UTAH DIVISION OF AIR QUALITY
SOURCE PLAN REVIEW

Heidi Thorn
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2825 East Cottonwood Parkway
Suite 500
Salt Lake City, UT 84121

Project Number: N149470001

RE:	Industrial Recycling & Renewable Power Facility Salt Lake County; CDS B; MACT (Part 63), Nonattainment or Maintenance Area, NSPS (Part 60)
Review Engineer:	Jon Black
Date:	November 18, 2014
Notice of Intent Submitted:	April 17, 2014
Plant Contact:	Heidi Thorn
Phone Number:	(801) 205-6680
Source Location:	8800 South 700 West, Sandy, UT Salt Lake County 4,493,846 m Northing, 423,132 m Easting, UTM Zone 12 UTM Datum: NAD27

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

Navitus Sustainable Industries (Navitus) has requested an AO to construct and operate an industrial byproduct recovery facility to generate methane gas. The methane gas is used as a fuel source in four (4) Internal Combustion engines which generate electricity. This proposed facility will process 350 tons per day of mixed municipal solid waste (MSW) and mixed industrial waste to create the methane. The Navitus facility will be located at 8800 South 700 West, Sandy, Utah 84070. Sandy is located in Salt Lake County, a non-attainment area for PM_{10}, PM2.5 and SO2 and a maintenance area for ozone. The emergency generator is subject to NSPS Subparts A and IIII and NESHAP Subparts A and ZZZZ. This source is not subject to the Operating Permits program due to the being classification as a minor source.

The potential to emit emissions for this facility, in tons per year, will be as follows: PM_{10} = 0.03, $PM_{2.5}$(Subset of PM_{10}) = 0.03, NO_x = 7.60, CO = 33.02, SO_2 = 0.16, VOC = 11.95, Total HAPs = 1.78 and CO_2e = 77,561.27.

SOURCE SPECIFIC DESIGNATIONS

Applicable Programs:

NSPS (Part 60), Subpart A: General Provisions applies to South Valley Recycling & Renewable Power Facility
NSPS (Part 60), Subpart IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines applies to South Valley Recycling & Renewable Power Facility
MACT (Part 63), Subpart A: General Provisions applies to South Valley Recycling & Renewable Power Facility
MACT (Part 63), Subpart ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines applies to South Valley Recycling & Renewable Power Facility
Salt Lake County O3 Maintenance Area applies to South Valley Recycling & Renewable Power Facility
Salt Lake County PM_{10} NAA applies to South Valley Recycling & Renewable Power Facility
Salt Lake County $PM_{2.5}$ NAA applies to South Valley Recycling & Renewable Power Facility
Salt Lake County SO_2 NAA applies to South Valley Recycling & Renewable Power Facility

Permit History:

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

Is Derived From	Notice of Intent Document dated April 17, 2014
Incorporates	Additional NOI Information dated June 10, 2014
Incorporates	Additional NOI Information dated June 30, 2014
Incorporates	Additional NOI Information dated July 21, 2014
Incorporates	Additional NOI Information dated October 15, 2014

Nonattainment or Maintenance Areas Impacted:
This source is located in Sandy which is in Salt Lake County, a non-attainment area for PM_{10}, $PM_{2.5}$ and SO_2 and a maintenance area for ozone.

SUMMARY OF NOTICE OF INTENT INFORMATION

Description of Proposal:

Navitus has requested to construct and operate an industrial byproduct recovery facility to create methane gas and generate electricity from methane gas. The primary feedstock for the facility will be mixed MSW and mixed industrial waste. The MSW will make up approximately 70 percent of the feedstock. The remainder of the feedstock may consist of mixed industrial waste, land clearing debris, and yard waste. The South Valley Recycling & Renewable Power Facility will gasify the non-recyclable feedstock. The material will not be directly combusted; instead, a thermal chemical process converts the feed material into a synthetic gas (syngas) consisting of 90 percent methane gas and other hydrocarbons. The syngas (methane gas) is then fed to an internal combustion engine to generate electricity to sale to the local utility grid.

Recycling and Renewable Power Facility Process:

Feedstock Receiving and Storage:
Mixed MSW and mixed industrial waste arrives at the facility via truck to the tipping floor of the material recovery facility. The mixed preprocessed industrial waste is stored within an enclosed structure. The material recovery facility area includes equipment for storage, handling, grinding and screening of the feedstock. To control fugitive PM_{10} and $PM_{2.5}$ emissions all feedstock is stored within an enclosed, indoor air controlled, and sprinkler equipped building. The associated conveyor equipment will also be enclosed. Front-end loaders will be used to move the materials from the tipping floor to the material recovery facility system (MRF) including storage and processing areas. An internal dust collection system will be installed which is equipped with a baghouse. The baghouse will not vent outside of the MRF. The MRF handling area will include a feedstock grinder. The pyrolysis units require the feedstock to be reduced in size, less than 2 inch minus, as to produce sufficient surface area to allow the prepared fuel biomass (PFB) to be fully consumed during the residence time of the thermo chemical conversion reaction.

Thermal Chemical Pyrolysis Unit and Heater Assembly:
Navitus will use a pyrolysis system (oxygen starved environment) with a control system to sequester noxious elements and produces a clean, combustible gas, consisting primarily of methane. Each pyrolysis unit measures 8' wide x 16' long by 10' tall. The heater assembly, which contains the burners, provides a controlled temperature zone throughout. The burners are initially fired with propane fuel at startup and as needed for temperature stabilization, and pyrolysis unit product gas (methane), which is derived from the thermal chemical conversion of the PFB. The methane gas will be the primary fuel used during process operations. The heater assembly has a single flue stack for discharge of the combustion gases to the inlet of the IC engine. Seven (7) units will be installed.

The PFB begins the process of molecular disassociation as it nears the pyrolysis unit chamber. The majority (greater than 90%) of the PFB material converts into methane. The thermo chemical pyrolysis process uses additives and a catalytic process to preferentially form the methane. Each pyrolysis unit is continuously fed utilizing an enclosed screw conveyor. A furnace with propane/methane fired burners heats the PFB to temperatures between 1600 and 1800 degrees Fahrenheit. The heating process releases water vapor and organic gases that flow from the retort into a water-cooled condenser. Water vapor and condensable hydrocarbons are re-introduced into the pyrolysis unit. The cooled fuel gas is then put through a filter to remove any entrained liquids prior to delivery to the IC engine. The remaining material

turns into char, which is collected at the bottom of the each pyrolysis unit for later reuse or disposal. Laboratory testing has shown the char to be inert.

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	77561.27	tons/yr
Carbon Monoxide	33.02	tons/yr
Nitrogen Oxides	7.60	tons/yr
Particulate Matter - PM_{10}	0.03	tons/yr
Particulate Matter - $PM_{2.5}$	0.03	tons/yr
Sulfur Dioxide	0.16	tons/yr
Volatile Organic Compounds	11.95	tons/yr
Estimated Hazardous Air Pollutant Potential Emissions		
Acetaldehyde (CAS #75070)	414	lbs/yr
Acrolein (CAS #107028)	254	lbs/yr
Benzene (Including Benzene From Gasoline) (CAS #71432)	22	lbs/yr
Biphenyl (CAS #92524)	10	lbs/yr
Formaldehyde (CAS #50000)	1.30	tons/yr
Generic HAPs (CAS #GHAPS)	60	lbs/yr
Hexane (CAS #110543)	55	lbs/yr
Methanol (CAS #67561)	124	lbs/yr
Styrene (CAS #100425)	1	lbs/yr
Toluene (CAS #108883)	20	lbs/yr
Xylenes (Isomers And Mixture) (CAS #1330207)	9	lbs/yr
Total hazardous air pollutants	1.78	tons/yr

Review of Best Available Control Technology:

1. BACT review regarding Internal Combustion Engines

   BACT Analysis for CAT 3520C Engines

   Particulate ($PM_{10}/PM_{2.5}$)
   The combustion of methane gas in the CAT 3520C engines will result in minor $PM_{10}/PM_{2.5}$ emissions (less than 1 ton). NSPS 40 CFR 60 Subpart JJJJ, which specifies performance standards for spark ignition engines, does not set PM emission limits for these types of engines.

   Based upon the RBLC database and engine manufacturing data, the UDAQ recommends proper maintenance and good combustion practices as BACT for $PM_{10}/PM_{2.5}$ emissions associated with the CAT 3520C engines.

Nitrogen Oxides (NO_x)
NO_x emissions from the IC engines consist of nitric oxide (NO) and Nitrogen dioxide (NO_2). NO_x is formed by the oxidation of nitrogen contained in the fuel (fuel NO_x), and by the combination of elemental nitrogen and oxygen in the high temperature environment of the combustion zone (thermal NO_x). Essentially all NO_x emissions originate as NO_x, which subsequently oxidizes in the IC exhaust or in the atmosphere to the more stable NO_2 molecule. Factors affecting the generation of NO_x include flame temperature, residence time, quantity of excess air, and nitrogen content of the fuel.

The IC engines have adopted combustion process controls through the use of 'lean burn' technology, the engines are equipped with an electronic air/fuel ratio controller. Therefore the basic BACT for NO_x is combustion process controls.

BACT included a review of post combustion catalytic and non-catalytic control equipment, Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR) were evaluated for post combustion NO_x control. Based on previous BACT determinations, there are no applications of SCR or SNCR controls for methane fired IC engines. However, SCR has been used for diesel-fired IC engines.

Based on BACT selection procedures, the UDAQ recommends the use of combustion controls with air/fuel ratio and lean burn design in combination with SCR to reduce overall NO_x emissions by 90 percent. The CAT 3520 C engine is manufacturer certified to comply with NSPS 40 CFR 60 Subpart JJJJ emission standards.

Carbon Monoxide (CO)
The IC Engines are designed for high-combustion efficiency, which will inherently minimize the production of CO. The engines are equipped with electronic control to automatically adjust the ignition timing and air to fuel ratio to minimize incomplete combustion and maintain CO and NO_x emissions.

Volatile Organic Compounds (VOC)
Oxidation catalyst technology is the primary method to reduce VOC emissions.

The UDAQ shall require the use of oxidation catalyst technology along with combustion controls and good combustion practices as BACT for the IC engines. The CO and VOC emission limits will meet the requirements of NSPS 40 CFR 60 Subpart JJJJ.
[Last updated October 16, 2014]

2. BACT review regarding Pyrolysis Units
Each pyrolysis unit will utilize a heater assembly which provides external heat to the pyrolysis unit. The heater assembly contains burners fired with propane at startup and product gas (methane) during normal operations. The total heater burner rating is 9.2 MMBtu/hr per pyrolysis unit. Due to the minimal emissions generated from each of these units and the fact that all emissions are routed through the IC engines prior to being emitted, no additional control is required for these units. Proper maintenance along with use of propane and product gas as fuel is considered BACT for the various pyrolysis unit heaters onsite.
[Last updated November 18, 2014]

3. BACT review regarding Emergency Diesel Generator and Fire Pump

The stationary emergency diesel generator and fire pump engines will utilize low sulfur diesel as fuel. The engines will also meet the limits contained in NSPS 40 CFR 60 Subpart IIII and NESHAP 40 CFR 63 Subpart ZZZZ. Additional emission reductions would be economically infeasible for the amount of emissions reduced. BACT for these engines is compliance with Subparts IIII and ZZZZ combined with good combustion practices.
[Last updated November 18, 2014]

4. BACT review regarding Dryers
The dryers are utilized to ensure that the prepared biomass fuel is free of liquids prior to introduction into the Pyrolysis units. The dryers are fuel on propane or processed gas (methane). Each dryer has a maximum burner rating of 0.87 MMBtu/hr. BACT for the dryers shall be the use of propane or processed gas along with proper maintenance and combustion practices. [Last updated November 18, 2014]

5. BACT review regarding Emergency Flare
The emergency flare will only operate during emergencies or upset conditions. During this time the vapors from the pyrolysis system or other process equipment will be routed to the operating emergency flare. BACT will require no visible emissions during emergency flare operation.
[Last updated November 18, 2014]

6. BACT review regarding Baghouse
The baghouse will be installed on the MRF to capture fugitive dust associated with the material handling of the MSW and mixed industrial waste. The MRF area will be enclosed with no emission points to the atmosphere. All exhaust air will be ducted to the baghouse which will re-introduce the exhaust air back into the MRF building. Therefore, no emission point is associated with the baghouse unit and BACT is not required for the baghouse.
[Last updated November 18, 2014]

Modeling Results:

A dispersion modeling analysis was performed for the following source:
Company: Navitus Sustainable Industries
Site: Byproduct Recovery Facility

The individual HAP emission increases triggered the requirement to model under R307-410-5 for the following pollutants:
-Formaldehyde
-Acrolein

The model predicted all HAP concentrations to be less than their respective UDAQ - Toxic Screening Levels (TSL). Based on these results, no further analysis is required.

Pollutant	Average	Impact ug/cu.m	TSL ug/cu.m	Percent TSL
Formaldehyde	1-Hour	2.6	37.0	7.0%
Acrolein	1-Hour	0.3	23.0	1.1%

[Last updated November 18, 2014]

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:

Navitus Sustainable Industries
2825 East Cottonwood Parkway
Suite 500
Salt Lake City, UT 84121

Permitted Location:

Navitus Sustainable Industries- South Valley Recycling & Renewable Power Facility
8800 South 700 West
Sandy, UT 84070

UTM coordinates: 423,132 m Easting, 4,493,846 m Northing, UTM Zone 12
SIC code: 4911 (Electric Services)

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 **South Valley Recycling & Renewable Power Facility**

II.A.2 **Material Recovery Facility System**
One (1) Material Recovery Facility System

Facility Area consists of equipment for storage, handling, grinding and screening of the feedstock. The material recovery area is enclosed, controlled with sprinklers and a baghouse. The baghouse does not vent externally.

Facility ID: MRF1
Consist of Equipment IDs: Grinder (GRIN1), Feedstock Storage Bin (FSB1), Enclosed Belt Conveyor Feed System (CNYS1), Dust Collection System (DUCOLL1), Tipping Floor (TFL1), and Truck Weigh Station (TWS1)

II.A.3 **Pyrolysis System**
Seven (7) Thermal Chemical Conversion Pyrolysis Units equipped with Heater Assembly
Heater assembly total burner rating: 9.2 MMBtu/hr per pyrolysis unit
Equipment IDs: TCR1/HAB1, TCR2/HAB2, TCR3/HAB3, TCR4/HAB4, TCR5/HAB5, TCR6/HAB6, TCR7/HAB7

II.A.4 **Internal Combustion Engines**
Four (4) Caterpillar IC Engines
Maximum Engine Rating: 2233 hp
Fuel Type: Methane Gas
Equipment IDs: ICENG1, ICENG2, ICENG3, ICENG4

II.A.5 **Dryers**
Two (2) Prepared Fuel Biomass Dryers
Maximum Rating: 0.87 MMBTU/hr each
Equipment IDs: FBD1, FBD2

II.A.6 **Baghouse**
One (1) Reverse Air Baghouse
Maximum Rating: 26,650 acfm

Note: The baghouse is vented back into the MRF building and is noted here for informational purposes only.

II.A.7 **Emergency Flare**
One (1) Emergency Flare
Maximum Waste Stream Input: 500 scfm
Equipment ID: EX-FLARE1

II.A.8 **Emergency Generator**

One (1) Emergency Generator

Maximum Rating:	500 kW
Fuel Type:	Diesel
Equipment ID:	EX-GEN1

II.A.9 **Fire Water Pump**

One (1) Emergency Fire Water Pump Engine

Maximum Rating:	500 kW
Fuel Type:	Diesel
Equipment ID:	EX-FIPU1

II.A.10 **Syngas Storage**

Syngas Storage Day Tank

Equipment ID:	SDT1

II.B Requirements and Limitations

II.B.1 **Navitus Sustainable Industries shall operate in accordance with the following:**

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 has been completed and is operational. To ensure proper credit when notifying the Director, send your correspondence to the Director, attn: Compliance Section.

If the owner/operator has not notified the Director in writing within 18 months from the date of this AO on the status of the construction and/or installation, the Director shall require documentation of the continuous construction and/or installation of the operation. If a continuous program of construction and/or installation is not proceeding, the Director may revoke the AO. [R307-401-18]

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

A. All Internal Combustion Engine Exhaust Stacks - 10% opacity;
B. All Natural gas/Methane fired equipment exhaust points - 10% opacity;
C. All Diesel Engines - 20% opacity;
D. All Other Points - 20% opacity. [R307-401-8]

II.B.1.b.1 Opacity observations of visible emissions from stationary sources shall be conducted according to 40 CFR 60, Appendix A, Method 9.

For equipment subject to NSPS, opacity shall be determined by conducting observations in accordance with 40 CFR 60.11(b) and 40CFR 60, Appendix A, Method 9. [R307-401]

II.B.1.c All feedstock waste shall be stored within an enclosed building. [R307-401-8]

II.B.1.d The baghouse shall control emissions from the material recovery area. The baghouse shall be sized to handle at least 26,650 acfm for the existing conditions. All exhaust air from the material recovery area shall be routed through the baghouse before being vented back into the material recovery building. [R307-401-8]

II.B.1.e Emissions to the atmosphere from the indicated emission points shall not exceed the following rates:

Source: 2,233 hp IC Engine with SCR and Oxygen Catalyst Control (4 each):

Pollutants	gr/hp-hr
NO_x	0.05
CO	0.45
VOC	0.07

[R307-401-8]

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

Emissions Point	Pollutant	Testing Status	Test Frequency
2,233 hp IC Engine with SCR: with SCR and Oxygen Catalyst Control (Each Stack)	NO_x	*	#
	CO	*	#
	VOC	*	#

[R307-401-8]

II.B.1.f.1 Testing Status (To be applied above)

* Initial compliance testing is required. The initial test date shall be performed as soon as possible and in no case later than 180 days after the start-up of a new emission source or the granting of an AO to an existing emission source that is modified.

\# The source shall perform an EPA reference method stack test at least one time every calendar year. [R307-165-2]

II.B.1.f.2 Notification

The applicant shall provide a notification to the Director at least 30 days before any emission test to be conducted as required by this AO. A pretest conference shall be held if directed by the Director. It shall be held at least 30 days before the test and include representation from the

owner/operator, the tester, and the Director. The emission point shall be designed to conform to the requirements of 40 CFR 60, Appendix A, Method 1, and Occupational Safety and Health Administration (OSHA) or Mine Safety and Health Administration (MSHA) approved access shall be provided to the test location. [R307-165-3]

II.B.1.f.3 Volumetric Flow Rate

40 CFR 60, Appendix A, Method 2. [40 CFR 60]

II.B.1.f.4 Nitrogen Oxides (NO_x)

40 CFR 60, Appendix A, Method 7, 7A, 7B, 7C, 7D, 7E or other EPA approved testing methods approved by the Director. [40 CFR 60]

II.B.1.f.5 CO

40 CFR 60, Appendix A, Method 10, or other EPA approved testing methods approved by the Director. [40 CFR 60]

II.B.1.f.6 VOC

40 CFR 60 Appendix A: Method 18, 25, 25A, 40 CFR 63 Appendix A: Method 320, ASTM-D6348, or other EPA approved testing methods approved by the Director. [40 CFR 60]

II.B.1.f.7 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. [R307-165]

II.B.1.f.8 New Source Operation

For a new source/emission point, the production rate during all method-testing shall be no less than 90% of the maximum production rate (rated capacity) of the source. If the production rate has not been achieved at the time of the test, method-testing shall be conducted at no less than 90% of the maximum production rate achieved as of the date of the test. [R307-165]

II.B.1.f.9 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-

165]

II.B.2 **The Emergency Diesel Generator shall be subject to the following:**

II.B.2.a The sulfur content of any diesel fuel burned in the stationary diesel engines on site shall not exceed 0.0015 percent by weight. The sulfur content shall be determined by ASTM Method D2880-71, D4294-89, or approved equivalent. Certification of diesel fuel shall be either by the owner/operator's own testing or by test reports from the diesel fuel marketer. [R307-203, R307-401-8]

II.B.2.b Total hours of operation for testing and maintenance purposes shall not exceed 100 hours per year for the emergency diesel generator. [40 CFR 60 Subpart IIII, R307-401-8]

II.B.2.b.1 Hours of operation for testing, maintenance and emergency-use shall be determined by supervisor monitoring and maintaining of an operations log. The owner/operator shall record the time of operation of each emergency generator and shall designate the purpose of the operation of each emergency generator. [40 CFR 60 Subpart IIII]

II.B.2.c The duration of all emergency-use operation shall be recorded. "Emergency-use operation" is defined as all operation not for testing and maintenance. An operational day is defined as emergency-use operation for one (1) hour or more per calendar day. [R307-401]

II.B.3 **The Emergency Flare shall be subject to the following:**

II.B.3.a During emergencies or upset conditions vapors from the pyrolysis system or other process equipment shall be routed to the operating Emergency Flare. [R307-401-8]

II.B.3.b The emergency flare shall operate with no visible emissions. [R307-401-8]

II.B.3.b.1 Visual determination of smoke emissions from the emergency 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), 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:

Is Derived From	Notice of Intent Document dated April 17, 2014
Incorporates	Additional NOI Information dated June 10, 2014
Incorporates	Additional NOI Information dated June 30, 2014
Incorporates	Additional NOI Information dated July 21, 2014
Incorporates	Additional NOI Information dated October 15, 2014

1. Comment regarding Internal Combustion Engines:
The Caterpillar 3520C engine is designed to run on traditional fossil fuels like natural gas. For this facility the manufacturer will utilize the pyrolysis unit produced methane gas, which has very similar characteristics to natural gas as fuel. All four (4) engines will be certified engines which meet all Tier 4 emission standards.

   The IC engines turn the generator and create electricity. Each IC engine has an electrical generating capacity of 1.6 Megawatts on a continuous basis (base load) with projected availability in excess of 85 percent. In case of an upset or emergency condition, controls are installed to shut down the IC engines. All excess fuel will be directed to an emergency enclosed flare. It is expected that the emergency flare will operate less than 50 hours per year. [Last updated November 18, 2014]

2. Comment regarding Engine Emission Calculations:
Emissions of criteria pollutants were estimated using vendor data and emission factors from USEPA's AP-42, Fifth Edition, Section 3.2, Table 3.2-3. Emissions of hazardous air pollutants (HAPs) were estimated using emission factors from USEPA's AP 42, Fifth Edition, Section 3.2, Table 3.2-3.

   The emission factors are as follows:

PM_{10}:	0.0000771 lb/mmBTU (AP-42, Section 3.2, Table 3.2-3)
$PM_{2.5}$:	0.0000771 lb/mmBTU (AP-42, Section 3.2, Table 3.2-3)
SO_x:	0.00059 lb/mmBTU (AP-42 Section 3.2, Table 3.2-2)
NO_x:	0.5 g/bhp-hr (vendor)
CO:	2.0 g/bhp-hr (vendor)
VOC:	0.7 g/bhp-hr (vendor)
CO_2e:	40 CFR 98.33 Tables C-1, C-2
Benzene:	6.21E-03 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Chlorobenzene:	4.29E-04 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Formaldehyde:	7.45E-01 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Acetaldehyde:	1.18E-01 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Toluene:	5.75E-03 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Acrolein:	7.25E-02 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Ethylbenzene:	5.60E-04 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Xylene:	2.60E-03 lb/hr (AP-42 Section 3.2, Table 3.2-3)
n-Hexane:	1.56E-02 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Phenol:	3.38E-04 lb/hr (AP-42 Section 3.2, Table 3.2-3)

Naphthalene: 1.05E-03 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Styrene: 3.34E-04 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Vinyl Chloride: 2.10E-04 lb/hr (AP-42 Section 3.2, Table 3.2-3)
Biphenyl: 2.99E-03 lb/hr (AP-42 Section 3.2, Table 3.2-3)
1,1,2,2-Tetrachloroethane: 5.64E-04 lb/hr (AP-42 Section 3.2, Table 3.2-3)
1,1,2-Trichloroethane: 4.49E-04 lb/hr (AP-42 Section 3.2, Table 3.2-3)

[Last updated October 16, 2014]

3. Comment regarding Material Handling Process Emissions:
Emissions of PM_{10} and $PM_{2.5}$ from material handling processes were calculated using the following emission factors:

PM_{10}: 5.139E-06 lb/ton (AP 42 Emission Factor)
$PM_{2.5}$: 7.782E-07 lb/ton (AP 42 Emission Factor)

Calculations assumed 350 tons/day of processing.

[Last updated October 16, 2014]

4. Comment regarding Feedstock Dryers Emission Calculations:
The combustion emission factors from the Feedstock Dryers were calculated using the following:

AP-42 calculations using 1020 Btu/scf of natural gas.
NO_x: 32 lb/10^6 Scf
CO: 84 lb/10^6 Scf
$PM_{10}/PM_{2.5}$: 7.6 lb/10^6 Scf
SO_2: 0.6 lb/10^6 Scf
VOC: 5.5 lb/10^6 Scf

[Last updated November 17, 2014]

5. Comment regarding Emergency Flare Emission Calculations:
The Flare system emissions were calculated using the following factors:

NO_x: 0.07 lb/MMBtu (AP-42 Table 13.5-1)
CO: 0.37 lb/MMBtu (AP-42 Table 13.5-1)
VOC: 0.14 lb/MMBtu (AP-42 Table 13.5-1)
CO_2: 115.87 lb/MMBtu (40 CFR 98 Calculating GHG Emissions)

[Last updated October 16, 2014]

6. Comment regarding Emergency Diesel Generator:
The combustion emissions were calculated using the following emission factors:

$PM/PM_{10}/PM_{2.5}$: 0.2 g/kW-hr
NO_x: 6.0 g/kW-hr
CO: 3.5 g/kW-hr
SO_2: 0.0079 g/kW-hr

Assumed 100 hours of operation of the emergency diesel generator.

[Last updated October 16, 2014]

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	Division of Air Quality (typically interchangeable with UDAQ)
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
UDAQ	Utah Division of Air Quality (typically interchangeable with DAQ)
VOC	Volatile organic compounds