximum Achievable Control Technology (MACT) standards. Major HAP sources have the PTE 10 tpy or more of any single HAP or 25 tpy or more of all combined HAP emissions. At the Revolution facility, potential emissions of individual HAPs will be less than 10 tpy and combined HAP emissions will be less than 25 tpy.

### I.5.1 SUBPART Q

Subpart Q (National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers) does not apply to Revolutions cooling tower as they are not anticipated to use chromium based water treatment chemicals.

### I.5.2 SUBPART ZZZZ

Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Internal Combustion Engines) is applicable to Revolution's emergency generator and fire pump engine. The two engines are subject to Subpart ZZZZ as new reciprocating internal combustion engines as they were constructed after June 12, 2006. However, both engines meet ZZZZ requirements by complying with 40 CFR 60, Subpart IIII requirements as stated in section 40 CFR 63.6590(c)(1).

### I.5.3 SUBPART JJJJJJ

Subpart JJJJJJ (National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources) does not apply to Revolutions auxiliary boiler as it burns only gaseous fuel and meets the definition of a gas fired boiler as defined in the subpart.

## I.6 ACID RAIN REQUIREMENTS

The acid rain requirements codified in 40 CFR Parts 72-78 apply only to utilities and other facilities that combust fossil fuel and generate electricity for wholesale or retail sale. The Title IV Acid Rain Program is for sources that use coal as a source of combustion and sources that produce over 25 MW of power. Revolution does not meet the criteria necessary to be applicable to this part.

## I.7 RISK MANAGEMENT PROGRAMS FOR CHEMICAL ACCIDENTAL RELEASE PREVENTION

The facility is subject to the Chemical Accidental Release Prevention Program and will be required to develop a Risk Management Plan (RMP). Facilities that produce, process, store, or use any regulated toxic or flammable substance in excess of the thresholds listed in 40 CFR Part 68 must develop a RMP. The facility will have a 30,000 gallon liquefied petroleum gas (LPG) storage tank which has the capacity to contain approximately 111,000 pounds of propane or LPG. The applicable threshold for propane is 10,000 pounds stored at a single vessel or group of vessels that are connected or stored together. A RMP appears to be necessary for this facility.

## I.8 STATE RULES

The Utah Division of Administrative Rules (DAR) promulgates several emissions regulations that apply to Revolution in addition to those listed above.

### I.8.1 GENERAL REQUIREMENTS – BREAKDOWNS

UAC R307-107 indicates the applicable general requirements for breakdown events. Breakdowns will be reported within 24 hours of an incident with a written description of the event. Revolution's will comply with the procedures and requirements outlined in R307-107 and submit the necessary information and reports to UDAQ related to excess emissions due to startup, shutdown, scheduled maintenance, safety measures, upsets and breakdowns.

### I.8.2 EMISSION INVENTORIES

UAC R307-150 establishes requirements for emission inventory submittals. Revolution will comply with this rule where appropriate.

### I.8.3 PERMIT: NEW AND MODIFIED SOURCES

UAC R307-401 establishes the permitting requirements for any new and modified sources. Revolution will comply with any permitting requirements as defined in the rule and that applies to the Approval Order.

# Appendix J Emissions Impact Analysis

# Sign-off Sheet

**AERMOD Modeling Report to Assess Ambient Air Quality Impacts –**

Revolution Fuels, LLC
Coal to Liquid Project

Prepared for:
Utah Dept. of Environmental Quality
Division of Air Quality
P.O. Box 144820
Salt Lake City, UT 84114-482
Phone: 801.536.4000

Prepared by:
Stantec Consulting Services Inc.
7669 W Riverside Drive, Ste. 101
Boise, ID 83714
Contact: David E.B. Strohm, II
Phone: 208.853.0883

**May 5, 2015**

# Sign-off Sheet

This document entitled **AERMOD Modeling Report to Assess Ambient Air Quality Impacts** was prepared by **Stantec Consulting Services** ("Stantec") for the account of **Revolution Fuels, LLC** ("Revolution" or the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by: **David E.B. Strohm, II**
**Project Manager, Environmental Science**

Eric E. Clark

Reviewed by: **Eric Clark**
**Environmental Engineer**

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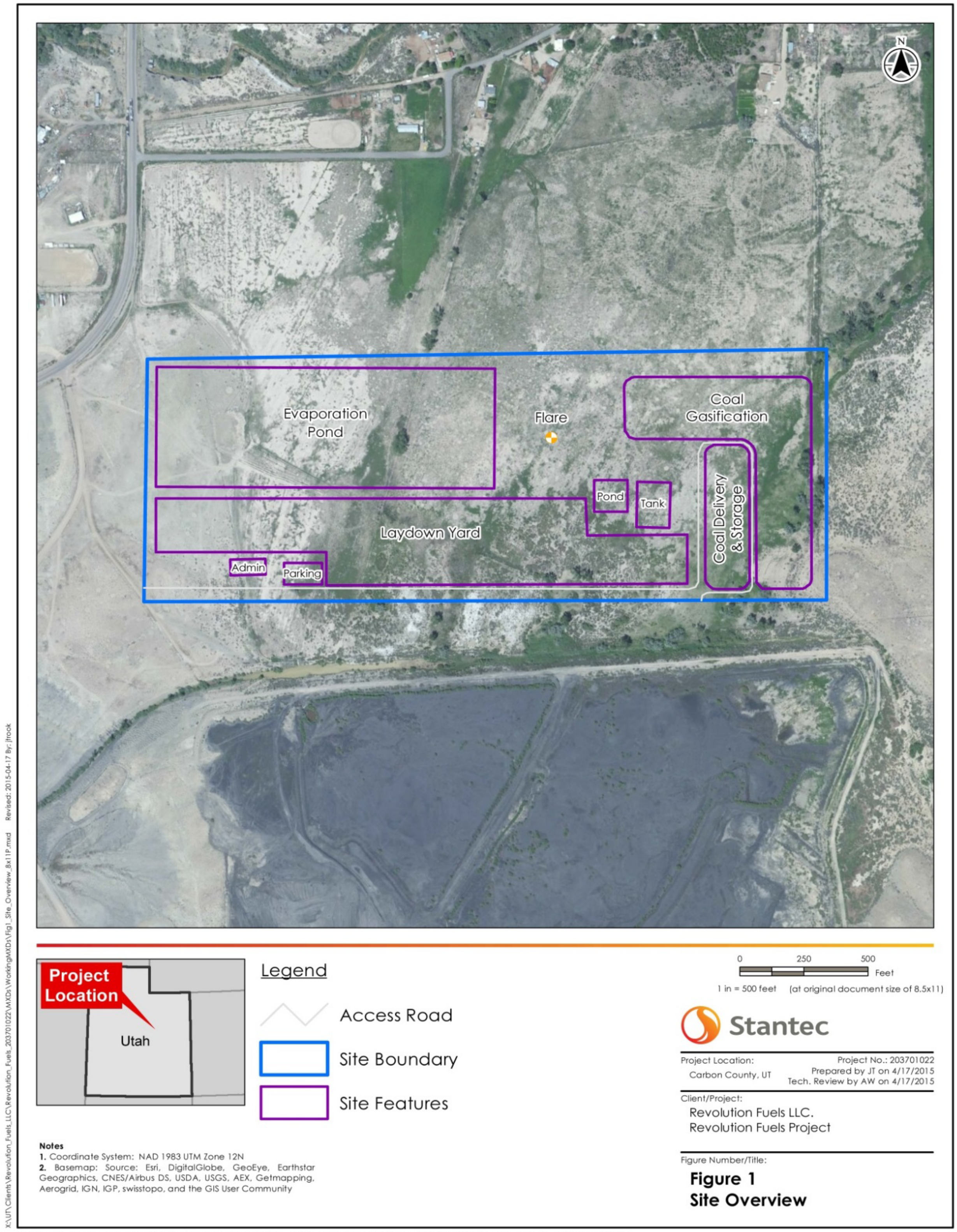
## Appendices

# 1.0 PURPOSE

This air quality modeling report, "*AERMOD Modeling Report to Assess Ambient Air Quality Impacts,*" documents the methodology used to prepare the air quality analyses in support of a Notice of Intent (NOI) application by Revolution Fuels, LLC (Revolution). Revolution is proposing to construct a new coal to liquid facility outside of Wellington, Utah (Approximate Address: Ridge Road at Farnham Wellington, UT 39.536365, -110.690361). The facility operations will include coal handling, coal gasification, ash handling, syngas treatment and product upgrading. The facility is expected to produce diesel fuel, jet fuel, liquefied petroleum gas (LPG), and naphtha as products with a coal throughput of 500 tons per day. Figure 1.1, below, presents the general location and Public Access Boundary (PAB) of the facility. The proposed facility plot plan, Figure 1.1 and a map of AERMOD modeled sources and onsite buildings are provided in Appendix B.

**Figure 1.1 General Location Map and Facility Public Access Boundary**

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# 2.0 MODEL DESCRIPTION / JUSTIFICATION

AERMOD was chosen as the most appropriate model for use in the analysis. AERMOD is the United States Environmental Protection Agency (USEPA)–approved dispersion model and one of the most frequently used regulatory dispersion models in the United States. In addition to AERMOD, the complimentary computer models BPIP-Prime, AERMAP, AERSURFACE and AERMET were utilized in this analysis. BPIP-Prime was utilized to calculate downwash associated with structures at the source. AERMAP was utilized to assess terrain and elevation data throughout the modeling domain. Finally, AERMET/AERSURFACE was used to preprocess meteorological data for this analysis, including local surface and upper air data.

All the models selected were applied as recommended in EPA's Guideline on Air Quality Models, and in a manner consistent with guidance in Utah Division of Air Quality's (UDAQ's) Modeling Guidelines as currently documented on the UDAQ website at:

http://www.airquality.utah.gov/Planning/Modeling/NSR_Permit_Modeling/Modguint.htm

This AERMOD application utilized source data consistent with the proposed emissions inventory and a model receptor network and domain that meet all EPA and UDAQ recommendations to ensure a complete dispersion analysis that captured maximum potential impacts.

# 3.0 MODELING REQUIREMENTS

In order to assess what modeling was required for the associated NOI, facility-wide project emissions were calculated for the future Potential to Emit (PTE) utilizing the proposed facility set up. These emissions were utilized to assess which modeling criterion were met and what modeling was therefore required.

Table 3-1 below compares the facility's total controlled PTE for all criteria pollutants against UDAQ modeling thresholds. UDAQ does not have a modeling threshold established for $PM_{2.5}$. However, $PM_{2.5}$ modeling was assumed to apply as the $PM_{2.5}$ emissions would exceed the $PM_{10}$ non-fugitive modeling threshold.

**Table 3-1: Project PTE vs. UDAQ Modeling Thresholds**

| Modeling Analysis Requirement | $PM_{10}$ Fugitive | $PM_{10}$ Non-fugitive | $PM_{2.5}$ | $NO_2$ | $SO_2$ | CO |
|---|---|---|---|---|---|---|
| | TPY | TPY | TPY | TPY | TPY | TPY |
| Proposed Facility-Wide PTE | 1.5 | 27.4 | 28.91 | 93.4 | 1.9 | 95 |
| Modeling Threshold | 5 | 15 | | 40 | 40 | 100 |
| Modeling Required | No | Yes | Yes | Yes | No | No |

In addition, since the proposed operating scenario contains natural gas burning and tank product storage, hazardous air pollutant (HAP) emissions were calculated and compared to UDAQ's modeling thresholds for each pollutant. Emissions calculations for HAPs assume that all emission points are vertically unrestricted and less than 50 meters from the property boundary; an assumption that most conservatively estimates HAPs emissions. Table 3-2 below shows the comparison of estimated facility-wide HAP emissions with UDAQ's modeling thresholds.

**Table 3-2: Proposed HAP's Emission vs. UDAQ HAP's Modeling Thresholds**

| Pollutant | Emissions (lb/hr) | Emissions (tpy) | Averaging Time | Emission Threshold Value (lb/hr) | Modeling Required? |
|---|---|---|---|---|---|
| Benzene | 1.04E-02 | 5.78E-03 | Chronic, 8 Hour | 0.3163 | No |
| Dichlorobenzene | 5.47E-04 | 1.95E-03 | Chronic, 8 Hour | 11.905 | No |
| 1,3 butadiene | 6.02E-05 | 1.51E-05 | Chronic, 8 Hour | 0.292 | No |
| Formaldehyde | 3.51E-02 | 1.22E-01 | Acute, 1hour | 0.0567 | No |
| Hexane | 8.20E-01 | 2.92E+00 | Chronic, 8 Hour | 34.895 | No |
| Napthalene | 4.08E-04 | 1.02E-03 | Chronic, 8 Hour | 10.381 | No |
| Toluene | 5.09E-03 | 6.40E-03 | Chronic, 8 Hour | 14.922 | No |
| Xylene | 2.44E-03 | 6.10E-04 | Chronic, 8 Hour | 85.97 | No |
| Acetaldehyde | 1.44E-03 | 3.61E-04 | Acute, 1hour | 6.9363 | No |
| Acrolein | 2.24E-04 | 5.60E-05 | Chronic, 8 Hour | 0.0353 | No |

# 4.0 EMISSION AND SOURCE DATA

Modeled emissions included all sources of all pollutants emitted above UDAQ modeling thresholds in the emission inventory and submitted with this application. UDAQ has not established a modeling threshold for $PM_{2.5}$. In absence of the established threshold, $PM_{2.5}$ modeling applicability was assessed using the same criterion as $PM_{10}$.

Emission rates represent the maximum anticipated operating rates for the averaging period modeled, taking into account the maximum hours per day of operation requested in the application for all averaging periods. For that reason, emission rates for $PM_{2.5}$ and $NO_2$ (which have both short term and annual average impact standards) were prepared to allow modeling with separate emission rates for the short term averaging period and the long term averaging period if needed, however, the modeling documented in this report demonstrated compliance with the NAAQs using the short term maximum emissions rates.

The project area is located 2.25 miles east of Wellington, Utah and is shown in Figure 1. All proposed project emission sources are contained within the established Public Access Boundary (PAB). The PAB defines the limit of public access into the project area, and is where the ambient air boundary begins.

Emissions release parameters and emissions rates used in the modeling are included in Appendix A of this report. All release parameters, locations and dimensions were provided by the proponent for the project.

# 5.0 RECEPTOR NETWORK

The model receptor network used in this analysis included a mix of fence line receptors along the property boundary and gridded Cartesian receptors outside of the property boundary. The fence line receptors were spaced at 25 meter (m) intervals to ensure small scale concentration maxima were resolved. Outside of the property boundary, an initial 50-m resolution receptor grid was utilized to a distance of 200-m from the source boundary. This grid was followed by a 100-m receptor grid that extended to a distance of one kilometer (km) from the PAB. This grid was followed by a 250-m receptor grid that extended to a distance of five km from the PAB. Finally, a 500-m receptor grid extended to a distance of 10 km from the PAB to ensure all far field effects were captured in the modeling analysis. As noted earlier, the property boundary was defined as the limit of public access.

# 6.0 ELEVATION DATA

The AERMAP program was used to determine elevations for all model buildings, source bases, and model receptors, and to process elevation and terrain data to be ready for the AERMOD analysis. All elevation heights used in this modeling analysis were calculated using the National Elevation Dataset (NED), distributed by the United States Geologic Service (USGS), which are based on North American Datum 1983 (NAD83). The data set had a resolution of 1 arc-second.

The NAD83 NED data was downloaded from the National Elevation Seamless Server. All AERMAP preprocessing files are provided electronically for verification. AERMAP was utilized in accordance with EPA guidance and UDAQ modeling guidelines. All source and building locations were provided by the proponent in NAD83 coordinates allowing no need for offsets to be calculated when processing AERMAP with USGS NAD83 files.

# 7.0 METEOROLOGICAL DATA

The U.S. EPA recommends that five years (preferably consecutive years) of representative National Weather Service (NWS) meteorological data be used in AERMOD, or at least one year of onsite data (40 CFR Part 51, Appendix W, §8.3.1.2). In accordance with this guidance, five consecutive years of AERMOD-ready meteorological data was provided by Tom Orth of UDAQ (2008-2012). These data were developed using AERMAP from NWS surface meteorological conditions collected at Carbon County Airport, located in Price, UT and upper air data collected by the NWS in Salt Lake City, UT.

The meteorological data used for the modeling is included electronically for the project record.

# 8.0 RURAL / URBAN LAND USE CLASSIFICATION

For modeling purposes, the rural/urban classification of an area is determined by either the dominance of a specific land use or by population data in the study area. Generally, if the sum of heavy industrial, light-moderate industrial, commercial, and compact residential (single and multiple family) land uses within a three kilometer radius from the facility are greater than 50%, the area is classified as urban. Conversely, if the sum of common residential, estate residential, metropolitan natural, agricultural rural, undeveloped (grasses), undeveloped (heavily wooded) and water surfaces land uses within a three kilometer radius from the facility are greater than 50%, the area is classified as rural. Alternatively, if the population is greater than 750 persons per $km^2$, the area is also classified as urban.

Rural land use in the area surrounding the proposed Project is much greater than 50%. Thus, the rural classification was used in the modeling.

# 9.0 OZONE LIMITING METHOD FOR EVALUATING $NO_2$ IMPACTS

The Ozone Limiting method (OLM), which is a non-regulatory option in AERMOD, was used to evaluate the impact of $NO_2$ in the near vicinity of the project area. OLM involves an initial comparison of the estimated maximum $NO_x$ concentration and the ambient ozone concentration to determine the limiting factor in the formation of $NO_2$. If the ozone concentration is greater than the maximum $NO_x$ concentration, total conversion is assumed. If the $NO_x$ concentration is greater than the ozone concentration, the formation of $NO_2$ is limited by the ambient ozone concentration. The method also uses a correction factor to account for in-stack conversion of $NO_x$ to $NO_2$.

Seasonal ozone and 1-hour and annual $NO_2$ background values were provided by Tom Orth of UDAQ and were used with OLM in the analysis. In-stack and equilibrium ratios were also provided by UDAQ for use in the OLM analysis. All UDAQ-provided values used in the OLM analysis, are shown in Table 9-1 below.

**Table 9-1: UDAQ-Provided OLM Ratio and Background Values**

| | |
|---|---|
| In-Stack Ratio (All Sources) | 0.25 |
| Equilibrium Ratio | 0.9 |
| Ozone Background (seasonal) | winter 70 ppb<br>spring 66 ppb<br>summer 66 ppb<br>fall 58 ppb |
| $NO_2$ Background | 64 µg/m³ (1-hour)<br>20 µg/m³ (annual) |

# 10.0 BACKGROUND CONCENTRATIONS

To evaluate the potential impacts of emissions from the Revolution Project on the public, the dispersion modeling evaluation must consider the existing background concentrations of pollutants in the area where impacts are being evaluated. The background concentration of a given pollutant is added to the modeled impact from the Project, and the result is compared to the EPA's National Ambient Air Quality Standards (NAAQs).

Facility-wide PTE calculations were utilized to determine if UDAQ modeling criterions were met and what modeling was therefore required for the Project. The criteria air pollutants which are regulated under Utah law are carbon monoxide (CO), lead (Pb), sulfur dioxide ($SO_2$), particulate matter less than or equal in diameter to 10 microns ($PM_{10}$), particulate matter less than or equal in diameter to 2.5 microns ($PM_{2.5}$), ozone ($O_3$), and nitrogen dioxide ($NO_2$). Criteria pollutants directly emitted by operations from the Project, which exceeded the Utah modeling thresholds[1] and were evaluated in the dispersion modeling analysis, are $PM_{10}$, $PM_{2.5}$, and $NO_2$. $O_3$ was not analyzed as part of this modeling effort due to the photochemical formation of $O_3$; atmospheric chemistry is not able to be modeled in a steady state Gaussian plume model such as AERMOD.

Tom Orth of UDAQ provided 1-hour and annual background concentrations for $NO_2$, as shown in Table 9-1. For all other background values necessary for the permitting analysis, Mr. Orth suggested referencing U.S. EPA's Air Quality System (AQS) Data Mart, available here: http://www.epa.gov/airdata/.

$PM_{10}$ and $PM_{2.5}$ background concentrations for this permitting analysis were determined based on the standard-related summary data available on the AQS Data Mart, Air Quality Statistics Report site available here: http://www.epa.gov/airdata/ad_rep_con.html.

$PM_{10}$ and $PM_{2.5}$ monitoring data were not available for Carbon County, Utah, within which the proposed facility lies, for reporting years 2012-2014. Washington County was selected as the most representative source of background $PM_{10}$ and $PM_{2.5}$ concentrations, based on a comparison of regional population densities and near-field emissions sources. Background concentrations for $PM_{10}$, $PM_{2.5}$, and $NO_2$ used in this analysis are presented in Table 10-1 below.

[1] UDAQ has not established a modeling threshold for $PM_{2.5}$. In absence of the established threshold, $PM_{2.5}$ modeling applicability was assessed using the same criterion as $PM_{10}$.

**Table 10-1: Background Concentration Values to Be Used for the Modeling Analysis**

| Pollutant | Averaging Period | Background Concentration (µg/m³) | NAAQS Standard (µg/m³) |
|---|---|---|---|
| $PM_{2.5}$ | 24-hr | 11[(a)] | 35 |
| | Annual | 6.6[(b)] | 12 |
| $PM_{10}$ | 24-hr | 47[(c)] | 150 |
| $NO_2$ | 1-hr | 64 | 188 |
| | Annual | 20 | 100 |

(a) Represents the 98th percentile of the daily average measurements for the year, averaged over three years of data (2012-2014). Air Quality Statistics Report available for query here: http://www.epa.gov/airdata/ad_rep_con.html

(b) Represents the highest Weighted Annual Mean (mean weighted by calendar quarter) over three years of data (2012-2014). Monitor values report is available for query here: http://www.epa.gov/airdata/ad_rep_mon.html

(c) Represents the first maximum 24-hour value for 2014. No data exists for 2013 or 2012. Monitor values report is available for query here: http://www.epa.gov/airdata/ad_rep_mon.html

# 11.0 EVALUATION OF COMPLIANCE WITH STANDARDS

For the NSR criteria pollutant modeling associated with this analysis, total modeled concentrations were added to the approved background concentrations. The resultant total impacts were compared to the NAAQS. Al l modeled impacts were below the NAAQS for the facility.

**Table 11-1: Compliance with NAAQS**

| Revolution Impacts | | | | | | |
|---|---|---|---|---|---|---|
| **All Sources** | | | | | | |
| **Pollutant** | **Averaging period** | **Background (µg/m³)** | **Model Results Initial Construction (µg/m³)** | **Total (µg/m³)** | **NAAQS Standard (µg/m³)** | **Percent of Standard** |
| $PM_{2.5}$[a] | 24-hr | 11 | 10.80 | 21.80 | 35 | 62.28% |
| $PM_{2.5}$[c] | Annual | 6.6 | 2.87 | 9.47 | 12 | 78.89% |
| $PM_{10}$[b] | 24-hr | 47 | 39.49 | 86.49 | 150 | 57.66% |
| $NO_2$[a,d] | 1-hr | 64 | 84.07 | 148.07 | 188 | 78.76% |
| $NO_2$[c, d] | Annual | 20 | 3.51 | 23.51 | 100 | 23.51% |

a. 8th high value averaged over 5 year modeled period.
b. Highest 6th high over five years modeled.
c. Highest 1st high (averaged over five years modeled for $PM_{2.5}$)
d. Using OLM

# 12.0 ELECTRONIC COPIES OF THE MODELING FILES

Electronic copies of the facility emission inventory and all input, output, and supporting modeling files necessary to duplicate the model results accompany the submittal of this final modeling report.

# Appendix A Model Source Emissions and Parameters

**POINT SOURCES**

| Source ID | Stack Release Type (Beta) | FLAT (Non-Default) | Source Description | Easting (x) | Northing (Y) | Base Elevation | Stack Height | Temperature | Exit Velocity | Stack Diameter | PM10 | PM10_ANN | PM2.5 | PM2.5_AN | NO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (m) | (m) | (m) | (m) | (K) | (m/s) | (m) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) |
| COALBH | | | Coal handling baghouse | 527072.00 | 4376334.00 | 1643.58 | 3.66 | 0.00 | 40.45 | 0.6096 | 0.007134 | 0.009765 | 0.001080 | 0.001479 | |
| SILOBH | | | Coal silo baghouse | 527077.00 | 4376337.00 | 1643.64 | 17.98 | 0.00 | 40.45 | 0.6096 | 0.016684 | 0.026190 | 0.012709 | 0.017904 | |
| F | | | Gasification flue gas without SCR | 527116.00 | 4376333.00 | 1643.92 | 9.35 | 394.26 | 116.59 | 0.76 | 2.776955 | 11.663211 | 2.776955 | 11.663211 | 20.349600 |
| ASHBH | | | Ash handling baghouse | 527093.00 | 4376330.00 | 1643.65 | 3.6576 | 338.71 | 40.45 | 0.6096 | 0.0002354 | 0.00102335 | 3.565E-05 | 0.000155 | |
| BINBH | | | Ash bin baghouse | 527095.00 | 4376330.00 | 1643.66 | 17.983 | 338.71 | 40.45 | 0.6096 | 0.0002354 | 0.00102335 | 3.565E-05 | 0.000155 | |
| E | | | Flare Pilot | 526851.00 | 4376441.00 | 1645.03 | 15.24 | 699.82 | 61 | 0.61 | 0.01 | 0.03 | 0.01 | 0.03 | 0.05 |
| H | | | Activation/Regeneration Heater #1 | 527149.00 | 4376478.00 | 1645.27 | 7.62 | 644.26 | 3.2 | 0.5 | 0.01 | 0.02 | 0.01 | 0.02 | 0.06 |
| I | | | Activation/Regeneration Heater #2 | 527149.00 | 4376453.00 | 1644.87 | 7.62 | 616.48 | 3.7 | 0.3 | 0.00 | 0.01 | 0.00 | 0.01 | 0.03 |
| B | | | Product Upgrading Heater #1 | 527019.00 | 4376459.00 | 1645.53 | 15.24 | 694.26 | 10.5156 | 0.2032 | 0.04 | 0.15 | 0.04 | 0.15 | 0.24 |
| C | | | Product Upgrading Heater #2 | 527019.00 | 4376483.00 | 1646 | 15.24 | 647.04 | 10.668 | 0.3048 | 0.08 | 0.32 | 0.08 | 0.32 | 0.50 |
| G | | | Auxillary boiler | 527147.00 | 4376340.00 | 1644.45 | 15.24 | 449.82 | 12.4968 | 0.9144 | 0.55 | 0.14 | 0.55 | 0.14 | 3.62156863 |
| J | | | Emergency generator (diesel) | 527149.00 | 4376505.00 | 1646.02 | 3.81 | 749.82 | 70.229 | 0.254 | 0.36 | 0.09 | 0.36 | 0.09 | 12.91 |
| 960 | | | Fire water pump (diesel) | 526942.00 | 4376455.00 | 1645.52 | 3.66 | 748.15 | 47.055 | 0.127 | 0.07 | 0.02 | 0.07 | 0.02 | 1.20 |
| 920 | | | Cooling Tower | 526995.00 | 4376450.00 | 1645.36 | 10.058 | 313.71 | 15.24 | 0.6096 | 3.91704 | 16.451568 | 3.91704 | 16.451568 | |

**Area Sources**

| Source ID | FLAT (Non-Default) | Source Description | Easting (X) | Northing (Y) | Base Elevation | Release Height | Easterly Length | Northerly Length | Angle from North | Initial Vertical Dimension | PM10 | PM10_ANN | PM2.5 | PM2.5_AN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m) | (m) | (m) | (m) | (m) | (m) | | (m) | (lb/hr) | (tpy) | (lb/hr) | (tpy) |
| COAL_STORAGE | | Coal Storage Pile | 527047.00 | 4376373.00 | 1644.04 | 5 | 11 | 15 | | | 0.36 | 1.36 | 0.05 | 0.20 |

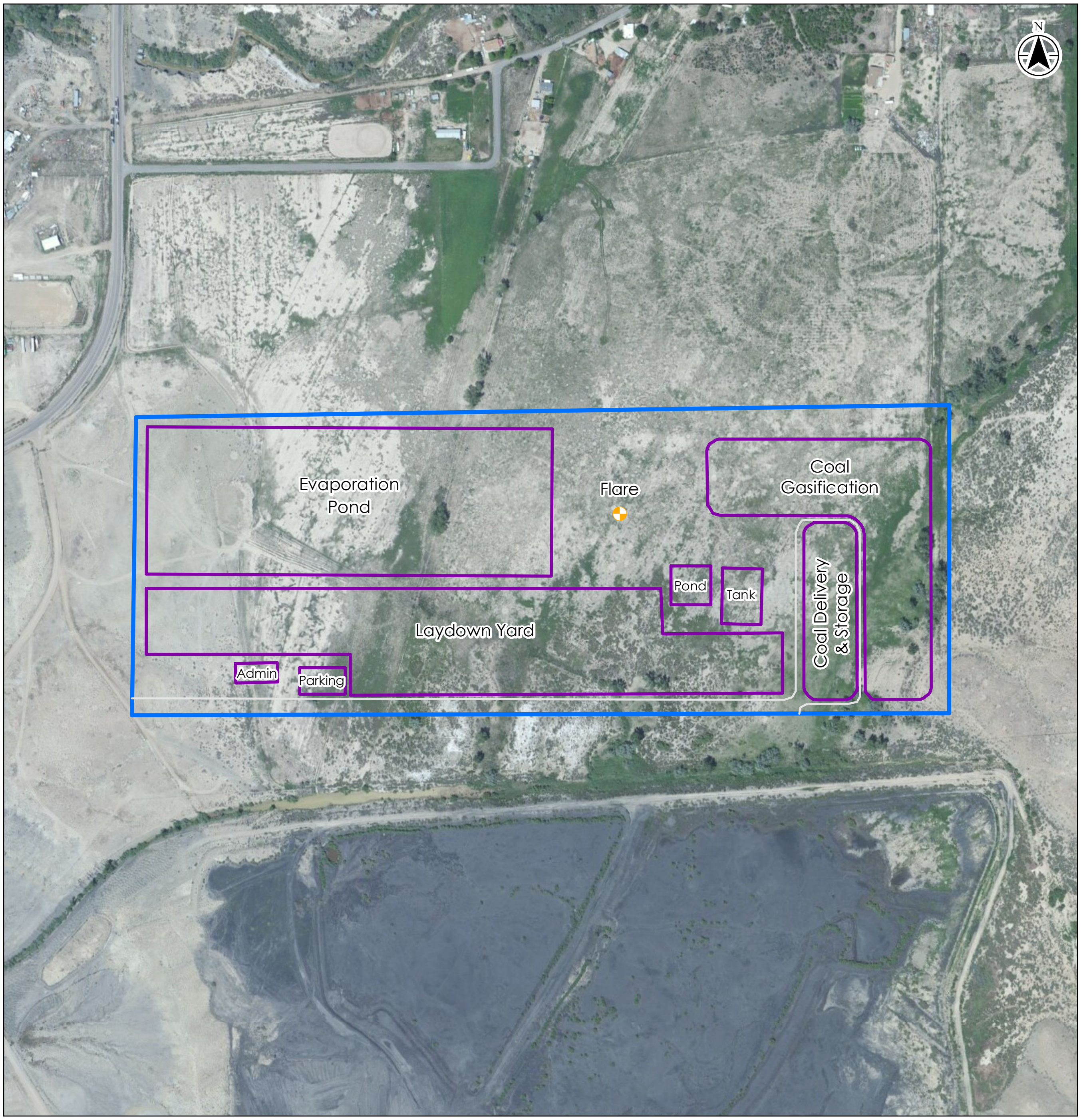
**Volume Sources**

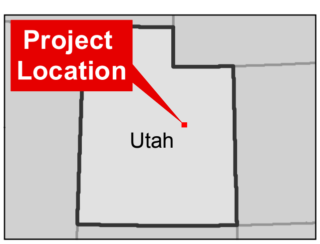
Total For Paved Haul Road

| Source ID | FLAT (Non-Default) | Source Description | Easting (x) | Northing (Y) | Base Elevation | Release Height | Init. Horizontal Dimension | Init. Vertical Dimension | PM10 | PM10_ANN | PM2.5 | PM2.5_AN | NO2 | Comments, assumptions made, etc. | PM10 | PM10_ANN | PM2.5 | PM2.5_AN | NO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m) | (m) | (m) | (m) | (m) | (m) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) |
| TRK_DMP | | Truck Unloading | 527031.00 | 4376329.00 | 1643.55 | 0.43 | 4.186 | 0.395 | 7.13E-02 | 9.76E-02 | 1.08E-02 | 1.48E-02 | 0.00E+00 | Assumes a drop height of 0.5 meters. | 0.07 | 0.10 | 0.01 | 0.01 | |
| HR1_0001 | | Paved Haul Road | 526372.44 | 4376247.32 | 1648.17 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | Total for access roads divided by 137 volume sources along road. | 0.015352 | 0.067242 | 0.003813 | 0.016701 | 0.013852 |
| HR1_0002 | | Paved Haul Road | 526380.81 | 4376247.30 | 1647.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0003 | | Paved Haul Road | 526389.18 | 4376247.29 | 1647.42 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0004 | | Paved Haul Road | 526397.55 | 4376247.27 | 1647.15 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0005 | | Paved Haul Road | 526405.92 | 4376247.26 | 1646.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0006 | | Paved Haul Road | 526414.29 | 4376247.24 | 1646.61 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0007 | | Paved Haul Road | 526422.66 | 4376247.22 | 1646.34 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0008 | | Paved Haul Road | 526431.03 | 4376247.21 | 1646.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0009 | | Paved Haul Road | 526439.40 | 4376247.19 | 1645.79 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0010 | | Paved Haul Road | 526447.77 | 4376247.18 | 1645.47 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0011 | | Paved Haul Road | 526456.14 | 4376247.16 | 1645.14 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0012 | | Paved Haul Road | 526464.51 | 4376247.14 | 1644.86 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0013 | | Paved Haul Road | 526472.88 | 4376247.13 | 1644.64 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0014 | | Paved Haul Road | 526481.25 | 4376247.11 | 1644.42 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0015 | | Paved Haul Road | 526489.62 | 4376247.10 | 1644.22 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0016 | | Paved Haul Road | 526497.99 | 4376247.08 | 1644.01 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0017 | | Paved Haul Road | 526506.36 | 4376247.06 | 1643.81 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0018 | | Paved Haul Road | 526514.73 | 4376247.05 | 1643.64 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0019 | | Paved Haul Road | 526523.10 | 4376247.03 | 1643.49 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0020 | | Paved Haul Road | 526531.47 | 4376247.02 | 1643.33 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0021 | | Paved Haul Road | 526539.84 | 4376247.00 | 1643.19 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0022 | | Paved Haul Road | 526548.21 | 4376246.98 | 1643.05 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0023 | | Paved Haul Road | 526556.58 | 4376246.97 | 1642.91 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0024 | | Paved Haul Road | 526564.95 | 4376246.95 | 1642.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0025 | | Paved Haul Road | 526573.32 | 4376246.94 | 1642.78 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0026 | | Paved Haul Road | 526581.69 | 4376246.92 | 1642.71 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0027 | | Paved Haul Road | 526590.06 | 4376246.90 | 1642.63 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0028 | | Paved Haul Road | 526598.43 | 4376246.89 | 1642.55 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0029 | | Paved Haul Road | 526606.80 | 4376246.87 | 1642.47 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0030 | | Paved Haul Road | 526615.17 | 4376246.86 | 1642.38 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0031 | | Paved Haul Road | 526623.54 | 4376246.84 | 1642.3 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0032 | | Paved Haul Road | 526631.91 | 4376246.82 | 1642.24 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0033 | | Paved Haul Road | 526640.28 | 4376246.81 | 1642.2 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0034 | | Paved Haul Road | 526648.65 | 4376246.79 | 1642.17 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0035 | | Paved Haul Road | 526657.02 | 4376246.78 | 1642.14 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0036 | | Paved Haul Road | 526665.39 | 4376246.76 | 1642.12 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0037 | | Paved Haul Road | 526673.76 | 4376246.74 | 1642.1 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0038 | | Paved Haul Road | 526682.13 | 4376246.74 | 1642.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0039 | | Paved Haul Road | 526690.50 | 4376246.78 | 1642.06 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0040 | | Paved Haul Road | 526698.87 | 4376246.81 | 1642.05 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0041 | | Paved Haul Road | 526707.24 | 4376246.85 | 1642.04 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0042 | | Paved Haul Road | 526715.61 | 4376246.89 | 1642.03 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0043 | | Paved Haul Road | 526723.97 | 4376246.93 | 1642.02 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0044 | | Paved Haul Road | 526732.34 | 4376246.97 | 1641.99 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0045 | | Paved Haul Road | 526740.71 | 4376247.00 | 1641.97 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0046 | | Paved Haul Road | 526749.08 | 4376247.04 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0047 | | Paved Haul Road | 526757.45 | 4376247.08 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0048 | | Paved Haul Road | 526765.82 | 4376247.12 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0049 | | Paved Haul Road | 526774.19 | 4376247.15 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0050 | | Paved Haul Road | 526782.56 | 4376247.19 | 1641.93 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0051 | | Paved Haul Road | 526790.93 | 4376247.23 | 1641.91 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0052 | | Paved Haul Road | 526799.30 | 4376247.27 | 1641.89 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0053 | | Paved Haul Road | 526807.67 | 4376247.31 | 1641.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0054 | | Paved Haul Road | 526816.04 | 4376247.34 | 1641.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0055 | | Paved Haul Road | 526824.41 | 4376247.38 | 1641.86 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0056 | | Paved Haul Road | 526832.78 | 4376247.42 | 1641.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0057 | | Paved Haul Road | 526841.15 | 4376247.46 | 1641.83 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0058 | | Paved Haul Road | 526849.52 | 4376247.49 | 1641.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0059 | | Paved Haul Road | 526857.89 | 4376247.53 | 1641.77 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0060 | | Paved Haul Road | 526866.26 | 4376247.57 | 1641.74 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0061 | | Paved Haul Road | 526874.63 | 4376247.61 | 1641.75 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0062 | | Paved Haul Road | 526883.00 | 4376247.65 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0063 | | Paved Haul Road | 526891.37 | 4376247.68 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0064 | | Paved Haul Road | 526899.74 | 4376247.72 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0065 | | Paved Haul Road | 526908.11 | 4376247.76 | 1641.75 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0066 | | Paved Haul Road | 526916.48 | 4376247.80 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0067 | | Paved Haul Road | 526924.85 | 4376247.84 | 1641.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0068 | | Paved Haul Road | 526933.22 | 4376247.87 | 1641.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0069 | | Paved Haul Road | 526941.59 | 4376247.91 | 1641.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0070 | | Paved Haul Road | 526949.96 | 4376247.95 | 1641.93 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0071 | | Paved Haul Road | 526958.33 | 4376247.99 | 1641.98 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0072 | | Paved Haul Road | 526966.70 | 4376248.02 | 1642.05 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0073 | | Paved Haul Road | 526975.07 | 4376248.06 | 1642.13 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0074 | | Paved Haul Road | 526983.44 | 4376248.10 | 1642.21 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HR1_0075 | | Paved Haul Road | 526991.81 | 4376248.14 | 1642.27 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0076 | | Paved Haul Road | 527000.18 | 4376248.18 | 1642.32 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0077 | | Paved Haul Road | 527008.55 | 4376248.21 | 1642.37 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0078 | | Paved Haul Road | 527016.92 | 4376248.25 | 1642.44 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0079 | | Paved Haul Road | 527025.29 | 4376248.29 | 1642.5 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0080 | | Paved Haul Road | 527033.29 | 4376248.69 | 1642.57 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0081 | | Paved Haul Road | 527033.21 | 4376257.06 | 1642.68 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0082 | | Paved Haul Road | 527033.13 | 4376265.43 | 1642.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0083 | | Paved Haul Road | 527033.05 | 4376273.80 | 1642.91 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0084 | | Paved Haul Road | 527032.97 | 4376282.17 | 1642.99 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0085 | | Paved Haul Road | 527032.89 | 4376290.54 | 1643.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0086 | | Paved Haul Road | 527032.81 | 4376298.91 | 1643.16 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0087 | | Paved Haul Road | 527032.73 | 4376307.28 | 1643.26 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0088 | | Paved Haul Road | 527032.64 | 4376315.65 | 1643.37 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0089 | | Paved Haul Road | 527032.56 | 4376324.02 | 1643.49 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0090 | | Paved Haul Road | 527032.48 | 4376332.39 | 1643.6 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0091 | | Paved Haul Road | 527032.40 | 4376340.76 | 1643.69 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0092 | | Paved Haul Road | 527032.32 | 4376349.13 | 1643.77 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0093 | | Paved Haul Road | 527032.24 | 4376357.50 | 1643.86 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0094 | | Paved Haul Road | 527032.16 | 4376365.87 | 1643.94 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0095 | | Paved Haul Road | 527032.08 | 4376374.24 | 1644.06 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0096 | | Paved Haul Road | 527032.00 | 4376382.61 | 1644.17 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0097 | | Paved Haul Road | 527031.92 | 4376390.98 | 1644.29 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0098 | | Paved Haul Road | 527031.84 | 4376399.35 | 1644.41 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0099 | | Paved Haul Road | 527031.76 | 4376407.72 | 1644.55 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0100 | | Paved Haul Road | 527031.68 | 4376416.09 | 1644.7 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0101 | | Paved Haul Road | 527031.60 | 4376424.45 | 1644.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0102 | | Paved Haul Road | 527031.52 | 4376432.82 | 1645 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0103 | | Paved Haul Road | 527038.93 | 4376433.87 | 1645 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0104 | | Paved Haul Road | 527047.30 | 4376433.97 | 1644.96 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0105 | | Paved Haul Road | 527055.67 | 4376434.08 | 1644.93 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0106 | | Paved Haul Road | 527064.04 | 4376434.19 | 1644.9 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0107 | | Paved Haul Road | 527072.40 | 4376434.29 | 1644.87 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0108 | | Paved Haul Road | 527080.41 | 4376433.41 | 1644.82 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0109 | | Paved Haul Road | 527086.73 | 4376427.92 | 1644.68 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0110 | | Paved Haul Road | 527090.69 | 4376421.35 | 1644.57 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0111 | | Paved Haul Road | 527090.77 | 4376412.98 | 1644.45 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0112 | | Paved Haul Road | 527090.85 | 4376404.61 | 1644.33 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0113 | | Paved Haul Road | 527090.93 | 4376396.24 | 1644.21 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0114 | | Paved Haul Road | 527091.01 | 4376387.87 | 1644.13 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0115 | | Paved Haul Road | 527091.09 | 4376379.50 | 1644.04 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0116 | | Paved Haul Road | 527091.17 | 4376371.13 | 1643.96 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0117 | | Paved Haul Road | 527091.25 | 4376362.76 | 1643.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0118 | | Paved Haul Road | 527091.33 | 4376354.39 | 1643.82 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0119 | | Paved Haul Road | 527091.42 | 4376346.02 | 1643.77 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0120 | | Paved Haul Road | 527091.50 | 4376337.65 | 1643.71 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0121 | | Paved Haul Road | 527091.58 | 4376329.28 | 1643.64 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0122 | | Paved Haul Road | 527091.66 | 4376320.91 | 1643.55 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0123 | | Paved Haul Road | 527091.74 | 4376312.54 | 1643.47 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0124 | | Paved Haul Road | 527091.82 | 4376304.17 | 1643.39 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0125 | | Paved Haul Road | 527091.90 | 4376295.80 | 1643.32 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0126 | | Paved Haul Road | 527091.98 | 4376287.43 | 1643.26 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0127 | | Paved Haul Road | 527092.06 | 4376279.06 | 1643.19 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0128 | | Paved Haul Road | 527092.14 | 4376270.69 | 1643.13 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0129 | | Paved Haul Road | 527092.22 | 4376262.32 | 1643.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0130 | | Paved Haul Road | 527092.30 | 4376253.95 | 1643.02 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0131 | | Paved Haul Road | 527088.99 | 4376248.92 | 1642.96 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0132 | | Paved Haul Road | 527080.62 | 4376248.89 | 1642.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0133 | | Paved Haul Road | 527072.25 | 4376248.86 | 1642.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0134 | | Paved Haul Road | 527063.88 | 4376248.83 | 1642.79 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0135 | | Paved Haul Road | 527055.52 | 4376248.80 | 1642.74 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0136 | | Paved Haul Road | 527047.15 | 4376248.77 | 1642.68 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0137 | | Paved Haul Road | 527038.78 | 4376248.74 | 1642.62 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |

# Appendix B Proposed Facility Plot Plan, Model Sources and Site Layout




## Legend

- Access Road
- Site Boundary
- Site Features

0 250 500 Feet

1 in = 500 feet (at original document size of 8.5x11)

**Notes**
**1.** Coordinate System: NAD 1983 UTM Zone 12N
**2.** Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Stantec

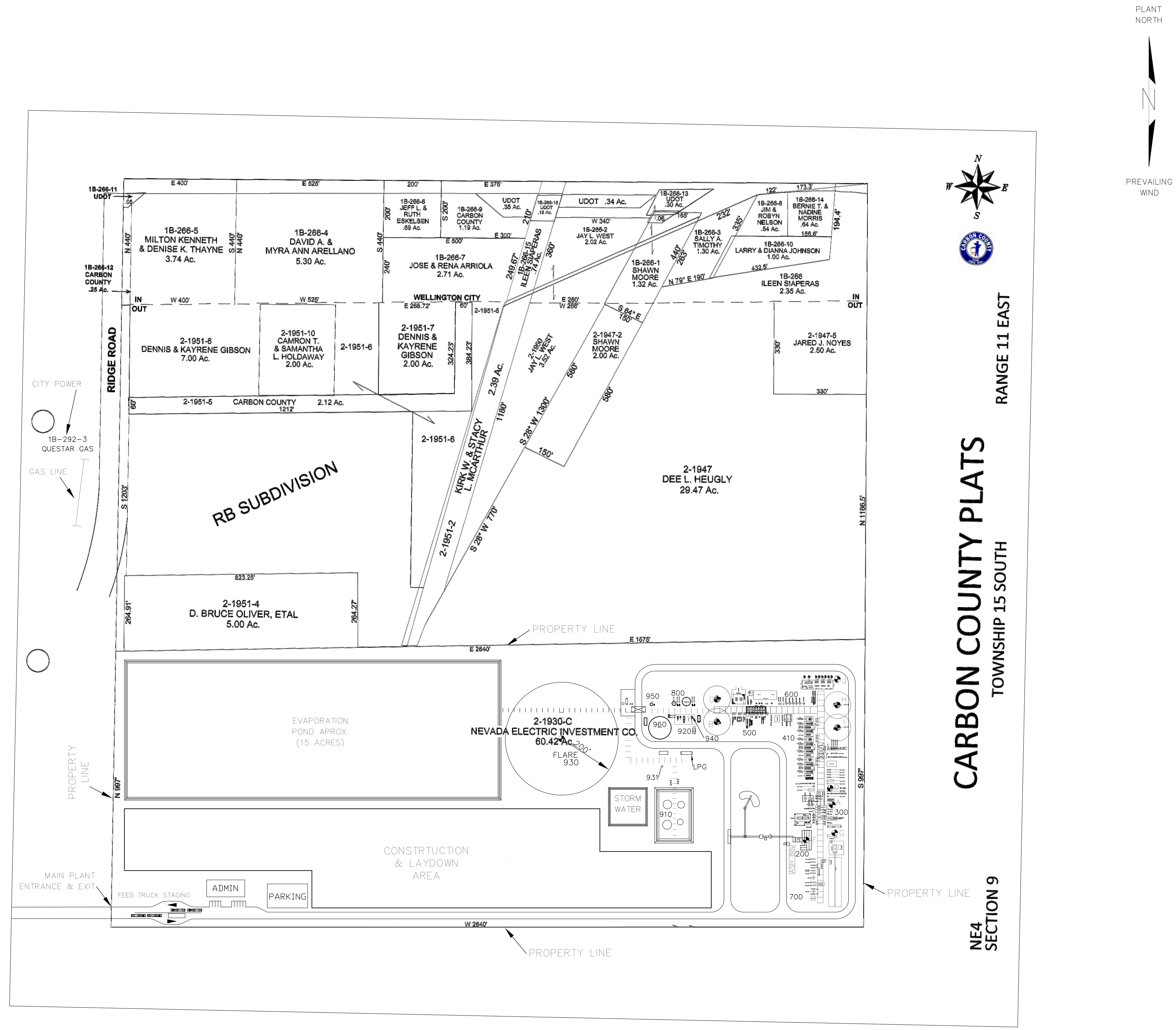
Project Location: Carbon County, UT

Project No.: 203701022
Prepared by JT on 4/17/2015
Tech. Review by AW on 4/17/2015

Client/Project:
Revolution Fuels LLC.
Revolution Fuels Project

Figure Number/Title:
**Figure 1**
**Site Overview**

X:\UT\Clients\Revolution_Fuels_LLC\Revolution_Fuels_203701022\MXDs\WorkingMXDs\Fig1_Site_Overview_8x11P.mxd Revised: 2015-04-17 By: jtrook




| UNIT NO. | DESCRIPTION | RESPONSIBILTY | DRAWING NO. |
|---|---|---|---|
| 000 | COMMON | RED ROCK BIOFUELS | TBD |
| 110 | SHREDDED FEED RECEIVING/ STORAGE/RECLAIM & TRANSFER | RED ROCK BIOFUELS | TBD |
| 210 | GASIFICATION SYSTEM– STEAM AND PYROLYSIS | TCG GLOBAL | P1–FLOORPLAN |
| 220 | GASIFICATION SYSTEM– STEAM REFORMER | TCG GLOBAL | P1–FLOORPLAN |
| 230 | WATER SCRUBBING/IONIZED WATER SYSTEM/FILTRATION | TCG GLOBAL | P1–FLOORPLAN |
| 240 | ASH HANDLING AND STORAGE | FLUOR | TBD |
| 310 | SYNGAS COMPRESSION | FLUOR | TBD |
| 320 | CO2 REMOVAL | FLUOR | TBD |
| 330 | GUARD BED | FLUOR | TBD |
| 410 | FISCHER–TROPSCH (FT) SYNTHESIS | VELOCYS | TBD |
| 510 | HYDRO–PROCESSING | HALDOR TOPSOE | M71090–00 |
| 520 | DISTILLATION | HALDOR TOPSOE | M71090–00 |
| 610 | PRESSURE SWING ADSORPTION (PSA) | FLUOR | TBD |
| 630 | TAIL GAS COMPRESSION | FLUOR | TBD |
| 710 | STEAM TURBINE GENERATOR | FLUOR | TBD |
| 720 | AUXILIARY BOILER | FLUOR | THIS DWG |
| 730 | STEAM/CONDENSATE SYSTEM | FLUOR | TBD |
| 740 | BOILER FEEDWATER (BFW) SYSTEM | FLUOR | TBD |
| 750 | EMERGENCY GENERATOR(DIESEL) | FLUOR | THIS DWG |
| 810 | RAW WATER TREATMENT | FLUOR | TBD |
| 820 | WASTEWATER TREATMENT | FLUOR | TBD |
| 900 | INTERCONNECTING PIPERACK | FLUOR | THIS DWG |
| 910 | STORAGE TANKS | FLUOR | THIS DWG |
| 920 | COOLING WATER SYSTEM | FLUOR | TBD |
| 930 | FLARE SYSTEM | FLUOR | THIS DWG |
| 931 | FUEL GAS | FLUOR | THIS DWG |
| 940 | PLANT/INSTRUMENT AIR SYSTEM | FLUOR | THIS DWG |
| 950 | NITROGEN SYSTEM | FLUOR | THIS DWG |
| 960 | FIRE WATER/ FIRE PROTECTION SYSTEM | FLUOR | TBD |
| 970 | OILY WATER SEWER | FLUOR | TBD |
| 980 | CONTROL SYTEMS | FLUOR | TBD |
| 990 | ELECTRICAL | FLUOR | THIS DWG |
| 991 | BUILDINGS | FLUOR | THIS DWG |
| 992 | COMMUNICATIONS | FLUOR | NA |
| 993 | SITE PREPERATION/ SITE IMPROVEMENT | FLUOR | NA |

| EMISSION POINTS | DESCRIPTION | NORTH | EAST | ELEV. |
|---|---|---|---|---|
| A | CO2 VENT | | | |
| B | H–311 | | | |
| C | H–321 | | | |
| D | REGENERATOR AIR VENT | | | |
| E | FLARE | | | |
| F | GASIFICATION | | | |
| G | AUX BOILER | | | |
| H | OXIDATION AIR HEATER | | | |
| I | REGENERATION HYDROGEN HEATER | | | |
| J | DIESEL GENERATOR | | | |

TCG Coal & Ash Handling
200-1: Coal storage pile
200-2: Truck unloading
200-3: Coal handling baghouse
200-4: Coal silo baghouse
240-1: Ash handling baghouse
240-2: Ash bin baghouse

LEGEND

EMISSION POINT

0 100 200 300 400

REDUCED PRINT SCALE 1"=200'-0"

HPFS EL. 100'-0"
ACTUAL EL. FT

| REV | DATE | REVISION DESCRIPTION | BY | CHK | APPV | REV | DATE | REVISION DESCRIPTION | BY | CHK | APPV | REFERENCE DWG NUMBER | REFERENCE DRAWINGS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 3MAR15 | ISSUED FOR CLIENT REVIEW | HB | MB | HB | | | | | | | | |

FLUOR



CONTRACT A6SF
DESIGNED BY H. BORGE
CHECKED BY M. BOWER
SUPERVISOR — APP DATE
LEAD ENGR/SPEC. H. BORGE — APP DATE
FLUOR P. NIH — APP DATE
CLIENT — APP DATE

# REVOLUTION FUELS PROJECT

## SITE PLAN

PRICE, UTAH

SCALE 1"=200'
DRAWING NUMBER A6SF-250-PP-003
REV B
CAD FILE NAME A6SF-250-PP-003.DGN

Tad Anderson <tdanderson@utah.gov>

# Re: Revolution Fuels NOI

1 message

**Marty Gray** <martygray@utah.gov> Mon, May 18, 2015 at 12:07 PM
To: "Armer, Melissa" <melissa.armer@stantec.com>
Cc: "Anderson, Tad" <tdanderson@utah.gov>

Thanks Melissa.

On Mon, May 18, 2015 at 11:57 AM, Armer, Melissa <melissa.armer@stantec.com> wrote:

> Marty,
>
> Per our discussion this morning. The Revolution Fuels NOI does not contain confidential business information. The box marked confidential information on Form 01 inadvertently remained checked, however the NOI does not contain confidential business information. I will follow-up with Tad Anderson today to discuss the NOI.
>
> Melissa
>
> **Melissa Armer, P.E.**
>
> Project Engineer
> 7669 West Riverside Drive, Suite 101 Boise ID 83714-6183
> Phone: (208) 853-0883 x 103
> Fax: (208) 853-0884
> melissa.armer@stantec.com
>
> Stantec
>
> 

--
Martin Gray
MNSR Section Manager

801-536-4151

Submitted
6/16/2015

## Revolution Fuels
RN15490-0001
Questions from NOI dated May 8, 2015

## Coal Handling Operations
Crushing and conveying operations are for 2737.5 hours per year and a total throughput of 273,750 tons per year of coal.

Crusher and conveyor operating 5 hours per day at a capacity of 100 tons per day of coal for 500 tons per day.

Why is there a +50% increase in the 500 tons per day in the throughput of coal in the emissions operating parameters sheet and calculations?

## Pyrolysis and Gasification
8,400 hours per year.

Where is the superheated water coming from for the pyrolysis vessel?

Where is the steam coming from for the gasification section in the reaction chamber?

In the gasification steam is being injected to control the hydrogen and carbon monoxide for the product syngas through the steam reforming process. Where is the steam coming from? If steam is coming from the 73.88 MMBtu/hr auxiliary boiler justify how 500 hours of operation per year can accommodate the gasification process.

Vortex-like ash removal removes carbonaceous material and ash from 1-micron (10%) to 15-microns (100%). Can you give more detailed information on how vortex-like removal system?

The Reactor House contains the pyrolysis vessel, carbonaceous reforming coils and cyclones and can reach temperatures of 1800 degrees F. Can you give more explanation on how the equipment is going to continuously function under these extreme temperatures and operating conditions?

## Ash Removal and Handling
6.6 tons per hour ash generated, 57,378 tons of ash generated per year, 8,694 hour per year.

How is the ash being pulled from the flow of gas in the final ash removal process?

## Syngas Treatment
8,400 hours per year

It is stated "From the gasifier, the raw syngas will flow through heat exchangers to the gas scrubbers, where the syngas is sprayed with free electron "saturated" ionized water to remove any organics, particulates, ash, sulfur, and metals still in the syngas stream. Sulfur removal is this step is accomplished from the electrically charged negative ions produced in the proprietary water processes. The negatively charged ions are highly reactive and are attracted to the positive ions of the sulfur species. Those ions attract and coagulate into elemental sulfur that is then filtered out through the water system with other elements that have also been coagulated." The DAQ is concerned with where the elemental sulfur and other elements which have been coagulated are ending up. Please provide a detailed description of these elements.

The clean dry syngas exits the gasification unit and enters the syngas compression unit where it is compressed in multiple stages. Compression units are typically IC engines, what fuel source is the compression unit operated with?

The CO2 laden amine solution is degassed and release gases like H2, CO, and CH4. Those gases are routed to the fuel gas system. What is the fuel gas system?

The NOI States that MDEA provides deep removal of CO2. What does deep mean?

## Fischer-Tropsch Unit

8,400 hours per year

The NOI states that there is periodic catalyst regeneration. What is considered periodic and how is it determined that it is necessary? Monitoring of catalyst and how?

The uncondensed vapor from the FT liquid separator is recycled back into the FT reactors as tail gas and used as fuel in other areas of the plant. What are the other areas in the plant and have emissions from these sources been addressed as Natural Gas fired equipment in the NOI?

Where is the purge gas stream from the catalyst regeneration going?

## Product Upgrading

Are there any emergency overflow tanks not being accounted for?

The listed 73.88 MMBtu/hr boiler is considered Auxiliary? How can this be? Typically a boiler of this size will operate more than 500 hours per year. Please provide an explanation of why this boiler would not be considered a regular part of the pyrolysis/gasification process.

## Emission Calculations

Tank emission calculations note that Tersoro MSDS and U.S. Oil and Refining Company MSDS's were used but also Tanks program emissions were submitted. Which of these were used?

Formaldehyde emissions say they require modeling in the emissions calculations section but say they do not require modeling in the modeling section. Which is it?

## Proposed Facility Plot Plan

The proposed facility plot plan spells out that there is a very large evaporation pond, a smaller pond, and a laydown yard. Have emissions been taken into account for these areas? What liquids will the evaporations ponds contain and what activity is going to take place in the laydown yard?

## General Questions

Does this facility meet the requirements of 40 CFR 60 Subpart Ja for the fuels portion of the project?

Pyrolysis and Gasification burners and Regeneration Heaters – Operate on tail gas. It would be necessary to require a fuel sulfur limitation when used in this type of operation for gas quality.

Loading/unloading racks not addressed in NOI.

No BACT for Loading/unloading in NOI.

No BACT for Cooling Tower in NOI.

Please address fugitive VOC equipment leaks in the NOI.

Is there a wastewater treatment plant on-site?

Location needs to be better defined. Outside Wellington Utah is to general.

In the block diagram for FLUOR a power generation steam turbine is listed. Source needs to provide a detailed description of the steam turbine project.

**Subpart Ja Applicability Determination**

**Subpart Ja Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007**

§60.100a Applicability, designation of affected facility, and reconstruction
(a) The provisions of this subpart apply to the following affected facilities in petroleum refineries: fluid catalytic cracking units (FCCU), fluid coking units (FCU), delayed coking units, ***fuel gas combustion devices (including process heaters), flares*** and sulfur recovery plants. The sulfur recovery plant need not be physically located within the boundaries of a petroleum refinery to be an affected facility, provided it processes gases produced within a petroleum refinery.

(b) Except for flares and delayed coking units, the provisions of this subpart apply only to affected facilities under paragraph (a) of this section which commence construction, modification or reconstruction after May 14, 2007. For flares, the provisions of this subpart apply only to flares which commence construction, modification or reconstruction after June 24, 2008. For the purposes of this subpart, a modification to a flare commences when a project that includes any of the activities in paragraphs (c)(1) or (2) of this section is commenced. For delayed coking units, the provisions of this subpart apply to delayed coking units that commence construction, reconstruction or modification on the earliest of the following dates:

(1) May 14, 2007, for such activities that involve a "delayed coking unit" defined as follows: one or more refinery process units in which high molecular weight petroleum derivatives are thermally cracked and petroleum coke is produced in a series of closed, batch system reactors;

(2) December 22, 2008, for such activities that involve a "delayed coking unit" defined as follows: a refinery process unit in which high molecular weight petroleum derivatives are thermally cracked and petroleum coke is produced in a series of closed, batch system reactors. A delayed coking unit consists of the coke drums and associated fractionator;

(3) September 12, 2012, for such activities that involve a "delayed coking unit" as defined in §60.101a.

(c) For all affected facilities other than flares, the provisions in §60.14 regarding modification apply. As provided in §60.14(f), the special provisions set forth under this subpart shall supersede the provisions in §60.14 with respect to flares. For the purposes of this subpart, a modification to a flare occurs as provided in paragraphs (c)(1) or (2) of this section.

(1) Any new piping from a refinery process unit, including ancillary equipment, or a fuel gas system is physically connected to the flare (e.g., for direct emergency relief or some form of continuous or intermittent venting). However, the connections described in paragraphs (c)(1)(i) through (vii) of this section are not considered modifications of a flare.

(i) Connections made to install monitoring systems to the flare.

(ii) Connections made to install a flare gas recovery system or connections made to upgrade or enhance components of a flare gas recovery system (e.g., addition of compressors or recycle lines).

(iii) Connections made to replace or upgrade existing pressure relief or safety valves, provided the new pressure relief or safety valve has a set point opening pressure no lower and an internal diameter no greater than the existing equipment being replaced or upgraded.

(iv) Connections made for flare gas sulfur removal.

(v) Connections made to install back-up (redundant) equipment associated with the flare (such as a back-up compressor) that does not increase the capacity of the flare.

(vi) Replacing piping or moving an existing connection from a refinery process unit to a new location in the same flare, provided the new pipe diameter is less than or equal to the diameter of the pipe/connection being replaced/moved.

(vii) Connections that interconnect two or more flares.

(2) A flare is physically altered to increase the flow capacity of the flare.

(d) For purposes of this subpart, under §60.15, the "fixed capital cost of the new components" includes the fixed capital cost of all depreciable components which are or will be replaced pursuant to all continuous programs of component replacement which are commenced within any 2-year period following the relevant applicability date specified in paragraph (b) of this section.

***The following affected facilities are applicable to the Revolution facility.***

***<u>Fuel gas combustion device</u>- any equipment, such as process heaters and boilers, used to combust fuel gas.***

- ***The following emission units will combust low pressure fuel gas produced by process equipment at the Revolution facility along with pipeline natural gas.***
- ***Gasification burner #1***
- ***Gasification burner #2***
- ***Product upgrading heater #1***
- ***Product upgrading heater #2***

***<u>Flare</u> - a combustion device that uses an uncontrolled volume of air to burn gases. The flare includes the foundation, flare tip, structural support, burner, igniter, flare controls, including air injection or steam injection systems, flame arrestors and the flare gas header system.***

***The Revolution facility does not have any process equipment that meets the definition of Fluid catalytic cracking units (FCCU), Fluid coking units (FCU), Delayed coking units, or sulfur recover plant.***

<u>§60.102a Emissions limitations</u>
(a) Each owner or operator that is subject to the requirements of this subpart shall comply with the emissions limitations in paragraphs (b) through (i) of this section on and after the date on which the initial performance test, required by §60.8, is completed, but not later than 60 days after achieving the maximum production rate at which the affected facility will be operated or 180 days after initial startup, whichever comes first.

***Paragraphs (b) through (f) do not apply***

(g) Each owner or operator of an affected fuel gas combustion device shall comply with the emissions limits in paragraphs (g)(1) and (2) of this section.

(1) Except as provided in (g)(1)(iii) of this section, for each fuel gas combustion device, the owner or operator shall comply with either the emission limit in paragraph (g)(1)(i) of this section or the fuel gas concentration limit in paragraph (g)(1)(ii) of this section.

(i) The owner or operator shall not discharge or cause the discharge of any gases into the atmosphere that contain $SO_2$ in excess of 20 ppmv (dry basis, corrected to 0-percent excess air) determined hourly on a 3-hour rolling average basis and $SO_2$ in excess of 8 ppmv (dry basis, corrected to 0-percent excess air), determined daily on a 365 successive calendar day rolling average basis; or

(ii) The owner or operator shall not burn in any fuel gas combustion device any fuel gas that contains $H_2S$ in excess of 162 ppmv determined hourly on a 3-hour rolling average basis and $H_2S$ in excess of 60 ppmv determined daily on a 365 successive calendar day rolling average basis.

***The Revolution facility will meet all applicable sulfur limitations***

(2) For each process heater with a rated capacity of greater than 40 million British thermal units per hour (MMBtu/hr) on a higher heating value basis, the owner or operator shall not discharge to the atmosphere any emissions of NOX in excess of the applicable limits in paragraphs (g)(2)(i) through (iv) of this section.

(i) For each natural draft process heater, comply with the limit in either paragraph (g)(2)(i)(A) or (B) of this section. The owner or operator may comply with either limit at any time, provided that the appropriate parameters for each alternative are monitored as specified in §60.107a; if fuel gas composition is not monitored as specified in §60.107a(d), the owner or operator must comply with the concentration limits in paragraph (g)(2)(i)(A) of this section.

(A) 40 ppmv (dry basis, corrected to 0-percent excess air) determined daily on a 30-day rolling average basis; or

(B) 0.040 pounds per million British thermal units (lb/MMBtu) higher heating value basis determined daily on a 30-day rolling average basis.

(ii) For each forced draft process heater, comply with the limit in either paragraph (g)(2)(ii)(A) or (B) of this section. The owner or operator may comply with either limit at any time, provided that the appropriate parameters for each alternative are monitored as specified in §60.107a; if fuel gas composition is not monitored as specified in §60.107a(d), the owner or operator must comply with the concentration limits in paragraph (g)(2)(ii)(A) of this section.

(A) 60 ppmv (dry basis, corrected to 0-percent excess air) determined daily on a 30-day rolling average basis; or

(B) 0.060 lb/MMBtu higher heating value basis determined daily on a 30-day rolling average basis.

***The gasification burner #2 is the only process heater with a rated capacity greater than 40 MMBtu/hr. The gasification burner #2 will meet all applicable NOx limitations. Paragraphs (iii) through (iv) do not apply since this burner does not burn both gaseous and liquid fuels.***

<u>§60.103a Design, equipment, work practice or operational standards</u>
(a) Except as provided in paragraph (g) of this section, each owner or operator that operates a flare that is subject to this subpart shall develop and implement a written flare management plan

no later than the date specified in paragraph (b) of this section. The flare management plan must include the information described in paragraphs (a)(1) through (7) of this section.

***The Revolution facility will develop a written flare management plan and will submit to the administrator prior to operation.***

(c) Except as provided in paragraphs (f) and (g) of this section, each owner or operator that operates a fuel gas combustion device, flare or sulfur recovery plant subject to this subpart shall conduct a root cause analysis and a corrective action analysis for each of the conditions specified in paragraphs (c)(1) through (3) of this section.

***The Revolution facility will conduct a root cause analysis and a corrective action analysis as specified and will submit to the administrator no later than 45 days after a covered occurrence.***

(h) Each owner or operator shall not burn in any affected flare any fuel gas that contains H2S in excess of 162 ppmv determined hourly on a 3-hour rolling average basis. The combustion in a flare of process upset gases or fuel gas that is released to the flare as a result of relief valve leakage or other emergency malfunctions is exempt from this limit.

***The Revolution facility will not combust in the flare any fuel gas that contains greater than 162 ppmv H2S.***

§60.104a Performance tests

(a) The owner or operator shall conduct a performance test for each FCCU, FCU, sulfur recovery plant, flare and fuel gas combustion device to demonstrate initial compliance with each applicable emissions limit in §60.102a according to the requirements of §60.8. The notification requirements of §60.8(d) apply to the initial performance test and to subsequent performance tests required by paragraph (b) of this section (or as required by the Administrator), but does not apply to performance tests conducted for the purpose of obtaining supplemental data because of continuous monitoring system breakdowns, repairs, calibration checks and zero and span adjustments.

***The Revolution facility will conduct all necessary performance testing for the flare and fuel gas combustion devices as specified in this subpart. Fuel gas combustion devices will follow the SO2 and NOx emission requirements outlined in §60.104a(i) and (j).***

§60.107a Monitoring of emissions and operations for fuel gas combustion devices and flares

(a) Fuel gas combustion devices subject to SO2 or H2S limit and flares subject to H2S concentration requirements. The owner or operator of a fuel gas combustion device that is subject to §60.102a(g)(1) and elects to comply with the SO2 emission limits in §60.102a(g)(1)(i) shall comply with the requirements in paragraph (a)(1) of this section. The owner or operator of a fuel gas combustion device that is subject to §60.102a(g)(1) and elects to comply with the H2S concentration limits in §60.102a(g)(1)(ii) or a flare that is subject to the H2S concentration requirement in §60.103a(h) shall comply with paragraph (a)(2) of this section.

(3) The owner or operator of a fuel gas combustion device or flare is not required to comply with paragraph (a)(1) or (2) of this section for fuel gas streams that are exempt under §§60.102a(g)(1)(iii) or 60.103a(h) or, for fuel gas streams combusted in a process heater, other fuel gas combustion device or flare that are inherently low in sulfur content. Fuel gas streams meeting

one of the requirements in paragraphs (a)(3)(i) through (iv) of this section will be considered inherently low in sulfur content.

(i) Pilot gas for heaters and flares.

(ii) Fuel gas streams that meet a commercial-grade product specification for sulfur content of 30 ppmv or less. In the case of a liquefied petroleum gas (LPG) product specification in the pressurized liquid state, the gas phase sulfur content should be evaluated assuming complete vaporization of the LPG and sulfur containing-compounds at the product specification concentration.

(iii) Fuel gas streams produced in process units that are intolerant to sulfur contamination, such as fuel gas streams produced in the hydrogen plant, catalytic reforming unit, isomerization unit, and HF alkylation process units.

(iv) Other fuel gas streams that an owner or operator demonstrates are low-sulfur according to the procedures in paragraph (b) of this section.

***The Revolution facility believes its fuel gas has inherently low sulfur content.***

(d) Process heaters complying with the NOX heating value-based or mass-based limit. The owner or operator of a process heater subject to the NOX emissions limit in §60.102a(g)(2) and electing to comply with the applicable emissions limit in §60.102a(g)(2)(i)(B) or (g)(2)(ii)(B) shall install, operate, calibrate and maintain an instrument for continuously monitoring and recording the concentration (dry basis, 0-percent excess air) of NOX emissions into the atmosphere and shall determine the F factor of the fuel gas stream no less frequently than once per day according to the monitoring requirements in paragraphs (d)(1) through (4) of this section.
For fuel gas streams, determine gas composition according to the requirements in paragraph (d)(4) of this section or the higher heating value according to the requirements in paragraph (d)(7) of this section;

***The Revolution facility will install, operate, calibrate and maintain an instrument for continuously monitoring and recording the concentration of NOx emission. The facility will also determine the F factor of the fuel gas as well as gas composition.***

(f) Flow monitoring for flares. Except as provided in paragraphs (f)(2) and (h) of this section, the owner or operator of an affected flare subject to §60.103a(c) through (e) shall install, operate, calibrate and maintain, in accordance with the specifications in paragraph (f)(1) of this section, a CPMS to measure and record the flow rate of gas discharged to the flare.

***The Revolution facility will install a flow monitor on the flare.***

§60.108a Recordkeeping and reporting requirements
(a) Each owner or operator subject to the emissions limitations in §60.102a shall comply with the notification, recordkeeping, and reporting requirements in §60.7 and other requirements as specified in this section.

(b) Each owner or operator subject to an emissions limitation in §60.102a shall notify the Administrator of the specific monitoring provisions of §§60.105a, 60.106a and 60.107a with which the owner or operator intends to comply. Each owner or operator of a co-fired process heater subject to an emissions limitation in §60.102a(g)(2)(iii) or (iv) shall submit to the Administrator documentation showing that the process heater meets the definition of a co-fired process heater in §60.101a. Notifications required by this paragraph shall be submitted with the notification of initial startup required by §60.7(a)(3).

***The Revolution facility will maintain all necessary records.***

Stantec

**Stantec Consulting Services Inc.**
7669 West Riverside Drive, Suite 101, Boise ID 83714-6183

July 21, 2015

**Attention: Tad Anderson**
Utah Department of Environmental Quality
Division of Air Quality
P.O. Box 144820
Salt Lake City, UT 84114-482

Dear Tad,

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility Notice of Intent**

Stantec Consulting Services (Stantec) is submitting the following response to questions posed by UDAQ on June 16, 2015. Should you require additional information or wish to discuss further, please contact me at 208-853-0883.

**Coal Handling Operations**
Crushing and conveying operations are for 2,737.5 hours per year and a total throughput of 273,750 tons per year of coal. Crusher and conveyor operating 5 hours per day at a capacity of 100 tons per hour of coal for 500 tons per day.

Q1: Why is there a +50% increase in the 500 tons per day in the throughput of coal in the emissions operating parameters sheet and calculations?

R1: The gasifier is the limiting factor capable of only 500 tons per day throughput. Bin storage at 750 tons per day is to allow for more than 1 full day of live storage for feeding the gasifier. The ability to crush and fill the bin at a higher capacity than the gasifier throughput is to allow for less hours of operation of the coal handling, crushing and bin silo filling.

Also, the crushers are relatively high maintenance item and therefore need to be serviced frequently and the proposed batch operation allows for this.

**Pyrolysis and Gasification**
8,400 hours per year.

Q2: Where is the superheated water coming from for the pyrolysis vessel?

R2: Superheated steam will be produced by the auxiliary boiler or by a coiled Inconel pipe in the ceiling of the reactor house that will be used to pre-heat water to be used in the pyrolysis system.

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

Q3: Where is the steam coming from for the gasification section in the reaction chamber?

R3: Same as above since both burner systems reside within the same reactor house, separated by a partial wall; this is relevant for the coiled Inconel pipe option.

Steam

Q4: In the gasification process steam is being injected to control the hydrogen and carbon monoxide for the product syngas through the steam reforming process. Where is the steam coming from?

R4: This is the same question (same steam) as stated above – Steam is only injected into the gasification coils and pyrolysis vessel and it comes from the same source as identified above.

Q5: If steam is coming from the 73.88 MMBtu/hr auxiliary boiler justify how 500 hours of operation per year can accommodate the gasification process.

R5: This is for additional steam if needed for the conditioning of the syngas feed to the Fischer Tropsch unit and refining process which is independent of the pyrolysis and gasification process.

Q6: Vortex-like ash removal removes carbonaceous material and ash from 1-micron (10%) to 15-microns (100%). Can you give more detailed information on how vortex-like removal system?

100%
PM15

R6: Two cyclones are used to redirect particles that are 80 to 150 microns in size to a 2-inch pipe that leads back to the front half of the pyrolysis vessel. The first is completed after the carbonaceous material has gone through the preliminary coil. The second is located after the material has passed through the three coils.

~~Q7: The Reacto~~r House contains the pyrolysis vessel, carbonaceous reforming coils and cyclones and can reach temperatures of 1800 degrees F. Can you give more explanation on how the equipment is going to continuously function under these extreme temperatures and operating conditions?

~~R7: All o~~f the components in the reactor house are made of Inconel 800 HT or similar specialty metals that are designed to withstand very high temperatures and pressure. The reactor house is lined on the inside with ceramic wool to insulate the housing.

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

**Ash Removal and Handling**
6.6 tons per hour ash generated, 57,378 tons of ash generated per year, 8,694 hour per year.

Thats a lot of solids

Q8: How is the ash being pulled from the flow of gas in the final ash removal process?

R8: The following description was included in the NOI- "The flow stream is sent through two cyclones in series which will remove any remaining carbonaceous material and ash carry-through. An estimated 10% of 1-micron particles, 25% of 2-micron particles, 35% of 3-micron particles and as much as 100% of 15-microns (and above) particles will be removed during this final polish phase". The cyclones are sized to handle this volume of material.

**Syngas Treatment**
8,400 hours per year

Q9: It is stated "From the gasifier, the raw syngas will flow through heat exchangers to the gas scrubbers, where the syngas is sprayed with free electron "saturated" ionized water to remove any organics, particulates, ash, sulfur, and metals still in the syngas stream. Sulfur removal is this step is accomplished from the electrically charged negative ions produced in the proprietary water processes. The negatively charged ions are highly reactive and are attracted to the positive ions of the sulfur species. Those ions attract and coagulate into elemental sulfur that is then filtered out through the water system with other elements that have also been coagulated." The DAQ is concerned with where the elemental sulfur and other elements which have been coagulated are ending up. Please provide a detailed description of these elements.

R9: The non-hazardous coagulated elements are filtered out of the gas scrubbing water and sent to a filter press for collection and permitted landfill disposal. If required, this material can be mixed with cement for additional stabilization.

assuming electric engine

Q10: The clean dry syngas exits the gasification unit and enters the syngas compression unit where it is compressed in multiple stages. Compression units are typically IC engines, what fuel source is the compression unit operated with?

R10: The centrifugal syngas compression units at the facility will be operated by motors. No fuel is combusted in these units.

Q11: The $CO_2$ laden amine solution is degassed and release gases like H2, CO, and CH4. Those gases are routed to the fuel gas system. What is the fuel gas system?

R11: Some of the gas that is produced in the process is used in the gasification process and product upgrading heaters. The fuel gas system is the external heating source for the gasification

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

process. The Fischer Tropsch tail gas is sent to the gasifier burners to be used as fuel and the emissions for those products were included in the emissions calculations.

Q12: The NOI States that MDEA provides deep removal of CO2. What does deep mean?

R12: Bulk $CO_2$ removal normally removes down to approximately 2 mole % $CO_2$ in the treated syngas. Any $CO_2$ in the syngas feed to the Fischer Tropsch unit is considered inert and bulk removal of this $CO_2$ facilitates a lower cost Fischer Tropsch unit.

**Fischer-Tropsch Unit**
8,400 hours per year

Q13: The NOI states that there is periodic catalyst regeneration. What is considered periodic and how is it determined that it is necessary? Monitoring of catalyst and how?

R13: Sulphur is a permanent poison for the Fischer Tropsch catalyst and must therefore be kept below 5 ppbv. Reactive nitrogen species are non-permanent Fischer Tropsch catalyst poisons and the catalyst activity loss resulting from nitrogen poisoning can be restored through a 3 step regeneration process (known as WROR). The WROR steps are as follows:

- Wax removal (WR)
- Oxidation (O) with diluted air
- Reduction (R)

Condition

The frequency of regeneration is dependent on the purity of the fresh synthesis gas but typically occurs every 80-120 days per train with each WROR event taking 7-10 days. For a 6 FT reactor, 3 train facility (assuming a 90 day regeneration frequency per train and a 10 day WROR process per train) one train will be in regeneration 30 days out of every 90 days.

Q14: The uncondensed vapor from the Fischer Tropsch liquid separator is recycled back into the Fischer Tropsch reactors as tail gas and used as fuel in other areas of the plant. What are the other areas in the plant and have emissions from these sources been addressed as Natural Gas fired equipment in the NOI?

R14: These emissions are accounted for as natural gas fired emission units F- gasification burners, B and C- Product upgrading heaters #1 and #2.

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

Q15: Where is the purge gas stream from the catalyst regeneration going?

R15: The purge gas is released to the atmosphere and identified as the Fischer Tropsch purge gas identified as source ID
The "purge" streams from the FT island are as follows:

1. Flash gases from degassing of the FT liquid, FT wax and FT water which should be routed to flare; flare create only piolot
2. Hydrogen purge from the wax removal and reduction steps of the regeneration process, which can be routed into the fuel gas system; and
3. Dilute air purge from the oxidation step of the regeneration process, which can be released to atmosphere. This source is identified as the Fischer Tropsch purge gas source ID: D. ~ Hard to believe only $CO_2$ and no HAP's

**Product Upgrading**

fine

Q16: Are there any emergency overflow tanks not being accounted for?

R16: No further tankage than has been identified is envisioned.

hours limit on boiler

Q17: The listed 73.88 MMBtu/hr boiler is considered Auxiliary? How can this be? Typically a boiler of this size will operate more than 500 hours per year. Please provide an explanation of why this boiler would not be considered a regular part of the pyrolysis/gasification process.

R17: Normal operating balance does not require additional steam from the boiler. The pyrolysis / gasification system has a gas fired heating system previously identified and is independent of the Auxiliary Boiler.

**Emission Calculations**

Q18: Tank emission calculations note that Tesoro MSDS and U.S. Oil and Refining Company MSDS's were used but also Tanks program emissions were submitted. Which of these were used?

R18: The TANKS program was used to estimate the total VOC emissions from each tank and then the individual HAPs were speciated and emissions estimated based on the compositions identified in the MSDSs.

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

Q19: Formaldehyde emissions say they require modeling in the emissions calculations section but say they do not require modeling in the modeling section. Which is it?

R19: The HAP emission calculations have been revised and are enclosed with this submittal. The natural gas combustion calculations included in the submittal were double counting HAP emissions from the gasification burners since they are listed twice in the Source ID table. Included with this response are updated HAP emission calculations. As a result of this change, the updated formaldehyde emissions are below modeling thresholds.

**Proposed Facility Plot Plan**

Q20: The proposed facility plot plan spells out that there is a very large evaporation pond, a smaller pond, and a laydown yard. Have emissions been taken into account for these areas? What liquids will the evaporations ponds contain and what activity is going to take place in the laydown yard?

let DWW deal with it.

R20: Emissions were not included because the water streams routed to the evaporation pond are blowdown from the cooling tower and reverse osmosis units and these aqueous streams will not contain any volatile compounds, only dissolved and suspended solids. The laydown yard is an area to be used for the storage of equipment and/or products. No emissions units are located in this area.

**General Questions**

Q21: Does this facility meet the requirements of 40 CFR 60 Subpart Ja for the fuels portion of the project?

got yea

R21: It has been determined that Subpart Ja applies to gasification burners, product upgrading heaters #1 and #2, and the flare. A complete applicability analysis is included as an attachment to this letter.

Q22: Pyrolysis and Gasification burners and Regeneration Heaters – Operate on tail gas. It would be necessary to require a fuel sulfur limitation when used in this type of operation for gas quality.

where are test for sulfur, going to be?

R22: Sulfur is a poison for the FT catalyst, therefore all the sulfur is removed from the syngas before entering the FT process. There will be no sulfur in the FT tailgas.

Q23: Loading/unloading racks not addressed in NOI.

R23: Products will be piped to the Price River Terminal facility which is located at 6000 East Wash Plant Road Wellington, Utah 84542 and loadout will occur at the Price River Terminal facility.

Sole source operation

July 21, 2015
Tad Anderson


**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

aggregation

Q24: No BACT for Loading/unloading in NOI.

R24: See response to question number 23 above.

Q25: No BACT for Cooling Tower in NOI.

R25: The proposed control technology for PM10 is drift eliminators to capture drift aerosols upstream of the release point to the atmosphere. The use of drift eliminating media to de-entrain aerosol droplets from the air flow exiting the tower is commercially proven technique to reduce PM10 emissions. In addition to the use of drift eliminators, management of the tower water balance to control the concentration of dissolved solids in the cooling water can also reduce particulate emissions. Dissolved solids accumulate in the cooling water due to increasing concentration of dissolved solids in the make-up water as the circulating water evaporates. To maintain reliable operation of the tower, the tower will be designed based on 5 cycles of concentration, that is, the circulating water will be on average 5 times the dissolved solids concentration of the makeup water that is introduced. The proposed cooling tower is to be operated at a design level of total dissolved solids (TDS) concentration of 5,550 ppm in the cooling water, based on 1,110 ppm in the makeup water. The proposed BACT option for the Revolution cooling tower is use of drift eliminators achieving a maximum drift of 0.001% of the circulating water. This measure, along with a limit on the circulating water TDS to an average of 5,550 ppm ~~is~~ considered to be the best available control option for particulate emissions from the cooling towers. The cooling tower PM10 emission estimates have been updated and are included in the revised emission calculation spreadsheet enclosed with this submittal. PM10 emissions from the cooling tower decreased by approximately 54% based on updated data for circulating water rate, TDS concentration, and the use of drift eliminators.

Q26: Please address fugitive VOC equipment leaks in the NOI.

R26: Fugitive VOC emissions from equipment leaks have been calculated and are included in the revised emission calculation spreadsheet enclosed with this submittal. The fugitive equipment leak emissions speciated for individual hazardous air pollutants (HAPs) were also added to the air dispersion modeling threshold determination and did not trigger modeling.

Q27: Is there a wastewater treatment plant on-site?

R27: No major water treatment plant is located on site. Specifically identified wastewater will go through Reverse Osmosis systems for recovery. Backwash from reverse osmosis and remaining wastewater will be sent to the evaporation pond.
The aqueous effluent from the FT unit will be internally consumed in the gasification process avoiding treatment of this stream.

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

Q28: Location needs to be better defined. Outside Wellington Utah is to general.

R28: The facility is located on the parcel that is east of the intersection of Ridge Road and East Farnham Road.

Q29: In the block diagram for FLUOR a power generation steam turbine is listed. Source needs to provide a detailed description of the steam turbine project.

R29: The steam turbine system will receive steam from the heat recovery systems within each of the plant's units. The steam will be at 3 different levels of pressure. Each pressure level will enter the turbine at specific points in the turbine and drive a single shaft that will be connected to an electric generator. The exhaust from the turbine will be wet steam that will be fully condensed in a vacuum condenser and pumped back to the plant's boiler feed water system for reuse.

Regards,

Melissa Armer

Melissa Armer, P.E.
Project Engineer, Stantec

Enclosure:
Updated Appendix C emission calculations
Subpart Ja applicability determination

# Updated Appendix C Emission Calculations

**Operational Parameter Assumptions**

| Coal Feed and Crushing | Parameter | Units | Description/Comment |
|---|---|---|---|
| Coal feed conveyor throughput | 273,750 | ton/yr | Total coal feed throughput to crushing circuit; 500 tpd + 50% for 365 day/yr |
| Coal moisture content | 10 | % | |
| | | | |
| **Gasification- Gasifier Reactor** | | | |
| Coal Throughput | 500 | ton/day | Dry basis |
| Burner system #1 | 33.6 | MMBtu/hr | Pyrolysis burner system will included (3) 6-inch Kinemax LE burners each providing a maximum of 11.2 MMBtu/hr |
| Burner system #2 | 300 | MMBtu/hr | Coil burner system will include (5) 14-inch Kinemax LE burners each providing a maximum of 60 MMBtu/hr |
| Fuel heat content | 913 | Btu/scf | |
| Gasification system- operating hrs | 8,400 | hr/yr | |
| Flue gas- operating hrs | 8,400 | hr/yr | |
| | | | |
| **Syngas Compression and Amine $CO_2$ Removal** | | | |
| $CO_2$ vent- operating hours | 8,400 | hr/yr | |
| | | | |
| **Fischer-Tropsch (FT) Synthesis** | | | |
| FT Activation/Regeneration Heater #1- size | 1.12 | MMBtu/hr | Equipt with low NOx burner |
| FT Activation/Regeneration Heater #1- operating hrs | 4,032 | hr/yr | |
| FT Activation/Regeneration Heater #2- size | 0.60 | MMBtu/hr | Equipt with low NOx burner |
| FT Activation/Regeneration Heater #2- operating hrs | 2,016 | hr/yr | |
| FT Activation/Regeneration Heater Fuel Heat Content | 918 | Btu/scf | |
| Purge stream- min | 36,960 | min lb/yr | Air diluted with nitrogen, contains CO2 |
| Purge stream- max | 59,136 | max lb/yr | The Fischer-Tropsch Synthesis process is a closed loop system. There are fugitive VOCs via equipment leaks. |
| Purge stream- operating hrs | 1,344 | hr/yr | |
| | | | |
| **Product Upgrading (Hydrotreating and Fractionation)** | | | |
| Product Upgrading Fired Heater #1- size | 4.85 | MMBtu/hr | |
| Product Upgrading Fired Heater #1- operating hrs | 8,400 | hr/yr | |
| Product Upgrading Fired Heater #2- size | 10.25 | MMBtu/hr | |
| Product Upgrading Fired Heater #2- operating hrs | 8,400 | hr/yr | |
| Product Upgrading Fired Heater Fuel Heat Content | 1020 | Btu/scf | |
| | | | |
| **Flare Pilot** | | | |
| Burner size | 1 | MMBtu/hr | |
| Flare Pilot operating hours | 8,760 | hr/yr | |
| | | | |
| **Cooling Towers** | | | |
| Number of cooling towers | 1 | | |
| Liquid circulation rate | 665 | gal/min | Based on preliminary engineering design from Fluor |
| Water total dissolved solids content | 1,110 | ppm | Based on 3-yr average analytical results from DMR reports at Price River |
| Cooling Tower- operating hours | 8,400 | hr/yr | |
| | | | |
| **Ash Handling** | | | |
| Pyrolysis ash vibrating conveyor throughput | 52,560 | ton/yr | Based on 6,000 lb/hr * 200% |
| Coil ash vibrating conveyor | 4,818 | ton/yr | Based on 550 lb/hr * 200% |
| Ash covered day bin | 57,378 | ton/yr | Sum of pyrolysis ash conveyor and ash day bin |
| | | | |
| **Auxiliary Systems** | | | |
| Emergency generator (diesel)- size | 1,482 | Hp | |
| Emergency generator (diesel)- operating hours | 500 | hr/yr | |
| Auxiliary boiler- size | 73.88 | MMBtu/hr | |
| Auxiliary boiler- operating hours | 500 | hr/yr | |
| Fire water pump (diesel)- size | 220 | Hp | |
| Fire water pump (diesel)- operating hours | 500 | Hr/yr | |
| | | | |
| | | | |
| ac - acre (43,560 ft2, 4840 yd2) | | | |
| ft - feet | | | |
| gal - gallon | | | |
| Hp- Horsepower | | | |
| in - inch | | | |
| lb - pound | | | |
| mi - mile | | | |
| MMBtu/hr - million British Thermal Units per hour | | | |
| % - percent | | | |
| $yd^3$ - cubic yard | | | |
| hours/year - 8,760 | | | |
| pounds/ton - 2,000 | | | |

**FACILITY WIDE POTENTIAL TO EMIT**

| Source ID | Source Description | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | Lead | | $CO_2$ | | $N_2O$ | | $CH_4$ | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| | Truck unloading | | | | | | | | | 0.07 | 0.10 | 0.01 | 0.01 | | | | | | | | | | |
| | Coal storage pile- wind erosion | | | | | | | | | 0.36 | 1.36 | 0.05 | 0.20 | | | | | | | | | | |
| | Paved haul road | | | | | | | | | 0.04 | 0.07 | 0.01 | 0.02 | | | | | | | | | | |
| 200-3 | Coal handling baghouse | | | | | | | | | 0.01 | 0.01 | 0.00 | 0.00 | | | | | | | | | | |
| 200-4 | Coal silo baghouse | | | | | | | | | 0.02 | 0.03 | 0.01 | 0.02 | | | | | | | | | | |
| F | Gasification flue gas without SCR | 20.35 | 85.47 | 17.35 | 72.86 | 2.01 | 8.44 | 0.39 | 1.63 | 2.78 | 11.66 | 2.78 | 11.66 | 0.0002 | 0.0008 | 43,847 | 184,156 | 0.23 | 0.98 | 0.84 | 3.53 | 3.82E-01 | 1.4 |
| | Gasification flue gas with SCR | 3.67 | 15.41 | 14.68 | 61.65 | 0.00 | 0.00 | | | | | | | | | | | | | | | | |
| 240-1 | Ash handling baghouse | | | | | | | | | 0.000 | 0.001 | 0.000 | 0.000 | | | | | | | | | | |
| 240-2 | Ash bin baghouse | | | | | | | | | 0.000 | 0.001 | 0.000 | 0.000 | | | | | | | | | | |
| E | Flare Pilot | 0.05 | 0.21 | 0.08 | 0.36 | 0.01 | 0.02 | 0.00 | 0.00 | 0.01 | 0.03 | 0.01 | 0.03 | 4.9E-07 | 2.1E-06 | 118 | 515 | 0.001 | 0.003 | 0.002 | 0.010 | | |
| A | $CO_2$ Vent | | | 3.4 | 14.1 | | | | | | | | | | | 23,874 | 100,272 | | | | | | |
| H | Activation/Regeneration Heater #1 | 0.06 | 0.12 | 0.10 | 0.21 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.02 | 0.01 | 0.02 | 6.1E-07 | 1.2E-06 | 146 | 295 | 0.001 | 0.002 | 0.003 | 0.006 | | |
| I | Activation/Regeneration Heater #2 | 0.03 | 0.03 | 0.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 3.3E-07 | 3.3E-07 | 78 | 79 | 0.0004 | 0.0004 | 0.002 | 0.002 | | |
| D | Fischer Tropsch purge gas | | | | | | | | | | | | | | | 0.23 | 0.16 | | | | | | |
| B | Product Upgrading Heater #1 | 0.24 | 1.0 | 0.40 | 1.7 | 0.03 | 0.11 | 0.00 | 0.01 | 0.04 | 0.15 | 0.04 | 0.15 | 2.4E-06 | 1.0E-05 | 571 | 2,396 | 0.00 | 0.01 | 0.01 | 0.05 | | |
| C | Product Upgrading Heater #2 | 0.50 | 2.1 | 0.84 | 3.5 | 0.06 | 0.23 | 0.01 | 0.03 | 0.08 | 0.32 | 0.08 | 0.32 | 5.0E-06 | 2.1E-05 | 1,206 | 5,065 | 0.01 | 0.03 | 0.02 | 0.10 | | |
| G | Auxillary boiler | 3.6 | 0.91 | 6.1 | 1.5 | 0.40 | 0.10 | 0.04 | 0.01 | 0.55 | 0.14 | 0.55 | 0.14 | | | 8,692 | 2,173 | 0.05 | 0.01 | 0.17 | 0.04 | | |
| J | Emergency generator (diesel) | 12.91 | 3.23 | 2.16 | 0.54 | 0.23 | 0.06 | 0.36 | 0.09 | 0.36 | 0.09 | 0.36 | 0.09 | | | 1719.12 | 430 | 0.01 | 0.06 | 0.07 | 0.29 | | |
| 960 | Fire water pump (diesel) | 1.20 | 0.30 | 0.58 | 0.14 | 0.03 | 0.01 | 0.45 | 0.11 | 0.07 | 0.02 | 0.07 | 0.02 | | | 253.00 | 63 | 0.002 | 0.009 | 0.010 | 0.043 | | |
| 910 | Tanks | | | | | 0.05 | 0.21 | | | | | | | | | | | | | | | | |
| 920 | Cooling Tower | | | | | | | | | 1.8 | 7.8 | 1.8 | 7.8 | | | | | | | | | | |
| | Fugitive Equipment Leaks | | | | | 1.72 | 7.52 | | | | | | | | | | | | | | | 1.43 | 6.25 |
| | **TOTAL POINT SOURCES (without SCR)** | | **93.4** | | **95.0** | | **9.2** | | **1.9** | | **20.2** | | **20.2** | | **0.001** | | **295,445** | | **1.1** | | **4.1** | | **8.9** |
| | **TOTAL POINT SOURCES (with SCR)** | | **23.3** | | **83.8** | | | | | | | | | | | | | | | | | | |

**$CO_2e$[1] =** **329.1** **101.6**

[1] Utilizes a global warming potential of 298 for $N_2O$ and 25 for $CH_4$ per updated ruling 11/29/13 78 FR 71904

**AIR DISPERSION MODELING DETERMINATION- WORST CASE WITHOUT SCR**

| Threshold | $NO_x$ tons/yr | CO tons/yr | $SO_2$ tons/yr | $PM_{10}$ tons/yr | $PM_{2.5}$ tons/yr |
|---|---|---|---|---|---|
| PTE non-fugitive sources | 93.4 | 95.0 | 1.9 | 20.2 | 20.21 |
| Modeling threshold | 40 | 100 | 40 | 15 | 15 |
| Exceeds modeling threshold (Y/N) | Y | N | N | Y | Y |

| Threshold | $PM_{10}$ tons/yr | $PM_{2.5}$ tons/yr |
|---|---|---|
| PTE fugitive sources | 1.5 | 0.2 |
| Modeling threshold | 5 | 5 |
| Exceeds modeling threshold (Y/N) | N | N |

| Pollutant | Emissions (lb/hr) | Emissions (tpy) | Ave. Time | ETV (lb/hr) | Modeling Required? |
|---|---|---|---|---|---|
| Benzene | 7.66E-02 | 2.95E-01 | Chronic, 8 Hour | 0.3163 | No |
| Dichlorobenzene | 5.47E-04 | 1.95E-03 | Chronic, 8 Hour | 11.905 | No |
| 1,3 butadiene | 6.02E-05 | 1.51E-05 | Chronic, 8 Hour | 0.292 | No |
| Formaldehyde | 3.51E-02 | 1.22E-01 | Acute, 1hour | 0.0567 | No |
| Hexane | 1.28E+00 | 4.93E+00 | Chronic, 8 Hour | 34.895 | No |
| Napthalene | 6.96E-02 | 3.02E-01 | Chronic, 8 Hour | 10.381 | No |
| Toluene | 2.69E-01 | 1.16E+00 | Chronic, 8 Hour | 14.922 | No |
| Xylene | 4.67E-01 | 2.03E+00 | Chronic, 8 Hour | 85.97 | No |
| Acetaldehyde | 1.44E-03 | 3.61E-04 | Acute, 1hour | 6.9363 | No |
| Acrolein | 2.24E-04 | 5.60E-05 | Chronic, 8 Hour | 0.0353 | No |

1 Assumes all emission points are vertically unrestricted and less than 50 m from property boundary

**FACILITY WIDE UNCONTROLLED POTENTIAL TO EMIT**

| Source ID | Source Description | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | Lead | | $CO_2$ | | $N_2O$ | | $CH_4$ | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| | Truck unloading | | | | | | | | | 0.07 | 0.10 | 0.01 | 0.01 | | | | | | | | | | |
| | Coal storage pile- wind erosion | | | | | | | | | 0.36 | 1.36 | 0.05 | 0.20 | | | | | | | | | | |
| | Paved haul road | | | | | | | | | 0.04 | 0.07 | 0.01 | 0.02 | | | | | | | | | | |
| 200-3 | Coal handling | | | | | | | | | 0.14 | 0.20 | 0.02 | 0.03 | | | | | | | | | | |
| 200-4 | Coal silo | | | | | | | | | 0.33 | 0.52 | 0.25 | 0.36 | | | | | | | | | | |
| F | Gasification flue gas | 20.35 | 85.47 | 17.35 | 72.86 | 2.01 | 8.44 | 0.39 | 1.63 | 2.78 | 11.66 | 2.78 | 11.66 | 0.0002 | 0.0008 | 43,847 | 184,156 | 0.23 | 0.98 | 0.84 | 3.53 | 3.82E-01 | 1.4 |
| 240-1 | Ash handling | | | | | | | | | 0.005 | 0.020 | 0.001 | 0.003 | | | | | | | | | | |
| 240-2 | Ash bin | | | | | | | | | 0.005 | 0.020 | 0.001 | 0.003 | | | | | | | | | | |
| E | Flare Pilot | 0.05 | 0.21 | 0.08 | 0.36 | 0.01 | 0.02 | 0.00 | 0.00 | 0.01 | 0.03 | 0.01 | 0.03 | 4.9E-07 | 2.1E-06 | 118 | 515 | 0.001 | 0.003 | 0.002 | 0.010 | | |
| A | $CO_2$ Vent | | | 3.4 | 14.1 | | | | | | | | | | | 23,874 | 100,272 | | | | | | |
| H | Activation/Regeneration Heater #1 | 0.06 | 0.12 | 0.10 | 0.21 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.02 | 0.01 | 0.02 | 6.1E-07 | 1.2E-06 | 146 | 295 | 0.001 | 0.002 | 0.003 | 0.006 | | |
| I | Activation/Regeneration Heater #2 | 0.03 | 0.03 | 0.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 3.3E-07 | 3.3E-07 | 78 | 79 | 0.0004 | 0.0004 | 0.002 | 0.002 | | |
| D | Fischer Tropsch purge gas | | | | | | | | | | | | | | | 0.23 | 0.16 | | | | | | |
| B | Product Upgrading Heater #1 | 0.24 | 1.0 | 0.40 | 1.7 | 0.03 | 0.11 | 0.00 | 0.01 | 0.04 | 0.15 | 0.04 | 0.15 | 2.4E-06 | 1.0E-05 | 571 | 2,396 | 0.00 | 0.01 | 0.01 | 0.05 | | |
| C | Product Upgrading Heater #2 | 0.50 | 2.1 | 0.84 | 3.5 | 0.06 | 0.23 | 0.01 | 0.03 | 0.08 | 0.32 | 0.08 | 0.32 | 5.0E-06 | 2.1E-05 | 1,206 | 5,065 | 0.01 | 0.03 | 0.02 | 0.10 | | |
| G | Auxiliary boiler | 3.6 | 0.91 | 6.1 | 1.5 | 0.40 | 0.10 | 0.04 | 0.01 | 0.55 | 0.14 | 0.55 | 0.14 | | | 8,692 | 2,173 | 0.05 | 0.01 | 0.17 | 0.04 | | |
| J | Emergency generator (diesel) | 12.91 | 3.23 | 2.16 | 0.54 | 0.23 | 0.06 | 0.36 | 0.09 | 0.36 | 0.09 | 0.36 | 0.09 | | | 1719.12 | 430 | 0.01 | 0.06 | 0.07 | 0.29 | | |
| 960 | Fire water pump (diesel) | 1.20 | 0.30 | 0.58 | 0.14 | 0.03 | 0.01 | 0.45 | 0.11 | 0.07 | 0.02 | 0.07 | 0.02 | | | 253.00 | 63 | 0.002 | 0.009 | 0.010 | 0.043 | | |
| 910 | Tanks | | | | | 0.05 | 0.21 | | | | | | | | | | | | | | | | |
| 920 | Cooling Tower | | | | | | | | | 1.8 | 7.8 | 1.8 | 7.8 | | | | | | | | | | |
| | **TOTAL POINT SOURCES** | | **93.4** | | **95.0** | | **9.2** | | **1.9** | | **21.0** | | **20.6** | | **0.001** | | **295,445** | | **1.1** | | **4.1** | | **3.1** |
| | | | | | | | | | | | | | | | | | | **$CO_2e$[1] =** | **329.1** | | **101.6** | | |

[1] Utilizes a global warming potential of 298 for $N_2O$ and 25 for $CH_4$ per updated ruling 11/29/13 78 FR 71904
[2] Operating hours and throughputs limitied as identified in combustion and material handling calculations

**AIR DISPERSION MODELING DETERMINATION**

| Threshold | $NO_x$ tons/yr | CO tons/yr | $SO_2$ tons/yr | $PM_{10}$ tons/yr | $PM_{2.5}$ tons/yr |
|---|---|---|---|---|---|
| PTE non-fugitive sources | 93.4 | 95.0 | 1.9 | 21.0 | 20.59 |
| Modeling threshold | 40 | 100 | 40 | 15 | 15 |
| Exceeds modeling threshold (Y/N) | Y | N | N | Y | Y |

| Threshold | $PM_{10}$ tons/yr | $PM_{2.5}$ tons/yr |
|---|---|---|
| PTE fugitive sources | 1.5 | 0.2 |
| Modeling threshold | 5 | 5 |
| Exceeds modeling threshold (Y/N) | N | N |

| Pollutant | Emissions (lb/hr) | Emissions (tpy) | Ave. Time | ETV (lb/hr) | Modeling Required? |
|---|---|---|---|---|---|
| Benzene | 1.05E-02 | 5.78E-03 | Chronic, 8 Hour | 0.3163 | No |
| Dichlorobenzene | 5.47E-04 | 1.95E-03 | Chronic, 8 Hour | 11.905 | No |
| 1,3 butadiene | 6.02E-05 | 1.51E-05 | Chronic, 8 Hour | 0.292 | No |
| Formaldehyde | 3.51E-02 | 1.22E-01 | Acute, 1hour | 0.0567 | No |
| Hexane | 8.20E-01 | 2.92E+00 | Chronic, 8 Hour | 34.895 | No |
| Napthalene | 9.37E-04 | 1.02E-03 | Chronic, 8 Hour | 10.381 | No |
| Toluene | 5.18E-03 | 6.40E-03 | Chronic, 8 Hour | 14.922 | No |
| Xylene | 2.97E-03 | 6.10E-04 | Chronic, 8 Hour | 85.97 | No |
| Acetaldehyde | 1.44E-03 | 3.61E-04 | Acute, 1hour | 6.9363 | No |
| Acrolein | 2.24E-04 | 5.60E-05 | Chronic, 8 Hour | 0.0353 | No |

1 Assumes all emission points are vertically unrestricted and less than 50 m from property boundary

**EXTERNAL NATURAL GAS COMBUSTION UNIT CRITERIA POLLUTANTS EMISSION CALCULATIONS**

| Source ID# | Source Name | Heat Input (MMBtu/hr) | Average Gas Heating Value (btu/scf) | Annual Hours of Operation | $NO_x$ [1] | | CO [1] | | VOC [2] | | $SO_2$ [7] | | $PM_{10}$ [3] | | $PM_{2.5}$ [3] | | Lead [2] | | $CO_2$ | | $N_2O$ | | $CH_4$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 50 | lb/$10^6$ scf | 84 | lb/$10^6$ scf | 5.5 | lb/$10^6$ scf | 0.6 | lb/$10^6$ scf | 7.6 | lb/$10^6$ scf | 7.6 | lb/$10^6$ scf | 0.0005 | lb/$10^6$ scf | 120,000 | lb/$10^6$ scf | 0.64 | lb/$10^6$ scf | 2.3 | lb/$10^6$ scf |
| | | | | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| F | Gasification burner #1 [5] (without SCR) | 33.6 | 913 | 8,400 | 2.05 | 8.61 | 1.75 | 7.34 | 0.20 | 0.85 | 0.04 | 0.16 | 0.28 | 1.17 | 0.28 | 1.17 | 0.00 | 0.00 | 4,416 | 18,548 | 0.02 | 0.1 | 0.08 | 0.4 |
| F | Gasification burner #2 [5] (without SCR) | 300 | 913 | 8,400 | 18.30 | 76.86 | 15.60 | 65.52 | 1.81 | 7.59 | 0.35 | 1.47 | 2.50 | 10.49 | 2.50 | 10.49 | 0.00 | 0.00 | 39,430 | 165,608 | 0.21 | 0.9 | 0.76 | 3.2 |
| F | Gasification burner #1 [5] (with SCR) | 33.6 | 913 | 8,400 | 0.37 | 1.55 | 1.48 | 6.21 | | | | | | | | | | | | | | | | |
| F | Gasification burner #2 [5] (with SCR) | 300 | 913 | 8,400 | 3.30 | 13.86 | 13.20 | 55.44 | | | | | | | | | | | | | | | | |
| E | Gasifier flare pilot | 1.0 | 1,020 | 8,760 | 0.05 | 0.21 | 0.08 | 0.36 | 0.01 | 0.02 | 0.0006 | 0.003 | 0.01 | 0.03 | 0.01 | 0.03 | 0.00 | 0.00 | 118 | 515 | 0.001 | 0.003 | 0.002 | 0.01 |
| H | FT Activation/Regeneration Heater #1 | 1.12 | 918 | 4,032 | 0.06 | 0.12 | 0.10 | 0.21 | 0.01 | 0.01 | 0.0007 | 0.001 | 0.01 | 0.0187 | 0.01 | 0.02 | 0.00 | 0.00 | 146 | 295 | 0.001 | 0.002 | 0.003 | 0.01 |
| I | FT Activation/Regeneration Heater #2 | 0.60 | 918 | 2,016 | 0.03 | 0.03 | 0.05 | 0.06 | 0.00 | 0.00 | 0.0004 | 0.000 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 78 | 79 | 0.0004 | 0.000 | 0.002 | 0.002 |
| B | Product upgrading heater #1 | 4.85 | 1,020 | 8,400 | 0.24 | 1.00 | 0.40 | 1.68 | 0.03 | 0.11 | 0.0029 | 0.01 | 0.04 | 0.15 | 0.04 | 0.15 | 0.00 | 0.00 | 571 | 2,396 | 0.003 | 0.01 | 0.01 | 0.05 |
| C | Product upgrading heater #2 | 10.25 | 1,020 | 8,400 | 0.50 | 2.11 | 0.84 | 3.55 | 0.06 | 0.23 | 0.0060 | 0.03 | 0.08 | 0.32 | 0.08 | 0.32 | 0.00 | 0.00 | 1,206 | 5,065 | 0.01 | 0.03 | 0.02 | 0.1 |
| G | Auxiliary boiler | 73.88 | 1,020 | 500 | 3.62 | 0.91 | 6.08 | 1.52 | 0.40 | 0.10 | 0.0435 | 0.01 | 0.55 | 0.14 | 0.55 | 0.14 | 0.00 | 0.00 | 8,692 | 2,173 | 0.05 | 0.01 | 0.17 | 0.04 |
| | **TOTAL WITHOUT SCR ON GASIFICATION FLUE GAS:** | | | | | **89.85** | | **80.22** | | **8.92** | | **1.69** | | **12.33** | | **12.33** | | **0.0008** | | **194,680** | | **1.04** | | **3.73** |
| | **TOTAL WITH SCR ON GASIFICATION FLUE GAS:** | | | | | **19.80** | | **69.02** | | | | | | | | | | | | | | | | |

[1] AP-42 Tables 1.4-1 for low Nox burners

[2] AP-42Tables 1.4-2

[3] AP-42Tables 1.4-2. All PM is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factor is used to estimate PM10 and PM2.5 emissions.

[4] FT activation/regeneration heater emissions provided by Velocys

[5] Gasification burner emission factor without SCR provided by vendor (Maxon) NOx = 0.061 lb/MMBtu; CO = 0.052 lb/MMBtu

[6] Gasification burner emission factor with SCR provided by vendor (Nationwide) NOx = 0.011 lb/MMBtu; CO = 0.044 lb/MMBtu

[7] Gasification burner $SO_2$ emissions assume 6ppm sulfur content ~ 3,546 grains/10^6 scf based on manufacturer information

**EXTERNAL NATURAL GAS HAZARDOUS AIR POLLUTANT EMISSION CALCULATIONS**

| Pollutant | Emission Factor (lb/10^6 scf) | Emissions (lb/hr) | Emissions (tpy) |
|---|---|---|---|
| Benzene | 2.10E-03 | 9.57E-04 | 3.41E-03 |
| Dichlorobenzene | 1.20E-03 | 5.47E-04 | 1.95E-03 |
| Formaldehyde | 7.50E-02 | 3.42E-02 | 1.22E-01 |
| Hexane | 1.80E+00 | 8.20E-01 | 2.92E+00 |
| Naphthalene | 6.10E-04 | 2.78E-04 | 9.90E-04 |
| Toluene | 3.40E-03 | 1.55E-03 | 5.52E-03 |
| | | 8.57E-01 | 3.05E+00 |

[1] Emission factors per AP-42 Table 1.4-3

[2] Emissions threshold values assume vertically unrestricted releases

Emissions from all stacks were added together and the distance associated with the nearest stack to the property boundary was selected = <50 m

**INTERNAL DIESEL COMBUSTION UNIT EMISSION CALCULATIONS**

| Source ID# | Source Name | Size (hp/hr) | MMBtu/hr | Annual Hours of Operation | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | $CO_2$ [2] | | $N_2O$ | | $CH_4$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 3.95 | g/Hp-hr | 0.66 | g/Hp-hr | 0.07 | g/Hp-hr | 0.11 | g/Hp-hr | 0.11 | g/Hp-hr | 0.11 | g/Hp-hr | 1.16 | lb/Hp-hr | 0.60 | g/mmBtu | 3.0 | g/mmBtu |
| | | | | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| J | Emergency generator (diesel) [1] | 1,482 | 10.4 | 500 | 12.91 | 3.23 | 2.16 | 0.54 | 0.23 | 0.06 | 0.36 | 0.09 | 0.36 | 0.09 | 0.36 | 0.09 | 1,719 | 429.78 | 0.01 | 0.1 | 0.07 | 0.3 |
| | | | | **TOTAL:** | | **3.23** | | **0.54** | | **0.06** | | **0.09** | | **0.09** | | **0.09** | | | | | | |

[1] Emission factors based on manufacturer data. Cummins QST30-G5-NR2, Full standby g/Hp-hr.
[2] Emission factors based on AP-42 Table 3.4-1; diesel fuel
[3] $N_2O$ and $CH_4$ emission factors based on 40 CFR Part 98 Table C-2 Default $CH_4$ and $N_2O$ emissions factors

**LARGE DIESEL HAZARDOUS AIR POLLUTANT CALCULATIONS**

| Pollutant | Emission Facto (lb/MMBtu) | Emissions (lb/hr) | Emissions (tpy) |
|---|---|---|---|
| Benzene | 7.76E-04 | 8.05E-03 | 2.01E-03 |
| Formaldehyde | 7.89E-05 | 8.19E-04 | 2.05E-04 |
| Toluene | 2.81E-04 | 2.92E-03 | 7.29E-04 |
| Xylene | 1.93E-04 | 2.00E-03 | 5.01E-04 |
| Acetaldehyde | 2.52E-05 | 2.61E-04 | 6.54E-05 |
| Acrolein | 7.9E-06 | 8.17E-05 | 2.04E-05 |
| | | 1.41E-02 | 3.53E-03 |

[1] Emission factors per AP-42 Table 3.4-3
[2] Emissions threshold values assume vertically unrestricted releases
Emissions from all stacks were added together and the distance associated with the nearest stack to the property boundary was selected = <20 m

| Source ID# | Source Name | Size (hp/hr) | MMBtu/hr | Annual Hours of Operation | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | $CO_2$ | | $N_2O$ | | $CH_4$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.475 | g/Hp-hr | 1.193 | g/Hp-hr | 0.062 | g/Hp-hr | 0.930 | g/Hp-hr | 0.149 | g/Hp-hr | 0.149 | g/Hp-hr | 1.15 | lb/Hp-hr | 0.60 | g/mmBtu | 3.0 | g/mmBtu |
| | | | | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| 960 | Fire water pump engine (diesel) [1] | 220 | 1.5 | 500 | 1.20 | 0.30 | 0.58 | 0.14 | 0.03 | 0.01 | 0.45 | 0.11 | 0.07 | 0.02 | 0.07 | 0.02 | 253 | 63.25 | 0.00 | 0.01 | 0.01 | 0.043 |
| | | | | **TOTAL:** | | **0.30** | | **0.14** | | **0.01** | | **0.11** | | **0.02** | | **0.02** | | **63** | | | | |

[1] Emission factors based on manufacturer data. Cummins CFP7E-F50, 15 ppm diesel duel
[2] Emission factors based on AP-42 Table 3.4-1; diesel fuel
[3] $N_2O$ and $CH_4$ emission factors based on 40 CFR Part 98 Table C-2 Default $CH_4$ and $N_2O$ emissions factors

**SMALL DIESEL HAZARDOUS AIR POLLUTANT CALCULATIONS**

| Pollutant | Emission Facto (lb/MMBtu) | Emissions (lb/hr) | Emissions (tpy) |
|---|---|---|---|
| Benzene | 9.33E-04 | 1.44E-03 | 3.59E-04 |
| 1,3 butadiene | 3.91E-05 | 6.02E-05 | 1.51E-05 |
| Formaldehyde | 7.89E-05 | 1.22E-04 | 3.04E-05 |
| Naphthalene | 8.48E-05 | 1.31E-04 | 3.26E-05 |
| Toluene | 4.09E-04 | 6.30E-04 | 1.57E-04 |
| Xylene | 2.85E-04 | 4.39E-04 | 1.10E-04 |
| Acetaldehyde | 7.67E-04 | 1.18E-03 | 2.95E-04 |
| Acrolein | 9.3E-05 | 1.42E-04 | 3.56E-05 |
| | | | 1.04E-03 |

[1] Emission factors per AP-42 Table 3.3-2
[2] Emissions threshold values assume vertically unrestricted releases
Emissions from all stacks were added together and the distance associated with the nearest stack to the property boundary was selected = <20 m

| Source ID# | Source Name | Roundtrip Miles per hour[1] | Roundtrip Miles per year[2] | | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | $CO_2$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2.7084 | g/mile | 0.6738 | g/mile | 0.2876 | g/mile | | g/mile | 0.0371 | g/mile | 0.0371 | g/mile | 22.20 | lb/gal |
| | | | | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| | Haul truck tailpipe emissions | 2 | 6,360 | | 0.01 | 0.02 | 0.00 | 0.005 | 0.00 | 0.002 | 0.00 | 0.0001 | 0.00 | 0.0003 | 0.00 | 0.0003 | 7.80 | 10.70 |
| | | | | **TOTAL:** | | **0.02** | | **0.00** | | **0.00** | | **0.00** | | **0.00** | | **0.00** | | **11** |

[1] Assumes a max hourly coal delivery throughput of 100 ton/hr in 43 ton haul trucks = 2.32 trucks per hr; Roundtrip distance each truck load = 1 miles
[2] Assumes a annual coal delivery throughput of 273,500 ton/year in 43 ton haul trucks =6,360 trucks per year; Roundtrip distance each truck load = 1 miles
[3] $SO_2$ Assumes a fuel consumption of 6.6 mpg and sulfur content of 15 ppm and diesel fuel density of 7.05 lb/gal
[4] Emission factors derived from Mobile 6 for heavy duty diesel vehicles

| | Clean Syngas |
|---|---|
| VapFrac | 0.999 |
| T [F] | 120.0 |
| P [psig] | 161.3 |
| Mole Flow [lbmol/h] | 5,917.3 |
| Mass Flow [lb/h] | 82,784.9 |
| Std Gas Volume Flow [MMSCFD] | 53.9 |
| Mole Fraction [Fraction] | |
| WATER | 0.01018 |
| OXYGEN | 0.00000 |
| NITROGEN | 0.00334 |
| HYDROGEN | 0.58786 |
| CARBON MONOXIDE | 0.28524 |
| CARBON DIOXIDE | 0.09602 |
| HYDROGEN SULFIDE | 0.00190 |
| ARGON | - |
| METHANE | 0.01547 |
| AMMONIA | 0.00000 |

**COAL AND ASH MATERIAL HANDLING EMISSION CALCULATIONS**

| Description | Baghouse Control Eff (%) | Max | Max | | Emission Factors [1] (lbs/ton) | | | Emissions (lbs/hr) | | | Emissions (ton/yr) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Hourly | Annual | Units | PM | $PM_{10}$ | $PM_{2.5}$ | PM | $PM_{10}$ | $PM_{2.5}$ | PM | $PM_{10}$ | $PM_{2.5}$ |
| Truck unloading [2] | | 100 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.151 | 0.071 | 0.011 | 0.21 | 0.10 | 0.01 |
| Coal storage pile- wind erosion [8] | | | | | | | | 0.576 | 0.288 | 0.043 | 2.52 | 1.26 | 0.19 |
| Paved haul road[9] | | | | | 0.11 | 0.0211 | 0.0052 | 0.211 | 0.042 | 0.010 | 0.33 | 0.07 | 0.02 |
| Conveyor transfer to hopper [2,4] | 95 | 100 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.008 | 0.004 | 0.001 | 0.01 | 0.00 | 0.00 |
| Radial stacker to coal storage pile | | 100 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.151 | 0.071 | 0.011 | 0.21 | 0.10 | 0.01 |
| Conveyor transfer to crusher [2,4] | 95 | 100 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.008 | 0.004 | 0.001 | 0.01 | 0.00 | 0.00 |
| Coal crushing [1] | 95 | 100 | 273,750 | tons | 0.0054 | 0.00240 | 0.00240 | 0.027 | 0.012 | 0.012 | 0.04 | 0.02 | 0.02 |
| Conveyor transfer from crusher to silo day bin [2,4] | 95 | 100 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.008 | 0.004 | 0.001 | 0.01 | 0.00 | 0.00 |
| Conveyor transfer from silo day bin to lockhopper [2,4] | 95 | 31.3 | 273,750 | tons | 0.0015 | 0.0007 | 0.0001 | 0.002 | 0.001 | 0.000 | 0.01 | 0.00 | 0.00 |
| Pyrolysis ash vibrating conveyor transfer [2,4,5] | 95 | 6.0 | 52,560 | tons | 0.0015 | 0.0007 | 0.0001 | 0.000 | 0.0002 | 0.0000 | 0.002 | 0.001 | 0.000 |
| Coil ash vibrating conveyor transfer [2,4,6] | 95 | 0.6 | 4,818 | tons | 0.0015 | 0.0007 | 0.0001 | 0.00005 | 0.00002 | 0.00000 | 0.0002 | 0.0001 | 0.0000 |
| Ash covered day bin transfer[7] | 95 | 6.6 | 57,378 | tons | 0.0015 | 0.0007 | 0.0001 | 0.000 | 0.0002 | 0.0000 | 0.0022 | 0.0010 | 0.0002 |
| | | | | | | | **Total** | **1.141** | **0.497** | **0.089** | **3.353** | **1.562** | **0.255** |

[1] AP-42, Section 11.19.2-2 for uncontrolled sources with an applied control efficiency of 95% for baghouse control

[2] AP-42, Section 13.2.4 with 20 mph highest daily mean wind speed from weatherpark.com and 10% moisture from the coal analysis

[3] Assumes conservative loading rate of 100 tons per hour through day bin; Assumes gasifier operation at 500 tpd + 50%

[4] Assumes all conveyors are covered

[5] Based on 6,000 lb/hr * 200%

[6] Based on 550 lb/hr * 200%

[7] Sum of coil ash vibrating conveyor and pyrolysis ash vibrating conveyor

[8] AP-42, Table 11.9-1 Storage pile assumed to be ~0.04 acres; particle size multipliers from 13.2.5

[9] AP-42, Table 13.2.1.3 eqn 1; emission factors are in lb/VMT; Roundtrip miles per hour = 2; Roundtrip miles per year = 6,360

## $CO_2$ VENT GAS

Venting hours: 8,400 hr/yr

| Component | lbmol/hr | MW | Emissions lb/hr | tpy |
|---|---|---|---|---|
| CO | 0.12 | 28 | 3.4 | 14.1 |
| $H_2$ | 0.29 | 2 | 0.6 | 2.4 |
| $CO_2$ | 542.6 | 44 | 23,874 | 100,272 |
| $H_2O$ | 32.76 | 18 | 590 | 2,477 |

[a] Emission rates provided by manufacturer

## GASIFICATION FLUE GAS

Venting hours: 8,400 hr/yr
Release amount: 10,898 lbmol/hr

| Component | mol% | MW | Emissions lb/hr | tpy |
|---|---|---|---|---|
| $N_2$ | 72.5 | 28 | 221,229 | 929,163 |
| $CO_2$ | 8.4 | 44 | 40,279 | 169,172 |
| $H_2O$ | 16.1 | 18 | 31,582 | 132,646 |
| $O_2$ | 3.1 | 32 | 10,811 | 45,405 |

[a] Flue gas composition provided by manufacturer
[b] CO2 emissions from gasification burner emission calculations conservatively used since they were larger than the flue gas values provided by TCG below

## FISCHER TROPSCH PURGE GAS

Venting hours: 1,344 hr/yr
Release amount: 1.6 lbmol/hr

| Component | mol% | MW | Emissions lb/hr | tpy |
|---|---|---|---|---|
| $N_2$ | 95.66 | 28 | 42.9 | 28.8 |
| $CO_2$ | 0.33 | 44 | 0.2 | 0.2 |
| Ar | 1.01 | 40 | 0.6 | 0.4 |
| $O_2$ | 3.0 | 32 | 1.5 | 1.0 |

[a] Vent gas composition provided by manufacturer

**TANK EMISSIONS**

Operating hours: 8,760 hr/yr

| Tanks | Size | VOC Emissions lb/hr | VOC Emissions tpy | Naphthalene wt% | Naphthalene lb/hr | Benzene wt% | Benzene lb/hr | Toluene wt% | Toluene lb/hr | Xylene wt% | Xylene lb/hr |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Diesel [a] | 4,021 bbl | 0.019 | 0.06 | 0.5 | 0.0001 | | 0 | | 0 | 1 | 0.00019 |
| Jet Fuel [b] | 4,406 bbl | 0.019 | 0.08 | 1.5 | 0.0003 | 0.1 | 2E-05 | 0.25 | 5E-05 | 1 | 0.00019 |
| Off Spec Storage [c] | 4,406 bbl | 0.015 | 0.06 | 1.0 | 0.0001 | 0.1 | 1E-05 | 0.3 | 4E-05 | 1.0 | 0.000148 |
| | | | | Total: | 0.0005 | | 0.0000 | | 0.0001 | | 0.0005 |

[a] Based on Tesoro MSDS

[b] Based on U.S. Oil and Rifining Co. MSDS

[c] Combination of off-spec diesel fuel and off-spec jet fuel

**COOLING TOWER EMISSION CALCULATIONS**

| | | | |
|---|---|---|---|
| Total liquid drift factor: | 1.7 | lb/10^3 gal | AP-42 Table 13.4-1 |
| Total liquid circulation rate | 665 | gal/min | |
| Total liquid drift | 333 | lb/hr | Assume 0.001% of total water circulation rate utilizing drift/mist eliminators |
| Water total dissolved solids content | 5,550 | ppm | Based on 5 times the 3-yr average analytical results from DMR reports at Price River |
| PM10 emissions | 1.85 | lb/hr | |
| Operating hours | 8,400 | hr/yr | |
| | 7.8 | ton/yr | |

**EQUIPMENT LEAKS**

**Fischer-Tropsch Synthesis**

| Source | Product | Component Count | Emission Factor [a] | Emission Rate | TOC Weight | VOC Emissions [b] | |
|---|---|---|---|---|---|---|---|
| | | | (kg/comp-hr) | (lb/hr) | | lb/hr | tpy |
| Valves | G/V | 150 | 0.0006 | 0.09 | 100% | 0.09 | 0.39 |
| Valves | LL | 0 | 0.0017 | 0.00 | 100% | 0.00 | 0.00 |
| Pumps | LL | 10 | 0.012 | 0.12 | 100% | 0.12 | 0.53 |
| Compressor Seals | G/V | 0 | 0.0894 | 0.00 | 100% | 0.00 | 0.00 |
| Pressure-Relief Valves | G/V | 10 | 0.0447 | 0.45 | 100% | 0.45 | 1.96 |
| Sampling Connections | All | 0 | 0.00006 | 0.00 | 100% | 0.00 | 0.00 |
| Open-ended Lines | All | 0 | 0.0015 | 0.00 | 100% | 0.00 | 0.00 |
| | | | | | **Total VOCs** | **0.66** | **2.88** |
| | | | | | Napthalene (4% of VOCs) | 0.03 | 0.12 |
| | | | | | Ethylbenzene (7% of VOCs) | 0.05 | 0.20 |
| | | | | | Cumene (1% of VOCs) | 0.01 | 0.03 |
| | | | | | Hexane (35% of VOCs) | 0.23 | 1.01 |
| | | | | | Xylene (35% of VOCs) | 0.23 | 1.01 |
| | | | | | Toluene (20% of VOCs) | 0.13 | 0.58 |
| | | | | | Benzene (5% of VOCs) | 0.03 | 0.14 |

**Hydroprocessing and Distillation**

| Source | Product | Component Count | Emission Factor [a] | Emission Rate | TOC Weight | VOC Emissions [b] | |
|---|---|---|---|---|---|---|---|
| | | | (kg/comp-hr) | (lb/hr) | | lb/hr | tpy |
| Valves | G/V | 150 | 0.0006 | 0.09 | 100% | 0.09 | 0.39 |
| Valves | LL | 0 | 0.0017 | 0.00 | 100% | 0.00 | 0.00 |
| Pumps | LL | 10 | 0.012 | 0.12 | 100% | 0.12 | 0.53 |
| Compressor Seals | G/V | 0 | 0.0894 | 0.00 | 100% | 0.00 | 0.00 |
| Pressure-Relief Valves | G/V | 10 | 0.0447 | 0.45 | 100% | 0.45 | 1.96 |
| Sampling Connections | All | 0 | 0.00006 | 0.00 | 100% | 0.00 | 0.00 |
| Open-ended Lines | All | 0 | 0.0015 | 0.00 | 100% | 0.00 | 0.00 |
| | | | | | **Total VOCs** | **0.66** | **2.88** |
| | | | | | Napthalene (4% of VOCs) | 0.03 | 0.12 |
| | | | | | Ethylbenzene (7% of VOCs) | 0.05 | 0.20 |
| | | | | | Cumene (1% of VOCs) | 0.01 | 0.03 |
| | | | | | Hexane (35% of VOCs) | 0.23 | 1.01 |
| | | | | | Xylene (35% of VOCs) | 0.23 | 1.01 |
| | | | | | Toluene (20% of VOCs) | 0.13 | 0.58 |
| | | | | | Benzene (5% of VOCs) | 0.03 | 0.14 |

**Tank Farm**

| Source | Product | Component Count | Emission Factor [a] | Emission Rate | TOC Weight | VOC Emissions [b] | |
|---|---|---|---|---|---|---|---|
| | | | (kg/comp-hr) | (lb/hr) | | lb/hr | tpy |
| Valves | G/V | 100 | 0.0006 | 0.06 | 100% | 0.06 | 0.26 |
| Valves | LL | 0 | 0.0017 | 0.00 | 100% | 0.00 | 0.00 |
| Pumps | LL | 10 | 0.012 | 0.12 | 100% | 0.12 | 0.53 |
| Compressor Seals | G/V | 0 | 0.0894 | 0.00 | 100% | 0.00 | 0.00 |
| Pressure-Relief Valves | G/V | 5 | 0.0447 | 0.22 | 100% | 0.22 | 0.98 |
| Sampling Connections | All | 0 | 0.00006 | 0.00 | 100% | 0.00 | 0.00 |
| Open-ended Lines | All | 0 | 0.0015 | 0.00 | 100% | 0.00 | 0.00 |
| | | | | | **Total VOCs** | **0.40** | **1.77** |
| | | | | | Napthalene (1.5% of VOCs) | 0.02 | 0.07 |
| | | | | | Xylene (1% of VOCs) | 0.00 | 0.02 |
| | | | | | Toluene (0.3% of VOCs) | 0.00 | 0.01 |
| | | | | | Benzene (0.1% of VOCs) | 0.00 | 0.00 |

| | | |
|---|---|---|
| **Facility Wide Total VOCs** | **1.72** | **7.52** |
| Napthalene (4% of VOCs) | 0.07 | 0.30 |
| Ethylbenzene (7% of VOCs) | 0.09 | 0.40 |
| Cumene (1% of VOCs) | 0.01 | 0.06 |
| Hexane (35% of VOCs) | 0.46 | 2.01 |
| Xylene (35% of VOCs) | 0.46 | 2.03 |
| Toluene (20% of VOCs) | 0.26 | 1.16 |
| Benzene (5% of VOCs) | 0.07 | 0.29 |

[a] Emissions estimation protocol for petroleum refineries. August 2014 version 3. Table 2-3 Screening ranges emission factors <10,000 ppm

[b] Operating hours per year = 8,760

[c] HAPs wt percent in FT and hydroprocessing and distillation based on process knowledge and estimates from similar proposed facilities

[c] HAPs wt percent from tank farm based on worst case tank compositions

**POINT SOURCES**

| Source ID | Stack Release Type (Beta) | FLAT (Non-Default) | Source Description | Easting (x) | Northing (Y) | Base Elevation | Stack Height | Temperature | Exit Velocity | Stack Diameter | PM10 | PM10_ANN | PM2.5 | PM2.5_AN | NO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (m) | (m) | (m) | (m) | (K) | (m/s) | (m) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) |
| COALBH | | | Coal handling baghouse | 527072.00 | 4376334.00 | 1643.58 | 3.66 | 0.00 | 40.45 | 0.6096 | 0.007134 | 0.009765 | 0.001080 | 0.001479 | |
| SILOBH | | | Coal silo baghouse | 527077.00 | 4376337.00 | 1643.64 | 17.98 | 0.00 | 40.45 | 0.6096 | 0.016684 | 0.026190 | 0.012709 | 0.017904 | |
| F | | | Gasification flue gas without SCR | 527116.00 | 4376333.00 | 1643.92 | 9.35 | 394.26 | 116.59 | 0.76 | 2.776955 | 11.663211 | 2.776955 | 11.663211 | 20.349600 |
| ASHBH | | | Ash handling baghouse | 527093.00 | 4376330.00 | 1643.65 | 3.6576 | 338.71 | 40.45 | 0.6096 | 0.0002354 | 0.00102335 | 3.565E-05 | 0.000155 | |
| BINBH | | | Ash bin baghouse | 527095.00 | 4376330.00 | 1643.66 | 17.983 | 338.71 | 40.45 | 0.6096 | 0.0002354 | 0.00102335 | 3.565E-05 | 0.000155 | |
| E | | | Flare Pilot | 526851.00 | 4376441.00 | 1645.03 | 15.24 | 699.82 | 61 | 0.61 | 0.01 | 0.03 | 0.01 | 0.03 | 0.05 |
| H | | | Activation/Regeneration Heater #1 | 527149.00 | 4376478.00 | 1645.27 | 7.62 | 644.26 | 3.2 | 0.5 | 0.01 | 0.02 | 0.01 | 0.02 | 0.06 |
| I | | | Activation/Regeneration Heater #2 | 527149.00 | 4376453.00 | 1644.87 | 7.62 | 616.48 | 3.7 | 0.3 | 0.00 | 0.01 | 0.00 | 0.01 | 0.03 |
| B | | | Product Upgrading Heater #1 | 527019.00 | 4376459.00 | 1645.53 | 15.24 | 694.26 | 10.5156 | 0.2032 | 0.04 | 0.15 | 0.04 | 0.15 | 0.24 |
| C | | | Product Upgrading Heater #2 | 527019.00 | 4376483.00 | 1646 | 15.24 | 647.04 | 10.668 | 0.3048 | 0.08 | 0.32 | 0.08 | 0.32 | 0.50 |
| G | | | Auxillary boiler | 527147.00 | 4376340.00 | 1644.45 | 15.24 | 449.82 | 12.4968 | 0.9144 | 0.55 | 0.14 | 0.55 | 0.14 | 3.62156863 |
| J | | | Emergency generator (diesel) | 527149.00 | 4376505.00 | 1646.02 | 3.81 | 749.82 | 70.229 | 0.254 | 0.36 | 0.09 | 0.36 | 0.09 | 12.91 |
| 960 | | | Fire water pump (diesel) | 526942.00 | 4376455.00 | 1645.52 | 3.66 | 748.15 | 47.055 | 0.127 | 0.07 | 0.02 | 0.07 | 0.02 | 1.20 |
| 920 | | | Cooling Tower | 526995.00 | 4376450.00 | 1645.36 | 10.058 | 313.71 | 15.24 | 0.6096 | 1.8468513 | 7.75677546 | 1.8468513 | 7.7567755 | |

**Area Sources**

| Source ID | FLAT (Non-Default) | Source Description | Easting (X) | Northing (Y) | Base Elevation | Release Height | Easterly Length | Northerly Length | Angle from North | Initial Vertical Dimension | PM10 | PM10_ANN | PM2.5 | PM2.5_AN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m) | (m) | (m) | (m) | (m) | (m) | | (m) | (lb/hr) | (tpy) | (lb/hr) | (tpy) |
| COAL_STORAGE | | Coal Storage Pile | 527047.00 | 4376373.00 | 1644.04 | 5 | 11 | 15 | | | 0.36 | 1.36 | 0.05 | 0.20 |

**Volume Sources**

| Source ID | FLAT (Non-Default) | Source Description | Easting (x) | Northing (Y) | Base Elevation | Release Height | Init. Horizontal Dimension | Init. Vertical Dimension | PM10 | PM10_ANN | PM2.5 | PM2.5_AN | NO2 | Comments, assumptions made, etc. | Total For Paved Haul Road PM10 | PM10_ANN | PM2.5 | PM2.5_AN | NO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m) | (m) | (m) | (m) | (m) | (m) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) |
| TRK_DMP | | Truck Unloading | 527031.00 | 4376329.00 | 1643.55 | 0.43 | 4.186 | 0.395 | 7.13E-02 | 9.76E-02 | 1.08E-02 | 1.48E-02 | 0.00E+00 | Assumes a drop height of 0.5 meters. | 0.07 | 0.10 | 0.01 | 0.01 | |
| HR1_0001 | | Paved Haul Road | 526372.44 | 4376247.32 | 1648.17 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | Total for access roads divided by 137 volume sources along road. | 0.015352 | 0.067242 | 0.003813 | 0.016701 | 0.013852 |
| HR1_0002 | | Paved Haul Road | 526380.81 | 4376247.30 | 1647.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0003 | | Paved Haul Road | 526389.18 | 4376247.29 | 1647.42 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0004 | | Paved Haul Road | 526397.55 | 4376247.27 | 1647.15 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0005 | | Paved Haul Road | 526405.92 | 4376247.26 | 1646.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0006 | | Paved Haul Road | 526414.29 | 4376247.24 | 1646.61 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0007 | | Paved Haul Road | 526422.66 | 4376247.22 | 1646.34 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0008 | | Paved Haul Road | 526431.03 | 4376247.21 | 1646.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0009 | | Paved Haul Road | 526439.40 | 4376247.19 | 1645.79 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0010 | | Paved Haul Road | 526447.77 | 4376247.18 | 1645.47 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0011 | | Paved Haul Road | 526456.14 | 4376247.16 | 1645.14 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0012 | | Paved Haul Road | 526464.51 | 4376247.14 | 1644.86 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0013 | | Paved Haul Road | 526472.88 | 4376247.13 | 1644.64 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0014 | | Paved Haul Road | 526481.25 | 4376247.11 | 1644.42 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0015 | | Paved Haul Road | 526489.62 | 4376247.10 | 1644.22 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0016 | | Paved Haul Road | 526497.99 | 4376247.08 | 1644.01 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0017 | | Paved Haul Road | 526506.36 | 4376247.06 | 1643.81 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0018 | | Paved Haul Road | 526514.73 | 4376247.05 | 1643.64 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0019 | | Paved Haul Road | 526523.10 | 4376247.03 | 1643.49 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0020 | | Paved Haul Road | 526531.47 | 4376247.02 | 1643.33 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0021 | | Paved Haul Road | 526539.84 | 4376247.00 | 1643.19 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0022 | | Paved Haul Road | 526548.21 | 4376246.98 | 1643.05 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0023 | | Paved Haul Road | 526556.58 | 4376246.97 | 1642.91 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0024 | | Paved Haul Road | 526564.95 | 4376246.95 | 1642.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0025 | | Paved Haul Road | 526573.32 | 4376246.94 | 1642.78 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0026 | | Paved Haul Road | 526581.69 | 4376246.92 | 1642.71 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0027 | | Paved Haul Road | 526590.06 | 4376246.90 | 1642.63 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0028 | | Paved Haul Road | 526598.43 | 4376246.89 | 1642.55 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0029 | | Paved Haul Road | 526606.80 | 4376246.87 | 1642.47 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0030 | | Paved Haul Road | 526615.17 | 4376246.86 | 1642.38 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0031 | | Paved Haul Road | 526623.54 | 4376246.84 | 1642.3 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0032 | | Paved Haul Road | 526631.91 | 4376246.82 | 1642.24 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0033 | | Paved Haul Road | 526640.28 | 4376246.81 | 1642.2 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0034 | | Paved Haul Road | 526648.65 | 4376246.79 | 1642.17 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0035 | | Paved Haul Road | 526657.02 | 4376246.78 | 1642.14 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0036 | | Paved Haul Road | 526665.39 | 4376246.76 | 1642.12 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0037 | | Paved Haul Road | 526673.76 | 4376246.74 | 1642.1 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0038 | | Paved Haul Road | 526682.13 | 4376246.74 | 1642.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0039 | | Paved Haul Road | 526690.50 | 4376246.78 | 1642.06 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0040 | | Paved Haul Road | 526698.87 | 4376246.81 | 1642.05 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0041 | | Paved Haul Road | 526707.24 | 4376246.85 | 1642.04 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0042 | | Paved Haul Road | 526715.61 | 4376246.89 | 1642.03 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0043 | | Paved Haul Road | 526723.97 | 4376246.93 | 1642.02 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0044 | | Paved Haul Road | 526732.34 | 4376246.97 | 1641.99 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0045 | | Paved Haul Road | 526740.71 | 4376247.00 | 1641.97 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0046 | | Paved Haul Road | 526749.08 | 4376247.04 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0047 | | Paved Haul Road | 526757.45 | 4376247.08 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0048 | | Paved Haul Road | 526765.82 | 4376247.12 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0049 | | Paved Haul Road | 526774.19 | 4376247.15 | 1641.95 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0050 | | Paved Haul Road | 526782.56 | 4376247.19 | 1641.93 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0051 | | Paved Haul Road | 526790.93 | 4376247.23 | 1641.91 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0052 | | Paved Haul Road | 526799.30 | 4376247.27 | 1641.89 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0053 | | Paved Haul Road | 526807.67 | 4376247.31 | 1641.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0054 | | Paved Haul Road | 526816.04 | 4376247.34 | 1641.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0055 | | Paved Haul Road | 526824.41 | 4376247.38 | 1641.86 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0056 | | Paved Haul Road | 526832.78 | 4376247.42 | 1641.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0057 | | Paved Haul Road | 526841.15 | 4376247.46 | 1641.83 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0058 | | Paved Haul Road | 526849.52 | 4376247.49 | 1641.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0059 | | Paved Haul Road | 526857.89 | 4376247.53 | 1641.77 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0060 | | Paved Haul Road | 526866.26 | 4376247.57 | 1641.74 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0061 | | Paved Haul Road | 526874.63 | 4376247.61 | 1641.75 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0062 | | Paved Haul Road | 526883.00 | 4376247.65 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0063 | | Paved Haul Road | 526891.37 | 4376247.68 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0064 | | Paved Haul Road | 526899.74 | 4376247.72 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0065 | | Paved Haul Road | 526908.11 | 4376247.76 | 1641.75 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0066 | | Paved Haul Road | 526916.48 | 4376247.80 | 1641.76 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0067 | | Paved Haul Road | 526924.85 | 4376247.84 | 1641.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0068 | | Paved Haul Road | 526933.22 | 4376247.87 | 1641.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0069 | | Paved Haul Road | 526941.59 | 4376247.91 | 1641.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0070 | | Paved Haul Road | 526949.96 | 4376247.95 | 1641.93 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0071 | | Paved Haul Road | 526958.33 | 4376247.99 | 1641.98 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0072 | | Paved Haul Road | 526966.70 | 4376248.02 | 1642.05 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0073 | | Paved Haul Road | 526975.07 | 4376248.06 | 1642.13 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |
| HR1_0074 | | Paved Haul Road | 526983.44 | 4376248.10 | 1642.21 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 | | | | | | |

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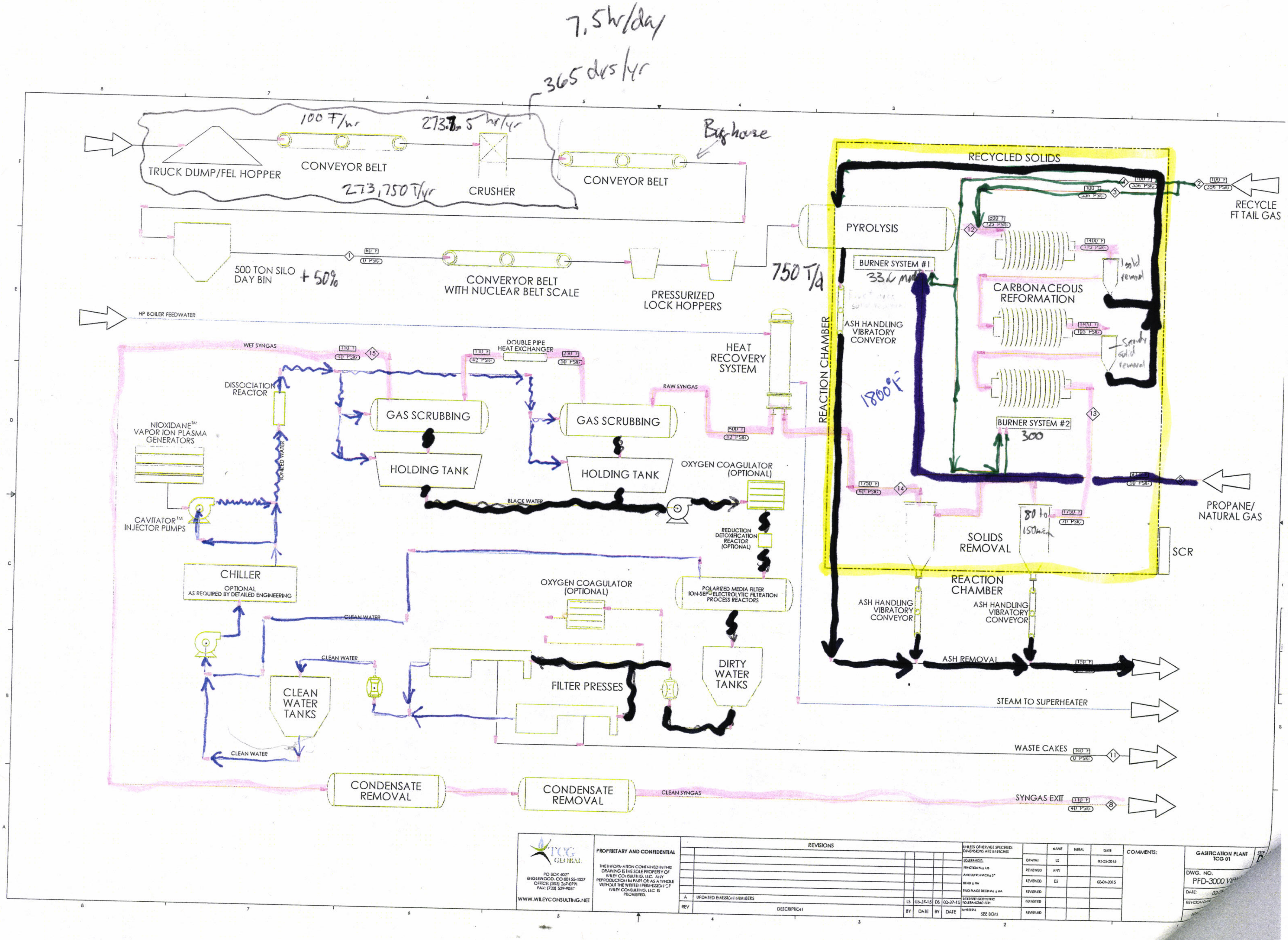
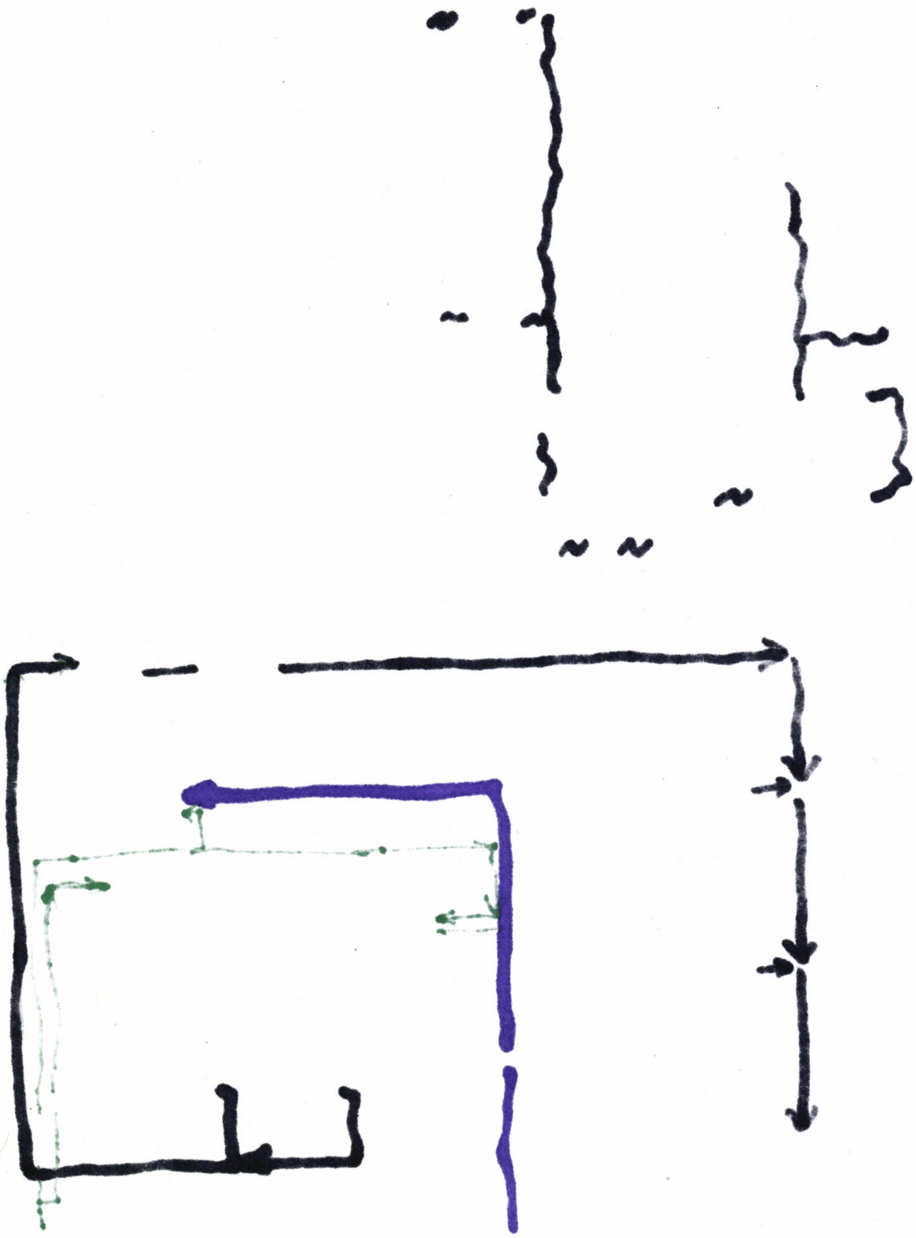
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HR1_0075 | | Paved Haul Road | 526991.81 | 4376248.14 | 1642.27 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0076 | | Paved Haul Road | 527000.18 | 4376248.18 | 1642.32 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0077 | | Paved Haul Road | 527008.55 | 4376248.21 | 1642.37 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0078 | | Paved Haul Road | 527016.92 | 4376248.25 | 1642.44 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0079 | | Paved Haul Road | 527025.29 | 4376248.29 | 1642.5 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0080 | | Paved Haul Road | 527033.29 | 4376248.69 | 1642.57 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0081 | | Paved Haul Road | 527033.21 | 4376257.06 | 1642.68 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0082 | | Paved Haul Road | 527033.13 | 4376265.43 | 1642.8 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0083 | | Paved Haul Road | 527033.05 | 4376273.80 | 1642.91 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0084 | | Paved Haul Road | 527032.97 | 4376282.17 | 1642.99 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0085 | | Paved Haul Road | 527032.89 | 4376290.54 | 1643.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0086 | | Paved Haul Road | 527032.81 | 4376298.91 | 1643.16 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0087 | | Paved Haul Road | 527032.73 | 4376307.28 | 1643.26 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0088 | | Paved Haul Road | 527032.64 | 4376315.65 | 1643.37 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0089 | | Paved Haul Road | 527032.56 | 4376324.02 | 1643.49 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0090 | | Paved Haul Road | 527032.48 | 4376332.39 | 1643.6 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0091 | | Paved Haul Road | 527032.40 | 4376340.76 | 1643.69 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0092 | | Paved Haul Road | 527032.32 | 4376349.13 | 1643.77 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0093 | | Paved Haul Road | 527032.24 | 4376357.50 | 1643.86 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0094 | | Paved Haul Road | 527032.16 | 4376365.87 | 1643.94 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0095 | | Paved Haul Road | 527032.08 | 4376374.24 | 1644.06 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0096 | | Paved Haul Road | 527032.00 | 4376382.61 | 1644.17 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0097 | | Paved Haul Road | 527031.92 | 4376390.98 | 1644.29 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0098 | | Paved Haul Road | 527031.84 | 4376399.35 | 1644.41 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0099 | | Paved Haul Road | 527031.76 | 4376407.72 | 1644.55 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0100 | | Paved Haul Road | 527031.68 | 4376416.09 | 1644.7 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0101 | | Paved Haul Road | 527031.60 | 4376424.45 | 1644.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0102 | | Paved Haul Road | 527031.52 | 4376432.82 | 1645 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0103 | | Paved Haul Road | 527038.93 | 4376433.87 | 1645 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0104 | | Paved Haul Road | 527047.30 | 4376433.97 | 1644.96 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0105 | | Paved Haul Road | 527055.67 | 4376434.08 | 1644.93 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0106 | | Paved Haul Road | 527064.04 | 4376434.19 | 1644.9 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0107 | | Paved Haul Road | 527072.40 | 4376434.29 | 1644.87 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0108 | | Paved Haul Road | 527080.41 | 4376433.41 | 1644.82 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0109 | | Paved Haul Road | 527086.73 | 4376427.92 | 1644.68 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0110 | | Paved Haul Road | 527090.69 | 4376421.35 | 1644.57 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0111 | | Paved Haul Road | 527090.77 | 4376412.98 | 1644.45 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0112 | | Paved Haul Road | 527090.85 | 4376404.61 | 1644.33 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0113 | | Paved Haul Road | 527090.93 | 4376396.24 | 1644.21 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0114 | | Paved Haul Road | 527091.01 | 4376387.87 | 1644.13 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0115 | | Paved Haul Road | 527091.09 | 4376379.50 | 1644.04 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0116 | | Paved Haul Road | 527091.17 | 4376371.13 | 1643.96 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0117 | | Paved Haul Road | 527091.25 | 4376362.76 | 1643.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0118 | | Paved Haul Road | 527091.33 | 4376354.39 | 1643.82 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0119 | | Paved Haul Road | 527091.42 | 4376346.02 | 1643.77 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0120 | | Paved Haul Road | 527091.50 | 4376337.65 | 1643.71 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0121 | | Paved Haul Road | 527091.58 | 4376329.28 | 1643.64 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0122 | | Paved Haul Road | 527091.66 | 4376320.91 | 1643.55 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0123 | | Paved Haul Road | 527091.74 | 4376312.54 | 1643.47 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0124 | | Paved Haul Road | 527091.82 | 4376304.17 | 1643.39 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0125 | | Paved Haul Road | 527091.90 | 4376295.80 | 1643.32 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0126 | | Paved Haul Road | 527091.98 | 4376287.43 | 1643.26 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0127 | | Paved Haul Road | 527092.06 | 4376279.06 | 1643.19 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0128 | | Paved Haul Road | 527092.14 | 4376270.69 | 1643.13 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0129 | | Paved Haul Road | 527092.22 | 4376262.32 | 1643.08 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0130 | | Paved Haul Road | 527092.30 | 4376253.95 | 1643.02 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0131 | | Paved Haul Road | 527088.99 | 4376248.92 | 1642.96 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0132 | | Paved Haul Road | 527080.62 | 4376248.89 | 1642.88 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0133 | | Paved Haul Road | 527072.25 | 4376248.86 | 1642.84 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0134 | | Paved Haul Road | 527063.88 | 4376248.83 | 1642.79 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0135 | | Paved Haul Road | 527055.52 | 4376248.80 | 1642.74 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0136 | | Paved Haul Road | 527047.15 | 4376248.77 | 1642.68 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |
| HR1_0137 | | Paved Haul Road | 527038.78 | 4376248.74 | 1642.62 | 2.55 | 4.186 | 2.372 | 1.12E-04 | 4.91E-04 | 2.78E-05 | 1.22E-04 | 1.01E-04 |

| Revolution Fenceline | |
|---|---|
| East (X) | North (Y) |
| (m) | (m) |
| 526371 | 4376533 |
| 526365 | 4376237 |
| 527178 | 4376240 |
| 527179 | 4376547 |


7,5 hr/day
365 dys/yr
100 T/hr
273,750 T/yr
2737.5 hr/yr
Baghouse
TRUCK DUMP/FEL HOPPER
CONVEYOR BELT
CRUSHER
CONVEYOR BELT
500 TON SILO
DAY BIN
+ 50%
CONVEYOR BELT
WITH NUCLEAR BELT SCALE
PRESSURIZED
LOCK HOPPERS
750 T/d
HP BOILER FEEDWATER
RECYCLED SOLIDS
PYROLYSIS
BURNER SYSTEM #1
336 mm
CARBONACEOUS
REFORMATION
ASH HANDLING
VIBRATORY
CONVEYOR
REACTION CHAMBER
1800°F
BURNER SYSTEM #2
300
RECYCLE
FT TAIL GAS
PROPANE/
NATURAL GAS
SOLIDS
REMOVAL
SCR
80 to 150 mm
HEAT
RECOVERY
SYSTEM
RAW SYNGAS
WET SYNGAS
DISSOCIATION
REACTOR
DOUBLE PIPE
HEAT EXCHANGER
GAS SCRUBBING
GAS SCRUBBING
HOLDING TANK
HOLDING TANK
BLACK WATER
OXYGEN COAGULATOR
(OPTIONAL)
REDUCTION
DETOXIFICATION
REACTOR
(OPTIONAL)
NIOXIDANE™
VAPOR ION PLASMA
GENERATORS
CAVITATOR™
INJECTOR PUMPS
IONIZED WATER
CHILLER
OPTIONAL
AS REQUIRED BY DETAILED ENGINEERING
CLEAN WATER
OXYGEN COAGULATOR
(OPTIONAL)
POLARIZED MEDIA FILTER
ION-SEP ELECTROLYTIC FILTRATION
PROCESS REACTORS
CLEAN
WATER
TANKS
FILTER PRESSES
DIRTY
WATER
TANKS
REACTION
CHAMBER
ASH HANDLING
VIBRATORY
CONVEYOR
ASH REMOVAL
STEAM TO SUPERHEATER
WASTE CAKES
CONDENSATE
REMOVAL
CONDENSATE
REMOVAL
CLEAN SYNGAS
SYNGAS EXIT
TCG GLOBAL
WWW.WILEYCONSULTING.NET
PROPRIETARY AND CONFIDENTIAL
REVISIONS
UPDATED EMISSION NUMBERS
DESCRIPTION
COMMENTS:
GASIFICATION PLANT
TCG 01
DWG. NO.
PFD-3000



Stantec Consulting Services Inc.
7669 West Riverside Drive, Suite 101, Boise ID 83714-6183

September 17, 2015

**Attention: Tad Anderson**
Utah Department of Environmental Quality
Division of Air Quality
P.O. Box 144820
Salt Lake City, UT 84114-482

Dear Tad,

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility Notice of Intent**

Stantec Consulting Services (Stantec) is submitting the following response to questions posed by UDAQ on August 26, 2015. Should you require additional information or wish to discuss further, please contact me at 208-853-0883.

**Pyrolysis and Gasification**
Q1: Does the coiled Inconel pipe in the ceiling of the reactor house that is used to pre-heat water meet the definition of Boiler as defined in 40 CFR 63.11237;

"Boiler means an enclosed device using controlled flame combustion in which water is heated to recover thermal energy in the form of steam or hot water. Controlled flame combustion refers to a steady-state, or near steady-state, process wherein fuel and/or oxidizer feed rates are controlled. Waste heat boilers are excluded from this definition."

If the definition Boiler applies to the reactor chamber, then the reactor chamber is subject to 40 CFR 60 Da and 40 CFR 63 JJJJJJ.

R1: The primary purpose of the large-diameter coiled Inconel pipe is the gasification of the feedstock. In order to provide the correct $H_2$:CO ratio for the Fischer-Tropsch process, water must be added to the reaction. The water turns to steam as a result of the surrounding high temperatures; so, while steam enters the reaction, it can enter as water to provide the same result. Therefore, while there is waste heat recovered from the stream, the main purpose is that of a chemical reactor. This also eliminates the reactor chamber as being defined as a boiler.

The small-diameter coiled pipe above the reactor coils is used to pre-heat the ionized water entering the system; it would also not fit the definition of a boiler since it uses waste heat from the flue gas to pre-heat the water.

40 CFR Part 60, Subpart Da - Standards of Performance for Electric Utility Steam Generating Units
§60.40Da Applicability and designation of affected facility.

(a) Except as specified in paragraph (e) of this section, the affected facility to which this subpart applies is each electric utility steam generating unit:

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

*Electric utility steam-generating unit* means any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW net-electrical output to any utility power distribution system for sale. Also, any steam supplied to a steam distribution system for the purpose of providing steam to a steam-electric generator that would produce electrical energy for sale is considered in determining the electrical energy output capacity of the affected facility.

The reaction chamber is not an electric generating unit and the purpose of the steam produced is not to supply a steam-electric generator. The steam produced in the reaction chamber is solely to be used for gasification of the feedstock. In order to provide the correct $H_2$:CO ratio for the Fischer-Tropsch process, water must be added to the reaction.

(e) Applicability of this subpart to an electric utility combined cycle gas turbine other than an IGCC electric utility steam generating unit is as specified in paragraphs (e)(1) through (3) of this section.

*Electric utility combined cycle gas turbine* means any combined cycle gas turbine used for electric generation that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW net-electrical output to any utility power distribution system for sale. Any steam distribution system that is constructed for the purpose of providing steam to a steam electric generator that would produce electrical power for sale is also considered in determining the electrical energy output capacity of the affected facility.

The reaction chamber is not an electric generating unit and the purpose of the steam produced is not to supply a steam-electric generator. See response to question 5 below for Subpart Da applicability determination for the Revolution facility steam turbine.

Subpart JJJJJJ—National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources

§63.11195 Are any boilers not subject to this subpart?

The types of boilers listed in paragraphs (a) through (k) of this section are not subject to this subpart and to any requirements in this subpart.

(e) A gas-fired boiler as defined in this subpart.
*Gas-fired boiler* includes any boiler that burns gaseous fuels not combined with any solid fuels and burns liquid fuel only during periods of gas curtailment, gas supply interruption, startups, or periodic testing on liquid fuel. Periodic testing of liquid fuel shall not exceed a combined total of 48 hours during any calendar year.

As stated above, Revolution does not believe the definition Boiler applies to the reactor chamber. However, if the definition was found to apply, the reaction chamber would be exempt under

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

Subpart JJJJJJ since only gaseous fuel is burned to produce the heat associated with the reaction chamber and would meet the definition of a gas-fired boiler.

South Louisiana Methanol
As discussed in our conference call on 9/2/15, Revolution mentioned that a similar process has been permitted in the State of Louisiana. Included in Attachment A is the Title V permit for the St. James Methanol Plant (SJMP).

The SJMP produces methanol from a feedstock of natural gas and carbon dioxide. The natural gas is broken down in a reaction process referred to as steam reforming which converts the natural gas into synthesis gas which is a mix of carbon oxides and hydrogen.

The Revolution reaction chamber is a similar process where synthesis gas is produced from the gasification of the coal feedstock. The reaction chamber is similar to the steam reformer in that steam is produced as a result of high temperatures converting the water that is added to the reaction. As noted in Section XI Table 2 on page 11 of the SJMP permit, NSPS Subparts D, Db, and Dc were determined to be not applicable to the steam reformer since the steam reformer was not classified as a steam generator.

Red Lion Bio-Energy
Another process similar to the Revolution gasifier has been permitted in the State of Ohio. Included in Attachment B is the air permit for the Red Lion Bio-Energy project.

The Red Lion Bio-Energy plant produces syngas from bio-mass utilizing (10) 4 mmBtu/hr process heaters fired by natural gas and/or syngas fuel. The bio-mass is gasified into syngas using technology similar to the pyrolysis and gasification system at the Revolution facility. The syngas produced at the Red Lion Bio-Energy plant is used to fuel the University of Toledo's onsite boilers and does not go through the Fischer Tropsch process. The State of Ohio Environmental Protection Agency categorized the fuel combusting devices used in the bio-mass gasification process as process heaters and not boilers.

**Ash Removal and Handling**
Q2: The NOI has 6.6 tons per hour of ash being removed with an annual amount of 57,378 tons per year of ash being produced. When dividing the annual ash removal by the hour ash removal gives a yearly ash removal of 8,694 hours per year. How is the ash being removed when the syngas treatment, pyrolysis and gasification processes operates 8,400 hours per year?

R2: The amount of ash was based on 8,760 hours/year. While the syngas treatment, pyrolysis and gasification processes are expected to operate 8,400 hours per year, the ash emissions were based on year-round operation so as not to impose a permit limit on the operating hours.

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

**Syngas Treatment**
Q3: Is the centrifugal syngas compressor unit motors operated by line power or power from the on-site turbine?

R3: The centrifugal syngas compressor is operated by power from the on-site steam turbine. The steam turbine system receives steam from the heat recovery systems throughout the facility to drive an electrical generator to support operations at the facility and possibility back into the local grid. Based on the initial evaluation of the facility's overall power requirements and power generation capability, the facility will be a net exporter of approximately 6 MW of electricity with a total internal usage of 11 MW. These numbers are subject to update based upon final heat recovery optimization in the Gasification Island.

**General Questions**
Q4: If the Price River Terminal facility receives 100% of load out product through pipeline and the Coal Gasification facility has no storage capacity, the Price River facility becomes a support facility for the Coal Gasification facility and both facilities would be combined as one source.

R4: The Revolution facility has storage tanks onsite from which the final product will be distributed. The agreement with Price River Terminal (PRT) is based on current market conditions and may change in the future as market conditions change. Revolution has the option to distribute its products to multiple end users dependent on the most favorable market conditions. When Revolution distributes to PRT, product will be piped from the onsite product storage tanks to PRT. Revolution will also not be the sole supplier to the PRT facility and is anticipated to supply approximately 25% of PRT's product volume.

Onsite storage tanks:
- Liquefied petroleum gas: 30,000 gallon pressurized bullet tank
- Naphtha: 1,853 barrel fixed cone roof tank
- Diesel: 4,021 barrel fixed cone roof tank
- Jet fuel: 4,406 barrel fixed cone roof tank

Revolution production:
- Liquefied petroleum gas: 104 barrels per day
- Naphtha: 262 barrels per day
- Diesel: 573 barrels per day
- Jet fuel: 556 barrels per day
- Off specification diesel and jet fuel: 370 barrels per day

Price River Terminal production:
- 2014 average product volume: 6,086 barrels per day
- 2015 average product volume: 10,438 barrels per day

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

Q5: The steam turbine system receives steam from the heat recovery systems throughout the facility to drive an electrical generator to support operations at the facility and possibly back into the local grid. Please address possible applicability to the following subparts;

R5: 40 CFR 60- Y (Standards of Performance for Coal Preparation and Processing Plants):
See Subpart Y discussion in Appendix I.4.3 of the Notice of Intent. Subpart Y is applicable to Revolution since the facility will process more than 200 tons per day of coal. However, the steam turbine does not meet the definition of a thermal dryer or any other applicable unit under this subpart. Thermal dryers as defined under this Subpart reduce the moisture content of coal by either contact with a heated gas stream which is exhausted to the atmosphere or through indirect heating of the coal through contact with a heated heat transfer medium. The steam turbine system receives steam from the heat recovery systems throughout the facility to drive an electrical generator and the steam is not used to reduce the moisture content in the coal.

GG (Standards of Performance for Stationary Gas Turbines)
§60.330 Applicability and designation of affected facility.

(a) The provisions of this subpart are applicable to the following affected facilities: All stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the lower heating value of the fuel fired.

The steam turbine at the Revolution facility does not combust fuel, it will receive steam from the heat recovery systems within each of the plant's units. The steam will be at 3 different levels of pressure. Each pressure level will enter the turbine at specific points in the turbine and drive a single shaft that will be connected to an electric generator.

40 CFR 63 UUUUU (National Emissions Standards for Hazardous Air Pollutant: Coal and Oil Fired Electric Utility Steam Generating Units)
63.9980 What is the purpose of this subpart?

This subpart establishes national emission limitations and work practice standards for hazardous air pollutants (HAP) emitted from coal- and oil-fired electric utility steam generating units (EGUs) as defined in §63.10042 of this subpart. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations.

The steam turbine at the Revolution facility does not combust fuel, it will receive steam from the heat recovery systems within each of the plant's units. The exhaust from the turbine will be wet steam that will be fully condensed in a vacuum condenser and pumped back to the plant's boiler feed water system for reuse.

40 CFR Part 60, Subpart Da - Standards of Performance for Electric Utility Steam Generating Units
§60.40Da Applicability and designation of affected facility.

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

(a) Except as specified in paragraph (e) of this section, the affected facility to which this subpart applies is each electric utility steam generating unit:

Electric utility steam-generating unit means any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW net-electrical output to any utility power distribution system for sale. Also, any steam supplied to a steam distribution system for the purpose of providing steam to a steam-electric generator that would produce electrical energy for sale is considered in determining the electrical energy output capacity of the affected facility.

Based on the initial evaluation of the facility's overall power requirements and power generation capability, the facility will be a net exporter of approximately 6 MW of electricity with a total internal usage of 11 MW. These numbers are subject to update based upon final heat recovery optimization in the Gasification Island. The steam turbine at the Revolution facility will not produce more than 25 MW net-electrical output to any utility power distribution system for sale.

(e) Applicability of this subpart to an electric utility combined cycle gas turbine other than an IGCC electric utility steam generating unit is as specified in paragraphs (e)(1) through (3) of this section.

Electric utility combined cycle gas turbine means any combined cycle gas turbine used for electric generation that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW net-electrical output to any utility power distribution system for sale. Any steam distribution system that is constructed for the purpose of providing steam to a steam electric generator that would produce electrical power for sale is also considered in determining the electrical energy output capacity of the affected facility.

The steam turbine at the Revolution facility will not produce more than 25 MW net-electrical output to any utility power distribution system for sale.

Regards,

Melissa Armer

Melissa Armer, P.E.
Project Engineer, Stantec
Enclosure:
St. James Methanol Plant Title V permit
Red Lion Bio-Energy air permit

**Attachment A**
**St. James Methanol Plant Title V Permit**

ASAP

DEQ LOUISIANA

# AIR PERMIT ROUTING/APPROVAL SLIP-Permits

1-9-14

| | | | | | |
|---|---|---|---|---|---|
| AI No. | 188074 | Company | South LA Methanol LP | Date Received | [illegible]3/2013 |
| Activity No. | PER20130001 | Facility | St James Methanol Plant | Permit Type | Initial Title V |
| CDS No. | 2560-00292 | Permit No. | 2560-00292-V0 | Expedited Permit | ☒ yes ☐ no |

| 1. Technical Review | Approved | Date rec'd | Date FW | Comments |
|---|---|---|---|---|
| Permit Writer DVC | | | 9/24/13 | |
| Air Quality / Modeling | Qmj | | 10/15/13 | |
| Toxics | | | | |
| Technical ~~Advisor~~ Review | Qmj | | 10/3/13 | |
| Supervisor | | | | |
| Other | | | | |
| **2. Management Review (if PN req'd)** | **Approved** | **Date rec'd** | **Date FW** | **Comments** |
| Supervisor | | | | |
| Manager | DVC | | 10/15/13 | |
| Assistant Secretary (PN) | SLP | | 10/15/13 | |
| **3. Response to Comments (if PN req'd)** | **Approved** | **Date rec'd** | **Date FW** | **Comments** |
| Supervisor | | | | |
| Manager | | | | |
| Administrator | | | | |
| Legal (BFD) | | | | |
| **4. Final Approval** | **Approved** | **Date rec'd** | **Date FW** | **Comments** |
| Supervisor | | | | |
| Manager | DVC | | 12/17/13 | A petition was received on 12/16/13 |
| Administrator | | | | |
| Assistant Secretary | SLP | | 12/23/13 | |

**1. Technical Review**

| | | | | | |
|---|---|---|---|---|---|
| PN of App needed | ☑ yes ☐ no | Date of PN of App | | Newspaper | |
| Fee paid | ☑ yes ☐ no | | | | |
| NSPS applies | ☑ yes ☐ no | PSD/NNSR applies | ☑ yes ☐ no | NESHAP applies | ☑ yes ☐ no |

**2. Post-Technical Review**

| | | | | | |
|---|---|---|---|---|---|
| Company technical review | ☑ yes ☐ no ☐ n/a | E-mail date | 10/3/13 | Remarks received | ☑ yes ☐ no 10/8/13 |
| Surveillance technical review | ☑ yes ☐ no ☐ n/a | E-mail date | 10/8/13 | Remarks received | ☐ yes ☐ no |

**3. Public Notice**

| | | | | | |
|---|---|---|---|---|---|
| Public Notice Required | ☑ yes ☐ no | | | | |
| Library | Vacherie Library | | extended to 12/16/13 | | |
| PN newspaper 1/City | *The Advocate*/Baton Rouge | | PN Date 10/23/13 | EDMS Verification | ☑ yes ☐ no |
| PN newspaper 2/City | Enterprise, St. James | | PN Date 10/23/13 | | ☑ yes ☐ no |
| Company notification letter sent | Date mailed | 10/21/13 | | | |
| EPA PN notification e-mail sent | Date e-mailed | 10/21/13 | APG OCT 15 2013 HD | | |
| OES PN mailout | Date | 10/22/13 | | | |

**4. Final Review**

| | | | | | |
|---|---|---|---|---|---|
| Public comments received | ☑ yes ☐ no | EPA comments rec'd | ☐ yes ☑ no | Date EPA Resp. to Comments-mailed | |
| Company comments received | ☐ yes ☑ no | PN info entered into Permit Sec VI | ☑ yes ☐ no | Date EPA approved permit | |
| Comments | | | | | |

BOBBY JINDAL
GOVERNOR

PEGGY M. HATCH
SECRETARY

# State of Louisiana

## DEPARTMENT OF ENVIRONMENTAL QUALITY
## ENVIRONMENTAL SERVICES

Certified Mail No.: 7004 1160 0001 9948 8026

Activity No.: PER20130001
Agency Interest No. 188074

Mr. Price Howard
Project Director
South Louisiana Methanol, LLC
12912 Hill Country Blvd., Suite F-225
Austin, TX 78738

RE: Part 70 Operating Permit, St. James Methanol Plant, South Louisiana Methanol, LP, St. James Parish, Louisiana

Dear Mr. Howard:

This is to inform you that the permit for the above referenced facility has been approved under LAC 33:III.501. The permit is both a state preconstruction and Part 70 Operating Permit. The submittal was approved on the basis of the emissions reported and the approval in no way guarantees the design scheme presented will be capable of controlling the emissions as to the types and quantities stated. A new application must be submitted if the reported emissions are exceeded after operations begin. The synopsis, data sheets and conditions are attached herewith.

It will be considered a violation of the permit if all proposed control measures and/or equipment are not installed and properly operated and maintained as specified in the application.

Operation of this facility is hereby authorized under the terms and conditions of this permit. This authorization shall expire at midnight on the 23 of December, 2018, unless a timely and complete renewal application has been submitted six months prior to expiration. Terms and conditions of this permit shall remain in effect until such time as the permitting authority takes final action on the application for permit renewal. The permit number and agency interest number cited above should be referenced in future correspondence regarding this facility.

Please be advised that pursuant to provisions of the Environmental Quality Act and the Administrative Procedure Act, the Department may initiate review of a permit during its term. However, before it takes any action to modify, suspend or revoke a permit, the Department shall, in accordance with applicable statutes and regulations, notify the permittee by mail of the facts or operational conduct that warrant the intended action and provide the permittee with the opportunity to demonstrate compliance with all lawful requirements for the retention of the effective permit.

Done this 23 day of December, 2013.

Permit No.: 2560-00292-V0

Sincerely,

S L Phillips

Sam L. Phillips
Assistant Secretary
SLP: DVC

c: EPA Region VI

# AIR PERMIT BRIEFING SHEET
## AIR PERMITS DIVISION
## LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

## I. Background

South Louisiana Methanol, LP will own and operate St. James Methanol Plant (SJMP). The facility will be located on Highway 18, 5 miles north of St. James, Louisiana.

This is the initial Part 70 operating permit for this facility.

## II. Origin

A permit application and Emission Inventory Questionnaire, dated July 11, 2013, were submitted by South Louisiana Methanol, LP requesting a Part 70 operating permit. Supplemental information dated July 29, August 1, and October 8, 2013 was also received.

## III. Description

SJMP is designed to produce 5,150 metric tons per day of refined methanol from natural gas and carbon dioxide ($CO_2$) feedstock. The methanol process consists of four main steps as follows:

1. Feedstock preparation
2. Production of synthesis gas
3. Synthesis gas compression and crude methanol synthesis
4. Production of refined methanol

Natural gas is supplied to the plant at the required feed pressure and treated to remove low levels of impurities which would otherwise poison the catalysts used to promote the chemical reactions carried out in the process plant. The feed natural gas is heated up before passing over a catalyst bed where complex compounds are reacted with hydrogen to convert the sulphur in the gas to hydrogen sulfide which is subsequently removed by absorption over zinc oxide.

The natural gas is broken down in two reaction stages to a mixture of basic components; this reaction process is referred to as steam reforming and converts the natural gas into a mixture of carbon oxides, hydrogen and residual methane which contains water in the form of steam. The resulting mix of carbon oxides and hydrogen is referred to as synthesis gas as these are the key components for the formation of methanol. Imported $CO_2$ is added to the synthesis gas.

The methanol synthesis reactions take place over a suitable catalyst given the appropriate controlled reaction conditions. A circulating gas stream is used to return unconverted reactants back to the methanol reactor after separation of crude methanol product by cooling. The

**AIR PERMIT BRIEFING SHEET**
**AIR PERMITS DIVISION**
**LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY**

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

synthesis gas also contains non reactive components (inerts) in the form of nitrogen and any remaining methane from the natural gas feed which has not been broken down earlier in the process. A small gas purge taken before recycle of the unconverted feed prevents these components from building up.

The crude methanol contains impurities which are more volatile than pure methanol together with traces of dissolved gases from the methanol synthesis stage. These light ends including ketones and aldehydes are removed in the topping column which separates them into an overhead vapour stream. This stream also contains the dissolved gases which are stripped from the methanol by this column. A second refining column removes remaining impurities to produce a high quality refined methanol product. The impurities are removed as two liquid streams consisting of a small flow of heavy organic byproducts known as fusel oil and a much larger flow of water containing traces of miscible organic components.

Off spec methanol is stored in the crude methanol tank prior to being processed in the distillation section. Product methanol is stored in tanks prior to distribution. Loading of methanol will be performed by another company.

Estimated emissions from the proposed facility in tons per year are as follows:

| Pollutant | Emission Rates |
|---|---|
| $PM_{10}$ | 86.35 |
| $PM_{2.5}$ | 82.89 |
| $SO_2$ | 6.63 |
| $NO_X$ | 138.63 |
| CO | 98.92 |
| VOC* | 70.32 |
| $CO_2e$ | 1,303,228 |

* VOC LAC 33:III.Chapter 51 Toxic Air Pollutants (TAPs)

| VOC TAPs | Emissions in tons per year |
|---|---|
| n-Hexane | 19.71 |
| Methanol | 9.10 |
| Benzene | 0.02 |
| Dichlorobenzene | 0.01 |
| Formaldehyde | 0.83 |
| Naphthalene | 0.01 |
| Toluene | 0.06 |

# AIR PERMIT BRIEFING SHEET
# AIR PERMITS DIVISION
# LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

Other TAPs

| TAPs | Emissions in tons per year |
|---|---|
| Ammonia | 65.08 |
| Arsenic (and compounds) | 0.002 |
| Barium (and compounds) | 0.052 |
| Cadmium (and compounds) | 0.01 |
| Chromium (and compounds) | 0.015 |
| Copper (and compounds) | < 0.01 |
| Manganese (and compounds) | 0.004 |
| Mercury (and compounds) | 0.003 |
| Nickel (and compounds) | 0.02 |
| Zinc (and compounds) | 0.35 |

## IV. Type of Review

This permit was reviewed for compliance with 40 CFR 70, the Louisiana Air Quality Regulations, Prevention of Significant Deterioration (PSD) Regulations, New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAP).

This facility is a major source of toxic air pollutants (TAPs) pursuant to LAC 33:III.Chapter 51.

PSD Analysis

SJMP will be a new stationary source and is classified as one of the 28 listed source categories in the Prevention of Significant Deterioration (PSD) program. The plant has the potential to emit (PTE) $NO_X$ in excess of 100 tons per year (tpy) and also has the PTE carbon dioxide equivalent ($CO_2e$) in excess of 100,000 tons per year; therefore, the facility is determined to be a major PSD source. According to the PSD regulations, PSD review is required on a pollutant-specific basis for a proposed major source with emissions above significant thresholds. Estimated potential emissions from the proposed facility are shown in the table blow:

| | Criteria/GHG Pollutants (tpy) | | | | | | |
|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_X$ | CO | VOC | $CO_2e$ |
| Facility-wide Emissions | 86.35 | 82.89 | 6.63 | 138.63 | 98.92 | 70.32 | 1,303,228 |
| PSD Threshold | 15 | 10 | 40 | 40 | 100 | 40 | 100,000 |
| Threshold Exceeded? | Yes | Yes | No | Yes | No | Yes | Yes |

**AIR PERMIT BRIEFING SHEET**
**AIR PERMITS DIVISION**
**LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY**

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

Emissions of $PM_{10}$, $PM_{2.5}$, $NO_X$, VOC, and $CO_2e$ exceed PSD significance thresholds. The PSD air permit regulations (40 CFR 52.21(j) and LAC 33:III.509.J) require new major sources of air pollution to apply Best Available Control Technology (BACT) for each regulated pollutant for which the PTE is significant. BACT is to be applied to new and modified emission units and is to be determined on a case-by-case basis, with consideration given to technical feasibility and economic impacts. A PSD permit for the proposed facility has been reviewed concurrently with this operating permit. All PSD terms and limits have been incorporated into this permit.

Compliance Assurance Monitoring (CAM) Rule

The EPA established the Compliance Assurance Monitoring (CAM) rule under 40 CFR Part 64 to ensure that major source units required to obtain a Part 70 Operating Permit and that utilize an active control device to achieve compliance with a Federal regulatory emission standard will maintain compliance during daily operations. The CAM rule requires owners and operators to monitor the operation and maintenance of the subject control equipment, evaluate the performance of their control device, and report whether or not the emission standards are met.

As part of this initial Title V permit, the St. James Methanol Plant has evaluated the pre-control and post-control emissions pertaining to the Pollutant Specific Emission Units (PSEUs). The Steam Methane Reformer will be equipped with Selective Catalytic Reduction (SCR) for $NO_X$ control with a Continuous Emission Monitoring System (CEMS). Although the pre-control $NO_X$ emissions would be greater than 100 tpy, a CAM plan is not required for the operation of the SCR with CEMS. The boilers are subject to 40 CFR 60 NSPS Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units which was proposed for amendment on June 13, 2007. The cooling tower drift eliminators were also reviewed for CAM applicability. Although the cooling tower is equipped with drift eliminators, drift eliminators are not considered a control device as defined in 40 CFR 64.1 since the drift eliminators act as a passive control measure to prevent release of pollutants (i.e. drift).

Louisiana Consolidated Fugitive Emission Program (LCFEP)

Process fugitive emissions from the SJMP are subject to the requirements of 40 CFR 63 Subpart H, 40 CFR 61 Subpart V, 40 CFR 60 Subpart VVa, and LAC 33:III.2121. Among these regulations, 40 CFR 63 Subpart H is the overall most stringent leak detection and repair program. Therefore, the SJMP will comply with these requirements by complying with the overall most stringent program, 40 CFR 63 Subpart H (HON).

**AIR PERMIT BRIEFING SHEET**
**AIR PERMITS DIVISION**
**LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY**

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

| Unit or Plant Site | Programs Being Streamlined | Stream Applicability | Overall Most Stringent Program |
|---|---|---|---|
| SJMP | 40 CFR 63 Subpart H – HON | ≤5% VOHAP | 40 CFR 63 Subpart H |
| | 40 CFR 61 Subpart V – NESHAP for Equipment Leaks | ≤ 10% VOTAP | |
| | 40 CFR 60 Subparts VVa – NSPS for Equipment Leaks of VOC in SOCMI or Refineries | ≤ 10% VOC | |
| | LAC 33:III.2121 – Fugitive Emission Control | ≤ 10% VOC | |

## V. Credible Evidence

Notwithstanding any other provisions of any applicable rule or regulation or requirement of this permit that state specific methods that may be used to assess compliance with applicable requirements, pursuant to 40 CFR Part 70 and EPA's Credible Evidence Rule, 62 Fed. Reg. 8314 (Feb. 24, 1997), any credible evidence or information relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed shall be considered for purposes of Title V compliance certifications. Furthermore, for purposes of establishing whether or not a person has violated or is in violation of any emissions limitation or standard or permit condition, nothing in this permit shall preclude the use, including the exclusive use, by any person of any such credible evidence or information.

## VI. Public Notice

A notice requesting public comment on the permit was published in *The Advocate*, Baton Rouge, on October 23, 2013; and in the Enterprise, St. James, on October 23, 2013. A copy of the public notice was mailed to concerned citizens listed in the Office of Environmental Services Public Notice Mailing List on October 22, 2013. The proposed permit was also submitted to US EPA Region VI on October 21, 2013. The comment period was extended from November 27 to December 16, 2013. LDEQ received a formal petition from the residents of the 5th District Community of St. James Parish, Louisiana on December 16, 2013. The petition expressed opposition to the proposed St. James Methanol Plant. LDEQ addressed a letter of response to comments on December 23, 2013. All comments have been considered prior to a final permit decision.

## VII. Effects on Ambient Air

Emissions associated with the proposed facility were reviewed by LDEQ to ensure compliance with the NAAQS and AAS. Modeling analyses on $PM_{10}$, $PM_{2.5}$, $NO_2$ and $NH_3$ were performed. The modeling results are presented in the table below.

# AIR PERMIT BRIEFING SHEET
# AIR PERMITS DIVISION
# LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

Dispersion Model(s) Used: AERMOD

| Pollutant | Time Period | Calculated Maximum Ground Level Concentration | Louisiana Toxic Air Pollutant Ambient Air Quality Standard or (National Ambient Air Quality Standard {NAAQS}) |
|---|---|---|---|
| $NH_3$ | 8-hour | 4.53 $\mu g/m^3$ | 640.0 $\mu g/m^3$ |
| $PM_{10}$ | 24-hour | 2.43 $\mu g/m^3$ | (150 $\mu g/m^3$) |
| $PM_{2.5}$ | 24-hour | 0.95 $\mu g/m^3$ | (35 $\mu g/m^3$) |
| | Annual | 0.10 $\mu g/m^3$ | (12 $\mu g/m^3$) |
| $NO_2$ | 1-hour | 7.23 $\mu g/m^3$ | (188 $\mu g/m^3$) |
| | Annual | 0.22 $\mu g/m^3$ | (100 $\mu g/m^3$) |

## VIII. General Condition XVII Activities

| | | Emission Rates – tons per year | | | | |
|---|---|---|---|---|---|---|
| Work Activity | Schedule | $PM_{10}$ | $SO_2$ | $NO_X$ | CO | VOC |
| Sampling Procedures | 800/year | | | | | 0.05 |
| Pump Preparation | 8/year | | | | | 0.01 |
| Line Preparation | 4/year | | | | | 0.01 |
| Filter Replacement | 1/month | | | | | 0.03 |
| Instrumentation Mechanical Work | 5/month | | | | | 0.15 |
| Shop Work on Unit Equipment | 1/quarter | | | | | 0.01 |
| Vessel Preparation | 2/year | | | | | 0.10 |
| Valve Maintenance | 6/year | | | | | 0.02 |
| Compressor Maintenance | 1/year | | | | | 0.05 |
| Catalyst Oxidation Vent (Catalyst Change Out) | 1/every 4 years | | | | | <0.01 |
| Tank Cleaning Operations | 1/Year | | | | | 1.21 |

## IX. Insignificant Activities

| ID No. | Description | Citation |
|---|---|---|
| 13-DST1 | 10,000 gal diesel storage tank (37,550 gal/yr) | LAC 33:III.501.B.5.A.3 |
| 13-AST1 | 10,000 gal aqueous ammonia tank (220,000 gal/yr) | LAC 33:III.501.B.5.A.10 |
| 13-TLO | Tank loading (4/yr) | LAC 33:III.501.B.5.D |

**LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY**

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

## X. Table 1. Applicable Louisiana and Federal Air Quality Requirements

| ID No. | Description | LAC 33:III.Chapter | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5▲ | 509 | 9 | 11 | 13 | 15 | 2103 | 2107 | 2108 | 2111 | 2113 | 2115 | 2121 | 2147 | 2153 | 22 | 29* | 51* | 53* | 56 | 59* |
| UNF1 | FW Facility-Wide | 1 | 1 | 1 | 1 | 1 | | | | | | 1 | | | | | | 1 | 1 | | 1 | 1 |
| EQT 1 | RV-13 Reformer Vent | | 1 | | 2 | 1 | 3 | | | | | | | | 3 | | | | | | | |
| EQT 2 | RV-13-SUSD Reformer Vent - SUSD | | | | | | | | | | | | | | | | | | | | | |
| EQT 3 | B1-13 Boiler 1 | | 1 | | 2 | 1 | 3 | | | | | | | | | | | | | | | |
| EQT 4 | B2-13 Boiler 2 | | 1 | | 2 | 1 | 3 | | | | | | | | | | | | | | | |
| EQT 5 | B1-13-SUSD Boiler 1 - SUSD | | | | | | | | | | | | | | | | | | | | | |
| EQT 6 | B2-13-SUSD Boiler 2 - SUSD | | | | | | | | | | | | | | | | | | | | | |
| EQT 7 | CT-13 Cooling Tower | | 1 | | | | | | | | | | | | | | | | | | | |
| EQT 8 | FL1-13 Process Flare | | | | 1 | 3 | 3 | | | | | | | | | | | | | | | |
| EQT 9 | FL2-13 Tank Flare | | | | 1 | 3 | 3 | | | | | | | | | | | | | | | |
| EQT 10 | FL1-13-SUSD Process Flare - SUSD | | | | | | | | | | | | | | | | | | | | | |
| EQT 11 | DV-13 Decarbonator Vent | | | | | | | | | | | | | | | | | | | | | |
| EQT 12 | DEG1-13 1100 HP Diesel Fired Emergency Generator Engine | | | | 1 | 1 | 3 | | | | | | | | | | | | | | | |
| EQT 13 | DFP1-13 373 HP Diesel Fire Pump Engine | | | | 1 | 1 | 3 | | | | | | | | | | | | | | | |
| EQT 14 | MT-13 Methanol Tank | | | | | | | 1 | | | | | | | | | | | | | | |
| EQT 15 | MST1-13 Methanol Shift Tank 1 | | | | | | | 1 | | | | | | | | | | | | | | |

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

## X. Table 1. Applicable Louisiana and Federal Air Quality Requirements

| ID No. | Description | LAC 33:III.Chapter | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5▲ | 509 | 9 | 11 | 13 | 15 | 2103 | 2107 | 2108 | 2111 | 2113 | 2115 | 2121 | 2147 | 2153 | 22 | 29* | 51* | 53* | 56 | 59* |
| EQT 16 | MST2-13 Methanol Shift Tank 2 | | | | | | | 1 | | | | | | | | | | | | | | |
| EQT 17 | OSMT1-13 Crude-Offspec Tank 1 | | | | | | | 1 | | | | | | | | | | | | | | |
| FUG 1 | WWTF-13 Wastewater Treatment Fug | | | | | | | | | | | | | 1 | | | | | | | | |
| FUG 2 | PF-13 Process Fugitives | | | | | | | | | | 1 | | | 1 | | | | | | | | |

* The regulations indicated above are State Only regulations.

▲ All LAC 33:III.Chapter 5 citations are federally enforceable including LAC 33:III.501.C.6 citations, except when the requirement found in the "Specific Requirements" report specifically states that the regulation is State Only.

**KEY TO MATRIX**

1 -The regulations have applicable requirements that apply to this particular emission source.
 -The emission source may have an exemption from control stated in the regulation. The emission source may not have to be controlled but may have monitoring, recordkeeping, or reporting requirements.

2 -The regulations have applicable requirements that apply to this particular emission source but the source is currently exempt from these requirements due to meeting a specific criterion, such as it has not been constructed, modified or reconstructed since the regulations have been in place. If the specific criteria changes the source will have to comply at a future date.

3 -The regulations apply to this general type of emission source (i.e. vents, furnaces, towers, and fugitives) but do not apply to this particular emission source.

Blank – The regulations clearly do not apply to this type of emission source.

**LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY**

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

**X. Table 1. Applicable Louisiana and Federal Air Quality Requirements**

| ID No. | Description | 40 CFR 60 NSPS | | | | | | | | | 40 CFR 61 | | 40 CFR 63 NESHAP | | | | | | | | 40 CFR | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | Kb | D | Db | Dc | VVa | 3N | 3R | IIII | A | V | A | F | G | H | Q | 4E | 4Z | 5D | 64 | 68 | 82 |
| UNF1 | FW Facility-Wide | 1 | | | | | | | | | 1 | | 1 | | | | | | | | | 1 | 1 |
| EQT 1 | RV-13 Reformer Vent | | | 3 | 3 | 3 | | 1 | 3 | | | | | 3 | | | | | | 1 | 3 | | |
| EQT 2 | RV-13-SUSD Reformer Vent - SUSD | | | | | | | | | | | | | | | | | | | | | | |
| EQT 3 | B1-13 Boiler 1 | | | | 1 | | | | | | | | | | | | | | | 1 | | | |
| EQT 4 | B2-13 Boiler 2 | | | | 1 | | | | | | | | | | | | | | | 1 | | | |
| EQT 5 | B1-13-SUSD Boiler 1 - SUSD | | | | | | | | | | | | | | | | | | | | | | |
| EQT 6 | B2-13-SUSD Boiler 2 - SUSD | | | | | | | | | | | | | | | | | | | | | | |
| EQT 7 | CT-13 Cooling Tower | | | | | | | | | | | | | 1 | | | 3 | | | | | | |
| EQT 8 | FL1-13 Process Flare | 1 | | | | | | 1 | | | | | 1 | | | 1 | | | | | | | |
| EQT 9 | FL2-13 Tank Flare | 1 | 1 | | | | | | | | | | 1 | | | 1 | | | | | | | |
| EQT 10 | FL1-13-SUSD Process Flare - SUSD | | | | | | | | | | | | | | | | | | | | | | |
| EQT 11 | DV-13 Decarbonator Vent | | | | | | | | | | | | | | | | | | | | | | |
| EQT 12 | DEG1-13 1100 HP Diesel Fired Emergency Generator Engine | | | | | | | | | 1 | | | | | | | | | 1 | | | | |
| EQT 13 | DFP1-13 373 HP Diesel Fire Pump Engine | | | | | | | | | 1 | | | | | | | | | 1 | | | | |
| EQT 14 | MT-13 Methanol Tank | | 1 | | | | | | | | | | | | 1 | | | 3 | | | | | |
| EQT 15 | MST1-13 Methanol Shift Tank 1 | | 1 | | | | | | | | | | | | 1 | | | 3 | | | | | |

## LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

**X. Table 1. Applicable Louisiana and Federal Air Quality Requirements**

| ID No. | Description | 40 CFR 60 NSPS | | | | | | | | | 40 CFR 61 | | 40 CFR 63 NESHAP | | | | | | | | 40 CFR | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | Kb | D | Db | Dc | VVa | 3N | 3R | IIII | A | V | A | F | G | H | Q | 4E | 4Z | 5D | 64 | 68 | 82 |
| EQT 16 | MST2-13 Methanol Shift Tank 2 | | 1 | | | | | | | | | | | | 1 | | | 3 | | | | | |
| EQT 17 | OSMT1-13 Crude-Offspec Tank 1 | | 1 | | | | | | | | | | | | 1 | | | 3 | | | | | |
| FUG 1 | WWTF-13 Wastewater Treatment Fug | | | | | | 3 | | | | | 3 | | 1 | 1 | | | 3 | | | | | |
| FUG 2 | PF-13 Process Fugitives | | | | | | 1 | | | | | 1 | | | | 1 | | 3 | | | | | |

**KEY TO MATRIX**

1 -The regulations have applicable requirements that apply to this particular emission source.
-The emission source may have an exemption from control stated in the regulation. The emission source may not have to be controlled but may have monitoring, recordkeeping, or reporting requirements.

2 -The regulations have applicable requirements that apply to this particular emission source but the source is currently exempt from these requirements due to meeting a specific criterion, such as it has not been constructed, modified or reconstructed since the regulations have been in place. If the specific criteria changes the source will have to comply at a future date.

3 -The regulations apply to this general type of emission source (i.e. vents, furnaces, towers, and fugitives) but do not apply to this particular emission source.

Blank – The regulations clearly do not apply to this type of emission source.

# LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

**XI. Table 2. Explanation for Exemption Status or Non-Applicability of a Source**

| ID No. | Requirement | Notes |
|---|---|---|
| EQT 1, RV-13 Reformer Vent | Control Emissions of Smoke [LAC 33:III.1101.B] | EXEMPT. Burns natural gas/gaseous fuel with a carbon to hydrogen atomic ratio of less than 0.34. |
| | Emission Standards for Sulfur Dioxide [LAC 33:III.1502] | DOES NOT APPLY. $SO_2$ emissions < 5 tons/year. |
| | Limit VOC Emissions from SOCMI Reactor Processes and Distillation Operation [LAC 33:III.2147] | DOES NOT APPLY. The plant is not in the an affected Parish. |
| | NSPS Subpart RRR – Standards of Performance for VOC Emissions from SOCMI Reactor Processes [40.CFR 60.700] | DOES NOT APPLY. No reactor stream sent to the fuel system. |
| | NSPS Subpart D – Standards of Performance for Fossil-Fuel-Fired steam Generators for which Construction is Commenced after August 17, 1971 [40.CFR 60.40(a)] | DOES NOT APPLY. The steam reformer is not a steam generator. |
| | NSPS Subpart Db – Standards of Performance for Industrial-Commercial Institutional Steam Generating Units [40.CFR 60.40b(a)] | DOES NOT APPLY. The steam reformer is not a steam generator. |
| | NSPS Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units [40.CFR 60.40c(a)] | DOES NOT APPLY. The steam reformer is not a steam generator. |
| | NESHAP Subpart F – National Emissions Standards for Organic Hazardous Air Pollutants from the SOCMI Industry [40 CFR 63.107(h)(5)] | DOES NOT APPLY. Distillation stream sent to a fuel system. |
| | Compliance Assurance Monitoring [40 CFR 64] | DOES NOT APPLY. Subject to CEMS; install SCR with CEMS as BACT for $NO_X$. |
| EQT 3 and 4, B1-13 and B2-13 Boilers 1 and 2 | Control Emissions of Smoke [LAC 33:III.1101.B] | EXEMPT. Burns natural gas/gaseous fuel with a carbon to hydrogen molecular ratio of less than 0.34. |
| | Emission Standards for Sulfur Dioxide [LAC 33:III.1502] | DOES NOT APPLY. $SO_2$ emissions < 5 tons/year. |
| EQT 7, CT-13 Cooling Tower | NESHAP Subpart Q – National Emission Standards for Hazardous Air Pollutants: Industrial Process Cooling Tower [40 CFR 63.400(a)] | DOES NOT APPLY. The cooling tower will not be operated with chromium-based water treatment chemicals. |

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

**St. James Methanol Plant**
**Agency Interest No. 188074**
**South Louisiana Methanol, LP**
**St. James, St. James Parish, Louisiana**

## XI. Table 2. Explanation for Exemption Status or Non-Applicability of a Source

| ID No. | Requirement | Notes |
|---|---|---|
| EQT 8 and 9, FL1-13 and F2-13 Process Flare and Tank Flare | Emission Standards for Particulate Matter [LAC 33:III.1311.A] [LAC 33:III.1313.B] | DOES NOT APPLY. The flare combusts gaseous fuels only which do not meet the definition of process weight. Also, the fuel burning equipment is not utilized for the primary purpose of producing steam, hot water, hot air or other indirect heating of liquids, gases, or solids. |
| | Emission Standards for Sulfur Dioxide [LAC 33:III.1502] | DOES NOT APPLY. $SO_2$ emissions < 5 tons/year. |
| EQT 12 and 13, DEG1-13 and DEP1-13 Diesel Engine and Pump | Emission Standards for Sulfur Dioxide [LAC 33:III.1502] | DOES NOT APPLY. $SO_2$ emissions < 5 tons/year. |
| EQT 14 thru. 17, MT13, MST1-13, MST2-13, and OSMT-13 Tanks | NESHAP Subpart EEEE – National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline) [40 CFR 63.2338(c)(1)] | DOES NOT APPLY. Equipment that is part of an affected source under another subpart of 40 CFR Part 63 is excluded from the affected source in this subpart. |
| FUG 1, WWTF-13 Wastewater Treatment Fugitives | NSPS Subpart VVa – Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for which Construction, Reconstruction, or Modification Commenced after November 7, 2006 [40 CFR 60.480a] | DOES NOT APPLY. Drains, sumps, and junction boxes are not regulated by this subpart. |
| | NESHAP Subpart V – National Emission Standard for Equipment Leaks (Fugitive Emission Sources) [ 40 CFR 61.240] | DOES NOT APPLY. Drains, sumps, and junction boxes are not regulated by this subpart. |
| | NESHAP Subpart EEEE – National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline) [40 CFR 63.2338(c)(1)] | DOES NOT APPLY. Equipment that is part of an affected source under another subpart of 40 CFR Part 63 is excluded from the affected source in this subpart. |
| FUG 2, PF-13 Process Fugitives | NESHAP Subpart EEEE – National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline) [40 CFR 63.2338(c)(1)] | DOES NOT APPLY. Equipment that is part of an affected source under another subpart of 40 CFR Part 63 is excluded from the affected source in this subpart. |

The above table provides explanation for both the exemption status and non-applicability of a source cited by 1, 2 or 3 in the matrix presented in Section X (Table 1) of this permit.

# General Information

## AI ID: 188074 South LA Methanol LP - St James Methanol Plant
## Activity Number: PER20130001
## Permit Number: 2560-00292-V0
## Air - Title V Regular Permit Initial

**Also Known As:**

| ID | Name | User Group | Start Date |
|---|---|---|---|
| 2560-00292 | CDS # | CDS Number | 07-12-2013 |

**Physical Location:** Hwy 18
St. James, LA 70000

**Mailing Address:** 12912 Hill Country Blvd Ste F-225
Austin, TX 78738

**Related People:**

| Name | Mailing Address | Phone (Type) | Relationship |
|---|---|---|---|
| Price Howard | 12912 Hill Country Blvd Ste F-225 Austin, TX 78738 | 5123947346 (WP) | Responsible Official for |
| Price Howard | 12912 Hill Country Blvd Ste F-225 Austin, TX 78738 | phoward@southloui: | Responsible Official for |

**Related Organizations:**

| Name | Address | Phone (Type) | Relationship |
|---|---|---|---|
| South LA Methanol LP | 12912 Hill Country Blvd Ste F-225 Austin, TX 78738 | | Operates |
| South LA Methanol LP | 12912 Hill Country Blvd Ste F-225 Austin, TX 78738 | | Air Billing Party for |

**Note: This report entitled "General Information" contains a summary of facility-level information contained in LDEQ's TEMPO database for this facility and is not considered a part of the permit. Please review the information contained in this document for accuracy and completeness. If any changes are required or if you have questions regarding this document, you may email your changes to facupdate@la.gov.**

# INVENTORIES

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

**Subject Item Inventory:**

| ID | Description | Tank Volume | Max. Operating Rate | Normal Operating Rate | Contents | Operating Time |
|---|---|---|---|---|---|---|
| **St. James Methanol Plant** | | | | | | |
| EQT 0001 | RV-13 - Reformer Vent | | 2434 MM BTU/hr | | | 8760 hr/yr |
| EQT 0002 | RV-13-SUSD - Reformer Vent - SUSD | | | 1704 MM BTU/hr | | 25 hr/yr |
| EQT 0003 | B1-13 - Boiler 1 | | 368 MM BTU/hr | 40 MM BTU/hr | max operating rate for SUSD | 8760 hr/yr |
| EQT 0004 | B2-13 - Boiler 2 | | 368 MM BTU/hr | 40 MM BTU/hr | max operating rate for SUSD | 8760 hr/yr |
| EQT 0005 | B1-13-SUSD - Boiler 1 - SUSD | | 368 MM BTU/hr | | | 25 hr/yr |
| EQT 0006 | B2-13-SUSD - Boiler 2 - SUSD | | 368 MM BTU/hr | | | 25 hr/yr |
| EQT 0007 | CT-13 - Cooling Tower | | | 70860 gallons/min | | 8760 hr/yr |
| EQT 0008 | FL1-13 - Process Flare | | | 2.745 MM BTU/hr | | 8760 hr/yr |
| EQT 0009 | FL2-13 - Tank Flare | | | 3.802 MM BTU/hr | | 8760 hr/yr |
| EQT 0010 | FL1-13-SUSD - Process Flare - SUSD | | | 4529.57 MM BTU/hr | SUSD heat input | 25 hr/yr |
| EQT 0011 | DV-13 - Decarbonator Vent | | | | | 8760 hr/yr |
| EQT 0012 | DEG1-13 - 1100 HP Diesel Fired Emergency Generator Engine | | 1100 horsepower | | | 100 hr/yr |
| EQT 0013 | DFP1-13 - 373 HP Diesel Fire Pump Engine | | 373 horsepower | | | 100 hr/yr |
| EQT 0014 | MT-13 - Methanol Tank | 1.92 million gallons | | 622 MM gallons/yr | methanol | 8760 hr/yr |
| EQT 0015 | MST1-13 - Methanol Shift Tank 1 | 961380 gallons | | 607 MM gallons/yr | methanol | 8760 hr/yr |
| EQT 0016 | MST2-13 - Methanol Shift Tank 2 | 961380 gallons | | 607 MM gallons/yr | methanol | 8760 hr/yr |
| EQT 0017 | OSMT1-13 - Crude-Offspec Tank 1 | 2.82 million gallons | | 86 MM gallons/yr | offspec methanol | 8760 hr/yr |
| FUG 0001 | WWTF-13 - Wastewater Treatment Fugitive | | | | | 8760 hr/yr |
| FUG 0002 | PF-13 - Process Fugitives | | | | | 8760 hr/yr |

**Stack Information:**

| ID | Description | Velocity (ft/sec) | Flow Rate (cubic ft/min-actual) | Diameter (feet) | Discharge Area (square feet) | Height (feet) | Temperature (oF) |
|---|---|---|---|---|---|---|---|
| **St. James Methanol Plant** | | | | | | | |
| EQT 0001 | RV-13 - Reformer Vent | 24 | 572265 | 22.5 | | 135 | 356 |
| EQT 0002 | RV-13-SUSD - Reformer Vent - SUSD | 24 | 572265 | 22.5 | | 135 | 356 |
| EQT 0003 | B1-13 - Boiler 1 | 55 | 64763 | 5 | | 115 | 600 |
| EQT 0004 | B2-13 - Boiler 2 | 55 | 64763 | 5 | | 115 | 600 |
| EQT 0005 | B1-13-SUSD - Boiler 1 - SUSD | 55 | 64763 | 5 | | 115 | 600 |
| EQT 0006 | B2-13-SUSD - Boiler 2 - SUSD | 55 | 64763 | 5 | | 115 | 600 |
| EQT 0007 | CT-13 - Cooling Tower | 20 | 1000000 | | 800 | 40 | |
| EQT 0008 | FL1-13 - Process Flare | 170.15 | 28.61 | 4.5 | | 190 | 1800 |
| EQT 0009 | FL2-13 - Tank Flare | 348.2 | 16400 | 1 | | 40 | 1800 |
| EQT 0010 | FL1-13-SUSD - Process Flare - SUSD | .03 | 28.61 | 4.5 | | 190 | 1800 |

# INVENTORIES

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

**Stack Information:**

| ID | Description | Velocity (ft/sec) | Flow Rate (cubic ft/min-actual) | Diameter (feet) | Discharge Area (square feet) | Height (feet) | Temperature (oF) |
|---|---|---|---|---|---|---|---|
| **St. James Methanol Plant** | | | | | | | |
| EQT 0011 | DV-13 - Decarbonator Vent | 100 | 13136 | 1.67 | | 20 | 85 |
| EQT 0012 | DEG1-13 - 1100 HP Diesel Fired Emergency Generator Engine | 284.44 | 6014 | .67 | | 15 | 952 |
| EQT 0013 | DFP1-13 - 373 HP Diesel Fire Pump Engine | 285.68 | 1943 | .38 | | 5.01 | 917 |
| EQT 0014 | MT-13 - Methanol Tank | .24 | .01 | .03 | | 44 | 70 |
| EQT 0015 | MST1-13 - Methanol Shift Tank 1 | .24 | .01 | .03 | | 42 | 70 |
| EQT 0016 | MST2-13 - Methanol Shift Tank 2 | .24 | .01 | .03 | | 42 | 70 |
| EQT 0017 | OSMT1-13 - Crude-Offspec Tank 1 | | | | | | |
| FUG 0001 | WWTF-13 - Wastewater Treatment Fugitive | | | | | | 70 |
| FUG 0002 | PF-13 - Process Fugitives | | | | | | 70 |

**Relationships:**

| ID | Description | Relationship | ID | Description |
|---|---|---|---|---|
| EQT 0017 | OSMT1-13 - Crude-Offspec Tank 1 | Vents to | EQT 0009 | FL2-13 - Tank Flare |

**Subject Item Groups:**

| ID | Group Type | Group Description |
|---|---|---|
| CRG 0001 | Common Requirements Group | Tanks - Methanol Tank |
| CRG 0002 | Common Requirements Group | Boilers - Boilers |
| UNF 0001 | Unit or Facility Wide | AI 188074 - St. James Methanol Plant |

**Group Membership:**

| ID | Description | Member of Groups |
|---|---|---|
| EQT 0003 | B1-13 - Boiler 1 | CRG0000000002 |
| EQT 0004 | B2-13 - Boiler 2 | CRG0000000002 |
| EQT 0014 | MT-13 - Methanol Tank | CRG0000000001 |
| EQT 0015 | MST1-13 - Methanol Shift Tank 1 | CRG0000000001 |
| EQT 0016 | MST2-13 - Methanol Shift Tank 2 | CRG0000000001 |

**NOTE: The UNF group relationship is not printed in this table. Every subject item is a member of the UNF group**

**Annual Maintenance Fee:**

| Fee Number | Air Contaminant Source | Multiplier | Units Of Measure |
|---|---|---|---|
| 0630 | 0630 Organic Oxides, Alcohols, Glycols (Rated Capacity) | 3650 | MM lbs/yr |

**SIC Codes:**

# INVENTORIES

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

**SIC Codes:**

| | | |
|---|---|---|
| 2869 | Industrial organic chemicals, nec | AI 188074 |
| 2869 | Industrial organic chemicals, nec | UNF 001 |

# EMISSION RATES FOR CRITERIA POLLUTANTS AND CO2e

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

| | CO | | | NOx | | | PM10 | | | SO2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subject Item | Avg lb/hr | Max lb/hr | Tons/Year | Avg lb/hr | Max lb/hr | Tons/Year | Avg lb/hr | Max lb/hr | Tons/Year | Avg lb/hr | Max lb/hr | Tons/Year |
| St. James Methanol Plant | | | | | | | | | | | | |
| EQT 0001 RV-13 | 8.76 | 10.51 | 38.38 | 26.00 | 31.20 | 113.88 | 18.14 | 21.76 | 79.43 | 1.43 | 1.72 | 6.27 |
| EQT 0002 RV-13-SUSD | 140.31 | 168.38 | 1.75 | 18.00 | 21.60 | 0.23 | 25.00 | 30.00 | 0.31 | 1.00 | 1.20 | 0.01 |
| EQT 0003 B1-13 | 1.52 | 1.82 | 6.66 | 1.44 | 1.73 | 6.31 | 0.20 | 0.24 | 0.88 | 0.02 | 0.03 | 0.10 |
| EQT 0004 B2-13 | 1.52 | 1.82 | 6.66 | 1.44 | 1.73 | 6.31 | 0.20 | 0.24 | 0.88 | 0.02 | 0.03 | 0.10 |
| EQT 0005 B1-13-SUSD | 13.98 | 16.78 | 2.57 | 13.25 | 15.90 | 2.44 | 1.84 | 2.21 | 0.34 | 0.22 | 0.26 | 0.04 |
| EQT 0006 B2-13-SUSD | 13.98 | 16.78 | 2.57 | 13.25 | 15.90 | 2.44 | 1.84 | 2.21 | 0.34 | 0.22 | 0.26 | 0.04 |
| EQT 0007 CT-13 | | | | | | | 0.79 | 0.95 | 3.47 | | | |
| EQT 0008 FL1-13 | 1.41 | 1.41 | 6.17 | 0.26 | 0.26 | 1.13 | 0.03 | 0.03 | 0.12 | <0.01 | <0.01 | 0.01 |
| EQT 0009 FL2-13 | 1.60 | 1.60 | 7.02 | 0.30 | 0.30 | 1.29 | 0.03 | 0.03 | 0.14 | <0.01 | <0.01 | 0.01 |
| EQT 0010 FL1-13-SUSD | 1676.33 | 1676.33 | 20.95 | 308.08 | 308.08 | 3.85 | 33.76 | 33.76 | 0.42 | 2.67 | 2.67 | 0.03 |
| EQT 0011 DV-13 | 1.40 | 1.68 | 6.13 | | | | | | | | | |
| EQT 0012 DEG1-13 | 0.56 | 0.67 | 0.03 | 12.56 | 15.07 | 0.63 | 0.06 | 0.07 | <0.01 | <0.01 | <0.01 | <0.01 |
| EQT 0013 DFP1-13 | 0.61 | 0.74 | 0.03 | 2.47 | 2.96 | 0.12 | 0.08 | 0.09 | <0.01 | <0.01 | <0.01 | <0.01 |
| EQT 0014 MT-13 | | | | | | | | | | | | |
| EQT 0015 MST1-13 | | | | | | | | | | | | |
| EQT 0016 MST2-13 | | | | | | | | | | | | |
| FUG 0001 WWTF-13 | | | | | | | | | | | | |
| FUG 0002 PF-13 | | | | | | | | | | | | |

# EMISSION RATES FOR CRITERIA POLLUTANTS AND CO2e

## AI ID: 188074 - South LA Methanol LP - St James Methanol Plant
Activity Number: PER20130001
Permit Number: 2560-00292-V0
Air - Title V Regular Permit Initial

| | VOC | | | PM2.5 | | | CO2e | | |
|---|---|---|---|---|---|---|---|---|---|
| Subject Item | Avg lb/hr | Max lb/hr | Tons/Year | Avg lb/hr | Max lb/hr | Tons/Year | Avg lb/hr | Max lb/hr | Tons/Year |
| St. James Methanol Plant | | | | | | | | | |
| EQT 0001 RV-13 | 13.12 | 15.75 | 57.49 | 18.14 | 21.76 | 79.43 | | | 1.247E+6 |
| EQT 0002 RV-13-SUSD | 9.19 | 11.02 | 0.11 | 25.00 | 30.00 | 0.31 | | | 2492 |
| EQT 0003 B1-13 | 0.22 | 0.26 | 0.94 | 0.20 | 0.24 | 0.88 | | | 20499 |
| EQT 0004 B2-13 | 0.22 | 0.26 | 0.94 | 0.20 | 0.24 | 0.88 | | | 20499 |
| EQT 0005 B1-13-SUSD | 1.98 | 2.38 | 0.37 | 1.84 | 2.21 | 0.34 | | | 732 |
| EQT 0006 B2-13-SUSD | 1.98 | 2.38 | 0.37 | 1.84 | 2.21 | 0.34 | | | 732 |
| EQT 0007 CT-13 | | | | <0.01 | <0.01 | 0.01 | | | |
| EQT 0008 FL1-13 | 0.15 | 0.15 | 0.65 | 0.03 | 0.03 | 0.12 | | | 1950 |
| EQT 0009 FL2-13 | 0.37 | 0.37 | 1.63 | 0.03 | 0.03 | 0.14 | | | 2220 |
| EQT 0010 FL1-13-SUSD | 9.66 | 9.66 | <0.01 | 33.76 | 33.76 | 0.42 | | | 6626 |
| EQT 0011 DV-13 | <0.01 | <0.01 | 0.01 | | | | | | 20 |
| EQT 0012 DEG1-13 | 0.07 | 0.09 | <0.01 | 0.06 | 0.07 | <0.01 | | | 63 |
| EQT 0013 DFP1-13 | 0.08 | 0.10 | <0.01 | 0.08 | 0.09 | <0.01 | | | 21 |
| EQT 0014 MT-13 | 0.47 | | 2.06 | | | | | | |
| EQT 0015 MST1-13 | 0.38 | | 1.65 | | | | | | |
| EQT 0016 MST2-13 | 0.38 | | 1.65 | | | | | | |
| FUG 0001 WWTF-13 | 0.29 | | 1.24 | | | | | | |
| FUG 0002 PF-13 | 0.27 | | 1.18 | | | | | | |

Note: Emission rates in bold are from alternate scenarios and are not included in permitted totals unless otherwise noted in a footnote.

# EMISSION RATES FOR TAP/HAP & OTHER POLLUTANTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
***Air - Title V Regular Permit Initial***

| Emission Pt. | Pollutant | Avg lb/hr | Max lb/hr | Tons/Year |
|---|---|---|---|---|
| EQT 0005 B1-13-SUSD | Formaldehyde | 0.03 | 0.03 | 0.01 |
| | Zinc (and compounds) | 0.011 | 0.013 | <0.01 |
| | n-Hexane | 0.65 | 0.78 | 0.12 |
| EQT 0006 B2-13-SUSD | Ammonia | 3.50 | 4.20 | 0.04 |
| | Formaldehyde | 0.03 | 0.03 | 0.01 |
| | Zinc (and compounds) | 0.011 | 0.013 | <0.01 |
| | n-Hexane | 0.65 | 0.78 | 0.12 |
| EQT 0009 FL2-13 | Methanol | 0.30 | 0.30 | 1.31 |
| EQT 0011 DV-13 | Ammonia | 0.10 | 0.12 | 0.44 |
| | Methanol | 0.001 | 0.001 | <0.01 |
| EQT 0014 MT-13 | Methanol | 0.47 | | 2.06 |
| EQT 0015 MST1-13 | Methanol | 0.38 | | 1.65 |
| EQT 0016 MST2-13 | Methanol | 0.38 | | 1.65 |
| FUG 0001 WWTF-13 | Methanol | 0.29 | | 1.24 |
| FUG 0002 PF-13 | Methanol | 0.27 | | 1.18 |
| UNF 0001 AI 188074 | Ammonia | | | 65.08 |
| | Arsenic (and compounds) | | | 0.002 |
| | Barium (and compounds) | | | 0.052 |
| | Benzene | | | 0.02 |
| | Cadmium (and compounds) | | | 0.01 |
| | Chromium VI (and compounds) | | | 0.015 |
| | Copper (and compounds) | | | <0.01 |
| | Dichlorobenzene | | | 0.01 |
| | Formaldehyde | | | 0.83 |
| | Manganese (and compounds) | | | 0.004 |
| | Mercury (and compounds) | | | 0.003 |
| | Methanol | | | 9.10 |
| | Naphthalene | | | 0.01 |
| | Nickel (and compounds) | | | 0.02 |
| | Toluene | | | 0.06 |
| | Zinc (and compounds) | | | 0.35 |
| | n-Hexane | | | 19.71 |

**Note: Emission rates in bold are from alternate scenarios and are not included in permitted totals unless otherwise noted in a footnote. Emission rates attributed to the UNF reflect the sum of the TAP/HAP limits of the individual emission points (or caps) under this permit, but do not constitute an emission cap.**

# EMISSION RATES FOR TAP/HAP & OTHER POLLUTANTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

| Emission Pt. | Pollutant | Avg lb/hr | Max lb/hr | Tons/Year |
|---|---|---|---|---|
| EQT 0001 RV-13 | Ammonia | 14.00 | 16.80 | 61.32 |
| | Arsenic (and compounds) | <0.001 | <0.001 | 0.002 |
| | Barium (and compounds) | 0.011 | 0.013 | 0.046 |
| | Benzene | 0.01 | 0.01 | 0.02 |
| | Cadmium (and compounds) | 0.003 | 0.003 | 0.012 |
| | Chromium VI (and compounds) | 0.003 | 0.004 | 0.015 |
| | Cobalt compounds | <0.001 | <0.001 | <0.01 |
| | Copper (and compounds) | 0.002 | 0.002 | 0.009 |
| | Dichlorobenzene | <0.01 | <0.01 | 0.01 |
| | Formaldehyde | 0.18 | 0.22 | 0.78 |
| | Manganese (and compounds) | 0.001 | 0.001 | 0.004 |
| | Mercury (and compounds) | 0.001 | 0.001 | 0.003 |
| | Naphthalene | <0.01 | <0.01 | 0.01 |
| | Nickel (and compounds) | 0.005 | 0.006 | 0.022 |
| | Toluene | 0.01 | 0.01 | 0.04 |
| | Zinc (and compounds) | 0.07 | 0.08 | 0.30 |
| | n-Hexane | 4.30 | 5.15 | 18.81 |
| EQT 0002 RV-13-SUSD | Ammonia | 14.00 | 16.80 | 0.18 |
| | Formaldehyde | 0.13 | 0.15 | <0.01 |
| | Zinc (and compounds) | 0.05 | 0.06 | <0.01 |
| | n-Hexane | 3.01 | 3.61 | 0.04 |
| EQT 0003 B1-13 | Ammonia | 0.35 | 0.42 | 1.53 |
| | Barium (and compounds) | <0.001 | <0.001 | 0.001 |
| | Formaldehyde | 0.003 | 0.004 | 0.01 |
| | Toluene | <0.001 | <0.001 | <0.01 |
| | Zinc (and compounds) | 0.001 | 0.001 | 0.01 |
| | n-Hexane | 0.07 | 0.08 | 0.31 |
| EQT 0004 B2-13 | Ammonia | 0.35 | 0.42 | 1.53 |
| | Barium (and compounds) | <0.001 | <0.001 | 0.001 |
| | Formaldehyde | 0.003 | 0.004 | 0.01 |
| | Toluene | <0.001 | <0.001 | <0.01 |
| | Zinc (and compounds) | 0.001 | 0.001 | 0.01 |
| | n-Hexane | 0.07 | 0.08 | 0.31 |
| EQT 0005 B1-13-SUSD | Ammonia | 3.50 | 4.20 | 0.04 |

# SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

## CRG 0001 Tanks - Methanol Tank

**Group Members:** EQT 0014EQT 0015EQT 0016

| | | |
|---|---|---|
| 1 | [40 CFR 60.110b] | Comply with the requirements of 40 CFR 63 Subpart G. (NSPS Subpart Kb). |
| 2 | [40 CFR 63.119(a)(1)] | Reduce hazardous air pollutants emissions to the atmosphere either by operating and maintaining a fixed roof and internal floating roof, an external floating roof, an external floating roof converted to an internal floating roof, a closed-vent system and control device, routing the emissions to a process or a fuel gas system, or vapor balancing in accordance with the requirements in 40 CFR 63.119(b), (c), (d), (e), (f), or (g) or equivalent as provided in 40 CFR 63.121. Subpart G. [40 CFR 63.119(a)(1)] |
| 3 | [40 CFR 63.119(b)(3)] | Internal floating roof: Equip each internal floating roof with a closure device between the wall of the storage vessel and the roof edge. Closure device shall consist of one of the devices listed in 40 CFR 63.119(b)(3)(i) through (b)(3)(iii), except as specified in 40 CFR 63.119(b)(3)(iv). Subpart G. [40 CFR 63.119(b)(3)] |
| 4 | [40 CFR 63.119(b)(4)] | Internal floating roof: Ensure that automatic bleeder vents are closed at all times when the roof is floating, except when the roof is being floated off or is being landed on the roof leg supports. Subpart G. [40 CFR 63.119(b)(4)] |
| 5 | [40 CFR 63.119(b)(5)] | Internal floating roof: Ensure that each internal floating roof meets the specifications listed in 40 CFR 63.119(b)(5)(i) through (b)(5)(vii), except as provided in 40 CFR 63.119(b)(5)(viii). Subpart G. [40 CFR 63.119(b)(5)] |
| 6 | [40 CFR 63.119(b)(6)] | Internal floating roof: Ensure that each cover or lid on any opening in the internal floating roof is closed except when the cover or lid must be open for access. Ensure that covers on each access hatch and each gauge float well are bolted or fastened so as to be air-tight when they are closed. Rim space vents are to be set to open only when the internal floating roof is not floating or when the pressure beneath the rim seal exceeds the manufacturer's recommended setting. Subpart G. [40 CFR 63.119(b)(6)] |
| 7 | [40 CFR 63.119(b)] | Internal floating roof: Ensure that the internal floating roof is floating on the surface at all times except when the floating roof must be supported by the leg supports during the periods specified in 40 CFR 63.119(b)(1)(i) through (b)(1)(iii). When the floating roof is resting on the leg supports, ensure that the process of filling, emptying or refilling is continuous and accomplished as soon as practical. Subpart G. [40 CFR 63.119(b)] |
| 8 | [40 CFR 63.120(a)(1)] | Tank roof and seals monitored by visual inspection/determination at the regulation's specified frequency. Inspect the internal floating roof, the primary seal, and the secondary seal (if one is in service) according to the schedule specified in 40 CFR 63.120(a)(2) and (a)(3). Subpart G. [40 CFR 63.120(a)(1)]<br>Which Months: All Year Statistical Basis: None specified |
| 9 | [40 CFR 63.120(a)(2)i] | Visually inspect the internal floating roof and the seal through manholes and roof hatches on the fixed roof at least once every 12 months after initial fill, or at least once every 12 months after the compliance date specified in § 63.100 of 40 CFR 63 Subpart F. [40 CFR 63.120(a)(2)i] |
| 10 | [40 CFR 63.120(a)(2)ii] | Visually inspect the internal floating roof, the seal, gaskets, slotted membranes, and sleeve seals (if any) each time the storage vessel is emptied and degassed, and at least once every 10 years after the compliance date specified in 63.100 of 40 CFR 63 Subpart F. [40 CFR 63.120(a)(2)ii] |
| 11 | [40 CFR 63.120(a)(4)] | Repair storage vessel or empty and remove from service within 45 calendar days, if during the inspections required by 40 CFR 63.120(a)(2)(i) or (a)(3)(ii), any of the conditions specified in 40 CFR 63.120(a)(4) are found. Subpart G. [40 CFR 63.120(a)(4)] |
| 12 | [40 CFR 63.120(a)(7)] | If any of the conditions listed in 40 CFR 63.120(a)(7) are found during the inspections required by 40 CFR 63.120(a)(2)(ii), (a)(3)(i), or (a)(3)(iii), repair the storage vessel as necessary so that none of the conditions specified exist before filling or refilling the storage vessel with organic HAP. Subpart G. [40 CFR 63.120(a)(7)] |

## SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

### CRG 0001 Tanks - Methanol Tank

| | | |
|---|---|---|
| 13 | [40 CFR 63.120(a)] | Submit Notification: Due in writing at least 30 calendar days prior to the refilling of each storage vessel to afford DEQ the opportunity to have an observer present, for all the inspections required by 40 CFR 63.120(a)(2)(ii), (a)(3)(i), and (a)(3)(ii). If the inspection required by 40 CFR 63.120(a)(2)(ii), (a)(3)(i), or (a)(3)(ii) is not planned and it could not have been known about 30 calendar days in advance of refilling, submit notification at least 7 calendar days prior to the refilling. Notification can be made by telephone and immediately followed by written documentation demonstrating why the inspection was unplanned. Subpart G. [40 CFR 63.120(a)] |
| 14 | [40 CFR 63.123] | Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Keep readily accessible records of the information specified in 40 CFR 63.123(a) through (i), as applicable. Keep the records as long as the storage vessel retains Group 1 status and is in operation. Subpart G. |
| 15 | [40 CFR 63.152(a)] | The owner or operator of a source subject to this subpart shall submit the reports listed in paragraphs (a)(1) through (a)(5) of this section and keep continuous records of monitored parameters as specified in paragraph (f) of this section. Owners or operators requesting an extension of compliance shall also submit the report described in § 63.151(a)(6) of 63 Subpart D. [40 CFR 63.152(a)] |
| 16 | [LAC 33:III.2013.A] | Equip with a submerged fill pipe. A pressure tank capable of maintaining working pressures sufficient at all times under normal operating conditions to prevent vapor or gas loss to the atmosphere. |
| 17 | [LAC 33:III.2103.E.1] | The vapor loss control system shall reduce inlet emissions of total volatile organic compounds by 95 percent or greater. |
| 18 | [LAC 33:III.2103.H.3] | Determine VOC maximum true vapor pressure using the methods in LAC 33:III.2103.H.3 a-e. |
| 19 | [LAC 33:III.2103.I] | Shall maintain records to verify compliance with or exemption from LAC 33:III.2103. The records shall be maintained for at least two years. |
| 20 | [LAC 33:III.2103.J] | The notice shall be provided to the Office of Environmental Compliance in the manner identified in LAC 33:I.3923.A in advance, if possible, but no later than 24 hours after the tank starts filling. |

### CRG 0002 Boilers - Boilers

**Group Members: EQT 0003 EQT 0004**

| | | |
|---|---|---|
| 21 | [40 CFR 60.44b] | Nitrogen oxides (NOx) <= 0.2 lb/MMBTU (86 ng/J) heat input (expressed as NO2), except as provided in 40 CFR 60.44b(k). The nitrogen oxide standards apply at all times, including periods of startup, shutdown, or malfunction. Subpart Db.<br>Which Months: All Year Statistical Basis: Thirty-day rolling average |
| 22 | [40 CFR 60.46b(c)] | Determine compliance with the NOx standards in 40 CFR 60.44b through performance testing under 40 CFR 60.46b(e) or (f), or under 40 CFR 60.46b(g) or (h), as applicable. Subpart Db. [40 CFR 60.46b(c)] |
| 23 | [40 CFR 60.48b(b)(1)] | Install, calibrate, maintain, and operate CEMS for measuring NOx and O2 (or CO2 ) emissions discharged to the atmosphere, and shall record the output of the system. Calculate NOx emission rates as specified in 60.48b(d); except as provided in 60.48b(g), (h), and (i). One-hour average. 60 Subpart Db. [40 CFR 60.48b(b)(1)] |
| 24 | [40 CFR 60.48b(c)] | The CEMS required under paragraph (b) of 60.48b shall be operated and data recorded during all periods of operation of the affected facility except for CEMS breakdowns and repairs. Data is recorded during calibration checks, and zero and span adjustments. 60 Subpart Db. [40 CFR 60.48b(c)] |
| 25 | [40 CFR 60.48b(e)] | The procedures under 60.13 shall be followed for installation, evaluation, and operation of the continuous monitoring systems. [40 CFR 60.48b(e)] |

## SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

**CRG 0002 Boilers - Boilers**

| | | |
|---|---|---|
| 26 | [40 CFR 60.48b(f)] | When NOx emission data are not obtained because of CEMS breakdowns, repairs, calibration checks and zero and span adjustments, emission data will be obtained by using standby monitoring systems, Method 7 of appendix A of 40 CFR 60, Method 7A of appendix A of 40 CFR 60, or other approved reference methods to provide emission data for a minimum of 75 percent of the operating hours in each steam generating unit operating day, in at least 22 out of 30 successive steam generating unit operating days. 60 Subpart Db. [40 CFR 60.48b(f)] |
| 27 | [40 CFR 60.48b(g)] | Comply with the provisions of paragraphs (b), (c), (d), (e)(2), (e)(3), and (f) or monitor steam generating unit operating conditions and predict NOx emission rates as specified in a plan submitted pursuant to 60.49b(c). Subpart Db . [40 CFR 60.48b(g)] |
| 28 | [40 CFR 60.49b(a)] | Submit notification: Due as provided by 40 CFR 60.7. Submit a notification of the actual date of initial startup including design heat input capacity of the affected facility, identification of fuels to be combusted, copy of any federally enforceable requirement limiting annual capacity factor, and all other data as specified in 40 CFR 60.49b(a)(1) through (a)(4). Subpart Db. [40 CFR 60.49b(a)] |
| 29 | [40 CFR 60.49b(b)] | Submit the maximum heat input capacity data from the demonstration of the maximum heat input capacity of the affected facility to DEQ. Subpart Db. [40 CFR 60.49b(b)] |
| 30 | [40 CFR 60.49b(b)] | Submit the performance test data from the initial performance test and the performance evaluation of the CEMS using the applicable performance specifications in 40 CFR 60 Appendix B to DEQ. Subpart Db. [40 CFR 60.49b(b)] |
| 31 | [40 CFR 60.49b(c)] | Submit plan: Due within 360 days of initial startup to DEQ for approval. Identify in the plan the operating conditions to be monitored under 40 CFR 60.48b(g)(2), the records to be maintained under 40 CFR 60.49b(g), and all other information as specified in 40 CFR 60.49b(c)(1) through (c)(3). If the plan is approved, maintain records of predicted nitrogen oxide emission rates and the monitored operating conditions, including steam generating unit load, identified in the plan. Subpart Db. [40 CFR 60.49b(c)] |
| 32 | [40 CFR 60.49b(d)] | Fuel rate recordkeeping by electronic or hard copy daily. Record the amounts of each fuel combusted during each day and calculate the annual capacity factor individually for coal, distillate oil, residual oil, natural gas, wood, and municipal-type solid waste for the reporting period. Determine the annual capacity factor on a 12-month rolling average basis with a new annual capacity factor calculated at the end of each calendar month. If the facility is not required to continuously monitor any emissions (excluding opacity) or parameters indicative of emissions, the facility may record the amount of each fuel combusted during each calendar month. Subpart Db. [40 CFR 60.49b(d)] |
| 33 | [40 CFR 60.49b(g)] | Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Maintain records of the information listed in 40 CFR 60.49b(g)(1) through (g)(10) for each steam generating unit operating day, except as provided under 40 CFR 60.49b(p). Subpart Db. [40 CFR 60.49b(g)] |
| 34 | [40 CFR 60.49b(h)] | Submit excess emissions report: Due by the 30th day following the end of each six-month period. Report any excess emissions which occurred during the reporting period. Subpart Db. [40 CFR 60.49b(h)] |
| 35 | [40 CFR 60.49b(i)] | Submit reports containing the nitrogen dioxide emission rate information recorded under 40 CFR 60.49b(g). Subpart Db. [40 CFR 60.49b(i)] |
| 36 | [40 CFR 60.49b(o)] | Maintain all records required under 40 CFR 60.49b for a period of 2 years following the date of such record. Subpart Db. [40 CFR 60.49b(o)] |
| 37 | [40 CFR 60.49b(p)] | Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Maintain records of the calendar date, the number of hours of operation, and the hourly steam load for each steam generating unit operating day. Subpart Db. [40 CFR 60.49b(p)] |
| 38 | [40 CFR 60.49b(q)] | Submit a report to DEQ containing the annual capacity factor over the previous 12 months, the average fuel nitrogen content during the reporting period if residual oil was fired, and all other applicable information per 40 CFR 60.49b(q)(1) through (q)(3). Subpart Db. [40 CFR 60.49b(q)] |
| 39 | [40 CFR 63.7540(a)(10)vi] | Maintain on-site and submit, if requested by the Administrator, an annual report containing the information in paragraphs (a)(10)(vi)(A) through (C) of 63.7540. Subpart DDDDD. [40 CFR 63.7540(a)(10)vi] |

## SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

### CRG 0002 Boilers - Boilers

| | | |
|---|---|---|
| 40 | [40 CFR 63.7540(a)(vi)] | Process heater has a heat input capacity of 10 million Btu per hour or greater, conduct an annual tune-up of the boiler or process heater to demonstrate continuous compliance as specified in paragraphs (a)(10)(i) through (vi) of 63.7540. This frequency does not apply to limited-use boilers and process heaters, as defined in § 63.7575, or units with continuous oxygen trim systems that maintain an optimum air to fuel ratio. [40 CFR 63.7540(a)(vi)] |
| 41 | [40 CFR 63.7540(a)] | Conduct a tune-up of the boiler or process heater annually as specified in 63.7540. Units in either the gas 1 or Metal Process Furnace subcategories will conduct this tune-up as a work proctice for all regulated emissions under 63 Subpart DDDDD. [40 CFR 63.7540(a)] |
| 42 | [40 CFR 63.7555(h)(i)] | Maintain records of the calendar date, time, occurrence and duration of each startup and shutdown. 63 Subpart DDDDD. [40 CFR 63.7555(h)(i)] |
| 43 | [40 CFR 63.7555(h)(j)] | Maintain records of the type(s) and amount(s) of fuels used during each startup and shutdown. 63.Subpart DDDDD. [40 CFR 63.7555(h)(j)] |
| 44 | [40 CFR 63.7560] | maintain records as required in 40 CFR 63.7560 (a) through (c). |
| 45 | [LAC 33:III.1313.C] | Totatal suspended particulate <= 0.6 lb/MMBTU of heat input (complies by using sweet natural gas as fuel). |
| 46 | [LAC 33:III.509.J.2] | The boilers (B1-13 and B2-13) shall be equipped with Low NOx Burners for NOx Emission Control to maintain max NOx <= 0.036 lb/MMBTU (annual average) - PSD-LA-780. |

### EQT 0001 RV-13 - Reformer Vent

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|---|---|---|
| 47 | [40 CFR 60.662(a)] | Reduce emissions of TOC (less methane and ethane) by 98 weight-percent, or to a TOC (less methane and ethane) concentration of 20 ppmv, on a dry basis corrected to 3 percent oxygen, whichever is less stringent. If a boiler or process heater is used to comply with this paragraph, then the vent stream shall be introduced into the flame zone of the boiler or process heater. [40 CFR 60.662(a)] |
| 48 | [40 CFR 60.663(c)(1)] | A flow indicator that provides a record of vent stream flow to the boiler or process heater at least once every hour for each affected facility. The flow indicator shall be installed in the vent stream from each distillation unit within an affected facility at a point closest to the inlet of each boiler or process heater and before being joined with any other vent stream. [40 CFR 60.663(c)(1)] |
| 49 | [40 CFR 60.664(a)] | For the purpose of demonstrating compliance with § 60.662, all affected facilities shall be run at full operating conditions and flow rates during any performance test. [40 CFR 60.664(a)] |
| 50 | [40 CFR 60.664(b)] | Use the 40 CFR 60 Appendix A methods listed in 40 CFR 60.664(b) through (h), except as provided under 40 CFR 60.60.8(b), as reference methods t determine compliance with the emission limit or percent reduction efficiency specified under 40 CFR 60.662(a). 60 Subpart NNN. [40 CFR 60.664(b)] |
| 51 | [40 CFR 60.665(a)] | Notify the LDEQ of the specific provisions of § 60.662 (§ 60.662 (a), (b), or (c)) with which the owner or operator has elected to comply. Notification shall be submitted with the notification of initial start-up required by § 60.7(a)(3). If an owner or operator elects at a later date to use an alternative provision of § 60.662 with which he or she will comply, then the LDEQ shall be notified by the owner or operator 90 days before implementing a change and, upon implementing the change, a performance test shall be performed as specified by § 60.664 within 180 days. [40 CFR 60.665(a)] |

## SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

### EQT 0001 RV-13 - Reformer Vent

| | | |
|---|---|---|
| 52 | [40 CFR 60.665(b)] | Each owner or operator subject to the provisions of this subpart shall keep an up-to-date, readily accessible record of the following data measured during each performance test, and also include the following data in the report of the initial performance test required under § 60.8. Where a boiler or process heater with a design heat input capacity of 44 MW (150 million Btu/hour) or greater is used to comply with § 60.662(a), a report containing performance test data need not be submitted, but a report containing the information in § 60.665(b)(2)(i) is required. The same data specified in 63.665 shall be submitted in the reports of all subsequently required performance tests where either the emission control efficiency of a control device, outlet concentration of TOC, or the TRE index value of a vent stream from a recovery system is determined. [40 CFR 60.665(b)] |
| 53 | [40 CFR 63.663(c)(1)] | Install a flow indicator that provides a record of vent stream flow to the reformer at least once every hour. [40 CFR 63.663(c)(1)] |
| 54 | [40 CFR 63.7540(a)(10)vi] | Maintain on-site and submit, if requested by the Administrator, an annual report containing the information in paragraphs (a)(10)(vi)(A) through (C) of 63.7540. Subpart DDDDD. [40 CFR 63.7540(a)(10)vi] |
| 55 | [40 CFR 63.7540(a)(vi)] | Process heater has a heat input capacity of 10 million Btu per hour or greater, conduct an annual tune-up of the boiler or process heater to demonstrate continuous compliance as specified in paragraphs (a)(10)(i) through (vi) of 63.7540. This frequency does not apply to limited-use boilers and process heaters, as defined in § 63.7575, or units with continuous oxygen trim systems that maintain an optimum air to fuel ratio. [40 CFR 63.7540(a)(vi)] |
| 56 | [40 CFR 63.7540(a)] | Conduct a tune-up of the boiler or process heater annually as specified in 63.7540. Units in either the gas 1 or Metal Process Furnace subcategories will conduct this tune-up as a work proctice for all regulated emissions under 63 Subpart DDDDD. [40 CFR 63.7540(a)] |
| 57 | [40 CFR 63.7555(h)(i)] | Maintain records of the calendar date, time, occurrence and duration of each startup and shutdown. 63 Subpart DDDDD. [40 CFR 63.7555(h)(i)] |
| 58 | [40 CFR 63.7555(h)(j)] | Maintain records of the type(s) and amount(s) of fuels used during each startup and shutdown. 63.Subpart DDDDD. [40 CFR 63.7555(h)(j)] |
| 59 | [40 CFR 63.7560] | maintain records as required in 40 CFR 63.7560 (a) through (c). |
| 60 | [LAC 33:III.1313.C] | Totatal suspended particulate <= 0.6 lb/MMBTU of heat input. |
| 61 | [LAC 33:III.509.J.2] | The Steam Methane Reformer (RV-13) shall be equipped with a Selective Catalytic Reduction (SCR) system for NOx emission control to maintain max NOx <= 0.011 lb/MMBTU (annual average). To ensure compliance with the NOx emission limit, a continuous emission monitoring system (CEMS) shall be installed and maintained on the Steam Methane Reformer (RV-13) to monitor NOx emissions. Ensure that the CEMS meets all of the requirements of 40 CFR Part 60.13 and performance specification 2 of 40 CFR 60, Appendix B, or the requirements of 40 CFR Part 75 for units regulated under the Acid Rain Program - PSD-LA-780. |

### EQT 0007 CT-13 - Cooling Tower

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|---|---|---|
| 62 | [40 CFR 63.104(a)] | Unless one or more of the conditions specified in paragraphs (a)(1) through (a)(6) of this section are met, owners and operators of sources subject to this subpart shall monitor each heat exchange system used to cool process equipment in a chemical manufacturing process unit meeting the conditions of § 63.100 (b)(1) through (b)(3) of this subpart, except for chemical manufacturing process units meeting the condition specified in § 63.100(c) of this subpart, according to the provisions in either paragraph (b) or (c) of this section. Whenever a leak is detected, the owner or operator shall comply with the requirements in paragraph (d) of § 63.104. [40 CFR 63.104(a)] |

## SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

### EQT 0007 CT-13 - Cooling Tower

| | | |
|---|---|---|
| 63 | [40 CFR 63.104(b)] | Heat exchange systems (cooling water): HAP monitored by the regulation's specified method(s) monthly for the first 6 months and quarterly thereafter to detect leaks. Monitor for total hazardous air pollutants, total volatile organic compounds, total organic carbon, one or more speciated HAP compounds, or other representative substances that would indicate the presence of a leak in the heat exchange system. Subpart F. [40 CFR 63.104(b)]<br>Which Months: All Year Statistical Basis: None specified |
| 64 | [40 CFR 63.104(d)] | Heat exchange systems: Repair leaks as soon as practicable but not later than 45 calendar days after receiving results of monitoring tests indicating a leak, if a leak is detected according to the criteria of 40 CFR 63.104(b) or (c). Once the leak has been repaired, confirm that the heat exchange system has been repaired within 7 calendar days of the repair or startup, whichever is later. Subpart F. [40 CFR 63.104(d)] |
| 65 | [40 CFR 63.104(f)(2)iii] | The owner or operator shall report the reason(s) for delay of repair. If delay of repair is invoked due to the reasons described in paragraph (e)(2) of 40 CFR 63.104, documentation of emissions estimates must also be submitted. [40 CFR 63.104(f)(2)iii] |
| 66 | [40 CFR 63.104(f)] | Heat exchange systems: Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Retain the records identified in 40 CFR 63.104(f)(1)(i) through (iv) as specified in 40 CFR 63.103(c)(1). Subpart F. [40 CFR 63.104(f)] |
| 67 | [LAC 33:III.509.J.2] | The cooling tower (CT-13) shall be equipped with high efficiency drift eliminator with drift factor of 0.001% - PSD-LA-780. |

### EQT 0008 FL1-13 - Process Flare

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| 68 | [40 CFR 60.18(b)] | Comply with the control device requirements of 40 CFR 63.18(c) through (f). [40 CFR 60.18(b)] |
| 69 | [40 CFR 60.662(a)] | Reduce emissions of TOC (less methane and ethane) by 98 weight-percent, or to a TOC (less methane and ethane) concentration of 20 ppmv, on a dry basis corrected to 3 percent oxygen, whichever is less stringent. [40 CFR 60.662(a)] |
| 70 | [40 CFR 60.662(b)] | Combust the emissions in a flare that meets the requirements of 60.18. Subpart NNN. [40 CFR 60.662(b)] |
| 71 | [40 CFR 60.663(b)(1)] | Presence of a flame monitored by heat sensing device continuously. Use a heat sensing device, such as an ultra-violet beam sensor or thermocouple, at the pilot light to indicate the continuous presence of a flame. Presence of a flame recordkeeping by electronic or hard copy continuously. [40 CFR 60.663(b)(1)] |
| 72 | [40 CFR 60.663(b)(2)] | Flow monitored by flow indicator that provides a record of vent stream flow to the flare at least once every hour for each affected facility. The flow indicator shall be installed in the vent stream from each affected facility at a point closest to the flare and before being joined with any other vent stream. Presence of flow recordkeeping by electronic or hard copy hourly. [40 CFR 60.663(b)(2)] |
| 73 | [40 CFR 60.664(d)] | When a flare is used to seek to comply with 40 CFR 60.662(b), the flare shall comply with the requirements of 40 CFR 60.18. [40 CFR 60.664(d)] |
| 74 | [40 CFR 60.665(l)] | Submit report: Due semiannually. Submit initial report within 6 months after the initial start-up date. Include the information outlined in 40 CFR 60.665(l)(1) through (l)(7). [40 CFR 60.665(l)] |
| 75 | [40 CFR 63.11(b)(1)] | Monitor flares to assure that they are operated and maintained in conformance with their designs. Subpart A. [40 CFR 63.11(b)(1)] |
| 76 | [40 CFR 63.11(b)(3)] | Operate at all times when emissions may be vented to the flare. Subpart A. [40 CFR 63.11(b)(3)] |
| 77 | [40 CFR 63.11(b)(5)] | Operate with a flame present at all times. Presence of a flame monitored by flame monitor continuously. Use a thermocouple or any other equivalent device to detect the presence of a flame. Subpart A. [40 CFR 63.11(b)(5)] |

**EQT 0008 FL1-13 - Process Flare**

| | | |
|---|---|---|
| 78 | [40 CFR 63.11(b)(5)] | Presence of a flame monitored by flame monitor continuously. Use a thermocouple or any other equivalent device to detect the presence of a flame. Subpart A. [40 CFR 63.11(b)(5)]<br>Which Months: All Year Statistical Basis: None specified |
| 79 | [40 CFR 63.11(b)(6)(i)(A)] | Diameter >= 3 in; nonassisted; Hydrogen content >= 8 % by volume; Exit Velocity < 122 ft/sec (37.2 m/sec) and < Vmax, as determined using the equation specified in 40 CFR 63.11(b)(6)(i)(A). Subpart A. [40 CFR 63.11(b)(6)(i)(A)]<br>Which Months: All Year Statistical Basis: None specified |
| 80 | [40 CFR 63.11(b)(6)(i)(B)] | Determine the actual exit velocity using the method specified in 40 CFR 63.11(b)(7)(i). Subpart A. [40 CFR 63.11(b)(6)(i)(B)] |
| 81 | [40 CFR 63.11(b)(6)(ii)] | Heat content >= 200 BTU/scf (7.45 MJ/scm). Determine the net heating value of the gas being combusted using the equation specified in 40 CFR 63.11(b)(6)(ii). Subpart A. [40 CFR 63.11(b)(6)(ii)]<br>Which Months: All Year Statistical Basis: None specified |
| 82 | [40 CFR 63.11(b)(7)(i)] | Exit Velocity < 60 ft/sec (18.3 m/sec), as determined using the method specified in 40 CFR 63.11(b)(7)(i). Subpart A. [40 CFR 63.11(b)(7)(i)]<br>Which Months: All Year Statistical Basis: None specified |
| 83 | [40 CFR 63.11(b)(7)(ii)] | Exit Velocity >= 60 and < 400 ft/sec (18.3 m/sec and 122 m/sec), as determined by the method specified in 40 CFR 63.11(b)(7)(i). Subpart A. [40 CFR 63.11(b)(7)(ii)]<br>Which Months: All Year Statistical Basis: None specified |
| 84 | [40 CFR 63.11(b)(7)(iii)] | Exit Velocity < 400 ft/sec and Vmax, as determined by the method specified in 40 CFR 63.11(b)(7)(i). Determine Vmax using the method specified in 40 CFR 63.11(b)(7)(iii). Subpart A. [40 CFR 63.11(b)(7)(iii)]<br>Which Months: All Year Statistical Basis: None specified |
| 85 | [40 CFR 63.172(d)] | Comply with the requirements of 40 CFR 63.11(b). Subpart H. [40 CFR 63.172(d)] |
| 86 | [40 CFR 63.172(e)] | Monitor control devices to ensure that they are operated and maintained in conformance with their design. [40 CFR 63.172(e)] |
| 87 | [40 CFR 63.172(h)] | Leaks, as indicated by an instrument reading greater than 500 parts per million above background or by visual inspections, shall be repaired as soon as practicable. A first attempt at repair shall be made no later than 5 calendar days after the leak is detected; repair shall be completed no later than 15 calendar days after the leak is detected except as provided in paragraph (i) of 63.172 Subpart H. [40 CFR 63.172(h)] |
| 88 | [LAC 33:III.1105] | The emission of smoke from a flare or other similar device used for burning in connection with pressure valve releases for control over process upsets shall be controlled so that the shade or appearance of the emission does not exceed 20 percent opacity (LAC 33:III.1503.D.2, Table 4) for a combined total of six hours in any 10 consecutive days. Determine opacity by using Method 9 or 40 CFR Part 60, Appendix A or by using continuous opacity monitoring system (COMS) meeting the requirements outlined in 40 CFR 60.13(c) and (d). If it appears the emergency cannot be controlled in six hours, SPOC shall be notified by the emitter in accordance with LAC 33:I.3923 as soon as possible after the start of the upset period. |
| 89 | [LAC 33:III.1107] | Exemptions from the provisions of LAC 33:III.1105 may be granted by the administrative authority during start-up and shutdown periods if the flaring was not the result of failure to maintain or repair equipment. A report in writing, explaining the conditions and duration of the start-up or shutdown and listing the steps necessary to remedy, prevent, and limit the excess emission, shall be submitted to SPOC within seven calendar days of the occurrence. In addition, the flaring must be minimized and no ambient air quality standard may be jeopardized. |

**EQT 0009 FL2-13 - Tank Flare**

# SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

## EQT 0009 FL2-13 - Tank Flare

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| 90 | [40 CFR 60.112b(a)(ii)] | The control device shall be designed and operated to reduce inlet VOC emissions by 95 percent or greater. If a flare is used as the control device, it shall meet the specifications described in the general control device requirements (60.18) of the General Provisions. 60 Subpart Kb. [40 CFR 60.112b(a)(ii)] |
| 91 | [40 CFR 60.113b(c)(2)] | Operate the closed vent system and control device and monitor the parameters of the closed vent system and control device in accordance with the operating plan submitted to the Administrator in accordance with paragraph 60.113b(c)(1) of this section, unless the plan was modified by the LDEQ during the review process. In this case, the modified plan applies. [40 CFR 60.113b(c)(2)] |
| 92 | [40 CFR 60.115b(d)(2)] | Records shall be kept of all periods of operation during which the flare pilot flame is absent. Keep copies of all records for at least two years. [40 CFR 60.115b(d)(2)] |
| 93 | [40 CFR 60.115b(d)(3)] | Semiannual reports of all periods recorded under § 60.115b(d)(2) in which the pilot flame was absent shall be furnished to the LDEQ. Keep copies of all records for at least two years. [40 CFR 60.115b(d)(3)] |
| 94 | [40 CFR 60.18(b)] | Comply with the control device requirements of 40 CFR 63.18(c) through (f). [40 CFR 60.18(b)] |
| 95 | [40 CFR 63.11(b)(1)] | Monitor flares to assure that they are operated and maintained in conformance with their designs. Subpart A. [40 CFR 63.11(b)(1)] |
| 96 | [40 CFR 63.11(b)(3)] | Operate at all times when emissions may be vented to the flare. Subpart A. [40 CFR 63.11(b)(3)] |
| 97 | [40 CFR 63.172(d)] | Comply with the requirements of 40 CFR 63.11(b). Subpart H. [40 CFR 63.172(d)] |
| 98 | [40 CFR 63.172(e)] | Monitor control devices to ensure that they are operated and maintained in conformance with their design. [40 CFR 63.172(e)] |
| 99 | [40 CFR 63.172(h)] | Leaks, as indicated by an instrument reading greater than 500 parts per million above background or by visual inspections, shall be repaired as soon as practicable. A first attempt at repair shall be made no later than 5 calendar days after the leak is detected; repair shall be completed no later than 15 calendar days after the leak is detected except as provided in paragraph (i) of 63.172 Subpart H. [40 CFR 63.172(h)] |
| 100 | [LAC 33:III.1105] | The emission of smoke from a flare or other similar device used for burning in connection with pressure valve releases for control over process upsets shall be controlled so that the shade or appearance of the emission does not exceed 20 percent opacity (LAC 33:III.1503.D.2, Table 4) for a combined total of six hours in any 10 consecutive days. Determine opacity by using Method 9 or 40 CFR Part 60, Appendix A or by using continuous opacity monitoring system (COMS) meeting the requirements outlined in 40 CFR 60.13(c) and (d). If it appears the emergency cannot be controlled in six hours, SPOC shall be notified by the emitter in accordance with LAC 33:I.3923 as soon as possible after the start of the upset period. |
| 101 | [LAC 33:III.1107] | Exemptions from the provisions of LAC 33:III.1105 may be granted by the administrative authority during start-up and shutdown periods if the flaring was not the result of failure to maintain or repair equipment. A report in writing, explaining the conditions and duration of the start-up or shutdown and listing the steps necessary to remedy, prevent, and limit the excess emission, shall be submitted to SPOC within seven calendar days of the occurrence. In addition, the flaring must be minimized and no ambient air quality standard may be jeopardized. |

## EQT 0012 DEG1-13 - 1100 HP Diesel Fired Emergency Generator Engine

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|---|---|---|
| 102 | [40 CFR 60.4205(b)] | Comply with the emission standards for new nonroad CI engines in 40 CFR 60.4202, for all pollutants, for the same model year and maximum engine power. Subpart IIII. [40 CFR 60.4205(b)] |
| 103 | [40 CFR 60.4206] | Operate and maintain stationary CI ICE that achieve the emission standards as required in 40 CFR 60.4204 and 40 CFR 60.4205 over the entire life of the engine. Subpart IIII. |

# SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

## EQT 0012 DEG1-13 - 1100 HP Diesel Fired Emergency Generator Engine

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|---|---|---|
| 104 | [40 CFR 60.4207(b)] | Use diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel, except that any existing diesel fuel purchased (or otherwise obtained) prior to October 1, 2010, may be used until depleted. Subpart IIII. [40 CFR 60.4207(b)] |
| 105 | [40 CFR 60.4209(a)] | Operating time monitored by hour/time monitor continuously during operation. If the emergency engine meets the standards applicable to emergency engines, install a non-resettable hour meter prior to startup of the engine. Subpart IIII. [40 CFR 60.4209(a)]<br>Which Months: All Year Statistical Basis: None specified |
| 106 | [40 CFR 60.4211(a)(1)] | Operate and maintain the stationary CI internal combustion engine and control device according to the manufacturer's emission-related written instructions, except as permitted in 40 CFR 60.4211(g). Subpart IIII. [40 CFR 60.4211(a)(1)] |
| 107 | [40 CFR 60.4211(a)(2)] | Change only those emission-related settings that are permitted by the manufacturer, except as permitted in 40 CFR 60.4211(g). Subpart IIII. [40 CFR 60.4211(a)(2)] |
| 108 | [40 CFR 60.4211(a)(3)] | Meet the requirements of 40 CFR 89, 94 and/or 1068, as applicable, except as permitted in 40 CFR 60.4211(g). Subpart IIII. [40 CFR 60.4211(a)(3)] |
| 109 | [40 CFR 60.4211(c)] | Ensure engine is certified to the emission standards in 40 CFR 60.4204(b), or 40 CFR 60.4205(b) or (c), as applicable, for the same model year and maximum (or in the case of fire pumps, NFPA nameplate) engine power. Install and configure according to the manufacturer's emissions-related specifications, except as permitted in 40 CFR 60.4211(g). Subpart IIII. [40 CFR 60.4211(c)] |
| 110 | [40 CFR 60.4211(f)] | Operate according to the requirements in 40 CFR 60.4211(f)(1) through (f)(3). Any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in nonemergency situations for 50 hours per year, as described in 40 CFR 60.4211(f)(1) through (f)(3), is prohibited. May operate your emergency stationary ICE for any combination of the purposes specified in paragraphs (f)(2)(i) through (iii) of this section for a maximum of 100 hours per calendar year. 40 CFR 60 Subpart IIII. [40 CFR 60.4211(f)] |
| 111 | [40 CFR 60.4211(g)] | Keep a maintenance plan and records of conducted maintenance. Subpart IIII. [40 CFR 60.4211(g)] |
| 112 | [40 CFR 60.4211(g)] | Maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. Subpart IIII. [40 CFR 60.4211(g)] |
| 113 | [40 CFR 60.4214(b)] | Operating time recordkeeping by electronic or hard copy upon occurrence of event. If the emergency engine meets the standards applicable to emergency engines in the applicable model year, keep records of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Subpart IIII. [40 CFR 60.4214(b)] |
| 114 | [40 CFR 63.6590(b)] | Meet the initial notification requirements of § 63.6645(f). 63 Subpart ZZZZ. [40 CFR 63.6590(b)] |
| 115 | [LAC 33:III.1101.B] | Opacity <= 20 percent, except for emissions that have an average opacity in excess of 20 percent for not more than one six-minute period in any 60 consecutive minutes. Determine opacity by using Method 9 of 40 CFR Part 60, Appendix A or by using a continuous opacity monitoring system (COMS) meeting the requirements outlined in 40 CFR 60.13(c)and (d). |
| 116 | [LAC 33:III.1311.C] | Opacity <= 20 percent, except for emissions that have an average opacity in excess of 20 percent for not more than one six-minute period in any 60 consecutive minutes. |

## EQT 0013 DFP1-13 - 373 HP Diesel Fire Pump Engine

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| 117 | [40 CFR 60.4205(c)] | Non-methane hydrocarbons plus Nitrogen oxides (NOx) <= 3.0 g/BHP-hr (4.0 g/KW-hr). Subpart IIII. [40 CFR 60.4205(c)]<br>Which Months: All Year Statistical Basis: None specified |

## SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
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**EQT 0013 DFP1-13 - 373 HP Diesel Fire Pump Engine**

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|---|---|---|
| 118 | [40 CFR 60.4205(c)] | Particulate matter (10 microns or less) (PM10) <= 0.15 g/BHP-hr (0.20 g/KW-hr). Subpart IIII. [40 CFR 60.4205(c)]<br>Which Months: All Year Statistical Basis: None specified |
| 119 | [40 CFR 60.4206] | Operate and maintain stationary CI ICE that achieve the emission standards as required in 40 CFR 60.4204 and 40 CFR 60.4205 over the entire life of the engine. Subpart IIII. |
| 120 | [40 CFR 60.4207(b)] | Use diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel, except that any existing diesel fuel purchased (or otherwise obtained) prior to October 1, 2010, may be used until depleted. Subpart IIII. [40 CFR 60.4207(b)] |
| 121 | [40 CFR 60.4209(a)] | Operating time monitored by hour/time monitor continuously during operation. If the emergency engine meets the standards applicable to emergency engines, install a non-resettable hour meter prior to startup of the engine. Subpart IIII. [40 CFR 60.4209(a)]<br>Which Months: All Year Statistical Basis: None specified |
| 122 | [40 CFR 60.4211(a)(1)] | Operate and maintain the stationary CI internal combustion engine and control device according to the manufacturer's emission-related written instructions, except as permitted in 40 CFR 60.4211(g). Subpart IIII. [40 CFR 60.4211(a)(1)] |
| 123 | [40 CFR 60.4211(a)(2)] | Change only those emission-related settings that are permitted by the manufacturer, except as permitted in 40 CFR 60.4211(g). Subpart IIII. [40 CFR 60.4211(a)(2)] |
| 124 | [40 CFR 60.4211(a)(3)] | Meet the requirements of 40 CFR 89, 94 and/or 1068, as applicable, except as permitted in 40 CFR 60.4211(g). Subpart IIII. [40 CFR 60.4211(a)(3)] |
| 125 | [40 CFR 60.4211(c)] | Ensure engine is certified to the emission standards in 40 CFR 60.4204(b), or 40 CFR 60.4205(b) or (c), as applicable, for the same model year and maximum (or in the case of fire pumps, NFPA nameplate) engine power. Install and configure according to the manufacturer's emissions-related specifications, except as permitted in 40 CFR 60.4211(g). Subpart IIII. [40 CFR 60.4211(c)] |
| 126 | [40 CFR 60.4211(f)] | Operate according to the requirements in 40 CFR 60.4211(f)(1) through (f)(3). Any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in nonemergency situations for 50 hours per year, as described in 40 CFR 60.4211(f)(1) through (f)(3), is prohibited. May operate your emergency stationary ICE for any combination of the purposes specified in paragraphs (f)(2)(i) through (iii) of this section for a maximum of 100 hours per calendar year. 40 CFR 60 Subpart IIII. [40 CFR 60.4211(f)] |
| 127 | [40 CFR 60.4211(g)] | Keep a maintenance plan and records of conducted maintenance. Subpart IIII. [40 CFR 60.4211(g)] |
| 128 | [40 CFR 60.4211(g)] | Maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. Subpart IIII. [40 CFR 60.4211(g)] |
| 129 | [40 CFR 60.4214(b)] | Operating time recordkeeping by electronic or hard copy upon occurrence of event. If the emergency engine meets the standards applicable to emergency engines in the applicable model year, keep records of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Subpart IIII. [40 CFR 60.4214(b)] |
| 130 | [40 CFR 63.6590(c)] | Comply with the requirements of 63 Supart ZZZZ by meeting the requirements of 40 CFR 60 Subpart IIII forcompression ignition engines. 63 Subpart ZZZZ. [40 CFR 63.6590(c)] |
| 131 | [LAC 33:III.1101.B] | Opacity <= 20 percent, except for emissions that have an average opacity in excess of 20 percent for not more than one six-minute period in any 60 consecutive minutes. Determine opacity by using Method 9 of 40 CFR Part 60, Appendix A or by using a continuous opacity monitoring system (COMS) meeting the requirements outlined in 40 CFR 60.13(c)and (d). |
| 132 | [LAC 33:III.1311.C] | Opacity <= 20 percent, except for emissions that have an average opacity in excess of 20 percent for not more than one six-minute period in any 60 consecutive minutes. |

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### EQT 0017 OSMT1-13 - Crude-Offspec Tank 1

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|---|---|---|
| 133 | [40 CFR 60.110b] | Comply with the requirements of 40 CFR 63 Subpart G. (NSPS Subpart Kb). |
| 134 | [40 CFR 63.119(a)(1)] | Reduce hazardous air pollutants emissions to the atmosphere either by operating and maintaining a fixed roof and internal floating roof, an external floating roof, an external floating roof converted to an internal floating roof, a closed-vent system and control device, routing the emissions to a process or a fuel gas system, or vapor balancing in accordance with the requirements in 40 CFR 63.119(b). (c), (d), (e), (f), or (g) or equivalent as provided in 63.121. Subpart G. [40 CFR 63.119(a)(1)] |
| 135 | [40 CFR 63.120(d)(1)] | The owner or operator shall either prepare a design evaluation, which includes the information specified in paragraph (d)(1)(i) of this section, or submit the results of a performance test as described in paragraph (d)(1)(ii) of 63 Subpart G . [40 CFR 63.120(d)(1)] |
| 136 | [40 CFR 63.120(d)(2 and 3)] | Submit a monitoring plan as part of the Notification of Compliance Status containing the information specified in paragraph (d)(2)(i) through (d)(2)(iii) and (d)3 of 63.120. Subpart G. [40 CFR 63.120(d)(2 and 3)] |
| 137 | [40 CFR 63.120(d)(5)] | The owner or operator shall monitor the parameters specified in the Notification of Compliance Status required in § 63.152(b) of 63 Subpart G or in the operating permit and shall operate and maintain the control device such that the monitored parameters remain within the ranges specified in the Notification of Compliance Status. [40 CFR 63.120(d)(5)] |
| 138 | [40 CFR 63.120(d)(6)] | Closed vent system shall be inspected as specified in § 63.148 of 63 Subpart G. The initial and annual inspections required by § 63.148(b) of this subpart shall be done during filling of the storage vessel. [40 CFR 63.120(d)(6)] |
| 139 | [40 CFR 63.122(a)(4)] | Shall submit Periodic Reports as required by 63.152(c) and shall submit as part of the Periodic Reports the information specified in paragraphs (d), (e), (f), and (g) of 63.152 Subpart G. [40 CFR 63.122(a)(4)] |
| 140 | [40 CFR 63.122(a)(5)] | Shall submit, as applicable, other reports as required by 63.152(d) of Subpart G, containing the information specified in paragraph 63.122 (h). Subpart G. [40 CFR 63.122(a)(5)] |
| 141 | [LAC 33:III.2013.A] | Equip with a submerged fill pipe. A pressure tank capable of maintaining working pressures sufficient at all times under normal operating conditions to prevent vapor or gas loss to the atmosphere. |
| 142 | [LAC 33:III.2103.B] | Maintaining working pressures sufficient at all times under normal operating conditions to prevent vapor or gas loss to the atmosphere. |
| 143 | [LAC 33:III.2103.E.1] | The vapor loss control system shall reduce inlet emissions of total volatile organic compounds by 95 percent or greater. |
| 144 | [LAC 33:III.2103.H.3] | Determine VOC maximum true vapor pressure using the methods in LAC 33:III.2103.H.3 a-e. |
| 145 | [LAC 33:III.2103.I] | Shall maintain records to verify compliance with or exemption from LAC 33:III.2103. The records shall be maintained for at least two years. |
| 146 | [LAC 33:III.2103.J] | The notice shall be provided to the Office of Environmental Compliance in the manner identified in LAC 33:I.3923.A in advance, if possible, but no later than 24 hours after the tank starts filling. |

### FUG 0001 WWTF-13 - Wastewater Treatment Fugitive

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| 147 | [40 CFR 63.105(b)] | The owner or operator shall prepare a description of maintenance procedures for management of wastewaters generated from the emptying and purging of equipment in the process during temporary shutdowns for inspections, maintenance, and repair (i.e., a maintenance-turnaround) and during periods which are not shutdowns (i.e., routine maintenance). [40 CFR 63.105(b)] |
| 148 | [40 CFR 63.105(c)] | The owner or operator shall modify and update the information required by paragraph (b) of this section as needed following each maintenance procedure based on the actions taken and the wastewaters generated in the preceding maintenance procedure. [40 CFR 63.105(c)] |

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### FUG 0001 WWTF-13 - Wastewater Treatment Fugitive

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| 149 | [40 CFR 63.105(e)] | The owner or operator shall maintain a record of the information required by paragraphs (b) and (c) of this section as part of the start-up, shutdown, and malfunction plan required under § 63.6(e)(3). [40 CFR 63.105(e)] |
| 150 | [40 CFR 63.144(b)(3)] | Where knowledge is used to determine the annual average concentration, the owner or operator shall provide sufficient information to document the annual average concentration for wastewater streams determined to be Group 2 wastewater streams. Documentation to determine the annual average concentration is not required for Group 1 streams. Examples of acceptable documentation include material balances, records of chemical purchases, process stoichiometry, or previous test results. If test data are used, the owner or operator shall provide documentation describing the testing protocol and the means by which any losses of volatile compounds during sampling, and the bias and accuracy of the analytical method, were accounted for in the determination. [40 CFR 63.144(b)(3)] |
| 151 | [40 CFR 63.144(c)(1)] | Where knowledge is used to determine the annual average flow rate, the owner or operator shall provide sufficient information to document the flow rate for wastewater streams determined to be Group 2 wastewater streams. [40 CFR 63.144(c)(1)] |
| 152 | [40 CFR 63.146(b)(1)] | For Group 2 wastewater streams, the owner or operator shall include the information specified in paragraphs (b)(1)(i) through (iv) of this section in the Notification of Compliance Status Report. [40 CFR 63.146(b)(1)] |
| 153 | [40 CFR 63.147(b)(8)] | This paragraph (b)(8) does not apply to Group 2 wastewater streams that are used to comply with § 63.138(g). For all other Group 2 wastewater streams, the owner or operator shall keep in a readily accessible location the records specified in paragraphs (b)(8)(i) through (iv) of 63.147. [40 CFR 63.147(b)(8)] |
| 154 | [40 CFR 63.149] | Equip drains and sumps of in-process water streams meeting 63.139(e) criteria with controls per 63 Subpart G Table 35. |
| 155 | [LAC 33:III.2121.B.1] | Repair according to LAC 33:III.2121.B.3 any regulated component observed leaking by sight, sound, or smell, regardless of the leak's concentration. |
| 156 | [LAC 33:III.2121.B.3] | Make every reasonable effort to repair a leaking component, as described in LAC 33:III.2121.B, within 15 days, except as specified in LAC 33:III.2121.B.3. |
| 157 | [LAC 33:III.2121.E.1] | When a leak that cannot be repaired on-line and in-place is located, affix to the leaking component a weatherproof and readily visible tag bearing an identification number and the date the leak is located. Date and remove the tag after the leak is repaired. |
| 158 | [LAC 33:III.2121.E] | Equipment/operational data recordkeeping by survey log upon each occurrence of a leak. Include the leaking component information specified in LAC 33:III.2121.E.2. Retain the survey log for two years after the latter date specified in LAC 33:III.2121.E.2 and make said log available to DEQ upon request. |
| 159 | [LAC 33:III.2121.F] | Submit report: Due semiannually, by the 31st of January and July, to the Office of Environmental Services. Include the information specified in LAC 33:III.2121.F.1 through F.4 for each calendar quarter during the reporting period. |

### FUG 0002 PF-13 - Process Fugitives

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| 160 | [40 CFR 60.480(a)] | Comply with 40 CFR 60 NSPS Subpart VVa by implementing the Louisiana Consolidated Fugitive Emission Program Guidelines. Compliance is achieved through compliance with 40 CFR 63 Subpart H. [40 CFR 60.480(a)] |
| 161 | [40 CFR 61.240] | Comply with 40 CFR 61 NESHAP Subpart V by implementing the Louisiana Consolidated Fugitive Emission Program Guidelines. Compliance is achieved through compliance with 40 CFR 63 Subpart H. |
| 162 | [40 CFR 63.162(c)] | Identify each piece of equipment in a process unit such that it can be distinguished readily from equipment that is not subject to 40 CFR 63 Subpart H. Subpart H. [40 CFR 63.162(c)] |

**FUG 0002 PF-13 - Process Fugitives**

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|---|---|---|
| 163 | [40 CFR 63.162(f)] | Clearly identify leaking equipment, for leaking equipment detected as specified in 40 CFR 63.163, 40 CFR 63.164, 40 CFR 63.168, 40 CFR 63.169, and 40 CFR 63.172 through 63.174. The identification may be removed after the equipment is repaired, except for valves or for connectors subject to 40 CFR 63.174(c)(1)(i). The identification on a valve may be removed after it has been monitored as specified in 40 CFR 63.168(f)(3) and 63.175(e)(i)(D), and no leak has been detected during the follow-up monitoring. If electing to comply using the provisions of 40 CFR 63.174(c)(1)(i), the identification on a connector may be removed after it is monitored as specified in 40 CFR 63.174(c)(1)(i) and no leak is detected during that monitoring. Subpart H. [40 CFR 63.162(f)] |
| 164 | [40 CFR 63.163(b)(1)] | Pumps in light liquid service: Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 monthly to detect leaks, except as provided in 40 CFR 63.162(b) and 63.163(e) through (j). If a reading of 10,000 ppm (phase I); 5,000 ppm (phase II); or 5,000 ppm (phase III, pumps handling polymerizing monomers), 2,000 ppm (phase III, pumps in food/medical service), or 1,000 ppm (phase III, all other pumps) or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.163(c). Subpart H. [40 CFR 63.163(b)(1)]<br>Which Months: All Year Statistical Basis: None specified |
| 165 | [40 CFR 63.163(b)(3)] | Pumps in light liquid service: Presence of a leak monitored by visual inspection/determination weekly (calendar). Monitor for indications of liquids dripping from the pump seal. If there are indications of liquids dripping from the pump seal, a leak is detected. If a leak is detected, initiate the repair provisions specified in 40 CFR 63.163(c). Subpart H. [40 CFR 63.163(b)(3)]<br>Which Months: All Year Statistical Basis: None specified |
| 166 | [40 CFR 63.163(c)] | Pumps in light liquid service: Make a first attempt at repair no later than 5 calendar days after a leak is detected, and complete repairs no later than 15 calendar days after the leak is detected, except as provided in 40 CFR 63.163(c)(3) and 40 CFR 63.171. Subpart H. [40 CFR 63.163(c)] |
| 167 | [40 CFR 63.163(d)(2)] | Pumps in light liquid service: Implement a quality improvement program for pumps that complies with the requirements of 40 CFR 63.176, if, in Phase III, calculated on a 6-month rolling average, the greater of either 10 percent of the pumps in a process unit or three pumps in a process unit leak. Subpart H. [40 CFR 63.163(d)(2)] |
| 168 | [40 CFR 63.163(d)(4)] | Pumps in light liquid service: Determine percent leaking pumps using the equation in 40 CFR 63.163(d)(4). Subpart H. [40 CFR 63.163(d)(4)] |
| 169 | [40 CFR 63.163(e)(1)] | Pumps in light liquid service (dual mechanical seal system): Operate with the barrier fluid at a pressure that is at all times greater than the pump stuffing box pressure; or equip with a barrier fluid degassing reservoir that is routed to a process or fuel gas system or connected by a closed-vent system to a control device that complies with the requirements of 40 CFR 63.172; or equip with a closed-loop system that purges the barrier fluid into a process stream. Comply with this requirement instead of the requirements in 40 CFR 63.163(a) through (d). Subpart H. [40 CFR 63.163(e)(1)] |
| 170 | [40 CFR 63.163(e)(2)] | Pumps in light liquid service (dual mechanical seal system): Ensure that the barrier fluid is not in light liquid service. Comply with this requirement instead of the requirements in 40 CFR 63.163(a) through (d). Subpart H. [40 CFR 63.163(e)(2)] |
| 171 | [40 CFR 63.163(e)(3)] | Pumps in light liquid service (dual mechanical seal system): Equip barrier fluid system with a sensor that will detect failure of the seal system, barrier fluid system, or both. Comply with this requirement instead of the requirements in 40 CFR 63.163(a) through (d). Subpart H. [40 CFR 63.163(e)(3)] |
| 172 | [40 CFR 63.163(e)(4)] | Pumps in light liquid service (dual mechanical seal system): Presence of a leak monitored by visual inspection/determination weekly (calendar). Monitor for indications of liquids dripping from the pump seal. If there are indications of liquid dripping from the pump seal at the time of the weekly inspection, monitor the pump as specified in 40 CFR 63.180(b) to determine if there is a leak of organic HAP in the barrier fluid. If an instrument reading of 1,000 ppm or greater is measured, a leak is detected. If a leak is detected, initiate the repair provisions in 40 CFR 63.163(e)(6). Comply with this requirement instead of the requirements in 40 CFR 63.163(a) through (d). Subpart H. [40 CFR 63.163(e)(4)]<br>Which Months: All Year Statistical Basis: None specified |

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### FUG 0002 PF-13 - Process Fugitives

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|---|---|---|
| 173 | [40 CFR 63.163(e)(6)(i)] | Pumps in light liquid service (dual mechanical seal system): Determine, based on design considerations and operating experience, criteria that indicates failure of the seal system, the barrier fluid system, or both. Comply with this requirement instead of the requirements in 40 CFR 63.163(a) through (d). Subpart H. [40 CFR 63.163(e)(6)(i)] |
| 174 | [40 CFR 63.163(e)(6)] | Pumps in light liquid service (dual mechanical seal system): Make a first attempt at repair no later than 5 calendar days after each leak is detected, and complete repairs no later than 15 calendar days after the leak is detected, except as provided in 40 CFR 63.171. Comply with this requirement instead of the requirements in 40 CFR 63.163(a) through (d). Subpart H. [40 CFR 63.163(e)(6)] |
| 175 | [40 CFR 63.163(e)] | Pumps in light liquid service (dual mechanical seal system - sensor): Equipment/operational data monitored by visual inspection/determination daily, or equip with an audible alarm unless the pump is located within the boundary of an unmanned plant site. If the sensor indicates failure of the seal system, the barrier fluid system, or both based on the criteria established in 40 CFR 63.163(e)(6), a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.163(e)(6). Comply with this requirement instead of the requirements in 40 CFR 63.163(a) through (d). Subpart H. [40 CFR 63.163(e)]<br>Which Months: All Year Statistical Basis: None specified |
| 176 | [40 CFR 63.163(j)(1)] | Pumps in light liquid service (unsafe-to-monitor): Determine that the pump is unsafe-to-monitor because monitoring personnel would be exposed to an immediate danger as a consequence of complying with 40 CFR 63.163(b) through (d). Comply with this requirement instead of the requirements in 40 CFR 63.163(b) through (e). Subpart H. [40 CFR 63.163(j)(1)] |
| 177 | [40 CFR 63.163(j)(2)] | Pumps in light liquid service (unsafe-to-monitor): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency. Maintain a written plan that requires monitoring of the pump as frequently as practicable during safe-to-monitor times but not more frequently than the periodic monitoring schedule otherwise applicable. Comply with this requirement instead of the requirements in 40 CFR 63.163(b) through (e). Subpart H. [40 CFR 63.163(j)(2)]<br>Which Months: All Year Statistical Basis: None specified |
| 178 | [40 CFR 63.164(a)] | Compressors: Equip with a seal system that includes a barrier fluid system and that prevents leakage of process fluid to the atmosphere, except as provided in 40 CFR 63.162(b) and 40 CFR 63.164(h) and (i). Subpart H. [40 CFR 63.164(a)] |
| 179 | [40 CFR 63.164(b)] | Compressors: Operate the seal system with the barrier fluid at a pressure that is greater than the compressor stuffing box pressure; or equip with a barrier fluid system degassing reservoir that is routed to a process or fuel gas system or connected by a closed-vent system to a control device that complies with the requirements of 40 CFR 63.172; or equip with a closed-loop system that purges the barrier fluid directly into a process stream. Subpart H. [40 CFR 63.164(b)] |
| 180 | [40 CFR 63.164(c)] | Compressors: Ensure that the barrier fluid is not in light liquid service. Subpart H. [40 CFR 63.164(c)] |
| 181 | [40 CFR 63.164(d)] | Compressors: Equip each barrier fluid system as described in 40 CFR 63.164(a) through (c) with a sensor that will detect failure of the seal system, barrier fluid system, or both. Subpart H. [40 CFR 63.164(d)] |
| 182 | [40 CFR 63.164(e)(2)] | Compressors (sensor): Determine, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both. Subpart H. [40 CFR 63.164(e)(2)] |
| 183 | [40 CFR 63.164(g)] | Compressors: Make a first attempt at repair no later than 5 calendar days after each leak is detected, and complete repairs no later than 15 calendar days after each leak is detected, except as provided in 40 CFR 63.171. Subpart H. [40 CFR 63.164(g)] |
| 184 | [40 CFR 63.164(i)(2)] | Compressors (no detectable emissions): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 once initially and annually, and at other times requested by DEQ. Comply with this requirement instead of the requirements in 40 CFR 63.164(a) through (h). Subpart H. [40 CFR 63.164(i)(2)]<br>Which Months: All Year Statistical Basis: None specified |

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## FUG 0002 PF-13 - Process Fugitives

| | | |
|---|---|---|
| 185 | [40 CFR 63.164] | Compressors (sensor): Equipment/operational data monitored by visual inspection/determination daily, or equip with an alarm, unless the compressor is located within the boundary of an unmanned plant site. If the sensor indicates failure of the seal system, the barrier fluid system, or both based on the criterion determined under 40 CFR 63.164(e)(2), a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.164(g). Subpart H.<br>Which Months: All Year Statistical Basis: None specified |
| 186 | [40 CFR 63.165(a)] | Pressure relief device in gas/vapor service: Organic HAP < 500 ppm above background except during pressure releases, as determined by the method specified in 63.180(c). Subpart H. [40 CFR 63.165(a)]<br>Which Months: All Year Statistical Basis: None specified |
| 187 | [40 CFR 63.165(b)(1)] | Pressure relief devices in gas/vapor service: After each pressure release, return to a condition indicated by an instrument reading of less than 500 ppm above background, as soon as practicable, but no later than 5 calendar days after each pressure release, except as provided in 40 CFR 63.171. Subpart H. [40 CFR 63.165(b)(1)] |
| 188 | [40 CFR 63.165(b)(2)] | Pressure relief devices in gas/vapor service: Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 within 5 days (calendar) after the pressure release and being returned to organic HAP service, to confirm the condition indicated by an instrument reading of less than 500 ppm above background, as measured by the method specified in 40 CFR 63.180(c). Subpart H. [40 CFR 63.165(b)(2)]<br>Which Months: All Year Statistical Basis: None specified |
| 189 | [40 CFR 63.165(d)(2)] | Pressure relief devices in gas/vapor service (rupture disk): After each pressure release, install a new rupture disk upstream of the pressure relief device as soon as practicable, but no later than 5 calendar days after each pressure release, except as provided in 40 CFR 63.171. Comply with this requirement instead of the requirements in 40 CFR 63.165(a) and (b). Subpart H. [40 CFR 63.165(d)(2)] |
| 190 | [40 CFR 63.166] | Sampling connection systems: Equip with a closed-purge, closed-loop, or closed-vent system, except as provided in 40 CFR 63.162(b). Operate the system as specified in 40 CFR 63.166(b). Subpart H. |
| 191 | [40 CFR 63.167] | Open-ended valves or lines: Equip with a cap, blind flange, plug, or a second valve, except as provided in 40 CFR 63.162(b) and 40 CFR 63.167(d) and (e). Ensure that the cap, blind flange, plug or second valve seals the open end at all times except during operations requiring process fluid flow through the open-ended valve or line, or during maintenance or repair. Operate each open-ended valve or line equipped with a second valve in a manner such that the valve on the process fluid end is closed before the second valve is closed. Subpart H. |
| 192 | [40 CFR 63.168(c)] | Valves in gas/vapor service or light liquid service (Phase I): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 quarterly, as specified in 40 CFR 63.180(b). If an instrument reading of 10,000 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions in 40 CFR 63.168(f). Subpart H. [40 CFR 63.168(c)]<br>Which Months: All Year Statistical Basis: None specified |
| 193 | [40 CFR 63.168(c)] | Valves in gas/vapor service or light liquid service (Phase II): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 quarterly, as specified in 40 CFR 63.180(b). If an instrument reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions in 40 CFR 63.168(f). Subpart H. [40 CFR 63.168(c)]<br>Which Months: All Year Statistical Basis: None specified |

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**FUG 0002 PF-13 - Process Fugitives**

| | | |
|---|---|---|
| 194 | [40 CFR 63.168(d)(1)] | Valves in gas/vapor service or light liquid service (Phase III, 2 percent or greater leaking valves): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 monthly, as specified in 40 CFR 63.180(b); or implement a quality improvement program for valves that complies with the requirements of 40 CFR 63.175 and monitor quarterly. If an instrument reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions in 40 CFR 63.168(f). If electing to implement a quality improvement program, follow the procedures in 40 CFR 63.175. Subpart H. [40 CFR 63.168(d)(1)]<br>Which Months: All Year Statistical Basis: None specified |
| 195 | [40 CFR 63.168(d)(2)] | Valves in gas/vapor service or light liquid service (Phase III, less than 2 percent leaking valves): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 quarterly, as specified in 40 CFR 63.180(b). If an instrument reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions in 40 CFR 63.168(f). Permittee may elect to comply with the alternate standards in 40 CFR 63.168(d)(3) and (d)(4). Subpart H. [40 CFR 63.168(d)(2)]<br>Which Months: All Year Statistical Basis: None specified |
| 196 | [40 CFR 63.168(e)(1)] | Valves in gas/vapor service or light liquid service: Determine percent leaking valves using the equation in 40 CFR 63.168(e)(1). Subpart H. [40 CFR 63.168(e)(1)] |
| 197 | [40 CFR 63.168(f)(3)] | Valves in gas/vapor service or light liquid service (after leak repair): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 once within three months (at least) after repair to determine whether the valve has resumed leaking. Subpart H. [40 CFR 63.168(f)(3)]<br>Which Months: All Year Statistical Basis: None specified |
| 198 | [40 CFR 63.168(f)] | Valves in gas/vapor service or light liquid service: Make a first attempt at repair no later than 5 calendar days after a leak is detected, and complete repairs no later than 15 calendar days after the leak is detected, except as provided in 40 CFR 63.171. Subpart H. [40 CFR 63.168(f)] |
| 199 | [40 CFR 63.168(h)(1)] | Valves in gas/vapor service or light liquid service (unsafe-to-monitor): Demonstrate that the valve is unsafe to monitor because monitoring personnel would be exposed to an immediate danger as a consequence of complying with 40 CFR 63.168(b) through (d). Comply with this requirement instead of the requirements in 40 CFR 63.168(b) through (f). Subpart H. [40 CFR 63.168(h)(1)] |
| 200 | [40 CFR 63.168(h)(2)] | Valves in gas/vapor service or light liquid service (unsafe-to-monitor): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency. Maintain a written plan that requires monitoring of the valves as frequently as practicable during safe-to-monitor times, but not more frequently than the periodic monitoring schedule otherwise applicable. Comply with this requirement instead of the requirements in 40 CFR 63.168(b) through (f). Subpart H. [40 CFR 63.168(h)(2)]<br>Which Months: All Year Statistical Basis: None specified |
| 201 | [40 CFR 63.168(i)(1)] | Valves in gas/vapor service or light liquid service (difficult-to-monitor): Demonstrate that the valve cannot be monitored without elevating the monitoring personnel more than 2 meters above a support surface or it is not accessible at anytime in a safe manner. Comply with this requirement instead of the requirements in 40 CFR 63.168(b) through (d). Subpart H. [40 CFR 63.168(i)(1)] |
| 202 | [40 CFR 63.168(i)(3)] | Valves in gas/vapor service or light liquid service (difficult-to-monitor): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 annually. Maintain a written plan that requires monitoring of the valves at least once per calendar year. Comply with this requirement instead of the requirements in 40 CFR 63.168(b) through (d). Subpart H. [40 CFR 63.168(i)(3)]<br>Which Months: All Year Statistical Basis: None specified |

**FUG 0002 PF-13 - Process Fugitives**

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|---|---|---|
| 203 | [40 CFR 63.169(a)] | Pumps, valves, connectors, and agitators in heavy liquid service; instrumentation systems; and pressure relief devices in liquid service: Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 within 5 days (calendar) if evidence of a potential leak to the atmosphere is found by visible, audible, olfactory, or any other detection method. If a reading of 10,000 ppm for agitators, 5,000 ppm for pumps handling polymerizing monomers, 2,000 ppm for all other pumps (including pumps in food/medical service), or 500 ppm for valves, connectors, instrumentation systems, and pressure relief devices, or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.169(c). Subpart H. [40 CFR 63.169(a)]<br>Which Months: All Year Statistical Basis: None specified |
| 204 | [40 CFR 63.169(c)] | Pumps, valves, connectors, and agitators in heavy liquid service; instrumentation systems; and pressure relief devices in liquid service: Make a first attempt at repair no later than 5 calendar days after each leak is detected, and complete repairs no later than 15 calendar days after it each leak is detected, except as provided in 40 CFR 63.171. Subpart H. [40 CFR 63.169(c)] |
| 205 | [40 CFR 63.170] | Surge control vessels and bottoms receivers: Equip with a closed-vent system that routes the organic vapors vented from the surge control vessel or bottoms receiver back to the process or to a control device that complies with the requirements of 40 CFR 63.172, except as provided in 40 CFR 63.162(b), or comply with the requirements of 40 CFR 63.119(b) or (c), if surge control vessel or bottoms receiver is not routed back to the process and meets the conditions specified in 40 CFR 63 Subpart H Table 2 or Table 3. Subpart H. |
| 206 | [40 CFR 63.172(f)(1)(i)] | Closed-vent system (hard-piping): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 once initially according to the procedures in 40 CFR 63.180(b). If an instrument reading greater than 500 ppm above background is recorded, a leak is detected. If a leak is detected, initiate repair provisions in 40 CFR 63.172(h). Subpart H. [40 CFR 63.172(f)(1)(i)]<br>Which Months: All Year Statistical Basis: None specified |
| 207 | [40 CFR 63.172(f)(1)(ii)] | Closed-vent system (hard-piping): Presence of a leak monitored by visual, audible, and/or olfactory annually. If a leak is detected, initiate repair provisions in 40 CFR 63.172(h). Subpart H. [40 CFR 63.172(f)(1)(ii)]<br>Which Months: All Year Statistical Basis: None specified |
| 208 | [40 CFR 63.172(f)(2)(i)] | Closed-vent system (duct work): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 once initially according to the procedures in 40 CFR 63.180(b). If an instrument reading greater than 500 ppm above background is recorded, a leak is detected. If a leak is detected, initiate repair provisions in 40 CFR 63.172(h). Subpart H. [40 CFR 63.172(f)(2)(i)]<br>Which Months: All Year Statistical Basis: None specified |
| 209 | [40 CFR 63.172(f)(2)(ii)] | Closed-vent system (duct work): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 annually according to the procedures in 40 CFR 63.180(b). If an instrument reading greater than 500 ppm above background is recorded, a leak is detected. If a leak is detected, initiate repair provisions in 40 CFR 63.172(h). Subpart H. [40 CFR 63.172(f)(2)(ii)]<br>Which Months: All Year Statistical Basis: None specified |
| 210 | [40 CFR 63.172(h)] | Make a first attempt at repair no later than 5 calendar days after each leak is detected, and complete repairs no later than 15 calendar days after it each leak is detected, except as provided in 40 CFR 63.172(i). Subpart H. [40 CFR 63.172(h)] |
| 211 | [40 CFR 63.172(j)(1)] | Closed-vent system (bypass lines): Flow monitored by flow indicator once every 15 minutes. Install flow indicator at the entrance to any bypass line. Subpart H. [40 CFR 63.172(j)(1)]<br>Which Months: All Year Statistical Basis: None specified |
| 212 | [40 CFR 63.172(j)(1)] | Closed-vent system (bypass lines): Flow recordkeeping by electronic or hard copy once every 15 minutes. Generate records as specified in 40 CFR 63.118(a)(3). Subpart H. [40 CFR 63.172(j)(1)] |

# SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

**FUG 0002 PF-13 - Process Fugitives**

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|---|---|---|
| 213 | [40 CFR 63.172(j)(2)] | Closed-vent system (bypass lines): Seal or closure mechanism monitored by visual inspection/determination monthly to ensure the valve is maintained in the non-diverting position and the vent stream is not diverted through the bypass line. Subpart H. [40 CFR 63.172(j)(2)]<br>Which Months: All Year Statistical Basis: None specified |
| 214 | [40 CFR 63.172(j)(2)] | Closed-vent system (bypass lines): Secure the bypass line valve in the non-diverting position with a car-seal or a lock-and-key type configuration. Subpart H. [40 CFR 63.172(j)(2)] |
| 215 | [40 CFR 63.172(k)(1)] | Closed-vent system (unsafe-to-inspect): Demonstrate that the equipment is unsafe to inspect because inspecting personnel would be exposed to an imminent or potential dangers as a consequence of complying with 40 CFR 63.172(f)(1) or (f)(2). Comply with this requirement instead of the requirements in 40 CFR 63.172(f)(1) and (f)(2). Subpart H. [40 CFR 63.172(k)(1)] |
| 216 | [40 CFR 63.172(k)(2)] | Closed-vent system (unsafe-to-inspect): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency. Maintain a written plan that requires inspection of the equipment as frequently as practicable during safe-to-inspect times, but not more frequently than annually. Comply with this requirement instead of the requirements in 40 CFR 63.172(f)(1) and (f)(2). Subpart H. [40 CFR 63.172(k)(2)]<br>Which Months: All Year Statistical Basis: None specified |
| 217 | [40 CFR 63.172(l)(1)] | Closed-vent system (difficult-to-inspect): Demonstrate that the equipment cannot be inspected without elevating the inspecting personnel more than 2 meters above a support surface. Comply with this requirement instead of the requirements in 40 CFR 63.172(f)(1) and (f)(2). Subpart H. [40 CFR 63.172(l)(1)] |
| 218 | [40 CFR 63.172(l)(2)] | Closed-vent system (difficult-to-inspect): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 once every five years. Maintain a written plan that requires inspection of the equipment at least once every five years. Comply with this requirement instead of the requirements in 40 CFR 63.172(f)(1) and (f)(2). Subpart H. [40 CFR 63.172(l)(2)]<br>Which Months: All Year Statistical Basis: None specified |
| 219 | [40 CFR 63.172(m)] | Ensure that the closed-vent system or control device is operating whenever organic HAP emissions are vented to the closed-vent system or control device. Subpart H. [40 CFR 63.172(m)] |
| 220 | [40 CFR 63.174(b)(2)] | Connectors in gas/vapor service or light liquid service: Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 once within the first 12 months after initial startup or by no later than 12 months after the date of promulgation of a specific subpart that references 40 CFR 63 Subpart H, whichever is later, except as specified in 40 CFR 63.174(f) through (h). If an instrument reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions in 40 CFR 63.174(d). Subpart H. [40 CFR 63.174(b)(2)]<br>Which Months: All Year Statistical Basis: None specified |
| 221 | [40 CFR 63.174(b)(3)(i)] | Connectors in gas/vapor service or light liquid service (0.5% or greater leaking): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 annually. Subpart H. [40 CFR 63.174(b)(3)(i)]<br>Which Months: All Year Statistical Basis: None specified |
| 222 | [40 CFR 63.174(b)(3)(ii)] | Connectors in gas/vapor service or light liquid service (less than 0.5% leaking): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 once every two years. Subpart H. [40 CFR 63.174(b)(3)(ii)]<br>Which Months: All Year Statistical Basis: None specified |

**FUG 0002 PF-13 - Process Fugitives**

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| 223 | [40 CFR 63.174(c)(1)(i)] | Connectors in gas/vapor service or light liquid service (opened or otherwise had the seal broken): Presence of a leak monitored by 40 CFR 60, Appendix A, Method 21 within three months after being returned to organic HAP service or when it is reconnected. If monitoring detects a leak, repair according to the provisions of 40 CFR 63.174(d), as specified, except as provided in 40 CFR 63.174(c)(1)(ii). Subpart H. [40 CFR 63.174(c)(1)(i)]<br>Which Months: All Year Statistical Basis: None specified |
| 224 | [40 CFR 63.174(c)(2)(i)] | Connectors in gas/vapor service or light liquid service (2 inches or less in nominal diameter): Comply with the requirements of 40 CFR 63.169. Subpart H. [40 CFR 63.174(c)(2)(i)] |
| 225 | [40 CFR 63.174(c)(2)(ii)] | Connectors in gas/vapor service or light liquid service (2 inches or less in nominal diameter): Organic HAP monitored by technically sound method within three months after being returned to organic HAP service after having been opened or otherwise had the seal broken. If monitoring detects a leak, implement repair provisions in 40 CFR 63.174(d). Subpart H. [40 CFR 63.174(c)(2)(ii)]<br>Which Months: All Year Statistical Basis: None specified |
| 226 | [40 CFR 63.174(d)] | Connectors in gas/vapor service or light liquid service: Make a first attempt at repair no later than 5 calendar days after each leak is detected, and complete repairs no later than 15 calendar days after it each leak is detected, except as provided in 40 CFR 63.171 and 63.174(g). Subpart H. [40 CFR 63.174(d)] |
| 227 | [40 CFR 63.174(f)(1)] | Connectors in gas/vapor service or light liquid service (unsafe-to-monitor): Demonstrate that the connector is unsafe to monitor because personnel would be exposed to an immediate danger as a result of complying with 40 CFR 63.174(a) through (c). Comply with this requirement instead of the requirements in 40 CFR 63.174(a). Subpart H. [40 CFR 63.174(f)(1)] |
| 228 | [40 CFR 63.174(f)(2)] | Connectors in gas/vapor service or light liquid service (unsafe-to-monitor): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency. Maintain a written plan that requires monitoring of connectors as frequently as practicable during safe to monitor times, but not more frequently than the periodic schedule otherwise applicable. Comply with this requirement instead of the requirements in 40 CFR 63.174(a). Subpart H. [40 CFR 63.174(f)(2)]<br>Which Months: All Year Statistical Basis: None specified |
| 229 | [40 CFR 63.174(g)] | Connectors in gas/vapor service or light liquid service (unsafe-to-repair): Demonstrate that repair personnel would be exposed to an immediate danger as a consequence of complying with 40 CFR 63.174(d). Comply with this requirement instead of the requirements in 40 CFR 63.174(a), (d), and (e). Subpart H. [40 CFR 63.174(g)] |
| 230 | [40 CFR 63.174(h)(2)] | Connectors in gas/vapor service or light liquid service (inaccessible, ceramic, or ceramic-lined): Make a first attempt at repair within 5 days after leak is detected by visual, audible, olfactory or other means, and complete repairs no later than 15 calendar days after leak is detected, except as provided in 40 CFR 63.171 and 63.174(g). Comply with this requirement instead of the monitoring requirements of 40 CFR 63.174(a) and (c) and from the recordkeeping and reporting requirements of 40 CFR 63.181 and 63.182. Subpart H. [40 CFR 63.174(h)(2)] |
| 231 | [40 CFR 63.174(i)] | Connectors in gas/vapor service or light liquid service: Calculate percent leaking connectors as specified in 40 CFR 63.174(i)(1) and (i)(2). Subpart H. [40 CFR 63.174(i)] |
| 232 | [40 CFR 63.180] | Comply with the test methods and procedures requirements provided in 40 CFR 63.180. Subpart H. |
| 233 | [40 CFR 63.181] | Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Maintain records as specified in 40 CFR 63.181(a) through (k). Subpart H. |
| 234 | [40 CFR 63.182(b)] | Submit Initial Notification: Due within 120 days after the date of promulgation of the subpart that references 40 CFR 63 Subpart H. Include the information specified in 40 CFR 63.182(b)(1). Subpart H. [40 CFR 63.182(b)] |

## SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

### FUG 0002 PF-13 - Process Fugitives

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| 235 | [40 CFR 63.182(b)] | Submit Initial Notification: Due within 90 days after the date of promulgation of the subpart that references 40 CFR 63 Subpart H. Include the information specified in 40 CFR 63.182(b)(1). Subpart H. [40 CFR 63.182(b)] |
| 236 | [40 CFR 63.182(b)] | Submit application: Due as soon as practicable before the construction or reconstruction is planned to commence (but it need not be sooner than 90 days after the date of promulgation of the subpart that references 40 CFR 63 Subpart H). Submit application for approval of construction or reconstruction required by 40 CFR 63.5(d) in lieu of the Initial Notification. Subpart H. [40 CFR 63.182(b)] |
| 237 | [40 CFR 63.182(c)] | Submit Notification of Compliance Status: Due within 90 days of the compliance dates specified in the 40 CFR 63 subpart that references 40 CFR 63 Subpart H. Include the information specified in 40 CFR 63.182(c)(1) through (c)(3). Subpart H. [40 CFR 63.182(c)] |
| 238 | [40 CFR 63.182(d)] | Submit Periodic Reports: Due semiannually starting 6 months after the Notification of Compliance Status, as required in 40 CFR 63.182(c). Include the information specified in 40 CFR 63.182(d)(2) through (d)(4). Subpart H. [40 CFR 63.182(d)] |
| 239 | [LAC 33:III.2111] | Equip all rotary pumps and compressors handling volatile organic compounds having a true vapor pressure of 1.5 psia or greater at handling conditions with mechanical seals or other equivalent equipment. |
| 240 | [LAC 33:III.501.C.6] | Comply with LAC 33:III.2121 by implementing the Louisiana Consolidated Fugitive Emission Program Guidelines. Compliance is achieved through compliance with 40 CFR 63 Subpart H. |

### UNF 0001 AI 188074 - St. James Methanol Plant

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| 241 | [40 CFR 60.] | All affected facilities shall comply with all applicable provisions in 40 CFR 60 Subpart A. |
| 242 | [40 CFR 61.] | All affected facilities shall comply with all applicable provisions in 40 CFR 61 Subpart A. |
| 243 | [40 CFR 63.] | All affected facilities shall comply with all applicable provisions in 40 CFR 63 Subpart A. |
| 244 | [40 CFR 68.] | Comply with the requirements of 40 CFR Part 68 (synthesis gas). |
| 245 | [40 CFR 82.Subpart F] | Comply with the standards for recycling and emissions reduction pursuant to 40 CFR Part 82, Subpart F, except as provided for Motor Vehicle Air Conditioners (MVACs) in Subpart B. |
| 246 | [LAC 33:III.1103] | Emissions of smoke which pass onto or across a public road and create a traffic hazard by impairment of visibility as defined in LAC 33:III.111 or intensifies an existing traffic hazard condition are prohibited. |
| 247 | [LAC 33:III.1303.B] | Emissions of particulate matter which pass onto or across a public road and create a traffic hazard by impairment of visibility or intensify an existing traffic hazard condition are prohibited. |
| 248 | [LAC 33:III.2113.A] | Maintain best practical housekeeping and maintenance practices at the highest possible standards to reduce the quantity of organic compounds emissions. Good housekeeping shall include, but not be limited to, the practices listed in LAC 33:III.2113.A.1-5. |
| 249 | [LAC 33:III.219] | Failure to pay the prescribed application fee or annual fee as provided herein, within 90 days after the due date, will constitute a violation of these regulations and shall subject the person to applicable enforcement actions under the Louisiana Environmental Quality Act including, but not limited to, revocation or suspension of the applicable permit, license, registration, or variance. |
| 250 | [LAC 33:III.2901.D] | Discharges of odorous substances at or beyond property lines which cause a perceived odor intensity of six or greater on the specified eight point butanol scale as determined by Method 41 of LAC 33:III.2901.G are prohibited. |

## SPECIFIC REQUIREMENTS

**AI ID: 188074 - South LA Methanol LP - St James Methanol Plant**
**Activity Number: PER20130001**
**Permit Number: 2560-00292-V0**
**Air - Title V Regular Permit Initial**

**UNF 0001 AI 188074 - St. James Methanol Plant**

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| 251 | [LAC 33:III.2901.F] | If requested to monitor for odor intensity, take and transport samples in a manner which minimizes alteration of the samples either by contamination or loss of material. Evaluate all samples as soon after collection as possible in accordance with the procedures set forth in LAC 33:III.2901.G. |
| 252 | [LAC 33:III.509.J.2] | The $CO_2e$ emissions from the entire facility are limited to 0.693 ton per metric ton methanol produced (annual average). To demonstrate compliance with this limit, the permittee shall record the methanol production monthly. $CO_2e$ emissions shall be recorded in accordance with the Mandatory Reporting of Greenhouse Gases Rule (40 CFR 98). All records shall be maintained onsite for at lease five years and be available for inspection by LDEQ. PSD-LA-780. |
| 253 | [LAC 33:III.509] | Comply with the requirements of PSD-LA-780. This permit includes provisions of the Prevention of Significant Deterioration (PSD) review from Permit PSD-LA-780. |
| 254 | [LAC 33:III.5107.A.2] | Annual emissions reports and revisions to any emissions report shall include a certification statement that attests that the information contained in the emissions report is true, accurate, and complete, and that is signed by a responsible official, as defined in LAC 33:III.502. |
| 255 | [LAC 33:III.5107.A] | The owner or operator of any major source that meets the applicability requirements in LAC 33:III.5101.A and emits any toxic air pollutant listed in LAC 33:III.5112, Table 51.1 or 51.3, shall submit a completed annual emissions report to the Office of Environmental Services in a format specified by the LDEQ. |
| 256 | [LAC 33:III.535] | Comply with the Part 70 General Conditions as set forth in LAC 33:III.535 and the Louisiana General Conditions as set forth in LAC 33:III.537. [LAC 33:III.535, LAC 33:III.537] |
| 257 | [LAC 33:III.5609.A.1.b] | Activate the preplanned abatement strategy listed in LAC 33:III.5611.Table 5 when the administrative authority declares an Air Pollution Alert. |
| 258 | [LAC 33:III.5609.A.2.b] | Activate the preplanned strategy listed in LAC 33:III.5611.Table 6 when the administrative authority declares an Air Pollution Warning. |
| 259 | [LAC 33:III.5609.A.3.b] | Activate the preplanned abatement strategy listed in LAC 33:III.5611.Table 7 when the administrative authority declares an Air Pollution Emergency. |
| 260 | [LAC 33:III.5609.A] | Prepare standby plans for the reduction of emissions during periods of Air Pollution Alert, Air Pollution Warning and Air Pollution Emergency. Design standby plans to reduce or eliminate emissions in accordance with the objectives as set forth in LAC 33:III.5611.Tables 5, 6, and 7. |
| 261 | [LAC 33:III.5901.A] | Comply with the provisions in 40 CFR 68, except as specified in LAC 33:III.5901. |
| 262 | [LAC 33:III.5911.A] | Submit registration: Due January 31, 1998, or within 60 days after the source becomes subject to LAC 33:III.Chapter 59, whichever is later. Include the information listed in LAC 33:III.5911.B, and submit to the Office of Environmental Compliance. |
| 263 | [LAC 33:III.919] | Submit Emission Inventory (EI)/Annual Emissions Statement: Due annually, by the 30th of April to the Office of Environmental Services, for the reporting period of the previous calendar year that coincides with period of ownership or operatorship, unless otherwise directed by DEQ. Submit both an emissions inventory and the certification statement required by LAC 33:III.919.F.1.c, separately for each AI, in a format specified by DEQ. Include the information specified in LAC 33:III.919.F.1.a through F.1.d. |
| 264 | [LAC 33:III.927] | The unauthorized discharge of any air pollutant into the atmosphere shall be reported in accordance with the provisions of LAC 33:I.Chapter 39, Notification Regulations and Procedures for Unauthorized Discharges. |

**Attachment B**
**Red Lion Bio-Energy Air Permit**

OhioEPA
State of Ohio Environmental Protection Agency

STREET ADDRESS:
Lazarus Government Center
50 W. Town St., Suite 700
Columbus, Ohio 43215

TELE: (614) 644-3020 FAX: (614) 644-3184
www.epa.ohio.gov

MAILING ADDRESS:
P.O. Box 1049
Columbus, OH 43216-1049

Certified Mail

| | |
|---|---|
| No | TOXIC REVIEW |
| No | PSD |
| No | SYNTHETIC MINOR |
| No | CEMS |
| No | MACT |
| No | NSPS |
| No | NESHAPS |
| No | NETTING |
| No | MAJOR NON-ATTAINMENT |
| No | MODELING SUBMITTED |

10/27/2009

Mr. Doug Struble
Red Lion Bio-Energy
387 Dussel Drive
Maumee, OH 43537

RE: FINAL AIR POLLUTION PERMIT-TO-INSTALL AND OPERATE
Facility ID: 0448011888
Permit Number: P0105583
Permit Type: Initial Installation
County: Lucas

Dear Permit Holder:

Enclosed please find a final Air Pollution Permit-to-Install and Operate ("PTIO") which will allow you to install, modify, and/or operate the described emissions unit(s) in the manner indicated in the permit. Because this permit contains conditions and restrictions, please read it very carefully.

Ohio EPA maintains a document entitled "Frequently Asked Questions about the PTIO". The document can be downloaded from the DAPC Web page, www.epa.ohio.gov/dapc, from the "Permits" link. This document contains additional information related to your permit, such as what activities are covered under the PTIO, who has enforcement authority over the permit and Ohio EPA's authorization to inspect your facility and records. Please contact the Office of Compliance Assistance and Pollution Prevention at (614) 644-3469 if you need assistance.

The issuance of this PTIO is a final action of the Director and may be appealed to the Environmental Review Appeals Commission ("ERAC") under Section 3745.04 of the Ohio Revised Code. The appeal must be in writing and describe the action complained of and the grounds for the appeal. The appeal must be filed with the ERAC within thirty (30) days after notice of the Director's action. A filing fee of $70.00 must be submitted to the ERAC with the appeal, although the ERAC, has discretion to reduce the amount of the filing fee if you can demonstrate (by affidavit) that payment of the full amount of the fee would cause extreme hardship. If you file an appeal of this action, you must notify Ohio EPA of the filing of the appeal (by providing a copy to the Director) within three (3) days of filing your appeal with the ERAC. Ohio EPA requests that a copy of the appeal also be provided to the Ohio Attorney General's Office, Environmental Enforcement Section. An appeal may be filed with the ERAC at the following address:

Environmental Review Appeals Commission
309 South Fourth Street, Room 222
Columbus, OH 43215

If you have any questions regarding this permit, please contact the Toledo Department of Environmental Services. This permit has been posted to the Division of Air Pollution Control (DAPC) Web page www.epa.ohio.gov/dapc.

Sincerely,

Michael W. Ahern

Michael W. Ahern, Manager
Permit Issuance and Data Management Section, DAPC

Cc: TDES

State of Ohio Environmental Protection Agency
Division of Air Pollution Control

# FINAL

# Air Pollution Permit-to-Install and Operate
for
Red Lion Bio-Energy

| | |
|---|---|
| Facility ID: | 0448011888 |
| Permit Number: | P0105583 |
| Permit Type: | Initial Installation |
| Issued: | 10/27/2009 |
| Effective: | 10/27/2009 |
| Expiration: | 10/27/2019 |

State of Ohio Environmental Protection Agency
Division of Air Pollution Control

# Air Pollution Permit-to-Install and Operate

for

Red Lion Bio-Energy

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OhioEPA

State of Ohio Environmental Protection Agency
Division of Air Pollution Control

**Final Permit-to-Install and Operate**
**Permit Number:** P0105583
**Facility ID:** 0448011888
**Effective Date:** 10/27/2009

# Authorization

Facility ID: 0448011888
Application Number(s): A0038506
Permit Number: P0105583
Permit Description: Syngas production from bio-mass with roads and piles.
Permit Type: Initial Installation
Permit Fee: $800.00
Issue Date: 10/27/2009
Effective Date: 10/27/2009
Expiration Date: 10/27/2019
Permit Evaluation Report (PER) Annual Date: Jan 1 - Dec 31, Due Feb 15
None

This document constitutes issuance to:

Red Lion Bio-Energy
1000 Research Drive
Toledo, OH 43606

of a Permit-to-Install and Operate for the emissions unit(s) identified on the following page.

Ohio EPA District Office or local air agency responsible for processing and administering your permit:

Toledo Department of Environmental Services
348 South Erie Street
Toledo, OH 43604
(419)936-3015

The above named entity is hereby granted this Permit-to-Install and Operate for the air contaminant source(s) (emissions unit(s)) listed in this section pursuant to Chapter 3745-31 of the Ohio Administrative Code. Issuance of this permit does not constitute expressed or implied approval or agreement that, if constructed or modified in accordance with the plans included in the application, the described emissions unit(s) will operate in compliance with applicable State and federal laws and regulations.

This permit is granted subject to the conditions attached hereto.

Ohio Environmental Protection Agency

Chris Korleski
Director

# Authorization (continued)

Permit Number: P0105583
Permit Description: Syngas production from bio-mass with roads and piles.

Permits for the following emissions unit(s) or groups of emissions units are in this document as indicated below:

**Emissions Unit ID:** **F001**
Company Equipment ID: F001
Superseded Permit Number:
General Permit Category and Type: Not Applicable

**Emissions Unit ID:** **F002**
Company Equipment ID: F002
Superseded Permit Number:
General Permit Category and Type: Not Applicable

**Emissions Unit ID:** **P001**
Company Equipment ID: P001
Superseded Permit Number:
General Permit Category and Type: Not Applicable

# A. Standard Terms and Conditions

**1. What does this permit-to-install and operate ("PTIO") allow me to do?**

This permit allows you to install and operate the emissions unit(s) identified in this PTIO. You must install and operate the unit(s) in accordance with the application you submitted and all the terms and conditions contained in this PTIO, including emission limits and those terms that ensure compliance with the emission limits (for example, operating, recordkeeping and monitoring requirements).

**2. Who is responsible for complying with this permit?**

The person identified on the "Authorization" page, above, is responsible for complying with this permit until the permit is revoked, terminated, or transferred. "Person" means a person, firm, corporation, association, or partnership. The words "you," "your," or "permittee" refer to the "person" identified on the "Authorization" page above.

The permit applies only to the emissions unit(s) identified in the permit. If you install or modify any other equipment that requires an air permit, you must apply for an additional PTIO(s) for these sources.

**3. What records must I keep under this permit?**

You must keep all records required by this permit, including monitoring data, test results, strip-chart recordings, calibration data, maintenance records, and any other record required by this permit for five years from the date the record was created. You can keep these records electronically, provided they can be made available to Ohio EPA during an inspection at the facility. Failure to make requested records available to Ohio EPA upon request is a violation of this permit requirement.

**4. What are my permit fees and when do I pay them?**

There are two fees associated with permitted air contaminant sources in Ohio:

- PTIO fee. This one-time fee is based on a fee schedule in accordance with Ohio Revised Code (ORC) section 3745.11, or based on a time and materials charge for permit application review and permit processing if required by the Director.

  You will be sent an invoice for this fee after you receive this PTIO and payment is due within 30 days of the invoice date. You are required to pay the fee for this PTIO even if you do not install or modify your operations as authorized by this permit.

- Annual emissions fee. Ohio EPA will assess a separate fee based on the total annual emissions from your facility. You self-report your emissions in accordance with Ohio Administrative Code (OAC) Chapter 3745-78. This fee assessed is based on a fee schedule in ORC section 3745.11 and funds Ohio EPA's permit compliance oversight activities. For facilities that are permitted as synthetic minor sources, the fee schedule is adjusted annually for inflation. Ohio EPA will notify you when it is time to report your emissions and to pay your annual emission fees.

**5. When does my PTIO expire, and when do I need to submit my renewal application?**

This permit expires on the date identified at the beginning of this permit document (see "Authorization" page above) and you must submit a renewal application to renew the permit. Ohio EPA will send a renewal notice to you approximately six months prior to the expiration date of this permit. However, it is very important that you submit a complete renewal permit application (postmarked prior to expiration of this permit) even if you do not receive the renewal notice.

If a complete renewal application is submitted before the expiration date, Ohio EPA considers this a timely application for purposes of ORC section 119.06, and you are authorized to continue operating the emissions unit(s) covered by this permit beyond the expiration date of this permit until final action is taken by Ohio EPA on the renewal application.

6. **What happens to this permit if my project is delayed or I do not install or modify my source?**

This PTIO expires 18 months after the issue date identified on the "Authorization" page above unless otherwise specified if you have not (1) started constructing the new or modified emission sources identified in this permit, or (2) entered into a binding contract to undertake such construction. This deadline can be extended by up to 12 months, provided you apply to Ohio EPA for this extension within a reasonable time before the 18-month period has ended and you can show good cause for any such extension.

7. **What reports must I submit under this permit?**

An annual permit evaluation report (PER) is required in addition to any malfunction reporting required by OAC rule 3745-15-06 or other specific rule-based reporting requirement identified in this permit. Your PER due date is identified in the Authorization section of this permit.

8. **If I am required to obtain a Title V operating permit in the future, what happens to the operating provisions and PER obligations under this permit?**

If you are required to obtain a Title V permit under OAC Chapter 3745-77 in the future, the permit-to-operate portion of this permit will be superseded by the issued Title V permit. From the effective date of the Title V permit forward, this PTIO will effectively become a PTI (permit-to-install) in accordance with OAC rule 3745-31-02(B). The following terms and conditions will no longer be applicable after issuance of the Title V permit: Section B, Term 1.b) and Section C, for each emissions unit, Term a)(2).

The PER requirements in this permit remain effective until the date the Title V permit is issued and is effective, and cease to apply after the effective date of the Title V permit. The final PER obligation will cover operations up to the effective date of the Title V permit and must be submitted on or before the submission deadline identified in this permit on the last day prior to the effective date of the Title V permit.

9. **What are my obligations when I perform scheduled maintenance on air pollution control equipment?**

You must perform scheduled maintenance of air pollution control equipment in accordance with OAC rule 3745-15-06(A). If scheduled maintenance requires shutting down or bypassing any air pollution control equipment, you must also shut down the emissions unit(s) served by the air pollution control equipment during maintenance, unless the conditions of OAC rule 3745-15-06(A)(3) are met. Any emissions that exceed permitted amount(s) under this permit (unless specifically exempted by rule) must be reported as deviations in the annual permit evaluation report (PER), including nonexempt excess emissions that occur during approved scheduled maintenance.

10. **Do I have to report malfunctions of emissions units or air pollution control equipment? If so, how must I report?**

If you have a reportable malfunction of any emissions unit(s) or any associated air pollution control system, you must report this to the Toledo Department of Environmental Services in accordance with

OAC rule 3745-15-06(B). Malfunctions that must be reported are those that result in emissions that exceed permitted emission levels. It is your responsibility to evaluate control equipment breakdowns and operational upsets to determine if a reportable malfunction has occurred.

If you have a malfunction, but determine that it is not a reportable malfunction under OAC rule 3745-15-06(B), it is recommended that you maintain records associated with control equipment breakdown or process upsets. Although it is not a requirement of this permit, Ohio EPA recommends that you maintain records for non-reportable malfunctions.

**11. Can Ohio EPA or my local air agency inspect the facility where the emission unit(s) is/are located?**

Yes. Under Ohio law, the Director or his authorized representative may inspect the facility, conduct tests, examine records or reports to determine compliance with air pollution laws and regulations and the terms and conditions of this permit. You must provide, within a reasonable time, any information Ohio EPA requests either verbally or in writing.

**12. What happens if one or more emissions units operated under this permit is/are shut down permanently?**

Ohio EPA can terminate the permit terms associated with any permanently shut down emissions unit. "Shut down" means the emissions unit has been physically removed from service or has been altered in such a way that it can no longer operate without a subsequent "modification" or "installation" as defined in OAC Chapter 3745-31.

You should notify Ohio EPA of any emissions unit that is permanently shut down by submitting a certification that identifies the date on which the emissions unit was permanently shut down. The certification must be submitted by an authorized official from the facility. You cannot continue to operate an emission unit once the certification has been submitted to Ohio EPA by the authorized official.

You must comply with all recordkeeping and reporting for any permanently shut down emissions unit in accordance with the provisions of the permit, regulations or laws that were enforceable during the period of operation, such as the requirement to submit a PER, air fee emission report, or malfunction report. You must also keep all records relating to any permanently shutdown emissions unit, generated while the emissions unit was in operation, for at least five years from the date the record was generated.

Again, you cannot resume operation of any emissions unit certified by the authorized official as being permanently shut down without first applying for and obtaining a permit pursuant to OAC Chapter 3745-31.

**13. Can I transfer this permit to a new owner or operator?**

You can transfer this permit to a new owner or operator. If you transfer the permit, you must follow the procedures in OAC Chapter 3745-31, including notifying Ohio EPA or the local air agency of the change in ownership or operator. Any transferee of this permit must assume the responsibilities of the transferor permit holder.

**14. Does compliance with this permit constitute compliance with OAC rule 3745-15-07, "air pollution nuisance"?**

This permit and OAC rule 3745-15-07 prohibit operation of the air contaminant source(s) regulated under this permit in a manner that causes a nuisance. Ohio EPA can require additional controls or modification of the requirements of this permit through enforcement orders or judicial enforcement action if, upon investigation, Ohio EPA determines existing operations are causing a nuisance.

**15. What happens if a portion of this permit is determined to be invalid?**

If a portion of this permit is determined to be invalid, the remainder of the terms and conditions remain valid and enforceable. The exception is where the enforceability of terms and conditions are dependent on the term or condition that was declared invalid.

# B. Facility-Wide Terms and Conditions

1. This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).

   a) For the purpose of a permit-to-install document, the facility-wide terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.

      (1) None.

   b) For the purpose of a permit-to-operate document, the facility-wide terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.

      (1) None.

# C. Emissions Unit Terms and Conditions

**1. F001, Paved roadways, unpaved roadways, and parking lots**

**Operations, Property and/or Equipment Description:**

Roadways and Parking Lots

a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).

(1) For the purpose of a permit-to-install document, the emissions unit terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.

a. None.

(2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.

a. None.

b) Applicable Emissions Limitations and/or Control Requirements

(1) The specific operations(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

| | Applicable Rules/Requirements | Applicable Emissions Limitations/Control Measures |
|---|---|---|
| | OAC rule 3745-31-05(A)(3)(a)(ii) | See b)(2)a. |
| a. | OAC rule 3745-17-07(B)(4) | See b)(2)b. |
| b. | OAC rule 3745-17-07(B)(5) | See b)(2)c. |
| c. | OAC rule 3745-17-08(B) | Reasonable available control measures that are sufficient to minimize or eliminate visible particulate emissions of fugitive dust. See b)(2)d. through b)(2)h. |

(2) Additional Terms and Conditions

a. The Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3) do not apply to the particulate emissions from this air contaminant source since the uncontrolled potential to emit for particulate matter is less than 10 tons/year.

b. There shall be no visible particulate emissions from the paved roadways and/or parking areas except for a period of time not to exceed six minutes during any 60-minute observation period.

c. There shall be no visible particulate emissions from the unpaved roadways and/or parking areas except for a period of time not to exceed 13 minutes during any 60-minute observation period. If any unpaved roadway and/or parking area (or any portion of them) is or becomes paved, such paved areas shall be subject to a limitation of no visible particulate emissions except for a period of time not to exceed six minutes during any 60-minute observation period.

d. The permittee shall employ best available control measures on all paved and unpaved roadways and parking areas for the purpose of ensuring compliance with the above-mentioned applicable requirements. In accordance with the permittee's application, the permittee has committed to treat the paved and unpaved roadways and parking areas by application of chemical stabilization/dust suppressants and/or watering at sufficient treatment frequencies to ensure compliance. Nothing in this paragraph shall prohibit the permittee from employing other control measures to ensure compliance.

e. The needed frequencies for implementation of the control measures shall be determined by the permittee's inspections pursuant to the monitoring section of this permit. Implementation of the control measures shall not be necessary for paved or unpaved roadways and parking areas that are covered with snow and/or ice or if precipitation has occurred that is sufficient for that day to ensure compliance with the above-mentioned applicable requirements. Implementation of any control measure may be suspended if unsafe or hazardous driving conditions would be created by its use.

f. The permittee shall promptly remove, in such a manner as to minimize or prevent resuspension, earth and/or other material from paved streets onto which such material has been deposited by trucking or earth moving equipment or erosion by water or other means.

g. Open-bodied vehicles transporting materials likely to become airborne shall have such materials covered at all times if the control measure is necessary for the materials being transported.

h. Any unpaved roadway or parking area that is subsequently paved, will require an application to re-evaluate emissions for this emissions unit.

c) Operational Restrictions

(1) None.

d) Monitoring and/or Recordkeeping Requirements

(1) Except as otherwise provided in this section, the permittee shall perform inspections of each of the roadway segments and parking areas in accordance with the following frequencies:

| unpaved roadways and parking areas | minimum inspection frequency |
|---|---|
| all roads and parking areas | daily |

(2) The purpose of the inspections is to determine the need for implementing the above-mentioned control measures. The inspections shall be performed during representative, normal traffic conditions. No inspection shall be necessary for a roadway or parking area that is covered with snow and/or ice or if precipitation has occurred that is sufficient for that day to ensure compliance with the above-mentioned applicable requirements. Any required inspection that is not performed due to any of the above-identified events shall be performed as soon as such event(s) has (have) ended, except if the next required inspection is within one week.

(3) For emission points for which the daily checks show emissions that are representative of normal operation for 30 consecutive operating days, the required frequency of visible emissions checks may be reduced to weekly (once per week, when the emission unit is in operation). If a subsequent check of such emission point by the permittee or an Ohio EPA inspector indicates abnormal emissions, the frequency of emissions checks shall revert to daily for that emission point until such time as there are 30 consecutive operating days of normal visible emissions.

(4) The permittee shall maintain records of the following information:

a. the date and reason any required inspection was not performed, including those inspections that were not performed due to snow and/or ice cover or precipitation;

b. the date of each inspection where it was determined by the permittee that it was necessary to implement the control measures;

c. the dates the control measures were implemented; and

d. on a calendar quarter basis, the total number of days the control measures were implemented and the total number of days where snow and/or ice cover or precipitation were sufficient to not require the control measures.

The information required for d)(4)d. shall be kept separately for (i) the paved roadways and parking areas and (ii) the unpaved roadways and parking areas, and shall be updated on a quarterly basis within 30 days after the end of each calendar quarter.

e) Reporting Requirements

(1) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit.

(2) The permittee shall identify the following information in the annual permit evaluation report in accordance with the monitoring requirements for visible emissions in d)(4) above:

a. each day during which an inspection was not performed by the required frequency, excluding an inspection which was not performed due to an exemption for snow and/or ice cover or precipitation; and

b. each instance when a control measure, that was to be implemented as a result of an inspection, was not implemented.

f) Testing Requirements

(1) Compliance with the emission limitations in b)(1) shall be determined in accordance with the following methods:

a. Emission Limitation:

No visible PE from paved roadways and parking areas except for a period of time not to exceed six minutes during any 60-minute observation period.

Applicable Compliance Method:

If required, compliance with the visible PE limitation listed above shall be determined in accordance with Test Method 22 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 1996, and the modifications listed in paragraphs (B)(4)(a) through (B)(4)(d) of OAC rule 3745-17-03.

b. Emission Limitation:

No visible PE from unpaved roadways and parking areas except for a period of time not to exceed 13 minutes during any 60-minute observation period.

Applicable Compliance Method:

If required, compliance with the visible PE limitation listed above shall be determined in accordance with Test Method 22 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources").

g) Miscellaneous Requirements

(1) None.

**2. F002, Feedstock storage piles**

**Operations, Property and/or Equipment Description:**

Feedstock storage piles, loading and unloading

a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).

(1) For the purpose of a permit-to-install document, the emissions unit terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.

a. None.

(2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.

a. None.

b) Applicable Emissions Limitations and/or Control Requirements

(1) The specific operations(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

| | Applicable Rules/Requirements | Applicable Emissions Limitations/Control Measures |
|---|---|---|
| a. | OAC rule 3745-31-05(E) | See b)(2)a. |
| b. | OAC rule 3745-17-07(B)(6) | No visible particulate emissions from any material storage pile except for a period of time not to exceed thirteen minutes during any sixty-minute period. |
| c. | OAC rule 3745-17-08(B) | See b)(2)b. through b)(2)f. |

(2) Additional Terms and Conditions

a. Permit to Install P0105583 for this air contaminant source takes into account the following voluntary restrictions (including the use of any applicable air pollution control equipment) as proposed by the permittee for the purpose of avoiding Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3):

i. A maximum throughput of 32,000 tons per year

b. The permittee shall employ best available control measures on all load-in and load-out operations associated with the storage piles for the purpose of ensuring compliance with the above-mentioned applicable requirements. In accordance with the permittee's application, the permittee has committed to maintain minimal drop heights for stackers and front-loaders, and chemical stabilization/dust suppressants and/or watering/sprinkling systems at sufficient treatment frequencies to ensure compliance.

c. The operator shall avoid dragging any front-end loader bucket along the ground. Nothing in this paragraph shall prohibit the permittee from employing other control measures to ensure compliance.

d. The above-mentioned control measure(s) shall be employed for each load-in and load-out operation of each storage pile if the permittee determines, as a result of the inspection conducted pursuant to the monitoring section of this permit, that the control measure(s) are necessary to ensure compliance with the above-mentioned applicable requirements. Any required implementation of the control measure(s) shall continue during any such operation until further observation confirms that use of the measure(s) is unnecessary.

e. The permittee shall employ best available control measures for wind erosion from the surfaces of all storage piles for the purpose of ensuring compliance with the above-mentioned applicable requirements. In accordance with the application, the permittee has committed to perform one or more of the following: (chemical stabilization, watering/sprinkling systems/hoses, covering the storage piles) to ensure compliance. Nothing in this paragraph shall prohibit the permittee from employing other control measures to ensure compliance.

f. The above-mentioned control measure(s) shall be employed for wind erosion from each pile if the permittee determines, as a result of the inspection conducted pursuant to the monitoring section of this permit, that the control measure(s) are necessary to ensure compliance with the above-mentioned applicable requirements. Implementation of the control measure(s) shall not be necessary for a storage pile that is covered with snow and/or ice or if precipitation has occurred that is sufficient for that day to ensure compliance with the above-mentioned applicable requirements.

c) Operational Restrictions

(1) None.

d) Monitoring and/or Recordkeeping Requirements

(1) Except as otherwise provided in this section, the permittee shall perform inspections of each load-in operation at each storage pile in accordance with the following frequencies:

| storage pile identification | minimum load-in inspection frequency |
|---|---|
| all | daily |

(2) Except as otherwise provided in this section, the permittee shall perform inspections of each load-out operation at each storage pile in accordance with the following frequencies:

| storage pile identification | minimum load-out inspection frequency |
|---|---|
| all | daily |

(3) Except as otherwise provided in this section, the permittee shall perform inspections of the wind erosion from pile surfaces associated with each storage pile in accordance with the following frequencies:

| storage pile identification | minimum wind erosion inspection frequency |
|---|---|
| all | daily |

(4) No inspection shall be necessary for wind erosion from the surface of a storage pile when the pile is covered with snow and/or ice and for any storage pile activity if precipitation has occurred that is sufficient for that day to ensure compliance with the above-mentioned applicable requirements. Any required inspection that is not performed due to any of the above identified events shall be performed as soon as such event(s) has (have) ended, except if the next required inspection is within one week.

(5) The purpose of the inspections is to determine the need for implementing the control measures specified in this permit for load-in and load-out of a storage pile, and wind erosion from the surface of a storage pile. The inspections shall be performed during representative, normal storage pile operating conditions.

(6) The permittee shall maintain records of the following information:

a. the date and reason any required inspection was not performed, including those inspections that were not performed due to snow and/or ice cover or precipitation;

b. the date of each inspection where it was determined by the permittee that it was necessary to implement the control measures;

c. the dates the control measures were implemented; and

d. on a calendar quarter basis, the total number of days the control measures were implemented and, for wind erosion from pile surfaces, the total number of days where snow and/or ice cover or precipitation were sufficient to not require the control measure(s).

The information required in d)(6)d. shall be kept separately for (i) the load-in operations, (ii) the load-out operations, and (iii) the pile surfaces (wind erosion), and shall be updated on a calendar quarter basis within 30 days after the end of each calendar quarter.

e) Reporting Requirements

(1) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit.

f) Testing Requirements

(1) Compliance with the emission limitations in b)(1) shall be determined in accordance with the following methods:

a. Emission Limitation:

No visible particulate emissions from any material storage pile except for a period of time not to exceed thirteen minutes during any sixty-minute period.

Applicable Compliance Method:

Compliance with the visible PE limitations for the storage piles identified above shall be determined in accordance with Test Method 22 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources").

g) Miscellaneous Requirements

(1) None.

**3. P001, Syngas Plant**

**Operations, Property and/or Equipment Description:**

A 87.5 tons of feedstock per day syngas plant with (10) 4 mmBtu/hr process heaters fired by natural gas and/or syngas fuel and a flare.

a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).

(1) For the purpose of a permit-to-install document, the emissions unit terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.

a. None.

(2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.

a. None.

b) Applicable Emissions Limitations and/or Control Requirements

(1) The specific operations(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

| | Applicable Rules/Requirements | Applicable Emissions Limitations/Control Measures |
|---|---|---|
| a. | OAC rule 3745-31-05(A)(3) | Nitrogen oxides emissions ($NO_x$) shall not exceed 24.24 pound per hour and 41.36 tons per year. |
| | | Carbon Monoxide (CO) emissions shall not exceed 9.03 pounds per hour and 18.10 tons per year. |
| | | Sulfur dioxide ($SO_2$) emissions shall not exceed 8.53 pounds per hour and 11.58 tons per year. |
| | | See b)(2)a. and b)(2)b. |
| b. | OAC Rule 3745-31-05(A)(3)(a)(ii) | See b)(2)c. |
| | OAC rule 3745-17-10(B)(1) | Particulate emissions (PE) shall not exceed 0.020 lb/million Btu actual heat input. |
| c. | OAC rule 3745-17-07(A)(1) | Visible PE from any stack serving this emissions unit shall not exceed 20% opacity as a 6-minute average, except as provided by the rule. |
| d. | OAC rule 3745-18-06(E) | This emissions unit is exempt from the requirements of OAC rule 3745-18-06(E) |

| | Applicable Rules/Requirements | Applicable Emissions Limitations/Control Measures |
|---|---|---|
| | | pursuant to OAC rule 3745-18-06(C). |
| e. | OAC rule 3745-21-08(B) | See b)(2)d. |

(2) Additional Terms and Conditions

a. The hourly and annual emission limitations for the process heaters were established for PTI purposes to reflect the potential to emit for this emissions unit. Therefore, it is not necessary to develop monitoring, record keeping and/or reporting requirements to ensure compliance with these limitations.

b. The permittee shall properly install, operate, and maintain a device to continuously monitor the pilot flame of the flare when the emissions unit is in operation. The monitoring device and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals.

c. The Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3) do not apply to the PM, $PM_{10}$, and VOC emissions from this air contaminant source since the uncontrolled potential to emit for PM, $PM_{10}$, and VOC are each less than 10 tons/year.

d. The permittee has satisfied the "best available control techniques and operating practices" required pursuant to OAC rule 3745-21-08(B).

On November 5, 2002, OAC rule 3745-21-08 was revised to delete paragraph (B); therefore, paragraph (B) is no longer part of the State regulations. However, that rule revision has not yet been submitted to the U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revisions to OAC rule 3745-21-08, the requirement to satisfy the "best available control techniques and operating practices" still exists as part of the federally-approved SIP for Ohio.

c) Operational Restrictions

(1) The permittee shall burn only natural gas and/or syngas as fuel in this emissions unit.

(2) A pilot flame shall be maintained at all times in the flare's pilot light burner while the emission unit was in operation.

(3) The $H_2S$ content of syngas produced shall not exceed 9.53E-06 lbs $H_2S$ per cubic foot of syngas.

d) Monitoring and/or Recordkeeping Requirements

(1) For each day during which the permittee burns a fuel other than the natural gas or syngas, the permittee shall maintain a record of the type and quantity of fuel burned in this emissions unit.

(2) The permittee shall record all periods of time during which there was no pilot flame or the flare was inoperable while the emission unit was in operation.

(3) The permittee shall perform a daily analysis of the $H_2S$ content of the syngas produced and calculate a monthly arithmetic average of $H_2S$ content.

e) Reporting Requirements

(1) Annual Permit Evaluation Report (PER) forms will be mailed to the permittee at the end of the reporting period specified in the Authorization section of this permit. The permittee shall submit the PER in the form and manner provided by the director by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit.

(2) The permittee shall identify on the PER forms all periods of time during which the pilot flame was not functioning properly or the flare was not maintained as required in this permit. The reports shall include the date, time, and duration of each such period.

(3) The permittee shall identify on the PER forms any month in which the monthly average $H_2S$ content exceeded the value in c)(3).

f) Testing Requirements

(1) Compliance with the emission limitations in b)(1) shall be determined in accordance with the following methods:

a. Emission Limitation:

$NO_x$ shall not exceed 24.24 pound per hour.

Applicable Compliance Method:

This emission limitation was established to reflect the potential to emit for this emissions unit for process heat and flare emissions. Compliance may be demonstrated through calculations performed as follows: multiply the maximum fuel usage rate of 40 mmbtu/hr of the process heaters by the emission factor of 0.171 lb $NO_x$/mmbtu (which is derived from manufacturers data and greater than the emission factor for natural gas). To this is added the maximum flare emissions which are calculated from the emissions factor supplied by the applicant of 0.10 lbs $NO_x$/mmbtu multiplied by the maximum heat output of the flare of 174 mmbtu/hr.

If required, the permittee shall demonstrate compliance with this emission limitation in accordance with the methods and procedures specified in Methods 1 through 4 and 7 of 40 CFR Part 60, Appendix A, or other U.S. EPA-approved test method, with prior approval from the Ohio EPA.

b. Emission Limitation:

$NO_x$ shall not exceed 41.36 tons per year.

Applicable Compliance Method:

This emission limitation was established to reflect the potential to emit for this emissions unit for process heat and flare emissions. Compliance may be demonstrated through calculations performed as follows: multiply the maximum fuel usage rate of 40 mmbtu/hr of the process heaters by the emission factor of 0.171 lb $NO_x$/mmbtu (which is derived from manufacturers data and greater than the emission factor for natural gas) and by 8760 hours per year. To this is added the maximum flare emissions which are calculated from the emissions factor supplied by the applicant of 0.10 lbs $NO_x$/mmbtu multiplied by 30% of the heat output from the potential cubic feet of syngas produced in a year from 87.5 tons of feedstock per day.

c. Emission Limitation:

CO shall not exceed 9.03 pound per hour.

Applicable Compliance Method:

This emission limitation was established to reflect the potential to emit for this emissions unit for process heat and flare emissions. Compliance may be demonstrated through calculations performed as follows: multiply the maximum fuel usage rate of 40 mmbtu/hr of the process heaters by the emission factor of 0.0823 lb CO/mmbtu (which is derived from the AP-42 emission factor for natural gas). To this is added the maximum flare emissions which are calculated from the emissions factor supplied by the applicant of 0.033 lbs $NO_x$/mmbtu multiplied by the maximum heat output of the flare of 174 mmbtu/hr.

If required, the permittee shall demonstrate compliance with this emission limitation in accordance with the methods and procedures specified in Methods 1 through 4 and 10 of 40 CFR Part 60, Appendix A, or other U.S. EPA-approved test method, with prior approval from the Ohio EPA.

d. Emission Limitation:

CO shall not exceed 18.10 tons per year.

Applicable Compliance Method:

This emission limitation was established to reflect the potential to emit for this emissions unit for process heat and flare emissions. Compliance may be demonstrated through calculations performed as follows: multiply the maximum fuel usage rate of 40 mmbtu/hr of the process heaters by the emission factor of 0.0823 lb CO/mmbtu (which is derived from the AP-42 emission factor for natural gas) and by 8760 hours per year. To this is added the maximum flare emissions which are calculated from the emissions factor supplied by the applicant of 0.033 lbs CO/mmbtu multiplied by 30% of the heat output from the potential cubic feet of syngas produced from 87.5 tons of feedstock per day.

e. Emission Limitation:

$SO_2$ shall not exceed 8.53 pound per hour.

Applicable Compliance Method:

This emission limitation was established to reflect the potential to emit for this emissions unit for process heat and flare emissions. Compliance may be demonstrated through calculations performed as follows: multiply the maximum fuel usage rate of 40 mmbtu/hr of the process heaters by the emission factor of 0.0402 lb $SO_2$/mmbtu (which is derived from syngas content analysis and greater than the emission factor for natural gas). To this is added the maximum flare emissions which are calculated from the emissions factor supplied by the applicant of 0.0398 lbs $SO_2$/mmbtu multiplied by the maximum heat output of the flare of 174 mmbtu/hr.

If required, the permittee shall demonstrate compliance with this emission limitation through emission testing performed in accordance with Methods 1 through 4 and 6 of 40 CFR Part 60 Appendix A using the methods and procedures specified in OAC rule 3745-18-04, or other U.S. EPA-approved test method, with prior approval from the Ohio EPA.

f. Emission Limitation:

$SO_2$ shall not exceed 11.58 tons per year.

Applicable Compliance Method:

This emission limitation was established to reflect the potential to emit for this emissions unit for process heat and flare emissions. Compliance may be demonstrated through calculations performed as follows: multiply the maximum fuel usage rate of 40 mmbtu/hr of the process heaters by the emission factor of 0.0402 lb $SO_2$/mmbtu (which is derived from syngas content analysis and greater than the emission factor for natural gas) and by 8760 hours per year. To this is added the maximum flare emissions which are calculated from the emissions factor supplied by the applicant of 0.0398 lbs $SO_2$/mmbtu multiplied by 30% of the heat output from the potential cubic feet of syngas produced from 87.5 tons of feedstock per day.

g. Emission Limitation:

Particulate emissions (PE) shall not exceed 0.020 lb/million Btu actual heat input.

Applicable Compliance Method:

This emission limitation was established to reflect the potential to emit for this emissions unit for process heat and flare emissions. Compliance may be demonstrated based on the emission factors as calculated: to the emission factor for the process heaters of 0.01 lb PE/mmbtu (supplied by the applicant and greater than that for natural gas) is added the emission factor for flare emissions of 0.01 lb PE/mmbtu.

h. Emission Limitation:

Visible PE from any stack serving this emissions unit shall not exceed 20% opacity as a 6-minute average, except as provided by the rule.

Applicable Compliance Method:

If required, compliance shall be demonstrated based upon visible particulate emission observations performed in accordance with 40 CFR part 60, Appendix A, Method 9 and the procedures specified in 40 CFR Part 60.11.

g) Miscellaneous Requirements

(1) None.

Tad Anderson <tdanderson@utah.gov>

## Subpart D information and draft engineering review comments

1 message

**Armer, Melissa** <melissa.armer@stantec.com> Fri, Oct 23, 2015 at 4:17 PM
To: Tad Anderson <tdanderson@utah.gov>
Cc: Marty Gray <martygray@utah.gov>, TROY MCKINLEY <mckinleyelectric@msn.com>

Tad and Marty,

Attached are our comments on the draft engineering review that Marty provided on 10/20. We've also attached Subpart D applicability information for the pyrolysis and gasification systems.

I was able to speak with Christopher Smith at the Louisiana Dept. of Env. Quality- Air Permits Division who is the permit writer working on a permit modification for the St. James methanol plant. He was unable to find any documentation providing additional details regarding the Subpart D applicability determination for the steam reformer at the St. James methanol plant, but we were able to obtain a copy of the permit application. Christopher also indicated that there are multiple methanol plants permitted in Louisiana and none of the steam reformers were subject to Subpart D.

Christopher Smith

Environmental Chemical Specialist Advanced

LDEQ/Air Permits Division

225-219-3439

Christopher.smith@la.gov

I will plan to contact you early next week to discuss this information and the path forward for finalizing the NOI.

Melissa


**Melissa Armer, P.E.**

Project Engineer
7669 West Riverside Drive, Suite 101 Boise ID 83714-6183
Phone: (208) 853-0883 x 103
Fax: (208) 853-0884
melissa.armer@stantec.com

Stantec

Celebrating 60 years of community, creativity, and client relationships.



**2 attachments**

**Rev_response to DAQ 10232015.pdf**
142K

**Working Document-RF_rev comments.doc**
70K

Stantec

**Stantec Consulting Services Inc.**
7669 West Riverside Drive, Suite 101, Boise ID 83714-6183

October 23, 2015

**Attention: Tad Anderson**
Utah Department of Environmental Quality
Division of Air Quality
P.O. Box 144820
Salt Lake City, UT 84114-482

Dear Tad,

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility Notice of Intent**

Stantec Consulting Services (Stantec) is submitting the following additional information to help with New Source Performance Standard (NSPS) applicability determinations. Should you require additional information or wish to discuss further, please contact me at 208-853-0883.

**Pyrolysis and Gasification**
**40 CFR Part 60 Subpart D Applicability**

**Subpart D—STANDARDS OF PERFORMANCE FOR FOSSIL-FUEL-FIRED STEAM GENERATORS**

§60.40 Applicability and designation of affected facility.
(a)(1) Each fossil-fuel-fired steam generating unit of more than 73 megawatts (MW) heat input rate (250 million British thermal units per hour (MMBtu/hr)).

"*Fossil-fuel-fired steam generating unit* means a furnace or boiler used in the process of burning fossil fuel for the purpose of producing steam by heat transfer."

*The pyrolysis burner system consists of (3) 6-inch Kinemax LE burners each providing a maximum of 11.2 MMBtu/hr (33.6 MMBtu/hr). These burners do not meet the MMBtu/hr heat input rating for this subpart.*

*The gasification burner system will include (5) 14-inch Kinemax LE burners each providing a maximum of 60 MMBtu/hr (300 MMBtu/hr). These burners meet the MMBtu/hr heat input rating for this subpart but do not meet the definition of a fossil-fuel-fired steam generating unit. The purpose of the pyrolysis and gasification burner systems is to provide heat for the reaction chamber used to convert the coal feed into syngas. The primary purpose of the large-diameter coiled Inconel pipe is the gasification of the feedstock.*

*Water is injected into the system to be used as a reactant to control the hydrogen and carbon monoxide $H_2$:CO ratio. The water subsequently changes to steam due to the high temperatures in the reaction chamber. Although steam is formed as part of the pyrolysis and gasification process, the purpose of the burner systems which are natural gas fired are not to produce steam. The small-diameter coiled pipe above*

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

*the reactor coils is used to pre-heat the ionized water entering the system; it would also not fit the definition of a boiler since it uses waste heat from the flue gas to pre-heat the water.*

**Subpart Da—STANDARDS OF PERFORMANCE FOR ELECTRIC UTILITY STEAM GENERATING UNITS**

Revolution provided a Subpart Da applicability outline in the 9/17/15 response to UDAQ questions (R1).

**Subpart Db—STANDARDS OF PERFORMANCE FOR INDUSTRIAL-COMMERCIAL-INSTITUTIONAL STEAM GENERATING UNITS**

§60.40b Applicability and designation of affected facility.

(a) The affected facility to which this subpart applies is each steam generating unit that commences construction, modification, or reconstruction after June 19, 1984, and that has a heat input capacity from fuels combusted in the steam generating unit of greater than 29 megawatts (MW) (100 million British thermal units per hour (MMBtu/hr)).

*The pyrolysis burner system consists of (3) 6-inch Kinemax LE burners each providing a maximum of 11.2 MMBtu/hr (33.6 MMBtu/hr). These burners do not meet the MMBtu/hr heat input rating for this subpart.*

*The gasification burner system will include (5) 14-inch Kinemax LE burners each providing a maximum of 60 MMBtu/hr (300 MMBtu/hr). These burners meet the MMBtu/hr heat input rating for this subpart but do not meet the definition of a fossil-fuel-fired steam generating unit. See Subpart D discussion above.*

**Subpart Dc—STANDARDS OF PERFORMANCE FOR SMALL INDUSTRIAL-COMMERCIAL-INSTITUTIONAL STEAM GENERATING UNITS**

§60.40C Applicability and designation of affected facility.

(a) Except as provided in paragraphs (d), (e), (f), and (g) of this section, the affected facility to which this subpart applies is each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 29 megawatts (MW) (100 million British thermal units per hour (MMBtu/h)) or less, but greater than or equal to 2.9 MW (10 MMBtu/h).

*The pyrolysis burner system consists of (3) 6-inch Kinemax LE burners each providing a maximum of 11.2 MMBtu/hr (33.6 MMBtu/hr). These burners meet the MMBtu/hr heat input rating for this subpart but do not meet the definition of a fossil-fuel-fired steam generating unit. See Subpart D discussion above.*

**Reference: Response to UDAQ Questions- Revolution Fuels, LLC Proposed Coal to Liquids Facility**

*The gasification burner system will include (5) 14-inch Kinemax LE burners each providing a maximum of 60 MMBtu/hr (300 MMBtu/hr). These burners do not meet the MMBtu/hr heat input rating for this subpart.*

**St. James Methanol**

The St. James Methanol Plant has a steam reformer where natural gas is broken down in two reaction stages to a mixture of basic components in a process referred to as steam reforming. Steam reforming converts natural gas into a mixture of carbon oxides, hydrogen and residual methane which contains water in the form of steam. The resulting mixture of carbon oxides and hydrogen is referred to as synthesis gas, which contains key components for the formation of methanol.

This process is similar to the pyrolysis and gasification reaction chamber at the Revolution facility as syngas is produced from coal which is broken down into basic components. In the St. James process steam is a byproduct produced from the breakdown of the natural gas components. In the Revolution process, water is a reactant used to produce syngas from the breakdown of coal. Page 11 of the St. James methanol plant Title V permit states that Subpart D, Db, Dc does not apply to the steam reformer since the steam reformer is not a steam generator. Regulations 40 CFR 60.40(a), 40 CFR 60.40b(a), 40 CFR 60.40c(a), are referenced.

A copy of the initial permit application for the St. James methanol plant can be obtained at the link below:

https://zendto.deq.louisiana.gov/pickup.php?claimID=8UukbQBPxVPxe5wX&claimPasscode=MxqUND3vxPSCbTcx&emailAddr=ellen.peneguy%40la.gov

Regards,

Melissa Armer

Melissa Armer, P.E.
Project Engineer, Stantec

Enclosure:
St. James Methanol Plant Title V permit application

Tad Anderson <tdanderson@utah.gov>

# FW: Revolution Fuels - Response to Source Plan Review

**Clark, Eric** <eric.clark@stantec.com> Thu, Nov 12, 2015 at 9:17 AM
To: "tdanderson@utah.gov" <tdanderson@utah.gov>

Tad –

We have reviewed the Source Plan you provided a few days ago. Please see the attached files. These a word document highlighting our comments via Track Changes and a newly updated emission inventory including the jet fuel/natural gas combination as discussed by Melissa and yourself. I've also included a memo outlining a few comments that warranted a bit more explanation. Please let me know if you have any questions or comments. Thank you.

**Eric Clark**

Project Engineer
7669 West Riverside Drive Suite 101 Boise ID 83714-6183
Phone: (208) 853-0883 x 106
Fax: (208) 853-0884
eric.clark@stantec.com

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**3 attachments**

**Stantec final Emission Calculations rev2.xlsx**
183K

**mem_Response to Source Review.docx**
241K

**RN15490-0001 with WJC and TCG comments.rtf**
410K

Stantec

# Memo

| | | | |
|---|---|---|---|
| To: | Tad Anderson<br>UDAQ | From: | Eric Clark<br>7669 W. Riverside Drive<br>Boise, ID 83714 |
| File: | 203701022 | Date: | November 11, 2015 |

**Reference:** **Response to Source Plan Review – Revolution Fuels**

Mr. Anderson

Revolution Fuels and Stantec appreciate the opportunity to review the Source Plan relating to the proposed Approval Order. We have attached a Word document in track changes that outlines areas of the Source Plan that warrant updating or clarification. In addition, for those comments that require further explanation, they are highlighted below:

- **Comments JC 1 & TH2** – The maximum coal throughput is requested to be 750 tons per day. Note that is value is consistent with the emission calculations within the emissions inventory. Note that that 500 tpd is applied with a multiplier of 1.5 for a total of 750 tpd. Please also note that the annual amount is assumed for 365 days.
- **Comment JC 3** – It is our understanding that the non-fugitive value of PM2.5 and PM10 are assumed equivalent for the PTE calculations, but the intent of the language within the Abstract is to ensure that it is understood that, in reality, the amount of PM2.5 will be less than PM10.
- **Comments JC 6 through JC 9** – These comments are intended to request clarification language when describing the process.
- **Comments JC 29 & JC 30** - I believe the draft references low NOx burners in one and not the other. Both units are equipment with low NOx burners, thus it may be best to include such language in both locations.
- **Comments that state TCG in front** – Please disregard the "TCG" portion as that is strictly a reference to the commenter and has no bearing on the content of the comment.

We have also included an updated emissions inventory per your conversation with Melissa Armer yesterday. The updates include emission changes to the "worst-case" scenario between the use of jet fuel, diesel fuel or some combination thereof.

Lastly, please note that is it is our understanding that Dave Prey is still in the process of reviewing the submitting modeling files. Should there be any questions pertaining to those results, we will address them as they come.

Stantec



**Reference: Response to Source Plan Review – Revolution Fuels**

If you have any questions regarding these comments or anything else regarding this project please do not hesitate to contact me at the number or email listed below. Thank you.

Eric E. Clark

Eric Clark, P.E.
Project Engineer
Phone: (208) 853-0883 x 106
Fax: (208) 853-0884
eric.clark@stantec.com

Attachment: Stantec Final Emission Calculations rev2.xlsx
RN15490-0001 with WJC and TCG comments.rtf

c. Troy McKinley mckinleyelectric@msn.com

**FACILITY WIDE POTENTIAL TO EMIT**

| Source ID | Source Description | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | Lead | | $CO_2$ | | $N_2O$ | | $CH_4$ | | HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| | Truck unloading | | | | | | | | | 0.07 | 0.10 | 0.01 | 0.01 | | | | | | | | | | |
| | Coal storage pile- wind erosion | | | | | | | | | 0.36 | 1.36 | 0.05 | 0.20 | | | | | | | | | | |
| | Paved haul road | | | | | | | | | 0.04 | 0.07 | 0.01 | 0.02 | | | | | | | | | | |
| 200-3 | Coal handling baghouse | | | | | | | | | 0.01 | 0.01 | 0.00 | 0.00 | | | | | | | | | | |
| 200-4 | Coal silo baghouse | | | | | | | | | 0.02 | 0.03 | 0.01 | 0.02 | | | | | | | | | | |
| F | Gasification flue gas without SCR | 20.35 | 85.47 | 17.35 | 72.86 | 2.01 | 8.44 | 0.39 | 1.63 | 2.78 | 11.66 | 2.78 | 11.66 | 0.0002 | 0.0008 | 43,847 | 184,156 | 0.23 | 0.98 | 0.84 | 3.53 | 3.82E-01 | 1.4 |
| | Gasification flue gas with SCR | 3.67 | 15.41 | 14.68 | 61.65 | 0.00 | 0.00 | | | | | | | | | | | | | | | | |
| 240-1 | Ash handling baghouse | | | | | | | | | 0.000 | 0.001 | 0.000 | 0.000 | | | | | | | | | | |
| 240-2 | Ash bin baghouse | | | | | | | | | 0.000 | 0.001 | 0.000 | 0.000 | | | | | | | | | | |
| E | Flare Pilot | 0.05 | 0.21 | 0.08 | 0.36 | 0.01 | 0.02 | 0.00 | 0.00 | 0.01 | 0.03 | 0.01 | 0.03 | 4.9E-07 | 2.1E-06 | 118 | 515 | 0.001 | 0.003 | 0.002 | 0.010 | | |
| A | $CO_2$ Vent | | | 3.4 | 14.1 | | | | | | | | | | | 23,874 | 100,272 | | | | | | |
| H | Activation/Regeneration Heater #1 | 0.06 | 0.12 | 0.10 | 0.21 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.02 | 0.01 | 0.02 | 6.1E-07 | 1.2E-06 | 146 | 295 | 0.001 | 0.002 | 0.003 | 0.006 | | |
| I | Activation/Regeneration Heater #2 | 0.03 | 0.03 | 0.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 3.3E-07 | 3.3E-07 | 78 | 79 | 0.0004 | 0.0004 | 0.002 | 0.002 | | |
| D | Fischer Tropsch purge gas | | | | | | | | | | | | | | | 0.23 | 0.16 | | | | | | |
| B | Product Upgrading Heater #1 | 0.24 | 1.0 | 0.40 | 1.7 | 0.03 | 0.11 | 0.00 | 0.01 | 0.04 | 0.15 | 0.04 | 0.15 | 2.4E-06 | 1.0E-05 | 571 | 2,396 | 0.00 | 0.01 | 0.01 | 0.05 | | |
| C | Product Upgrading Heater #2 | 0.50 | 2.1 | 0.84 | 3.5 | 0.06 | 0.23 | 0.01 | 0.03 | 0.08 | 0.32 | 0.08 | 0.32 | 5.0E-06 | 2.1E-05 | 1,206 | 5,065 | 0.01 | 0.03 | 0.02 | 0.10 | | |
| G | Auxillary boiler | 3.6 | 0.91 | 6.1 | 1.5 | 0.40 | 0.10 | 0.04 | 0.01 | 0.55 | 0.14 | 0.55 | 0.14 | | | 8,692 | 2,173 | 0.05 | 0.01 | 0.17 | 0.04 | | |
| J | Emergency generator (diesel) | 12.91 | 3.23 | 2.16 | 0.54 | 0.23 | 0.06 | 0.36 | 0.09 | 0.36 | 0.09 | 0.36 | 0.09 | | | 1719.12 | 430 | 0.01 | 0.06 | 0.07 | 0.29 | | |
| 960 | Fire water pump (diesel) | 1.20 | 0.30 | 0.58 | 0.14 | 0.03 | 0.01 | 0.45 | 0.11 | 0.07 | 0.02 | 0.07 | 0.02 | | | 253.00 | 63 | 0.002 | 0.009 | 0.010 | 0.043 | | |
| 910 | Tanks | | | | | 0.05 | 0.23 | | | | | | | | | | | | | | | | |
| 920 | Cooling Tower | | | | | | | | | 1.8 | 7.8 | 1.8 | 7.8 | | | | | | | | | | |
| | Fugitive Equipment Leaks | | | | | 1.72 | 7.52 | | | | | | | | | | | | | | | 1.43 | 6.25 |
| | **TOTAL POINT SOURCES (without SCR)** | | **93.4** | | **95.0** | | **9.2** | | **1.9** | | **20.2** | | **20.2** | | **0.001** | | **295,445** | | **1.1** | | **4.1** | | **8.9** |
| | **TOTAL POINT SOURCES (with SCR)** | | **23.3** | | **83.8** | | | | | | | | | | | | | | | | | | |

$CO_2e$[1] = **329.1** **101.6**

[1] Utilizes a global warming potential of 298 for $N_2O$ and 25 for $CH_4$ per updated ruling 11/29/13 78 FR 71904

**AIR DISPERSION MODELING DETERMINATION- WORST CASE WITHOUT SCR**

| Threshold | $NO_x$ tons/yr | CO tons/yr | $SO_2$ tons/yr | $PM_{10}$ tons/yr | $PM_{2.5}$ tons/yr |
|---|---|---|---|---|---|
| PTE non-fugitive sources | 93.4 | 95.0 | 1.9 | 20.2 | 20.21 |
| Modeling threshold | 40 | 100 | 40 | 15 | 15 |
| Exceeds modeling threshold (Y/N) | Y | N | N | Y | Y |

| Threshold | $PM_{10}$ tons/yr | $PM_{2.5}$ tons/yr |
|---|---|---|
| PTE fugitive sources | 1.5 | 0.2 |
| Modeling threshold | 5 | 5 |
| Exceeds modeling threshold (Y/N) | N | N |

| Pollutant | Emissions (lb/hr) | Emissions (tpy) | Ave. Time | ETV (lb/hr) | Modeling Required? |
|---|---|---|---|---|---|
| Benzene | 7.66E-02 | 2.95E-01 | Chronic, 8 Hour | 0.3163 | No |
| Dichlorobenzene | 5.47E-04 | 1.95E-03 | Chronic, 8 Hour | 11.905 | No |
| 1,3 butadiene | 6.02E-05 | 1.51E-05 | Chronic, 8 Hour | 0.292 | No |
| Formaldehyde | 3.51E-02 | 1.22E-01 | Acute, 1hour | 0.0567 | No |
| Hexane | 1.28E+00 | 4.93E+00 | Chronic, 8 Hour | 34.895 | No |
| Napthalene | 6.99E-02 | 3.02E-01 | Chronic, 8 Hour | 10.381 | No |
| Toluene | 2.69E-01 | 1.16E+00 | Chronic, 8 Hour | 14.922 | No |
| Xylene | 4.67E-01 | 2.03E+00 | Chronic, 8 Hour | 85.97 | No |
| Acetaldehyde | 1.44E-03 | 3.61E-04 | Acute, 1hour | 6.9363 | No |
| Acrolein | 2.24E-04 | 5.60E-05 | Chronic, 8 Hour | 0.0353 | No |

1 Assumes all emission points are vertically unrestricted and less than 50 m from property boundary