San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

DEC 18 2015

N. Ross Buckenham
California Bioenergy LLC
2828 Routh St, Suite 500
Dallas, TX 75201-1438

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: S-8596
Project Number: S-1150067

Dear Mr. Buckenham:

Enclosed for your review and comment is the District's analysis of California Bioenergy's application for an Authority to Construct for a biogas digester and two 1,412 bhp digester gas-fired engines, at 20229 Old River Road, Bakersfield, CA

The notice of preliminary decision for this project will be published approximately three days from the date of this letter. After addressing all comments made during the 30-day public notice period, the District intends to issue the Authority to Construct. Please submit your written comments on this project within the 30-day public comment period, as specified in the enclosed public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. George Heinen of Permit Services at (559) 230-5811.

Sincerely,

Arnaud Marjollet
Director of Permit Services

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Enclosures

cc: Mike Tollstrup, CARB (w/ enclosure) via email

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San Joaquin Valley Air Pollution Control District

Authority to Construct Application Review

Digester System and Two Digester Gas-Fired IC Engines with SCR

Facility Name:	ABEC #4 LLC (California Bioenergy)	Date:	December 10, 2015
Mailing Address:	ABEC #4 LLC c/o California Bioenergy, LLC 2828 Routh Street, Suite 500 Dallas, TX 75201-1438	Engineer:	G. Heinen
		Lead Engineer:	Errol Villegas
Contact Person:	N. Ross Buckenham		
Telephone:	(214) 849-9886	Cell Phone:	(214) 906-9359
E-Mail:	rbuckenham@calbioenergy.com		
Application #s:	S-8596-1-0, -2-0, and -3-0		
Project #:	S-1150067		
Deemed Complete:	May 14, 2015		

I. Proposal

ABEC #4 LLC dba California Bioenergy, LLC, has requested Authority to Construct (ATC) permits to construct an anaerobic digester system consisting of a lined and covered lagoon anaerobic digester with two cells (ATC S-8596-1-0) and to install two 1,412 bhp digester gas-fired IC engines (ATC S-8596-2-0 and -3-0) at the Carlos Echeverria and Sons (CE&S) Dairy (Facility S-5069). Each engine will be equipped with a selective catalytic reduction (SCR) system for emissions control and will power a 1,000 kW electrical generator. The digester system will be used to produce renewable biogas that will be used to fuel the IC engine generator sets.

ABEC #4/California Bioenergy and CE&S Dairy, which are separate companies, are undertaking the project as a partnership. ABEC #4 LLC has provided information supporting that the dairy and the biogas facility will be separately owned and operated.

The following is a summary of some of the information provided by the applicant:

- The proposed digester system at the dairy will be operated and maintained by ABEC #4 LLC. The responsibility of the dairy will be limited to providing the manure feedstock and disposing of the effluent, which the dairy already must do for compliance with water quality regulations. ABEC #4 LLC will not be involved at all in the dairy's primary activity, production of milk.
- The feedstock and lease agreements specify that ABEC #4 LLC will build, own, and operate the biogas facility and also allows ABEC #4 LLC to make plant and equipment improvements. The proposed digester gas-fired IC engine generator sets that will be constructed on land leased from the dairy site and will be owned, operated, and maintained by ABEC #4 LLC. ABEC #4 LLC will be solely responsible for ensuring that the digester system and digester gas-fired IC engines comply with all applicable air quality regulations.

- The generator sets will sell all of the electricity generated to the utility grid and will not provide any electricity directly to the dairy. Because the dairy and the proposed digester gas power plant at the site will be separately owned and operated and will have different two-digit Standard Industrial Classification (SIC) codes (Industry Group 24: Dairy Farms for the Dairy vs. Industry Group 49: Electric, Gas, And Sanitary Services for the IC engine generator set), pursuant to Section 3.37 of District Rule 2201, the proposed digester system and the digester gas-fired IC engines will not be part of the dairy agricultural stationary source. Therefore, the digester system and digester gas-fired IC engines will be permitted as a non-agricultural stationary source (S-8596).

II. Applicable Rules

Rule 2201	New and Modified Stationary Source Review Rule (4/21/11)
Rule 2410	Prevention of Significant Deterioration (6/16/11)
Rule 2520	Federally Mandated Operating Permits (6/21/01)
Rule 4101	Visible Emissions (2/17/05)
Rule 4102	Nuisance (12/17/92)
Rule 4201	Particulate Matter Concentration (12/17/92)
Rule 4701	Internal Combustion Engines – Phase 1 (8/21/03)
Rule 4702	Internal Combustion Engines (11/14/13)
Rule 4801	Sulfur Compounds (12/17/92)

40 CFR Part 60, Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines
40 CFR Part 63, Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
CH&SC 41700 Health Risk Assessment
CH&SC 42301.6 School Notice
Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)
California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387: CEQA Guidelines

III. Project Location

The ABEC #4 LLC Stationary Source (Facility S-8596) is located at the dairy at 20229 Old River Road, Bakersfield, CA. The proposed equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

Anaerobic Digester System

An anaerobic digester is a sealed basin or tank that is designed to accelerate and control the decomposition of organic matter by microorganisms in the absence of oxygen. The process of anaerobic decomposition results in the conversion of organic compounds in the substrate into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate Volatile Organic Compounds (VOCs). The gas generated by this process is known as biogas, waste gas, or

digester gas. In addition to methane and carbon dioxide, biogas may also contain small amounts of Nitrogen (N_2), Oxygen (O_2), Hydrogen Sulfide (H_2S), and Ammonia (NH_3). Biogas may also include trace amounts of various VOCs that remain from incomplete digestion of the volatile solids in the incoming substrate. Because biogas is mostly composed of methane, the main component of natural gas, the gas produced in the digester can be cleaned to remove H_2S and other impurities and used as fuel.

The proposed anaerobic digester system will be designed to process the manure generated by the cattle at the dairy. The manure will be flushed from the cow housing areas at the dairy to a sand separation system prior to the digester system. This pre-digester separation system will remove fibrous solids from the manure. After the separation system, the liquid manure will flow to one of three settling basins that are designed to remove heavy solids by sedimentation. After the separation systems, the liquid manure will gravity flow into the proposed lined and covered-lagoon digester, which will be constructed over existing lagoons that are currently used for storage. The liquid effluent from the digesters will be pumped to the existing large storage pond at the dairy for use to irrigate and fertilize adjacent cropland. The digester will process the liquid fraction from the dairy manure solid separation system. The proposed digester system will consist of an in-ground, lined, covered-lagoon, anaerobic digester and will be divided into two cells.

An area located west of the existing lagoons at the dairy, which is currently used for drying and storage of solid manure will be excavated to create the proposed covered lagoon anaerobic digester. The bottom and the walls of the new lagoon will be lined with a system of high-density polyethylene (HDPE) membranes and a gas collection system will be installed. The new lagoon cells will be fitted with HDPE covers. The gas collection system will consist of perforated piping under the HDPE covers at the perimeter of the covered lagoons.

The covered lagoon digester will utilize an air injection system for removal of H_2S from the digester gas. The continuous injection of controlled quantities of air under the digester covers increases the amount of oxygen in the space under the digester covers and in the surface layer of the digester liquid, which facilitates oxidation of sulfides in the digester gas and surface of the liquid to elemental sulfur and water. Injection of air also promotes biological removal of H_2S from the digester gas by facilitating the establishment of sulfur oxidizing microorganisms, such as Thiobacillus species, which have the ability to grow under various environmental conditions and oxidize H_2S to elemental sulfur.

The digester gas will be captured by the covered the lagoon gas collection system and will be piped to the gas conditioning system for polishing to remove additional H_2S and removal of moisture, using an iron sponge scrubber or an equivalent H2S removal system. The gas will then be sent to the engines for use as fuel to generate electricity for sale to the utility and to produce heat for the digester system. When the gas cannot be used in the engines, the digester gas will collect under the lagoon covers. As the gas collects under the lagoon covers, the pressure in the digesters will rise. In rare emergency situations when the gas cannot be combusted in the engines for an extended period, the pressure will cause the relief valves to open and release the digester gas, composed primarily of methane and carbon dioxide, into the atmosphere. As the pressure decreases, the gas relief valves will automatically close and normal operation will proceed.

When operating at full capacity, the digester system is expected to produce an average of 523,000 ft^3 of biogas per day. The applicant has indicated that the biogas produced by the covered lagoon digester will be composed of approximately 60% methane and 40% carbon dioxide. Because the proposed digester system will be able to store the biogas for extended periods under the digester covers and the proposed engines will have more than sufficient capacity to combust all of gas generated, no flare is being proposed for this digester installation at this facility.

Digester Gas-Fired IC Engines

The applicant is proposing to install two 1,412 bhp Caterpillar Model G3516A+ lean-burn digester gas-fired IC engines. Each engine will be equipped with an SCR system and will power a 1,000 kW generator.

The engines will power electrical generators that will produce power to be sold to a utility. Excess heat from the engines will be used in the first covered lagoon anaerobic digester (West Lagoon Digester) to promote more efficient production of digester gas. The engines will be permitted to operate up to 24 hr/day and 8,760 hr/year.

In addition to the use of digester gas as fuel, the engines will also be permitted to use natural gas as fuel for no more than 96,000 kWh of operation (96 hours x 1,000 kW) during utility interconnect testing in the event that insufficient digester gas is available for the engines at the time that the required utility testing is scheduled. The engines will remain subject to the same emission limits during the limited period of the use of natural gas fuel for required utility testing.

V. Equipment Listing

S-8596-1-0: ANAEROBIC DIGESTER SYSTEM CONSISTING OF A LINED, COVERED LAGOON ANAEROBIC DIGESTER WITH AN AIR INJECTION SYSTEM FOR HYDROGEN SULFIDE CONTROL AND PRESSURE/VACUUM VALVE(S)

S-8596-2-0: 1,412 BHP CATERPILLAR MODEL A3516A+ (OR DISTRICT APPROVED EQUIVALENT) DIGESTER GAS-FIRED LEAN-BURN IC ENGINE #1 WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AND A CARBON H2S SCRUBBER (OR EQUIVALENT H2S REMOVAL SYSTEM) POWERING AN ELECTRICAL GENERATOR

S-8596-3-0: 1,412 BHP CATERPILLAR MODEL A3516A+ (OR DISTRICT APPROVED EQUIVALENT) DIGESTER GAS-FIRED LEAN-BURN IC ENGINE #2 WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AND A CARBON H2S SCRUBBER (OR EQUIVALENT H2S REMOVAL SYSTEM) POWERING AN ELECTRICAL GENERATOR

VI. Emission Control Technology Evaluation

Digester System (S-8596-1-0)

The digester system will be equipped with pressure-vacuum (PV) relief valves or an emergency venting system. The digester gas will be scrubbed to remove hydrogen sulfide and will be used to fuel engines to generate electricity. Combustion of the digester gas in the engines will convert any VOCs present in the gas into carbon dioxide and water. As stated above, because the digester system will be able to store the gas for extended periods and the engines will have more than enough capacity to combust all of the gas generated, no flare is being proposed for this digester project.

H_2S Removal

As described above, the covered lagoon anaerobic digester will utilize an air injection system for removal of H_2S from the digester gas. The continuous injection of controlled quantities of air under the lagoon covers increases the amount of oxygen in the space under the digester covers and the surface layer of the liquid in the covered lagoon digester, which facilitates oxidation of sulfides in the digester gas and surface of the liquid to elemental sulfur and water. The sulfur dissolves in the water in the digester and can be removed from the digester system by deposition and filtration. Injection of air also promotes biological removal of H_2S from the digester gas by facilitating the establishment of sulfur oxidizing microorganisms, such as Thiobacillus species, which have the ability to grow under various environmental conditions and oxidize H_2S to elemental sulfur and sulfates that can be removed from the digester system. Use of air injection to remove H_2S from digester gas has been shown to have higher effectiveness in covered lagoon digesters because the large areas under the lagoon covers facilitate contact with the digester gas and lagoon surface, which enables improved oxidation and biological reduction of sulfides. Successful installations of the air injection sulfur removal system have demonstrated significantly reduced operation and maintenance costs when compared to other methods of sulfur removal.

For final polishing, the digester gas will be sent through an activated carbon H_2S scrubber, iron sponge scrubber, or equivalent system to remove H_2S from the gas prior to combustion in the proposed engines.

Specially treated activated carbon can be used to remove H_2S from the digester gas stream. H_2S is adsorbed as the gas flows through the activated carbon bed. Activated carbon has a large number of pores, which greatly increases the surface area for adsorption. Contaminants in the gas diffuse into these pores and are retained on the carbon surface due to both chemical and physical forces. Activated carbon used for the removal of H_2S is usually treated with chemical bases to increase the holding capacity for H_2S.

An iron sponge scrubber is comprised of vessels containing iron sponge. Iron sponge consists of a hydrated form of iron oxide impregnated onto wood shavings. The wood shavings serve only as a carrier for the iron oxide powder. Iron oxide impregnated into the wood surface will not wash off or migrate with the gas. As the gas passes through the iron sponge material, the H_2S is removed by the following chemical reaction producing black iron sulfide and water:

$$H_2S + Fe(OH)_2 \rightarrow FeS + 2H_2O + heat$$

For the iron sponge to effectively perform, it must be maintained within a defined range of sufficient moisture content. This requirement is typically satisfied if the gas is saturated with water vapor, as is frequently the case with digester gas. If the iron sponge becomes dry, it can be re-wet and remain effective. The iron sponge reaction is not pressure sensitive and is not affected by other gas constituents.

The proposed scrubber will consist of enclosed vessels filled with treated activated carbon or iron sponge. The digester gas will flow through the scrubber and then to a dryer and chiller to remove moisture. For continuous operation, there will be secondary unit that will be brought online at specified times or when monitoring indicates that the primary unit is nearing saturation. Valves can be arranged so either bed can operate while the other is serviced. The useful life of the activated carbon or iron sponge vessels will vary depending on the inlet concentration of H_2S, the flow rate, and the mass of iron sponge in the vessels. Before the scrubber is completely spent, it must be regenerated or replaced. Spent activated carbon or iron sponge vessels will be sent to a regeneration facility or to an appropriate disposal facility. The proposed scrubber will be capable of reducing H_2S concentrations in the digester gas to 40 ppmv or less. Reducing the H_2S concentration in the gas will minimize SO_X emissions from combustion and will also reduce the maintenance requirements for engines and emission control equipment and protects from masking, plugging, and poisoning of catalysts.

The proposed engines will be equipped with:

- Turbocharger
- Aftercooler
- Air/Fuel Ratio or an O_2 Controller
- Lean Burn Technology
- Positive Crankcase Ventilation (PCV) or 90% efficient control device
- Selective Catalytic Reduction (SCR)

The turbocharger reduces the NO_X emission rate from the engine by increasing the efficiency and promoting more complete burning of the fuel.

The aftercooler cools the air after it leaves the turbocharger, reducing the engine's inlet air temperature. By reducing the inlet air temperature, the peak combustion temperature is lowered, which reduces the formation of thermal NO_X.

The fuel/air ratio controller (oxygen controller) is used to maintain the amount of oxygen in the exhaust stream to optimize engine operation and catalyst function.

Lean burn technology increases the volume of air in the combustion process and therefore increases the heat capacity of the mixture. This technology also incorporates improved swirl patterns to promote thorough air/fuel mixing. This in turn lowers the combustion temperature and reduces NO_X formation.

The PCV system reduces crankcase VOC and PM_{10} emissions by at least 90% over an uncontrolled crankcase vent.

A Selective Catalytic Reduction (SCR) system operates as an external control device where flue gases and a reagent, in this case urea, are passed through an appropriate catalyst. Urea, will be injected upstream of the catalyst where it is converted to ammonia. The ammonia is used to reduce NO_X, over the catalyst bed, to form elemental nitrogen and other by-products. The use of a catalyst typically reduces the NO_X emissions by up to 90%.

The SCR system also includes an oxidation catalyst which converts CO and VOC emissions to CO2 and water. Typically, these catalysts are located prior to the urea injection site since the oxidation catalyst would otherwise convert the excess ammonia into NOx. Based on the pre- and post-commissioning emission factors supplied by the applicant, the control efficiency of the oxidation catalyst is expected to be 64% for CO and 90% for VOC.

VII. General Calculations

A. Assumptions

- ABEC #4 LLC (Facility S-8596) and CE&S Dairy (Facility S-5069) are separate stationary sources. The following condition will be placed on each of the engine ATCs to ensure compliance with this requirement:

  - *To ensure this facility (Facility S-8596) and the adjacent dairy operation (Facility S-5069) are separate stationary sources, this generating system shall be physically separated from the electrical system of the dairy. No generated electricity shall be provided directly to the dairy operation. [District Rule 2201]*

- Because of the high moisture content of separated manure solids, PM emissions from the handling of separated solids for the digester system are considered negligible.
- Because the manure for the digester system will be taken from the mechanical separation system at the dairy and the digested solids and effluent from the digester system will be returned to the dairy for use, all emissions from the manure processed in the digester system will be allocated to the liquid manure handling system at the dairy.
- The proposed digester system will reduce potential VOC emissions from manure generated by the cattle at the dairy. Manure that is currently stored in uncovered lagoons and ponds will be placed in covered ponds, thereby decreasing volatilization of compounds from the manure. In a digester, most VOCs present will be converted to methane (an exempt compound) and carbon dioxide further reducing the potential for VOC emissions. Because results of dairy digester analyses have indicated very low VOC content (less than 1% by weight), fugitive VOC emissions from the digester system are assumed to be negligible, consistent with District Policy SSP 2015. During operation, the digester gas will be directed to the engines where the gas will be combusted resulting in the oxidation of gaseous hydrocarbons into carbon dioxide and water. Therefore, VOC emissions from the digester system are considered negligible.
- Molar composition of typical digester gas is about 60% methane and 40% carbon dioxide with trace amounts of hydrogen sulfide, VOC, and other compounds. [1]

[1] EPA AgSTAR – frequent questions (http://www.epa.gov/agstar/anaerobic/faq.html#q4). "Anaerobic Digestion of Animal Wastes: Factors to Consider", ATTRA - National Sustainable Agriculture Information Service (https://attra.ncat.org/attra-pub/summaries/summary.php?pub=307) & "Anaerobic Digestion Overview", David

- Typical Higher Heating Value for Digester Gas: 600 Btu/scf (Per AP-42 (4/00), notes to Tables Table 3.1-1, Table 3.1-2b, Table 3.1-7, and Table 3.1-8.)
- Typical EPA F-factor for Biogas: 9,100 dscf/MMBtu (Dry, adjusted to 60 °F), (Estimated based on previous biogas fuel analyses for source tests for Permits N-1660-7 & -9 and Project S-1053738)
- Average sulfur content of the scrubbed biogas: 40 ppmv as H_2S (required as BACT)
- bhp to Btu/hr conversion: 2,545 Btu/hp-hr
- Thermal efficiency of engine: commonly ≈ 33%
- Molar Specific Volume = 379.5 scf/lb-mol (60°F)
- Molecular weights:
  NO_X (as NO_2) = 46 lb/lb-mol CO = 28 lb/lb-mol NH3 = 17 lb/lb-mol
  VOC (as CH_4) = 16 lb/lb-mol SO_X (as SO_2) = 64.06 lb/lb-mol
- Each of the engines will be permitted to operate 24 hours/day and 365 days per year.
- There will be no increase in permitted emissions for the limited use of natural gas for required utility testing in the event that sufficient digester gas is not available.
- PM2.5 emissions from the gas-fired engines are assumed to be equal to PM10 emissions.

Assumptions for Commissioning Period

- The applicant has requested that the ATC permits include a commissioning period to allow testing, adjustment, tuning, and calibration of the engines without the SCR systems installed. The duration of the commissioning period shall consist of no more than 120 hours of operation of each engine without an SCR system installed.
- Engine emissions during the commissioning period will be calculated as uncontrolled based on information provided by the engine supplier.

B. Emission Factors

Emission Factors during the Commissioning Period:

The commissioning period precedes the normal operation of a power plant. Activities conducted during the commissioning period typically include: checking all mechanical, electrical, and control systems for the units and related equipment; confirming the performance measures specified for the equipment; test firing the units; and tuning of the units and the generators. The early stages of commissioning are conducted prior to the installation of the emission control equipment to prevent damage to the control equipment. In accordance with EPA's guidance, the commissioning period is considered the final phase of the construction process rather than initial startup of the equipment.[2] Therefore,

Schmidt, University of Minnesota Department of Biosystems and Agricultural Engineering (http://www.mnproject.org/presentations/Schmidt/Anaerobicdigestion101.pdf)

[2] See US EPA Implementation Question and Answer Document for National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines and New Source Performance Standards for

other than quantifying emissions for New and Modified Source Review (NSR), source-specific emission limitations from applicable rules and regulations are generally not effective until completion of the commissioning period. Because emission control devices are not in place and functioning during commissioning, higher emission limits are required during this time.

The emission factors for NO_X (1.0 g/bhp-hr), CO (4.85 g/bhp-hr), and VOC (1.0 g/bhp-hr) for the commissioning period are emissions from the engine without an SCR system in place and were provided by the engine supplier. The emission factors for SO_X (0.04 g/bhp-hr), PM_{10} (0.07 g/bhp-hr), and ammonia slip (0.05 g/bhp-hr) after initial installation of the SCR system during the commissioning period are assumed to be the same emissions factors as during normal operation. SO_X emissions are based on the maximum sulfur content of the dairy digester gas (40 ppmv – required as BACT). PM_{10} emissions on a lb/MMBtu basis are assumed to be similar to natural gas-fueled IC engines. For more conservative PM_{10} emission calculations PM emission factor for rich burn natural gas-fueled engines was used since it was higher than the value for lean burn natural gas engines. The ammonia emission factor was based on an ammonia slip limit of 10 ppmv NH_3.

Commissioning Period Emission Factors for Digester Gas-Fired Engines				
Pollutant	g/hp·hr	lb/MMBtu	ppmvd (@ 15%O_2)	Source
NO_X	1.0	0.2859	73 ppmvd	Manufacturer's Information – See equation below
SO_X	0.04	0.0113	40 ppmvd in fuel gas	BACT Requirement/Mass Balance Equation Below
PM_{10}	0.07	0.01941	--	AP-42 (7/00) Table 3.2-3 (Conservative Value based on Rich-Burn Natural Gas Engines)
CO	4.85	1.3865	583 ppmvd	Manufacturer's Information – See equation below
VOC	1.0	0.2859	210 ppmvd as CH_4	Manufacturer's Information – See equation below
NH_3	0.05	0.0144	10 ppmvd	Required/Proposed – See equation below

<u>NO_X – 1.0 g/bhp-hr</u>

$$1.0\frac{g\,NOx}{bhp-hr}\times\frac{1\,lb}{453.59\,g}\times\frac{1\,hp-hr}{2{,}545\,Btu}\times\frac{0.33Btu_{out}}{1Btu_{in}}\times\frac{10^6\,Btu}{1\,MMBtu}=0.2859\frac{lb\,NOx}{MMBtu}$$

$$0.2859\frac{lb\,NOx}{MMBtu}\times\frac{(20.9-15)\%\,O_2}{20.9\%\,O_2}\times\frac{1\,MMBtu}{9{,}100\,ft^3}\times\frac{379.5\,ft^3}{lb-mole}\times\frac{lb-mole}{46\,lb\,NO_X}\times\frac{10^6\,ppmv}{1}=73\ ppmvd\,NOx\,@\,15\%\,O_2$$

<u>SO_X – 40 ppmvd H_2S in fuel gas</u>

$$\frac{40\,ft^3\,H_2S}{10^6\,ft^3}\times\frac{32.06\,lb\,S}{lb-mol\,H_2S}\times\frac{lb-mole}{379.5\,ft^3}\times\frac{64.06\,lb\,SO_2}{32.06\,lb\,S}\times\frac{ft^3}{600\,Btu}\times\frac{10^6\,Btu}{MMBtu}=0.0113\ \frac{lb\,SOx}{MMBtu}$$

Stationary Compression Ignition and Spark Ignition Internal Combustion Engines, April 2, 2013, Question 39 (http://www.epa.gov/ttn/atw/icengines/docs/20120717riceqaupdate.pdf)

$$0.0113\ \frac{\text{lb SOx}}{\text{MMBtu}} \times \frac{1\text{MMBtu}}{10^6\text{Btu}} \times \frac{\text{Btu}_{in}}{0.33\text{Btu}_{out}} \times \frac{2{,}545\ \text{Btu}}{\text{hp - hr}} \times \frac{453.59\ \text{g}}{\text{lb}} = 0.040\ \frac{\text{g SOx}}{\text{bhp - hr}}$$

CO – 4.85 g/bhp-hr

$$4.85\ \frac{\text{g CO}}{\text{bhp - hr}} \times \frac{1\text{lb}}{453.59\text{g}} \times \frac{1\text{hp - hr}}{2{,}545\text{Btu}} \times \frac{0.33\text{Btu}_{out}}{1\text{Btu}_{in}} \times \frac{10^6\text{Btu}}{1\text{MMBtu}} = 1.3865\ \frac{\text{lb CO}}{\text{MMBtu}}$$

$$1.3865\ \frac{\text{lb CO}}{\text{MMBtu}} \times \frac{(20.9-15)\%\ O_2}{20.9\%\ O_2} \times \frac{1\text{MMBtu}}{9{,}100\ \text{ft}^3} \times \frac{379.5\ \text{ft}^3}{\text{lb - mole}} \times \frac{\text{lb - mole}}{28\ \text{lb CO}} \times \frac{10^6\ \text{ppmv}}{1} = 583\ \text{ppmvd CO @ 15\% } O_2$$

VOC – 1.0 g/bhp-hr

$$1.0\ \frac{\text{g VOC}}{\text{bhp - hr}} \times \frac{1\text{lb}}{453.59\text{g}} \times \frac{1\text{hp - hr}}{2{,}545\ \text{Btu}} \times \frac{0.33\text{Btu}_{out}}{1\text{Btu}_{in}} \times \frac{10^6\text{Btu}}{1\text{MMBtu}} = 0.2859\ \frac{\text{lb VOC}}{\text{MMBtu}}$$

$$0.2859\ \frac{\text{lb VOC}}{\text{MMBtu}} \times \frac{(20.9-15)\%\ O_2}{20.9\%\ O_2} \times \frac{1\text{MMBtu}}{9{,}100\ \text{ft}^3} \times \frac{379.5\ \text{ft}^3}{\text{lb - mole}} \times \frac{\text{lb - mole}}{16\ \text{lb VOC}} \times \frac{10^6\ \text{ppmv}}{1} = 210\ \text{ppmvd VOC @ 15\% } O_2$$

NH_3 – 10 ppmvd @ 15% O_2

$$\frac{10\ \text{ppmv}\ NH_3}{10^6} \times \frac{17\ \text{lb}\ NH_3}{\text{lb - mole}} \times \frac{\text{lb - mole}}{379.5\ \text{ft}^3} \times \frac{9{,}100\ \text{ft}^3}{\text{MMBtu}} \times \frac{20.9\%\ O_2}{(20.9-15)\%\ O_2} = 0.0144\ \frac{\text{lb}\ NH_3}{\text{MMBtu}}$$

$$0.0144\ \frac{\text{lb}\ NH_3}{\text{MMBtu}} \times \frac{1\text{MMBtu}}{10^6\text{Btu}} \times \frac{\text{Btu}_{in}}{0.33\text{Btu}_{out}} \times \frac{2{,}545\ \text{Btu}}{\text{hp - hr}} \times \frac{453.59\ \text{g}}{\text{lb}} = 0.05\ \frac{\text{g}\ NH_3}{\text{bhp - hr}}$$

Emission Factors during Normal Operation after the Commissioning Period:

The emission factors for NO_X (0.15 g/bhp-hr), CO (1.75 g/bhp-hr), and VOC (0.10 g/bhp-hr) from the proposed engines during normal operation were proposed by the applicant and supported by information provided by the engine supplier. The emission factors for NO_X and VOC were required as BACT and will be achieved with the use of the primary SCR catalyst and an oxidation catalyst. The emission factors for SO_X (0.04 g/bhp-hr), PM_{10} (0.07 g/bhp-hr), and ammonia slip (0.05 g/bhp-hr) during normal operation are same as the emission factors presented above for the commissioning period since they are fuel based and don't rely on external controls which may not be operated during commissioning.

Emission Factors for Digester Gas-Fired Engines (Normal Operation)				
Pollutant	g/hp·hr	lb/MMBtu	ppmvd (@ 15%O_2)	Source
NO_X	0.15	0.0429	11.0 ppmvd	BACT Requirement; Proposed by Applicant – See equation below
SO_X	0.04	0.0113	40 ppmvd in fuel gas	BACT Requirement/Mass Balance Equation Above
PM_{10}	0.07	0.01941	--	AP-42 (7/00) Table 3.2-3 (Conservative Value based on Rich-Burn Natural Gas Engines)
CO	1.75	0.500	210 ppmvd	Proposed by Applicant – See equation below
VOC	0.10	0.0286	21 ppmvd as CH_4	BACT Requirement; Proposed by Applicant – See equation below
NH_3	0.05	0.0144	10 ppmvd	Required/Proposed – See equation above

NO_X – 0.15 g/bhp-hr

$$0.15\frac{g\,NOx}{bhp-hr}\times\frac{1\,lb}{453.59\,g}\times\frac{1\,hp-hr}{2{,}545\,Btu}\times\frac{0.33Btu_{out}}{1Btu_{in}}\times\frac{10^6\,Btu}{1\,MMBtu}=0.0429\frac{lb\,NOx}{MMBtu}$$

$$0.0429\frac{lb\,NOx}{MMBtu}\times\frac{(20.9-15)\%\,O_2}{20.9\%\,O_2}\times\frac{1\,MMBtu}{9{,}100\,ft^3}\times\frac{379.5\,ft^3}{lb-mole}\times\frac{lb-mole}{46\,lb\,NOx}\times\frac{10^6\,ppmv}{1}=11.0\ ppmvd\,NOx\,@\,15\%\,O_2$$

CO – 1.75 g/bhp-hr

$$1.75\frac{g\,CO}{bhp-hr}\times\frac{1\,lb}{453.59\,g}\times\frac{1\,hp-hr}{2{,}545\,Btu}\times\frac{0.33Btu_{out}}{1Btu_{in}}\times\frac{10^6\,Btu}{1\,MMBtu}=0.500\frac{lb\,CO}{MMBtu}$$

$$0.500\frac{lb\,CO}{MMBtu}\times\frac{(20.9-15)\%\,O_2}{20.9\%\,O_2}\times\frac{1\,MMBtu}{9{,}100\,ft^3}\times\frac{379.5\,ft^3}{lb-mole}\times\frac{lb-mole}{28\,lb\,CO}\times\frac{10^6\,ppmv}{1}=210\,ppmvd\,CO\,@\,15\%\,O_2$$

VOC – 0.10 g/bhp-hr

$$0.10\frac{g\,VOC}{bhp-hr}\times\frac{1\,lb}{453.59\,g}\times\frac{1\,hp-hr}{2{,}545\,Btu}\times\frac{0.33Btu_{out}}{1Btu_{in}}\times\frac{10^6\,Btu}{1\,MMBtu}=0.0286\frac{lb\,VOC}{MMBtu}$$

$$0.0286\frac{lb\,VOC}{MMBtu}\times\frac{(20.9-15)\%\,O_2}{20.9\%\,O_2}\times\frac{1\,MMBtu}{9{,}100\,ft^3}\times\frac{379.5\,ft^3}{lb-mole}\times\frac{lb-mole}{16\,lb\,VOC}\times\frac{10^6\,ppmv}{1}=21\,ppmvd\,VOC\,@\,15\%\,O_2$$

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Since the digester system and the engines are new emissions units, PE1 = 0 for all affected pollutants.

2. Post Project Potential to Emit (PE2)

Digester System (S-8596-1-0)

As explained above, the digester system will be composed of sealed lagoons that will reduce VOC emissions from the manure and will have negligible fugitive emissions; therefore, VOC emissions from the manure will only be attributed to the dairy for manure prior to entering the digester system and when returned to the dairy and emissions from the digester system are considered negligible.

Digester Gas-Fired Engines (S-8596-2-0 and -3-0)

Daily PE2 for Each Engine during the Commissioning Period:

Daily PE during the commissioning period for each of the proposed engines is calculated in the table below:

Daily PE for Engines S-8596-2-0 &-3-0 During the Commissioning Periods								
NO_X	1.0	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**74.7**	(lb/day)
SO_X	0.04	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**3.0**	(lb/day)
PM_{10}	0.07	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**5.2**	(lb/day)
CO	4.85	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**362.3**	(lb/day)
VOC	1.0	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**74.7**	(lb/day)
NH_3	0.05	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**3.7**	(lb/day)

Daily PE2 for Each Engine after Completion of the Commissioning Period:

Daily PE for each of the proposed engines after completion of the commissioning periods is calculated in the table below:

Daily PE for Engines S-8596-2-0 &-3-0 After Commissioning								
NO_X	0.15	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**11.2**	(lb/day)
SO_X	0.04	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**3.0**	(lb/day)
PM_{10}	0.07	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**5.2**	(lb/day)
CO	1.75	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**130.7**	(lb/day)
VOC	0.10	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**7.5**	(lb/day)
NH_3	0.05	(g/hp·hr) x	1,412	(hp) x	24	(hr/day) ÷ 453.59 (g/lb) =	**3.7**	(lb/day)

Maximum Annual PE2 for Each Engine Including the Commissioning Periods:

As discussed above, each of the proposed engines will be allowed to operate up to 120 hours for commissioning during the first year of operation. The maximum annual PE for each engine will calculated based on the maximum hours of operation during the commissioning period and the remaining hours during normal operation.

PE2 for Engines S-8596-2-0 &-3-0 During the Commissioning Periods								
NO_X	1.0	(g/hp·hr) x	1,412	(hp) x	120	(hr) ÷ 453.59 (g/lb) =	**374**	(lb/yr)
SO_X	0.04	(g/hp·hr) x	1,412	(hp) x	120	(hr) ÷ 453.59 (g/lb) =	**15**	(lb/yr)
PM_{10}	0.07	(g/hp·hr) x	1,412	(hp) x	120	(hr) ÷ 453.59 (g/lb) =	**26**	(lb/yr)
CO	4.85	(g/hp·hr) x	1,412	(hp) x	120	(hr) ÷ 453.59 (g/lb) =	**1,812**	(lb/yr)
VOC	1.0	(g/hp·hr) x	1,412	(hp) x	120	(hr) ÷ 453.59 (g/lb) =	**374**	(lb/yr)
NH_3	0.05	(g/hp·hr) x	1,412	(hp) x	120	(hr) ÷ 453.59 (g/lb) =	**19**	(lb/yr)

1st Year PE2 for Engines S-8596-2-0 &-3-0 After Commissioning								
NO_X	0.15	(g/hp·hr) x	1,412	(hp) x	8,640	(hr) ÷ 453.59 (g/lb) =	**4,034**	(lb/yr)
SO_X	0.04	(g/hp·hr) x	1,412	(hp) x	8,640	(hr) ÷ 453.59 (g/lb) =	**1,076**	(lb/yr)
PM_{10}	0.07	(g/hp·hr) x	1,412	(hp) x	8,640	(hr) ÷ 453.59 (g/lb) =	**1,883**	(lb/yr)
CO	1.75	(g/hp·hr) x	1,412	(hp) x	8,640	(hr) ÷ 453.59 (g/lb) =	**47,068**	(lb/yr)
VOC	0.10	(g/hp·hr) x	1,412	(hp) x	8,640	(hr) ÷ 453.59 (g/lb) =	**2,690**	(lb/yr)
NH_3	0.05	(g/hp·hr) x	1,412	(hp) x	8,640	(hr) ÷ 453.59 (g/lb) =	**1,345**	(lb/yr)

Maximum PE2 from Each Engine during 1st year, Including Commissioning:

NO_X: 374 lb-NO_X/yr + 4,034 lb-NO_X/yr = **4,408 lb-NO_X/yr**
SO_X: 15 lb-SO_X/yr + 1,076 lb-SO_X/yr = **1,091 lb-SO_X/yr**
PM_{10}: 26 lb-PM_{10}/yr + 1,883 lb-PM_{10}/yr = **1,909 lb-PM_{10}/yr**
CO: 1,812 lb-CO/yr + 47,068 lb-CO/yr = **48,880 lb-CO/yr**
VOC: 374 lb-VOC/yr + 2,690 lb-VOC/yr = **3,064 lb-VOC/yr**
NH_3: 19 lb-NH_3/yr + 1,345 lb-NH_3/yr = **1,364 lb-NH_3/yr**

Maximum Total Combined Annual PE2 from Both Engines, Including Commissioning:

The maximum total combined annual PE2 for both the engines, including emissions during commissioning, is calculated as follows:

NO_X: 4,408 lb-NO_X/yr-engine x 2 engines = **8,816 lb-NO_X/yr**
SO_X: 1,091 lb-SO_X/yr-engine x 2 engines = **2,182 lb-SO_X/yr**
PM_{10}: 1,909 lb-PM_{10}/yr-engine x 2 engines = **3,818 lb-PM_{10}/yr**
CO: 48,880 lb-CO/yr-engine x 2 engines = **97,760 lb-CO/yr**
VOC: 3,064 lb-VOC/yr-engine x 2 engines = **6,128 lb-VOC/yr**
NH_3: 1,364 lb-NH_3/yr-engine x 2 engines = **2,728 lb-NH_3/yr**

Annual PE2 for Each Engine in years with no Commissioning:

The annual PE2 for each of the engines after completion of the first year of operation when there will not be any commissioning periods is calculated as follows:

Annual PE2 for Engines S-8596-2-0 &-3-0 with no Commissioning								
NO_X	0.15	(g/hp·hr) x	1,412	(hp) x	8,760	(hr) ÷ 453.59 (g/lb) =	**4,090**	(lb/yr)
SO_X	0.04	(g/hp·hr) x	1,412	(hp) x	8,760	(hr) ÷ 453.59 (g/lb) =	**1,091**	(lb/yr)
PM_{10}	0.07	(g/hp·hr) x	1,412	(hp) x	8,760	(hr) ÷ 453.59 (g/lb) =	**1,909**	(lb/yr)
CO	1.75	(g/hp·hr) x	1,412	(hp) x	8,760	(hr) ÷ 453.59 (g/lb) =	**47,721**	(lb/yr)
VOC	0.10	(g/hp·hr) x	1,412	(hp) x	8,760	(hr) ÷ 453.59 (g/lb) =	**2,727**	(lb/yr)
NH_3	0.05	(g/hp·hr) x	1,412	(hp) x	8,760	(hr) ÷ 453.59 (g/lb) =	**1,363**	(lb/yr)

Maximum Total Combined Annual PE2 from Engines in years with no Commissioning:

The maximum total combined annual PE2 for both the engines in years with no commissioning is calculated as follows:

NO_X: 4,090 lb-NO_X/yr-engine x 2 engines = **8,180 lb-NO_X/yr**
SO_X: 1,091 lb-SO_X/yr-engine x 2 engines = **2,182 lb-SO_X/yr**
PM_{10}: 1,909 lb-PM_{10}/yr-engine x 2 engines = **3,818 lb-PM_{10}/yr**
CO: 47,721 lb-CO/yr-engine x 2 engines = **95,442 lb-CO/yr**
VOC: 2,727 lb-VOC/yr-engine x 2 engines = **5,454 lb-VOC/yr**
NH_3: 1,363 lb-NH_3/yr-engine x 2 engines = **2,726 lb-NH_3/yr**

Maximum Daily and Annual PE2 for Engines from Calculations Above:

The maximum daily and annual emissions for each pollutant calculated above, including commissioning emissions, are shown in the table below.

Max. Post-Project Potential to Emit (PE2) for S-8596-2-0 &-3-0			
	Max. Daily Emissions for each engine (lb/day)	Max. Annual Emissions for each engine (lb/year)	Max. Total Combined Annual Emissions for both engines (lb/year)
NO_X	74.7	4,408	8,816
SO_X	3.0	1,091	2,182
PM_{10}	5.2	1,909	3,818
CO	362.3	48,880	97,760
VOC	74.7	3,064	6,128
NH_3	3.7	1,364	2,728

3. Pre-Project Stationary Source Potential to Emit (SSPE1)

Pursuant to District Rule 2201, the SSPE1 is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of Emission Reduction Credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions (AER) that have occurred at the source, and which have not been used on-site.

Since this is a new facility, there are no valid ATCs, PTOs, or ERCs at the Stationary Source; therefore, the SSPE1 is equal to zero.

4. Post Project Stationary Source Potential to Emit (SSPE2)

Pursuant to District Rule 2201, the SSPE2 is the PE from all units with valid ATCs or PTOs at the Stationary Source and the quantity of ERCs which have been banked since September 19, 1991 for AER that have occurred at the source, and which have not been used on-site.

SSPE2 (lb/year)						
Permit Unit	NO_X	SO_X	PM_{10}	CO	VOC	NH_3
ATC S-8596-1-0 (Digester System)	0	0	0	0	0	0
ATC S-8596-2-0 (1,412 bhp Digester Gas Engine)	4,408	1,091	1,909	48,880	3,064	1,364
ATC S-8596-3-0 (1,412 bhp Digester Gas Engine)	4,408	1,091	1,909	48,880	3,064	1,364
SSPE2	8,816	2,182	3,818	97,760	6,128	2,728

5. Major Source Determinations

Rule 2201 Major Source Determination:

Pursuant to District Rule 2201, a Major Source is a stationary source with a SSPE2 equal to or exceeding one or more of the following threshold values. For the purposes of determining major source status the following shall not be included:

- any ERCs associated with the stationary source
- Emissions from non-road IC engines (i.e. IC engines at a particular site at the facility for less than 12 months)
- Fugitive emissions, except for the specific source categories specified in 40 CFR 51.165

Rule 2201 Major Source Determination (lb/year)						
	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO	VOC
SSPE1	0	0	0	0	0	0
SSPE2	8,816	2,182	3,818	3,818	97,760	6,128
Major Source Thresholds	20,000	140,000	140,000	200,000	200,000	20,000
Major Source?	No	No	No	No	No	No

Note: PM2.5 assumed to be equal to PM10

Rule 2410 Major Source Determination:

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(iii). Therefore the PSD Major Source threshold is 250 tpy for any regulated NSR pollutant.

PSD Major Source Determination (tons/year)						
	NO2	VOC	SO2	CO	PM	PM10
Estimated Facility PE before Project Increase	0	0	0	0	0	0
PSD Major Source Thresholds	250	250	250	250	250	250
PSD Major Source ? (Y/N)	N	N	N	N	N	N

Because this is a new facility, the PE for all regulated NSR pollutants prior to the project is equal to zero.

As shown above, the facility is not an existing PSD major source for any regulated NSR pollutant expected to be emitted at this facility.

6. Baseline Emissions (BE)

The BE calculation (in lb/year) is performed pollutant-by-pollutant for each unit within the project to calculate the QNEC, and if applicable, to determine the amount of offsets required.

Pursuant to District Rule 2201, BE = PE1 for:

- Any unit located at a non-Major Source,
- Any Highly-Utilized Emissions Unit, located at a Major Source,
- Any Fully-Offset Emissions Unit, located at a Major Source, or
- Any Clean Emissions Unit, located at a Major Source.

otherwise,

BE = Historic Actual Emissions (HAE), calculated pursuant to District Rule 2201.

As shown in Section VII.C.5 above, the facility is not a Major Source for any pollutant; Therefore BE = PE1.

Since the proposed digester system and engines are new emissions units,

BE = PE1 = 0 for all pollutants from each unit.

7. SB 288 Major Modification

SB 288 Major Modification is defined in 40 CFR Part 51.165 as "any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under the Act."

Since this facility is not a major source for any of the pollutants addressed in this project, this project does not constitute an SB 288 major modification.

8. Federal Major Modification

District Rule 2201 states that a Federal Major Modification is the same as a "Major Modification" as defined in 40 CFR 51.165 and part D of Title I of the CAA.

Since this facility is not a Major Source for any pollutants, this project does not constitute a Federal Major Modification. Additionally, since the facility is not a major source for PM_{10} (140,000 lb/year), it is not a major source for PM2.5 (200,000 lb/year).

9. Rule 2410 – Prevention of Significant Deterioration (PSD) Applicability Determination

Rule 2410 applies to any pollutant regulated under the Clean Air Act, except those for which the District has been classified nonattainment. The pollutants which must be addressed in the PSD applicability determination for sources located in the SJV and which are emitted in this project are: (See 52.21 (b) (23) definition of significant)

- NO2 (as a primary pollutant)
- SO2 (as a primary pollutant)
- CO
- PM
- PM10
- Hydrogen sulfide (H2S)
- Total reduced sulfur (inlcuding H2S)
- Reduced sulfur compounds

I. Project Emissions Increase - New PSD Major Source Determination

The post-project potentials to emit from all new and modified units are compared to the PSD major source thresholds to determine if the project constitutes a new major source subject to PSD requirements.

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(i). The PSD Major Source threshold is 250 tpy for any regulated NSR pollutant.

New PSD Major Source Determination: Potential to Emit (tons/year)						
	NO2	VOC	SO2	CO	PM	PM10
Total PE from New and Modified Units	4.4	3.1	1.1	48.9	1.9	1.9
PSD Major Source threshold	250	250	250	250	250	250
New PSD Major Source?	N	N	N	N	N	N

As shown in the table above, the potential to emit for the project, by itself, does not exceed any PSD major source threshold. Therefore Rule 2410 is not applicable and no further analysis is required.

10. Quarterly Net Emissions Change (QNEC)

The QNEC is calculated solely to establish emissions that are used to complete the District's PAS emissions profile screen. Detailed QNEC calculations are included in Appendix A.

VIII. Compliance

Rule 1070 Inspections

This rule applies to any source operation, which emits or may emit air contaminants. This rule allows the District to perform inspections for the purpose of obtaining information necessary to determine whether air pollution sources are in compliance with applicable rules and regulations. The rule also allows the District to require record keeping, to make inspections and to conduct tests of air pollution sources. The following conditions will be included on each permit to ensure compliance.

- Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]

- Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

BACT requirements are triggered on a pollutant-by-pollutant basis and on an emissions unit-by-emissions unit basis. Unless specifically exempted by Rule 2201, BACT shall be required for the following actions*:

a. Any new emissions unit with a potential to emit exceeding two pounds per day,
b. The relocation from one Stationary Source to another of an existing emissions unit with a potential to emit exceeding two pounds per day,
c. Modifications to an existing emissions unit with a valid Permit to Operate resulting in an AIPE exceeding two pounds per day, and/or
d. Any new or modified emissions unit, in a stationary source project, which results in an SB 288 Major Modification or a Federal Major Modification, as defined by the rule.

*Except for CO emissions from a new or modified emissions unit at a Stationary Source with an SSPE2 of less than 200,000 pounds per year of CO.

a. New emissions units – PE > 2 lb/day

As seen in Section VII.C.2 above, the applicant is proposing to install two new digester gas-fired IC engines, each with a PE greater than 2.0 lb/day for NO_X, SO_X, PM_{10}, CO, and VOC. Therefore, BACT is triggered for NO_X, SO_X, PM_{10}, and VOC. The PE for CO from each unit also exceeds 2.0 lb/day; however, BACT is not triggered for CO since the SSPE2 for CO is not greater than 200,000 lb/year, as demonstrated in Section VII.C.5 above.

b. Relocation of emissions units – PE > 2 lb/day

As discussed in Section I above, there are no emissions units being relocated from one stationary source to another; therefore BACT is not triggered for relocation of an emissions unit.

c. Modification of emissions units – AIPE > 2 lb/day

As discussed in Section I above, there are no modified emissions units associated with this project. Therefore, BACT is not triggered for modification of a unit.

d. SB 288/Federal Major Modification

As discussed in Sections VII.C.7 and VII.C.8 above, this project does not constitute an SB 288 and/or Federal Major Modification for NO_X emissions. Therefore BACT is not triggered for Major Modification purposes.

2. BACT Guideline

S-8596-2-0 & -3-0

BACT Guideline 3.3.15 applies to the proposed digester gas-fired IC engines. (See Appendix B)

3. Top-Down BACT Analysis

Pursuant to the Top-Down BACT Analysis (See Appendix B), BACT has been satisfied with the following:

NO_X: NO_X emissions ≤ 0.15 g/bhp-hr
SO_X: Fuel sulfur content ≤ 40 ppmv (as H_2S)
PM_{10}: Fuel sulfur content ≤ 40 ppmv (as H_2S)
VOC: VOC emissions ≤ 0.10 g/bhp-hr
NH_3: NH_3 slip emissions ≤ 10 ppmv @ 15% O_2

B. Offsets

1. Offset Applicability

Offset requirements shall be triggered on a pollutant by pollutant basis and shall be required if the SSPE2 equals to or exceeds the offset threshold levels in Table 4-1 of Rule 2201.

The SSPE2 is compared to the offset thresholds in the following table.

Offset Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
SSPE2	8,816	2,182	3,818	97,760	6,128
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets triggered?	No	No	No	No	No

2. Quantity of Offsets Required

As seen above, the SSPE2 is not greater than the offset thresholds for all the pollutants; therefore offset calculations are not necessary and offsets will not be required for this project.

C. Public Notification

1. Applicability

Public noticing is required for:
a. New Major Sources, Federal Major Modifications, and SB 288 Major Modifications,

b. Any new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any one pollutant,
c. Any project which results in the offset thresholds being surpassed, and/or
d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant.
e. Any project which results in a Title V significant permit modification

a. New Major Sources, Federal Major Modifications, and SB 288 Major Modifications

New Major Sources are new facilities, which are also Major Sources. As shown in Section VII.C.5 above, the SSPE2 is not greater than the Major Source threshold for any pollutant. Therefore, public noticing is not required for this project for new Major Source purposes.

b. PE > 100 lb/day

Applications which include a new emissions unit with a PE greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements.

The PE2 for the proposed new IC Engines is compared to the daily PE Public Notice thresholds in the following table:

PE > 100 lb/day Public Notice Thresholds			
Pollutant	PE2 (lb/day)	Public Notice Threshold	Public Notice Triggered?
NO_X	74.7	100 lb/day	No
SO_X	3.0	100 lb/day	No
PM_{10}	5.2	100 lb/day	No
CO	362.3	100 lb/day	**Yes**
VOC	74.7	100 lb/day	No
NH_3	3.7	100 lb/day	No

Therefore, public noticing for PE > 100 lb/day purposes is required.

c. Offset Threshold

The SSPE1 and SSPE2 are compared to the offset thresholds in the following table:

Offset Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO_X	0	8,816	20,000 lb/year	No
SO_X	0	2,182	54,750 lb/year	No
PM_{10}	0	3,818	29,200 lb/year	No
CO	0	97,760	200,000 lb/year	No
VOC	0	6,128	20,000 lb/year	No

As detailed above, there were no thresholds surpassed with this project; therefore public noticing is not required for surpassing an offset threshold.

d. SSIPE > 20,000 lb/year

Public notification is required for any permitting action that results in a SSIPE of more than 20,000 lb/year of any affected pollutant. According to District policy, the SSIPE = SSPE2 – SSPE1. The SSIPE is compared to the SSIPE Public Notice thresholds in the following table.

SSIPE Public Notice Thresholds					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO_x	8,816	0	8,816	20,000 lb/year	Yes
SO_x	2,182	0	2,182	20,000 lb/year	No
PM_{10}	3,818	0	3,818	20,000 lb/year	No
CO	97,760	0	97,760	20,000 lb/year	**Yes**
VOC	6,128	0	6,128	20,000 lb/year	No
NH_3	2,726	0	2,726	20,000 lb/year	No

As demonstrated above, the SSIPE for CO was greater than 20,000 lb/year; therefore public noticing for SSIPE > 20,000 lb is required.

e. Title V Significant Permit Modification

Since this facility does not have a Title V operating, this change is not a Title V Significant Permit Modification, and therefore public noticing is not required.

2. Public Notice Action

As discussed above, public noticing is required for this project for CO emissions from an emissions unit in excess of 100 lb/day and for an SSIPE for CO that exceeds 20,000 lb/yr. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation prior to the issuance of the ATC for this equipment.

D. Daily Emission Limits (DELs)

DELs and other enforceable conditions are required by Rule 2201 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. The DEL must be contained in the latest ATC and contained in or enforced by the latest PTO and enforceable, in a practicable manner, on a daily basis. DELs are also required to enforce the applicability of BACT.

Proposed Rule 2201 (DEL) Conditions for the Digester System (S-8596-1-0)

As stated above, the digester system will reduce emissions from the manure produced by cattle at the dairy. The following condition will be placed on the ATC permit to ensure that fugitive emissions from the digester system will be negligible:

- The VOC content of the digester gas produced by the digester system shall not exceed 10% by weight. [District Rule 2201]
- The air injection system shall be maintained and operated according to the manufacturer's recommendation to minimize the concentration of hydrogen sulfide in the bio-gas. [District Rule 2201]

Proposed Rule 2201 (DEL) Conditions for the Engines (S-8596-2-0 & -3-0)

Proposed Rule 2201 (DEL) Conditions for Engines during Commissioning and Normal Operation:

- This engine shall be fired only on digester gas as fuel except in the case that insufficient digester gas is available for the engine at the time that the required utility interconnect testing is scheduled the engine will be permitted to fire sufficient natural gas fuel to complete the required utility interconnect testing. [District Rule 2201]
- During times this engine is fueled with natural gas for required utility interconnect testing, the engine shall continue to comply with all emission standards and limitations contained in this permit. [District Rule 2201]
- The total amount of electrical energy produced by this engine while fueled on natural gas for required utility interconnect testing shall not exceed 96,000 kW-hrs. The following records shall be maintained: 1) date(s) and time(s) that this engine is fueled with natural gas for utility testing, 2) the total amount of electrical energy (kW-hr) produced by this engine when fueled with natural gas for utility testing, and 3) the total number of hours that this engine is fueled with natural gas. [District Rule 2201]
- The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H2S. The District may approve an averaging period of up to one calendar day in length for demonstration of compliance with the fuel sulfur content limit. [District Rules 2201, 4702, and 4801]
- Ammonia (NH3) emissions from this engine shall not exceed 10 ppmvd @ 15% O2. [District Rule 2201]

- {1897} This engine shall be equipped with either a positive crankcase ventilation (PCV) system that recirculates crankcase emissions into the air intake system for combustion, or a crankcase emissions control device of at least 90% control efficiency. [District Rule 2201]
- The permittee shall obtain written District approval for the use of any equivalent control equipment not specifically approved by this Authority to Construct. Approval of the equivalent control equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate control equipment is equivalent to the specifically authorized equipment. [District Rule 2010]
- The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2010] N
- Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct. [District Rule 2201]
- No emission factor and no emission shall be greater for the alternate equipment than for the proposed equipment. No changes in the hours of operation, operating rate, throughput, or power rating may be authorized for any alternate equivalent equipment. The power rating of the equivalent equipment shall not be less than 1,271 bhp or greater than 1,412 bhp. [District Rule 2201]
- {4261} This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]
- {4037} During periods of operation, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

Proposed Rule 2201 (DEL) Conditions during Commissioning Period:

For these digester gas-fired IC engines, the DELs for NO_X, PM_{10}, CO, and VOC are stated in the form of maximum emission factors (g/bhp-hr) and maximum number of hours allowed for commissioning activities.

- Commissioning activities are defined as, but not limited to, all testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the construction contractor to ensure safe and reliable operation of the reciprocating IC engine, emission control equipment, and associated electrical delivery systems. [District Rule 2201]
- Commissioning period shall commence when all mechanical, electrical, and control systems are installed and individual system startup has been completed, or when a reciprocating engine is first fired, whichever occurs first. The commissioning period shall terminate when the engine has completed initial performance testing, completed initial

engine tuning, and the engine is available for commercial operation. The total duration of the commissioning period for this engine shall not exceed 120 hours of operation of the engine. [District Rule 2201]

- Emission rates from this engine during the commissioning period shall not exceed any of the following limits: 1.0 g-NOx/bhp-hr, 0.07 g-PM10/bhp-hr, 4.85 g-CO/bhp-hr, 1.0 g-VOC/bhp-hr. [District Rule 2201]
- The total number of firing hours of this unit without abatement of emissions by the SCR system shall not exceed 120 hours during the commissioning period. Such operation of this unit without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system. Upon completion of these activities, the permittee shall provide written notice to the District and the unused balance of the 120 firing hours without abatement shall expire. [District Rule 2201]
- At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and the construction contractor, the engine shall be tuned to minimize emissions. [District Rule 2201]
- At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and the construction contractor, the Selective Catalytic Reduction (SCR) system and oxidation catalyst shall be installed, adjusted, and operated to minimize emissions from this unit. [District Rule 2201]

Proposed Rule 2201 (DEL) Conditions during Normal Operation:

For these digester gas-fired IC engines, the DELs for NO_X, PM_{10}, CO, and VOC during normal operation are stated in the form of emission factors (g/hp-hr & ppmv), the maximum engine horsepower rating (1,412 bhp), and the maximum operational time of 24 hours per day.

- Emissions from this engine after the commissioning period shall not exceed any of the following limits: 0.15 g-NOx/bhp-hr (equivalent to 11.0 ppmvd NOx @ 15% O2), NOx referenced as NO2; 0.07 g-PM10/bhp-hr; 1.75 g-CO/bhp-hr (equivalent to 210 ppmvd CO @ 15% O2); 0.10 g-VOC/bhp-hr (equivalent to 20 ppmvd VOC @ 15% O2), VOC referenced as methane. [District Rules 2201 and 4702]

E. Compliance Assurance

1. Source Testing

The proposed 1,412 bhp digester gas-fired engines are subject to District Rule 4702 - Internal Combustion Engines – Phase 2. Section 6.3.2.1 of District Rule 4702 requires source testing of NO_X, CO, and VOC emissions at least once every 24 months for a non-agricultural spark-ignited IC engine. The periodic source testing will demonstrate compliance with the applicable NSR requirements NO_X, CO, and VOC. Therefore, source testing for NO_X, CO, and VOC will be required within 120 days of initial start-up and at least once every 24 months thereafter.

Since the control equipment will include an SCR system, periodic testing of ammonia slip will also be required. Initial source testing will also be required to demonstrate compliance with the emission limits for PM_{10} and H_2S.

The proposed engines are also subject to 40 CFR 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. However, the District has not been delegated the authority to implement 40 CFR 60, Subpart JJJJ for non-Major Sources; therefore, no testing requirements from this subpart will be included in the ATC permits.

The following conditions will be placed on the permits to ensure compliance:

- Source testing to measure NOx, CO, VOC, PM10, and ammonia (NH3) emissions from this unit shall be conducted within 120 days of initial start-up. [District Rules 1081, 2201, and 4702]
- Source testing to measure H2S emissions from this unit shall be conducted within 120 days of initial start-up. [District Rules 1081 and 4102]
- Source testing to measure NOx, CO, VOC, and ammonia (NH3) emissions from this unit shall be conducted at least once every 24 months. [District Rules 1081, 2201, and 4702]
- {3791} Emissions source testing shall be conducted with the engine operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. [District Rule 4702]
- For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC emissions shall be reported as methane. NOx, CO, VOC, and NH3 concentrations shall be reported in ppmv, corrected to 15% oxygen. [District Rules 2201 and 4702]
- The following methods shall be used for source testing: NOx (ppmv) - EPA Method 7E or ARB Method 100; CO (ppmv) - EPA Method 10 or ARB Method 100; VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100; stack gas oxygen - EPA Method 3 or 3A or ARB Method 100; stack gas velocity - EPA Method 2 or EPA Method 19; stack gas moisture content - EPA Method 4; PM10 (filterable and condensable) - EPA Method 201 and 202, EPA Method 201a and 202, or ARB Method 5 in combination with 501; NH3 - BAAQMD ST-1B or SCAQMD Method 207-1. Alternative test methods as approved by the District may also be used to address the source testing requirements of this permit. [District Rules 1081 and 4702]
- The following methods shall be used for source testing of stack H2S emissions: EPA Method 15, 16, 16A, 16B, or 16C; or ARB Method 15, 16, or 16A. Alternative test methods as approved by the District may also be used to test stack H2S emissions. [District Rule 1081]
- {109} Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081]

- The results of each source test shall be submitted to the District within 60 days after completion of the source test. [District Rule 1081] N

2. Monitoring

As stated above the engines are subject to District Rule 4702. Section 5.8.1 of District Rule 4702 requires engines rated at least 1,000 bhp that can operate more than 2,000 hour per calendar year or equipped with external control devices to install, operate, and maintain an APCO-approved alternate monitoring plan. Section 5.8.9 of District Rule 4702 requires monitoring of NO_X emissions at least once every calendar quarter for a non-agricultural spark-ignited IC engine. However, Section 6.5.3 of District Rule 4702 requires monthly monitoring for engines equipped with non-certified control devices in order to demonstrate compliance with the emission limits in District Rule 4702. Therefore, monthly monitoring of NO_X, CO, and O_2 concentrations in accordance pre-approved alternate monitoring plan "A" will be required. Since the engine will be equipped with SCR quarterly monitoring of ammonia slip will also be required.

The following conditions will be placed on the permits to ensure compliance:

- The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every month (in which a source test is not performed) using a portable emission monitor that meets District specifications. [In-stack emission monitors may be allowed if they satisfy the standards required for portable analyzers as specified in District policies and are approved in writing by the APCO.] Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]
- The permittee shall monitor and record the stack concentration of NH3 at least once every calendar quarter in which a source test is not performed. NH3 monitoring shall be conducted utilizing District approved gas-detection tubes or a District approved equivalent method. Monitoring shall not be required if the unit is not in operation, i.e. the unit need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the unit unless monitoring has been performed within the last quarter. [District Rules 2201 and 4102]
- If the NOx, CO, or NH3 concentrations, as measured by the portable analyzer or the District approved ammonia monitoring equipment, exceed the allowable emission concentration, the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours after detection. If the portable analyzer readings continue to exceed the allowable emissions concentration after 8 hours, the permittee shall notify the District within the following 1 hour, and conduct a certified source test within 60 days of the first exceedance. In lieu of conducting a source test, the permittee may stipulate a violation has occurred, subject to enforcement action. The permittee must then correct the violation, show compliance has been re-established, and resume monitoring procedures. If the deviations are the result of a qualifying breakdown condition pursuant to Rule 1100, the permittee

may fully comply with Rule 1100 in lieu of performing the notification and testing required by this condition. [District Rules 2201 and 4702]

- {3787} All alternate monitoring parameter emission readings shall be taken with the unit operating either at conditions representative of normal operations or conditions specified in the permit-to-operate. The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. Emission readings taken shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings, evenly spaced out over the 15 consecutive-minute period. [District Rule 4702]

In addition, Section 5.10.1 of District Rule 4702 requires an annual analysis of the sulfur content of engine fuel. Because of the variable content of digester gas, additional monitoring of the fuel sulfur content and monitoring of the methane content and heating value of the digester gas will be required. The following conditions will be placed on the permits to ensure compliance:

- Fuel sulfur analysis shall be performed at least annually using EPA Method 11 or EPA Method 15, as appropriate. Records of the fuel sulfur analysis shall be maintained and provided it to the District upon request. [District Rules 2201 and 4702]
- The sulfur content of the digester gas used to fuel the engine shall be monitored and recorded at least once every calendar quarter in which a fuel sulfur analysis is not performed. If quarterly monitoring shows a violation of the fuel sulfur content limit of this permit, monthly monitoring will be required until six consecutive months of monitoring show compliance with the fuel sulfur content limit. Once compliance with the fuel sulfur content limit is shown for six consecutive months, then the monitoring frequency may return to quarterly. Monitoring of the sulfur content of the digester gas fuel shall not be required if the engine does not operate during that period. Records of the results of monitoring of the digester gas fuel sulfur content shall be maintained. [District Rule 2201]
- Monitoring of the digester gas sulfur content shall be performed using gas detection tubes calibrated for H2S; a Testo 350 XL portable emission monitor; a continuous fuel gas monitor that meets the requirements specified in SCAQMD Rule 431.1, Attachment A; District-approved source test methods, including EPA Method 15, ASTM Method D1072, D4084, and D5504; District-approved in-line H2S monitors; or an alternative method approved by the District. Prior to utilization of in-line monitors to demonstrate compliance with the digester gas sulfur content limit of this permit, the permittee shall submit details of the proposed monitoring system, including the make, model, and detection limits, to the District and obtain District approval for the proposed monitor(s). [District Rule 2201]

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the offset, public notification and daily emission limit requirements of Rule 2201. The following condition(s) are listed on the permit to operate:

- The SCR catalyst shall be maintained and replaced in accordance with the recommendations of the catalyst manufacturer or emission control supplier. Records of catalyst maintenance and replacement shall be maintained. [District Rule 2201 and 4702]
- The permittee shall maintain records of: (1) the date and time of NOx, CO, O2, and NH3 measurements, (2) the O2 concentration in percent and the measured NOx, CO, and NH3 concentrations corrected to 15% O2, (3) make and model of exhaust gas analyzer, (4) exhaust gas analyzer calibration records, (5) the method of determining the NH3 emission concentration, and (6) a description of any corrective action taken to maintain the emissions within the acceptable range. [District Rules 2201 and 4702]
- The permittee shall maintain an engine operating log to demonstrate compliance. The engine operating log shall include, on a monthly basis, the following information: the total hours of operation, the type and quantity of fuel used, maintenance and modifications performed, monitoring data, compliance source test results, and any other information necessary to demonstrate compliance. Quantity of fuel used shall be recorded in standard cubic feet using a non-resettable, totalizing mass or volumetric fuel flow meter or other APCO approved-device. [District Rules 2201 and 4702]
- All records shall be maintained and retained for a minimum of five (5) years, and shall be made available for District inspection upon request. All records may be maintained and submitted in an electronic format approved by the District. [District Rules 2201 and 4702]

4. Reporting

As stated above, the proposed 1,412 bhp digester gas-fired engines are subject to 40 CFR 60, Subpart JJJJ. 40 CFR 60, Subpart JJJJ requires uncertified engines rated 500 bhp or more to submit an initial notification to EPA. However, the District has not been delegated the authority to implement 40 CFR 60, Subpart JJJJ for non-Major Sources; therefore, no Subpart JJJJ reporting requirements from this subpart will be included in the ATC permits. Therefore, the following condition will be listed on the permit:

- The permittee shall submit a summary of activities to be performed during the commissioning period to the District at least two weeks prior to the first firing of this engine. The summary shall include a list of each commissioning activity, the anticipated duration of each activity in hours, and the purpose of the activity. The activities described shall include, but are not limited to, the tuning of the engine, the installation and operation of the SCR system, the installation, calibration, and testing of emissions monitors, and any activities requiring the firing of this unit without abatement by the SCR system. [District Rule 2201] N

F. Ambient Air Quality Analysis (AAQA)

District Rule 2201 requires that an ambient air quality analysis (AAQA) be conducted for the purpose of determining whether a new or modified Stationary Source will cause or make worse a violation of an air quality standard. The Technical Services Division of the

SJVAPCD conducted the required analysis. Refer to Appendix C of this document for the AAQA summary sheet.

The proposed location is in an attainment area for NO_X, CO, and SO_X. As shown by the AAQA summary sheet the proposed equipment will not cause a violation of an air quality standard for NO_X, CO, or SO_X. The proposed location is in a non-attainment area for the state's PM_{10} as well as federal and state $PM_{2.5}$ thresholds.

The results of the Criteria Pollutant Modeling conducted for the AAQA are summarized in the following table:

Criteria Pollutant Modeling Results*					
Digester Gas-Fired IC Engines	**1 Hour**	**3 Hours**	**8 Hours.**	**24 Hours**	**Annual**
CO	Pass	X	Pass	X	X
NO_X	Pass[1]	X	X	X	Pass
SO_X	Pass	Pass	X	Pass	Pass
PM_{10}	X	X	X	Pass[2]	Pass[2]

* Results were taken from the PSD spreadsheet.
[1] The project was compared to the 1-hour NO2 National Ambient Air Quality Standard that became effective on April 12, 2010 using the District's approved procedures.
[2] The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2).

As shown by the AAQA summary, the proposed equipment will not cause a violation of an ambient air quality standard.

Rule 2410 Prevention of Significant Deterioration

As shown in Section VII. C. 9. above, this project does not result in a new PSD major source or PSD major modification. No further discussion is required.

Rule 2520 Federally Mandated Operating Permits

Since this facility's potential emissions do not exceed any major source thresholds of Rule 2201, this facility is not a major source, and Rule 2520 does not apply.

Rule 4101 Visible Emissions

Rule 4101 states that no air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity.

Since the IC engines are fired solely on gaseous fuel, visible emissions are not expected to exceed Ringelmann 1 or 20% opacity. The following condition will be listed on the proposed ATC permits to ensure compliance:

- {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]

Rule 4102 Nuisance

Rule 4102 prohibits discharge of air contaminants which could cause injury, detriment, nuisance or annoyance to the public. Public nuisance conditions are not expected as a result of these operations, provided the equipment is well maintained. Therefore, compliance with this rule is expected.

California Health & Safety Code 41700 (Health Risk Assessment)

District Policy APR 1905 – *Risk Management Policy for Permitting New and Modified Sources* specifies that for an increase in emissions associated with a proposed new source or modification, the District perform an analysis to determine the possible impact to the nearest resident or worksite.

An Health Risk Assessment (HRA) is not required for a project with a total facility prioritization score of less than one. According to the Technical Services Memo for this project (Appendix C), the total facility prioritization score including this project was greater than one. Therefore, an HRA was required to determine the short-term acute and long-term chronic exposure from this project. The results of the health risk assessment are summarized in the table below.

RMR Summary			
Categories	**1,412 bhp Bio Gas Engines (Unit -2-0 & -3-0)**	**Project Totals**	**Facility Totals**
Prioritization Score	107 (each)	214	>1
Acute Hazard Index	0.38 (each)	0.76	0.76
Chronic Hazard Index	0.09 (each)	0.18	0.18
Maximum Individual Cancer Risk (10^{-6})	0.006 (each)	0.01	0.01
T-BACT Required?	**No**		
Special Permit Conditions?	**Yes**		

Discussion of T-BACT

BACT for toxic emission control (T-BACT) is required if the cancer risk exceeds one in one million. As demonstrated above, T-BACT is not required for this project because the HRA indicates that the risk is not above the District's thresholds for triggering T-BACT requirements; therefore, compliance with the District's Risk Management Policy is expected.

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification not have acute or chronic indices, or a cancer risk greater than the District's significance levels (i.e. acute and/or chronic indices greater than 1 and a cancer risk greater than 10 in a million). As outlined by the HRA Summary in

Appendix C of this report, the emissions increases for this project was determined to be less than significant.

To ensure compliance with the HRA; the following permit conditions are required:

Digester Gas-Fired IC Engine (S-8596-2-0 & -3-0)

- {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102] N

- The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H2S. The District may approve an averaging period of up to one calendar day in length for demonstration of compliance with the fuel sulfur content limit. [District Rules 2201, 4702, and 4801] N[1]

[1] This condition, along with the engine rating in the equipment description, will ensure that the H2S emissions from the engine exhaust stack shall not exceed 1.8 lb/hr, as required by the Health Risk Assessment.

Rule 4201 Particulate Matter Concentration

The purpose of this rule is to protect the ambient air quality by establishing a particulate matter emission standard. Section 3.1 prohibits discharge of dust, fumes, or total particulate matter into the atmosphere from any single source operation in excess of 0.1 grain per dry standard cubic foot.

$$0.07 \quad \frac{g}{hp \cdot hr} \times \frac{1 hp \cdot hr}{2{,}545 Btu} \times \frac{10^6 Btu}{9{,}100 dscf} \times \frac{0.33 Btu_{out}}{1 Btu_{in}} \times \frac{15.43 grain}{g} = \quad 0.015 \quad \frac{grain}{dscf}$$

Since 0.015 grain/dscf is less than 0.1 grain/dscf, compliance with this rule is expected.

The following condition will be listed on the proposed ATC permits to ensure compliance:

- {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

Rule 4701 Stationary Internal Combustion Engines – Phase I

The requirements of Rule 4702 are equivalent or more stringent than the requirements of this rule. Since the proposed IC engine is subject to both Rules 4701 and 4702, compliance with Rule 4702 is sufficient to demonstrate compliance with this rule.

Rule 4702 Internal Combustion Engines – Phase 2

The purpose of this rule is to limit the emissions of nitrogen oxides (NO_X), carbon monoxide (CO), volatile organic compounds (VOC), and sulfur oxides (SO_X) from internal combustion engines.

This rule applies to any internal combustion engine with a rated brake horsepower of 25 brake horsepower or greater.

Section 5.2.1 requires that the operator of a spark-ignited non-agricultural internal combustion engine rated > 50 bhp shall not operate it in such a manner that results in emissions exceeding the limits in Table 1 of Rule 4702 until such time that the engine has demonstrated compliance with emission limits in Table 2 of Rule 4702 pursuant to the compliance deadlines in Section 7.5. In lieu of complying with Table 1 emission limits, the operator of a spark-ignited engine shall comply with the applicable emission limits pursuant to Section 8.0.

Table 1 Emission Limits/Standards for a Spark-Ignited Internal Combustion Engine rated at >50 bhp Used Exclusively in Non-AO (All ppmv limits are corrected to 15% oxygen on a dry basis).

Engine Type	NO_X	CO	VOC
1. a. Rich Burn, Waste Gas Fueled	50 ppmv or 90% reduction	2,000 ppmv	250 ppmv
1. b. Rich Burn, Cyclic Loaded, Field Gas Fueled	50 ppmv	2,000 ppmv	250 ppmv
1. c. Rich Burn, All Other Engine	25 ppmv or 96% reduction	2,000 ppmv	250 ppmv
2. a. Lean Burn 2-Stroke, Gaseous Fueled, < 100 hp	75 ppmv or 85% reduction	2,000 ppmv	750 ppmv
2. b. Lean Burn, All Other Engines	65 ppmv or 90% reduction	2,000 ppmv	750 ppmv

Section 5.2.2 requires that on and after the compliance schedule specified in Section 7.5, the operator of a spark-ignited non-agricultural internal combustion engine rated > 50 bhp shall comply with all the applicable requirements of the rule and the requirements of Section 5.2.2.1, 5.2.2.2, or 5.2.2.3, on an engine-by-engine basis.

Section 5.2.2.1 requires that on and after the compliance schedule specified in Section 7.5, the operator of a spark-ignited engine that is used exclusively in non-agricultural operations shall comply with Sections 5.2.2.1.1 through 5.2.2.1.3 on an engine-by-engine basis:

5.2.2.1.1 NO_X, CO, and VOC emission limits pursuant to Table 2;

5.2.2.1.2 SO_X control requirements of Section 5.7, pursuant to the deadlines specified in Section 7.5; and

5.2.2.1.3 Monitoring requirements of Section 5.10, pursuant to the deadlines specified in Section 7.5.

Rule 4702, Table 2 Emission Limits/Standards for Spark-Ignited IC Engines rated >50 bhp Used in Non-Agricultural Operations (Emission Limits are effective according to the compliance schedule specified in Rule 4702, Section 7.5.)			
Engine Type	**NO_X Emission Limit (ppmv @ 15% O_2, dry)**	**CO Emission Limit (ppmv @ 15% O_2, dry)**	**VOC Emission Limit (ppmv @ 15% O_2, dry)**
1. a. Rich-Burn, Waste Gas Fueled	50 ppmv	2,000 ppmv	250 ppmv
1. b. Rich-Burn, Cyclic Loaded, Field Gas Fueled	50 ppmv	2,000 ppmv	250 ppmv
1. c. Rich-Burn, Limited Use	25 ppmv	2,000 ppmv	250 ppmv
1. d. Rich-Burn, Not Listed Above	11 ppmv	2,000 ppmv	250 ppmv
2. a. Lean-Burn, 2-Stroke, Gaseous Fueled, >50 bhp & <100 bhp	75 ppmv	2,000 ppmv	750 ppmv
2. b. Lean-Burn, Limited Use	65 ppmv	2,000 ppmv	750 ppmv
2. c. Lean-Burn Engine used for gas compression	65 ppmv or 93% reduction	2,000 ppmv	750 ppmv
2. d. Waste Gas Fueled	65 ppmv or 90% reduction	2,000 ppmv	750 ppmv
2. e. Lean-Burn, Not Listed Above	11 ppmv	2,000 ppmv	750 ppmv

The District has determined that the IC engines are a non-agricultural IC engines. The lean burn, digester gas-fired, engines are waste gas-fired engines and are required to comply with the following emissions limits from Table 1: 65 ppmvd NO_X, 2,000 ppmvd CO, and 750 ppmvd VOC (all measured @ 15% O_2). The engines will also be required to comply with the emission limits from Table 2 in accordance with the compliance schedule in Section 7.5.

Therefore, the following previously proposed condition will be listed on the proposed ATC permits to ensure compliance:

- Emissions from this engine after the commissioning period shall not exceed any of the following limits: 0.15 g-NOx/bhp-hr (equivalent to 11.0 ppmvd NOx @ 15% O2), NOx referenced as NO2; 0.07 g-PM10/bhp-hr; 1.75 g-CO/bhp-hr (equivalent to 210 ppmvd CO @ 15% O2); 0.10 g-VOC/bhp-hr (equivalent to 20 ppmvd VOC @ 15% O2), VOC referenced as methane. [District Rules 2201 and 4702]

Section 5.2.4 requires the operator of a certified compression-ignited engine rated >50 bhp shall comply with the requirements of Sections 5.2.4.1, 5.2.4.2, 5.2.4.3, 5.2.4.3, and 5.2.4.4. The proposed digester gas-fired engines are not compression-ignited engines; therefore, this section does not apply to the proposed engines.

Section 5.7 requires that on and after the compliance schedule specified in Section 7.5, operators of non-agricultural spark-ignited engines and non-agricultural compression-ignited engines shall comply shall comply with Sections 5.7.1, 5.7.2, 5.7.3, 5.7.4, 5.7.5, or 5.7.6:

5.7.1 Operate the engine exclusively on PUC-quality natural gas, commercial propane, butane, or liquefied petroleum gas, or a combination of such gases; or

5.7.2 Limit gaseous fuel sulfur content to no more than five (5) grains of total sulfur per one hundred (100) standard cubic feet; or

5.7.3 Use California Reformulated Gasoline for gasoline-fired spark-ignited engines; or

5.7.4 Use California Reformulated Diesel for compression-ignited engines; or

5.7.5 Operate the engine on liquid fuel that contains no more than 15 ppm sulfur, as determined by the test method specified in Section 6.4.6; or

5.7.6 Install and properly operate an emission control system that reduces SO_2 emissions by at least 95% by weight as determined by the test method specified in Section 6.4.6.

To satisfy BACT, the average sulfur content of the digester gas fuel for the engine will be limited to 40 ppmv, which is approximately equal to 2.4 grains sulfur per 100 scf. The following condition will be listed on the proposed ATC permits to ensure compliance:

- The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H2S. The District may approve an averaging period of up to one calendar day in length for demonstration of compliance with the fuel sulfur content limit. [District Rules 2201, 4702, and 4801]

Section 5.8 requires that the operator of a non-agricultural spark-ignited IC engine subject to the requirements of Section 5.2 or any engine subject to the requirements of Section 8.0 shall comply with the following requirements of Sections 5.8.1 – 5.8.11:

Section 5.8.1 stipulates that for each engine with a rated brake horsepower of 1,000 hp or greater and which is allowed to operate more than 2,000 hours per calendar year, or with an external emission control device, shall either install, operate, and maintain continuous monitoring equipment for NO_X, CO, and oxygen, as identified in Rule 1080 (Stack Monitoring), or install, operate, and maintain APCO-approved alternate monitoring. The monitoring system may be a continuous emissions monitoring system (CEMS), a parametric emissions monitoring system (PEMS), or an alternative monitoring system approved by the APCO. APCO-approved alternate monitoring shall consist of one or more of the following:

5.8.1.1 Periodic NO_X and CO emission concentrations,

5.8.1.2 Engine exhaust oxygen concentration,

5.8.1.3 Air-to-fuel ratio,

5.8.1.4 Flow rate of reducing agents added to engine exhaust,

5.8.1.5 Catalyst inlet and exhaust temperature,

5.8.1.6 Catalyst inlet and exhaust oxygen concentration, or

5.8.1.7 Other operational characteristics.

The applicant has proposed to meet this section of the rule by proposing a pre-approved alternate emissions monitoring plan that specifies that the permittee perform periodic NO_X, CO, and O_2 emissions concentrations as specified in District Policy SSP-1810, dated 4/29/04. Therefore, the following condition will be placed on the ATC permits:

- The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every month (in which a source test is not performed) using a portable emission monitor that meets District specifications. [In-stack emission monitors may be allowed if they satisfy the standards required for portable analyzers as specified in District policies and are approved in writing by the APCO.] Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]

Section 5.8.2 requires that for each non-agricultural spark-ignited IC engine not subject to Section 5.8.1, the operator shall monitor operational characteristics recommended by the engine manufacturer or emission control system supplier, and approved by the APCO. The proposed engines will be subject to Section 5.8.1; therefore this section is not applicable.

Section 5.8.3 requires that for each engine with an alternative monitoring system, the operator shall submit to, and receive approval from the APCO, adequate verification of the alternative monitoring system's acceptability. The proposed ATC permits for the digester gas-fired engines include a pre-approved alternate emissions monitoring plan that specifies that the permittee perform periodic NO_X, CO, and O_2 emissions concentrations as specified in District Policy SSP-1810, dated 4/29/04. Therefore, this section is satisfied.

Section 5.8.4 requires that for each engine with an APCO approved CEMS, operate the CEMS in compliance with the requirements of 40 Code of Federal Regulations (CFR) Part 51, 40 CFR Parts 60.7 and 60.13 (except subsection h), 40 CFR Appendix B (Performance Specifications), 40 CFR Appendix F (Quality Assurance Procedures), and applicable provisions of Rule 1080 (Stack Monitoring). The IC engines proposed under this project will not have CEMS installed; therefore this section of the rule is not applicable.

Section 5.8.5 requires that each engine have the data gathering and retrieval capabilities of an installed monitoring system described in Section 5.8 approved by the APCO. As stated above, the proposed ATC permits for the proposed digester gas-fired engines include an alternate emissions monitoring plan that has been pre-approved by the APCO. Therefore, this section is satisfied.

Section 5.8.6 requires that for each non-agricultural spark-ignited IC engine, the operator shall install and operate a nonresettable elapsed operating time meter. In lieu of installing a nonresettable time meter, the operator may use an alternative device, method, or technique in determining operating time provided that the alternative is approved by the APCO. The operator shall maintain and operate the required meter in accordance with the manufacturer's instructions. The applicant has proposed a nonresettable elapsed operating time meter for the engine involved with this project. Therefore, the following condition will be placed on the ATC permits to ensure compliance:

- This engine shall be equipped with an operational non-resettable elapsed time meter. [District Rules 2201 and 4702]

Section 5.8.7 requires that for each engine, the permittee shall implement the Inspection and Monitoring (I&M) plan submitted to and approved by the APCO pursuant to Section 6.5. The applicant has submitted an I&M program with this ATC application and the requirements of this plan will be explained in detail in the section that covers Section 6.5 of this rule.

Section 5.8.8 requires that for each engine, collect data through the I&M plan in a form approved by the APCO. The applicant has submitted an I&M program and the requirements of this plan will be explained in detail in the section that covers Section 6.5 of this rule.

Section 5.8.9 requires for each non-agricultural spark-ignited IC engine, use a portable NO_X analyzer to take NO_X emission readings to verify compliance with the emission requirements of Section 5.2 or Section 8.0 during each calendar quarter in which a source test is not performed. If an engine is operated less than 120 calendar days per calendar year, the operator shall take one NO_X emission reading during the calendar year in which a source test is not performed and the engine is operated. All emission readings shall be taken with the engine operating either at conditions representative of normal operations or conditions specified in the Permit-to-Operate or Permit-Exempt Equipment Registration. The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. All NO_X emissions readings shall be reported to the APCO in a manner approved by the APCO. NO_X emission readings taken pursuant to this section shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive minute sample reading or by taking at least five (5) readings evenly spaced out over the 15 consecutive-minute period. Therefore, the following conditions will be placed on the ATC permit:

- The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every month (in which a source test is not performed) using a portable emission monitor that meets District specifications. [In-stack emission monitors may be allowed if they satisfy the standards required for portable analyzers as specified in District policies and are approved in writing by the APCO.] Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]
- {3787} All alternate monitoring parameter emission readings shall be taken with the unit operating either at conditions representative of normal operations or conditions specified in the permit-to-operate. The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. Emission readings taken shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings, evenly spaced out over the 15 consecutive-minute period. [District Rule 4702]

Section 5.8.10 specifies that the APCO shall not approve an alternative monitoring system unless it is documented that continued operation within ranges of specified emissions related

performance indicators or operational characteristics provides a reasonable assurance of compliance with applicable emission limits and that the operator shall source test over the proposed range of surrogate operating parameters to demonstrate compliance with the applicable emission standards. The proposed ATC permits for the digester gas-fired engines include a pre-approved alternate emissions monitoring plan that requires periodic NO_X, CO, and O_2 emissions concentrations. Therefore, this section is satisfied.

Section 5.8.11 requires that for each non-agricultural spark-ignited IC engine subject to the Alternate Emission Control Plan (AECP) of Section 8.0, the operator shall install and operate a nonresettable fuel meter. The use of an Alternate Emission Control Plan to comply with Section 5.2 is not being proposed for the IC engines under this project; therefore this section of the rule is not applicable.

Section 5.9 specifies monitoring requirements for all other engines that are not subject to the requirements of Section 5.8. The proposed spark-ignited non-agricultural digester gas-fired engines are subject to the requirements of Section 5.8; therefore this section of the rule is not applicable.

Section 5.10 specifies SO_X Emissions Monitoring Requirements. On and after the compliance schedule specified in Section 7.5, an operator of a non-agricultural IC engine shall comply with the following requirements:

5.10.1 An operator of an engine complying with Sections 5.7.2 or 5.7.5 shall perform an annual sulfur fuel analysis in accordance with the test methods in Section 6.4. The operator shall keep the records of the fuel analysis and shall provide it to the District upon request,

5.10.2 An operator of an engine complying with Section 5.7.6 by installing and operating a control device with at least 95% by weight SOx reduction efficiency shall submit for approval by the APCO the proposed the key system operating parameters and frequency of the monitoring and recording not later than July 1, 2013, and

5.10.3 An operator of an engine complying with Section 5.7.6 shall perform an annual source test unless a more frequent sampling and reporting period is included in the Permit-to-Operate. Source tests shall be performed in accordance with the test methods in Section 6.4.

The following condition will be listed on the proposed ATC permits to ensure compliance:

- Fuel sulfur content analysis shall be performed at least annually using EPA Method 11 or EPA Method 15, as appropriate. Records of the fuel sulfur analysis shall be maintained and provided to the District upon request. [District Rules 2201 and 4702]

Section 5.11 applies to operators of engines used exclusively in agricultural operations. The proposed engines are non-agricultural engines; therefore this section of the rule is not applicable.

Section 6.1 requires that the operator of an engine subject to the requirements of Rule 4702 shall submit to the APCO an approvable emission control plan of all actions to be taken to satisfy the emission requirements of Section 5.2 and the compliance schedules of Section 7.0.

If there is no change to the previously-approved emission control plan, the operator shall submit a letter to the District indicating that the previously approved plan is still valid.

Section 6.1.1 specifies that the requirement to submit an emission control plan shall apply to the following engines:

6.1.1.1 Engines that have been retrofitted with an exhaust control device, except those certified per Section 9.0;
6.1.1.2 Engines subject to Section 8.0;
6.1.1.3 An agricultural spark-ignited engine that is subject to the requirements of Section 8.0;
6.1.1.4 An agricultural spark-ignited engine that has been retrofitted with a catalytic emission control and is not subject to the requirements of Section 8.0

Section 6.1.2 specifies that the emission control plan shall contain the following information, as applicable for each engine:

6.1.2.1 Permit-to-Operate number, Authority-to-Construct number, or Permit-Exempt Equipment Registration number,
6.1.2.2 Engine manufacturer,
6.1.2.3 Model designation and engine serial number,
6.1.2.4 Rated brake horsepower,
6.1.2.5 Type of fuel and type of ignition,
6.1.2.6 Combustion type: rich-burn or lean-burn,
6.1.2.7 Total hours of operation in the previous one-year period, including typical daily operating schedule,
6.1.2.8 Fuel consumption (cubic feet for gas or gallons for liquid) for the previous one-year period,
6.1.2.9 Stack modifications to facilitate continuous in-stack monitoring and to facilitate source testing,
6.1.2.10 Type of control to be applied, including in-stack monitoring specifications,
6.1.2.11 Applicable emission limits,
6.1.2.12 Documentation showing existing emissions of NO_X, VOC, and CO, and
6.1.2.13 Date that the engine will be in full compliance with this rule.

Section 6.1.3 requires that the emission control plan shall identify the type of emission control device or technique to be applied to each engine and a construction/removal schedule, or shall provide support documentation sufficient to demonstrate that the engine is in compliance with the emission requirements of this rule.

Section 6.1.4 requires that for an engine being permanently removed from service, the emission control plan shall include a letter of intent pursuant to Section 7.2.

The applicant has submitted all the required information for Section 6.1 in the application for the IC engine involved with this project.

Section 6.2.1 requires that the operator of an engine subject to the requirements of Section 5.2 shall maintain an engine operating log to demonstrate compliance with Rule 4702. This

information shall be retained for a period of at least five years, shall be readily available, and be made available to the APCO upon request. The engine operating log shall include, on a monthly basis, the following information:

6.2.1.1 Total hours of operation,
6.2.1.2 Type of fuel used,
6.2.1.3 Maintenance or modifications performed,
6.2.1.4 Monitoring data,
6.2.1.5 Compliance source test results, and
6.2.1.6 Any other information necessary to demonstrate compliance with this rule.
6.2.1.7 For an engine subject to Section 8.0, the quantity (cubic feet of gas or gallons of liquid) of fuel used on a daily basis.

The following condition will be placed on the ATC permit:

- The permittee shall maintain an engine operating log to demonstrate compliance. The engine operating log shall include, on a monthly basis, the following information: the total hours of operation, the type and quantity of fuel used, maintenance and modifications performed, monitoring data, compliance source test results, and any other information necessary to demonstrate compliance. Quantity of fuel used shall be recorded in standard cubic feet using a non-resettable, totalizing mass or volumetric fuel flow meter or other APCO approved-device. [District Rules 2201 and 4702] N

Section 6.2.2 requires that the data collected pursuant to the requirements of Section 5.8 and Section 5.9 shall be maintained for at least five years, shall be readily available, and made available to the APCO upon request.

The following previously proposed condition will be listed on the proposed ATC permit to ensure compliance:

- All records shall be maintained and retained for a minimum of five (5) years, and shall be made available for District inspection upon request. All records may be maintained and submitted in an electronic format approved by the District. [District Rules 2201 and 4702]

Section 6.2.3 requires that an operator claiming an exemption under Section 4.2 or Section 4.3 shall maintain annual operating records. The applicant is not claiming an exemption for the proposed engine under Section 4.2 or Section 4.3; therefore, this section does not apply.

Section 6.3 requires that the operator of an engine subject to the emission limits in Section 5.2 or the requirements of Section 8.2, shall comply with the compliance testing requirements of Section 6.3.

Section 6.3.1 specifies that the requirements of Section 6.3.2 through Section 6.3.4 shall apply to the following engines:

6.3.1.1 Engines that have been retrofitted with an exhaust control device, except those certified per Section 9.0;
6.3.1.2 Engines subject to Section 8.0;

6.3.1.3 An agricultural spark-ignited engine that is subject to the requirements of Section 8.0;

6.3.1.4 An agricultural spark-ignited engine that has been retrofitted with a catalytic emission control and is not subject to the requirements of Section 8.0

Section 6.3.2 requires demonstration of compliance with applicable limits, ppmv or percent reduction, in accordance with the test methods in Section 6.4, as specified below:

6.3.2.1 By the applicable date specified in Section 5.2, and at least once every 24 months thereafter, except for an engine subject to Section 6.3.2.2.

6.3.2.2 By the applicable date specified in Section 5.2 and at least once every 60 months thereafter, for an agricultural spark-ignited engine that has been retro-fitted with a catalytic emission control device.

6.3.2.3 A portable NOx analyzer may be used to show initial compliance with the applicable limits/standards in Section 5.2 for agricultural spark-ignited engines, provided the criteria specified in Sections 6.3.2.3.1 to 6.3.2.3.5 are met, and a source test is conducted in accordance with Section 6.3.2 within 12 months from the required compliance date.

The following conditions will be included the ATC permit to ensure compliance:

- Source testing to measure NOx, CO, VOC, PM10, and ammonia (NH3) emissions from this unit shall be conducted within 120 days of initial start-up. [District Rules 1081, 2201, and 4702]
- Source testing to measure NOx, CO, VOC, and ammonia (NH3) emissions from this unit shall be conducted at least once every 12 months. [District Rules 1081, 2201, and 4702]

Section 6.3.3 requires the operator to conduct emissions source testing with the engine operating either at conditions representative of normal operations or conditions specified in the Permit-to-Operate or Permit-Exempt Equipment Registration. For emissions source testing performed pursuant to Section 6.3.2 for the purpose of determining compliance with an applicable standard or numerical limitation, the arithmetic average of three (3) 30-consecutive-minute test runs shall apply. If two (2) of three (3) runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC shall be reported as methane. VOC, NO_X, and CO concentrations shall be reported in ppmv, corrected to 15 percent oxygen. For engines that comply with a percent reduction limit, the percent reduction of NO_X emissions shall also be reported.

The following conditions will be included in the ATC permit to ensure compliance:

- {3791} Emissions source testing shall be conducted with the engine operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. [District Rule 4702]
- For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC emissions shall be reported as methane. NOx, CO, VOC, and NH3 concentrations shall be reported in ppmv, corrected to 15% oxygen. [District Rules 2201 and 4702]

Section 6.3.4 requires that in addition to other information, the source test protocol shall describe which critical parameters will be measured and how the appropriate range for these parameters shall be established. The range for these parameters shall be incorporated into the I&M plan.

Section 6.3.5 specifies that engines that are limited by Permit-to-Operate or Permit-Exempt Equipment Registration condition to be fueled exclusively with PUC quality natural gas shall not be subject to the reoccurring source test requirements of Section 6.3.2 for VOC emissions. The proposed engines will be fueled on digester gas; therefore this section does not apply.

Section 6.3.6 specifies requirements for spark-ignited engines for testing a unit or units that represent a specified group of units, in lieu of compliance with the applicable requirements of Section 6.3.2. Testing of representative units is not being proposed for the engines; therefore this section does not apply.

Section 6.4 requires that the compliance with the requirements of Section 5.2 shall be determined, as required, in accordance with the listed test procedures or any other method approved by EPA and the APCO. The following conditions will be listed on the proposed ATC permit to ensure compliance:

- The following methods shall be used for source testing: NOx (ppmv) - EPA Method 7E or ARB Method 100; CO (ppmv) - EPA Method 10 or ARB Method 100; VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100; stack gas oxygen - EPA Method 3 or 3A or ARB Method 100; stack gas velocity - EPA Method 2 or EPA Method 19; stack gas moisture content - EPA Method 4; PM10 (filterable and condensable) - EPA Method 201 and 202, EPA Method 201a and 202, or ARB Method 5 in combination with 501; NH3 - BAAQMD ST-1B or SCAQMD Method 207-1. Alternative test methods as approved by the District may also be used to address the source testing requirements of this permit. [District Rules 1081 and 4702]
- Fuel sulfur content analysis shall be performed at least annually using EPA Method 11 or EPA Method 15, as appropriate. Records of the fuel sulfur analysis shall be maintained and provided to the District upon request. [District Rules 2201 and 4702]
- The Higher Heating Value (HHV) of the fuel gas shall be determined using ASTM D1826, ASTM 1945 in conjunction with ASTM D3588, or an alternative method approved by the District. [District Rules 2201 and 4702]

Section 6.5 requires that the operator of an engine that is subject to the requirements of Section 5.2 or the requirements of Section 8.0 shall submit to the APCO for approval, an Inspection & Maintenance (I&M) plan that specifies all actions to be taken to satisfy the requirements of Sections 6.5.1 through Section 6.5.9 and the requirements of Section 5.8. The actions to be identified in the I&M plan shall include, but are not limited to, the information specified below. If there is no change to the previously approved I&M plan, the operator shall submit a letter to the District indicating that previously approved plan is still valid.

Section 6.5.1 specifies that the I&M plan requirements of Sections 6.5.2 through Section 6.5.9 shall apply to the following engines:

6.5.1.1 Engines that have been retrofitted with an exhaust control device, except those certified per Section 9.0;

6.5.1.2 Engines subject to Section 8.0;
6.5.1.3 An agricultural spark-ignited engine that is subject to the requirements of Section 8.0.
6.5.1.4 An agricultural spark-ignited engine that has been retrofitted with a catalytic emission control and is not subject to the requirements of Section 8.0

Section 6.5.2 requires procedures requiring the operator to establish ranges for control equipment parameters, engine operating parameters, and engine exhaust oxygen concentrations that source testing has shown result in pollutant concentrations within the rule limits.

Section 6.5.3 requires procedures for monthly inspections as approved by the APCO. The applicable control equipment parameters and engine operating parameters will be inspected and monitored monthly in conformance with a regular inspection schedule in the I&M plan.

The applicant has proposed that the alternate monitoring program will ensure compliance with Sections 6.5.2 and 6.5.3 of the rule. Therefore, the following previously proposed condition will be listed on the proposed ATC permit to ensure compliance:

- The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every month (in which a source test is not performed) using a portable emission monitor that meets District specifications. [In-stack emission monitors may be allowed if they satisfy the standards required for portable analyzers as specified in District policies and are approved in writing by the APCO.] Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]

Section 6.5.4 requires procedures for the corrective actions on the noncompliant parameter(s) that the operator will take when an engine is found to be operating outside the acceptable range for control equipment parameters, engine operating parameters, and engine exhaust NO_X, CO, VOC, or oxygen concentrations.

Section 6.5.5 requires procedures for the operator to notify the APCO when an engine is found to be operating outside the acceptable range for control equipment parameters, engine operating parameters, and engine exhaust NO_X, CO, VOC, or oxygen concentrations.

The applicant has proposed that the alternate monitoring program will ensure compliance with these two sections of the rule. Therefore, the following condition will be listed on the proposed ATC permit to ensure compliance:

- If the NOx, CO, or NH3 concentrations, as measured by the portable analyzer or the District approved ammonia monitoring equipment, exceed the allowable emission concentration, the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours after detection. If the portable analyzer readings continue to exceed the allowable emissions concentration after 8 hours, the permittee shall notify the District within the following 1 hour, and conduct a certified source test within 60 days of the first exceedance. In lieu of conducting a source test, the permittee may stipulate a violation has

occurred, subject to enforcement action. The permittee must then correct the violation, show compliance has been re-established, and resume monitoring procedures. If the deviations are the result of a qualifying breakdown condition pursuant to Rule 1100, the permittee may fully comply with Rule 1100 in lieu of performing the notification and testing required by this condition. [District Rules 2201 and 4702]

Section 6.5.6 requires procedures for and corrective maintenance performed for the purpose of maintaining an engine in proper operating condition. The applicant has proposed that the engines will be operated and maintained per the manufacturer's specifications. Therefore, the following conditions will be listed on the proposed ATC permits:

- This engine shall be operated and maintained in proper operating condition per the manufacturer's requirements as specified in the Inspection and Monitoring (I&M) plan. [District Rule 4702]
- {3203} This engine shall be operated within the ranges that the source testing has shown result in pollution concentrations within the emissions limits as specified on this permit. [District Rule 4702]

Section 6.5.7 requires procedures and a schedule for using a portable NO_X analyzer to take NO_X emission readings pursuant to Section 5.8.9. The applicant has proposed that the alternate monitoring program will ensure compliance with this section of the rule. The following previously proposed condition will be listed on the proposed ATC permits:

- {3787} All alternate monitoring parameter emission readings shall be taken with the unit operating either at conditions representative of normal operations or conditions specified in the permit-to-operate. The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. Emission readings taken shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings, evenly spaced out over the 15 consecutive-minute period. [District Rule 4702]

Section 6.5.8 requires procedures for collecting and recording required data and other information in a form approved by the APCO including, but not limited to, data collected through the I&M plan and the monitoring systems described in Sections 5.8.1 and 5.8.2. Data collected through the I&M plan shall have retrieval capabilities as approved by the APCO. The applicant has proposed that the alternate monitoring program will ensure compliance with this section of the rule. The following condition will be listed on the proposed ATC permits to ensure compliance:

- The permittee shall maintain records of: (1) the date and time of NOx, CO, O2, and NH3 measurements, (2) the O2 concentration in percent and the measured NOx, CO, and NH3 concentrations corrected to 15% O2, (3) make and model of exhaust gas analyzer, (4) exhaust gas analyzer calibration records, (5) the method of determining the NH3 emission concentration, and (6) a description of any corrective action taken to maintain the emissions within the acceptable range. [District Rules 2201 and 4702]

Section 6.5.9 specifies procedures for revising the I&M plan. The I&M plan shall be updated to reflect any change in operation. The I&M plan shall be updated prior to any planned change in

operation. An engine operator that changes significant I&M plan elements must notify the District no later than seven days after the change and must submit an updated I&M plan to the APCO no later than 14 days after the change for approval. The date and time of the change to the I&M plan shall be recorded in the engine operating log. For new engines and modifications to existing engines, the I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit-to-Operate or Permit-Exempt Equipment Registration. The operator of an engine may request a change to the I&M plan at any time. The applicant has proposed to comply with the I&M plan modification requirements per this section of the rule. The following condition will be listed on the proposed ATC permit to ensure compliance:

- {3212} The permittee shall update the I&M plan for this engine prior to any planned change in operation. The permittee must notify the District no later than seven days after changing the I&M plan and must submit an updated I&M plan to the APCO for approval no later than 14 days after the change. The date and time of the change to the I&M plan shall be recorded in the engine's operating log. For modifications, the revised I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit to Operate. The permittee may request a change to the I&M plan at any time. [District Rule 4702]

Section 7.0 specifies the schedules for compliance with the general requirements of Section 5.0 and the Alternative Emission Control Plan (AECP) option of Section 8.0. The proposed IC engines will be required to comply with the applicable sections of District Rule 4702 upon initial startup of the equipment; therefore, compliance with this section is expected.

Section 8.0 specifies requirements for use of an Alternative Emission Control Plan (AECP) to comply with the NO_X emission requirements of Section 5.2 for a group of engines. The use of an Alternate Emission Control Plan to comply with Section 5.2 is not being proposed for the IC engine proposed under this project; therefore this section of the rule is not applicable.

Section 9.0 specifies requirements for certification of exhaust control systems for compliance with District Rule 4702. Certification under this section for the exhaust control systems for the IC engine under this project is not currently being proposed and, in addition, certification under this section of the rule would require that the engines or identical units with the same fuel supply and exhaust control systems were operating and could be source tested to demonstrate compliance with the applicable limits; therefore this section of the rule is not applicable at this time.

Conclusion

As shown above, the proposed non-agricultural, digester gas-fired, lean burn, IC engines will satisfy all the requirements of Rule 4702. Therefore, the engines will be in compliance as of the date of initial operation and no further discussion is required.

Rule 4801 – Sulfur Compounds

The purpose of this District Rule 4801 is to limit the emissions of sulfur compounds. The limit is that sulfur compound emissions (as SO_2) shall not exceed 0.2% by volume. Using the ideal gas equation, the sulfur compound emissions are calculated as follows:

Volume of SO_X as (SO_2) = (n x R x T) ÷ P

Where:

n = moles SO_X

T (standard temperature) = 60 °F or 520 °R

R (universal gas constant) = $\frac{10.73\,\text{psi}\cdot\text{ft}^3}{\text{lb}\cdot\text{mol}\cdot{}^\circ\text{R}}$

$$0.0113 \quad \frac{lb}{MMBtu}\times\frac{1\,MMBtu}{9{,}100 scf_{exhaust}}\times\frac{1\,lb\cdot mol}{64\,lb\cdot SO_2}\times\frac{10.73\,psi\cdot ft^3}{lb\cdot mol\cdot{}^\circ R}\times\frac{520{}^\circ R}{14.7\,psi}\times 1{,}000{,}000\,ppm = \quad 7.4 \quad \text{ppmv}$$

Since 7.4 ppmv is ≤ 2000 ppmv, the engines are expected to comply with Rule 4801. The following condition will be placed on the ATC permits to ensure compliance:

- The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H2S. The District may approve an averaging period of up to one calendar day in length for demonstration of compliance with the fuel sulfur content limit. [District Rules 2201, 4702, and 4801]

40 CFR 60 Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

This rule incorporates the New Source Performance Standards (NSPS) from Part 60, Chapter 1, Title 40, Code of Federal Regulations (CFR); and applies to all new sources of air pollution and modifications of existing sources of air pollution listed in 40 CFR Part 60.

The purpose of 40 CFR 60 Subpart JJJJ is to establish New Source Performance Standards to reduce emissions of NO_X, SO_X, PM, CO, and VOC from new stationary spark ignition (SI) internal combustion (IC) engines.

Pursuant to Section 60.4230, compliance with this subpart is required for owners and operators of stationary SI IC engines that commence construction after June 12, 2006, where the stationary SI ICE are manufactured: (a) on or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP); (b) on or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP; (c) on or after July 1, 2008, for engines with a maximum engine power less than 500 HP; or (d) on or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 HP).

The proposed engines are 1,412 bhp SI ICEs that will be constructed after June 12, 2006 and manufactured after July 1, 2007; therefore, the engines are subject to this subpart. However, the District has not been delegated the authority to implement 40 CFR 60, Subpart JJJJ for non-Major Sources; therefore, the requirements from this subpart will not be included in the ATC permits.

40 CFR 63 Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Stationary Internal Combustion Engines

40 CFR 63 Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAPs) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. A major source of HAP emissions is a facility that has the potential to emit any single HAP at a rate of 10 tons/year or greater or any combinations of HAPs at a rate of 25 tons/year or greater. An area source of HAPs is a facility is not a major source of HAPs.

Pursuant to Section 63.6590(c), an affected source that is a new or reconstructed stationary Reciprocating Internal Combustion Engine (RICE) located at an area source must meet the requirements of 40 CFR 63, Subpart ZZZZ by meeting the requirements of 40 CFR 60, Subpart IIII, for compression ignition engines or 40 CFR 60, Subpart JJJJ, for spark ignition engines and no further requirements apply for such engines under this part. As with 40 CFR 60, Subpart JJJJ, the District has not been delegated the authority to implement 40 CFR 63, Subpart ZZZZ for non-Major Sources; therefore, no requirements from this subpart will be included in the ATC permits.

California Health & Safety Code 42301.6 (School Notice)

The District has verified that this site is not located within 1,000 feet of a school. Therefore, pursuant to California Health and Safety Code 42301.6, a school notice is not required.

California Environmental Quality Act (CEQA)

CEQA requires each public agency to adopt objectives, criteria, and specific procedures consistent with CEQA Statutes and the CEQA Guidelines for administering its responsibilities under CEQA, including the orderly evaluation of projects and preparation of environmental documents. The District adopted its *Environmental Review Guidelines* (ERG) in 2001. The basic purposes of CEQA are to:

- Inform governmental decision-makers and the public about the potential, significant environmental effects of proposed activities;
- Identify the ways that environmental damage can be avoided or significantly reduced;
- Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible; and
- Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

Greenhouse Gas (GHG) Significance Determination

It is determined that no other agency has or will prepare an environmental review document for the project. Thus the District is the Lead Agency for this project.

The proposed project is for construction of a renewable energy plant at an existing dairy facility. The proposed renewable energy plant will combust dairy digester gas in I.C.

engines to produce electricity. The proposed project will involve diverting manure from existing open basins at the dairy to covered lagoon digesters, which will result in the capture of much of the methane that is currently released into the atmosphere from the open basins and pond at the dairy. Combustion of the dairy digester gas at the proposed renewable energy plant will oxidize the methane in the gas to carbon dioxide and water vapor. Because methane has a global warming potential at least 21 times that of carbon dioxide, combustion of the methane from the dairy digesters will result in a large net decrease in the global warming potential emitted from the dairy when compared to current levels. Therefore, the project will not result in an increase in project specific greenhouse gas emissions. The District therefore concludes that the project would have a less than cumulatively significant impact on global climate change.

District CEQA Findings

The District is the Lead Agency for this project because there is no other agency with broader statutory authority over this project. The District performed an Engineering Evaluation (this document) for the proposed project and determined that, although the project is considered to take place at a separate stationary source for NSR purposes, the activity will occur on previously developed land at an existing dairy facility and the project involves negligible expansion of the existing use. Furthermore, the District determined that the activity will not have a significant effect on the environment. The District finds that the activity is categorically exempt from the provisions of CEQA pursuant to CEQA Guideline § 15301 (Existing Facilities), and finds that the project is exempt per the general rule that CEQA applies only to projects which have the potential for causing a significant effect on the environment (CEQA Guidelines §15061(b)(3)).

In order to ensure that issuance of these permits does not conflict with any conditions imposed by any local agency permit process, the following permit condition will be included on each permit.

- This permit does not authorize the violation of any conditions established for this facility (e.g. maximum number of animals or animal units, construction requirements, etc.) in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful NSR Public Noticing period, issue ATC S-8596-1-0, -2-0, and -3-0 subject to the permit conditions on the attached draft ATC in Appendix D.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
S-8367-1-0	3020-05-G	Covered Lagoon Digester	$111.00
S-8367-2-0	3020-10-F	1,412 bhp IC engine	$785.00
S-8367-3-0	3020-10-F	1,412 bhp IC engine	$785.00

Appendixes

A: Quarterly Net Emissions Change (QNEC)
B: BACT Analysis for the Digester Gas-Fired IC Engines
C: Summary of Health Risk Assessment (HRA) and Ambient Air Quality Analysis (AAQA)
D: Draft ATCs (S-8367-1-0, -2-0, & -3-0)

APPENDIX A
Quarterly Net Emissions Change (QNEC)

Quarterly Net Emissions Change (QNEC)

The Quarterly Net Emissions Change is used to complete the emission profile screen for the District's PAS database. The QNEC shall be calculated as follows:

QNEC = PE2 - PE1, where:

QNEC = Quarterly Net Emissions Change for each emissions unit, lb/qtr.
PE2 = Post Project Potential to Emit for each emissions unit, lb/qtr.
PE1 = Pre-Project Potential to Emit for each emissions unit, lb/qtr.

Using the values in Sections VII.C.2 and VII.C.6 in the evaluation above, quarterly PE2 and quarterly PE1 can be calculated as follows:

S-8596-1-0 (Digester System)

BE (lb/qtr) S-8596-1-0					
	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0

PE2 (lb/qtr) S-8596-1-0					
	PE2 (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0

Quarterly NEC [QNEC] S-8596-1-0					
	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	0.0	-	0.0	=	0.0

S-8596-2-0 & -3-0 (1,412 bhp Digester Gas-Fired, Lean Burn, IC engines)

BE (lb/qtr) S-8596-2-0 & -3-0					
	BE (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0

PE2 (lb/qtr) S-8596-2-0 & -3-0					
	PE2 (lb/year)	÷	4 qtr/year	=	BE (lb/qtr)
NO_X	4,408	÷	4 qtr/year	=	1,102.0
SO_X	1,091	÷	4 qtr/year	=	272.8
PM_{10}	1,909	÷	4 qtr/year	=	477.3
CO	48,880	÷	4 qtr/year	=	12,220.0
VOC	3,064	÷	4 qtr/year	=	766.0

Quarterly NEC [QNEC] S-8596-2-0 & -3-0					
	PE2 (lb/qtr)	-	BE (lb/qtr)	=	NEC (lb/qtr)
NO_X	1,102.0	-	0.0	=	1,102.0
SO_X	272.8	-	0.0	=	272.8
PM_{10}	477.3	-	0.0	=	477.3
CO	12,220.0	-	0.0	=	12,220.0
VOC	766.0	-	0.0	=	766.0

APPENDIX B

BACT Analysis for Digester Gas-Fired IC Engines

SJVAPCD
Best Available Control Technology (BACT) Guideline 3.3.15*
Last Update: 9/14/2013

Waste Gas-Fired IC Engine**

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
NO_X	0.15 g/bhp-hr (lean-burn engine with SCR, rich-burn engine with 3-way catalyst, or other equivalent)		1. Fuel Cells (<0.05 lb/MW-hr) 2. Microturbines (<9 ppmv @ 15% O_2) 3. Gas Turbine (<9 ppmv @ 15% O_2) *(Note: gas turbines only ABE for projects ≥ 3 MW)*
SO_X	Sulfur content of fuel gas ≤ 40 ppmv (as H_2S) (dry absorption, wet absorption, chemical H_2S reduction, water scrubber, or equivalent) (may be averaged up to 24 hours for compliance)		
PM_{10}	Sulfur content of fuel gas ≤ 40 ppmv (as H_2S)		
CO	2.0 g/bhp-hr		1. Fuel Cells (<0.10 lb/MW-hr) 2. Microturbines (<60 ppmv @ 15% O_2) 3. Gas Turbine (<60 ppmv @ 15% O_2) *(Note: gas turbines only ABE for projects ≥ 3 MW)*
VOC	0.10 g/bhp-hr (lean burn and positive crankcase ventilation (PCV) or a 90% efficient crankcase control device or equivalent)		Fuel Cells (<0.02 lb-VOC/MW-hr as CH_4)
Ammonia (NH_3) Slip	≤ 10 ppmv @ 15% O_2		

*** For the purposes of this determination, waste gas is a gas produced from the digestion of material excluding municipal sources such as waste water treatment plants, landfills, or any source where siloxane impurities are a concern.*

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source**

3.3.15

Current District BACT Guideline 3.3.15 applies to the proposed waste gas-fired IC engines.

BACT is triggered for NOx, SOx, PM10, VOC, and NH3, as detailed in the following table:

New Emissions Unit BACT Applicability for S-8596-2-0 & -3-0 After Commissioning				
Pollutant	PE2 for each unit after commissioning (lb/day)	BACT Threshold (lb/day)	SSPE2 (lb/yr)	BACT Triggered?
NO_X	11.2	> 2.0	N/A	**Yes**
SO_X	3.0	> 2.0	N/A	**Yes**
PM_{10}	5.2	> 2.0	N/A	**Yes**
CO	130.7	> 2.0 and SSPE2 ≥ 200,000 lb/yr	146,640	No
VOC	7.5	> 2.0	N/A	**Yes**
NH_3	3.7	> 2.0	N/A	**Yes**

* BACT is not required for CO from a new or modified emissions unit at a Stationary Source with an SSPE2 of less than 200,000 pounds per year of CO.

1. BACT Analysis for NO_X Emissions:

a. Step 1 - List all control technologies

District BACT Guideline 3.3.15 lists the following options to reduce NO_X emissions from waste gas-fired IC engines:

1) NO_X emissions ≤ 0.15 g/bhp-hr (lean-burn engine with SCR, rich-burn engine with 3-way catalyst, or other equivalent) (Achieved in Practice)
2) Fuel Cell (≤ 0.05 lb/MW-hr) (Alternate Basic Equipment)
3) Microturbine (< 9 ppmv NO_X @ 15% O_2) (Alternate Basic Equipment)
4) Waste Gas Turbine (< 9 ppmv NO_X @ 15% O_2) (Alternate Basic Equipment)

b. Step 2 - Eliminate technologically infeasible options

Option 4 - Waste Gas Turbine (≤ 9 ppmv NO_X @ 15% O_2) (Alternate Basic Equipment)

Option 4, waste gas-fired turbine, is not a technologically feasible option for this project. The available information indicates that the principal suppliers of gas turbines (Solar Turbines, Allison, and General Electric) do not currently produce or market waste gas-fired gas turbines rated less than 3 MW since this size range is generally covered by other generation technologies such as reciprocating IC engines and microturbines. The proposed project would require a gas turbine rated 1200 kW, which is below the range that is currently being marketed by turbine manufacturers; therefore, gas turbines are not considered feasible for this particular project and will be eliminated from consideration at this time.

c. Step 3 - Rank remaining options by control effectiveness

The following options are ranked based on their emission factor:

1. Fuel Cells (< 0.05 lb/MW-hr)
2. Microturbines (<9 ppmv @ 15% O_2)
3. 0.15 g/bhp-hr (lean burn engine with SCR, rich burn engine with 4-way catalyst)

d. Step 4 - Cost Effectiveness Analysis

Pursuant to Section IX.D of District Policy APR 1305 – BACT Policy, a cost effectiveness analysis is required for the options that have not been determined to be achieved in practice.

Option 1: Fuel Cells (<0.05 lb/MW-hr):

Since Fuel Cells reduce NO_X and VOC emissions in comparison to a reciprocating IC engine, a Multi-Pollutant Cost Effectiveness Threshold (MCET) will be used to determine if this option is cost-effective. In addition, since fuel cells are listed as an alternate basic equipment control option, the MCET value will be compared to the annualized cost difference of the fuel cells and the proposed IC engine, without controls.

$(Cost_{Alt} - Cost_{Basic})$ compared to MCET

Where:

$Cost_{Alt}$ = the equivalent annual capital cost of the alternate basic equipment plus its annual operating cost

$Cost_{Basic}$ = the equivalent annual capital cost of the proposed basic equipment, without BACT, plus its annual operating cost

MCET = the sum of the NOx emissions reduced multiplied by the District's NO_X cost effectiveness threshold plus the VOC emissions reduced multiplied by the District's VOC cost effectiveness threshold.

$COST_{Alt}$:

Capital Cost:

The purchase and installation costs for fuel cells will be estimated using data from the Environmental Protection Agency's (EPA's) Catalog of Combined Heat and Power Technologies Catalog, Section 6, Table 6-4, dated March 2015.

Interpolating the data from Table 5-2, the cost to purchase and install a 1,200 kW fuel cell can be determined as follows:

400 kW unit = $7,000/kW (total installed cost)
1,400 kW unit = $4,600/kW (total installed cost)

Using Linear Interpolation, for an 1,000 kW fuel cell results in the following:

1,000 kW unit = $5,560/kW (total installed cost)

Therefore, the total capital cost would be:

1,000 kW unit x $5,560 kW = $5,560,000

Pursuant to the District BACT Policy APR 1305, section X., the annualized capital cost of the microturbine will be calculated as follows. The capital cost will be spread over the expected life of the engines which is estimated at 10 years and using the capital recovery equation (Equation 1). A 10% interest rate is assumed in the equation and the assumption will be made that the equation has no salvage value at the end of the ten-year cycle.

Equation 1: $A = [P * i(I+1)^n]/[(I+1)^n-1]$
Where: A = Annual Cost
P = Present Value
I = Interest Rate (10%)
N = Equipment Life (10 years)

$A = [\$5,560,000 * 0.1 * (1.1)^{10}]/[(1.1)^{10}-1]$
= **$904,864/year**

Operation and Maintenance Costs

The typical operation and maintenance costs for a fuel cell was taken from EPA's Combined Heat and Power Technologies Catalog, Section 6, Table 6-4, dated March 2015.

Interpolating the data from Table 5-2, the cost to purchase and install a 1,000 kW fuel cell can be determined as follows:

400 kW unit = $36/MW-hr
1,400 kW unit = $40/MW-hr

Using Linear Interpolation, for an 1,000 kW fuel cell operation and maintenance costs results in the following:

1,000 kW unit = $36/MW-hr (total installed cost)

Therefore, the total operation and maintenance cost would be:

1,000 kW unit x $ 37.6/MW-hr x 8,760 hrs/year x 1 MW/1,000 kW

Op and Maint Costs = $329,376

$COST_{Alt}$ = Annualized Capital Cost + Annual Op and Maint Costs
$COST_{Alt}$ = $904,864 + $329,376

$COST_{Alt}$ = $1,234,240

$COST_{Basic}$:

Capital Cost:

The purchase and installation cost (total capital cost) of a 1,215 bhp IC engine was received from Daryl Maas of Maas Energy, September 11, 2015. The capital cost of that IC engine, without any controls, was estimated at $700,000. Applying the rule of six-tenths would escalate the cost to a 1,412 hp engine as follows:

$$\text{Total Capital Cost}_{1,412} = \$700,000 * (1,412/1,215)^{0.6}$$
$$= \$766,043$$

Pursuant to the District BACT Policy APR 1305, Section X. (Revised 4/18/95), the annual cost of installing and maintaining the engines will be calculated as follows. The installation cost will be spread over the expected life of the engines which is estimated at 10 years and using the capital recovery equation (Equation 1). A 10% interest rate is assumed in the equation and the assumption will be made that the equation has no salvage value at the end of the ten-year cycle.

Equation 1: $A = [P * i(I+1)^n]/[(I+1)^n-1]$

Where:
A = Annual Cost
P = Present Value
I = Interest Rate (10%)
N = Equipment Life (10 years)

$A = [\$766,043 * 0.1 * (1.1)^{10}]/[(1.1)^{10}-1]$
= $124,670/year

Annual Operation and Maintenance Cost

The typical operation and maintenance costs for an IC engine was taken from EPA's Catalog of Combined Heat and Power Technologies Catalog, Section 2, Table 2-6, dated March 2015. The average operation and maintenance costs of an IC engine, without any controls, is estimated as follows:

Total Operation and Maintenance Costs: $0.020/kW-hr

The rating of the proposed generator set is 1,000 kW. Therefore, the total annual operation and maintenance costs can be determined as follows:

Annual Op and Maint Costs = EF x Rating x Operation
Annual Op and Maint Costs = $0.020 / kW-hr x 1,000 kW x 8,760 hr/year

Op and Maint Costs = $175,200/year

$COST_{Basic}$ = Annualized Capital Cost + Annual Op and Maint Costs
$COST_{Basic}$ = $124,670/year + $175,200/year
$COST_{Basic}$ = $299,870/year

Emission Reductions:

NO_X and VOC Emission Factors:

Pursuant to the District's Revised BACT Cost Effectiveness Thresholds Memo (5/14/08), District Standard Emissions that will be used to calculate the emission reductions from alternative equipment.

The District Standard Emissions for NOx emissions from the engines will be based on the emission limit for the non-controlled emissions occurring during the Commissioning period, as previously detailed in the Section VII.B, above

The following emissions factors will be used for the cost analysis:

District Standard Emissions: 0.2540 lb-NO_X/MMBtu (65 ppmv NO_X @ 15% O_2) and 1.0 g/bhp-hr

Emissions from Fuel Cells as Alternative Equipment: 0.05 lb-NO_X/MW-hr and 0.02 lb-VOC/MW-hr as CH_4

Emission Reductions:

NO_X Emission Reductions:

Fuel Cell Emissions:

In accordance with BACT Guideline 3.3.15, the fuel cells should be capable of achieving NO_X emissions down to 0.05 lb/MW-hr. For an 800 kW generator, a fuel cell should generate potential NO_X emissions as follows:

$Emissions_{Fuel\ Cell}$: EF (lb/MW-hr) x Rating (kW) x Operation (hr/yr) x (1 MW/1,000 kW)
$Emissions_{Fuel\ Cell}$: 0.05 lb/MW-hr x 1,000 (kW) x 8,760 (hr/yr) x (1 MW/1,000 kW)

$Emissions_{Fuel\ Cell}$: 438 lb-NO_X/year

IC Engine Emissions:

In accordance with information provided by the applicant, the uncontrolled NO_X emission rate from the proposed digester gas fired IC engine, without the SCR system, during commissioning, is as follows:

Emission Factor = 1.0 grams/bhp-hr
Engine Rating = 1,412 bhp
Operating Hours = 8,760 hours/year

$Emissions_{Engine}$: (EF x bhp x Operation) / 453.6 grams/lb
$Emissions_{Engine}$: 1.0 grams/bhp-hr x 1,412 bhp x 8,760 hours/year x lb/453.6 grams

$Emissions_{Engine}$ = 27,269 lb/year

Therefore, the total amount of NO_X emissions reduced from using a fuel cell versus an IC engine can be determined as follows:

NO_X Emissions Reduced = $Emissions_{Engine}$ (lb/yr) – $Emissions_{Fuel\ Cell}$ (lb/yr)
NO_X Emissions Reduced = 27,269 lb/year – 438 lb/year

NO_X Emissions Reduced = 26,831 lb/year = 13.4 tons/year

VOC Emission Reductions:

Fuel Cell Emissions:

In accordance with BACT Guideline 3.3.15, the fuel cells should be capable of achieving NO_X emissions down to 0.02 lb/MW-hr. For an 1,200 kW generator, a fuel cell should generate potential NO_X emissions as follows:

$Emissions_{Fuel\ Cell}$: EF (lb/MW-hr) x Rating (kW) x Operation (hr/yr) x (1 MW/1,000 kW)
$Emissions_{Fuel\ Cell}$: 0.02 lb/MW-hr x 1,000 (kW) x 8,760 (hr/yr) x (1 MW/1,000 kW)

$Emissions_{Fuel\ Cell}$: 175 lb-VOC/year

IC Engine Emissions:

In accordance with information provided by the applicant, the uncontrolled NO_X emission rate from the proposed digester gas fired IC engine, without the SCR system, during commissioning is:

Emission Factor = 1.0 grams-VOC/bhp-hr
Engine Rating = 1,412 bhp
Operating Hours = 8,760 hours/year

$Emissions_{Engine}$: (EF x bhp x Operation) / 453.6 grams/lb
$Emissions_{Engine}$: 1.0 grams/bhp-hr x 1,412 bhp x 8,760 hours/year x lb/453.6 grams

$Emissions_{Engine}$ = 27,269 lb-VOC/year

Therefore, the total amount of VOC emissions reduced from using a fuel cell versus an IC engine can be determined as follows:

VOC Emissions Reduced = $Emissions_{Engine}$ (lb/yr) – $Emissions_{Fuel\ Cell}$ (lb/yr)
VOC Emissions Reduced = 27,269 lb/year – 175 lb-VOC/year
VOC Emissions Reduced = 27,094 lb/year = 13.5 tons-VOC/year

Multi-Pollutant Cost Effective Threshold (MCET):

MCET = [NO_X Emissions Reduced (ton/year) x NO_X Cost Threshold ($/ton)] + [VOC Emissions Reduced (ton/year) x VOC Cost Threshold ($/ton)]
MCET = [13.4 (ton/year) x 24,500 ($/ton)] + [13.5 (ton/year) x 17,500 ($/ton)]
MCET = $564,550/year

Cost Effectiveness:

Comparing the MCET to the difference in the annual capital cost of utilizing fuel cells versus an IC engine is as follows:

($COST_{Alt}$ – $COST_{Basic}$) versus MCET
($1,234,240 - $299,870) versus $564,550/year
$934,370/year versus $564,550/year

Since the annualized cost difference to install fuel cells in place of an IC engine is greater than the annual cost associated with the potential NO_X and VOC emission reductions from this technology, fuel cells are therefore not cost effective and are being removed from consideration at this time.

Option 2. Microturbines (9 ppmvd NO_X @ 15% O_2):

Per District BACT Policy APR 1305, the cost effectiveness of an Alternate Basic Equipment control option shall be performed using the following equation:

$$\mathbf{CE_{alt} = (Cost_{Alt} - Cost_{Basic}) \div (Emission_{Basic} - Emission_{Alt})}$$

Where:

CE_{Alt} = the cost effectiveness of alternate basic equipment expressed as dollars per ton of emissions reduced

$Cost_{Alt}$ = the equivalent annual capital cost of the alternate basic equipment plus its annual operating cost

$Cost_{Basic}$ = the equivalent annual capital cost of the proposed basic equipment, without BACT, plus its annual operating cost

$Emission_{Basic}$ = the emissions from the proposed basic equipment, without BACT

$Emission_{Alt}$ = the emissions from the alternate basic equipment

$COST_{Alt}$:

Capital Cost:

The purchase and installation costs for a microturbine will be estimated using data from the Environmental Protection Agency's (EPA's) Catalog of Combined Heat and Power Technologies Catalog, Section 5, dated March 2015.

Using data from Table 5-2, the cost for a 1,000 kW unit = $2,500/kW (total installed cost).

Using data from Table 5-2, the amount of heat input it takes to produce 1,000 kW of electricity for nominally rated natural gas fired microturbines is as follows:

1000 kW unit = 12.155 MMBtu/hr => 0.0121 MMBtu/kW

The data in Table 5-2 only represents natural gas fired units. Due to the differences in the heating value of natural gas and digester gas, the 800 kW digester gas fired electrical generating unit proposed in this project would equate to the following size natural gas fired electrical generating unit, assuming the same total volume of fuel is used:

$Heat\ Input_{DG}$ = Input (MMBtu/kW) x (1 scf / 1,000 Btu_{NG}) x (700 Btu_{DG} / 1 scf)
$Heat\ Input_{DG}$ = 0.0121 $MMBtu_{NG}$/kW x 1 scf/1,000 Btu_{NG} x 700 Btu_{DG}/1 scf

$Heat\ Input_{DG}$ = 0.00847 MMBtu/kW

The ratio of the heat input required to produce the same amount of electricity for digester gas compared to natural gas is as follows:

0.00847 MMBtu/kW / 0.0121 MMBtu/kW = 0.7

Therefore, for an identical volume gas, you will generate more electricity with natural gas over digester gas. An equivalent natural gas generator to a 1,000 kW digester gas fired microturbine generator can be determined as follows:

1,000 kW = $Generator_{NG}$ x 0.7
$Generator_{NG}$ = 1,000 kW / 0.7

$Generator_{NG}$ = 1,429 kW

Therefore, for the purposes of comparing similar units in this cost analysis to the units given in EPA's CHP catalog, it will be considered that the 1,000 kW digester gas fired generator would equate to a 1,429 kW natural gas fired microturbine generator.

Total Capital Cost $_{1,412}$ = $2,500/kW * 1,429kW
= $3,572,500

Pursuant to the District BACT Policy APR 1305, Section X, the annualized capital cost of the microturbine will be calculated as follows. The capital cost will be spread over the expected life of the engines which is estimated at 10 years and using the capital recovery equation (Equation 1). A 10% interest rate is assumed in the equation and the assumption will be made that the equation has no salvage value at the end of the ten-year cycle.

Equation 1: $A = [P * i(I+1)^n]/[(I+1)^n-1]$
Where: A = Annual Cost
P = Present Value
I = Interest Rate (10%)
N = Equipment Life (10 years)

$A = [\$3,572,500 * 0.1 * (1.1)^{10}]/[(1.1)^{10}-1]$
= **$581,408/year**

Operation and Maintenance Costs

The typical operation and maintenance costs for a microturbine was taken from EPA's Combined Heat and Power Technologies Catalog, Section 5, Table 5-5, dated March 2015. The average operation and maintenance costs of a microturbine are estimated as follows:

Total Operation and Maintenance Costs: $0.012/kW-hr

The rating of the proposed generator set is 1,429 kW. Therefore, the total annual operation and maintenance costs can be determined as follows:

Annual Op and Maint Costs = EF x Rating x Operation
Annual Op and Maint Costs = $0.012 / kW-hr x 1,429 kW x 8,760 hr/year

Op and Maint Costs = $150,216

$COST_{Alt}$ = Annualized Capital Cost + Annual Op and Maint Costs
$COST_{Alt}$ = $581,408 + $150,216

$COST_{Alt}$ = $731,624/year

$COST_{Basic}$:

Capital Cost:

The costs for the basic engine generator set were calculated in Option 1 as:
$COST_{Basic}$ = $299,870/year

$Emission_{Basic}$:

In accordance with information provided by the Dresser-Rand/Guascor, the engine manufacturer, the uncontrolled NO_X emission rate from the proposed digester gas fired IC engine, without the SCR system, is as follows:

Emission Factor = 1.0 grams/bhp-hr
Engine Rating = 1,215 bhp
Operating Hours = 8,760 hours/year

$Emissions_{Basic}$: (EF x bhp x Operation) / 453.6 grams/lb
$Emissions_{Basic}$: 1.0 grams/bhp-hr x 1,215 bhp x 8,760 hours/year x lb/453.6 grams

$Emissions_{Basic}$ = 23,464 lb/year

$Emissions_{Alt}$:

The emissions from microturbine(s) operating at 9 ppmvd NO_X @ 15% O_2 are as follows:

Emission Factor = 0.126 grams/hp-hr (9 ppmv @ 15% O_2)
Equivalent Microturbine Rating = 1,429 bhp
Operating Hours = 8,760 hours/year

$Emissions_{Basic}$: (EF x bhp x Operation) / 453.6 grams/lb
$Emissions_{Basic}$: 0.126 grams/bhp-hr x 1,429 bhp x 8,760 hours/year x lb/453.6 grams

$Emissions_{Alt}$ = 3,477 lb/year

Cost Effectiveness:

Therefore, the cost effectiveness of installing a natural gas fired turbine operating with NO_X emissions of 2 ppmvd @ 15% O_2 can be determined as follows:

$CE_{Alt} = (Cost_{Alt} - Cost_{Basic}) \div (Emission_{Basic} - Emission_{Alt})$

$CE_{Alt} = [(\$731,624/yr - \$299,870/yr) \div (23,464\ lb/yr - 3,477\ lb/yr)] \times 2,000\ lb/ton$

CE_{alt} = $43,203/ton

The cost of NO_X reduction utilizing a microturbine with an emission concentration of 9 ppmvd @ 15% O_2 would be greater than the $24,500/ton cost effectiveness threshold of the District BACT policy. The equipment is therefore not cost effective and is being removed from consideration at this time.

Option 3: NO_X emissions ≤ 0.15 g/bhp-hr (lean-burn engine with SCR, rich-burn engine with 3-way catalyst, or other equivalent) (Achieved in Practice)

This option is achieved practice and has been proposed by the applicant; therefore a cost analysis is not required.

e. Step 5 - Select BACT

Pursuant to the above BACT Analysis, BACT for the Digester Gas-fired Engines must be satisfied with the following: NO_X: NO_X emissions to ≤ 0.15 g/bhp-hr

The applicant has proposed to apply SCR systems to the digester gas-fired lean burn IC engines to reduce NO_X emissions to ≤ 0.15 g/bhp-hr. Therefore, the BACT requirements are satisfied.

2. BACT Analysis for SO_X Emissions:

a. Step 1 - Identify all control technologies

The following options were identified to reduce SO_X emissions from the proposed engine:

1) Sulfur Content of fuel gas not exceeding 40 ppmv H_2S (Achieved in Practice/Contained in SIP)

There are no options listed in the SJVUAPCD BACT Clearinghouse as alternate basic equipment.

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from step 1.

c. Step 3 - Rank remaining options by control effectiveness

There is only one option so ranking is not necessary.

d. Step 4 - Cost Effectiveness Analysis

The only option above is achieved practice and has been proposed by the applicant; therefore a cost analysis is not required.

e. Step 5 - Select BACT

Pursuant to the above BACT Analysis, BACT for SO_X emissions from the proposed engines is fuel gas sulfur content not exceeding 40 ppmv H_2S. The applicant has proposed to use a biological sulfur removal system and carbon canister scrubbers (or an equivalent sulfur removal system) to reduce the sulfur content of the digester gas

combusted in the engines to ≤ 40 ppmv as H_2S. Therefore, the BACT requirements for SO_X are satisfied.

3. BACT Analysis for PM_{10} Emissions:

a. Step 1 - Identify all control technologies

Combustion of gaseous fuels generally does not result in significant emissions of particulate matter. Dairy anaerobic digester gas is the planned fuel for the proposed IC engines. The anaerobic digester gas will be composed primarily of methane (approximately 60% molar composition) and CO_2 (approximately 40% molar composition) and is expected to burn in a fairly clean manner. Particulate emissions from combustion of the digester gas are expected to primarily result from the incineration of fuel-born sulfur compounds (mostly H_2S) resulting in the formation of sulfur-containing particulate. Therefore, scrubbing of the digester gas is the principal means to reduce particulate emissions.

The following control was identified to reduce particulate matter emissions from combustion of the digester gas as fuel in the proposed engines:

1) Sulfur Content of fuel ≤ 40 ppmv H_2S (Achieved in Practice/Contained in SIP)

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from step 1.

c. Step 3 - Rank remaining options by control effectiveness

There is only one option so ranking is not necessary.

d. Step 4 - Cost Effectiveness Analysis

The only option listed above has been identified as achieved in practice. Therefore, the option required and is not subject to a cost analysis.

e. Step 5 - Select BACT

Pursuant to the above BACT Analysis, BACT for PM_{10} emissions from the proposed engines is fuel gas sulfur content not exceeding 40 ppmv H_2S. The applicant has proposed to use a biological sulfur removal system and carbon canister scrubbers (or an equivalent sulfur removal system) to reduce the sulfur content of the digester gas combusted in the engines to ≤ 40 ppmv as H_2S. Therefore, the BACT requirements for SO_X are satisfied.

4. BACT Analysis for VOC Emissions:

a. Step 1 - Identify all control technologies

The following options were identified to reduce VOC emissions:

1) VOC emissions ≤ 0.10 g/bhp-hr (lean burn or equivalent and positive crankcase ventilation) (Achieved in Practice)
2) Fuel Cell (≤ 0.02 lb/MW-hr) (Alternate Basic Equipment)

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from step 1.

c. Step 3 - Rank remaining options by control effectiveness

1) Fuel Cell (≤ 0.02 lb/MW-hr) (Alternate Basic Equipment)
2) VOC emissions ≤ 0.10 g/bhp-hr (Achieved in Practice)

d. Step 4 - Cost Effectiveness Analysis

Option 1: Fuel Cell (≤ 0.02 lb/MW-hr VOC as CH_4) (Alternate Basic Equipment)

The multi-pollutant cost analysis performed above for the NO_X and VOC emissions demonstrated that the annualized cost of this alternate option exceeds the Multi Pollutant Cost Effectiveness Threshold calculated for the NO_X and VOC emission reductions achieved by this technology. Therefore, this option is not cost effective and is being removed from consideration.

Option 2: VOC emissions ≤ 0.10 g/bhp-hr (Achieved in Practice)

This has been identified as achieved in practice and has been proposed by the applicant. Therefore, the option required and is not subject to a cost analysis.

e. Step 5 - Select BACT

Pursuant to the above BACT Analysis, BACT for VOC emissions from the proposed engines is VOC emissions ≤ 0.10 g/bhp-hr. The applicant has proposed IC engines with VOC emissions ≤ 0.10 g/bhp-hr. Therefore, the BACT requirements for VOC are satisfied.

5. BACT Analysis for NH_3 Slip Emissions:

A Selective Catalytic Reduction (SCR) system operates as an external control device where flue gases and a reagent (e.g. urea or ammonia) are passed through an appropriate catalyst. The reagent is used to reduce NO_X, over the catalyst bed, to form elemental nitrogen and other by-products. The use of a catalyst typically reduces the NO_X emissions by up to 90%. Ammonia slip is the result of unreacted ammonia exiting the SCR system.

a. Step 1 - Identify all control technologies

The District has not established a cost effectiveness threshold for ammonia. Therefore, only options that are determined to be Achieved-in-Practice controls will be considered for ammonia in this analysis.

The SCAQMD BACT Clearinghouse for non-major polluting facilities contains a BACT Guideline for stationary, non-emergency IC engines that lists an ammonia slip emission limit of 10 ppmvd @ 15% O_2. The available source test and monitoring information for waste gas-fired engines controlled by SCR indicate compliance with this limit. Therefore, this option is considered Achieved in Practice and will be listed as the Achieved in Practice BACT requirement for waste gas-fired IC engines in BACT Guideline 3.3.15.

1) NH_3 emissions ≤ 10 ppmvd @ 15% O_2 (Achieved in Practice)

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from step 1.

c. Step 3 - Rank remaining options by control effectiveness

There is only one option so ranking is not necessary.

d. Step 4 - Cost Effectiveness Analysis

The only option above is achieved in practice and has been proposed by the applicant. Additionally, as stated above, a cost effectiveness threshold for ammonia has not been established by the District. Therefore a cost analysis is not required.

e. Step 5 - Select BACT

Pursuant to the above BACT Analysis, BACT for NH_3 slip emissions from the proposed engines is NH_3 slip emissions ≤ 10 ppmvd @ 15% O_2. The applicant has proposed IC engines with NH_3 slip emissions ≤ 10 ppmvd @ 15% O_2. Therefore, the BACT requirements for NH_3 slip are satisfied.

APPENDIX C

Summary of Health Risk Assessment (HRA) and Ambient Air Quality Analysis (AAQA)

San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	George Heinen – Permit Services
From:	Kyle Melching – Technical Services
Date:	June 24, 2015
Facility Name:	ABEC #4 dba Lakeview Dairy Biogas
Location:	2029 Old River Rd., Bakerfield
Application #(s):	S-8596-2-0 & 3-0
Project #:	S-1150067

A. RMR SUMMARY

RMR Summary			
Categories	**1412 BHP Bio Gas Engines (Unit 2-0 & 3-0)**	**Project Totals**	**Facility Totals**
Prioritization Score	107 (ea.)	214	>1
Acute Hazard Index	0.38 (ea.)	0.76	0.76
Chronic Hazard Index	0.09 (ea.)	0.18	0.18
Maximum Individual Cancer Risk (10^{-6})	0.006 (ea.)	0.01	0.01
T-BACT Required?	**No**		
Special Permit Conditions?	**Yes**		

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Unit # 2-0 & 3-0

1. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102] N
2. The H2S emissions from the engine shall not exceed 1.8 lbs/hr. as determined by source testing.

B. RMR REPORT

I. Project Description

Technical Services received a request on June 23, 2015, to perform a Risk Management Review for a proposed installation of a 1,412 BHP Dairy Bio gas-fired full time IC engine.

II. Analysis

Technical Services performed a prioritization using the District's HEARTs database. Since the total facility prioritization score was greater than one, a refined health risk assessment was required. Emissions calculated using District approved Dairy Bio Gas emission factors for internal combustion were input into the HEARTs database. The AERMOD model was used, with the parameters outlined below and meteorological data for 2007-2011 from Arvin to determine the dispersion factors (i.e., the predicted concentration or X divided by the normalized source strength or Q) for a receptor grid. These dispersion factors were input into the Hot Spots Analysis and Reporting Program (HARP) risk assessment module to calculate the chronic and acute hazard indices and the carcinogenic risk for the project.

The following parameters were used for the review:

Analysis Parameters Unit 2-0 & 3-0			
Source Type	Point	**Location Type**	Rural
Stack Height (m)	9.144	**Closest Receptor (m)**	Various
Stack Diameter. (m)	0.4572	**Type of Receptor**	Business
Stack Exit Velocity (m/s)	19.766	**Max Hours per Year**	8760
Stack Exit Temp. (°K)	699.817	**Fuel Type**	Dairy Bio Gas
BHP	1,412		

Technical Services performed modeling for criteria pollutants CO, NOx, SOx and PM_{10}; as well as a RMR. The emission rates used for criteria pollutant modeling were 15.0978 lb/hr and 48,879.4 lb/yr CO, 3.1129 lb/hr and 4,407.9 lb/yr NOx, 0.2459 lb/hr and 2,154.3 lb/yr SOx, and 0.2335 lb/hr and 2,045.2 PM_{10}. The engineer supplied the maximum fuel rate for the IC engine used during the analysis.

The results from the Criteria Pollutant Modeling are as follows:

Criteria Pollutant Modeling Results*

ICE	1 Hour	3 Hours	8 Hours.	24 Hours	Annual
CO	Pass	X	Pass	X	X
NO_x	Pass[1]	X	X	X	Pass
SO_x	Pass	Pass	X	Pass	Pass
PM_{10}	X	X	X	Pass[2]	Pass[2]

*Results were taken from the attached PSD spreadsheet.
[1]The project was compared to the 1-hour NO2 National Ambient Air Quality Standard that became effective on April 12, 2010 using the District's approved procedures.
[2]The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2).

III. Conclusion

The acute and chronic indices are below 1.0 and the cancer risk factor associated with the project is less than 1.0 in a million. **In accordance with the District's Risk Management Policy, the project is approved without Toxic Best Available Control Technology (T-BACT).**

To ensure that human health risks will not exceed District allowable levels; the permit conditions listed on page 1 of this report must be included for this proposed unit.

These conclusions are based on the data provided by the applicant and the project engineer. Therefore, this analysis is valid only as long as the proposed data and parameters do not change.

The emissions from the proposed equipment will not cause or contribute significantly to a violation of the State and National AAQS.

IV. Attachments

A. RMR request from the project engineer
B. Additional information from the applicant/project engineer
C. Toxic emissions summary
D. Prioritization score
E. HARP Risk Analysis
F. Facility Summary
G. AERMOD Non-Regulatory Option Checklist

APPENDIX D
Draft ATCs
(S-8596-1-0, -2-0, & -3-0)

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-8596-1-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: CALIFORNIA BIOENERGY LLC
MAILING ADDRESS: 20229 OLD RIVER ROAD
BAKERSFIELD, CA 93311

LOCATION: 20229 OLD RIVER ROAD
BAKERSFIELD, CA 93311

EQUIPMENT DESCRIPTION:
ANAEROBIC DIGESTER SYSTEM CONSISTING OF A LINED, COVERED LAGOON ANAEROBIC DIGESTER WITH AN AIR INJECTION SYSTEM FOR HYDROGEN SULFIDE CONTROL AND PRESSURE/ VACUUM VALVE(S)

CONDITIONS

1. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
2. The VOC content of the digester gas produced by the digester system shall not exceed 10% by weight. [District Rule 2201]
3. The air injection system shall be maintained and operated according to the manufacturer's recommendation to minimize the concentration of hydrogen sulfide in the bio-gas. [District Rule 2201]

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

S-8596-1-0 Dec 15 2015 2:51PM – HEINENG : Joint Inspection NOT Required

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-8596-2-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: CALIFORNIA BIOENERGY LLC
MAILING ADDRESS: 20229 OLD RIVER ROAD
BAKERSFIELD, CA 93311

LOCATION: 20229 OLD RIVER ROAD
BAKERSFIELD, CA 93311

EQUIPMENT DESCRIPTION:
1,412 BHP CATERPILLAR MODEL A3516A+ (OR DISTRICT APPROVED EQUIVALENT) DIGESTER GAS-FIRED LEAN-BURN IC ENGINE #1 WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AND A CARBON H2S SCRUBBER (OR EQUIVALENT H2S REMOVAL SYSTEM) POWERING AN ELECTRICAL GENERATOR

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. All equipment shall be maintained in good operating condition and shall be operated in a manner consistent with good air pollution control practice to minimize emissions of air contaminants. [District Rule 2201]
4. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
5. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
6. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
7. To ensure this facility (Facility S-8596) and the adjacent dairy operation (Facility S-5069) are separate stationary sources, this generating system shall be physically separated from the electrical system of the dairy. No generated electricity shall be provided directly to the dairy operation. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

Southern Regional Office • 34946 Flyover Court • Bakersfield, CA 93308 • (661) 392-5500 • Fax (661) 392-5585

8. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

9. {4261} This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]

10. {3203} This engine shall be operated within the ranges that the source testing has shown result in pollution concentrations within the emissions limits as specified on this permit. [District Rule 4702]

11. This engine shall be fired only on digester gas as fuel except in the case that insufficient digester gas is available for the engine at the time that the required utility interconnect testing is scheduled the engine will be permitted to fire sufficient natural gas fuel to complete the required utility interconnect testing. [District Rule 2201]

12. During times this engine is fueled with natural gas for required utility interconnect testing, the engine shall continue to comply with all emission standards and limitations contained in this permit. [District Rule 2201]

13. The total amount of electrical energy produced by this engine while fueled on natural gas for required utility interconnect testing shall not exceed 96,000 kW-hrs. The following records shall be maintained: 1) date(s) and time(s) that this engine is fueled with natural gas for utility testing, 2) the total amount of electrical energy (kW-hr) produced by this engine when fueled with natural gas for utility testing, and 3) the total number of hours that this engine is fueled with natural gas. [District Rule 2201]

14. The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H2S. The District may approve an averaging period of up to one calendar day in length for demonstration of compliance with the fuel sulfur content limit. [District Rules 2201, 4702, and 4801]

15. The engine shall be equipped with an operational nonresettable elapsed time meter or other APCO approved alternative. [District Rules 2201 and 4702]

16. {1897} This engine shall be equipped with either a positive crankcase ventilation (PCV) system that recirculates crankcase emissions into the air intake system for combustion, or a crankcase emissions control device of at least 90% control efficiency. [District Rule 2201]

17. The owner/operator shall minimize the emissions from the engine to the maximum extent possible during the commissioning period. [District Rule 2201]

18. Commissioning activities are defined as, but not limited to, all testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the construction contractor to ensure safe and reliable operation of the reciprocating IC engine, emission control equipment, and associated electrical delivery systems. [District Rule 2201]

19. Commissioning period shall commence when all mechanical, electrical, and control systems are installed and individual system startup has been completed, or when a reciprocating engine is first fired, whichever occurs first. The commissioning period shall terminate when the engine has completed initial performance testing, completed initial engine tuning, and the engine is available for commercial operation. The total duration of the commissioning period for this engine shall not exceed 120 hours of operation of the engine. [District Rule 2201]

20. The permittee shall submit a summary of activities to be performed during the commissioning period to the District at least two weeks prior to the first firing of this engine. The summary shall include a list of each commissioning activity, the anticipated duration of each activity in hours, and the purpose of the activity. The activities described shall include, but are not limited to, the tuning of the engine, the installation and operation of the SCR system, the installation, calibration, and testing of emissions monitors, and any activities requiring the firing of this unit without abatement by the SCR system. [District Rule 2201]

21. At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and the construction contractor, the engine shall be tuned to minimize emissions. [District Rule 2201]

22. At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and the construction contractor, the Selective Catalytic Reduction (SCR) system and oxidation catalyst shall be installed, adjusted, and operated to minimize emissions from this unit. [District Rule 2201]

23. Emission rates from this engine during the commissioning period shall not exceed any of the following limits: 1.0 g-NOx/bhp-hr, 0.07 g-PM10/bhp-hr, 4.85 g-CO/bhp-hr, 1.0 g-VOC/bhp-hr. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

24. The permittee shall record total operating time of the engine in hours during the commissioning period. [District Rule 2201]

25. The total number of firing hours of this unit without abatement of emissions by the SCR system shall not exceed 120 hours during the commissioning period. Such operation of this unit without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system. Upon completion of these activities, the permittee shall provide written notice to the District and the unused balance of the 120 firing hours without abatement shall expire. [District Rule 2201]

26. Emissions from this engine after the commissioning period shall not exceed any of the following limits: 0.15 g-NOx/bhp-hr (equivalent to 11.0 ppmvd NOx @ 15% O2), NOx referenced as NO2; 0.031 g-PM10/bhp-hr; 1.75 g-CO/bhp-hr (equivalent to 210 ppmvd CO @ 15% O2); 0.10 g-VOC/bhp-hr (equivalent to 20 ppmvd VOC @ 15% O2), VOC referenced as methane. [District Rules 2201 and 4702]

27. The SCR catalyst shall be maintained and replaced in accordance with the recommendations of the catalyst manufacturer or emission control supplier. Records of catalyst maintenance and replacement shall be maintained. [District Rule 2201 and 4702]

28. Ammonia (NH3) emissions from this engine shall not exceed 10 ppmvd @ 15% O2. [District Rules 2201 and 4102]

29. Air-to-fuel ratio controller(s) shall be maintained and operated appropriately in order to ensure proper operation of the engine and control device to minimize emissions at all times. [District Rule 2201]

30. {4037} During periods of operation, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

31. Source testing to measure NOx, CO, VOC, PM10, and ammonia (NH3) emissions from this unit shall be conducted within 120 days of initial start-up. [District Rules 1081, 2201, and 4702]

32. Source testing to measure H2S emissions from this unit shall be conducted within 120 days of initial start-up. [District Rules 1081 and 4102]

33. Source testing to measure NOx, CO, VOC, and ammonia (NH3) emissions from this unit shall be conducted at least once every 24 months. [District Rules 1081, 2201, and 4702]

34. Fuel sulfur content analysis shall be performed at least annually using EPA Method 11 or EPA Method 15, as appropriate. Records of the fuel sulfur analysis shall be maintained and provided to the District upon request. [District Rules 2201 and 4702]

35. {3791} Emissions source testing shall be conducted with the engine operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. [District Rule 4702]

36. For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC emissions shall be reported as methane. NOx, CO, VOC, and NH3 concentrations shall be reported in ppmv, corrected to 15% oxygen. [District Rules 2201 and 4702]

37. The following methods shall be used for source testing: NOx (ppmv) - EPA Method 7E or ARB Method 100; CO (ppmv) - EPA Method 10 or ARB Method 100; VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100; stack gas oxygen - EPA Method 3 or 3A or ARB Method 100; stack gas velocity - EPA Method 2 or EPA Method 19; stack gas moisture content - EPA Method 4; PM10 (filterable and condensable) - EPA Method 201 and 202, EPA Method 201a and 202, or ARB Method 5 in combination with 501; NH3 - BAAQMD ST-1B or SCAQMD Method 207-1. Alternative test methods as approved by the District may also be used to address the source testing requirements of this permit. [District Rules 1081 and 4702]

38. The Higher Heating Value (HHV) of the fuel gas shall be determined using ASTM D1826, ASTM 1945 in conjunction with ASTM D3588, or an alternative method approved by the District. [District Rules 2201 and 4702]

39. {109} Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081]

CONDITIONS CONTINUE ON NEXT PAGE

40. {110} The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081]

41. The sulfur content of the digester gas used to fuel the engine shall be monitored and recorded at least once every calendar quarter in which a fuel sulfur analysis is not performed. If quarterly monitoring shows a violation of the fuel sulfur content limit of this permit, monthly monitoring will be required until six consecutive months of monitoring show compliance with the fuel sulfur content limit. Once compliance with the fuel sulfur content limit is shown for six consecutive months, then the monitoring frequency may return to quarterly. Monitoring of the sulfur content of the digester gas fuel shall not be required if the engine does not operate during that period. Records of the results of monitoring of the digester gas fuel sulfur content shall be maintained. [District Rule 2201]

42. Monitoring of the digester gas sulfur content shall be performed using gas detection tubes calibrated for H2S; a Testo 350 XL portable emission monitor; a continuous fuel gas monitor that meets the requirements specified in SCAQMD Rule 431.1, Attachment A; District-approved source test methods, including EPA Method 15, ASTM Method D1072, D4084, and D5504; District-approved in-line H2S monitors; or an alternative method approved by the District. Prior to utilization of in-line monitors to demonstrate compliance with the digester gas sulfur content limit of this permit, the permittee shall submit details of the proposed monitoring system, including the make, model, and detection limits, to the District and obtain District approval for the proposed monitor(s). [District Rule 2201]

43. The exhaust stack shall be equipped with permanent provisions to allow collection of stack gas samples consistent with EPA test methods and shall be equipped with safe permanent provisions to sample stack gases with a portable NOx, CO, and O2 analyzer during District inspections. The sampling ports shall be located in accordance with the CARB regulation titled California Air Resources Board Air Monitoring Quality Assurance Volume VI, Standard Operating Procedures for Stationary Emission Monitoring and Testing. [District Rule 1081]

44. The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every month (in which a source test is not performed) using a portable emission monitor that meets District specifications. [In-stack emission monitors may be allowed if they satisfy the standards required for portable analyzers as specified in District policies and are approved in writing by the APCO.] Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]

45. The permittee shall monitor and record the stack concentration of NH3 at least once every calendar quarter in which a source test is not performed. NH3 monitoring shall be conducted utilizing District approved gas-detection tubes or a District approved equivalent method. Monitoring shall not be required if the unit is not in operation, i.e. the unit need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the unit unless monitoring has been performed within the last quarter. [District Rules 2201 and 4102]

46. If the NOx, CO, or NH3 concentrations, as measured by the portable analyzer or the District approved ammonia monitoring equipment, exceed the allowable emission concentration, the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours after detection. If the portable analyzer readings continue to exceed the allowable emissions concentration after 8 hours, the permittee shall notify the District within the following 1 hour, and conduct a certified source test within 60 days of the first exceedance. In lieu of conducting a source test, the permittee may stipulate a violation has occurred, subject to enforcement action. The permittee must then correct the violation, show compliance has been re-established, and resume monitoring procedures. If the deviations are the result of a qualifying breakdown condition pursuant to Rule 1100, the permittee may fully comply with Rule 1100 in lieu of performing the notification and testing required by this condition. [District Rules 2201 and 4702]

47. {3787} All alternate monitoring parameter emission readings shall be taken with the unit operating either at conditions representative of normal operations or conditions specified in the permit-to-operate. The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. Emission readings taken shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings, evenly spaced out over the 15 consecutive-minute period. [District Rule 4702]

CONDITIONS CONTINUE ON NEXT PAGE

48. The permittee shall maintain records of: (1) the date and time of NOx, CO, O2, and NH3 measurements, (2) the O2 concentration in percent and the measured NOx, CO, and NH3 concentrations corrected to 15% O2, (3) make and model of exhaust gas analyzer, (4) exhaust gas analyzer calibration records, (5) the method of determining the NH3 emission concentration, and (6) a description of any corrective action taken to maintain the emissions within the acceptable range. [District Rules 2201 and 4702]

49. The permittee shall maintain an engine operating log to demonstrate compliance. The engine operating log shall include, on a monthly basis, the following information: the total hours of operation, the type and quantity of fuel used, maintenance and modifications performed, monitoring data, compliance source test results, and any other information necessary to demonstrate compliance. Quantity of fuel used shall be recorded in standard cubic feet using a non-resettable, totalizing mass or volumetric fuel flow meter or other APCO approved-device. [District Rules 2201 and 4702]

50. {3212} The permittee shall update the I&M plan for this engine prior to any planned change in operation. The permittee must notify the District no later than seven days after changing the I&M plan and must submit an updated I&M plan to the APCO for approval no later than 14 days after the change. The date and time of the change to the I&M plan shall be recorded in the engine's operating log. For modifications, the revised I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit to Operate. The permittee may request a change to the I&M plan at any time. [District Rule 4702]

51. All records shall be maintained and retained for a minimum of five (5) years, and shall be made available for District inspection upon request. All records may be maintained and submitted in an electronic format approved by the District. [District Rules 2201 and 4702]

52. The permittee shall obtain written District approval for the use of any equivalent control equipment not specifically approved by this Authority to Construct. Approval of the equivalent control equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate control equipment is equivalent to the specifically authorized equipment. [District Rule 2010]

53. The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2010]

54. Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct. [District Rule 2201]

55. No emission factor and no emission shall be greater for the alternate equipment than for the proposed equipment. No changes in the hours of operation, operating rate, throughput, or power rating may be authorized for any alternate equivalent equipment. The power rating of the equivalent equipment shall not be less than 1,271 bhp or greater than 1,412 bhp. [District Rule 2201]

56. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-8596-3-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: CALIFORNIA BIOENERGY LLC
MAILING ADDRESS: 20229 OLD RIVER ROAD
BAKERSFIELD, CA 93311

LOCATION: 20229 OLD RIVER ROAD
BAKERSFIELD, CA 93311

EQUIPMENT DESCRIPTION:
1,412 BHP CATERPILLAR MODEL A3516A+ (OR DISTRICT APPROVED EQUIVALENT) DIGESTER GAS-FIRED LEAN-BURN IC ENGINE #2 WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AND A CARBON H2S SCRUBBER (OR EQUIVALENT H2S REMOVAL SYSTEM) POWERING AN ELECTRICAL GENERATOR

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. All equipment shall be maintained in good operating condition and shall be operated in a manner consistent with good air pollution control practice to minimize emissions of air contaminants. [District Rule 2201]
4. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
5. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
6. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
7. To ensure this facility (Facility S-8596) and the adjacent dairy operation (Facility S-5069) are separate stationary sources, this generating system shall be physically separated from the electrical system of the dairy. No generated electricity shall be provided directly to the dairy operation. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

DRAFT

Arnaud Marjollet, Director of Permit Services

Southern Regional Office • 34946 Flyover Court • Bakersfield, CA 93308 • (661) 392-5500 • Fax (661) 392-5585

8. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

9. {4261} This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]

10. {3203} This engine shall be operated within the ranges that the source testing has shown result in pollution concentrations within the emissions limits as specified on this permit. [District Rule 4702]

11. This engine shall be fired only on digester gas as fuel except in the case that insufficient digester gas is available for the engine at the time that the required utility interconnect testing is scheduled the engine will be permitted to fire sufficient natural gas fuel to complete the required utility interconnect testing. [District Rule 2201]

12. During times this engine is fueled with natural gas for required utility interconnect testing, the engine shall continue to comply with all emission standards and limitations contained in this permit . [District Rule 2201]

13. The total amount of electrical energy produced by this engine while fueled on natural gas for required utility interconnect testing shall not exceed 96,000 kW-hrs. The following records shall be maintained: 1) date(s) and time(s) that this engine is fueled with natural gas for utility testing, 2) the total amount of electrical energy (kW-hr) produced by this engine when fueled with natural gas for utility testing, and 3) the total number of hours that this engine is fueled with natural gas. [District Rule 2201]

14. The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H2S. The District may approve an averaging period of up to one calendar day in length for demonstration of compliance with the fuel sulfur content limit. [District Rules 2201, 4702, and 4801]

15. This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rules 2201 and 4702]

16. {1897} This engine shall be equipped with either a positive crankcase ventilation (PCV) system that recirculates crankcase emissions into the air intake system for combustion, or a crankcase emissions control device of at least 90% control efficiency. [District Rule 2201]

17. The owner/operator shall minimize the emissions from the engine to the maximum extent possible during the commissioning period. [District Rule 2201]

18. Commissioning activities are defined as, but not limited to, all testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the construction contractor to ensure safe and reliable operation of the reciprocating IC engine, emission control equipment, and associated electrical delivery systems. [District Rule 2201]

19. Commissioning period shall commence when all mechanical, electrical, and control systems are installed and individual system startup has been completed, or when a reciprocating engine is first fired, whichever occurs first. The commissioning period shall terminate when the engine has completed initial performance testing, completed initial engine tuning, and the engine is available for commercial operation. The total duration of the commissioning period for this engine shall not exceed 120 hours of operation of the engine. [District Rule 2201]

20. The permittee shall submit a summary of activities to be performed during the commissioning period to the District at least two weeks prior to the first firing of this engine. The summary shall include a list of each commissioning activity, the anticipated duration of each activity in hours, and the purpose of the activity. The activities described shall include, but are not limited to, the tuning of the engine, the installation and operation of the SCR system, the installation, calibration, and testing of emissions monitors, and any activities requiring the firing of this unit without abatement by the SCR system. [District Rule 2201]

21. At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and the construction contractor, the engine shall be tuned to minimize emissions. [District Rule 2201]

22. At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and the construction contractor, the Selective Catalytic Reduction (SCR) system and oxidation catalyst shall be installed, adjusted, and operated to minimize emissions from this unit. [District Rule 2201]

23. Emission rates from this engine during the commissioning period shall not exceed any of the following limits: 1.0 g-NOx/bhp-hr, 0.07 g-PM10/bhp-hr, 4.85 g-CO/bhp-hr, 1.0 g-VOC/bhp-hr. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

24. The permittee shall record total operating time of the engine in hours during the commissioning period. [District Rule 2201]

25. The total number of firing hours of this unit without abatement of emissions by the SCR system shall not exceed 120 hours during the commissioning period. Such operation of this unit without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system. Upon completion of these activities, the permittee shall provide written notice to the District and the unused balance of the 120 firing hours without abatement shall expire. [District Rule 2201]

26. Emissions from this engine after the commissioning period shall not exceed any of the following limits: 0.15 g-NOx/bhp-hr (equivalent to 11.0 ppmvd NOx @ 15% O2), NOx referenced as NO2; 0.031 g-PM10/bhp-hr; 1.75 g-CO/bhp-hr (equivalent to 210 ppmvd CO @ 15% O2); 0.10 g-VOC/bhp-hr (equivalent to 20 ppmvd VOC @ 15% O2), VOC referenced as methane. [District Rules 2201 and 4702]

27. The SCR catalyst shall be maintained and replaced in accordance with the recommendations of the catalyst manufacturer or emission control supplier. Records of catalyst maintenance and replacement shall be maintained. [District Rule 2201 and 4702]

28. Ammonia (NH3) emissions from this engine shall not exceed 10 ppmvd @ 15% O2. [District Rules 2201 and 4102]

29. Air-to-fuel ratio controller(s) shall be maintained and operated appropriately in order to ensure proper operation of the engine and control device to minimize emissions at all times. [District Rule 2201]

30. {4037} During periods of operation, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

31. Source testing to measure NOx, CO, VOC, PM10, and ammonia (NH3) emissions from this unit shall be conducted within 120 days of initial start-up. [District Rules 1081, 2201, and 4702]

32. Source testing to measure H2S emissions from this unit shall be conducted within 120 days of initial start-up. [District Rules 1081 and 4102]

33. Source testing to measure NOx, CO, VOC, and ammonia (NH3) emissions from this unit shall be conducted at least once every 24 months. [District Rules 1081, 2201, and 4702]

34. Fuel sulfur content analysis shall be performed at least annually using EPA Method 11 or EPA Method 15, as appropriate. Records of the fuel sulfur analysis shall be maintained and provided to the District upon request. [District Rules 2201 and 4702]

35. {3791} Emissions source testing shall be conducted with the engine operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. [District Rule 4702]

36. For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC emissions shall be reported as methane. NOx, CO, VOC, and NH3 concentrations shall be reported in ppmv, corrected to 15% oxygen. [District Rules 2201 and 4702]

37. The following methods shall be used for source testing: NOx (ppmv) - EPA Method 7E or ARB Method 100; CO (ppmv) - EPA Method 10 or ARB Method 100; VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100; stack gas oxygen - EPA Method 3 or 3A or ARB Method 100; stack gas velocity - EPA Method 2 or EPA Method 19; stack gas moisture content - EPA Method 4; PM10 (filterable and condensable) - EPA Method 201 and 202, EPA Method 201a and 202, or ARB Method 5 in combination with 501; NH3 - BAAQMD ST-1B or SCAQMD Method 207-1. Alternative test methods as approved by the District may also be used to address the source testing requirements of this permit. [District Rules 1081 and 4702]

38. The Higher Heating Value (HHV) of the fuel gas shall be determined using ASTM D1826, ASTM 1945 in conjunction with ASTM D3588, or an alternative method approved by the District. [District Rules 2201 and 4702]

39. {109} Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081]

CONDITIONS CONTINUE ON NEXT PAGE

40. {110} The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081]

41. The sulfur content of the digester gas used to fuel the engine shall be monitored and recorded at least once every calendar quarter in which a fuel sulfur analysis is not performed. If quarterly monitoring shows a violation of the fuel sulfur content limit of this permit, monthly monitoring will be required until six consecutive months of monitoring show compliance with the fuel sulfur content limit. Once compliance with the fuel sulfur content limit is shown for six consecutive months, then the monitoring frequency may return to quarterly. Monitoring of the sulfur content of the digester gas fuel shall not be required if the engine does not operate during that period. Records of the results of monitoring of the digester gas fuel sulfur content shall be maintained. [District Rule 2201]

42. Monitoring of the digester gas sulfur content shall be performed using gas detection tubes calibrated for H2S; a Testo 350 XL portable emission monitor; a continuous fuel gas monitor that meets the requirements specified in SCAQMD Rule 431.1, Attachment A; District-approved source test methods, including EPA Method 15, ASTM Method D1072, D4084, and D5504; District-approved in-line H2S monitors; or an alternative method approved by the District. Prior to utilization of in-line monitors to demonstrate compliance with the digester gas sulfur content limit of this permit, the permittee shall submit details of the proposed monitoring system, including the make, model, and detection limits, to the District and obtain District approval for the proposed monitor(s). [District Rule 2201]

43. The exhaust stack shall be equipped with permanent provisions to allow collection of stack gas samples consistent with EPA test methods and shall be equipped with safe permanent provisions to sample stack gases with a portable NOx, CO, and O2 analyzer during District inspections. The sampling ports shall be located in accordance with the CARB regulation titled California Air Resources Board Air Monitoring Quality Assurance Volume VI, Standard Operating Procedures for Stationary Emission Monitoring and Testing. [District Rule 1081]

44. The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every month (in which a source test is not performed) using a portable emission monitor that meets District specifications. [In-stack emission monitors may be allowed if they satisfy the standards required for portable analyzers as specified in District policies and are approved in writing by the APCO.] Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]

45. The permittee shall monitor and record the stack concentration of NH3 at least once every calendar quarter in which a source test is not performed. NH3 monitoring shall be conducted utilizing District approved gas-detection tubes or a District approved equivalent method. Monitoring shall not be required if the unit is not in operation, i.e. the unit need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the unit unless monitoring has been performed within the last quarter. [District Rules 2201 and 4102]

46. If the NOx, CO, or NH3 concentrations, as measured by the portable analyzer or the District approved ammonia monitoring equipment, exceed the allowable emission concentration, the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours after detection. If the portable analyzer readings continue to exceed the allowable emissions concentration after 8 hours, the permittee shall notify the District within the following 1 hour, and conduct a certified source test within 60 days of the first exceedance. In lieu of conducting a source test, the permittee may stipulate a violation has occurred, subject to enforcement action. The permittee must then correct the violation, show compliance has been re-established, and resume monitoring procedures. If the deviations are the result of a qualifying breakdown condition pursuant to Rule 1100, the permittee may fully comply with Rule 1100 in lieu of performing the notification and testing required by this condition. [District Rules 2201 and 4702]

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CONDITIONS CONTINUE ON NEXT PAGE

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55. No emission factor and no emission shall be greater for the alternate equipment than for the proposed equipment. No changes in the hours of operation, operating rate, throughput, or power rating may be authorized for any alternate equivalent equipment. The power rating of the equivalent equipment shall not be less than 1,271 bhp or greater than 1,412 bhp. [District Rule 2201]

56. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]