

SEP 28 2016

Ray Brewer
CDE 24, LLC
145 North N Street, Suite A
Tulare, CA 93274

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: S-8741
Project Number: S-1152007

Dear Mr. Brewer:

Enclosed for your review and comment is the District's analysis of CDE 24, LLC's application for an Authority to Construct for an anaerobic digester vessel with a 10.5 MMBtu/hr backup flare and three 1,609 bhp digester gas-fired IC engines powering electrical generators at Western Sky Dairy, at 18501 Old River Rd, Bakersfield, CA.

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

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Ramon Norman of Permit Services at (559) 230-5909.

Sincerely,



Arnaud Marjollet
Director of Permit Services

AM:rn

Enclosures

cc: Tung Le, CARB (w/ enclosure) via email

Seyed Sadredin
Executive Director/Air Pollution Control Officer

Northern Region
4800 Enterprise Way
Modesto, CA 95356-8718
Tel: (209) 557-6400 FAX: (209) 557-6475

Central Region (Main Office)
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Fresno, CA 93726-0244
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Southern Region
34946 Flyover Court
Bakersfield, CA 93308-9725
Tel: 661-392-5500 FAX: 661-392-5585

Bakersfield Californian

Newspaper notice for publication in Bakersfield Californian and for posting on
valleyair.org

**NOTICE OF PRELIMINARY DECISION
FOR THE PROPOSED ISSUANCE OF
AN AUTHORITY TO CONSTRUCT**

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Unified Air Pollution Control District solicits public comment on the proposed issuance of Authority to Construct to CDE 24, LLC for an anaerobic digester vessel with a 10.5 MMBtu/hr backup flare and three 1,609 bhp digester gas-fired IC engines powering electrical generators at Western Sky Dairy, at 18501 Old River Rd, Bakersfield, CA.

The analysis of the regulatory basis for this proposed action, Project #S-1152007, is available for public inspection at http://www.valleyair.org/notices/public_notices_idx.htm and at any District office. For additional information, please contact the District at (559) 230-6000. Written comments on this project must be submitted by [DATE] to **ARNAUD MARJOLLET, DIRECTOR OF PERMIT SERVICES, SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, 1990 EAST GETTYSBURG AVENUE, FRESNO, CA 93726.**

**AVISO DE UNA DECISIÓN PRELIMINAR
PARA LA PROPUESTA EMISIÓN DE
UNA AUTORIDAD PARA CONSTRUIR**

POR EL PRESENTE SE NOTIFICA que El Distrito Unificado para el Control de la Contaminación del Aire del Valle de San Joaquín (el Distrito del Aire) está solicitando comentarios públicos en la propuesta emisión de una Autoridad para Construir a CDE 24, LLC para un recipiente digestor anaerobio con una llamarada de apoyo de 10.5 MMBtu/hr y tres motores de combustión interna de gas de 1,609 bhp apoderando generadores eléctricos en Western Sky Dairy, en 18501 Old River Rd, Bakersfield, CA.

El análisis de la base regulatoria para esta acción propuesta, Número del Proyecto #S-1152007, está disponible para la inspección pública en http://www.valleyair.org/notices/public_notices_idx.htm y en cualquiera de las oficinas del Distrito. Para más información en Español, por favor comuníquese con el Distrito al (559) 230-6000. Comentarios por escrito acerca de este proyecto deben ser sometidos antes del <DATE> a **ARNAUD MARJOLLET, DIRECTOR DEL DEPARTAMENTO DE PERMISOS, SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, 1990 EAST GETTYSBURG AVENUE, FRESNO, CA 93726.**

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San Joaquin Valley Air Pollution Control District
Authority to Construct Application Review
Digester System and Three Digester Gas-Fired IC Engines with SCR

Facility Name: CDE 24, LLC Date: September 27, 2016
Mailing Address: 145 North N Street, Suite A Engineer: Ramon Norman
Tulare, CA 93274 Lead Engineer: Jerry Sandhu
Applicant: Ray Brewer, President & CEO, CH4 Power, Inc.
Telephone: (559) 366-7052 Cell Phone: (916) 548-9823
E-Mail: Ray@ch4power.com
Contact Person: Bill Colldeweih, Permitting Specialist, CH4 Engineering and Construction
Telephone: (559) 366-7052 Cell Phone: (916) 317-1643
E-Mail: bill@ch4ec.com
Application #(s): S-8741-1-0, -2-0, -3-0, & -4-0
Project #: S-1152007
Deemed Complete: May 6, 2016

I. Proposal

CDE 24, LLC has requested Authority to Construct (ATC) permits to construct a DVO, Inc. in-ground, mixed plug-flow, anaerobic digester system with a digester gas-fired backup flare (ATC S-8741-1-0) and to install three 1,609 bhp digester gas-fired IC engines (or approved engines of equal or lesser bhp) (ATCs S-8741-2-0, -3-0, and -4-0) at Western Sky Dairy (Facility S-4554). Each engine will be equipped with a selective catalytic reduction (SCR) system for emissions control and will power an electrical generator that will produce up to 1,145 kW. The proposed digester and mechanical building will be constructed in an area of the existing dairy west of the existing lagoon in an area that is currently used for manure collection, drying, and storage. Western Sky Dairy will send manure from the dairy to the CDE 24, LLC anaerobic digester located on the dairy site. The digester system will produce renewable biogas that will be used to fuel the IC engine generator sets.

CDE 24, LLC and Western Sky Dairy, which are separate companies, are undertaking the project as separate consensual parties. CDE 24, LLC has provided information from the fuel supply agreement and land lease and easement agreement supporting that the dairy and the CDE 24, LLC biogas facility will be separately owned and operated.

The following is a summary of some of the information provided by the applicant. The proposed digester system and IC engines at the dairy will be installed, operated, maintained, repaired, and replaced if necessary by CDE 24, LLC. The responsibility of the dairy will be limited to providing the manure feedstock and disposing of the effluent, which the dairy already must do for compliance with water quality regulations. CDE 24, LLC will not be involved at all in the dairy's primary activity, production of milk. The fuel supply and lease agreements

specify that CDE 24, LLC will build and operate the digester facility and also allows CDE 24, LLC to make plant and equipment improvements. The proposed digester gas-fired IC engine generator sets that will be constructed on land leased from the dairy site and will be owned, operated, and maintained by CDE 24, LLC. CDE 24, LLC will be solely responsible for ensuring that the digester system and digester gas-fired IC engines comply with all applicable air quality regulations. The majority of the power generated will be sold to a utility; however, Western Sky Dairy will be given the option to buy a small amount of the power produced at a negotiated price. The applicant has estimated that at least 90% of the electricity generated will be sold to a utility and no more than 10% of the electricity generated will be sold to the dairy. The large proportion of electricity generated (90%) that will be sold to a utility rather than to the dairy further supports that the digester facility and dairy will be separate operations. Because the dairy and the proposed digester gas power plant at the site will be separately owned and operated and will have different two-digit Standard Industrial Classification (SIC) codes (Industry Group 24: Dairy Farms for the dairy vs. Industry Group 49: Electric, Gas, And Sanitary Services for the IC engine generator sets), pursuant to Section 3.39 of District Rule 2201, the proposed digester system and the digester gas-fired IC engines will not be part of the dairy agricultural stationary source. Therefore, the digester system and digester gas-fired IC engines will be permitted as a separate non-agricultural stationary source (Facility S-8741).

II. Applicable Rules

Rule 2201	New and Modified Stationary Source Review Rule (2/18/16)
Rule 2410	Prevention of Significant Deterioration (6/16/11)
Rule 2520	Federally Mandated Operating Permits (6/21/01)
Rule 4101	Visible Emissions (2/17/05)
Rule 4102	Nuisance (12/17/92)
Rule 4201	Particulate Matter Concentration (12/17/92)
Rule 4701	Internal Combustion Engines – Phase 1 (8/21/03)
Rule 4702	Internal Combustion Engines (11/14/13)
Rule 4801	Sulfur Compounds (12/17/92)

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

40 CFR Part 63, Subpart ZZZZ National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

CH&SC 41700 Health Risk Assessment

CH&SC 42301.6 School Notice

Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)

California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387: CEQA Guidelines

III. Project Location

The CDE 24, LLC Stationary Source (Facility S-8741) is located on Western Sky Dairy at 18501 Old River Road, Bakersfield, CA (Mt. Diablo Meridian T 31S, R 27E, Sec 31 in Kern County). The proposed equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

Anaerobic Digester System

An anaerobic digester is a sealed basin or tank that is designed to accelerate and control the decomposition of organic matter by microorganisms in the absence of oxygen. Anaerobic decomposition results in the conversion of organic compounds in the substrate into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate Volatile Organic Compounds (VOCs). The gas generated by this process is known as biogas, waste gas, or digester gas. In addition to methane and carbon dioxide, biogas may also contain small amounts of Nitrogen (N_2), Oxygen (O_2), Hydrogen Sulfide (H_2S), and Ammonia (NH_3). Biogas may also include trace amounts of various VOCs that remain from incomplete digestion of the volatile solids in the incoming substrate. Because biogas is mostly composed of methane, the main component of natural gas, the gas produced in the digester can be cleaned to remove H_2S and other impurities and used as fuel.

The proposed DVO, in-ground, mesophilic, mixed plug-flow anaerobic digester system will be designed to process the manure generated by the cattle at Western Sky Dairy. The manure will be flushed from the milking parlor and the cow housing areas at the dairy and the manure will be routed via the existing underground piping system to reception pits where the waste stream will be adjusted to the proper solids content (9-15% solids) and then pumped into the new digester. Excess manure liquid from the reception pits will be sent to a separated liquids pit where the liquid will be available for the dairy to use in the flush system. The effluent from the digester will be pumped to a solid separation area where the fiber solids will be separated from the liquid digester effluent. After the fiber solids have been separated, the liquid digester effluent will be pumped back to the separated liquids pit to be used in the flush system. Excess liquid from the separated liquids pit will flow to the existing dairy lagoon to be used to fertilize adjacent cropland.

The proposed in-ground, mixed plug-flow anaerobic digester system will process the manure slurry (mixed manure solids and liquids) from the reception pits. The digester will also accept available onsite feed waste that is deemed not to be suitable for the dairy cattle. The new digester will be constructed using reinforced concrete to form the digester vessel. The approximate external dimensions of the concrete digester vessel will be 348 ft. long x 222 ft. 6 in. wide x 16 ft. deep with an internal volume of approximately 9,246,640 gallons. The digester vessel will be constructed approximately 14 ft. below grade. The inside of the digester will be coated with chemical resistant sprayed-on elastomeric polyurethane to prevent leakage through micro cracks in the concrete. After the concrete bottom and sides of the digester vessel have cured, the digester vessel will be covered and sealed with reinforced concrete panels. The digester system will include parallel channels connected at one end resulting in three sections that will each have U-shaped flow pattern. Thus, in each of the three sections the influent will enter and effluent exit at adjacent locations at the same end of the digester. Each section of the digester will include different compartments for the digestion processes and will use digester gas for vertical mixing of the contents in the digester. The digester system will have a retention time of approximately 22 days. The digester will include separate pits for the removal of sludge and the effluent from the digester system. Sufficient waste heat will be recovered from the cooling systems and exhaust of the proposed IC engines to maintain the contents of the digester in the necessary temperature range (90 - 100 °F) for operation of the

digester. (See Appendix A for a diagram of the basic design of the DVO mesophilic, mixed plug-flow anaerobic digester.¹) The proposed digester and mechanical building will be constructed in an area of the existing dairy that is south of existing freestall barns and west of the existing lagoon in an area that is currently used for manure collection, drying, and storage. CDE 24, LLC indicates that in the future they would like to obtain approval for co-digestion of organic wastes from offsite sources at the site. If co-digestion of organic wastes from offsite sources is approved, CDE 24, LLC plans to install another storage pond to capture the effluent from the digester to satisfy the requirements of the Regional Water Quality Control Board.

The completed digester system will include a Digester Management System (DMS) to monitor the pH and temperature of the contents of the digester and the composition of the digester gas. The Digester Management System will also have a system to adjust the pH of the digester contents. The effluent leaving the digester will be sent to a solids separation area where it will be pumped over a two stage slope screen separator and roller press for separation of the digested manure fiber solids from the liquid. After the digested solids are separated and sent through the roller presses, the separated solids will then be conveyed to a bin storage system. The applicant indicates that approximately 50% of the digested solids will be returned to the dairy for use as bedding for the cattle in freestall barns, which is the current practice at the dairy. The remaining digested solids will be sold to a vendor for use as a soil amendment. The liquid effluent from the mechanical separators will be directed to the separated liquids pit for reuse in the dairy flush system. The existing dairy lagoon will be utilized for capture of any overflow from the separated liquids reception pit. The dairy will continue to use the existing lagoon to irrigate and fertilize adjacent cropland.

Biogas Conditioning and Use

The applicant has indicated that a proprietary iron oxide compound, FeSfix, will be added to the digester to remove H₂S from the digester gas. The iron compounds will bind with the sulfur, which will remain in solution until it exits with the effluent. The gas produced by the digester will then be piped to a gas dehydrator. The gas will then be directed to a gas blower where it will be pressurized to 4 psi. Once pressurized, the gas will be sent to biological H₂S scrubber that will use bacillus strain bacteria to remove H₂S from the gas by oxidizing the H₂S to elemental sulfur. The gas will then be sent through a gas conditioning system that will include carbon filters for polishing to remove additional H₂S and for removal of moisture. The gas will then be sent to the engines for use as fuel to generate electricity for sale to a utility and to produce heat for the digester system. A small amount of the electricity generated (<10%) may be sold back to the host dairy at a negotiated fixed retail price while the majority of electricity produced will be sold to a utility.

The applicant indicates that when operating at full capacity, the digester system is expected to produce approximately of 469,610,460 ft³ of biogas per year (an average of 1,286,604 ft³/day). The applicant has indicated that the biogas produced by the digester will be composed of approximately 60-70% methane and 30-40% carbon dioxide. When all of the digester gas cannot be used by the IC engines, the gas will be combusted in the proposed backup flare. The backup flare will be limited to combusting no more than 38.325 MMscf/yr, which is approximately equivalent to the flare operating for 25% of the year at its full rated capacity.

¹ From description of DVO Digester at <http://www.dvoinc.com/howitworks.php>

Anaerobic Digester System

- In-ground, Mesophilic, Mixed plug-flow Anaerobic Digester Vessel
 - Approximate External Dimensions: 348 ft. long x 222 ft. 6 in. wide x 16 ft. deep
 - Approximate Internal Volume: 9,246,640 gallons
 - Operating Temperature: 90 - 100 °F
 - Retention Time: ~ 22 days
- Digester Gas-Fired Backup Flare
 - Height: 25 ft. tall
 - Operating Temperature: 1,500 °F
 - Maximum Flow Rate of Gas to Flare: 17,500 scf/hour (420,000 scf per day)
 - Flare Rating: ~ 10.5 MMBtu/hr
 - Maximum Amount of Digester Gas Combusted Annually: 38.325 MMscf/yr

Summary of New Structures and Equipment for Proposed Digester System				
Structures/ Equipment	Description	Quantity	Approximate Measurements	Approximate Volume (Gallons)
Multi- Chamber Reception Pit	3-Chamber Concrete - In Ground Pit	1	2-Octagonal 42 ft. x 16 ft	163,836 gallons each
			1-Octagonal 20 ft. x 16 ft	72,816 gallons
Digester	In-ground, Mesophilic, Mixed plug-flow Anaerobic Digester Vessel	1	348 ft. long x 222 ft. 6 in. wide x 16 ft. deep	Internal Volume ~ 9,246,640 gallons
Flare	Digester Gas Backup Flare	1	25 ft. tall	--
Mechanical Steel Building	Steel frame, Sheet metal Siding fully enclosed	1	152 ft. x 77 ft.	--
Solid Separation Area	Concrete Pad with Wind Walls	1	100 ft. x 72 ft.	--
Solid Separators	Two-stage slope screen separator with a roller press	2	12 ft. x 8 ft.	--

Digester Gas-Fired IC Engines

The applicant is proposing to install three 1,609 bhp MTU GB1145B6 lean burn digester gas-fired IC engines (or equivalent engines of equal or lesser rating approved by the District). Each engine will be equipped with an SCR system and will power an electrical generator that will produce up to 1,145 kWe. Digester gas, which consists mostly of methane, the main component of natural gas, will be combusted in the IC engines to produce power. After initial removal of H₂S in the digester system, the digester gas will be sent to a biological sulfur removal system and then the digester gas will be piped to the gas conditioning system for polishing to remove H₂S using an activated carbon H₂S scrubber or an equivalent H₂S removal system and for removal of moisture. The digester gas will then be piped to the IC engines for use as fuel. The engines will power electrical generators that will produce power to be sold to a utility. Excess heat from the engines will be used to maintain the temperature of the digester vessel. The engines will be permitted to operate up to 24 hr/day and 8,760 hr/year.

V. Equipment Listing

- S-8741-1-0: DVO MIXED PLUG-FLOW MESOPHILIC ANAEROBIC DIGESTER SYSTEM CONSISTING OF A RECEPTION PIT AND AN IN-GROUND CONCRETE VESSEL (348' X 222' X 16') WITH ONE 10.5 MMBTU/HR DVO MODEL 7618 8" DIGESTER GAS-FIRED BACKUP FLARE SERVED BY A BIOLOGICAL H₂S REMOVAL SYSTEM AND A CARBON H₂S SCRUBBER (OR APPROVED EQUIVALENT H₂S REMOVAL SYSTEM)
- S-8741-2-0: 1,609 BHP MTU MODEL GB1145B6 (OR DISTRICT APPROVED EQUIVALENT) DIGESTER GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AND A CARBON H₂S SCRUBBER (OR APPROVED EQUIVALENT H₂S REMOVAL SYSTEM) POWERING AN ELECTRICAL GENERATOR
- S-8741-3-0: 1,609 BHP MTU MODEL GB1145B6 (OR DISTRICT APPROVED EQUIVALENT) DIGESTER GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AND A CARBON H₂S SCRUBBER (OR APPROVED EQUIVALENT H₂S REMOVAL SYSTEM) POWERING AN ELECTRICAL GENERATOR
- S-8741-4-0: 1,609 BHP MTU MODEL GB1145B6 (OR DISTRICT APPROVED EQUIVALENT) DIGESTER GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AND A CARBON H₂S SCRUBBER (OR APPROVED EQUIVALENT H₂S REMOVAL SYSTEM) POWERING AN ELECTRICAL GENERATOR

VI. Emission Control Technology Evaluation

Digester System (S-8741-1-0)

The digester gas will be scrubbed to remove hydrogen sulfide (H₂S) and will be used to fuel engines to generate electricity or will be combusted in the proposed flare when it is not possible to use the gas in the IC engines. Combustion of the digester gas in the engines or flare will convert any VOCs present in the gas into carbon dioxide and water.

H₂S Removal

As stated above, the applicant indicates that proprietary iron oxide compound, FeSfix, will be added to the digester to remove H₂S from the digester gas. FeSfix is a mixture of FeO and Fe₂O₃ with other trace elements. The process by which iron-oxides reduce the H₂S concentration in the digester liquid is briefly explained as follows: H₂S is a weak acid and disassociates resulting in the formation of the dissolved sulfide. Iron-oxides combine with the dissolved sulfide and form an iron sulfide precipitate, which is removed from the digester with the effluent.

After initial removal of H_2S in the digester system, the applicant indicates that the digester gas will be sent to a biological H_2S removal system that will use bacillus strain bacteria to remove H_2S from the gas by oxidizing the H_2S to elemental sulfur and sulfates.

For final polishing, the digester gas will be sent through an activated carbon H_2S scrubber or an equivalent system to remove H_2S from the gas prior to combustion in the proposed engines. H_2S will be adsorbed as the gas flows through the activated carbon bed. Activated carbon has a large number of pores, which greatly increase the surface area for adsorption. Contaminants in the gas diffuse into these pores and are retained on the carbon surface due to both chemical and physical forces. Activated carbon used for the removal of H_2S is usually treated with chemical bases to increase the holding capacity for H_2S .

The proposed activated carbon scrubber will consist of enclosed vessel(s) filled with treated activated carbon. The digester gas will be pumped through the scrubber and then to a dryer and chiller to remove moisture. For continuous operation, there will be a secondary unit that will be brought online at specified times or when monitoring indicates that the primary unit is nearing saturation. Valves can be arranged so either bed can operate while the other is serviced. The useful life of the activated carbon vessels will vary depending on the inlet concentration of H_2S , the flow rate, and the mass in the vessels. Before a scrubber is completely spent, it must be regenerated or replaced.

The proposed H_2S removal systems will be capable of reducing H_2S concentrations in the digester gas to 40 ppmv or less. Reducing the H_2S concentration in the gas will minimize SO_x emissions from combustion and will also reduce the maintenance requirements for the engines and will protect catalysts from masking, plugging, and poisoning.

Digester Gas-Fired IC Engines (S-8741-2-0, -3-0, & -4-0)

The proposed engines will be equipped with:

- Turbocharger
- Intercooler
- Air/Fuel Ratio or an O_2 Controller
- Lean Burn Technology
- Oxidation Catalyst
- Selective Catalytic Reduction (SCR)

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

Lean burn technology increases the volume of air in the combustion process and therefore increases the heat capacity of the mixture. This technology also incorporates improved swirl

patterns to promote thorough air/fuel mixing. This in turn lowers the combustion temperature and reduces NO_x formation.

An oxidation catalyst decreases CO and VOC emissions by using a catalyst to promote the chemical oxidation of VOC and CO into H₂O and CO₂.

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

VII. General Calculations

A. Assumptions

- CDE 24, LLC (Facility S-8741) and Western Sky Dairy (Facility S-4554) are separate stationary sources at the same site.
- PM emissions from the handling of separated solids for the digester system are considered negligible because of the high moisture content of separated manure solids.
- All emissions from the manure processed in the digester system will be allocated to the liquid manure handling system at Western Sky Dairy because the manure for the digester system will be taken from the flush system at Western Sky Dairy and the effluent from the digester system will be returned to Western Sky Dairy for use.
- Emissions from the processed digested solids are considered negligible.
- The proposed digester system will reduce potential VOC emissions from manure generated by the cattle at Western Sky Dairy. Manure that is currently stored in uncovered lagoon(s) and pond(s) will instead be placed in the enclosed digester vessel at the CDE 24, LLC facility, thereby decreasing volatilization of compounds from the manure. In a digester, most VOCs present will be converted to methane (an exempt compound) and carbon dioxide further reducing the potential for VOC emissions. Because results of dairy digester analyses have indicated negligible to very low VOC content (less than 1% by weight), fugitive VOC emissions from the digester system are assumed to be negligible, consistent with District Policy SSP 2015. During operation, the digester gas will be directed to the engines where the gas will be combusted resulting in the oxidation of gaseous hydrocarbons into carbon dioxide and water. Therefore, VOC emissions from the digester system are considered negligible.
- Molar composition of typical digester gas is about 60% methane and 40% carbon dioxide with trace amounts of hydrogen sulfide, VOC, and other compounds.²

² U.S. EPA AgSTAR (<http://www2.epa.gov/agstar>), "Market Opportunities for Biogas Recovery Systems at U.S. Livestock Facilities" (November 2011, <http://www2.epa.gov/agstar/agstar-market-opportunities-report>); "Anaerobic Digestion Overview", David Schmidt, University of Minnesota Department of Biosystems and Agricultural Engineering: (<http://www.extension.umn.edu/agriculture/manure-management-and-air-quality/manure-treatment/docs/anaerobic-digestion-overview.pdf>); and "Anaerobic Digestion of Animal Wastes: Factors to Consider", ATTRA - National Sustainable Agriculture Information Service (<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=307>)

- Typical Higher Heating Value for Digester Gas: 600 Btu/scf (Per AP-42 (4/00) - notes to Tables Table 3.1-1, Table 3.1-2b, Table 3.1-7, and Table 3.1-8)³
- Typical EPA F-factor for Digester Gas: 9,100 dscf/MMBtu (dry, adjusted to 60 °F), (Estimated based on previous digester gas fuel analyses for source tests)
- Average sulfur content of the scrubbed digester gas: 40 ppmv as H₂S (approximately 2.4 grains/100 scf; proposed by applicant and required as BACT for the IC engines)
- Molar Specific Volume = 379.5 scf/lb-mol (at 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

Assumptions for Digester Gas Backup Flare (S-8741-1)

- The maximum amount of digester gas that can be combusted in the flare on a daily basis will be based on the maximum flare gas flow rate of 17,500 scf/hr and operation of the flare for 24 hrs/day (420,000 scf per day).
- The backup flare will be limited to combusting no more than 38.325 MMscf/yr. (approximately equivalent to the flare operating for 25% of the year at its full rated capacity).
- The digester system backup flare is used to control the gas that is generated by the digester system and therefore is exempt from BACT as an emissions control device.

Assumptions for Digester Gas-Fired IC Engines (S-8741-2, -3, & -4)

- Each of the engines will be permitted to operate 24 hours/day and 365 days per year.
- bhp to Btu/hr conversion: 2,545 Btu/hp-hr
- Thermal efficiency of engine: commonly ≈ 33%

Assumptions for Commissioning Period for Engines

- The ATC permits include a commissioning period to allow testing, adjustment, and tuning of the engines without the operation of the SCR systems, and calibration and optimization of the SCR systems. The duration of the commissioning period shall consist of no more than 100 hours of operation of each engine without operation of an SCR system.
- Engine emissions during the commissioning period will be calculated as uncontrolled based on information provided by the engine supplier.

Assumption for PM_{2.5}

- PM_{2.5} emissions from the digester gas-fired backup flare and IC Engines are assumed to be equal to PM₁₀ emissions.

³ U.S. EPA AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combustion Sources, Section 3.1 Stationary gas Turbines (April 2000) (<https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s01.pdf>)

B. Emission Factors

Emission Factors for the Digester System Backup Flare (S-8741-1)

The NO_x emission factor (0.06 lb/MMBtu) is based on the District's practice for permitting well-controlled biogas flares. The SO_x emission factor (6.78×10^{-6} lb/scf or 0.0113 lb/MMBtu) is based on the maximum sulfur content of the dairy digester gas proposed by the applicant (40 ppmv as H₂S). The emission factors for PM (0.015 lb/MMBtu) and CO (0.046 lb/MMBtu) are based on the values given for landfill gas-fired flares in AP-42, Draft Section 2.4 Municipal Solid Waste Landfills (October 2008). The VOC emission factor (0.014 lb/MMBtu) is based on a VOC content of 0.5% by weight for dairy digester gas and the 97.7% VOC control efficiency for landfill gas-fired flares given in AP-42, Draft Section 2.4 Municipal Solid Waste Landfills (October 2008). As noted above, the VOC content of dairy digester gas is generally negligible to very low. For example, for the dairy digester gas fuel gas analyses performed for Facility S-7767 (ABEC Bidart-Old River) on 11/12/2015 and 9/22/2014 the only hydrocarbon measured was methane and no VOCs were detected; therefore, the assumed VOC content of 0.5% will result in a conservative estimate of VOC emissions.

The proposed emission factors for NO_x, CO, and VOC are conservative as they are greater than the emission factors of 0.0426 lb-NO_x/MMBtu, 0.0022 lb-CO/MMBtu, and 0.0023 lb-VOC/MMBtu measured during the 11/17/10 source test performed for the semi-enclosed dairy digester gas flare at Facility N-6311 (Fiscalini Farms and Fiscalini Dairy), and the proposed NO_x emission factor is also greater than the emission factor of 39 lb-NO_x/10⁶ dscf-CH₄ (0.039 lb/MMBtu) given for landfill gas-fired flares in AP-42, Draft Section 2.4 Municipal Solid Waste Landfills (October 2008).

It is reasonable to use the AP-42 emission factors for PM and CO from landfill gas-fired flares for the digester gas backup flare because landfill gas and digester gas are both types of biogas, so they are expected to have similar properties and emissions. One of the main differences between landfill gas and digester gas is that digester gas will tend to have higher methane content and heating value, which would tend to increase NO_x emissions from combustion of digester gas compared to landfill gas, while decreasing emissions that result from incomplete combustion, such as PM, CO, and VOC. Combustion of gaseous fuels will generally result in negligible to very low PM emissions; however, some PM becomes entrained in landfill gas as it travels through the landfill gas collection system to the combustion device, whereas the chance of PM becoming entrained in the digester gas after collection from a digester system is generally insignificant.

The emission factors that will be used to calculate the potential to emit for the digester gas-fired backup flare are shown in the table below.

Emissions Factors for Digester System Backup Flare (S-8741-1)			
Pollutant	lb/MMBtu	lb/scf*	Source
NO _x	0.06	3.6×10^{-5}	Typical District NO _x Emission Factor for well-controlled Flares
SO _x **	0.0113	6.78×10^{-6}	40 ppmvd in fuel gas (Proposed by Applicant)
PM ₁₀	0.015	9.0×10^{-6}	AP-42 Draft Table 2.4.4 (October 2008) (Value for Landfill Gas Flares)
CO	0.046	2.76×10^{-5}	AP-42 Draft Table 2.4.4 (October 2008) (Value for Landfill Gas Flares)
VOC**	0.014	8.4×10^{-6}	0.5% VOC by weight and 97.7% VOC Destruction Efficiency

*lb/scf equivalent equals lb/MMBtu x 0.0006 MMBtu/scf

**Example calculation of SO_x and VOC emission factors shown below

SO_x – 40 ppmvd H₂S in flared gas

$$\frac{40 \text{ ft}^3 \text{ H}_2\text{S}}{10^6 \text{ ft}^3} \times \frac{32.06 \text{ lb S}}{\text{lb - mol H}_2\text{S}} \times \frac{\text{lb - mole}}{379.5 \text{ ft}^3} \times \frac{64.06 \text{ lb SO}_2}{32.06 \text{ lb S}} \times \frac{\text{ft}^3}{600 \text{ Btu}} \times \frac{10^6 \text{ Btu}}{\text{MMBtu}} = 0.0113 \frac{\text{lb SO}_x}{\text{MMBtu}}$$

VOC – 0.5% VOC by weight in Digester Gas (DG) and 97.7% VOC Destruction Efficiency

$$\frac{0.5 \text{ lb - VOC}}{100 \text{ lb - DG}} \times \frac{(0.6 \times 16 + 0.4 \times 44) \text{ lb - DG}}{\text{lb - mol}} \times \frac{\text{lb - mole}}{379.5 \text{ ft}^3} \times \frac{\text{ft}^3}{600 \text{ Btu}} \times \frac{10^6 \text{ Btu}}{\text{MMBtu}} \times (1 - 0.977) = 0.014 \frac{\text{lb VOC}}{\text{MMBtu}}$$

Emissions Factors for the Digester Gas-Fired IC Engines (S-8741-2, -3, & -4)

Emission Factors for Engines during the Commissioning Periods:

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 damage to this equipment. In accordance with EPA's guidance, the commissioning period is considered the final phase of the construction process rather than initial startup of the equipment.⁴ 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.

The emission factors for NO_x (1.0 g/bhp-hr), CO (2.0 g/bhp-hr), and VOC (0.7 g/bhp-hr) for the engine commissioning periods are the emission factors provided by the engine supplier,

⁴ 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/airtoxics/icengines/docs/20120717riceqaupdate.pdf>)

MTU Onsite Energy, for the engines without SCR systems or oxidation catalysts. The emission factors during the commissioning periods for SO_x (0.04 g/bhp-hr) and PM₁₀ (0.05 g/bhp-hr) are assumed to be the same emission factors as during normal operation. The SO_x emission factor is based on the maximum sulfur content of the dairy digester gas (40 ppmv as H₂S required as BACT; approximately 2.4 grains/100 scf). The PM₁₀ emission factor is based on the value given for landfill gas-fired engines in AP-42, Draft Section 2.4 Municipal Solid Waste Landfills (October 2008). Although the engines may operate without an SCR system in place during some or all of the commissioning period, for conservative (highest) ammonia (NH₃) emission calculations, the NH₃ emission factor (0.05 g/bhp-hr) throughout all periods of operation of the engines is based on the assumption that the SCR systems will operate whenever the engines run. The NH₃ emission factor for all periods of operation of the engines is based on the ammonia slip limit of 10 ppmv NH₃ @ 15% O₂.

Commissioning Period Emission Factors for Digester Gas-Fired Engines		
Pollutant	g/bhp-hr	Source
NO _x	1.0	Engine Supplier's Information
SO _x	0.04	40 ppmvd in fuel gas; BACT Requirement/Mass Balance equation below
PM ₁₀	0.05	AP-42 Draft Table 2.4.4 (October 2008) (Value for Landfill Gas Engines)
CO	2.0	Engine Supplier's Information
VOC	0.7	Engine Supplier's Information

SO_x – 40 ppmvd H₂S in fuel gas

$$\frac{40 \text{ ft}^3 \text{ H}_2\text{S}}{10^6 \text{ ft}^3} \times \frac{32.06 \text{ lb S}}{\text{lb - mol H}_2\text{S}} \times \frac{\text{lb - mole}}{379.5 \text{ ft}^3} \times \frac{64.06 \text{ lb SO}_2}{32.06 \text{ lb S}} \times \frac{\text{ft}^3}{600 \text{ Btu}} \times \frac{10^6 \text{ Btu}}{\text{MMBtu}} = 0.0113 \frac{\text{lb SO}_x}{\text{MMBtu}}$$

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

PM₁₀ – 0.015 lb/MMBtu (based on 0.15 lb-PM/10⁶ dscf CH₄)

$$0.015 \frac{\text{lb PM}_{10}}{\text{MMBtu}} \times \frac{1 \text{ MMBtu}}{10^6 \text{ Btu}} \times \frac{\text{Btu}_{\text{in}}}{0.33 \text{ Btu}_{\text{out}}} \times \frac{2,545 \text{ Btu}}{\text{hp - hr}} \times \frac{453.59 \text{ g}}{\text{lb}} = 0.05 \frac{\text{g PM}_{10}}{\text{bhp - hr}}$$

Emission Factors during Normal Operation after the Commissioning Period:

The emission factors for NO_x (0.15 g/bhp-hr), CO (0.50 g/bhp-hr), and VOC (0.10 g/bhp-hr) during normal operation of the proposed engines were proposed by the applicant. These emission factors are supported by information provided by the engine and catalyst supplier. The emission factors for NO_x and VOC were required as BACT. The emission factors for SO_x (0.04 g/bhp-hr) and PM₁₀ (0.05 g/bhp-hr), during normal operation are same as the emission factors presented above for the commissioning period.

As explained above, although the SCR system may not operate during some or all of the commissioning period, the NH₃ emission factor (0.05 g/bhp-hr) is conservatively based on the assumption that the SCR systems will operate throughout all periods of operation of the engines and is based on the ammonia slip limit of 10 ppmv NH₃ @ 15% O₂.

Emission Factors for Digester Gas-Fired Engines (Normal Operation)				
Pollutant	g/bhp-hr	lb/MMBtu	ppmvd (@ 15%O ₂)	Source
NO _x	0.15	0.0429	11 ppmvd	BACT Requirement/Proposed by Applicant – See equation below
SO _x	0.04	0.0113	40 ppmvd in fuel gas	BACT Requirement/ Mass Balance equation above
PM ₁₀	0.05	0.015	--	AP-42 Draft Table 2.4.4 (October 2008) (Value for Landfill Gas Engines) See equation above
CO	0.50	0.143	60 ppmvd	Proposed by Applicant – See equation below
VOC	0.10	0.0286	21 ppmvd as CH ₄	BACT Requirement/Proposed by Applicant – See equation below
NH ₃	0.05	0.0144	10 ppmvd	10 ppmvd @ 15% O ₂ in exhaust; Required/Proposed – See equation below

NO_x – 0.15 g/bhp-hr

$$0.15 \frac{\text{g NO}_x}{\text{bhp-hr}} \times \frac{1 \text{ lb}}{453.59 \text{ g}} \times \frac{1 \text{ hp-hr}}{2,545 \text{ Btu}} \times \frac{0.33 \text{ Btu}_{\text{out}}}{1 \text{ Btu}_{\text{in}}} \times \frac{10^6 \text{ Btu}}{1 \text{ MMBtu}} = 0.0429 \frac{\text{lb NO}_x}{\text{MMBtu}}$$

$$0.0429 \frac{\text{lb NO}_x}{\text{MMBtu}} \times \frac{(20.9 - 15)\% \text{ O}_2}{20.9\% \text{ O}_2} \times \frac{1 \text{ MMBtu}}{9,100 \text{ ft}^3} \times \frac{379.5 \text{ ft}^3}{\text{lb-mole}} \times \frac{\text{lb-mole}}{46 \text{ lb NO}_x} \times \frac{10^6 \text{ ppmv}}{1} = 11 \text{ ppmvd NO}_x \text{ @ } 15\% \text{ O}_2$$

CO – 0.50 g/bhp-hr

$$0.50 \frac{\text{g CO}}{\text{bhp-hr}} \times \frac{1 \text{ lb}}{453.59 \text{ g}} \times \frac{1 \text{ hp-hr}}{2,545 \text{ Btu}} \times \frac{0.33 \text{ Btu}_{\text{out}}}{1 \text{ Btu}_{\text{in}}} \times \frac{10^6 \text{ Btu}}{1 \text{ MMBtu}} = 0.143 \frac{\text{lb CO}}{\text{MMBtu}}$$

$$0.143 \frac{\text{lb CO}}{\text{MMBtu}} \times \frac{(20.9 - 15)\% \text{ O}_2}{20.9\% \text{ O}_2} \times \frac{1 \text{ MMBtu}}{9,100 \text{ ft}^3} \times \frac{379.5 \text{ ft}^3}{\text{lb-mole}} \times \frac{\text{lb-mole}}{28 \text{ lb CO}} \times \frac{10^6 \text{ ppmv}}{1} = 60 \text{ ppmvd CO @ } 15\% \text{ O}_2$$

VOC – 0.10 g/bhp-hr

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

$$0.0286 \frac{\text{lb VOC}}{\text{MMBtu}} \times \frac{(20.9 - 15)\% \text{ O}_2}{20.9\% \text{ O}_2} \times \frac{1 \text{ MMBtu}}{9,100 \text{ ft}^3} \times \frac{379.5 \text{ ft}^3}{\text{lb-mole}} \times \frac{\text{lb-mole}}{16 \text{ lb VOC}} \times \frac{10^6 \text{ ppmv}}{1} = 21 \text{ ppmvd VOC @ } 15\% \text{ O}_2$$

NH₃ – 10 ppmvd @ 15% O₂ in exhaust

$$\frac{10 \text{ ppmv NH}_3}{10^6} \times \frac{17 \text{ lb NH}_3}{\text{lb-mole}} \times \frac{\text{lb-mole}}{379.5 \text{ ft}^3} \times \frac{9,100 \text{ ft}^3}{\text{MMBtu}} \times \frac{20.9\% \text{ O}_2}{(20.9 - 15)\% \text{ O}_2} = 0.0144 \frac{\text{lb NH}_3}{\text{MMBtu}}$$

$$0.0144 \frac{\text{lb NH}_3}{\text{MMBtu}} \times \frac{1 \text{ MMBtu}}{10^6 \text{ Btu}} \times \frac{\text{Btu}_{\text{in}}}{0.33 \text{ Btu}_{\text{out}}} \times \frac{2,545 \text{ Btu}}{\text{hp-hr}} \times \frac{453.59 \text{ g}}{\text{lb}} = 0.05 \frac{\text{g NH}_3}{\text{bhp-hr}}$$

C. Calculations**1. Pre-Project Potential to Emit (PE1)**

Since the proposed digester system with backup flare and IC engines are new emissions units, PE1 = 0 for all affected pollutants.

2. Post Project Potential to Emit (PE2)Digester System (S-8741-1-0)

As explained above, the applicant has proposed to construct a new enclosed, mixed plug flow anaerobic digester that will have negligible fugitive emissions; therefore, emissions for the digester will be calculated only based on combustion of the digester gas in the backup flare.

The potential to emit for the backup flare will be calculated based on the the maximum flare gas flow rate of 17,500 scf per hour (420,000 scf per day) and the annual limit of 38.325 MMscf/yr of digester gas combusted in the flare.

Daily PE2 for the Digester System Backup Plant Flare (S-8741-1-0)							
Pollutant	Emission Factor (lb/scf)	x	Gas Flow Rate (scf/hr)	x	Daily Hours of Operation (hrs/day)	=	PE2 (lb/day)
NO _x	3.6E-5	x	17,500	x	24	=	15.1
SO _x	6.78E-6	x	17,500	x	24	=	2.8
PM ₁₀	9.0E-6	x	17,500	x	24	=	3.8
CO	2.76E-5	x	17,500	x	24	=	11.6
VOC	8.4E-6	x	17,500	x	24	=	3.5

Annual PE2 for the Digester System Backup Plant Flare (S-8741-1-0)							
Pollutant	Emission Factor (lb/scf)	x	Maximum Gas Flared Annually (MMscf/yr)	x	10 ⁶ scf/MMscf	=	PE2 (lb/yr)
NO _x	3.6E-5	x	38.325	x	10 ⁶	=	1,380
SO _x	6.78E-6	x	38.325	x	10 ⁶	=	260
PM ₁₀	9.0E-6	x	38.325	x	10 ⁶	=	345
CO	2.76E-5	x	38.325	x	10 ⁶	=	1,058
VOC	8.4E-6	x	38.325	x	10 ⁶	=	322

Digester Gas-Fired Engines (S-8741-2-0, -3-0, and -4-0)Daily PE2 for Each Engine during the Commissioning Period:

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

Daily PE for Engines S-8741-2-0, -3-0, & -4-0 During the Commissioning Periods								
NO _x	1.0	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	85.1	(lb/day)
SO _x	0.04	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	3.4	(lb/day)
PM ₁₀	0.05	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	4.3	(lb/day)
CO	2.0	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	170.3	(lb/day)
VOC	0.7	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	59.6	(lb/day)

Daily PE2 for Each Engine during Normal Operation after the Commissioning Period:

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

Daily PE for Engines S-8741-2-0, -3-0, & -4-0 After Commissioning								
NO _x	0.15	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	12.8	(lb/day)
SO _x	0.04	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	3.4	(lb/day)
PM ₁₀	0.05	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	4.3	(lb/day)
CO	0.50	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	42.6	(lb/day)
VOC	0.10	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	8.5	(lb/day)
NH ₃	0.05	(g/bhp-hr) x	1,609	(bhp) x	24	(hr/day) ÷ 453.59 (g/lb) =	4.3	(lb/day)

Maximum Annual PE2 for Each Engine During the first Year Including the Commissioning Periods:

As discussed above, each of the proposed engines will be allowed to operate up to 100 hours for commissioning during the first year of operation. The maximum annual PE for NO_x, SO_x, PM₁₀, CO, and VOC from each engine will be calculated based on the maximum hours of operation during the commissioning period and the remaining hours during normal operation. The maximum annual PE for NH₃ will be conservatively calculated assuming operation of the SCR systems for 8,760 hours per year.

NO_x

$$1,609 \text{ bhp} \times (1.0 \text{ g-NO}_x/\text{bhp-hr} \times 100 \text{ hr} + 0.15 \text{ g-NO}_x/\text{bhp-hr} \times 8,660 \text{ hr}) \div 453.59 \text{ g/lb} = \mathbf{4,963 \text{ lb-NO}_x}$$

SO_x

$$1,609 \text{ bhp} \times (0.04 \text{ g-SO}_x/\text{bhp-hr} \times 100 \text{ hr} + 0.04 \text{ g-SO}_x/\text{bhp-hr} \times 8,660 \text{ hr}) \div 453.59 \text{ g/lb} = \mathbf{1,243 \text{ lb-SO}_x}$$

PM₁₀

$$1,609 \text{ bhp} \times (0.05 \text{ g-PM}_{10}/\text{bhp-hr} \times 100 \text{ hr} + 0.05 \text{ g-PM}_{10}/\text{bhp-hr} \times 8,660 \text{ hr}) \div 453.59 \text{ g/lb} = \mathbf{1,554 \text{ lb-PM}_{10}}$$

CO

$$1,609 \text{ bhp} \times (2.0 \text{ g-CO}/\text{bhp-hr} \times 100 \text{ hr} + 0.50 \text{ g-CO}/\text{bhp-hr} \times 8,660 \text{ hr}) \div 453.59 \text{ g/lb} = \mathbf{16,069 \text{ lb-CO}}$$

VOC

$$1,609 \text{ bhp} \times (0.7 \text{ g-VOC/bhp-hr} \times 100 \text{ hr} + 0.10 \text{ g-VOC/bhp-hr} \times 8,660 \text{ hr}) \div 453.59 \text{ g/lb} = \mathbf{3,320 \text{ lb-VOC}}$$

NH₃

$$1,609 \text{ bhp} \times (0.05 \text{ g-NH}_3\text{/bhp-hr} \times 8,760 \text{ hr}) \div 453.59 \text{ g/lb} = \mathbf{1,554 \text{ lb-NH}_3}$$

Maximum Total Combined Annual PE2 from all 3 Engines, Including Commissioning:

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

$$\text{NO}_x: 4,963 \text{ lb-NO}_x\text{/yr-engine} \times 3 \text{ engines} = \mathbf{14,889 \text{ lb-NO}_x\text{/yr}}$$

$$\text{SO}_x: 1,243 \text{ lb-SO}_x\text{/yr-engine} \times 3 \text{ engines} = \mathbf{3,729 \text{ lb-SO}_x\text{/yr}}$$

$$\text{PM}_{10}: 1,554 \text{ lb-PM}_{10}\text{/yr-engine} \times 3 \text{ engines} = \mathbf{4,662 \text{ lb-PM}_{10}\text{/yr}}$$

$$\text{CO}: 16,069 \text{ lb-CO/yr-engine} \times 3 \text{ engines} = \mathbf{48,207 \text{ lb-CO/yr}}$$

$$\text{VOC}: 3,320 \text{ lb-VOC/yr-engine} \times 3 \text{ engines} = \mathbf{9,960 \text{ lb-VOC/yr}}$$

$$\text{NH}_3: 1,554 \text{ lb-NH}_3\text{/yr-engine} \times 3 \text{ engines} = \mathbf{4,662 \text{ lb-NH}_3\text{/yr}}$$

Annual PE2 for Each Engine in years with no Commissioning:

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

Annual PE2 for Engines S-8741-2-0, -3-0, & -4-0 with no Commissioning								
NO _x	0.15	(g/bhp-hr) x	1,609	(bhp) x	8,760	(hr) ÷ 453.59 (g/lb) =	4,661	(lb/yr)
SO _x	0.04	(g/bhp-hr) x	1,609	(bhp) x	8,760	(hr) ÷ 453.59 (g/lb) =	1,243	(lb/yr)
PM ₁₀	0.05	(g/bhp-hr) x	1,609	(bhp) x	8,760	(hr) ÷ 453.59 (g/lb) =	1,554	(lb/yr)
CO	0.50	(g/bhp-hr) x	1,609	(bhp) x	8,760	(hr) ÷ 453.59 (g/lb) =	15,537	(lb/yr)
VOC	0.10	(g/bhp-hr) x	1,609	(bhp) x	8,760	(hr) ÷ 453.59 (g/lb) =	3,107	(lb/yr)
NH ₃	0.05	(g/bhp-hr) x	1,609	(bhp) x	8,760	(hr) ÷ 453.59 (g/lb) =	1,554	(lb/yr)

Max Total Combined Annual PE2 from all 3 Engines in years with no Commissioning:

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

$$\text{NO}_x: 4,661 \text{ lb-NO}_x\text{/yr-engine} \times 3 \text{ engines} = \mathbf{13,983 \text{ lb-NO}_x\text{/yr}}$$

$$\text{SO}_x: 1,243 \text{ lb-SO}_x\text{/yr-engine} \times 3 \text{ engines} = \mathbf{3,729 \text{ lb-SO}_x\text{/yr}}$$

$$\text{PM}_{10}: 1,554 \text{ lb-PM}_{10}\text{/yr-engine} \times 3 \text{ engines} = \mathbf{4,662 \text{ lb-PM}_{10}\text{/yr}}$$

$$\text{CO}: 15,537 \text{ lb-CO/yr-engine} \times 3 \text{ engines} = \mathbf{46,611 \text{ lb-CO/yr}}$$

$$\text{VOC}: 3,107 \text{ lb-VOC/yr-engine} \times 3 \text{ engines} = \mathbf{9,321 \text{ lb-VOC/yr}}$$

$$\text{NH}_3: 1,554 \text{ lb-NH}_3\text{/yr-engine} \times 3 \text{ engines} = \mathbf{4,662 \text{ lb-NH}_3\text{/yr}}$$

Maximum Daily and Annual PE2 from Calculations Above:

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

Max. Post-Project Potential to Emit (PE2) for S-8741-2-0, -3-0, & -4-0			
	Max. Daily Emissions for each engine (lb/day)	Max. Annual Emissions for each engine (lb/year)	Max. Total Combined Annual Emissions for all 3 engines (lb/year)
NO _x	85.1	4,963	14,889
SO _x	3.4	1,243	3,729
PM ₁₀	4.3	1,554	4,662
CO	170.3	16,069	48,207
VOC	59.6	3,320	9,960
NH ₃	4.3	1,554	4,662

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

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

Since this is a new facility, there are no valid ATCs, PTOs, or ERCs at the Stationary Source; therefore, the SSPE1 is equal to zero 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
ATC S-8741-1-0 (Digester System & Backup Flare)	1,380	260	345	1,058	322	0
ATC S-8741-2-0 (1,609 bhp Digester Gas Engine) ⁵	4,963	1,243	1,554	16,069	3,320	1,554
ATC S-8741-4-0 (1,609 bhp Digester Gas Engine) ⁵	4,963	1,243	1,554	16,069	3,320	1,554
ATC S-8741-4-0 (1,609 bhp Digester Gas Engine) ⁵	4,963	1,243	1,554	16,069	3,320	1,554
SSPE2	16,269	3,989	5,007	49,265	10,282	4,662

⁵ The SSPE2 values listed in this table include the worst case annual maximum emissions for NO_x, CO, and VOC during the 100 hours of allowed commissioning time where the engines are allowed to operate uncontrolled for setup and tuning purposes. After the first year, the PE for NO_x, CO, and VOC emissions will go down as the engines will no longer be allowed to operate without operation of controls for these pollutants. The maximum PE for NH₃ was calculated assuming operation of the SCR systems for 8,760 hours per year.

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	16,269	3,989	5,007	5,007	49,265	10,282
Major Source Threshold	20,000	140,000	140,000	140,000	200,000	20,000
Major Source?	No	No	No	No	No	No

Note: PM2.5 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 tons per year (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 ? (Y/N)	N	N	N	N	N	N

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 the proposed digester system and flare and engines are new emissions units, BE = PE1 = 0 for all pollutants from each unit.

7. SB 288 Major Modification

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

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

8. Federal Major Modification

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

Since this facility is not a Major Source for any pollutants, this project does not constitute a Federal Major Modification.

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)⁶
- Total reduced sulfur (including H₂S)⁶

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 tons per year (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	8.1	5.1	2.0	24.6	2.5	2.5
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 B.

⁶ Because the facility is not included in the specific source categories listed in 40 CFR 51.165, for PSD purposes only non-fugitive emissions from the engine exhaust stacks must be addressed for this project. Although the sulfur (primarily H₂S) in the fuel will be converted almost entirely to SO_x during combustion, the maximum possible amount of H₂S and total reduced sulfur compounds from the engine stacks can be calculated by assuming that all sulfur in the fuel is emitted as H₂S. Based on the fuel sulfur limit of 40 ppmv as H₂S, the maximum possible H₂S emission factor for the engines is calculated to be 0.02 g-H₂S/bhp (0.0056 lb-H₂S/MMBtu), resulting in a total combined maximum of 0.9 tpy H₂S from the exhaust stacks of all three engines. This is well below the applicable PSD threshold of 250 tpy.

VIII. Compliance Determination

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

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

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

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

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

As seen in Section VII.C.2 above, the applicant is proposing to install a new digester system with a backup flare and three new digester gas-fired IC engines.

Digester System with backup flare (S-8741-1-0)

The applicant proposes to install a digester system with a backup flare. As explained above, fugitive emissions from the digester system are considered negligible. The proposed digester gas backup flare will have a PE greater than 2.0 lb/day for NO_x, SO_x, PM₁₀, CO, and VOC. However, the flare is an emissions control device used to control gas from the digester system. The District has determined that an emissions control device is not an emissions unit that is subject to BACT. Therefore, the digester gas-fired backup flare is not subject to District BACT requirements.

Digester Gas-Fired Engines (S-8741-2-0, -3-0, and -4-0)

The proposed engines will each have a PE greater than 2.0 lb/day for NO_x, SO_x, PM₁₀, CO, VOC, and NH₃. Therefore, BACT is triggered for NO_x, SO_x, PM₁₀, and VOC. The PE for CO from each unit also exceeds 2.0 lb/day; however, BACT is not triggered for CO since the SSPE2 for CO is not greater than 200,000 lbs/year, as demonstrated in Section VII.C.5 above.

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

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

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

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

d. SB 288/Federal Major Modification

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

2. BACT Guideline

S-8741-1-0: Digester System and Backup Flare

As discussed above, the flare is used to control the digester gas that is generated by the digester system and therefore is an emission control device that is not subject to District BACT requirements. Although the flare is not subject to District BACT requirements, the flare will operate with NO_x emissions not exceeding 0.06 lb/MMBtu and will be subject to a 10% opacity limit to ensure operation with minimal smoke and PM emissions. Therefore, the flare is a well-controlled flare that will minimize the generation of pollutants not directly controlled by the flare.

S-8741-2-0, -3-0, & -4-0: Digester Gas-Fired IC Engines

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

3. Top-Down BACT Analysis

S-8741-2-0, -3-0, & -4-0: Digester Gas-Fired IC Engines

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

B. Offsets

1. Offset Applicability

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

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

Offset Determination (lb/year)					
	NO _x	SO _x	PM ₁₀	CO	VOC
SSPE2	16,269	3,989	5,007	49,265	10,282
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets triggered?	No	No	No	No	No

2. Quantity of Offsets Required

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

C. Public Notification

1. Applicability

Public noticing is required for:

- New Major Sources, Federal Major Modifications, and SB 288 Major Modifications,
- Any new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any one pollutant,
- Any project which results in the offset thresholds being surpassed
- Any project with an SSPE2 of greater than 20,000 lb/year for any pollutant, and/or
- Any project which results in a Title V significant permit modification.

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

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

b. PE > 100 lb/day

The PE2 for the new units is compared to the daily PE Public Notice thresholds in the following tables:

S-8741-1-0: Digester System and Backup Flare

PE > 100 lb/day Public Notice Thresholds			
Pollutant	PE2 (lb/day)	Public Notice Threshold	Public Notice Triggered?
NO _x	15.1	100 lb/day	No
SO _x	2.8	100 lb/day	No
PM ₁₀	3.8	100 lb/day	No
CO	11.6	100 lb/day	No
VOC	3.5	100 lb/day	No

Therefore, public noticing for PE > 100 lb/day purposes is not required for the proposed digester system and backup flare.

S-8741-2-0, -3-0, & -4-0: Digester Gas-Fired IC Engines

PE > 100 lb/day Public Notice Thresholds			
Pollutant	PE2 (lb/day)	Public Notice Threshold	Public Notice Triggered?
NO _x	85.1	100 lb/day	No
SO _x	3.4	100 lb/day	No
PM ₁₀	4.3	100 lb/day	No
CO	170.3	100 lb/day	Yes
VOC	59.6	100 lb/day	No
NH ₃	4.3	100 lb/day	No

Therefore, public noticing for PE > 100 lb/day purposes is required for the proposed digester gas-fired IC engines.

c. Offset Threshold

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

Offset Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO _x	0	16,269	20,000 lb/year	No
SO _x	0	3,989	54,750 lb/year	No
PM ₁₀	0	5,007	29,200 lb/year	No
CO	0	49,265	200,000 lb/year	No
VOC	0	10,282	20,000 lb/year	No

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

d. SSIPE > 20,000 lb/year

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

SSIPE Public Notice Thresholds					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO _x	16,269	0	16,269	20,000 lb/year	No
SO _x	3,989	0	3,989	20,000 lb/year	No
PM ₁₀	5,007	0	5,007	20,000 lb/year	No
CO	49,265	0	49,265	20,000 lb/year	Yes
VOC	10,282	0	10,282	20,000 lb/year	No
NH ₃	4,662	0	4,662	20,000 lb/year	No

As demonstrated above, the SSIPE for CO was greater than 20,000 lb/year; therefore public noticing for SSIPE > 20,000 lbs 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 for a Title V significant modification.

2. Public Notice Action

As discussed above, public noticing is required for this project for CO emissions from an emissions unit in excess of 100 lb/day and for an SSIPE for CO that exceeds 20,000

lb/yr. Therefore, public notice documents will be submitted to the California Air Resources Board (ARB) and a public notice will be published in a local newspaper of general circulation prior to the issuance of the ATC for this equipment.

D. Daily Emission Limits (DELs)

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

Proposed Rule 2201 (DEL) Conditions for the Digester System and Backup Flare (S-8741-1-0)

The following condition will be placed on the ATC permit to ensure that fugitive emissions from the digester system will be negligible:

- The VOC content of the digester gas produced by the digester system shall not exceed 10% by weight. [District Rule 2201]

Proposed DEL Conditions for the Backup Flare

For the digester gas flare, the DELs for NO_x, PM₁₀, CO, and VOC are stated in the form of maximum emission factors (lb/MMBtu) and maximum amount of gas that can be combusted (MMscf). The DEL for SO_x is based on the maximum sulfur content of the digester gas.

- No air contaminant shall be discharged into the atmosphere from the flare for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1/2 or 10% opacity. [District Rules 2201 and 4101]
- Only digester gas shall be combusted in the flare. [District Rule 2201]
- Emissions from the flare shall not exceed any of the following limits: 0.06 lb-NO_x/MMBtu, 0.015 lb-PM₁₀/MMBtu, 0.046 lb-CO/MMBtu, or 0.014 lb-VOC/MMBtu. [District Rule 2201]
- The sulfur content of the digester gas combusted in this flare shall not exceed 40 ppmv as H₂S. The District may approve an averaging period of up to one calendar day in length for demonstration of compliance with the digester gas sulfur content limit. [District Rules 2201 and 4801]

In addition, the following conditions will also be included on the ATC permit to ensure that the flare is properly operated and will comply with the annual emission limits.

- A flame shall be present at all times whenever combustible gases are vented through the flare. [District Rule 2201]

- The flare outlet shall be equipped with an automatic ignition system, or shall operate with a pilot flame present at all times when combustible gases are vented through the flare, except during purge periods for automatic-ignition equipped flares. [District Rule 2201]
- The amount of digester gas combusted in the flare shall not exceed either of the following limits: 252.0 MMBtu (equivalent to 0.420 MMscf) in any one day and 22,995 MMBtu (equivalent to 38.325 MMscf) in any consecutive 365-day period. [District Rule 2201]
- The flare shall be equipped with an operational, non-resettable, totalizing mass or volumetric fuel flow meter or other District-approved alternative method to measure the amount of gas combusted in the flare. [District Rule 2201]

Proposed Rule 2201 (DEL) Conditions for the Digester Gas-Fired Engines (S-8741-2-0, -3-0, & -4-0)

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

- This engine shall only be fueled with digester gas. [District Rule 2201]
- The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H₂S. The 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]
- Ammonia (NH₃) emissions from this engine shall not exceed 10 ppmvd @ 15% O₂. [District Rule 2201]

Proposed Rule 2201 (DEL) Conditions during Commissioning Period:

For these digester gas-fired IC engines, the DELs for NO_x, PM₁₀, CO, and VOC during commissioning are stated in the form of maximum emission factors (g/bhp-hr) and maximum number of hours allowed for commissioning activities.

- Commissioning period shall commence when all mechanical, electrical, and control systems are installed and individual system startup has been completed, or when the reciprocating engine is first fired, whichever occurs first. The commissioning period shall terminate when the engine has completed initial performance testing, completed initial engine tuning, and the engine is available for commercial operation. The total duration of the commissioning period for this engine shall not exceed 100 hours of operation. [District Rule 2201]
- The owner/operator shall minimize the emissions from the engine to the maximum extent possible during the commissioning period. [District Rule 2201]
- During the commissioning period emission rates from this IC engine shall not exceed any of the following limits: 1.0 g-NO_x/bhp-hr, 0.05 g-PM₁₀/bhp-hr, 2.0 g-CO/bhp-hr, or 0.7 g-VOC/bhp-hr. [District Rule 2201]
- The total number of firing hours of this unit without abatement of emissions by the SCR system shall not exceed 100 hours during the commissioning period. Such operation of

this unit without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system. Upon completion of these activities, the unused balance of the 100 firing hours without abatement shall expire. [District Rule 2201]

Proposed Rule 2201 (DEL) Conditions during Normal Operation:

For the proposed digester gas-fired IC engines, the DELs for NO_x, PM₁₀, CO, and VOC during normal operation are stated in the form of emission factors (g/hp-hr & ppmv), the maximum engine horsepower rating (1,609 bhp), and the maximum operational time of 24 hours per day.

- Coincident with the end of the commissioning period, emissions from this IC engine shall not exceed any of the following limits: 0.15 g-NO_x/bhp-hr (for periodic alternate monitoring, 11 ppmvd NO_x @ 15% O₂), NO_x referenced as NO₂; 0.05 g-PM₁₀/bhp-hr; 0.50 g-CO/bhp-hr (for periodic alternate monitoring, 60 ppmvd CO @ 15% O₂); or 0.10 g-VOC/bhp-hr (for periodic alternate monitoring, 21 ppmvd VOC @ 15% O₂), VOC referenced as CH₄. [District Rules 2201 and 4702]

E. Compliance Assurance

1. Source Testing

Digester System and Backup Flare (S-8741-1-0)

Source testing of this unit is not required to demonstrate compliance with the Rule 2201 emission limits for NO_x, PM₁₀, CO, or VOC. However, periodic testing of the fuel sulfur content of the digester gas will be required to ensure compliance with the digester gas fuel sulfur content limit.

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

- Digester gas sulfur content analysis shall be performed at least once every 12 months using EPA Method 11 or EPA Method 15, as appropriate. Records of the digester gas sulfur content analysis shall be maintained and provided to the District upon request. [District Rule 2201]

Digester Gas-Fired IC Engines (S-8741-2-0, -3-0, & -4-0)

The proposed 1,609 bhp digester gas-fired engines are subject to District Rule 4702 - Internal Combustion Engines. Section 6.3.2.1 of District Rule 4702 requires source testing of NO_x, CO, and VOC emissions at least once every 24 months for a non-agricultural spark-ignited IC engine. The periodic source testing required by District Rule 4702 will ensure compliance with the applicable New Source Review (NSR) requirements NO_x, CO, and VOC. Therefore, source testing for NO_x, CO, and VOC will be required within 90 days of initial start-up and at least once 24 months thereafter. Since the control equipment will include an SCR system, periodic testing of ammonia slip will also be required. In addition, Section 5.10.1 of District Rule 4702 requires an

annual analysis of the sulfur content of engine fuel. The PM₁₀ emissions from the engine are not expected to change much over time as long as the quality of the gas used to fuel the engines remains consistent. The facility will be required to periodically monitor the sulfur content of the digester gas fuel, which should ensure that the quality of the digester gas fuel is consistent. Therefore, initial PM₁₀ source testing will be required to demonstrate compliance with the PM₁₀ emission limit, but ongoing PM₁₀ source testing will not be required.

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

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

- Source testing to measure NO_x, CO, VOC, PM₁₀, and ammonia (NH₃) emissions from this unit shall be conducted within 90 days of initial start-up. [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]
- {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]
- 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 within 90 days of initial start-up using EPA Method 11 or EPA Method 15, as appropriate. [District Rules 2201 and 4702]
- Fuel sulfur analysis shall be performed at least annually using EPA Method 11 or EPA Method 15, as appropriate. Records of the fuel sulfur analysis shall be

maintained and provided it to the District upon request. [District Rules 2201 and 4702]

- {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]

2. Monitoring

Digester System and Backup Flare (S-8741-1-0)

Because of the variable composition of digester gas, monitoring of the sulfur content of the digester gas flared will be required. The following conditions will be placed on the flare permit to ensure compliance:

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

Digester Gas-Fired IC Engines (S-8741-2-0, -3-0, & -4-0)

As stated above the engines are subject to District Rule 4702. Section 5.8.1 of District Rule 4702 requires engines rated at least 1,000 bhp that can operate more than 2,000 hour per calendar year or equipped with external control devices to install, operate, and maintain an APCO-approved alternate monitoring plan. Section 5.8.9 of District Rule 4702 requires monitoring of NO_x emissions at least once every calendar quarter for a non-agricultural spark-ignited IC engine. Therefore, quarterly monitoring of NO_x, CO, and O₂ concentrations in accordance with pre-approved alternate monitoring plan "A"

within District Policy SSP 1810 will be required. Since the engines will be equipped with SCR, quarterly monitoring of ammonia slip will also be required.

The following conditions will be placed on the engine permits 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. [In-stack monitors may be allowed if they satisfy the standards for portable analyzers as specified in District policies and are approved in writing by the APCO.] 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. [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]
- {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]

Because of the variable composition of digester gas, additional monitoring of the fuel sulfur content of the digester gas will be required. The following conditions will be placed on the engine permits to ensure compliance:

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

3. Recordkeeping

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

Digester System and Backup Flare (S-8741-1-0)

- Permittee shall maintain daily and annual records of the quantity of digester gas combusted in the flare in standard cubic feet (scf). [District Rule 1070 and 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. Records may be maintained and submitted in an electronic format approved by the District. [District Rules 1070, 2201, and 4311]

Digester Gas-Fired IC Engines (S-8741-2-0, -3-0, & -4-0)

- 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]

- 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]
- The permittee shall maintain an engine operating log to demonstrate compliance. The engine operating log shall include, on a monthly basis, the following information: the total hours of operation, the type and quantity of fuel used, maintenance and modifications performed, monitoring data, compliance source test results, and any other information necessary to demonstrate compliance. Quantity of fuel used shall be recorded in standard cubic feet using a non-resettable, totalizing mass or volumetric fuel flow meter or other APCO approved-device. [District Rules 2201 and 4702]
- All records shall be maintained and retained for a minimum of five (5) years, and shall be made available for District inspection upon request. All records may be maintained and submitted in an electronic format approved by the District. [District Rules 2201 and 4702]

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

As stated above, the proposed 1,609 bhp engines are subject to 40 CFR 60, Subpart JJJJ. 40 CFR 60, Subpart JJJJ requires uncertified engines rated 500 bhp or more to submit an initial notification to EPA. As explained above, the District has not been delegated the authority to implement this regulation for non-Major Sources; therefore, this requirement will not be included in the ATC permits. However, the applicant will be responsible for compliance with the applicable requirements of this regulation.

F. Ambient Air Quality Analysis (AAQA)

An AAQA shall 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}.

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

Criteria Pollutant Modeling Results*					
Digester Gas-Fired Flare & 3 IC Engines	1 Hour	3 Hours	8 Hours.	24 Hours	Annual
CO	Pass	X	Pass	X	X
NO _x	Pass ¹	X	X	X	Pass
SO _x	Pass	Pass	X	Pass	Pass
PM ₁₀	X	X	X	Pass ²	Pass ²
PM _{2.5}	Pass	X	X	X	X

* Results were taken from the PSD spreadsheet.

¹ The project was compared to the 1-hour NO₂ National Ambient Air Quality Standard that became effective on April 12, 2010 using the District's approved procedures.

² The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2).

Rule 2410 Prevention of Significant Deterioration

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

Rule 2520 Federally Mandated Operating Permits

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

Rule 4101 Visible Emissions

Rule 4101 states that no 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).

Digester System and Backup Flare (S-8741-1-0)

Since the flare will only combust excess digester gas, visible emissions are not expected to exceed Ringelmann 1 or 20% opacity. Additionally, to ensure compliance with the particulate matter emission limit, visible emissions from the flare will be limited to no more than 10% opacity. The following condition will be listed on the proposed ATC permit to ensure compliance:

- 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 1/2 or 10% opacity. [District Rules 2201 and 4101]

Digester Gas-Fired IC Engines (S-8741-2-0, -3-0, & -4-0)

Since the IC engines are fired solely on gaseous fuel, visible emissions are not expected to exceed Ringelmann 1 or 20% opacity.

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

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

Rule 4102 Nuisance

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

California Health & Safety Code 41700 (Health Risk Assessment)

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

A Health Risk Assessment (HRA) is not required for a project with a total facility prioritization score of less than one. According to the Technical Services Memo for this project (Appendix 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 results of the health risk assessment are summarized in the table below.

RMR Summary						
Categories	Digester Backup Flare (S-8741-1-0)	1,609 bhp Digester Gas IC Engine (S-8741-2-0)	1,609 bhp Digester Gas IC Engine (S-8741-3-0)	1,609 bhp Digester Gas IC Engine (S-8741-4-0)	Project Totals	Facility Totals
Prioritization Score	13.5	64.6	64.6	64.6	>1.0	>1.0
Acute Hazard Index	0.00	0.11	0.11	0.10	0.32	0.32
Chronic Hazard Index	0.00	0.04	0.04	0.04	0.14	0.14
Maximum Individual Cancer Risk (10^{-6})	1.09E-8	3.18E-07	3.42E-07	3.69E-07	1.04E-06	1.04E-06
T-BACT Required?	No	No	No	No		
Special Permit Conditions?	No	Yes	Yes	Yes		

Discussion of T-BACT

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

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

To ensure compliance with the HRA; the following condition will be listed on the engine permits:

- {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]
- The exhaust stack shall be at least 25 feet tall. [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.

Digester System Backup Flare (S-8741-1-0)

$$0.015 \frac{lb - PM}{1MMBtu} \times \frac{1MMBtu}{9,100dscf} \times \frac{7,000 grain}{1lb} = 0.012 \frac{grain}{dscf}$$

Since 0.012 grain/dscf is less than 0.1 grain/dscf, compliance with this rule is expected.

Digester Gas-Fired IC Engines (S-8741-2-0, -3-0, & -4-0)

$$0.05 \frac{g}{hp \cdot hr} \times \frac{1hp \cdot hr}{2,545Btu} \times \frac{10^6 Btu}{9,100dscf} \times \frac{0.33Btu_{out}}{1Btu_{in}} \times \frac{15.43grain}{g} = 0.011 \frac{grain}{dscf}$$

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

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

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

District Rule 4311 Flares

The purpose of this rule is to limit the emissions of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) from the operation of flares.

Pursuant to Section 4.3, except for the record keeping requirement of Section 6.1.4 the requirements of this rule do not apply to any flare located at a stationary source with potential emissions less than 10.0 tons per year of VOC and 10.0 tons per year of NO_x.

Section 6.1.4 requires an operator claiming exemption under Section 4.3 to record annual throughput, material usage, or other information necessary to demonstrate compliance with the terms of the exemption. The following condition will ensure compliance with this recordkeeping requirement:

- The facility shall maintain records of annual gas production, throughput, material usage, or other information necessary to demonstrate that total emissions from the facility (S-8741) are less than ten tons per year for both NO_x and VOC. [District Rule 4311]

Therefore, compliance with the requirements of this rule is expected.

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 proposed new 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 proposed engines.

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. Pursuant to Section 5.2.2.2.1, engines in the fee payment program shall have actual emissions not greater than the applicable limits in Table 1 during the entire time the engine is part of the fee payment program. Pursuant to Section 5.2.2.2.2, compliance with Section 5.7 and 5.10, pursuant to the deadlines specified in Section 7.5, is also required as part of the fee payment option.

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. An operator electing this option shall not be eligible to participate in the fee payment option outlined in Section 5.2.2.2 and Section 5.6.

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)
1. a. Rich-Burn, Waste Gas Fueled	50 ppmv	2,000 ppmv	250 ppmv
1. b. Rich-Burn, Cyclic Loaded, Field Gas Fueled	50 ppmv	2,000 ppmv	250 ppmv
1. c. Rich-Burn, Limited Use	25 ppmv	2,000 ppmv	250 ppmv
1. d. Rich-Burn, Not Listed Above	11 ppmv	2,000 ppmv	250 ppmv
2. a. Lean-Burn, 2-Stroke, Gaseous Fueled, >50 bhp & <100 bhp	75 ppmv	2,000 ppmv	750 ppmv
2. b. Lean-Burn, Limited Use	65 ppmv	2,000 ppmv	750 ppmv
2. c. Lean-Burn Engine used for gas compression	65 ppmv or 93% reduction	2,000 ppmv	750 ppmv
2. d. Waste Gas Fueled	65 ppmv or 90% reduction	2,000 ppmv	750 ppmv
2. e. Lean-Burn, Not Listed Above	11 ppmv	2,000 ppmv	750 ppmv

The proposed digester gas-fired engines will be operated as a separate stationary source than the dairy farm and the District has determined that the IC engines are non-agricultural IC engines. The digester gas-fired, engines are waste gas-fired engines and are required to comply with the following emissions limits from Table 2, Row 2.d: 65 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 proposed ATC permits for the engines to ensure compliance:

- Coincident with the end of the commissioning period, emissions from this IC engine shall not exceed any of the following limits: 0.15 g-NO_x/bhp-hr (for periodic alternate monitoring, 11 ppmvd NO_x @ 15% O₂), NO_x referenced as NO₂; 0.05 g-PM₁₀/bhp-hr; 0.50 g-CO/bhp-hr (for periodic alternate monitoring, 60 ppmvd CO @ 15% O₂); or 0.10 g-VOC/bhp-hr (for periodic alternate monitoring, 21 ppmvd VOC @ 15% O₂), VOC referenced as CH₄. [District Rules 2201 and 4702]

Section 5.2.3.1 requires that the operator of a spark-ignited internal combustion engine rated > 50 bhp that is used exclusively in agricultural operations shall not operate it in such a manner that results in emissions exceeding the limits in Table 3 of Rule 4702 for the appropriate engine type on an engine-by-engine basis.

Section 5.2.3.2 allows that in lieu of complying with the NO_x, CO, and VOC limits of Table 3 on an engine-by-engine basis, an operator of a spark-ignited agricultural IC engine may elect to implement an alternative emission control plan pursuant to Section 8.0.

Section 5.2.3.3 requires an operator of an agricultural IC engine in that is subject to the applicable requirements of Table 3 shall not replace such engine with an engine that emits more emissions of NO_x, VOC, and CO, on a ppmv basis, (corrected to 15% oxygen on a dry basis) than the engine being replaced.

As stated above, the proposed digester gas-fired engines will be operated as part of a separate non-agricultural stationary source; therefore, Section 5.2.3 does not apply to the proposed engines.

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

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 IC engines proposed under this project will 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 IC engines 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 IC engines 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 digester gas-fired engines comply with the applicable emission limits of Table 2 of District Rule 4702; therefore payment of annual emissions fees for the engines 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.

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

- The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H₂S. The 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]

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 engine ATC permits:

- 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. [In-stack monitors may be allowed if they satisfy the standards for portable analyzers as specified in District policies and are approved in writing by the APCO.] 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 proposed engines will be subject to Section 5.8.1; therefore this section is not applicable.

Section 5.8.3 requires that for each engine with an alternative monitoring system, the operator shall submit to, and receive approval from the APCO, adequate verification of the alternative monitoring system's acceptability. The proposed ATC permits for the digester gas-fired engines include a pre-approved alternate emissions monitoring plan that specifies that the permittee perform periodic NO_x, CO, and 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 IC engines proposed under this project will not have CEMS installed; therefore this section of the Rule is not applicable.

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

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

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

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

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

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

- 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. [In-stack monitors may be allowed if

they satisfy the standards for portable analyzers as specified in District policies and are approved in writing by the APCO.] 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 proposed ATC permits for the digester gas-fired engines include 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. In lieu of installing a nonresettable fuel meter, the operator may use an alternative device, method, or technique in determining daily fuel consumption provided that the alternative is approved by the APCO. The operator shall maintain, operate, and calibrate the required fuel meter in accordance with the manufacturer's instructions. The use of an Alternate Emission Control Plan to comply with Section 5.2 is not being proposed for the IC engines under this project; therefore this section of the Rule is not applicable.

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

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

- 5.10.1 An operator of an engine complying with Sections 5.7.2 or 5.7.5 shall perform an annual sulfur fuel analysis in accordance with the test methods in Section 6.4. The

- operator shall keep the records of the fuel analysis and shall provide it to the District upon request,
- 5.10.2 An operator of an engine complying with Section 5.7.6 by installing and operating a control device with at least 95% by weight SOx reduction efficiency shall submit for approval by the APCO the proposed the key system operating parameters and frequency of the monitoring and recording not later than July 1, 2013, and
- 5.10.3 An operator of an engine complying with Section 5.7.6 shall perform an annual source test unless a more frequent sampling and reporting period is included in the Permit-to-Operate. Source tests shall be performed in accordance with the test methods in Section 6.4.

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

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

Section 5.11 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 proposed spark-ignited non-agricultural digester gas-fired engines are 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 each engine:

- 6.1.2.1 Permit-to-Operate number, Authority-to-Construct number, or Permit-Exempt Equipment Registration number,
- 6.1.2.2 Engine manufacturer,
- 6.1.2.3 Model designation and engine serial number,
- 6.1.2.4 Rated brake horsepower,
- 6.1.2.5 Type of fuel and type of ignition,

- 6.1.2.6 Combustion type: rich-burn or lean-burn,
- 6.1.2.7 Total hours of operation in the previous one-year period, including typical daily operating schedule,
- 6.1.2.8 Fuel consumption (cubic feet for gas or gallons for liquid) for the previous one-year period,
- 6.1.2.9 Stack modifications to facilitate continuous in-stack monitoring and to facilitate source testing,
- 6.1.2.10 Type of control to be applied, including in-stack monitoring specifications,
- 6.1.2.11 Applicable emission limits,
- 6.1.2.12 Documentation showing existing emissions of NO_x, VOC, and CO, and
- 6.1.2.13 Date that the engine will be in full compliance with this rule.

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

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

The applicant has submitted all the required information for Section 6.1 in the application for the IC engines 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 ATC permits:

- 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 proposed ATC permits 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. This information shall be retained for at least five years, shall be readily available, and provided to the APCO upon request. The records shall include, but are not limited to, the following:

- 6.2.3.1 Total hours of operation,
- 6.2.3.2 The type of fuel used,
- 6.2.3.3 The purpose for operating the engine,
- 6.2.3.4 For emergency standby engines, all hours of non-emergency and emergency operation shall be reported, and
- 6.2.3.5 Other support documentation necessary to demonstrate claim to the exemption

The applicant is not claiming an exemption for the proposed 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 Section 6.3.2 through Section 6.3.4 shall apply to the following engines:

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

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

- 6.3.2.1 By the applicable date specified in Section 5.2, and at least once every 24 months thereafter, except for an engine subject to Section 6.3.2.2.
- 6.3.2.2 By the applicable date specified in Section 5.2 and at least once every 60 months thereafter, for an agricultural spark-ignited engine that has been retro-fitted with a catalytic emission control device.
- 6.3.2.3 A portable NOx analyzer may be used to show initial compliance with the applicable limits/standards in Section 5.2 for agricultural spark-ignited engines,

provided the criteria specified in Sections 6.3.2.3.1 to 6.3.2.3.5 are met, and a source test is conducted in accordance with Section 6.3.2 within 12 months from the required compliance date.

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

- Source testing to measure NO_x, CO, VOC, PM₁₀, and ammonia (NH₃) emissions from this unit shall be conducted within 90 days of initial start-up. [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]

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

The following conditions will be included in the ATC permits 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 proposed engines will be fueled on digester gas; therefore this section does not apply.

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

Section 6.4 requires that the compliance with the requirements of Section 5.2 shall be determined, as required, in accordance with the 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:
$$\% \text{ Control Efficiency} = [(C_{\text{SO}_2, \text{inlet}} - C_{\text{SO}_2, \text{outlet}}) / C_{\text{SO}_2, \text{inlet}}] \times 100$$

Where:
 $C_{\text{SO}_2, \text{inlet}}$ = concentration of SO_x (expressed as SO₂) at the inlet side of the SO_x emission control system, in lb/Dscf
 $C_{\text{SO}_2, \text{outlet}}$ = 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 proposed ATC permits 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 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 digester gas-fired IC engines evaluated under this project will be equipped with SCR systems for control of NO_x and oxidation catalysts for control of CO and VOC. Therefore, the requirements of Sections 6.5.2 through 6.5.9 are applicable to the engines.

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

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

The digester gas-fired IC engines evaluated under this project will be equipped with SCR systems for control of NO_x and oxidation catalysts for control of CO and VOC. The applicant has proposed the following alternate monitoring program to ensure compliance with Sections 6.5.2 and 6.5.3 of the Rule.

NO_x Emissions:

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

1. Measurement of NO_x emissions concentrations 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 the catalyst control

system inlet exhaust temperature and NO_x emissions. The appropriate ranges for each operating load will be established during performance testing and will be monitored at least once per month.

CO and VOC Emissions:

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

1. Measurement of CO emissions concentrations with a portable analyzer at least once every calendar quarter. Generally, if the oxidation catalyst is controlling CO emissions, it should also be achieving the desired removal efficiency for VOC emissions. Therefore, no additional monitoring for VOC emissions is required.
2. To ensure that CO and VOC emissions concentrations are not being exceeded between periodic CO emissions concentration measurements, the applicant is proposing to determine a correlation between the catalyst control system inlet exhaust temperature and back pressure and CO emissions. The appropriate ranges for each operating load will be established during performance testing and will be monitored at least once per month.

Therefore, the following conditions will be listed on the proposed ATC permits to ensure compliance with the I & M requirements for NO_x, CO, and VOC:

- Within 90 days of initial start-up, the SCR system reagent injection rate and inlet temperature to the catalyst control system shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the NO_x emissions limit(s) 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%). Records of the acceptable SCR system reagent injection rate(s) and inlet temperature(s) to the catalyst control system demonstrated to result in compliance with the NO_x emission limit(s) shall be maintained and made available for inspection upon request. [District Rule 4702]
- If the SCR system reagent injection rate and/or the inlet temperature to the catalyst control system is outside of the established acceptable range(s), the permittee shall return the SCR system reagent injection rate and inlet temperature to the catalyst control system to within the established acceptable range(s) as soon as possible, but no longer than 8 hours after detection. If the SCR system reagent injection rate and inlet temperature to the catalyst control system are not returned to within acceptable range(s) 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 and inlet temperature to the catalyst control system are operating within the acceptable range(s) demonstrated to result in compliance with the NO_x emission limit(s) of this permit. [District Rule 4702]
- Within 90 days of initial start-up, the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system shall be monitored to

establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limit(s) 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%). Records of the established acceptable inlet temperature(s) and back pressure(s) demonstrated to result in compliance with the CO and VOC emission limits shall be maintained and made available for inspection upon request. [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 range(s), 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(s) 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(s) 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 operating within the acceptable range(s) demonstrated to result in compliance with the CO emission limit(s) of this permit. [District Rule 4702]
- The permittee shall monitor and record the engine operating load, the SCR system reagent injection rate, the inlet temperature to the catalyst control system, and the back pressure of the exhaust upstream of the catalyst control system at least once per month. [District Rule 4702]

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

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

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

- 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]

- If the SCR system reagent injection rate and/or the inlet temperature to the catalyst control system is outside of the established acceptable range(s), the permittee shall return the SCR system reagent injection rate and inlet temperature to the catalyst control system to within the established acceptable range(s) as soon as possible, but no longer than 8 hours after detection. If the SCR system reagent injection rate and inlet temperature to the catalyst control system are not returned to within acceptable range(s) 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 and inlet temperature to the catalyst control system are operating within the acceptable range(s) demonstrated to result in compliance with the NO_x emission limit(s) of this permit. [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 range(s), 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(s) 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(s) 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 operating within the acceptable range(s) demonstrated to result in compliance with the CO emission limit(s) of this permit. [District Rule 4702]

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

- {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]

Section 6.5.7 requires procedures and a schedule for using a portable NO_x analyzer to take NO_x emission readings pursuant to Section 5.8.9. The applicant has proposed that the

alternate monitoring program will ensure compliance with this section of the Rule. The following previously proposed condition will be listed on the proposed ATC permits:

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

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

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

- The permittee shall maintain records of: (1) the date and time of 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]

Section 6.5.9 specifies procedures for revising the I&M plan. The I&M plan shall be updated to reflect any change in operation. The I&M plan shall be updated prior to any planned change in operation. An engine operator that changes significant I&M plan elements must notify the District no later than seven days after the change and must submit an updated I&M plan to the APCO no later than 14 days after the change for approval. The date and time of the change to the I&M plan shall be recorded in the engine operating log. For new engines and modifications to existing engines, the I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit-to-Operate or Permit-Exempt Equipment Registration. The operator of an engine may request a change to the I&M plan at any time.

The applicant has proposed to comply with the I&M plan modification requirements per this section of the Rule. The following condition will be listed on the proposed engine ATC permits 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 proposed IC engines will be required to comply with the applicable sections of District Rule 4702 upon initial startup of the equipment; therefore, compliance with this section is expected.

Section 8.0 specifies requirements for use of an Alternative Emission Control Plan (AECPP) to comply with the NO_x emission requirements of Section 5.2 for a group of engines. Requirements for use of an AECPP include: only engines subject to Section 5.2 are eligible for inclusion in an AECPP; during any seven consecutive day period, the operator shall operate all engines in the AECPP to achieve an actual aggregate NO_x emission level that is ≤ 90% of the NO_x emissions that would be obtained by controlling the engines to comply individually with the NO_x limits in Section 5.2; the operator shall establish a NO_x emission factor limit for each engine; the operator must submit the AECPP at least 18 months before compliance with the emission limits in Section 5.2 is required and receive approval from the APCO; the operator must submit and updated or modified AECPP for approval by the APCO prior to any modifications; and the operator must maintain records necessary to demonstrate compliance with AECPP. The use of an Alternate Emission Control Plan to comply with Section 5.2 is not being proposed for the IC engines proposed under this project; therefore this section of the Rule is not applicable.

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

Conclusion

As shown above, the proposed non-agricultural, digester gas-fired, lean burn, IC engines are expected to comply with the applicable requirements of Rule 4702 upon initial operation and no further discussion is required.

Rule 4801 Sulfur Compounds

The purpose of this District Rule 4801 is to limit the emissions of sulfur compounds. The limit is that sulfur compound emissions (as SO₂) shall not exceed 0.2% by volume. Using the ideal gas equation, the sulfur compound emissions are calculated as follows:

Volume of SO_x as (SO₂) = (n x R x T) ÷ P

Where:

n = moles SO_x

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

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

To demonstrate compliance with the sulfur compound emission limit of Rule 4801, the maximum sulfur compound emissions from the flare and engine will be calculated using the maximum sulfur content allowed for the digester gas, which is 40 ppmv, equivalent to 0.0113 lb-SO_x/MMBtu.

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

Since 7.4 ppmv is $\leq$ 2000 ppmv, the engine is expected to comply with Rule 4801. The following conditions will be placed on the ATC permits to ensure compliance:

Digester System Backup Flare (S-8741-1-0)

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

Digester Gas-Fired IC Engines (S-8741-2-0, -3-0, & -4-0)

- 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]

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 proposed engines are 1,609 bhp SI ICEs that will be constructed after June 12, 2006 and manufactured after July 1, 2007; therefore, the engines are subject to this subpart. However, the District has not been delegated the authority to implement 40 CFR 60, Subpart JJJJ for non-Major Sources; therefore, the requirements from this subpart will not be included in the

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

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

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

Pursuant to Section 63.6590(c), an affected source that is a new or reconstructed stationary Reciprocating Internal Combustion Engine (RICE) located at an area source must meet the requirements of 40 CFR 63, Subpart ZZZZ by meeting the requirements of 40 CFR 60, Subpart IIII, for compression ignition engines or 40 CFR 60, Subpart JJJJ, for spark ignition engines and no further requirements apply for such engines under this part.

As with 40 CFR 60, Subpart JJJJ, the District has not been delegated the authority to implement 40 CFR 63, Subpart ZZZ for non-Major Sources; therefore, no requirements from this subpart will be included in the ATC permits. However, the applicant will be responsible for compliance with the applicable requirements of this regulation.

California Health & Safety Code 42301.6 (School Notice)

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

California Environmental Quality Act (CEQA)

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

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

Greenhouse Gas (GHG) Significance Determination

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

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

District CEQA Findings

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

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 ATCs S-8741-1-0, -2-0, -3-0, and -4-0 subject to the permit conditions on the attached draft ATC in Appendix E.

X. Billing Information

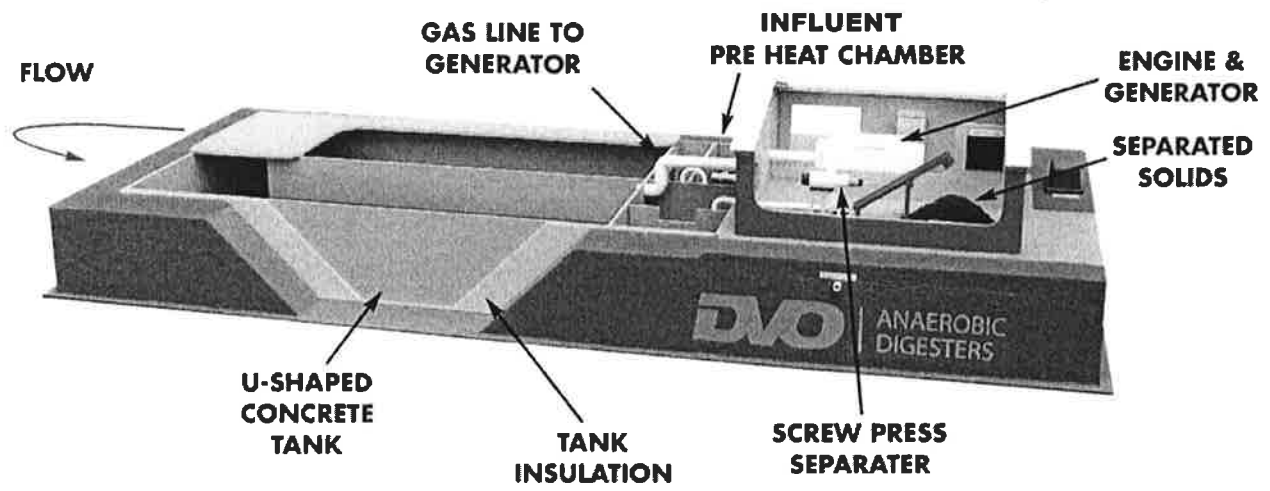
Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
S-8741-1-0	3020-02-G	10.5 MMBtu/hr Flare	\$893.00
S-8741-2-0	3020-10-F	1,609 bhp IC Engine	\$820.00
S-8741-3-0	3020-10-F	1,609 bhp IC Engine	\$820.00
S-8741-4-0	3020-10-F	1,609 bhp IC Engine	\$820.00

Appendixes

- A: Diagram of the Basic Design of the DVO Mixed Plug-Flow Anaerobic Digester
- B: Quarterly Net Emissions Change (QNEC)
- C: BACT Analysis for the Proposed Digester Gas-Fired IC Engines
- D: Summary of Health Risk Assessment (HRA) and Ambient Air Quality Analysis (AAQA)
- E: Draft ATCs (S-8741-1-0, -2-0, -3-0, & -4-0)

APPENDIX A

Diagram of the Basic Design of the DVO Mixed Plug-Flow Anaerobic Digester



APPENDIX B

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:

S-8741-1-0 (Digester System and Backup Flare)

PE1 (lb/qtr) S-8741-1-0					
	PE1 (lb/year)	÷	4 qtr/year	=	PE1 (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0.0
SO _x	0	÷	4 qtr/year	=	0.0
PM ₁₀	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0

PE2 (lb/qtr) S-8741-1-0					
	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO _x	1,380	÷	4 qtr/year	=	345.0
SO _x	260	÷	4 qtr/year	=	65.0
PM ₁₀	345	÷	4 qtr/year	=	86.3
CO	1,058	÷	4 qtr/year	=	264.5
VOC	322	÷	4 qtr/year	=	80.5

Quarterly NEC [QNEC] S-8741-1-0					
	PE2 (lb/qtr)	-	PE1 (lb/qtr)	=	NEC (lb/qtr)
NO _x	345.0	-	0.0	=	345.0
SO _x	65.0	-	0.0	=	65.0
PM ₁₀	86.3	-	0.0	=	86.3
CO	264.5	-	0.0	=	264.5
VOC	80.5	-	0.0	=	80.5

S-8741-2-0, -3-0, & -4-0 (1,609 bhp Digester Gas-Fired, Lean Burn, IC Engines)

PE1 (lb/qtr) S-8741-2-0, -3-0, & -4-0					
	PE1 (lb/year)	÷	4 qtr/year	=	PE1 (lb/qtr)
NO _x	0	÷	4 qtr/year	=	0.0
SO _x	0	÷	4 qtr/year	=	0.0
PM ₁₀	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	0	÷	4 qtr/year	=	0.0

PE2 (lb/qtr) S-8741-2-0, -3-0, & -4-0					
	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO _x	4,963	÷	4 qtr/year	=	1,240.8
SO _x	1,243	÷	4 qtr/year	=	310.8
PM ₁₀	1,554	÷	4 qtr/year	=	388.5
CO	16,069	÷	4 qtr/year	=	4,017.3
VOC	3,320	÷	4 qtr/year	=	830.0

Quarterly NEC [QNEC] S-8741-2-0, -3-0, & -4-0					
	PE2 (lb/qtr)	-	PE1 (lb/qtr)	=	NEC (lb/qtr)
NO _x	1,240.8	-	0.0	=	1,240.8
SO _x	310.8	-	0.0	=	310.8
PM ₁₀	388.5	-	0.0	=	388.5
CO	4,017.3	-	0.0	=	4,017.3
VOC	830.0	-	0.0	=	830.0

APPENDIX C

BACT Analysis for Digester Gas-Fired IC Engines

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)
Ammonia (NH ₃) Slip	≤ 10 ppmv @ 15% O ₂		

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

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

***This is a Summary Page for this Class of Source - Permit Specific BACT Determinations on Next Pages**

3.3.15

Top-Down BACT Analysis for Project S-1152007 Digester Gas-Fired IC Engines

Current District BACT Guideline 3.3.15 applies to the proposed waste gas-fired IC engines. In accordance with the District BACT policy, information from District BACT Guideline 3.3.15 will be utilized for the BACT analysis for the digester gas-fired engines proposed under this project.

I. Proposal and Process Description

CDE 24, LLC has requested Authority to Construct (ATC) permits to construct a DVO, Inc. in-ground, mixed plug-flow, anaerobic digester system with a digester gas-fired backup flare (ATC S-8741-1-0) and to install three 1,609 bhp digester gas-fired IC engines (or approved engines of equal or lesser bhp) (ATCs S-8741-2-0, -3-0, and -4-0) at Western Sky Dairy (Facility S-4554). Each engine will be equipped with a selective catalytic reduction (SCR) system for emissions control and will power an electrical generator that will produce up to 1,145 kWe. The applicant has indicated that a proprietary iron oxide compound, FeSfix, will be added to the digester to remove H₂S from the digester gas. The gas produced by the digester will then be piped to a gas dehydrator and a gas blower. The pressurized gas will then be sent to biological H₂S scrubber that will use bacillus strain bacteria to remove H₂S from the gas by oxidizing the H₂S to elemental sulfur. The gas will then be sent through a gas conditioning system that will include carbon filters for polishing to remove additional H₂S and for removal of moisture. The gas will then be sent to the engines for use as fuel to generate electricity for sale to a utility and to produce heat for the digester system. A small amount of the electricity generated (<10%) may be sold back to the host dairy at a negotiated fixed retail price while the majority of electricity produced will be sold to a utility.

II. BACT Applicability

New emissions units – PE > 2.0 lb/day

BACT Applicability for New Emissions Unit for S-8741-2-0, -3-0, & -4-0 After Commissioning				
Pollutant	PE2 for each unit after commissioning (lb/day)	BACT Threshold (lb/day)	SSPE2 (lb/yr)	BACT Triggered?
NO _x	12.8	> 2.0	N/A	Yes
SO _x	3.4	> 2.0	N/A	Yes
PM ₁₀	4.3	> 2.0	N/A	Yes
CO	42.6	> 2.0 and SSPE2 ≥ 200,000 lb/yr	49,265	No*
VOC	8.5	> 2.0	N/A	Yes
NH ₃	4.3	> 2.0	N/A	No**

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

** Current District BACT Guideline 3.3.15 will be amended to remove NH₃ slip emission requirements since NH₃ slip results from operation of an emissions control device (SCR) and, therefore, does not trigger BACT. However, NH₃ slip emissions from the proposed units will still be limited by the permits to no more than 10 ppmv @ 15% O₂.

III. Top-Down BACT Analyses for the Digester Gas-Fired Engines

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 digester gas-fired IC engines under this project.

1. BACT Analysis for NO_x Emissions:

a. Step 1 - List all control technologies

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

- 1) NO_x emissions $\leq$ 0.15 g/bhp-hr (lean-burn engine with SCR, rich-burn engine with 3-way catalyst, or other equivalent) (Achieved in Practice)
- 2) Fuel Cell ($\leq$ 0.05 lb/MW-hr) (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 $\leq$ 0.15 g/bhp-hr (9-11 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 ($\leq$ 0.05 lb- NO_x/MW-hr $\approx$ 1.5 ppmv NO_x @ 15% O₂) (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 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 biogas.

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 biogas 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, biogas-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 biogas-fired units.

Gas turbines are available in sizes ranging from 500 kW - 25 MW. Based on contacts with turbine suppliers, biogas-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 biogas-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 biogas-fired microturbines operating in California as of the year 2006.⁷ Microturbines generally have electrical efficiencies

⁷ "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>)

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% O_2 . However, several emission tests performed on biogas-fired microturbines have demonstrated even lower emissions. A small number of dairy digester gas-fired microturbines have been installed⁸, 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% O_2) (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 Technologies⁹ (March 2015) and the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]¹⁰ (October 5, 2015) also supports that gas turbines rated approximately 3 MW are not generally available. The smallest turbine for which the US EPA Combined Heat and Power Partnership Catalog

⁸ See EPA AgStar Program "AgStar Project Profiles", <http://www2.epa.gov/agstar/agstar-project-profiles>

⁹ US EPA Combined Heat and Power Partnership "Catalog of CHP Technologies" (March 2015)
<http://www.epa.gov/chp/catalog-chp-technologies>

¹⁰ SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] (October 5, 2015)
<http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=7889>

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 gas turbines rated 1,145 kW each, 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 engines are non-agricultural IC engines. The lean burn, digester gas-fired, engines are 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.d: 65 ppmvd NO_x (or 90% reduction), 2,000 ppmvd CO, and 750 ppmvd VOC (all measured @ 15% O₂). The proposed digester engines are also subject to the New Source Performance Standards (NSPS) for IC Engines contained in 40 CFR 60 Subpart JJJJ, which includes a more stringent 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 engines will be based on the emission limits contained in these applicable regulations.

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

demonstrates that replacement of the proposed engines with a fuel cell is not 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: 600 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*)
- bhp-hr to Btu conversion: 2,545 Btu/hp-hr
- Btu to kW-hr conversion: 3,413 Btu/kW-hr
- The initial capital costs and the operation costs for the digester gas-fueled IC engines and fuel cells will be based on information given in the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies⁹ and the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]¹⁰
- 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 biogas are taken from the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]¹⁰

Assumptions for Proposed Digester Gas-Fired IC Engines (S-8741-2-0, -3-0, & -4-0)

- Each engine will operate at full load for 24 hours/day and 8,760 hours/year
- Typical efficiency for IC engines: 33% (*Conservative estimate, the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies lists a HHV electrical efficiency of 36.8% for a 1,121 kW system*)
- The maximum total daily heating value of the digester gas used by each engine will be: 297.81 MMBtu/day ($1,609 \text{ bhp}_{out}/\text{engine} \times 1 \text{ bhp}_{in}/0.33 \text{ bhp}_{out} \times 2,545 \text{ Btu}_{in}/\text{bhp}_{in}\text{-hr} \times 1 \text{ MMBtu}/10^6 \text{ Btu} \times 24 \text{ hr}/\text{day} \times 1 \text{ engine}$)
- The maximum total annual heating value for of the digester gas used by each engine will be: 108,701.1 MMBtu/year ($1,609 \text{ bhp}_{out}/\text{engine} \times 1 \text{ bhp}_{in}/0.33 \text{ bhp}_{out} \times 2,545 \text{ Btu}_{in}/\text{bhp}_{in}\text{-hr} \times 1 \text{ MMBtu}/10^6 \text{ Btu} \times 8,760 \text{ hr}/\text{year} \times 1 \text{ engine}$)
- Estimated purchase and installation cost for CHP IC engine rated approximately 1,145 kW without add-on air pollution control equipment: \$1,713/kW (*average of interpolated values from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies and SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]*)

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>)

- Additional capital investment for biogas conditioning and cleanup for IC engines: \$387/kW (*SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]*)
- Total Installation Cost for biogas-fueled IC engine rated 1,145 kW: \$2,100/kW
- Estimated operation costs for CHP IC engine rated 1,145 kW without add-on air pollution control costs: \$0.019/kW-hr (*average of interpolated values from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies and SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]*)
- The SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] indicates that biogas conditioning/cleanup costs are highly dependent on the quantity of biogas being processed and contaminants being removed and that the differences in clean-up costs for biogas-fueled IC engines, microturbines, and gas turbines “reflect the greater rigor in the removal of the hydrogen sulfide”. The digester gas used to fuel the engines 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 engines, there will be no increase in operating costs related to cleaning the digester gas for use in IC engines.
- Rule 4702 NO_x emission limit for non-agricultural, lean burn IC engines: 65 ppmv @ 15% O₂ = 0.2540 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 each proposed engine: 1,650 kW (estimated based on 271.71 MMBtu/day and 45% efficiency)
- Estimated Purchase and Installation Cost for Molten Carbonate Fuel Cell: \$4,550/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 and SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]; 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>) 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 biogas conditioning and cleanup for fuel cells: \$563/kW (*SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]*)

- Total Installation Cost for biogas-fueled fuel cells rated $\geq 1,200$ kW: \$5,113/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 biogas 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 biogas-fueled fuel cells rated $\geq 1,200$ kW: \$0.19/kW-hr
- Fuel Cell NO_x emissions: 0.01 - 0.02 lb/MW-hr (*Note: Fuel cells have been certified to the ARB Distributed Generation Certification level of 0.07 lb-NO_x/MW-hr but measured emissions from fuel cells are generally much lower*)
- Fuel Cell VOC emissions: 0.02 lb-VOC/MW-hr (≤ 2.0 ppmv VOC @ 15% O₂ as CH₄ based on ARB Distributed Generation Certification level of 0.02 lb-VOC/MW-hr and emission tests on fuel cells)
- Unlike the proposed engines, 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 engines with fuel cells is calculated based on the difference in cost of a fuel cell power plant and the proposed IC engines.

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

$$(1,650 \text{ kW} \times \$5,113/\text{kW}) - (1,145 \text{ kW} \times \$2,100/\text{kW}) = \$6,031,950$$

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)

$$\begin{aligned} A &= [\$6,031,950 \times 0.1(1.1)^{10}]/[(1.1)^{10} - 1] \\ &= \mathbf{\$981,672/\text{year}} \end{aligned}$$

Annual Costs

Electricity Generated

The amount of electricity potentially generated by each option is calculated as follows:

Each Proposed IC Engine

$$1,145 \text{ kW} \times 8,760 \text{ hr/yr} = 10,030,200 \text{ kW-hr/year}$$

Fuel Cells (Alternate Equipment)

$$297.81 \text{ MMBtu/day} \times 10^6 \text{ Btu/MMBtu} \times 1 \text{ day/24 hr} \times 1 \text{ kW-hr/3,413 Btu} \times 0.45 \text{ (electrical efficiency)} = 1,636 \text{ kW}$$

$$108,701.1 \text{ MMBtu/yr} \times 10^6 \text{ Btu/MMBtu} \times 1 \text{ kW-hr/3,413 Btu} \times 0.45 \text{ (electrical efficiency)} = 14,332,111 \text{ kW-hr /year}$$

Cost (Decrease) from Increased Revenue for Power Generation from Replacing each Proposed 1,145 kW Engine with a Fuel Cell System

$$(10,030,200 \text{ kW-hr/yr} - 14,332,111 \text{ kW-hr/yr}) \times 1 \text{ MW/1,000 kW} \times \$127.72/\text{MW-hr} = -\$549,440/\text{year}$$

Annual Operation and Maintenance Cost

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

Each Proposed 1,145 IC kW Engine

$$10,030,200 \text{ kW-hr/yr} \times \$0.019/\text{kW-hr} = \$190,574/\text{year}$$

Fuel Cells (Alternate Equipment)

$$14,332,111 \text{ kW-hr/yr} \times \$0.19/\text{kW-hr} = \$2,723,101/\text{year}$$

Annual Costs of Increased Maintenance

$$\$2,723,101/\text{yr} - \$190,574/\text{yr} = \$2,532,527/\text{year}$$

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

$$\$981,672/\text{year} + (-\$549,440/\text{year}) + \$2,532,527/\text{year} = \mathbf{\$2,964,759/\text{year}}$$

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 engines will be based on the NO_x emission limit for non-agricultural, lean burn IC engines from District Rule 4702, Section 5.2.1, Table 1, 2.b. The District Standard Emissions for VOC emissions from the engines 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: 0.2540 lb-NO_x/MMBtu (65 ppmv NO_x @ 15% O₂) and 1.0 g-VOC/bhp-hr

Emissions from Fuel Cells as Alternative Equipment: 0.01 lb-NO_x/MW-hr and 0.02 lb-VOC/MW-hr as CH₄

Emission Reductions:

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

NO_x Emission Reductions (65 ppmv @ 15% O₂ → 0.01 lb-NO_x/MW-hr)
(108,701.1 MMBtu/yr x 0.2540 lb-NO_x/MMBtu) – (14,332,111 kW-hr/yr x
1 MW/1,000 kW x 0.01 lb-NO_x/MW-hr)
= 27,467 lb-NO_x/year (13.73 ton-NO_x/year)

VOC Emission Reductions (1.0 g/bhp-hr → 0.02 lb-VOC/MW-hr)
(1,609 bhp/engine x 8,760 hr/yr x 1 engine x 1.0 g-VOC/bhp-hr x 1 lb/453.59 g) –
(14,332,111 kW-hr/yr x 1 MW/1,000 kW x 0.02 lb-VOC/MW-hr)
= 30,787 lb-VOC/year (15.39 ton-VOC/year)

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

(13.73 ton-NO_x/year x \$24,500/ton-NO_x) + (15.39 ton-VOC/year x \$17,500/ton-VOC)
= **\$605,710/year**

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

Option 2 - Microturbines (≤ 9 ppmv NO_x @ 15% O₂) (Alternate Basic Equipment)

The cost analysis below demonstrates that the NO_x emission reductions achieved by replacement of the proposed engines with microturbines would not be cost effective based on the District's Revised BACT Cost Effectiveness Thresholds (May 14, 2008).

In addition, it should be noted that large lean burn IC engines generally have higher overall efficiencies than microturbines. The difference in efficiency between engines and microturbines will minimize and possibly eliminate any overall differences in NO_x emissions between these options. For example, information from a Capstone Turbine Corporation specification sheet indicates that the guaranteed NO_x emissions rate of 9 ppmvd @ 15% O₂ for their 1,000 kW renewable gas fuel microturbine package is equivalent to 0.14 g-NO_x/hp-hr.¹² This level is not significantly different than the current BACT requirement for waste gas-fired engines of 0.15 g-NO_x/bhp-hr.

The following discussion demonstrates how the difference the efficiency of engines and microturbines can affect the emission rate. NO_x emissions from the engines will be limited to no more than 0.15 g/bhp-hr (approximately 11 ppmv NO_x @ 15% O₂). Microturbine suppliers will generally guarantee NO_x emissions ≤ 9 ppmv @ 15% O₂ For digester gas-fired microturbines. The US EPA Combined Heat and Power Partnership "Catalog of CHP Technologies"¹³ (March 2015), Table 2-2: Gas Spark Ignition Engine CHP - Typical Performance Parameters, lists HHV electrical efficiencies of 34.5% for a 633 kW system and 36.8% for a 1,121 kW system. The SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]¹⁴ (October 5, 2015), Page A-28 indicates that "Typical observed efficiencies on IC engines deployed in the SGIP are 27% for electrical conversion (HHV)..." Therefore, the expected HHV electrical efficiency of each of the proposed 1,145 kW engines is between 27-36.8%.

The US EPA Combined Heat and Power Partnership "Catalog of CHP Technologies"¹³, Table 5-2: Gas Spark Ignition Engine CHP - Microturbine Cost and Performance Characteristics, lists HHV electrical efficiencies of 26-28% for microturbine systems rated at least 200 kW. The SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]¹⁴, Table A-15: Microturbine Electrical Conversion Efficiency, lists a HHV electrical efficiencies of 21% for microturbines based on SGIP metered data. Therefore, the expected HHV electrical efficiency of large microturbines is between 21-28%.

The maximum expected NO_x emission factor for the proposed engine-generator sets is approximately 0.47 lb/MW-hr (based on 0.15 g/bhp-hr and 95% generator efficiency). Based on 9 ppmv NO_x @ 15% O₂ and the expected range of microturbine electrical conversion efficiency given above, the NO_x emission factor from large digester gas-

¹² See: <http://www.adigo.no/wordpress/wp-content/uploads/2015/02/CR1000-teknisk-spesifikasjon-engelsk.pdf>. Note that because of lower efficiencies for smaller microturbines, the guaranteed emission rate of 9 ppmvd NO_x @ 15% O₂ from smaller units will actually be higher than 0.15 g-NO_x/bhp-hr

¹³ US EPA Combined Heat and Power Partnership "Catalog of CHP Technologies" (March 2015) <http://www.epa.gov/chp/catalog-chp-technologies>

¹⁴ SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] (October 5, 2015) <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=7889>

fuelled microturbines is expected to range from 0.43 – 0.57 lb/MW-hr. Because, the maximum NO_x emission factor for the proposed engine-generator sets falls within this range, the options could be considered equivalent.

Assumptions

- Digester Gas F-Factor: 9,100 dscf/MMBtu (dry, adjusted to 60 °F)
- Higher Heating Value for Dairy Digester Gas: 600 Btu/scf
- Molar Specific Volume = 379.5 scf/lb-mol (at 60°F)
- bhp-hr to Btu conversion: 2,545 Btu/hp-hr
- Btu to kW-hr conversion: 3,413 Btu/kW-hr
- The initial capital costs and the operation costs for the digester gas-fueled IC engines and microturbines will be based on information given in the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies¹³ and the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]¹⁴
- Because the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies only provides cost information for natural gas-fueled engines and microturbines, additional capital costs for the use of biogas are taken from the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]¹⁴
- The SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] indicates that biogas conditioning/cleanup costs are highly dependent on the quantity of biogas being processed and contaminants being removed and that the differences in clean-up costs for biogas-fueled IC engines, microturbines, and gas turbines “reflect the greater rigor in the removal of the hydrogen sulfide”. The digester gas used to fuel the engines or microturbines 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 both engines and microturbines and the same amount of total digester gas will be available for either option, there will be no difference in operating costs related to cleaning the digester gas for use in IC engines or microturbines.
- 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) beginning June 1, 2016*)

Assumptions for Proposed Digester Gas-Fired IC Engines (S-8741-2-0, -3-0, & -4-0)

- Each engine will operate at full load for 24 hours/day and 8,760 hours/year
- Typical efficiency for IC engines: 33% (*Conservative estimate, as discussed above, the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies lists a HHV electrical efficiency of 36.8% for a 1,121 kW system*)
- The maximum total daily heating value of the digester gas used by each engine will be: 297.81 MMBtu/day ($1,609 \text{ bhp}_{out}/\text{engine} \times 1 \text{ bhp}_{in}/0.33 \text{ bhp}_{out} \times 2,545 \text{ Btu}_{in}/\text{bhp}_{in}\text{-hr} \times 1 \text{ MMBtu}/10^6 \text{ Btu} \times 24 \text{ hr}/\text{day} \times 1 \text{ engine}$)

- The maximum total annual heating value for of the digester gas used by each engine will be: 108,701.1 MMBtu/year ($1,609 \text{ bhp}_{\text{out}}/\text{engine} \times 1 \text{ bhp}_{\text{in}}/0.33 \text{ bhp}_{\text{out}} \times 2,545 \text{ Btu}_{\text{in}}/\text{bhp}_{\text{in}}\text{-hr} \times 1 \text{ MMBtu}/10^6 \text{ Btu} \times 8,760 \text{ hr}/\text{year} \times 1 \text{ engine}$)
- Estimated purchase and installation cost for CHP IC engine rated approximately 1,145 kW without add-on air pollution control equipment: \$1,713/kW (*average of interpolated values from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies and SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]*)
- Additional capital investment for biogas conditioning and cleanup for IC engines: \$387/kW (*SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]*)
- Total Installation Cost for biogas-fueled IC engine rated 1,145 kW: \$2,100/kW
- Estimated operation costs for CHP IC engine rated 1,145 kW without add-on air pollution control costs: \$0.019/kW-hr (*average of interpolated values from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies and SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]*)
- Rule 4702 NO_x emission limit for non-agricultural, lean burn IC engines: 65 ppmv @ 15% O₂ = 0.2540 lb/MMBtu

Assumptions for Microturbines

- Net HHV electrical efficiency for a 950 kW net (1,000 kW nominal capacity) microturbine package: 24.5% (*conservative estimate, SGIP metered data indicates an efficiency of 21%*)
- Estimated Size of microturbine system needed to replace each engine: 950 kW net (1,000 kW nominal capacity - based the largest microturbine package listed in the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies; this is actually 17% smaller than the net kW rating of each proposed engine, however, the conservative assumption of a smaller rating will be used for this analysis)
- Estimated Purchase and Installation Cost for 950 kW net (1,000 kW nominal capacity) microturbine package: \$2,500/kW (*from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies*)
- Estimated additional capital investment for biogas conditioning and cleanup for microturbines: \$744/kW (*SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]*)
- Total Installation Cost for biogas-fueled microturbine system rated 950 kW net (1,000 kW nominal capacity): \$3,244/kW
- Typical operation costs for a 950 kW net (1,000 kW nominal capacity) microturbine package: \$0.012/kW-hr (*from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies*)
- NO_x Emissions for Digester gas-fueled microturbines: ≤ 9 ppmv NO_x @ 15% O₂ (~ 0.0352 lb-NO_x/MMBtu)

Capital Cost

The estimated increased incremental capital cost for replacement of each the proposed engines with microturbines is calculated based on the difference in cost of a microturbine system and the proposed IC engines.

The incremental capital cost for replacement of the proposed IC engines with a microturbine system is calculated as follows:

$$(950 \text{ kW} \times \$3,244/\text{kW}) - (1,145 \text{ kW} \times \$2,100/\text{kW}) = \$677,300$$

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)

$$\begin{aligned} A &= [\$677,300 \times 0.1(1.1)^{10}]/[(1.1)^{10} - 1] \\ &= \mathbf{\$110,227/\text{year}} \end{aligned}$$

Annual Costs

Electricity Generated

The amount of electricity potentially generated by each option is calculated as follows:

Each Proposed IC Engine

$$1,145 \text{ kW} \times 8,760 \text{ hr/yr} = 10,030,200 \text{ kW-hr/year}$$

950 kW (net) Microturbine Package (Alternate Equipment)

$$297.81 \text{ MMBtu/day} \times 10^6 \text{ Btu/MMBtu} \times 1 \text{ day/24 hr} \times 1 \text{ kW-hr/3,413 Btu} \times 0.245 \text{ (electrical efficiency)} = 891 \text{ kW}$$

$$108,701.1 \text{ MMBtu/yr} \times 10^6 \text{ Btu/MMBtu} \times 1 \text{ kW-hr/3,413 Btu} \times 0.245 \text{ (electrical efficiency)} = 7,803,038 \text{ kW-hr /year}$$

Cost of Decreased Revenue from Power Generation from Replacing each Proposed 1,145 kW Engine with Microturbines

$$(10,030,200 \text{ kW-hr/yr} - 7,803,038 \text{ kW-hr/yr}) \times 1 \text{ MW/1,000 kW} \times \$127.72/\text{MW-hr} = \$284,453/\text{year}$$

Annual Operation and Maintenance Cost

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

Each Proposed 1,145 kW IC Engine

$$10,030,200 \text{ kW-hr/yr} \times \$0.019/\text{kW-hr} = \$190,574/\text{year}$$

Microturbines (Alternate Equipment)

$$7,803,038 \text{ kW-hr/yr} \times \$0.012/\text{kW-hr} = \$93,636/\text{year}$$

Cost (Decrease) from Annual Maintenance Costs

$$\$93,636/\text{yr} - \$190,574/\text{yr} = -\$96,938/\text{year}$$

Total Increased Annual Costs for Microturbines as an Alternative to Each Proposed Engine

$$\$110,227/\text{year} + \$284,453/\text{year} + (-\$96,938/\text{year}) = \mathbf{\$297,742/\text{year}}$$

Emission Reductions:

NO_x 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 engines will be based on the NO_x emission limit for non-agricultural, lean burn IC engines from District Rule 4702, Section 5.2.1, Table 1, 2.b.

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

District Standard Emissions: 0.2540 lb-NO_x/MMBtu (65 ppmv NO_x @ 15% O₂)

Emissions from Microturbines as Alternative Equipment: 0.0352 lb-NO_x/MMBtu (9 ppmv NO_x @ 15% O₂)

Emission Reductions for Each Proposed Engine Compared to Microturbines based on District Standard Emission Reductions

$$\begin{aligned} &\text{NO}_x \text{ Emission Reductions (65 ppmv @ 15\% O}_2 \rightarrow 9 \text{ ppmv @ 15\% O}_2) \\ &108,701.1 \text{ MMBtu/yr} \times (0.2540 \text{ lb-NO}_x/\text{MMBtu} - 0.0352 \text{ lb-NO}_x/\text{MMBtu}) \\ &= 23,784 \text{ lb-NO}_x/\text{year} \text{ (11.89 ton-NO}_x/\text{year)} \end{aligned}$$

Cost of NO_x Emission Reductions

$$\begin{aligned} \text{Cost of reductions} &= (\$297,742/\text{year}) / [(23,784 \text{ lb-NO}_x/\text{year})(1 \text{ ton}/2000 \text{ lb})] \\ &= \mathbf{\$25,037/\text{ton of NO}_x \text{ reduced}} \end{aligned}$$

As shown above, the cost of the NO_x emission reductions for replacing each of the proposed engines with microturbines exceeds the \$24,500/ton cost effectiveness threshold of the District BACT policy. Therefore, this option is not cost effective and is being removed from consideration.

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

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

e. Step 5 - Select BACT

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

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

2. BACT Analysis for SO_x Emissions:

a. Step 1 - Identify all control technologies

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

- 1) Sulfur Content of fuel gas not exceeding 40 ppmv 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 engines 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 engines 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 engines. 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-born 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 engines:

- 1) Sulfur Content of fuel ≤ 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 ≤ 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 engines 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 engines to ≤ 40 ppmv as H_2S . Therefore, the BACT requirements for SO_x are satisfied.

4. BACT Analysis for VOC Emissions:

a. Step 1 - Identify all control technologies

The following options were identified to reduce VOC emissions:

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

d. Step 4 - Cost Effectiveness Analysis

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

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

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

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

e. Step 5 - Select BACT

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

APPENDIX D

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

San Joaquin Valley Air Pollution Control District

Risk Management Review

To: Ramon Norman – Permit Services

From: Cheryl Lawler – Technical Services

Date: May 10, 2016

Facility Name: CDE 24, LLC

Location: 18501 Old River Road, Bakersfield
(at Western Sky Dairy)

Application #(s): S-8741-1-0, 2-0, 3-0, 4-0

Project #: S-1152007

A. RMR SUMMARY

RMR Summary						
Categories	Digester Gas Flare (Unit 1-0)	Digester Gas ICE (Unit 2-0)	Digester Gas ICE (Unit 3-0)	Digester Gas ICE (Unit 4-0)	Project Totals	Facility Totals
Prioritization Score	13.5	64.6	64.6	64.6	>1.0	>1.0
Acute Hazard Index	0.00	0.11	0.11	0.10	0.32	0.32
Chronic Hazard Index	0.00	0.04	0.05	0.05	0.14	0.14
Maximum Individual Cancer Risk	1.09E-08	3.18E-07	3.42E-07	3.69E-07	1.04E-06	1.04E-06
T-BACT Required?	No	No	No	No		
Special Permit Requirements?	Yes	Yes	Yes	Yes		

Proposed Permit Requirements

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

Units 1-0, 2-0, 3-0, 4-0

1. 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.

Units 2-0, 3-0, 4-0

1. The exhaust stack shall be at least 25 feet tall.

B. RMR REPORT

I. Project Description

Technical Services received a request on April 26, 2016, to perform an Ambient Air Quality Analysis (AAQA) and a Risk Management Review (RMR) for the installation of an anaerobic digester system, including a mixed plug-flow, a concrete anaerobic digester vessel with a 10.5 MMBtu/hr Digester Gas backup flare (Unit 1-0), and three 1609 bhp Digester Gas IC engines (Units 2-0, 3-0, 4-0) at Western Sky Dairy. CDE 24, LLC, and Western Sky Dairy are separate stationary sources.

II. Analysis

Toxic emissions for this project were calculated using 2001 Ventura County Air Pollution Control District emission factors for Natural Gas fired external combustion and based on the Dairy Biomethane characterization in *Pipeline Quality Biomethane: North American Guidance Document for Introduction of Dairy Waste Derived Biomethane Into Existing Natural Gas Networks* (2009), and 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*. Emissions were then input into the San Joaquin Valley APCD's Hazard Assessment and Reporting Program (SHARP). In accordance with the District's Risk Management Policy for Permitting New and Modified Sources (APR 1905, May 28, 2015), risks from the project were prioritized using the procedures in the 1990 CAPCOA Facility Prioritization Guidelines. The prioritization score for the project 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 2010-2014 from Bakersfield 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:

Analysis Parameters Unit 1-0			
Source Type	Flare	Location Type	Rural
Eff. Stack Height (m)	9.28	Closest Receptor (m)	On-Site Workers for Dairy
Eff. Diameter (m)	1.93	Type of Receptor	Workers
Eff. Velocity (m/s)	11.95	Max Hours per Year	8760
Temperature (°K)	1088.71	Digester Gas Usage Rates (MMscf)	0.018 hr 153.3 yr

Analysis Parameters Units 2-0, 3-0, 4-0			
Source Type	Point	Location Type	Rural
Stack Height (m)	7.62	Closest Receptor (m)	On-Site Workers for Dairy
Stack Diameter (m)	0.36	Type of Receptor	Workers
Stack Gas Velocity (m/s)	13.44	Max Hours per Year	8760
Temperature (°K)	718	Digester Gas Usage Rates (MMscf)	0.02 hr 138.8 yr
		Ammonia Rates (lbs)	0.532 hr 4661.1 yr

Technical Services also performed modeling for criteria pollutants CO, NO_x, SO_x, and PM₁₀ with the emission rates below:

Unit #	NO _x (Lbs.)		SO _x (Lbs.)		CO (Lbs.)		PM ₁₀ (Lbs.)	
	Hr.	Yr.	Hr.	Yr.	Hr.	Yr.	Hr.	Yr.
1-0	0.63	1,380	0.12	260	3.26	7,128	0.16	345
2-0	3.55	4,963	0.14	1,243	7.09	16,069	0.18	1,554
3-0	3.55	4,963	0.14	1,243	7.09	16,069	0.18	1,554
4-0	3.55	4,963	0.14	1,243	7.09	16,069	0.18	1,554

The results from the Criteria Pollutant Modeling are as follows:

Criteria Pollutant Modeling Results*

Flare & 3 ICEs	1 Hour	3 Hours	8 Hours	24 Hours	Annual
CO	Pass	X	Pass	X	X
NO _x	Pass ¹	X	X	X	Pass
SO _x	Pass	Pass	X	Pass	Pass
PM ₁₀	X	X	X	Pass ²	Pass ²
PM _{2.5}	X	X	X	Pass ²	Pass ²

*Results were taken from the attached PSD spreadsheet.

¹The project was compared to the 1-hour NO₂ National Ambient Air Quality Standard that became effective on April 12, 2010, using the District's approved procedures. The Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM) was used in accordance with the District's *Assessment of Non-Regulatory Options in AERMOD – Specifically OLM and PVMRM*. A completed AERMOD Non-Regulatory Option checklist is attached.

²The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2).

III. Conclusion

The Acute and Chronic Indices are below 1.0, and the Cancer Risk factor associated with each unit 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 the proposed units.

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

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

IV. Attachments

- A. RMR Request Form & Attachments
- B. Flare & Engines Emission Speciation Worksheets
- C. Prioritization
- D. Flare Modeling Parameter Estimator
- E. Convert
- F. AAQA Results
- G. Facility Summary
- H. AERMOD Non-Regulatory Option Checklist

APPENDIX E

**Draft ATCs
(S-8741-1-0, -2-0, -3-0, & -4-0)**

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: S-8741-1-0

LEGAL OWNER OR OPERATOR: CDE24, LLC
MAILING ADDRESS: 145 NORTH N ST, SUITE A
TULARE, CA 93274

LOCATION: 18501 OLD RIVER RD
BAKERSFIELD, CA

EQUIPMENT DESCRIPTION:

DVO MIXED PLUG-FLOW MESOPHILIC ANAEROBIC DIGESTER SYSTEM CONSISTING OF A RECEPTION PIT AND AN IN-GROUND CONCRETE VESSEL (348' X 222' X 16') WITH ONE 10.5 MMBTU/HR DVO MODEL 7618 8" DIGESTER GAS-FIRED BACKUP FLARE SERVED BY A BIOLOGICAL H₂S REMOVAL SYSTEM AND A CARBON H₂S SCRUBBER (OR APPROVED EQUIVALENT H₂S REMOVAL SYSTEM)

CONDITIONS

1. The permittee shall obtain written District approval for the use of any equivalent control equipment not specifically approved by this Authority to Construct (ATC). Approval of the equivalent control equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate control equipment is equivalent to the specifically authorized equipment. [District Rule 2010]
2. The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2010]
3. Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct (ATC). [District Rule 2201]
4. No emission factor and no emissions shall be greater for the alternate equipment than for the proposed equipment. No changes in the hours of operation, operating rate, throughput, or firing rate may be authorized for any alternate equipment. [District Rule 2201]
5. {271} 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]
6. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director, APCO

Arnaud Marjollet, Director of Permit Services
S-8741-1-0 : Sep 27 2016 11:08AM - NORMANR : Joint Inspection NOT Required

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

7. The VOC content of the digester gas produced by the digester system shall not exceed 10% by weight. [District Rule 2201]
8. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
9. 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 1/2 or 10% opacity. [District Rules 2201 and 4101]
10. Only digester gas shall be combusted in the flare. [District Rule 2201]
11. A flame shall be present at all times whenever combustible gases are vented through the flare. [District Rule 2201]
12. The flare outlet shall be equipped with an automatic ignition system, or shall operate with a pilot flame present at all times when combustible gases are vented through the flare, except during purge periods for automatic-ignition equipped flares. [District Rule 2201]
13. The amount of digester gas combusted in the flare shall not exceed either of the following limits: 252.0 MMBtu (equivalent to 0.420 MMscf) in any one day and 22,995 MMBtu (equivalent to 38.325 MMscf) in any consecutive 365-day period. [District Rule 2201]
14. The flare shall be equipped with an operational, non-resettable, totalizing mass or volumetric fuel flow meter or other District-approved alternative method to measure the amount of gas combusted in the flare. [District Rule 2201]
15. Emissions from the flare shall not exceed any of the following limits: 0.06 lb-NOx/MMBtu, 0.015 lb-PM10/MMBtu, 0.046 lb-CO/MMBtu, or 0.014 lb-VOC/MMBtu. [District Rule 2201]
16. The sulfur content of the digester gas combusted in this flare shall not exceed 40 ppmv as H₂S. The District may approve an averaging period of up to one calendar day in length for demonstration of compliance with the digester gas sulfur content limit. [District Rules 2201 and 4801]
17. Digester gas sulfur content analysis shall be performed at least once every 12 months using EPA Method 11 or EPA Method 15, as appropriate. Records of the digester gas sulfur content analysis shall be maintained and provided to the District upon request. [District Rule 2201]
18. The sulfur content of the digester gas combusted in this flare shall be monitored and recorded at least once every calendar quarter in which a digester gas sulfur content analysis is not performed. If quarterly monitoring shows a violation of the sulfur content limit of this permit, monthly monitoring will be required until six consecutive months of monitoring show compliance with the sulfur content limit. Once compliance with the 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 flared shall not be required if the flare does not operate during that period. Records of the results of monitoring of the digester gas sulfur content shall be maintained. [District Rule 2201]
19. Monitoring of the digester gas sulfur content shall be performed using gas detection tubes calibrated for H₂S; a Testo 350 XL portable emission monitor; a continuous fuel gas monitor that meets the requirements specified in SCAQMD Rule 431.1, Attachment A; District-approved source test methods, including EPA Method 15, ASTM Method D1072, D4084, and D5504; District-approved in-line H₂S monitors; or an alternative method approved by the District. Prior to utilization of in-line monitors to demonstrate compliance with the digester gas sulfur content limit of this permit, the permittee shall submit details of the proposed monitoring system, including the make, model, and detection limits, to the District and obtain District approval for the proposed monitor(s). [District Rule 2201]
20. Permittee shall maintain daily and annual records of the quantity of digester gas combusted in the flare in standard cubic feet (scf). [District Rules 1070 and 2201]
21. The facility shall maintain records of annual gas production, throughput, material usage, or other information necessary to demonstrate that total emissions from the facility (S-8741) are less than ten tons per year for both NO_x and VOC. [District Rule 4311]
22. All records shall be maintained and retained for a minimum of five (5) years, and shall be made available for District inspection upon request. Records may be maintained and submitted in an electronic format approved by the District. [District Rules 1070, 2201, and 4311]

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-8741-2-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: CDE24, LLC
MAILING ADDRESS: 145 NORTH N ST, SUITE A
TULARE, CA 93274

LOCATION: 18501 OLD RIVER RD
BAKERSFIELD, CA

EQUIPMENT DESCRIPTION:

1,609 BHP MTU MODEL GB1145B6 (OR DISTRICT APPROVED EQUIVALENT) DIGESTER GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AND A CARBON H₂S SCRUBBER (OR APPROVED EQUIVALENT H₂S REMOVAL SYSTEM) POWERING AN ELECTRICAL GENERATOR

CONDITIONS

1. The permittee shall obtain written District approval for the use of any equivalent control equipment not specifically approved by this Authority to Construct (ATC). Approval of the equivalent control equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate control equipment is equivalent to the specifically authorized equipment. [District Rule 2010]
2. The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2010]
3. Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct (ATC). [District Rule 2201]
4. No emission factor and no emissions shall be greater for the alternate equipment than for the proposed equipment. No changes in the hours of operation, operating rate, throughput, or firing rate may be authorized for any alternate equipment. [District Rule 2201]
5. All equipment shall be maintained in good operating condition and shall be operated in a manner consistent with good air pollution control practice to minimize emissions of air contaminants. [District Rule 2201]
6. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
7. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services

S-8741-2-0 : Sep 27 2016 11:08AM - NORMANR Joint Inspection NOT Required

8. {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]
9. {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]
10. The exhaust stack shall be at least 25 feet tall. [District Rule 4102]
11. {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]
12. {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]
13. This engine shall only be fueled with digester gas. [District Rule 2201]
14. The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H₂S. The 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]
15. This engine shall be equipped with an operational non-resettable elapsed time meter. [District Rules 2201 and 4702]
16. Commissioning activities are defined as, but not limited to, all testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the construction contractor to ensure safe and reliable operation of the reciprocating IC engine, emission control equipment, and associated electrical delivery systems. [District Rule 2201]
17. Commissioning period shall commence when all mechanical, electrical, and control systems are installed and individual system startup has been completed, or when the reciprocating engine is first fired, whichever occurs first. The commissioning period shall terminate when the engine has completed initial performance testing, completed initial engine tuning, and the engine is available for commercial operation. The total duration of the commissioning period for this engine shall not exceed 100 hours of operation. [District Rule 2201]
18. The owner/operator shall minimize the emissions from the engine to the maximum extent possible during the commissioning period. [District Rule 2201]
19. At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and/or the construction contractor, the engine shall be tuned to minimize emissions. [District Rule 2201]
20. At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and/or the construction contractor, the emission control catalyst system(s) shall be installed, adjusted, and operated to minimize emissions from this unit. [District Rule 2201]
21. The permittee shall prepare and maintain a summary of activities to be performed during the commissioning period 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]
22. During the commissioning period emission rates from this IC engine shall not exceed any of the following limits: 1.0 g-NO_x/bhp-hr, 0.05 g-PM₁₀/bhp-hr, 2.0 g-CO/bhp-hr, or 0.7 g-VOC/bhp-hr. [District Rule 2201]
23. The total number of firing hours of this unit without abatement of emissions by the SCR system shall not exceed 100 hours during the commissioning period. Such operation of this unit without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system. Upon completion of these activities, the unused balance of the 100 firing hours without abatement shall expire. [District Rule 2201]
24. The permittee shall record total operating time of the engine in hours during the commissioning period. [District Rule 2201]

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CONDITIONS CONTINUE ON NEXT PAGE

25. Coincident with the end of the commissioning period, emissions from this IC engine shall not exceed any of the following limits: 0.15 g-NO_x/bhp-hr (for periodic alternate monitoring, 11 ppmvd NO_x @ 15% O₂), NO_x referenced as NO₂; 0.05 g-PM₁₀/bhp-hr; 0.50 g-CO/bhp-hr (for periodic alternate monitoring, 60 ppmvd CO @ 15% O₂); or 0.10 g-VOC/bhp-hr (for periodic alternate monitoring, 21 ppmvd VOC @ 15% O₂), VOC referenced as CH₄. [District Rules 2201 and 4702]
26. 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]
27. Ammonia (NH₃) emissions from this engine shall not exceed 10 ppmvd @ 15% O₂. [District Rules 2201 and 4102]
28. Source testing to measure NO_x, CO, VOC, PM₁₀, and ammonia (NH₃) emissions from this unit shall be conducted within 90 days of initial start-up. [District Rules 1081, 2201, and 4702]
29. 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]
30. Fuel sulfur content analysis shall be performed within 90 days of initial start-up using EPA Method 11 or EPA Method 15, as appropriate. [District Rules 2201 and 4702]
31. 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]
32. {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]
33. 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]
34. 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]
35. 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]
36. {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]
37. The results of each source test shall be submitted to the District within 60 days after completion of the source test. [District Rule 1081]
38. 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]

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39. Monitoring of the digester gas sulfur content shall be performed using gas detection tubes calibrated for H₂S; a Testo 350 XL portable emission monitor; a continuous fuel gas monitor that meets the requirements specified in SCAQMD Rule 431.1, Attachment A; District-approved source test methods, including EPA Method 15, ASTM Method D1072, D4084, and D5504; District-approved in-line H₂S monitors; or an alternative method approved by the District. Prior to utilization of in-line monitors to demonstrate compliance with the digester gas sulfur content limit of this permit, the permittee shall submit details of the proposed monitoring system, including the make, model, and detection limits, to the District and obtain District approval for the proposed monitor(s). [District Rule 2201]
40. 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]
41. 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. [In-stack monitors may be allowed if they satisfy the standards for portable analyzers as specified in District policies and are approved in writing by the APCO.] 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]
42. 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]
43. 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]
44. {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]
45. 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]

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46. Within 90 days of initial start-up, the SCR system reagent injection rate and inlet temperature to the catalyst control system shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the NO_x emissions limit(s) 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%). Records of the acceptable SCR system reagent injection rate(s) and inlet temperature(s) to the catalyst control system demonstrated to result in compliance with the NO_x emission limit(s) shall be maintained and made available for inspection upon request. [District Rule 4702]
47. If the SCR system reagent injection rate and/or the inlet temperature to the catalyst control system is outside of the established acceptable range(s), the permittee shall return the SCR system reagent injection rate and inlet temperature to the catalyst control system to within the established acceptable range(s) as soon as possible, but no longer than 8 hours after detection. If the SCR system reagent injection rate and inlet temperature to the catalyst control system are not returned to within acceptable range(s) 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 and inlet temperature to the catalyst control system are operating within the acceptable range(s) demonstrated to result in compliance with the NO_x emission limit(s) of this permit. [District Rule 4702]
48. Within 90 days of initial start-up, the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limit(s) 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%). Records of the established acceptable inlet temperature and back pressure demonstrated to result in compliance with the CO and VOC emission limits shall be maintained and made available for inspection upon request. [District Rule 4702]
49. 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 range(s), 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(s) 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(s) 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 operating within the acceptable range(s) demonstrated to result in compliance with the CO emission limit(s) of this permit. [District Rule 4702]
50. The permittee shall monitor and record the engine operating load, the SCR system reagent injection rate, the inlet temperature to the catalyst control system, and the back pressure of the exhaust upstream of the catalyst control system at least once per month. [District Rule 4702]
51. 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]
52. {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]

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53. 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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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-8741-3-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: CDE24, LLC
MAILING ADDRESS: 145 NORTH N ST, SUITE A
TULARE, CA 93274

LOCATION: 18501 OLD RIVER RD
BAKERSFIELD, CA

EQUIPMENT DESCRIPTION:

1,609 BHP MTU MODEL GB1145B6 (OR DISTRICT APPROVED EQUIVALENT) DIGESTER GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AND A CARBON H₂S SCRUBBER (OR APPROVED EQUIVALENT H₂S REMOVAL SYSTEM) POWERING AN ELECTRICAL GENERATOR

CONDITIONS

1. The permittee shall obtain written District approval for the use of any equivalent control equipment not specifically approved by this Authority to Construct (ATC). Approval of the equivalent control equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate control equipment is equivalent to the specifically authorized equipment. [District Rule 2010]
2. The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2010]
3. Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct (ATC). [District Rule 2201]
4. No emission factor and no emissions shall be greater for the alternate equipment than for the proposed equipment. No changes in the hours of operation, operating rate, throughput, or firing rate may be authorized for any alternate equipment. [District Rule 2201]
5. All equipment shall be maintained in good operating condition and shall be operated in a manner consistent with good air pollution control practice to minimize emissions of air contaminants. [District Rule 2201]
6. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
7. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

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

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services
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8. {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]
9. {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]
10. The exhaust stack shall be at least 25 feet tall. [District Rule 4102]
11. {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]
12. {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]
13. This engine shall only be fueled with digester gas. [District Rule 2201]
14. The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H₂S. The 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]
15. This engine shall be equipped with an operational non-resettable elapsed time meter. [District Rules 2201 and 4702]
16. Commissioning activities are defined as, but not limited to, all testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the construction contractor to ensure safe and reliable operation of the reciprocating IC engine, emission control equipment, and associated electrical delivery systems. [District Rule 2201]
17. Commissioning period shall commence when all mechanical, electrical, and control systems are installed and individual system startup has been completed, or when the reciprocating engine is first fired, whichever occurs first. The commissioning period shall terminate when the engine has completed initial performance testing, completed initial engine tuning, and the engine is available for commercial operation. The total duration of the commissioning period for this engine shall not exceed 100 hours of operation. [District Rule 2201]
18. The owner/operator shall minimize the emissions from the engine to the maximum extent possible during the commissioning period. [District Rule 2201]
19. At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and/or the construction contractor, the engine shall be tuned to minimize emissions. [District Rule 2201]
20. At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and/or the construction contractor, the emission control catalyst system(s) shall be installed, adjusted, and operated to minimize emissions from this unit. [District Rule 2201]
21. The permittee shall prepare and maintain a summary of activities to be performed during the commissioning period 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]
22. During the commissioning period emission rates from this IC engine shall not exceed any of the following limits: 1.0 g-NO_x/bhp-hr, 0.05 g-PM₁₀/bhp-hr, 2.0 g-CO/bhp-hr, or 0.7 g-VOC/bhp-hr. [District Rule 2201]
23. The total number of firing hours of this unit without abatement of emissions by the SCR system shall not exceed 100 hours during the commissioning period. Such operation of this unit without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system. Upon completion of these activities, the unused balance of the 100 firing hours without abatement shall expire. [District Rule 2201]
24. The permittee shall record total operating time of the engine in hours during the commissioning period. [District Rule 2201]

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25. Coincident with the end of the commissioning period, emissions from this IC engine shall not exceed any of the following limits: 0.15 g-NO_x/bhp-hr (for periodic alternate monitoring, 11 ppmvd NO_x @ 15% O₂), NO_x referenced as NO₂; 0.05 g-PM₁₀/bhp-hr; 0.50 g-CO/bhp-hr (for periodic alternate monitoring, 60 ppmvd CO @ 15% O₂); or 0.10 g-VOC/bhp-hr (for periodic alternate monitoring, 21 ppmvd VOC @ 15% O₂), VOC referenced as CH₄. [District Rules 2201 and 4702]
26. 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]
27. Ammonia (NH₃) emissions from this engine shall not exceed 10 ppmvd @ 15% O₂. [District Rules 2201 and 4102]
28. Source testing to measure NO_x, CO, VOC, PM₁₀, and ammonia (NH₃) emissions from this unit shall be conducted within 90 days of initial start-up. [District Rules 1081, 2201, and 4702]
29. 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]
30. Fuel sulfur content analysis shall be performed within 90 days of initial start-up using EPA Method 11 or EPA Method 15, as appropriate. [District Rules 2201 and 4702]
31. 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]
32. {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]
33. 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]
34. 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]
35. 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]
36. {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]
37. The results of each source test shall be submitted to the District within 60 days after completion of the source test. [District Rule 1081]
38. 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]

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39. Monitoring of the digester gas sulfur content shall be performed using gas detection tubes calibrated for H₂S; a Testo 350 XL portable emission monitor; a continuous fuel gas monitor that meets the requirements specified in SCAQMD Rule 431.1, Attachment A; District-approved source test methods, including EPA Method 15, ASTM Method D1072, D4084, and D5504; District-approved in-line H₂S monitors; or an alternative method approved by the District. Prior to utilization of in-line monitors to demonstrate compliance with the digester gas sulfur content limit of this permit, the permittee shall submit details of the proposed monitoring system, including the make, model, and detection limits, to the District and obtain District approval for the proposed monitor(s). [District Rule 2201]
40. 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]
41. 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. [In-stack monitors may be allowed if they satisfy the standards for portable analyzers as specified in District policies and are approved in writing by the APCO.] 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]
42. 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]
43. 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]
44. {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]
45. 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]

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46. Within 90 days of initial start-up, the SCR system reagent injection rate and inlet temperature to the catalyst control system shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the NO_x emissions limit(s) 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%). Records of the acceptable SCR system reagent injection rate(s) and inlet temperature(s) to the catalyst control system demonstrated to result in compliance with the NO_x emission limit(s) shall be maintained and made available for inspection upon request. [District Rule 4702]
47. If the SCR system reagent injection rate and/or the inlet temperature to the catalyst control system is outside of the established acceptable range(s), the permittee shall return the SCR system reagent injection rate and inlet temperature to the catalyst control system to within the established acceptable range(s) as soon as possible, but no longer than 8 hours after detection. If the SCR system reagent injection rate and inlet temperature to the catalyst control system are not returned to within acceptable range(s) 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 and inlet temperature to the catalyst control system are operating within the acceptable range(s) demonstrated to result in compliance with the NO_x emission limit(s) of this permit. [District Rule 4702]
48. Within 90 days of initial start-up, the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limit(s) 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%). Records of the established acceptable inlet temperature and back pressure demonstrated to result in compliance with the CO and VOC emission limits shall be maintained and made available for inspection upon request. [District Rule 4702]
49. 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 range(s), 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(s) 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(s) 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 operating within the acceptable range(s) demonstrated to result in compliance with the CO emission limit(s) of this permit. [District Rule 4702]
50. The permittee shall monitor and record the engine operating load, the SCR system reagent injection rate, the inlet temperature to the catalyst control system, and the back pressure of the exhaust upstream of the catalyst control system at least once per month. [District Rule 4702]
51. 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]
52. {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]

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53. 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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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-8741-4-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: CDE24, LLC
MAILING ADDRESS: 145 NORTH N ST, SUITE A
TULARE, CA 93274

LOCATION: 18501 OLD RIVER RD
BAKERSFIELD, CA

EQUIPMENT DESCRIPTION:

1,609 BHP MTU MODEL GB1145B6 (OR DISTRICT APPROVED EQUIVALENT) DIGESTER GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, AND A CARBON H₂S SCRUBBER (OR APPROVED EQUIVALENT H₂S REMOVAL SYSTEM) POWERING AN ELECTRICAL GENERATOR

CONDITIONS

1. The permittee shall obtain written District approval for the use of any equivalent control equipment not specifically approved by this Authority to Construct (ATC). Approval of the equivalent control equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate control equipment is equivalent to the specifically authorized equipment. [District Rule 2010]
2. The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2010]
3. Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct (ATC). [District Rule 2201]
4. No emission factor and no emissions shall be greater for the alternate equipment than for the proposed equipment. No changes in the hours of operation, operating rate, throughput, or firing rate may be authorized for any alternate equipment. [District Rule 2201]
5. All equipment shall be maintained in good operating condition and shall be operated in a manner consistent with good air pollution control practice to minimize emissions of air contaminants. [District Rule 2201]
6. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
7. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

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

Seyed Sadredin, Executive Director / APCO

Arnaud Marjollet, Director of Permit Services
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8. {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]
9. {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]
10. The exhaust stack shall be at least 25 feet tall. [District Rule 4102]
11. {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]
12. {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]
13. This engine shall only be fueled with digester gas. [District Rule 2201]
14. The sulfur content of the digester gas used as fuel in this engine shall not exceed 40 ppmv as H₂S. The 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]
15. This engine shall be equipped with an operational non-resettable elapsed time meter. [District Rules 2201 and 4702]
16. Commissioning activities are defined as, but not limited to, all testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the construction contractor to ensure safe and reliable operation of the reciprocating IC engine, emission control equipment, and associated electrical delivery systems. [District Rule 2201]
17. Commissioning period shall commence when all mechanical, electrical, and control systems are installed and individual system startup has been completed, or when the reciprocating engine is first fired, whichever occurs first. The commissioning period shall terminate when the engine has completed initial performance testing, completed initial engine tuning, and the engine is available for commercial operation. The total duration of the commissioning period for this engine shall not exceed 100 hours of operation. [District Rule 2201]
18. The owner/operator shall minimize the emissions from the engine to the maximum extent possible during the commissioning period. [District Rule 2201]
19. At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and/or the construction contractor, the engine shall be tuned to minimize emissions. [District Rule 2201]
20. At the earliest feasible opportunity, in accordance with the recommendations of the equipment supplier and/or the construction contractor, the emission control catalyst system(s) shall be installed, adjusted, and operated to minimize emissions from this unit. [District Rule 2201]
21. The permittee shall prepare and maintain a summary of activities to be performed during the commissioning period 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]
22. During the commissioning period emission rates from this IC engine shall not exceed any of the following limits: 1.0 g-NO_x/bhp-hr, 0.05 g-PM₁₀/bhp-hr, 2.0 g-CO/bhp-hr, or 0.7 g-VOC/bhp-hr. [District Rule 2201]
23. The total number of firing hours of this unit without abatement of emissions by the SCR system shall not exceed 100 hours during the commissioning period. Such operation of this unit without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system. Upon completion of these activities, the unused balance of the 100 firing hours without abatement shall expire. [District Rule 2201]
24. The permittee shall record total operating time of the engine in hours during the commissioning period. [District Rule 2201]

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25. Coincident with the end of the commissioning period, emissions from this IC engine shall not exceed any of the following limits: 0.15 g-NO_x/bhp-hr (for periodic alternate monitoring, 11 ppmvd NO_x @ 15% O₂), NO_x referenced as NO₂; 0.05 g-PM₁₀/bhp-hr; 0.50 g-CO/bhp-hr (for periodic alternate monitoring, 60 ppmvd CO @ 15% O₂); or 0.10 g-VOC/bhp-hr (for periodic alternate monitoring, 21 ppmvd VOC @ 15% O₂), VOC referenced as CH₄. [District Rules 2201 and 4702]
26. 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]
27. Ammonia (NH₃) emissions from this engine shall not exceed 10 ppmvd @ 15% O₂. [District Rules 2201 and 4102]
28. Source testing to measure NO_x, CO, VOC, PM₁₀, and ammonia (NH₃) emissions from this unit shall be conducted within 90 days of initial start-up. [District Rules 1081, 2201, and 4702]
29. 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]
30. Fuel sulfur content analysis shall be performed within 90 days of initial start-up using EPA Method 11 or EPA Method 15, as appropriate. [District Rules 2201 and 4702]
31. 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]
32. {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]
33. 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]
34. 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]
35. 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]
36. {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]
37. The results of each source test shall be submitted to the District within 60 days after completion of the source test. [District Rule 1081]
38. 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]

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39. Monitoring of the digester gas sulfur content shall be performed using gas detection tubes calibrated for H₂S; a Testo 350 XL portable emission monitor; a continuous fuel gas monitor that meets the requirements specified in SCAQMD Rule 431.1, Attachment A; District-approved source test methods, including EPA Method 15, ASTM Method D1072, D4084, and D5504; District-approved in-line H₂S monitors; or an alternative method approved by the District. Prior to utilization of in-line monitors to demonstrate compliance with the digester gas sulfur content limit of this permit, the permittee shall submit details of the proposed monitoring system, including the make, model, and detection limits, to the District and obtain District approval for the proposed monitor(s). [District Rule 2201]
40. 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]
41. 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. [In-stack monitors may be allowed if they satisfy the standards for portable analyzers as specified in District policies and are approved in writing by the APCO.] 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]
42. 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]
43. 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]
44. {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]
45. 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]

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46. Within 90 days of initial start-up, the SCR system reagent injection rate and inlet temperature to the catalyst control system shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the NO_x emissions limit(s) 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%). Records of the acceptable SCR system reagent injection rate(s) and inlet temperature(s) to the catalyst control system demonstrated to result in compliance with the NO_x emission limit(s) shall be maintained and made available for inspection upon request. [District Rule 4702]
47. If the SCR system reagent injection rate and/or the inlet temperature to the catalyst control system is outside of the established acceptable range(s), the permittee shall return the SCR system reagent injection rate and inlet temperature to the catalyst control system to within the established acceptable range(s) as soon as possible, but no longer than 8 hours after detection. If the SCR system reagent injection rate and inlet temperature to the catalyst control system are not returned to within acceptable range(s) 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 and inlet temperature to the catalyst control system are operating within the acceptable range(s) demonstrated to result in compliance with the NO_x emission limit(s) of this permit. [District Rule 4702]
48. Within 90 days of initial start-up, the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limit(s) 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%). Records of the established acceptable inlet temperature and back pressure demonstrated to result in compliance with the CO and VOC emission limits shall be maintained and made available for inspection upon request. [District Rule 4702]
49. 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 range(s), 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(s) 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(s) 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 operating within the acceptable range(s) demonstrated to result in compliance with the CO emission limit(s) of this permit. [District Rule 4702]
50. The permittee shall monitor and record the engine operating load, the SCR system reagent injection rate, the inlet temperature to the catalyst control system, and the back pressure of the exhaust upstream of the catalyst control system at least once per month. [District Rule 4702]
51. 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]
52. {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]

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53. 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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