

FEB 21 2020

Doug Bryant
Maas Energy Works, Inc
3711 Meadow View Dr, #100
Redding, CA 96002

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: C-9133
Project Number: C-1193519

Dear Mr. Bryant:

Enclosed for your review and comment is the District's analysis of Lone Oak Energy LLC's application for an Authority to Construct for the installation of a 1,306 bhp digester gas-fired IC engine powering an electrical generator, at 10014 S McMullin Grade, Hanford.

The notice of preliminary decision for this project has been posted on the District's website (www.valleyair.org). 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. Jesse A. Garcia of Permit Services at (559) 230-5918.

Sincerely,



Arnaud Marjollet
Director of Permit Services

AM:jag

Enclosures

cc: Courtney Graham, CARB (w/ enclosure) via email

Samir Sheikh
Executive Director/Air Pollution Control Officer

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San Joaquin Valley Air Pollution Control District
Authority to Construct Application Review
Installation of a Digester Gas-Fired IC Engine with SCR

Facility Name: Lone Oak Energy LLC
Mailing Address: 2911 Hanford Armona Rd
Hanford, CA 93230
Contact Person: Doug Bryant
Telephone: (207) 691-8068
E-Mail: doug@maasenergy.com
Application #(s): C-9133-3-0
Project #: C-1193519
Deemed Complete: December 9, 2019

Date: January 22, 2020
Engineer: Jesse A. Garcia
Lead Engineer: Jerry Sandhu

I. Proposal

Lone Oak Energy LLC has requested an Authority to Construct (ATC) to install a 1,306 bhp digester gas-fired IC engine powering an electrical generator. This IC engine was originally permitted under ATC C-9133-1-0; however, the applicant has requested higher NO_x, CO and VOC emission factors during normal operation after the commissioning period. A summary of the emission factors from ATC -1-0 and the ones proposed under this project are shown in the following table:

Summary of Emission Factor Changes (ppmv)		
Pollutant	From ATC -1-0	Proposed in this Project
NO _x	5	10
CO	15	223
VOC	10	20

Since the equipment being permitted in this project was also authorized under ATC -1-0, the ATC issued in this project will cancel and supersede ATC -1-0 and the following condition will be included on the ATC:

- This Authority to Construct (ATC) cancels and supersedes ATC C-9133-1-0. [District Rule 2201]

II. Applicable Rules

Rule 1070 Inspections (12/17/92)
Rule 2201 New and Modified Stationary Source Review Rule (8/15/19)
Rule 2410 Prevention of Significant Deterioration (6/16/11)

Rule 2520 Federally Mandated Operating Permits (8/15/19)
Rule 4001 New Source Performance Standards (4/14/99)
Rule 4002 National Emission Standards for Hazardous Air Pollutants (5/20/04)
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)
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 facility is located at 10014 S McMullin Grade in Hanford, CA. The 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

The applicant is proposing to install one 1,306 bhp Caterpillar lean burn digester gas-fired IC engine. The engine will be equipped with an SCR system and an oxidation catalyst for emissions control and will power a generator. The electricity generated by this operation will be sold to utility grid. The engine will be permitted to operate up to 24 hours per day and 120 hours per year during the commissioning period (the time allowed during initial startup of the engine to perform testing, adjustment, tuning, and calibration of the IC engine without full operation of the SCR system and/or oxidation catalyst) and up to 24 hours per day and 8,500 hours per year after the commissioning period.

V. Equipment Listing

C-9133-3-0: 1,306 BHP CATERPILLAR MODEL G3516LE DIGESTER GAS-FIRED LEAN-BURN IC ENGINE WITH A HUG ENGINEERING MODEL COMBIKAT CATALYST SYSTEM (SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM WITH OXIDATION CATALYST) POWERING AN ELECTRICAL GENERATOR

VI. Emission Control Technology Evaluation

The proposed engine will be equipped with:

- Turbocharger
- Intercooler
- Positive Crankcase Ventilation (PCV)
- Air/Fuel Ratio or an O₂ Controller
- Lean Burn Technology

- Oxidation Catalyst
- 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 intercooler functions in conjunction with the turbocharger to reduce the inlet air temperature. By reducing the inlet air temperature, the peak combustion temperature is lowered, which reduces the formation of thermal NO_x.

The PCV system reduces crankcase VOC and PM₁₀ emissions by at least 90% over an uncontrolled crankcase vent.

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

An oxidation catalyst 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 NO_x.

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 reacts and reduces 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%.

Additionally, prior to being combusted in the engine, the digester gas will be treated in a gas conditioning system to reduce the H₂S such that the sulfur content will not exceed 40 ppmv as H₂S.

VII. General Calculations

A. Assumptions

- To streamline emission calculations, PM_{2.5} emissions are assumed to be equal to PM₁₀ emissions.
- Higher Heating Value (HHV) for Digester Gas: 700 Btu/scf (proposed by the applicant, based on 70% methane content, also used in other similar District projects)
- Typical EPA F-factor for digester gas: 9,100 dscf/MMBtu (Estimated based on previous source tests and District practice)
- MMBtu/hr to bhp conversion 392.75 bhp-hr/MMBtu (per AP-42, Appendix A)

- Average sulfur content of the scrubbed digester gas: 40 ppmv as H₂S (proposed by applicant)
- Molar Specific Volume = 379.5 scf/lb-mol (60°F)
- Molecular weights:
NO_x (as NO₂) = 46 lb/lb-mol CO = 28 lb/lb-mol NH₃ = 17 lb/lb-mol
VOC (as CH₄) = 16 lb/lb-mol SO_x (as SO₂) = 64.06 lb/lb-mol
- Efficiency of engine = 30% (District practice)
- A commissioning period to perform testing, adjustment, tuning, and calibration of the IC engine without full operation of the SCR system or oxidation catalyst will be allowed during initial startup of the engine. The duration of the commissioning period shall last no more than 120 hours of operation of the engine without the SCR system or oxidation catalyst installed and operating at its maximum efficiency (proposed by applicant)
- During normal operation the engine will operate 24 hours/day and 8,500 hours per year (proposed by the applicant)
- Ammonia slip from SCR = 10 ppm (proposed by applicant)

B. Emission Factors

Emission Factors during the Commissioning Period:

The commissioning period precedes 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 its damage. 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.¹ Therefore, 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.

¹ 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 Stationary Compression Ignition and Spark Ignition Internal Combustion Engines, April 2, 2013, Question 39 (<http://www.epa.gov/ttn/atw/rice/20120717riceqaupdate.pdf>)

Emission Factors for Digester Gas-Fired Engine (Commissioning Period)			
Pollutant	g/bhp-hr	ppmvd (@ 15%O₂)	Source
NO _x	1.0	--	Information from Engine Supplier (Caterpillar)
SO _x	0.04	40 ppmvd in fuel gas	BACT Requirement/Mass Balance Equation on the Following Page
PM ₁₀	0.08	--	AP-42, Table 2.4-4, October 2008, See Equation on the Following Page
CO	4.4	--	Information from Engine Supplier (Caterpillar)
VOC	1.1	--	Information from Engine Supplier (Caterpillar)
NH ₃	0.06	10 ppmvd	Proposed by the Applicant, See Conversion on the Following Page

Emission Factors during Normal Operation after the Commissioning Period:

The emission factors for NO_x, CO, and VOC from the proposed engine during normal operation were proposed by the applicant and supported by information provided by the engine and catalyst supplier. The emission factors for NO_x, CO, and VOC will be achieved with the use of the SCR and catalyst system. The emission factors for SO_x, PM₁₀, and ammonia slip during normal operation are the same as the emission factors presented above for during the commissioning period. The unit conversions (from ppmvd to g/bhp-hr) for the emission factors are also shown below.

Emission Factors for Digester Gas-Fired Engine (Normal Operation)			
Pollutant	g/bhp-hr	ppmvd (@ 15%O₂)	Source
NO _x	0.15	10 ppmvd	Proposed by the Applicant, See Conversion Below
SO _x	0.04	40 ppmvd in fuel gas	Proposed by the Applicant, See Equation on the Following Page
PM ₁₀	0.08	--	AP-42, Table 2.4-4, October 2008, See Conversion on the Following Page
CO	2.0	223 ppmvd	Proposed by the Applicant, See Conversion on the Following Page
VOC	0.10	20 ppmvd	Proposed by the Applicant, See Conversion on the Following Page
NH ₃	0.06	10 ppmvd	Proposed by the Applicant, See Conversion on the Following Page

NO_x – 10 ppmvd @ 15% O₂ as proposed by the Applicant

$$\frac{10 \text{ ft}^3 \text{ NO}_x}{10^6 \text{ ft}^3} \times \frac{9,100 \text{ ft}^3}{1 \text{ MMBtu}} \times \frac{46 \text{ lb NO}_x}{1 \text{ lb - mole}} \times \frac{20.9}{20.9 - 15} \times \frac{1 \text{ lb - mole}}{379.5 \text{ ft}^3} \times \frac{\text{MMBtu}}{392.75 \text{ bhp - hr}} \times \frac{453.6 \text{ g}}{\text{lb}} \times \frac{\text{Btu}_{\text{in}}}{0.30 \text{ Btu}_{\text{out}}} = 0.15 \frac{\text{g - NO}_x}{\text{bhp - hr}}$$

SO_x – 40 ppmvd H₂S @ 15% O₂ in fuel gas

$$\frac{40 \text{ ft}^3 \text{ H}_2\text{S}}{10^6 \text{ ft}^3} \times \frac{32.06 \text{ lb S}}{\text{lb - mol H}_2\text{S}} \times \frac{\text{lb - mole}}{379.5 \text{ ft}^3} \times \frac{64.06 \text{ lb SO}_2}{32.06 \text{ lb S}} \times \frac{\text{ft}^3}{700 \text{ Btu}} \times \frac{10^6 \text{ Btu}}{\text{MMBtu}} = 0.00965 \frac{\text{lb SO}_x}{\text{MMBtu}}$$

$$0.00965 \frac{\text{lb SO}_x}{\text{MMBtu}} \times \frac{\text{MMBtu}}{392.75 \text{ bhp - hr}} \times \frac{\text{Btu}_{\text{in}}}{0.30 \text{ Btu}_{\text{out}}} \times \frac{453.59 \text{ g}}{\text{lb}} = 0.04 \frac{\text{g - SO}_x}{\text{bhp - hr}}$$

PM₁₀ – AP-42, Table 2.4-4: 15 lb/10⁶ dscf

$$15 \text{ lb-PM}_{10}/10^6 \text{ dscf} \times 1 \text{ scf/ 700 Btu} = 0.021 \text{ lb/MMBtu}$$

$$0.021 \frac{\text{lb PM}_{10}}{\text{MMBtu}} \times \frac{1 \text{ MMBtu}}{10^6 \text{ Btu}} \times \frac{\text{Btu}_{\text{in}}}{0.30 \text{ Btu}_{\text{out}}} \times \frac{2,545 \text{ Btu}}{\text{hp - hr}} \times \frac{453.59 \text{ g}}{\text{lb}} = 0.08 \frac{\text{g - PM}_{10}}{\text{bhp - hr}}$$

CO – 223 ppmvd @ 15% O₂

$$\frac{223 \text{ ft}^3 \text{ CO}}{10^6 \text{ ft}^3} \times \frac{9,100 \text{ ft}^3}{1 \text{ MMBtu}} \times \frac{28 \text{ lb CO}}{1 \text{ lb - mole}} \times \frac{20.9}{20.9 - 15} \times \frac{1 \text{ lb - mole}}{379.5 \text{ ft}^3} \times \frac{\text{MMBtu}}{392.75 \text{ bhp - hr}} \times \frac{453.6 \text{ g}}{\text{lb}} \times \frac{\text{Btu}_{\text{in}}}{0.30 \text{ Btu}_{\text{out}}} = 2.0 \frac{\text{g - CO}}{\text{bhp - hr}}$$

VOC – 20 ppmvd @ 15% O₂ as proposed by the Applicant

$$\frac{20 \text{ ft}^3 \text{ VOC}}{10^6 \text{ ft}^3} \times \frac{9,100 \text{ ft}^3}{1 \text{ MMBtu}} \times \frac{16 \text{ lb VOC}}{1 \text{ lb - mole}} \times \frac{20.9}{20.9 - 15} \times \frac{1 \text{ lb - mole}}{379.5 \text{ ft}^3} \times \frac{\text{MMBtu}}{392.75 \text{ bhp - hr}} \times \frac{453.6 \text{ g}}{\text{lb}} \times \frac{\text{Btu}_{\text{in}}}{0.30 \text{ Btu}_{\text{out}}} = 0.10 \frac{\text{g - VOC}}{\text{bhp - hr}}$$

NH₃ – 10 ppmvd @ 15% O₂ as proposed by the Applicant

$$\frac{10 \text{ ft}^3 \text{ NH}_3}{10^6 \text{ ft}^3} \times \frac{9,100 \text{ ft}^3}{\text{MMBtu}} \times \frac{17 \text{ lb NH}_3}{\text{lb - mole}} \times \frac{20.9}{20.9 - 15} \times \frac{1 \text{ lb - mole}}{379.5 \text{ ft}^3} \times \frac{\text{MMBtu}}{392.75 \text{ bhp - hr}} \times \frac{453.6 \text{ g}}{\text{lb}} \times \frac{\text{Btu}_{\text{in}}}{0.30 \text{ Btu}_{\text{out}}} = 0.06 \frac{\text{g - NH}_3}{\text{bhp - hr}}$$

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Since this is a new emissions unit, PE1 = 0 for all pollutants.

2. Post-Project Potential to Emit (PE2)

$$\text{PE2 (lb/day)} = [\text{EF (g/hp-hr)} \times \text{Rating (bhp)} \times 24 \text{ (hr/day)}] / 453.6 \text{ (g/lb)}$$

Daily PE2 During the Commissioning Period								
NO _x	1.0	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	69.1 (lb/day)
SO _x	0.04	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	2.8 (lb/day)
PM ₁₀	0.08	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	5.5 (lb/day)
CO	4.4	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	304.0 (lb/day)
VOC	1.1	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	76.0 (lb/day)
NH ₃	0.06	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	4.1 (lb/day)

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

Daily PE for the proposed engine after completion of the commissioning period is calculated in the table below:

$$PE2 \text{ (lb/day)} = [EF \text{ (g/hp-hr)} \times \text{Rating (bhp)} \times 24 \text{ (hr/day)}] / 453.6 \text{ (g/lb)}$$

Daily PE2 After the Commissioning Period (Normal Operation)								
NO _x	0.15	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	10.4 (lb/day)
SO _x	0.04	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	2.8 (lb/day)
PM ₁₀	0.08	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	5.5 (lb/day)
CO	2.0	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	138.2 (lb/day)
VOC	0.10	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	6.9 (lb/day)
NH ₃	0.06	(g/bhp-hr) x	1,306	(bhp) x	24	(hr/day) ÷	453.6 (g/lb) =	4.1 (lb/day)

Maximum Annual PE2 for the Engine Including the Commissioning Period:

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

Annual PE2 During the Commissioning Period								
NO _x	1.0	(g/bhp-hr) x	1,306	(bhp) x	120	(hr/yr) ÷	453.6 (g/lb) =	346 (lb/yr)
SO _x	0.04	(g/bhp-hr) x	1,306	(bhp) x	120	(hr/yr) ÷	453.6 (g/lb) =	14 (lb/yr)
PM ₁₀	0.08	(g/bhp-hr) x	1,306	(bhp) x	120	(hr/yr) ÷	453.6 (g/lb) =	28 (lb/yr)
CO	4.4	(g/bhp-hr) x	1,306	(bhp) x	120	(hr/yr) ÷	453.6 (g/lb) =	1,520 (lb/yr)
VOC	1.1	(g/bhp-hr) x	1,306	(bhp) x	120	(hr/yr) ÷	453.6 (g/lb) =	380 (lb/yr)
NH ₃	0.06	(g/bhp-hr) x	1,306	(bhp) x	120	(hr/yr) ÷	453.6 (g/lb) =	21 (lb/yr)

First Year Annual PE2 After the Commissioning Period								
NO _x	0.15	(g/bhp·hr) x	1,306	(bhp) x	8,380	(hr/yr) ÷	453.6 (g/lb) =	3,619 (lb/yr)
SO _x	0.04	(g/bhp·hr) x	1,306	(bhp) x	8,380	(hr/yr) ÷	453.6 (g/lb) =	965 (lb/yr)
PM ₁₀	0.08	(g/bhp·hr) x	1,306	(bhp) x	8,380	(hr/yr) ÷	453.6 (g/lb) =	1,930 (lb/yr)
CO	2.0	(g/bhp·hr) x	1,306	(bhp) x	8,380	(hr/yr) ÷	453.6 (g/lb) =	48,255 (lb/yr)
VOC	0.10	(g/bhp·hr) x	1,306	(bhp) x	8,380	(hr/yr) ÷	453.6 (g/lb) =	2,413 (lb/yr)
NH ₃	0.06	(g/bhp·hr) x	1,306	(bhp) x	8,380	(hr/yr) ÷	453.6 (g/lb) =	1,448 (lb/yr)

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

Maximum Post-Project Daily and Annual PE2				
Pollutant	Daily (lb/day)	During Commissioning (lb/year)	After Commissioning (lb/year)	Total (lb/year)
NO _x	69.1	346	3,619	3,965
SO _x	2.8	14	965	979
PM ₁₀	5.5	28	1,930	1,958
CO	304.0	1,520	48,255	49,775
VOC	76.0	380	2,413	2,793
NH ₃	4.1	21	1,448	1,469

Annual PE2 for the Engine in years with no Commissioning:

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

Annual PE2 After Year 1 with no Commissioning (Normal Operation)								
NO _x	0.15	(g/bhp·hr) x	1,306	(bhp) x	8,500	(hr/yr) ÷	453.6 (g/lb) =	3,671 (lb/yr)
SO _x	0.04	(g/bhp·hr) x	1,306	(bhp) x	8,500	(hr/yr) ÷	453.6 (g/lb) =	979 (lb/yr)
PM ₁₀	0.08	(g/bhp·hr) x	1,306	(bhp) x	8,500	(hr/yr) ÷	453.6 (g/lb) =	1,958 (lb/yr)
CO	2.0	(g/bhp·hr) x	1,306	(bhp) x	8,500	(hr/yr) ÷	453.6 (g/lb) =	48,946 (lb/yr)
VOC	0.10	(g/bhp·hr) x	1,306	(bhp) x	8,500	(hr/yr) ÷	453.6 (g/lb) =	2,447 (lb/yr)
NH ₃	0.06	(g/bhp·hr) x	1,306	(bhp) x	8,500	(hr/yr) ÷	453.6 (g/lb) =	1,468 (lb/yr)

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. Pursuant to the applicant, the digester gas operation permitted under ATC C-9133-2-0 will be implemented and should be included in the SSPE1 calculation; however, as calculated in project C-1170074, the PE2 for the digester gas operation is 0 lb/year. Therefore, SSPE1 = 0 lb/year for all pollutants.

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
C-9133-2-0	0	0	0	0	0	0
C-9133-3-0	3,965	979	1,958	49,775	2,793	1,469
SSPE2	3,965	979	1,958	49,775	2,793	1469

5. Major Source Determination

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	3,965	979	1,958	1,958	49,775	2,793
Major Source Threshold	20,000	140,000	140,000	140,000	200,000	20,000
Major Source?	No	No	No	No	No	No

Note: PM_{2.5} assumed to be equal to PM₁₀

As seen in the table above, the facility is not an existing Major Source and is not becoming a Major Source as a result of this project.

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)						
	NO ₂	VOC	SO ₂	CO	PM	PM ₁₀
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?	No	No	No	No	No	No

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.

Since this is a new emissions unit, BE = PE1 = 0 for all pollutants.

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.

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)

I. Project Emissions Increase - New 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.

PSD Major Source Determination: Potential to Emit (tons/year)						
	NO ₂	VOC	SO ₂	CO	PM	PM ₁₀
Total PE from New and Modified Units	2.0	1.4	0.5	24.9	1.0	1.0
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 E.

VIII. Compliance Determination

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

Pursuant to District Rule 2201, Section 4.1, 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 Adjusted Increase in Permitted Emissions (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 proposed engine will have a PE greater than 2.0 lb/day for NO_x, SO_x, PM₁₀, CO, and VOC. Therefore, BACT is triggered for NO_x, SO_x, PM₁₀, and VOC. However, BACT is not triggered for CO since the SSPE2 for CO is not greater than 200,000 lbs/year, as demonstrated in Section VII.C.5 of this document.

The proposed engine will have a PE greater than 2.0 lb/day for NH₃. However, NH₃ slip emissions are the result from operation of an emissions control device (SCR) and not the emissions unit; therefore, this project does not trigger BACT for NH₃ emissions.

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.

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.

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 any pollutant. Therefore BACT is not triggered for any pollutant.

2. BACT Guideline

BACT Guideline 3.3.15 applies to the proposed digester gas-fired IC engine. [Waste Gas-Fired IC Engines] (See Appendix B)

3. Top-Down BACT Analysis

Per Permit Services Policies and Procedures for BACT, a Top-Down BACT analysis shall be performed as a part of the application review for each application subject to the BACT requirements pursuant to the District's NSR Rule.

Pursuant to the Top-Down BACT Analysis (See Appendix C), 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 H₂S)
- PM₁₀: Fuel sulfur content ≤ 40 ppmv (as H₂S)
- VOC: VOC emissions ≤ 0.10 g/bhp-hr

The following conditions will be placed on the ATC to ensure compliance with the BACT requirements during normal operation:

- This engine shall be fired on digester gas fuel only. [District Rule 2201]
- After the commissioning period, emissions from this IC engine shall not exceed any of the following limits: 0.15 g-NO_x/bhp-hr (equivalent to 10 ppmvd NO_x @ 15% O₂), NO_x referenced as NO₂; 0.08 g-PM₁₀/bhp-hr; 2.0 g-CO/bhp-hr (equivalent to 223 ppmvd CO @ 15% O₂); or 0.10 g-VOC/bhp-hr (equivalent to 20 ppmvd VOC @ 15% O₂), VOC referenced as CH₄. [District Rules 2201 and 4702]
- The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H₂S. The applicant may utilize an averaging period of up to 24 hours in length for demonstration of compliance with the fuel sulfur content limit. [District Rules 2201, 4102, 4702, and 4801]

B. Offsets

1. Offset Applicability

Pursuant to District Rule 2201, Section 4.5, offset requirements shall be triggered on a pollutant by pollutant basis and shall be required if the SSPE2 equals 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	PM₁₀	CO	VOC
SSPE2	3,965	979	1,958	49,775	2,793
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

Pursuant to District Rule 2201, Section 5.4, 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,
- d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant, and/or
- 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. Since this is not a new facility, public noticing is not required for this project for New Major Source purposes.

As demonstrated in Sections VII.C.7 and VII.C.8, this project does not constitute an SB 288 or Federal Major Modification; therefore, public noticing for SB 288 or Federal Major Modification purposes is not required.

b. PE > 100 lb/day

The PE2 for this new unit 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	69.1	100 lb/day	No
SO _x	2.8	100 lb/day	No
PM ₁₀	5.5	100 lb/day	No
CO	304.0	100 lb/day	Yes
VOC	76.0	100 lb/day	No
NH ₃	4.1	100 lb/day	No

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

c. Offset Threshold

Public notification is required if the pre-project Stationary Source Potential to Emit (SSPE1) is increased to a level exceeding the offset threshold levels. The following table compares the SSPE1 with the SSPE2 in order to determine if any offset thresholds have been surpassed with this project.

Offset Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO _x	0	3,965	20,000 lb/year	No
SO _x	0	979	54,750 lb/year	No
PM ₁₀	0	1,958	29,200 lb/year	No
CO	0	49,775	200,000 lb/year	No
VOC	0	2,793	20,000 lb/year	No

As demonstrated above, there were no thresholds surpassed with this project; therefore public noticing is not required for offset purposes.

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	3,965	0	3,965	20,000 lb/year	No
SO _x	979	0	979	20,000 lb/year	No
PM ₁₀	1,958	0	1,958	20,000 lb/year	No
CO	49,775	0	49,775	20,000 lb/year	Yes
VOC	2,793	0	2,793	20,000 lb/year	No
NH ₃	1,469	0	1,469	20,000 lb/year	No

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

e. Title V Significant Permit Modification

Since this facility does not have a Title V operating permit, this change is not a Title V significant 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 in excess of 100 lb/day and SSIPE greater than 20,000 lb/year. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be electronically published on the District’s website 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

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

- This engine shall be fired on digester gas fuel only. [District Rule 2201]
- The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H₂S. The applicant may utilize an averaging period of up to 24 hours in length for demonstration of compliance with the fuel sulfur content limit.² [District Rules 2201, 4102, 4702, and 4801]
- This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rules 2201 and 4702]
- Ammonia (NH₃) emissions from this engine shall not exceed 10 ppmvd @ 15% O₂. [District Rules 2201 and 4102]
- 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 into the atmosphere. [District Rule 2201]

Proposed Rule 2201 (DEL) Conditions during Commissioning Period:

For the proposed engine, the DELs for NO_x, SO_x, PM₁₀, CO, and VOC are stated in the form of maximum emission factors (g/bhp-hr), the maximum engine horsepower rating (1,306 bhp), and maximum number of hours allowed for commissioning activities. The following conditions will be placed on the permit as a mechanism to ensure compliance.

- The owner/operator shall minimize the emissions from the engine to the maximum extent possible during the commissioning period. [District Rule 2201]
- Commissioning activities are defined as, but not limited to, all 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 the engine is first fired, whichever occurs first. The commissioning period shall terminate when the initial engine tuning has completed 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]

² Due to variations in sulfur content of the digester gas, an averaging time cannot be established until the unit has operated in a steadystate manner.

- The total number of firing hours of this unit without abatement of emissions by the SCR system and oxidation catalyst 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 or oxidation catalyst. 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 Rules 2201 and 4102]
- Emission rates from this engine unit during the commissioning period shall not exceed any of the following limits: 1.0 g-NO_x/bhp-hr, 0.08 g-PM₁₀/bhp-hr, 4.4 g-CO/bhp-hr, 1.1 g-VOC/bhp-hr. [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]
- 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 and oxidation catalyst, the installation, calibration, and testing of emissions monitors, and any activities requiring the firing of this unit without abatement by the SCR system and oxidation catalyst. [District Rule 2201]

Proposed Rule 2201 (DEL) Conditions during Normal Operation:

- After the commissioning period, emissions from this IC engine shall not exceed any of the following limits: 0.15 g-NO_x/bhp-hr (equivalent to 10 ppmvd NO_x @ 15% O₂), NO_x referenced as NO₂; 0.08 g-PM₁₀/bhp-hr; 2.0 g-CO/bhp-hr (equivalent to 223 ppmvd CO @ 15% O₂); or 0.10 g-VOC/bhp-hr (equivalent to 20 ppmvd VOC @ 15% O₂), VOC referenced as CH₄. [District Rules 2201 and 4702]

Additionally, to limit annual emissions, the following condition will be included on the ATC:

- This engine shall not operate more than 8,500 hours per calendar year. [District Rule 2201]

E. Compliance Assurance

1. Source Testing

In accordance with District Policy APR 1705, source testing for NO_x, CO and VOC emissions from the digester gas fired IC engine served by a catalyst control system (including SCR and an oxidation catalyst) shall be conducted initially and at least once every 24 months thereafter. In addition, in order to assure compliance with the ammonia slip limit from the SCR system, source testing of the ammonia emissions will also be required initially and at least once every 24 months thereafter.

For PM₁₀ emissions, the applicant has proposed to use an emission factor from AP-42, Section 2.4, which is applicable to municipal solid waste landfills. The digester gas fired in this engine should have a similar makeup to that of gas generated by a landfill. However, in order to assure that the engine is able to demonstrate compliance with the proposed PM₁₀ emission factor, initial source testing will be required.

The engine is not served by any control devices for PM₁₀ emissions. Therefore, it is not expected that the PM₁₀ emissions will change much over time as long as the quality of the gas combusted in this unit remains fairly consistent. The facility will be required to monitor the sulfur content of the digester gas combusted in this unit at least once per quarter. The results of this quarterly monitoring should demonstrate that the quality of the gas combusted is consistent. Therefore, ongoing periodic source testing for PM₁₀ emissions will not be required.

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

- Source testing to measure NO_x, CO, VOC, PM₁₀, and ammonia (NH₃) emissions from this unit shall be conducted within 60 days upon end of the commissioning period. [District Rules 1081, 2201, and 4702]
- Source testing to measure NO_x, CO, VOC, and ammonia (NH₃) emissions from this unit shall be conducted at least once every 24 months. [District Rules 1081, 2201, and 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. NO_x, 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 emissions source testing: NO_x (ppmv) - EPA Method 7E; CO (ppmv) - EPA Method 10; VOC (ppmv) - EPA Method 18, 25A or 25B; stack gas oxygen - EPA Method 3 or 3A; 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, ARB Method 5 (front half and back half), or ARB Method 5 (front half and back half) in combination with Method 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]

- {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]
- 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 NO_x, 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]

2. Monitoring

The proposed digester gas-fired engine is subject to District Rule 4702 - Internal Combustion Engines. 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 O₂ 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 permit to ensure compliance:

- The permittee shall monitor and record the stack concentration of NO_x, CO, and O₂ at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if 2 consecutive deviations are observed during quarterly monitoring. 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 if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. 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. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4102]
- If the NO_x, 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 will be required.

The following conditions will be placed on the 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 content analysis shall be maintained and provided 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 Rules 2201 and 4702]

- Monitoring of the digester gas sulfur content shall be performed using gas detection tubes calibrated for H₂S; a digital analyzer approved for gaseous fuel analysis; 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 Rules 2201 and 4702]

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the offset, public notification and daily emission limit requirements of Rule 2201. The following recordkeeping conditions will be listed on the permit:

- 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 Rules 2201 and 4702]
- 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]
- The permittee shall maintain records of: (1) the date and time of NO_x, CO, O₂, and NH₃ measurements, (2) the O₂ concentration in percent and the measured NO_x, 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 Rule 2201]
- 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 during commissioning period(s), the type and quantity of fuel used during normal operation, 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]
- Records of hydrogen sulfide analyzer(s) installed or utilized and the calibration records of such analyzer(s) shall be maintained. Records are only required on such analyzer(s) utilized to demonstrate compliance with this permit. [District Rule 2201]
- The permittee shall record total operating time of the engine in hours during the commissioning period. [District Rule 2201]
- {4051} The permittee shall record the total time the engine operates, in hours per calendar year. [District Rule 2201]

- 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

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis (AAQA)

Section 4.14 of District Rule 2201 requires that an 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 District's Technical Services Division conducted the required analysis. Refer to Appendix D 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 PM₁₀ as well as federal and state PM_{2.5} thresholds. As shown by the AAQA summary sheet the proposed equipment will not cause a violation of an air quality standard for PM₁₀ and PM_{2.5}.

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 4001 New Source Performance Standards (NSPS)

This rule incorporates 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.

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

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 engine is a 1,306 bhp SI ICE that was constructed after June 12, 2006 and manufactured after July 1, 2007; therefore, the engine is 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 permits. However, the applicant will be responsible for compliance with the applicable requirements of this regulation.

Rule 4002 National Emission Standards for Hazardous Air Pollutants (NESHAPs)

This rule incorporates NESHAPs from Part 63, 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 63.

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 III, 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 permit. However, the applicant will be responsible for compliance with the applicable requirements of this regulation.

Rule 4101 Visible Emissions

Rule 4101 states that no person shall discharge into the atmosphere emissions of any air contaminant aggregating more than 3 minutes in any hour which is as dark as or darker than Ringelmann 1 (or 20% opacity).

Since the engine is 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 permit as a mechanism 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.

The following nuisance prohibition condition will be included on the permits:

- No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

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 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 D), 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 cancer risk for this project is shown below:

HRA Summary		
Unit	Cancer Risk	T-BACT Required
C-9133-3-0	0.0823 per million	No

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 20 in a million). As outlined by the HRA Summary in Appendix D of this report, the emissions increases for this project was determined to be less than significant.

The following condition will be listed on the permit as a mechanism to ensure compliance.

- The total number of firing hours of this unit without abatement of emissions by the SCR system and oxidation catalyst 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 or oxidation catalyst. 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 Rules 2201 and 4102]
- 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]

Rule 4201 Particulate Matter Concentration

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. The higher of the two emission factors (0.08 g-PM₁₀/bhp-hr and 0.03 g-PM₁₀/bhp-hr) for the engine will be used to demonstrate compliance for the engine:

$$\frac{0.08 \text{ g}}{\text{hp} \cdot \text{hr}} \times \frac{1 \text{ hp} \cdot \text{hr}}{2,545 \text{ Btu}} \times \frac{10^9 \text{ Btu}}{9,100 \text{ dscf}} \times \frac{0.3 \text{ Btu}_{\text{out}}}{1 \text{ Btu}_{\text{in}}} \times \frac{15.43 \text{ grain}}{\text{g}} = 0.02 \frac{\text{grain}}{\text{dscf}}$$

Since 0.02 grain/dscf is less than 0.1 grain/dscf, compliance with this rule is expected.

The following condition will be listed on the permits as a mechanism to ensure compliance:

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

Rule 4701 Internal Combustion Engines – Phase I

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

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

Rule 4702 Internal Combustion Engines

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 IC 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.

The engines are required to immediately comply with the emission limits contained in Table 2 since the applicable compliance dates have passed (except for an operator with at least 12 existing engines at one stationary source); therefore, the emissions limits in Table 1 of Rule 4702 are not applicable to the engine.

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.

Section 5.2.2.2 allows that in lieu of complying with the NO_x emission limit requirement of Section 5.2.2.1.1, an operator may pay an annual fee to the District, as specified in Section 5.6, pursuant to Section 7.6. As shown below, the applicant is proposing to comply with the NO_x emission

limit requirement of Table 2 as required by Section 5.2.2.1.1; therefore, no further discussion is required.

Section 5.2.2.3 allows that in lieu of complying with the NO_x, CO, and VOC limits of Table 2 on an engine-by-engine basis, an operator may elect to implement an alternative emission control plan pursuant to Section 8.0. As shown below, the applicant is proposing to comply with the NO_x, CO, and VOC emission limit requirements of Table 2; therefore, no further discussion is required.

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% O₂, dry)	CO Emission Limit (ppmv @ 15% O₂, dry)	VOC Emission Limit (ppmv @ 15% O₂, dry)
2. e. Lean-Burn, Not Listed Above	11 ppmv	2,000 ppmv	750 ppmv

The engine is operated as a separate stationary source on land leased from an existing dairy, and the District has determined that the engine is a non-agricultural IC engine. The engine is fired on digester gas which does not satisfy the definition of waste gas; therefore, the engine is required to comply with the following emissions limits from Table 2, Row 2.e: 11 ppmvd NO_x, 2,000 ppmvd CO, and 750 ppmvd VOC (all measured @ 15% O₂).

Therefore, the following, previously presented, condition will be listed on the permit as a mechanism to ensure compliance:

- After the commissioning period, emissions from this IC engine shall not exceed any of the following limits: 0.15 g-NO_x/bhp-hr (equivalent to 10 ppmvd NO_x @ 15% O₂), NO_x referenced as NO₂; 0.08 g-PM₁₀/bhp-hr; 2.0 g-CO/bhp-hr (equivalent to 223 ppmvd CO @ 15% O₂); or 0.10 g-VOC/bhp-hr (equivalent to 20 ppmvd VOC @ 15% O₂), VOC referenced as CH₄. [District Rules 2201 and 4702]

Section 5.2.3 applies to spark-ignited engines used exclusively in agricultural operations. As stated above, the engine is operated as part of a separate non-agricultural stationary source; therefore, Section 5.2.3 does not apply to the engine.

Section 5.2.4 applies to certified compression-ignited engines. The engine is not a compression-ignited engine; therefore, Section 5.2.4 does not apply to the engine.

Section 5.2.5 applies to non-certified compression-ignited engines. The engine is not a compression-ignited engine; therefore, Section 5.2.5 does not apply to the engine.

Section 5.3 requires that all continuous emission monitoring systems (CEMS) emissions measurements shall be averaged over a period of 15 consecutive minutes. Any 15-consecutive minute block average CEMS measurement exceeding the applicable emission limits of this rule

shall constitute a violation of this rule. The engine does not have CEMS installed; therefore this section of the rule is not applicable.

Section 5.4 specifies procedures to calculate percent emission reductions if percent emission reductions are used to comply with the NO_x emission limits of Section 5.2. The use of percent emission reductions to comply with Section 5.2 is not being proposed for the engine under this project; therefore, this section of the rule is not applicable.

Section 5.5 requires the operator of an internal combustion engine that uses percent emission reduction to comply with the NO_x emission limits of Section 5.2 shall provide an accessible inlet and outlet on the external control device or the engine as appropriate for taking emission samples and as approved by the APCO. The use of percent emission reductions to comply with Section 5.2 is not being proposed for the engine under this project; therefore, this section of the rule is not applicable.

Section 5.6 specifies procedures that operators of non-agricultural spark-ignited IC engines who elect to comply under Section 5.2.2.2 must use for calculation of the annual emissions fee. The applicant has proposed that the engine complies with the applicable emission limits of Table 2 of District Rule 4702; therefore, payment of annual emissions fees for the engine is not required and this section of the rule is not applicable.

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 SO₂ emissions by at least 95% by weight as determined by the test method specified in Section 6.4.6.

The average sulfur content of the digester gas fuel for the engine is limited to 40 ppmv or 0.04 g/bhp-hr (approximately equal to 0.008 grains sulfur per standard cubic feet³). The following condition will be listed on the permit as a mechanism to ensure compliance:

- The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H₂S. The applicant may utilize an averaging period of up to 24 hours in length for

³

$$0.04 \frac{g}{hp \cdot hr} \times \frac{39275 hp \cdot hr}{MMBtu} \times \frac{MMBtu}{9,100 dscf} \times \frac{0.30 Btu_{out}}{1 Btu_{in}} \times \frac{15.43 grain}{g} = 0.008 \frac{grain}{dscf}$$

demonstration of compliance with the fuel sulfur content limit. [District Rules 2201, 4102, 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 comply with this section of the rule by proposing a pre-approved alternate emissions monitoring plan that specifies that the permittee perform periodic monitoring of NO_x, CO, and O₂ emissions concentrations as specified in District Policy SSP-1810, dated 4/29/04. Therefore, the following condition will be placed on the permit as a mechanism to ensure compliance:

- The permittee shall monitor and record the stack concentration of NO_x, CO, and O₂ at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. 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 if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. 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 engine is 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 engine includes a pre-approved alternate emissions monitoring plan that specifies that the permittee perform periodic NO_x, CO, and O₂ 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 engine does 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 engine includes 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 in this project. Therefore, the following condition will be placed on the permit as a mechanism to ensure compliance:

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

Section 5.8.7 requires that for each engine, the operator 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, the operator shall 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, the operator shall 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 permit as a mechanism to ensure compliance:

- The permittee shall monitor and record the stack concentration of NO_x, CO, and O₂ at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. 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 if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. 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 permit for the engine includes a pre-approved alternate emissions monitoring plan that requires periodic NO_x, CO, and O₂ 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 (AECPP) 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 engine; 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 engine is 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 SO_x 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 permit as a mechanism 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 requires operators of engines used exclusively in agricultural operations that are not required to have a Permit-to-Operate pursuant to California Health and Safety Code Section 42301.16 but are required to comply with Section 5.2 of Rule 4702 shall register such engines pursuant to Rule 2250 (Permit-Exempt Equipment Registration). The engine is required to have a District Permit to Operate; 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 the engines:

- 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 engines are 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 engine evaluated under 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 permit as a mechanism to ensure compliance:

- 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]

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 presented, condition will be listed on the permit as a mechanism 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 engines 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 Sections 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 NO_x 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 condition will be included in the permit as a mechanism to ensure compliance:

- Source testing to measure NO_x, CO, VOC, and ammonia (NH₃) emissions from this unit shall be conducted at least once every 24 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 permit as a mechanism 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. NO_x, 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 engine is fueled by 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 engine; 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 following test procedures or any other method approved by EPA and the APCO:

- 6.4.1 Oxides of nitrogen - EPA Method 7E, or ARB Method 100.
- 6.4.2 Carbon monoxide - EPA Method 10, or ARB Method 100.
- 6.4.3 Stack gas oxygen - EPA Method 3 or 3A, or ARB Method 100.
- 6.4.4 Volatile organic compounds - EPA Method 25A or 25B, or ARB Method 100. Methane and ethane, which are exempt compounds, shall be excluded from the result of the test.
- 6.4.5 Operating horsepower determination - any method approved by EPA and the APCO.
- 6.4.6 SO_x Test Methods
 - 6.4.6.1 Oxides of sulfur – EPA Method 6C, EPA Method 8, or ARB Method 100.
 - 6.4.6.2 Determination of total sulfur as hydrogen sulfide (H₂S) content – EPA Method 11 or EPA Method 15, as appropriate.
 - 6.4.6.3 Sulfur content of liquid fuel – American Society for Testing and Materials (ASTM) D 6920-03 or ASTM D 5453-99.
 - 6.4.6.4 The SO_x emission control system efficiency shall be determined using the following:
% Control Efficiency = $[(C_{SO_2, \text{inlet}} - C_{SO_2, \text{outlet}}) / C_{SO_2, \text{inlet}}] \times 100$
Where:
C_{SO₂, inlet} = concentration of SO_x (expressed as SO₂) at the inlet side of the SO_x emission control system, in lb/Dscf
C_{SO₂, outlet} = concentration of SO_x (expressed as SO₂) at the outlet side of the SO_x emission control system, in lb/Dscf
- 6.4.7 The Higher Heating Value (hhv) of the fuel shall be determined by one of the following test methods:
 - 6.4.7.1 ASTM D 240-02 or ASTM D 3282-88 for liquid hydrocarbon fuels.
 - 6.4.7.2 ASTM D 1826-94 or ASTM 1945-96 in conjunction with ASTM D 3588-89 for gaseous fuel.

The following conditions will be listed on the permit as a mechanism to ensure compliance:

- The following methods shall be used for source testing: NO_x (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 Method 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 content 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.

The engine is equipped with an SCR system for control of NO_x and oxidation catalyst for control of CO and VOC. Therefore, the requirements of Sections 6.5.2 through 6.5.9 are applicable to the engine.

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.

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.

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 engine is operated and maintained per the manufacturer's specifications.

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.

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.

NO_x Emissions:

In order to satisfy the I&M requirements for NO_x emissions, the applicant has proposed to perform the following:

1. The applicant will take periodic NO_x emission concentration measurements with a portable analyzer at least once every calendar quarter.
2. To ensure that NO_x emissions concentrations are not being exceeded between periodic NO_x portable analyzer measurements, the applicant is proposing to determine a correlation between the SCR system's reagent injection rate and NO_x emissions. The appropriate ranges for each operating load will be established during initial source testing and will be monitored at least once per month.

Therefore, the following conditions will be listed on the permit as a mechanism to ensure compliance:

- The SCR system reagent injection rate may be reestablished during a performance test by monitoring the SCR system reagent injection rate concurrently with each testing run to reestablish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges may be reestablished for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable SCR system reagent injection rate(s) demonstrated during the performance test that result in compliance with the NO_x emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]
- If the SCR system reagent injection rate is outside of the established acceptable range, the permittee shall return the SCR system reagent injection rate to within the established acceptable range as soon as possible, but no longer than 8 hours after detection. If the SCR system reagent injection rate is not returned to within acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of NO_x and O₂ at least once every month. Monthly monitoring of the stack concentration of NO_x and O₂ shall continue until the operator can show that the SCR system reagent injection rate is returned to operating within the acceptable ranges specified within this permit. [District Rule 4702]

- The permittee shall monitor and record the SCR system reagent injection rate and the engine operating load at least once per month. [District Rule 4702]
- The permittee shall monitor and record the stack concentration of NO_x, CO, and O₂ at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. 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 if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. 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. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4102]
- If the NO_x, CO, or NH₃ concentrations corrected to 15% O₂, as measured by the portable analyzer or the District-approved ammonia monitoring equipment, exceed the respective permitted emissions concentration(s), the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours of operation after detection. If the portable analyzer or ammonia monitoring equipment readings continue to exceed the permitted emissions concentration(s) after 8 hours of operation after detection, 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 the performing the notification and testing required by this condition. [District Rules 2201 and 4702]

In order to satisfy the I&M requirements for CO and VOC emissions, the applicant has proposed to perform the following:

1. The applicant will take periodic CO emission concentration measurements with a portable analyzer at least once every calendar quarter. Per the catalyst manufacturer, if the oxidation catalyst is controlling CO emissions, it should also be achieving the desired removal efficiency for VOC emissions. Therefore, quarterly emission concentration measurements with a portable analyzer for VOC emissions will not be required.

2. To ensure that CO and VOC emissions concentrations are not being exceeded between periodic CO emission concentration measurements, the applicant proposed to determine a correlation between the catalyst control system inlet exhaust temperature and back pressure. The appropriate ranges for each operating load were established during initial source testing and will be monitored at least once per month.

Therefore, the following conditions will be listed on the permit as a mechanism to ensure compliance:

- The inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system may be reestablished during a performance test by monitoring concurrently with each testing run to reestablish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges may be reestablished for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system demonstrated during the performance test that result in compliance with the CO and VOC emission limits shall be imposed as a condition in the Permit to Operate [District Rule 4702]
- The permittee shall monitor and record the inlet temperature to the SCR system, the back pressure of the exhaust upstream of the catalyst control system, and the engine operating load at least once per month. [District Rule 4702]
- If the inlet temperature to the catalyst control system and/or the back pressure of the exhaust upstream of the catalyst control system is outside of the established acceptable ranges established during the initial compliance test, the permittee shall return the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system back to the acceptable range as soon as possible, but no longer than 8 hours after detection. If the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system are not returned to within acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of CO and O₂ at least once every month. Monthly monitoring of the stack concentration of CO and O₂ shall continue until the operator can show that the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system are returned to operating within the acceptable ranges specified within this permit. [District Rule 4702]
- The permittee shall monitor and record the stack concentration of NO_x, CO, and O₂ at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. 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 if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. Records must be maintained of the

dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]

- If the NO_x, CO, or NH₃ concentrations corrected to 15% O₂, as measured by the portable analyzer or the District-approved ammonia monitoring equipment, exceed the respective permitted emissions concentration(s), the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours of operation after detection. If the portable analyzer or ammonia monitoring equipment readings continue to exceed the permitted emissions concentration(s) after 8 hours of operation after detection, 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 the performing the notification and testing required by this condition. [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 permit as a mechanism 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 (AECPP) option of Section 8.0. The engine was 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 (AECPP) 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 engine; 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 proposed engine is not currently being proposed; therefore, this section of the rule is not applicable at this time.

Conclusion

As shown above, the engine satisfies all the requirements of Rule 4702. The following conditions will be added to the permit as a mechanism to ensure continued compliance:

- {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]
- {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]

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 SO₂) shall not exceed 0.2% by volume. Using the ideal gas equation, the sulfur compound emissions are calculated as follows:

$$\text{Volume of SO}_x \text{ as (SO}_2\text{)} = (n \times R \times T) \div P$$

Where:

n = moles SO_x

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

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

To demonstrate compliance with the sulfur compound emission limit of Rule 4801, the maximum sulfur compound emissions from the engine will be calculated using the maximum sulfur content allowed for the digester gas, which is 40 ppmv, equivalent to 0.00965 lb-SO_x/MMBtu.

$$0.00965 \frac{\text{lb}}{\text{MMBtu}} \times \frac{1 \text{ MMBtu}}{9,100 \text{ scf}_{\text{exhaust}}} \times \frac{1 \text{ lb} \cdot \text{mol}}{64 \text{ lb} \cdot \text{SO}_2} \times \frac{10.73 \text{ psi} \cdot \text{ft}^3}{\text{lb} \cdot \text{mol} \cdot \text{°R}} \times \frac{520 \text{ °R}}{14.7 \text{ psi}} \times 1,000,000 \text{ ppm} = 6.29 \text{ ppmv}$$

Since 6.29 ppmv is ≤ 2000 ppmv, the engine is expected to comply with Rule 4801. The following condition will be placed on the permit as a mechanism to ensure compliance:

- The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H₂S. The applicant may utilize an averaging period of up to 24 hours in length for demonstration of compliance with the fuel sulfur content limit. [District Rules 2201, 4702, and 4801]

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 prepared 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 installation of an IC engine that will combust dairy digester gas to produce electricity. The digester system at this facility diverts manure from an adjacent dairy to covered lagoon digester(s), which will result in the capture of the methane that would otherwise be released into the atmosphere from open basin(s)/pond(s) at the dairy. Combustion of the dairy digester gas in the engine 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 digester(s) will result in a large net decrease in the global warming potential emitted from the dairy when compared to uncontrolled 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 the activity will occur at an existing facility and the project involves negligible expansion of the existing or former use. Furthermore, the District determined that the activity will not have a

significant effect on the environment. Therefore, 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 common sense exemption that CEQA applies only to projects which have the potential for causing a significant effect on the environment (CEQA Guidelines §15061(b)(3)).

Indemnification Agreement/Letter of Credit Determination

According to District Policy APR 2010 (CEQA Implementation Policy), when the District is the Lead or Responsible Agency for CEQA purposes, an indemnification agreement and/or a letter of credit may be required. The decision to require an indemnity agreement and/or a letter of credit is based on a case-by-case analysis of a particular project’s potential for litigation risk, which in turn may be based on a project’s potential to generate public concern, its potential for significant impacts, and the project proponent’s ability to pay for the costs of litigation without a letter of credit, among other factors.

The criteria pollutant emissions and toxic air contaminant emissions associated with the proposed project are not significant, and there is minimal potential for public concern for this particular type of facility/operation. Therefore, an Indemnification Agreement and/or a Letter of Credit will not be required for this project in the absence of expressed public concern.

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful NSR Public Noticing period, issue ATC C-9133-3-0 subject to the permit conditions on the attached draft ATC in Appendix A.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
C-9133-3-0	3020-10-F	1,306 bhp IC engine	\$900.00

Appendixes

- A: Draft ATC
- B: BACT Guideline
- C: BACT Analysis
- D: RMR and AAQA Summary
- E: Quarterly Net Emissions Change

APPENDIX A
Draft ATC

*San Joaquin Valley
Air Pollution Control District*

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT
DRAFT

PERMIT NO: C-9133-3-0

LEGAL OWNER OR OPERATOR: LONE OAK ENERGY LLC
MAILING ADDRESS: 2911 HANFORD ARMONA RD
HANFORD, CA 93230

LOCATION: 10014 S MCMULLIN GRDE
FRESNO, CA 93706

EQUIPMENT DESCRIPTION:

1,306 BHP CATERPILLAR MODEL G3516LE DIGESTER GAS-FIRED LEAN-BURN IC ENGINE WITH A HUG ENGINEERING MODEL COMBIKAT CATALYST SYSTEM (SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM WITH OXIDATION CATALYST) POWERING AN ELECTRICAL GENERATOR

CONDITIONS

1. This Authority to Construct (ATC) cancels and supersedes ATC C-9133-1-0. [District Rule 2201]
2. {1407} All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201]
3. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. {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]
6. {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]
7. {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]
8. {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]
9. This engine shall be fired on digester gas fuel only. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (559) 230-5950 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.

Samir Sheikh, Executive Director / APCO

Arnaud Marjolle, Director of Permit Services

C-9133-3-0 : Jan 21 2020 6:32PM - GARCIAJ : Joint Inspection NOT Required

10. The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H₂S. The applicant may utilize an averaging period of up to 24 hours in length for demonstration of compliance with the fuel sulfur content limit. [District Rules 2201, 4702 and 4801]
11. This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rules 2201 and 4702]
12. The owner/operator shall minimize the emissions from the engine to the maximum extent possible during the commissioning period. [District Rule 2201]
13. Commissioning activities are defined as, but not limited to, all adjustments, 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]
14. Commissioning period shall commence when all mechanical, electrical, and control systems are installed and individual system startup has been completed, or when the engine is first fired, whichever occurs first. The commissioning period shall terminate when the initial engine tuning has completed 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]
15. The total number of firing hours of this unit without abatement of emissions by the SCR system and oxidation catalyst 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 or oxidation catalyst. 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]
16. 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]
17. 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]
18. 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]
19. Emission rates from this engine unit during the commissioning period shall not exceed any of the following limits: 1.0 g-NO_x/bhp-hr, 0.08 g-PM₁₀/bhp-hr, 4.4 g-CO/bhp-hr, 1.1 g-VOC/bhp-hr. [District Rule 2201]
20. The permittee shall record total operating time of the engine in hours during the commissioning period. [District Rule 2201]
21. Operation of this engine shall not exceed 8,500 hours per year. [District Rule 2201]
22. After the commissioning period, emissions from this IC engine shall not exceed any of the following limits: 0.15 g-NO_x/bhp-hr (equivalent to 10 ppmvd NO_x @ 15% O₂), NO_x referenced as NO₂; 0.08 g-PM₁₀/bhp-hr; 2.0 g-CO/bhp-hr (equivalent to 223 ppmvd CO @ 15% O₂); or 0.10 g-VOC/bhp-hr (equivalent to 20 ppmvd VOC @ 15% O₂), VOC referenced as CH₄. [District Rules 2201 and 4702]
23. 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]
24. 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]
25. Ammonia (NH₃) emissions from this engine shall not exceed 10 ppmvd @ 15% O₂. [District Rules 2201 and 4102]

26. Source testing to measure NO_x, CO, VOC, PM₁₀, and ammonia (NH₃) emissions from this unit shall be conducted within 60 days upon end of the commissioning period. [District Rules 1081, 2201 and 4702]
27. Source testing to measure NO_x, CO, VOC, and ammonia (NH₃) emissions from this unit shall be conducted at least once every 24 months. [District Rules 1081, 2201 and 4702]
28. 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 content analysis shall be maintained and provided to the District upon request. [District Rules 2201 and 4702]
29. {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]
30. 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. NO_x, CO, VOC, and NH₃ concentrations shall be reported in ppmv, corrected to 15% oxygen. [District Rules 2201 and 4702]
31. The following methods shall be used for source testing: NO_x (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]
32. 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]
33. {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]
34. The results of each source test shall be submitted to the District within 60 days after completion of source test. [District Rule 1081]
35. 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]
36. Monitoring of the digester gas sulfur content shall be performed using gas detection tubes calibrated for H₂S; a digital analyzer approved for gaseous fuel analysis; 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]
37. 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 NO_x, 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]

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38. The permittee shall monitor and record the stack concentration of NO_x, CO, and O₂ at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. 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 if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]
39. 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]
40. If the NO_x, CO, or NH₃ concentrations, as measured by the portable analyzer or the District-approved ammonia monitoring equipment, exceed the respective permitted emissions concentration(s), the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours of operation after detection. If the portable analyzer or ammonia monitoring equipment readings continue to exceed the permitted emissions concentration(s) after 8 hours of operation after detection, 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 the performing the notification and testing required by this condition. [District Rules 2201 and 4702]
41. {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]
42. The permittee shall maintain records of: (1) the date and time of NO_x, CO, O₂, and NH₃ measurements, (2) the O₂ concentration in percent and the measured NO_x, 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]
43. The permittee shall monitor and record the SCR system reagent injection rate and the engine operating load at least once per month. [District Rule 4702]
44. During initial performance testing, the SCR system reagent injection rate shall be monitored concurrently with each testing run to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges shall be established for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable SCR system reagent injection rate(s) demonstrated during the initial performance test that result in compliance with the NO_x emission limits shall be imposed as a condition in the final Permit to Operate. [District Rule 4702]
45. The SCR system reagent injection rate may be reestablished during a performance test by monitoring the SCR system reagent injection rate concurrently with each testing run to reestablish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges may be reestablished for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable SCR system reagent injection rate(s) demonstrated during the performance test that result in compliance with the NO_x emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]

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46. If the SCR system reagent injection rate is outside of the established acceptable ranges established during the initial compliance test, the permittee shall return the SCR system reagent injection rate to within the established acceptable range as soon as possible, but no longer than 8 hours after detection. If the SCR system reagent injection rate is not returned to within an acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of NO_x and O₂ at least once every month. Monthly monitoring of the stack concentration of NO_x and O₂ shall continue until the operator can show that the SCR system reagent injection rate is returned to operating within the acceptable ranges specified within this permit. [District Rule 4702]
47. During initial performance testing, the inlet temperature to the SCR system and the back pressure of the exhaust upstream of the catalyst control system shall be monitored concurrently with each testing run to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges shall be established for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). For each operating load, the established acceptable inlet temperature and back pressure ranges demonstrated during the initial performance test that result in compliance with the CO emission limits shall be imposed as a condition in the final Permit to Operate. [District Rule 4702]
48. The inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system may be reestablished during a performance test by monitoring concurrently with each testing run to reestablish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges may be reestablished for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system demonstrated during the performance test that result in compliance with the CO and VOC emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]
49. The permittee shall monitor and record the inlet temperature to the SCR system, the back pressure of the exhaust upstream of the catalyst control system, and the engine operating load at least once per month. [District Rule 4702]
50. If the inlet temperature to the SCR system and/or the back pressure of the exhaust upstream of the catalyst control system is outside of the acceptable ranges established during the initial compliance test, the permittee shall return the inlet temperature to the SCR system and/or the back pressure of the exhaust upstream of the catalyst control system back to the acceptable range as soon as possible, but no longer than 8 hours after detection. If the inlet temperature to the SCR system and/or the back pressure of the exhaust upstream of the catalyst control system is not returned to within an acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of CO and O₂ at least once every month. Monthly monitoring of the stack concentration of CO and O₂ shall continue until the operator can show that the inlet temperature to the SCR system and/or the back pressure of the exhaust upstream of the catalyst control system are returned to operating within the acceptable ranges specified within this permit. [District Rule 4702]
51. {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]
52. 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 during commissioning period(s), the type and quantity of fuel used during normal operation, 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]
53. Records of hydrogen sulfide analyzer(s) installed or utilized and the calibration records of such analyzer(s) shall be maintained. Records are only required on such analyzer(s) utilized to demonstrate compliance with this permit. [District Rule 2201]
54. {4051} The permittee shall record the total time the engine operates, in hours per calendar year. [District Rule 2201]

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55. 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]

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APPENDIX B
BACT Guideline

SJVAPCD Best Available Control Technology (BACT) Guideline 3.3.15*
 Last Update: 3/6/2013

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 ₂ S) (dry absorption, wet absorption, chemical H ₂ S 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 ₂ S)		
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)

** 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 - Permit Specific BACT Determinations on Next Pages**

APPENDIX C
BACT Analysis

Top-Down BACT Analyses for the Digester Gas-Fired Engine

As stated above, the information from the existing District BACT Guideline 3.3.15 for Waste Gas-Fired IC Engines will be utilized for the BACT analysis for the proposed engine.

I. BACT Analysis for NO_x Emissions:

a. Step 1 - List all control technologies

- 1) NO_x emissions ≤ 0.15 g/bhp-hr = 10 ppmv NO_x @ 15% O₂⁴ (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 = 1.1 ppmv NO_x @ 15% O₂⁵) (Alternate Basic Equipment)
- 3) Microturbine (< 9 ppmv NO_x @ 15% O₂) (Alternate Basic Equipment)
- 4) Gas Turbine (< 9 ppmv NO_x @ 15% O₂) (Alternate Basic Equipment)

Description of Control Technologies

1) NO_x emissions ≤ 0.15 g/bhp-hr (10 ppmv NO_x @ 15% O₂) (Selective Catalytic Reduction (SCR) or equivalent) (Achieved in Practice)

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, water vapor, and other by-products. The use of a catalyst typically reduces the NO_x emissions by up to 90%.

2) Fuel Cell (≤ 0.05 lb- NO_x/MW-hr) (Alternate Basic Equipment)

Fuel cells use an electrochemical process to produce a direct electric current without the combustion of fuel. Fuel cells use externally supplied reactant gases (hydrogen and oxygen) that are combined in a catalytic process. Like a battery, the electric potential generated by a fuel cell is accessed by connecting an external load to the anode and cathode plates of the fuel cell. Because the fuel for a fuel cell is supplied externally, it does not run down like a battery. However, the fuel cell stack must be periodically replaced because of deactivation of catalytic materials contained in the fuel cell, which results in reduced conversion efficiencies. Since fuel cells require pure hydrogen gas for fuel, hydrocarbons used to power fuel cells must be purified and reformed prior to use. The reformation process can occur in an external fuel processor or through internal reforming in the fuel cell. Both molten carbonate fuel cells and

$$^4 \frac{0.15 \text{ g NO}_x}{\text{bhp} \cdot \text{hr}} \times \frac{\text{MMBtu}}{9,100 \text{ dscf}} \times \frac{30\%}{1} \times \frac{1 \text{ lb} \cdot \text{mol}}{46 \text{ lb}} \times \frac{20.9 - 15}{20.9} \times \frac{379.5 \text{ dscf}}{1 \text{ lb mol}} \times \frac{393.75 \text{ bhp} \cdot \text{hr}}{\text{MMBtu}} \times \frac{\text{lb}}{453.6 \text{ g}} = 10 \text{ ppmv @ 15 \% O}_2$$

$$^5 \frac{0.05 \text{ lb NO}_x}{\text{MW} \cdot \text{hr}} \times \frac{\text{MW}}{1,341 \text{ bhp}} \times \frac{\text{MMBtu}}{9,100 \text{ dscf}} \times \frac{30\%}{1} \times \frac{1 \text{ lb} \cdot \text{mol}}{46 \text{ lb}} \times \frac{20.9 - 15}{20.9} \times \frac{379.5 \text{ dscf}}{1 \text{ lb mol}} \times \frac{393.75 \text{ bhp} \cdot \text{hr}}{\text{MMBtu}} = 1.1 \text{ ppmv @ 15 \% O}_2$$

solid oxide fuel cells can internally reform the hydrocarbon fuel to hydrogen for use in the fuel cell. Additionally, these high temperature fuel cells are tolerant of CO₂ that is found in digester gas.

Fuel cells have recently been commercialized and offer the advantages of high efficiency, nearly negligible emissions, and very quiet power generation. The greatest deterrent to increased use of fuel cells is the significantly higher expense when compared to other generation technologies. These higher costs include the initial capital expense and, for digester gas installations, the increased ongoing expenses associated with the extensive cleanup required to remove contaminants that can poison fuel cell catalysts. Although this expense can be substantial, digester gas-fueled fuel cells have been installed at some wastewater treatment plants and fuel cells have also been fueled with other types of biogas (e.g. landfill gas and brewery wastewater gas).

3) Gas Turbine (< 9 ppmv NO_x @ 15% O₂) (Alternate Basic Equipment)

Gas turbines are internal combustion engines that operate on the Brayton (Joule) combustion cycle rather than the Otto combustion cycle used in reciprocating internal combustion engines or the diesel cycle for diesel engines. In the Brayton cycle the air flow and fuel injection are steady, and the different parts of the cycle occur continuously within different components of the system. In a gas turbine, fuel is continually injected into the combustion chamber or combustor and air is constantly drawn into the turbine and compressed. All elements of the Brayton cycle occur simultaneously in a gas turbine.

Gas turbines are one of the cleanest means of generating electricity. With the use of lean pre-mixed combustion or catalytic exhaust cleanup, NO_x emissions from large gas-fired turbines are generally in the single-digit ppmv range. These levels are generally for natural gas-fired units but they are considered technologically feasible for digester gas-fired units.

Gas turbines are available in sizes ranging from 500 kW - 25 MW. Based on contacts with turbine suppliers, digester gas-fired turbines used to produce electricity are expected to be available in the size range of 2 - 7 MW. According to Solar Turbines, the smaller digester gas-fired turbines are no longer actively produced or marketed since this size range is generally covered by other generation technologies such as reciprocating IC engines and microturbines.

4) Microturbine (< 9 ppmv NO_x @ 15% O₂) (Alternate Basic Equipment)

Microturbines are small gas turbines rated between 25 kW and 500 kW that burn gaseous and liquid fuels to generate electricity or provide mechanical power. Microturbines were developed from turbocharger technologies found in large trucks and the turbines in aircraft auxiliary power units. Microturbines can be operated on a wide variety of fuels, including natural gas, liquefied petroleum gas, gasoline, diesel, landfill gas, and digester gases. According to the California Air Resources Board (ARB), there were approximately 200 digester gas-fired microturbines operating in

California as of the year 2006.⁶ Microturbines generally have electrical efficiencies of 25 - 30%; however, the electrical efficiency of larger microturbines (≥ 200 kW) can range from 30 - 33%. Microturbine manufacturers include Capstone Microturbines and FlexEnergy.

Microturbines without add-on controls can meet very stringent emission limits and have significantly lower emissions of NO_x, CO, and VOC than uncontrolled reciprocating engines because most microturbines operating on gaseous fuels utilize lean premixed (dry low NO_x, or DLN) combustion technology. Microturbines manufacturers will generally guarantee NO_x emissions of 9 - 15 ppmv @ 15% O₂. However, several emission tests performed on digester gas-fired microturbines have demonstrated even lower emissions. A small number of dairy digester gas-fired microturbines have been installed⁷, including Twin Birch Dairy and New Hope Farm View dairy and Twin Birch Dairy in New York, and den Dulk Dairy in Michigan.

The proposed project is for a large waste gas to energy facility and, although larger microturbines have recently become available, several microturbines (at least 5) would still be required to replace each engine. The applicant states that when they investigated microturbines they found that there were difficulties related to the loss of power and efficiency because of heat de-rating in warmer climates and the very high pressure requirement and parasitic load, which increased overall costs. In addition, a different applicant for digester gas projects recently permitted by the District (Projects S-1143770 and S-1143771) indicated that when they investigated microturbines they found that they could not secure the necessary financing for a waste gas to energy project of this size using microturbines and that the major microturbines vendors were unable to secure the debt. Although microturbines may not currently be a practical option for this particular project, they will be considered in the cost analysis below.

b. Step 2 - Eliminate technologically infeasible options

Option 3 - Gas Turbine (≤ 9 ppmv NO_x @ 15% O₂) (Alternate Basic Equipment)

Option 3, Gas Turbine, was determined to be infeasible for the proposed project because 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 cost information given in the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies⁸ (March 2015) and the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]⁹ (October 5, 2015) also supports that gas turbines rated approximately 3 MW are not generally available. The smallest turbine

⁶ "Staff Report: Initial Statement of Reasons for Proposed Amendments to the Distributed Generation Certification Regulation" (9/1/2006), Cal EPA - ARB, Executive Summary Pg. ii (<http://www.arb.ca.gov/regact/dg06/dgisor.pdf>)

⁷ See EPA AgStar Program "AgStar Project Profiles", <http://www2.epa.gov/agstar/agstar-project-profiles>

⁸ US EPA Combined Heat and Power Partnership "Catalog of CHP Technologies" (March 2015)
<http://www.epa.gov/chp/catalog-chp-technologies>

⁹ SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] (October 5, 2015)
<http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=7889>

for which the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies provides cost information is 3,304 kW and the smallest turbine for which the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] provides cost information is 2,500 kW.

The proposed project would require a gas turbine rated 1,028 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

- 1) Fuel Cell (≤ 0.05 lb/MW-hr ≈ 1.5 ppmv NO_x @ 15% O₂) (Alternate Basic Equipment)
- 2) Digester gas-fueled microturbines (Alternate Basic Equipment)
- 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)

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. In accordance with the District’s Revised BACT Cost Effectiveness Thresholds Memo (5/14/08), to determine the cost effectiveness of particular technologically feasible control options or alternate equipment options, the amount of emissions resulting from each option will be quantified and compared to the District Standard Emissions allowed by the District Rule that is applicable to the particular unit. The emission reductions will be equal to the difference between the District Standard Emissions and the emissions resulting from the particular option being evaluated.

The District has determined that the proposed digester gas-fueled IC engine is a non-agricultural IC engine. The lean burn, digester gas-fired, engine is subject to the following emission limits for non-agricultural, lean burn, waste gas fueled IC engines contained in District Rule 4702, Section 5.2.2, Table 2, 2.e: 11 ppmvd NO_x (or 0.17 g/bhp-hr)¹⁰, 2,000 ppmvd CO, and 750 ppmvd VOC (all measured @ 15% O₂). The proposed digester gas-fired digester engine is also subject to the New Source Performance Standards (NSPS) for IC Engines contained in 40 CFR 60 Subpart JJJJ, which includes a VOC emissions limit of 1.0 g/bhp-hr (or 80 ppmv @ 15% O₂ reported as propane) for landfill and digester gas-fired IC engines. Therefore, the District Standard Emissions used for the BACT cost analysis below for the proposed engine will be based on the emission limits contained in these applicable regulations.

¹⁰

$$\frac{11 \text{ ft}^3 \text{ NO}_x}{10^6 \text{ ft}^3} \times \frac{9,100 \text{ ft}^3}{1 \text{ MMBtu}} \times \frac{46 \text{ lb NO}_x}{1 \text{ lb - mole}} \times \frac{20.9}{20.9 - 15} \times \frac{1 \text{ lb - mole}}{379.5 \text{ ft}^3} \times \frac{\text{MMBtu}}{392.75 \text{ bhp - hr}} \times \frac{453.6 \text{ g}}{\text{lb}} \times \frac{\text{Btu}_{in}}{0.30 \text{ Btu}_{out}} = 0.17 \frac{\text{g - NO}_x}{\text{bhp - hr}}$$

Option 1: Fuel Cells (≤ 0.05 lb/MW-hr ≈ 1.5 ppmv NO_x @ 15% O₂) (Alternate Basic Equipment)

Because fuel cells have reduced 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. The following cost analysis will examine if the replacement of the proposed engine with a fuel cell is cost effective even when the additional operation costs of a fuel cell are not considered.

Assumptions

- Digester Gas F-Factor: 9,100 dscf/MMBtu (dry, adjusted to 60 °F)
- Higher Heating Value for Dairy Digester Gas: 700 Btu/scf
- Molar Specific Volume = 379.5 scf/lb-mol (at 60°F)
- Price for electricity: \$127.72/MW-hr (based on the California Bioenergy Market Adjusting Tariff (BioMAT) initial contract price offered by Investor Owned Utilities (PG&E, SCE, and SDG&E)¹¹ beginning June 1, 2016)
- MMBtu/hr to bhp conversion: 392.75 (per AP-42, Appendix A)
- Btu to kW-hr conversion: 3,413 Btu/kW-hr (per AP-42, Appendix A)
- The initial capital costs and the operation costs for the digester gas-fueled IC engine and fuel cell will be based on information given in the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies⁸ and the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]⁹
- Because the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies only provides cost information for natural gas-fueled engines and fuel cells, additional capital costs for the use of digester gas are taken from the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]⁹

Assumptions for the Proposed Digester Gas-Fired IC Engine

- The engine will operate at full load for 24 hours/day and 8,500 hours/year
- Typical thermal efficiencies for IC engines range from 30-35%. A worst case thermal efficiency of 30% will be used.
- The maximum total daily heating value of the digester gas used by the engine will be: 266.02 MMBtu/day ($1,306 \text{ bhp}_{out}/engine \times 1 \text{ bhp}_{in}/0.30 \text{ bhp}_{out} \times 1 \text{ MMBtu}_{in}/392.75 \text{ bhp}_{in}\text{-hr} \times 24 \text{ hr/day}$)
- The maximum total annual heating value for of the digester gas used by the engine will be: 94,216 MMBtu/year ($1,306 \text{ bhp}_{out}/engine \times 1 \text{ bhp}_{in}/0.30 \text{ bhp}_{out} \times 1 \text{ MMBtu}_{in}/392.75 \text{ bhp}_{in}\text{-hr} \times 8,500 \text{ hr/year}$)
- Estimated purchase and installation cost for CHP IC engine rated approximately 1,028 kW without add-on air pollution control equipment: \$1,223/kW (average of interpolated

¹¹ See: <http://www.pge.com/en/b2b/energysupply/wholesaleelectricssuppliersolicitation/BioMAT/index.page>, <https://scebiomat.accionpower.com/biomat/home.asp>, and <http://www.sdge.com/procurement/bioenergy-market-adjusting-tariff-bio-mat>

values from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies on page 2-15 and SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] on page A-33)

- Additional capital investment for digester gas conditioning and cleanup for the engine: \$387/kW (SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report])
- Total Installation Cost for digester-fueled IC engine rated 1,028 kW: \$1,610/kW
- Estimated operation costs for CHP IC engine rated 1,028 kW without add-on air pollution control costs: \$0.028/kW-hr (average of interpolated values from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies on page 2-17 and SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] on page A-33)
- The SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] indicates that digester gas conditioning/cleanup costs are highly dependent on the quantity of digester gas being processed and contaminants being removed and that the differences in clean-up costs for digester gas-fired IC engines, microturbines, and gas turbines “reflect the greater rigor in the removal of the hydrogen sulfide”. The digester gas used to fuel the engine must be limited to a sulfur content of no more than 40 ppmv as H₂S to satisfy BACT for SO_x. Because required level of sulfur removal is adequate for use in the engine, there will be no increase in operating costs related to cleaning the digester gas for use in the engine.
- Rule 4702 NO_x emission limit for non-agricultural, lean burn IC engines: 11 ppmv @ 15% O₂ = 0.165 lb/MMBtu
- Rule 4702 VOC emission limit for non-agricultural, lean burn IC engines: 750 ppmv @ 15% O₂ as CH₄ = 1.0193 lb/MMBtu
- 40 CFR 60 Subpart JJJJ VOC emission limit for landfill and digester gas-fired IC engines: 1.0 g/bhp-hr (or 80 ppmv @ 15% O₂ reported as propane)

Assumptions for Fuel Cell System

- Net electrical efficiency for a molten carbonate fuel cell (MCFC): 45% (US EPA Combined Heat and Power Partnership Catalog of CHP Technologies gives efficiencies of 47% for a 300 kW MCFC and 42.5% for a 1,400 kW MCFC)
- Size of fuel cell system needed to replace the proposed engine: 1,463 kW (estimated based on 266.02 MMBtu/day and 45% efficiency¹²)
- Estimated Purchase and Installation Cost for Molten Carbonate Fuel Cell: \$4,474/kW (Average of the two costs for largest Molten Carbonate Fuel Cells given in US EPA Combined Heat and Power Partnership document Catalog of CHP Technologies on page 6-16 and SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] on page A-13; The U.S. Department of Energy Federal energy management Program (FEMP) document “Fuel Cells and Renewable Energy” (last updated 12-1-2014 and available at: <http://www.wbdg.org/resources/fuelcell.php>)

¹² $\frac{266.02 \text{ MMBtu}}{\text{day}} \times \frac{\text{kW} \cdot \text{hr}}{3,410 \text{ Btu}} \times \frac{10^6 \text{ Btu}}{\text{MMBtu}} \times \frac{\text{day}}{24 \text{ hrs}} \times 45\% = 1,463 \text{ kW}$

states, "Installation costs of a fuel cell system can range from \$5,000/kW to \$10,000/kW." Therefore, this estimate may be actually too low based on the recently reported costs for fuel cell power plants, such as the "Bloom Box".)

- Additional capital investment for digester gas conditioning and cleanup for the fuel cell: \$563/kW (SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report])
- Total Installation Cost for digester gas-fueled fuel cells rated $\geq 1,200$ kW (the larger the capacity, the cheaper the cost) will be used: \$5,037/kW
- Typical operation costs for natural gas-fueled fuel cells, including stack replacement costs: \$0.04/kW-hr (SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report])
- Additional operational costs for digester gas conditioning and cleanup for large fuel cells: \$0.15/kW-hr (SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report])
- Total Operation Cost for digester gas-fueled fuel cells rated $\geq 1,200$ kW (conservatively using the cheaper cost of the larger capacity fuel cell): \$0.19/kW-hr
- Unlike the proposed engine, a high-temperature fuel cell power plant must primarily operate at steady state conditions; there would not be the ability to store gas to generate more electricity during peak hours, which is the current business plan of the applicant. Because the price paid for electricity is greater during peak hours and less during other times, the price paid for electricity generated by a fuel cell power plant would be less. This would require the operator to alter their plans of operation and result in less revenue per kW-hr of electricity generated potentially offsetting the revenue from increased power generating capacity because of the higher efficiency of a fuel cell power plant. For more conservative analysis, the difference in the cost of peak and off-peak electricity was not considered in this comparison.

Capital Cost

The estimated increased incremental capital cost for replacement of the proposed engine with a fuel cell is calculated based on the difference in cost of a fuel cell power plant and the proposed IC engine.

The incremental capital cost for replacement of the proposed IC engine with a fuel cell power plant is calculated as follows:

$$(1,463 \text{ kW} \times \$5,037/\text{kW}) - (1,028 \text{ kW} \times \$1,610/\text{kW}) = \$5,714,051$$

Annualized Capital Cost

Pursuant to District Policy APR 1305, section X (11/09/99), the incremental capital cost for the purchase of the fuel cell system will be spread over the expected life of the system using the capital recovery equation. The expected life of the entire system will be estimated at 10 years. A 10% interest rate is assumed in the equation and the assumption will be made that the equipment has no salvage value at the end of the ten-year cycle.

$$A = [P \times i(1+i)^n] / [(1+i)^n - 1]$$

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

$$A = [\$5,714,051 \times 0.1(1.1)^{10}] / [(1.1)^{10} - 1]$$
$$= \mathbf{\$931,390/\text{year}}$$

Annual Costs

Annual Operation and Maintenance Cost

The annual operation and maintenance costs for each option are calculated as follows:

Proposed 1,028 kW IC Engine

$$8,738,000 \text{ kW-hr/yr} \times \$0.028/\text{kW-hr} = \$244,664/\text{year}$$

Fuel Cells (Alternate Equipment)

$$12,435,500 \text{ kW-hr/yr} \times \$0.19/\text{kW-hr} = \$2,362,745/\text{year}$$

Annual Costs of Increased Maintenance

$$\$2,362,745/\text{yr} - \$244,664/\text{yr} = \$2,118,081/\text{year}$$

Total Increased Annual Costs for Fuel Cell as an Alternative to the Proposed Engine

$$\$931,390/\text{year} + \$2,118,081/\text{year} = \mathbf{\$3,049,471/\text{year}}$$

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 NO_x emissions from the engine will be based on the NO_x emission limit for non-agricultural, lean burn IC engines from District Rule 4702, Section 5.2.2, Table 2, 2.e. The District Standard Emissions for VOC emissions from the engine will be based on the New Source Performance Standard (NSPS) VOC emission limit for landfill and digester gas-fired IC engines from 40 CFR 60 Subpart JJJJ, since this limit is more stringent than the applicable emission limit in District Rule 4702.

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

District Standard Emissions

0.165 lb-NO_x/MMBtu (11 ppmv NO_x @ 15% O₂)
0.111 lb-VOC/MMBtu (75 ppmv VOC @ 15% O₂)

Emissions from Fuel Cells as Alternative Equipment

0.016 lb-NO_x/MMBtu (0.05 lb-NO_x/MW-hr)
0.006 lb-VOC/MMBtu (0.02 lb-VOC/MW-hr)

Emission Reductions

The Proposed Engine Compared to Fuel Cells based on District Standard Emission Reductions

NO_x Emission Reductions (11 ppmv @ 15% O₂ → 0.05 lb-NO_x/MW-hr)

94,216 MMBtu/year x (0.165 lb-NO_x/MMBtu – 0.016 lb-NO_x/MMBtu)
= 14,038 lb-NO_x/year (7.0 ton-NO_x/year)

VOC Emission Reductions (1.0 g/bhp-hr → 0.02 lb-VOC/MW-hr)

94,216 MMBtu/year x (0.111 lb-VOC/MMBtu – 0.006 lb-VOC/MMBtu)
= 9,893 lb-VOC/year (4.9 ton-VOC/year)

Multi-Pollutant Cost Effectiveness Thresholds (MCET) for NO_x and VOC Reductions based on District Standard Emission Reductions

(7.0 ton-NO_x/year x \$24,500/ton-NO_x) + (4.9 ton-VOC/year x \$17,500/ton-VOC)
= **\$257,250/year**

As shown above, the annualized capital cost of this alternate option (\$3,049,471) exceeds the Multi-Pollutant Cost Effectiveness Threshold (MCET) calculated for the NO_x and VOC emission reductions (\$257,250). Therefore, this option is not cost effective and is being removed from consideration.

Options 2 and 3 – Microturbine and IC Engine with NO_x Emissions ≤ 0.15 g/bhp-hr

The applicant is proposing a NO_x limit of 0.08 g/bhp-hr. Since this proposed limit is lower than the remaining options, per District BACT Policy APR 1305, Section IX.D.1, a cost effectiveness analysis is not required and no further analysis is required.

e. Step 5 - Select BACT

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

The applicant has proposed to use an SCR system for the digester gas-fired lean burn IC engine to limit 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 as H₂S (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

The control efficiency of each of the options above is estimated and the controls are ranked below based on the control effectiveness.

- 1) Sulfur Content of fuel gas not exceeding 40 ppmv as H₂S (Achieved in Practice)

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 engine is fuel gas sulfur content not exceeding 40 ppmv as H₂S. The applicant has proposed to use addition of iron oxide chemicals to the digester, a biological sulfur removal system, and/or carbon canister scrubbers (or an equivalent sulfur removal system) to reduce the sulfur content of the digester gas combusted in the engine to ≤ 40 ppmv as H₂S. Therefore, the BACT requirements for SO_x are satisfied.

3. BACT Analysis for PM₁₀ 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 engine. The anaerobic digester gas will be composed primarily of methane (approximately 60% molar composition) and CO₂ (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-borne sulfur compounds (mostly H₂S) 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 engine:

- 1) Sulfur Content of fuel \leq 40 ppmv as H₂S (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

- 1) Sulfur Content of fuel gas \leq 40 ppmv as H₂S (Achieved in Practice)

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 PM₁₀ emissions from the proposed engine is fuel gas sulfur content not exceeding 40 ppmv as H₂S. The applicant has proposed to use addition of iron oxide chemicals to the digester, a biological sulfur removal system, and/or carbon canister scrubbers (or an equivalent sulfur removal system) to reduce the sulfur content of the digester gas combusted in the engine to \leq 40 ppmv as H₂S. Therefore, the BACT requirements for PM₁₀ 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 CH₄) (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 engine is VOC emissions ≤ 0.10 g/bhp-hr. The applicant has proposed an IC engine with VOC emissions ≤ 0.10 g/bhp-hr. Therefore, the BACT requirements for VOC are satisfied.

APPENDIX D
HRA and AAQA Summary

San Joaquin Valley Air Pollution Control District Risk Management Review and Ambient Air Quality Analysis

To: Manuel Salinas – Permit Services
 From: Will Worthley – Technical Services
 Date: December 10, 2019
 Facility Name: LONE OAK ENERGY LLC
 Location: 10014 S MCMULLIN GRDE, FRESNO
 Application #(s): C-9133-3-0
 Project #: C-1193519

1. Summary

1.1 RMR

Units	Prioritization Score	Acute Hazard Index	Chronic Hazard Index	Maximum Individual Cancer Risk	T-BACT Required	Special Permit Requirements
3-0	13.88	0.37	0.02	8.23E-08	No	Yes
Project Totals	13.88	0.37	0.02	8.23E-08		
Facility Totals	>1	0.64	0.03	1.41E-07		

1.2 AAQA

Pollutant	Air Quality Standard (State/Federal)				
	1 Hour	3 Hours	8 Hours	24 Hours	Annual
CO	Pass		Pass		
NO _x	Pass				Pass
SO _x	Pass	Pass		Pass	Pass
PM10				Pass ³	Pass ³
PM2.5				Pass ⁴	Pass ⁴

Notes:

- Results were taken from the attached AAQA Report.
- The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2) unless otherwise noted below.
- Modeled PM10 concentrations were below the District SIL for non-fugitive sources of 5 µg/m³ for the 24-hour average concentration and 1 µg/m³ for the annual concentration.
- Modeled PM2.5 concentrations were below the District SIL for non-fugitive sources of 1.2 µg/m³ for the 24-hour average concentration and 0.2 µg/m³ for the annual concentration.

To ensure that human health risks will not exceed District allowable levels; the following shall be included as requirements for:

Unit # 3-0

1. The total number of firing hours of this unit without abatement of emissions by the SCR system and oxidation catalyst 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 or oxidation catalyst. 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 Rules 2201 and 4102]
2. 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.

2. Project Description

Technical Services received a request on December 4, 2019 to perform a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) for the following:

- Unit -3-0: 1,306 BHP CATERPILLAR, MODEL G3516LE, DIGESTER GAS-FIRED LEAN-BURN IC ENGINE WITH A HUG ENGINEERING, MODEL COMBIKAT, CATALYST SYSTEM (SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM WITH OXIDATION CATALYST) POWERING AN ELECTRICAL GENERATOR

3. RMR Report

3.1 Analysis

The District performed an analysis pursuant to the District's Risk Management Policy for Permitting New and Modified Sources (APR 1905, May 28, 2015) to determine the possible cancer and non-cancer health impact to the nearest resident or worksite. This policy requires that an assessment be performed on a unit by unit basis, project basis, and on a facility-wide basis. If a preliminary prioritization analysis demonstrates that:

- A unit's prioritization score is less than the District's significance threshold and;
- The project's prioritization score is less than the District's significance threshold and;
- The facility's total prioritization score is less than the District's significance threshold

Then, generally no further analysis is required.

The District's significant prioritization score threshold is defined as being equal to or greater than 1.0. If a preliminary analysis demonstrates that either the unit(s) or the project's or the facility's total prioritization score is greater than the District threshold, a screening or a refined assessment is required

If a refined assessment is greater than one in a million but less than 20 in one million for carcinogenic impacts (Cancer Risk) and less than 1.0 for the Acute and Chronic hazard indices (Non-Carcinogenic) on a unit by unit basis, project basis and on a facility-wide basis the proposed application is considered less than significant. For unit's that exceed a cancer risk of 1 in one million, Toxic Best Available Control Technology (TBACT) must be implemented.

Toxic emissions for this project were calculated using the following methods:

- Toxic emissions for this Dairy Gas Fired internal combustion (2 Stroke Lean Burn, or 4 Stroke Lean Burn, or 4 Stroke Rich Burn) Engine were calculated using emission factors

from 2000, AP 42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combustion Sources, Section 2: Natural Gas-Fired Reciprocating Engines and Dairy Biomethane characterization from 2009 report, Pipeline Quality Biomethane: North American Guidance Document for Introduction of Dairy Waste Derived Biomethane Into Existing Natural Gas Networks.

These emissions were input into the San Joaquin Valley APCD's Hazard Assessment and Reporting Program (SHARP). In accordance with the District's Risk Management Policy, risks from the proposed unit's toxic emissions were prioritized using the procedure in the 2016 CAPCOA Facility Prioritization Guidelines. The prioritization score for this proposed facility was greater than 1.0 (see RMR Summary Table). Therefore, a refined health risk assessment was required.

The AERMOD model was used, with the parameters outlined below and meteorological data for 2013-2017 from Fresno (rural dispersion coefficient selected) 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 SHARP Program, which then used the Air Dispersion Modeling and Risk Tool (ADMRT) of the Hot Spots Analysis and Reporting Program Version 2 (HARP 2) to calculate the chronic and acute hazard indices and the carcinogenic risk for the project.

The following parameters were used for the review:

Source Process Rates					
Unit ID	Process ID	Process Material	Process Units	Hourly Process Rate	Annual Process Rate
3	1	Fuel Usage (Commissioning)	MMscf	0.013	1.59
3	1	NH3 (Commissioning)	Lbs	0.15	19
3	2	Fuel Usage (Non-Commissioning)	MMscf	0.013	112.9
3	2	NH3 (Non-Commissioning)	Lbs	0.16	1327

Point Source Parameters						
Unit ID	Unit Description	Release Height (m)	Temp. (°K)	Exit Velocity (m/sec)	Stack Diameter (m)	Vertical/Horizontal/Capped
3	Digester Engine (Non-Commissioning Period)	6.71	709	38.31	0.36	Vertical
3	Digester Engine (Commissioning Period)	6.71	709	38.31	0.36	Vertical

4. AAQA Report

The District modeled the impact of the proposed project on the National Ambient Air Quality Standard (NAAQS) and/or California Ambient Air Quality Standard (CAAQS) in accordance with District Policy APR-1925 (Policy for District Rule 2201 AAQA Modeling) and EPA's Guideline for Air Quality Modeling (Appendix W of 40 CFR Part 51). The District uses a progressive three level

approach to perform AAQAs. The first level (Level 1) uses a very conservative approach. If this analysis indicates a likely exceedance of an AAQS or Significant Impact Level (SIL), the analysis proceeds to the second level (Level 2) which implements a more refined approach. For the 1-hour NO₂ standard, there is also a third level that can be implemented if the Level 2 analysis indicates a likely exceedance of an AAQS or SIL.

The modeling analyses predicts the maximum air quality impacts using the appropriate emissions for each standard's averaging period. Required model inputs for a refined AAQA include background ambient air quality data, land characteristics, meteorological inputs, a receptor grid, and source parameters including emissions. These inputs are described in the sections that follow.

Ambient air concentrations of criteria pollutants are recorded at monitoring stations throughout the San Joaquin Valley. Monitoring stations may not measure all necessary pollutants, so background data may need to be collected from multiple sources. The following stations were used for this evaluation:

Monitoring Stations				
Pollutant	Station Name	County	City	Measurement Year
CO	Tranquillity	Fresno	Fresno	2016
NOx	Fresno-Drummond	Fresno	Fresno	2016
PM10	Fresno-Drummond	Fresno	Fresno	2016
PM2.5	Tranquillity	Fresno	Fresno	2016
SOx	Fresno - Garland	Fresno	Fresno	2016

Technical Services performed modeling for directly emitted criteria pollutants with the emission rates below:

Emission Rates (lbs/hour)						
Unit ID	Process	NOx	SOx	CO	PM10	PM2.5
3	1	2.89	0.12	12.67	0.23	0.23

Emission Rates (lbs/year)						
Unit ID	Process	NOx	SOx	CO	PM10	PM2.5
3	1	3,965	979	49,776	1,958	1,958

The AERMOD model was used to determine if emissions from the project would cause or contribute to an exceedance of any state of federal air quality standard. The parameters outlined below and meteorological data for 2013-2017 from Fresno (rural dispersion coefficient selected) were used for the analysis:

The following parameters were used for the review:

Point Source Parameters						
Unit ID	Unit Description	Release Height (m)	Temp. (°K)	Exit Velocity (m/sec)	Stack Diameter (m)	Vertical/Horizontal/Capped
3	Digester Engine	6.71	709	38.31	0.36	Vertical

5. Conclusion

5.1 RMR

The cumulative acute and chronic indices for this facility, including this project, are below 1.0; and the cumulative cancer risk for this facility, including this project, is less than 20 in a million. In addition, the cancer risk for each unit in this 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 requirements 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.

5.2 AAQA

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

6. Attachments

- A. Modeling request from the project engineer
- B. Additional information from the applicant/project engineer
- C. Prioritization score w/ toxic emissions summary
- D. Facility Summary
- E. AAQA results

APPENDIX E
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.1 in the evaluation above, quarterly PE2 and quarterly PE1 can be calculated as follows:

$PE2_{quarterly} = PE2_{annual} \div 4 \text{ quarters/year}$

$PE1_{quarterly} = PE1_{annual} \div 4 \text{ quarters/year}$

Quarterly NEC [QNEC]			
Pollutant	PE2 (lb/qtr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NO _x	991.25	0	991.25
SO _x	244.75	0	244.75
PM ₁₀	489.50	0	489.50
CO	12,443.75	0	12,443.75
VOC	698.25	0	698.25