March 31, 2023

Ignacio Sanchez
Brownie, LLC
1128 Clapp Ln, Box 315
Manotick, Ontario, Canada K4M-1A4

Re: Notice of Preliminary Decision - Authority to Construct
Facility Number: S-9908
Project Number: S-1213498

Dear Mr. Sanchez:

Enclosed for your review and comment is the District's analysis of Brownie, LLC's application for an Authority to Construct for the installation of a renewable natural gas production operation consisting of a digester system served by a backup flare, a digester gas upgrading operation served by a regenerative thermal oxidizer, and three 770 bhp natural gas-fired IC engines, at 11450 Jumper Ave, Wasco, CA.

The notice of preliminary decision for this project has been posted on the District's website (www.valleyair.org). After addressing all comments made during the 30-day public notice period, the District intends to issue the Authority to Construct. Please submit your written comments on this project within the 30-day public comment period, as specified in the enclosed public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Jesse A. Garcia of Permit Services at (559) 230-5918.

Sincerely,

Brian Clements
Director of Permit Services

BC:jag

Enclosures

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

San Joaquin Valley Air Pollution Control District
Authority to Construct Application Review

Digester System with Backup Flare, RTO and Digester Gas Upgrading Operation and Three Natural Gas-Fired IC Engines

Facility Name:	Brownie LLC	Date:	March 31, 2023
Mailing Address:	1128 Clapp Lane, Ste 302 Manotick, ON K4M 1A4	Engineer:	Jesse A. Garcia
		Lead Engineer:	Derek Fukuda
Contact Person:	Suparna Chakladar		
Telephone:	(951) 833-4153		
E-Mail:	Schakladar@opalfuels.com		
Application #s:	S-9908-1-0, -2-0, -3-0, -4-0		
Project #:	S-1213498		
Deemed Complete:	January 12, 2022		

I. Proposal

Brownie LLC has requested Authority to Construct (ATC) permits to construct a digester system (S-9908-1-0), three natural gas-fired IC engines (S-9908-2-0, -3-0, and -4-0), and a permit exempt manure drying operation (See Rule 2020 Compliance section for additional details).

The digester system consists of a covered digester lagoon, hydrolyzer(s)[1] to combine and homogenize the feedstock, equalization pit(s) to provide consistent influent flow to the digester by retaining high flow fluctuations, a digester gas-fired backup flare, a digester gas upgrading system, and permit exempt boilers that are fired on natural gas and have a maximum heat input less than 5.0 MMBtu/hr (ATC S-9908-1-0). The captured digester gas from the digester system will be treated and purified onsite to pipeline quality renewable natural gas (RNG) in the proposed digester gas upgrading operation consisting of feed gas blowers, compressors, coolers, chillers, iron sponge H_2S removal, a membrane CO_2 removal system, and product gas compressors served by a regenerative thermal oxidizer (RTO).

The applicant also proposes to install three 770 bhp natural gas-fired IC engines powering electrical generators (ATCs S-9908-2-0, -3-0, -4-0) that will provide heat and electricity for the digester system.

The proposed digester system, upgrading operation and IC engines will be constructed on open land leased from an existing dairy, Solo Dairy (S-6548), and will receive liquid manure from the dairy. The digester lagoon is newly constructed and will receive liquid manure from Solo Dairy. Solo Dairy's liquid manure system otherwise operates independently from the proposed digester

[1] A hydrolyzer is a tank that aggregates and homogenizes the feedstock before it is pumped into the anaerobic digester. In the hydrolyzer, the particles in the feedstock begin to be broken down and oxygen is removed. The hydrolyzed feedstock is then pumped to the anaerobic digester, optimizing system utilization.

system. The digester system will capture methane produced from the liquid manure and will send it to the digester gas upgrading operation that will be built next to the new digester system. The collected digester gas will be upgraded to pipeline quality RNG for injection into the PG&E statewide grid for delivery to the end users via a point of pipeline interconnection.

Brownie LLC and Solo Dairy are separate companies that will work together for the construction and operation of the proposed project. Brownie LLC has indicated that the dairy and the digester facility will be separately owned and operate as separate businesses. The following is a summary of the information provided by the applicant. The proposed digester system, digester gas upgrading operation, and IC engines will be owned, installed, operated, maintained, and repaired if necessary by Brownie 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 local water quality regulations. Brownie LLC will not be involved in the dairy's primary activity, the production of milk. Brownie LLC will be solely responsible for ensuring that the digester system, digester gas upgrading operation, and IC engines comply with all applicable air quality regulations. Because the dairy at the site will be separately owned and operated from the proposed digester system, upgrading operation, and IC engines and will have different two-digit Standard Industrial Classification (SIC) codes (Industry Group 02: Agricultural Production – Livestocks and Animal Specialties for the dairy vs. Industry Group 49: Electric, Gas, And Sanitary Services for the digester system and proposed equipment in this project), pursuant to Section 3.39 of District Rule 2201, the proposed equipment will not be part of the dairy agricultural stationary source. Therefore, the proposed operation and equipment will be permitted as a separate non-agricultural stationary source (Facility S-9908).

II. Applicable Rules

Rule 2020	Exemptions (12/18/14)
Rule 2201	New and Modified Stationary Source Review Rule (8/15/19)
Rule 2410	Prevention of Significant Deterioration (6/16/11)
Rule 2520	Federally Mandated Operating Permits (8/15/19)
Rule 4001	New Source Performance Standards (4/14/99)
Rule 4002	National Emissions Standards for Hazardous Air Pollutants (5/20/04)
Rule 4101	Visible Emissions (2/17/05)
Rule 4102	Nuisance (12/17/92)
Rule 4201	Particulate Matter Concentration (12/17/92)
Rule 4301	Fuel Burning Equipment (12/17/92)
Rule 4311	Flares (12/17/20)
Rule 4701	Internal Combustion Engines – Phase 1 (8/21/03)
Rule 4702	Internal Combustion Engines (8/19/21)
Rule 4801	Sulfur Compounds (12/17/92)
CH&SC 41700	Health Risk Assessment
CH&SC 42301.6	School Notice

Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)
California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387: CEQA Guidelines

III. Project Location

The facility is located at 11450 Jumper Ave in Wasco, CA. The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

S-9908-1-0 (Digester System)

The 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). Digester gas may also include trace amounts of various VOCs that remain from incomplete digestion of the volatile solids in the incoming substrate. Because digester gas 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 digester system will be designed to process the manure generated by the cattle at Solo Dairy and will capture fugitive methane that is currently being released from the uncovered lagoons and storage ponds at the dairy. The manure will be flushed from the milking parlor and the cow housing areas at the dairy and the manure will be pumped via an underground piping system to a hydrolyzer where the waste stream will be adjusted to the proper solids content (9-15% solids) and then pumped into the new digester system. 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 solids separation area where the fibrous solids will be separated from the liquid digester effluent. After the fibrous 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 storage ponds to be used to fertilize adjacent cropland.

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 for separation of the digested manure fiber solids from the liquid. The digested solids will be returned to the dairy for use as bedding for the cattle at the dairy or stored 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 storage ponds will be utilized for capture of any overflow from the separated liquids. The dairy will continue to use the existing storage ponds to irrigate and fertilize adjacent cropland.

S-9908-2-0, -3-0, -4-0 (Natural Gas-Fired IC Engines)

The project location will include a mechanical building next to the proposed digester to house the three proposed 770 bhp lean-burn natural gas-fired IC engines. Each engine will be equipped with an SCR system and a heat exchanger, and will power a 550 kW electrical generator. Heat will be recovered from the engines using the heat exchangers and will be used to heat the digesters.

The maximum operating schedule for the IC engines is 24 hr/day and 365 days/year.

V. Equipment Listing

S-9908-1-0: DIGESTER SYSTEM CONSISTING OF A COVERED DIGESTER LAGOON, HYDROLYZER(S), ONE 34.4 MMBTU/HR DIGESTER GAS-FIRED BACKUP FLARE, PERMIT EXEMPT BOILERS (NATURAL GAS-FIRED, 5 MMBTU/HR OR LESS), AND A DIGESTER GAS UPGRADING OPERATION CONSISTING OF FEED GAS BLOWERS, COMPRESSORS, COOLERS, CHILLERS, IRON SPONGE H2S REMOVAL, A MEMBRANE CO2 REMOVAL SYSTEM, PRODUCT GAS COMPRESSORS, AND A 2.0 MMBTU/HR TRITON 6.95 NATURAL GAS-FIRED REGENERATIVE THERMAL OXIDIZER (RTO)

S-9908-2-0: 770 BHP 2G ENERGY MODEL AVUS 500PLUS NATURAL GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM AND AN OXIDATION CATALYST SYSTEM POWERING AN ELECTRICAL GENERATOR AND PROVIDING HEAT FOR THE DIGESTER SYSTEM PERMITTED UNDER S-9908-1

S-9908-3-0: 770 BHP 2G ENERGY MODEL AVUS 500PLUS NATURAL GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM AND AN OXIDATION CATALYST SYSTEM POWERING AN ELECTRICAL GENERATOR AND PROVIDING HEAT FOR THE DIGESTER SYSTEM PERMITTED UNDER S-9908-1

S-9908-4-0: 770 BHP 2G ENERGY MODEL AVUS 500PLUS NATURAL GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM AND AN OXIDATION CATALYST SYSTEM POWERING AN ELECTRICAL GENERATOR AND PROVIDING HEAT FOR THE DIGESTER SYSTEM PERMITTED UNDER S-9908-1

VI. Emission Control Technology Evaluation

<u>S-9908-1-0</u>

<u>Digester System</u>
As previously discussed, a digester system 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 digestion results in greater conversion of organic compounds in the substrate into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate Volatile Organic Compounds (VOCs). Because construction of the digester system will allow the liquid manure to be anaerobically treated as opposed to be being processed through an open lagoon,

construction of the digester is expected to reduce VOC emissions from the dairy's liquid manure handling system.

Moisture as well as other impurities, such as CO_2, H_2S, and NH_3 will be removed from the digester gas via the digester gas upgrading equipment to upgrade the gas to pipeline quality renewable natural gas to be piped offsite and used elsewhere.

Under normal operation, digesters are assumed to capture 100% of the produced digester gas which is upgraded into RNG to be piped offsite. If produced digester gas cannot be upgraded and transported offsite, the excess gas will be vented to the backup/emergency flare for VOC control. Additionally, digester gas upgrading equipment will be served by an RTO for H_2S control.

The flare and RTO are considered emissions control devices and the products of combustion, which includes oxides of nitrogen (NOx), oxides of sulfur (SOx), particulate matter less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$), and carbon monoxide (CO) emissions are secondary pollutants.

Normal Operation – Digester Gas Upgrading

H_2S Removal

After capture of the digester gas, it is sent through an iron sponge H_2S scrubber for the removal of additional H_2S prior to delivery to the gas upgrading plant.

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

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

For the iron sponge to perform effectively, it must be maintained within a defined range of sufficient moisture content. This requirement is typically satisfied if the gas is saturated with water vapor, as is frequently the case with biogas. If the iron sponge becomes dry, moisture can be added and it will remain effective.

The scrubber consists of enclosed vessels filled with iron sponge or other dry media for removal of H_2S. The digester gas flows 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 iron sponge 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 spent scrubber vessels will be sent to a regeneration facility or to an appropriate disposal facility.

CO2 Membrane

Pursuant to Newpoint Gas, LLC[2], carbon dioxide membranes operate on the principle of selective permeation. Each gas component has a specific permeation rate. The rate of permeation is determined by the rate which a component dissolves into the membrane surface and the rate at which it diffuses through the membrane.

The components with higher permeation rates (such as CO2, H2, and H2S) will permeate faster through the membrane module than components with lower permeation rates (such as N2, C1, C2 and heavier hydrocarbons). For example, carbon dioxide is a “fast,” more permeable, gas than methane. When a stream consisting of these two gases contacts the membrane, the carbon dioxide will permeate through the fiber at a faster rate than the methane. Thus, the feed stream is separated into a methane-rich (residual) stream on the exterior of the membrane fiber and a carbon dioxide-rich (permeate) stream on the interior of the membrane fiber.

The primary driving force of the separation is the differential partial pressure of the permeating component. Therefore, the pressure difference between the feed gas and permeate gas and the concentration of the permeating component determine the product purity and the amount of carbon dioxide membrane surface required.

This system is a closed system and the waste tail gas created in this project will be sent to be combusted in the RTO.

RTO

The portion of the raw digester gas that cannot be otherwise collected in the gas upgrading operation, either by purification to PUC quality natural gas or capture with sorbent, is called the waste tail gas. The RTO receives waste tail gas and serves as a control device primarily for residual H2S and NH3 to minimize the health risk associated with those compounds. The RTO exhausts to atmosphere.

Backup Operation – Venting to Flare

Raw Digester Gas-Fired Flare

The proposed digester system must be equipped with a backup/emergency flare as a VOC control device if there is excess digester gas that must be disposed of. There may be excess raw digester gas in cases when the gas upgrading equipment is not operating due to breakdown or maintenance. However, the flare is expected to only operate in emergency situations since gas upgrading equipment is expected to be maintained and properly operated which will serve to ensure the equipment remains reliable.

Fugitive Emissions

Previous analyses of digester gas have consistently demonstrated that the VOC content of digester gas is very low (less than 1% by weight). District Policy SSP 2015 – Procedures for Quantifying Fugitive VOC Emissions at Petroleum and SOCMI (Synthetic Organic Chemical Manufacturing Industry) Facilities specifies that fugitive VOC emissions are not assessed for

[2] https://www.newpointgas.com/services/carbon-dioxide-co2-removal/

piping and components handling fluid streams with a VOC content of 10% or less by weight. Therefore, because of the very low VOC content of the digester gas, fugitive VOC emissions from the digester system and associated equipment are assumed to be negligible, consistent with District Policy SSP 2015.

S-9908-2-0, -3-0, -4-0 (Natural Gas-Fired IC Engines)
The IC engines may emit NOx, SOx, PM_{10}, $PM_{2.5}$, CO, VOC, and ammonia (NH_3). The proposed engines will be equipped with the following technology:

- Turbocharger
- Intercooler
- Air/fuel ratio controller
- Lean-burn technology
- Oxidation Catalyst
- Selective catalytic reduction (SCR) with urea injection

The turbocharger reduces NOx emissions from IC 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 and lowering the peak combustion temperature, which reduces the formation of thermal NOx.

The air-to-fuel ratio (AFR) controller is used to monitor the amount of oxygen in the exhaust stream and adjust engine air and fuel injection to optimize engine operation and catalyst function. Lean-burn technology increases the volume of air in the combustion process compared to the volume of fuel. This technology also incorporates improved swirl patterns to promote thorough air/fuel mixing. With lower fuel content and better mixing, the combustion temperatures are lowered and the fuel is used more efficiently resulting in reduced formation of NOx.

An oxidation catalyst converts CO and VOC emissions to CO_2 and water. Typically, these catalysts are located prior to the urea injection site since the oxidation catalyst would otherwise convert the excess ammonia into NOx.

An SCR system reduces NOx emissions through the use of a catalyst and a reagent, in this case urea. Urea is injected into the exhaust gas stream downstream of (after) the oxidizing catalyst and upstream (prior) to the NOx catalyst and is converted to ammonia. The ammonia is used with the catalyst to reduce NOx to elemental nitrogen, water vapor, and other by-products. The use of a catalyst typically reduces the NOx emissions by up to 90%. The urea injection results in some unreacted ammonia passing through the catalyst and out to the atmosphere. This excess ammonia is known as ammonia slip. Generally, urea injection is carefully monitored and adjusted to maintain the required NOx exhaust concentration and excess ammonia is limited by the operator to reduce the cost of urea used in the system. Ammonia slip will be limited by permit condition to not exceed 10 ppmv @ 15% O_2.

VII. General Calculations

A. Assumptions

S-9908-1-0

Digester System and Upgrading Equipment:

- Brownie LLC (Facility S-9908) and Solo Dairy (Facility S-6548) 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 are allocated to the liquid manure handling system at the dairy because the manure for the digester system will be taken from the flush system at the dairy and the effluent from the digester system will be returned to the dairy for use
- The proposed digester system will reduce potential VOC emissions from manure generated by the cattle at the dairy. Manure that is currently stored in uncovered lagoons and ponds will instead be placed in covered digester lagoons at the Brownie LLC facility, thereby decreasing volatilization of compounds from the manure. In the digester, most VOCs present will be converted to methane (an exempt organic compound) and carbon dioxide further reducing the potential for VOC emissions. The results of digester gas analyses have consistently demonstrated very low VOC content (less than 1% by weight). District Policy SSP 2015 specifies that fugitive VOC emissions are not assessed for piping and components handling fluid streams with a VOC content of 10% or less by weight. Therefore, consistent with District Policy SSP 2015, the VOC content of the digester gas will be limited by permit condition to no more than 10% by weight and the fugitive VOC emissions from the digester system will be assumed to be negligible.
- To streamline emission calculations, PM2.5 emissions are assumed to be equal to PM10 emissions
- Digester gas properties:
  - Higher Heating Value = 580 Btu/scf (per applicant)
  - F-factor = 9,100 dscf/MMBtu (dry, adjusted to 60 °F), (Estimated based on previous digester gas fuel analyses for source tests)
  - Maximum VOC content = 0.5% by weight
  - Molar specific volume = 379.5 scf/lb-mol (at 60°F)
- Natural gas properties:
- F-factor = 8,578 dscf/MMBtu (dry, adjusted to 60 °F), per 40 CFR 60, Appendix B
- Molecular weights:
  - NO_X (as NO_2) = 46 lb/lb-mol
  - CO_2 = 44 lb/lb-mol
  - NH3 = 17 lb/lb-mol
  - VOC (as CH_4) = 16 lb/lb-mol
  - SO_X (as SO_2) = 64.06 lb/lb-mol

Backup flare:

- Maximum amount of gas combusted by flare is the equivalent of 750 hr/year operation, which is 44.48 MMscf/year (as calculated in the table below).
- Higher heating value of flared gas = 580 Btu/scf (per applicant)
- The maximum potential flare gas flowrate is the following:

Maximum flowrate (per applicant. See Flare Supplemental Application)	**Equivalent Btu content (per applicant; based on 580 Btu/scf heating value)**
59,310 scf/hr	34.4 MMBtu/hr
44.48 MMscf/yr (based on 750 hr/yr)	25,800 MMBtu/yr (based on 750 hr/yr)

- Flare VOC destruction efficiency = 98%[3]

Digester Gas Upgrading Operation Served by RTO:

- Maximum waste tail gas venting rate from the CO2 membrane to the RTO = 373 scfm (per manufacturer)
- 100% of waste tail gas vented to the RTO

S-9908-2-0, -3-0, -4-0 (IC Engines):

- Maximum engine operation schedule is 24 hours/day and 365 days per year
- The maximum rated heat input for each engine is 4.627 MMBtu/hr (per engine data sheet, see Appendix D)
- Bhp to Btu/hr conversion = 2,545 Btu/bhp-hr
- Engine thermal efficiency = 30% (District practice)
- The engines will not require any commissioning period. All emission control equipment will be installed to manufacturer specifications prior to startup
- Ammonia slip from SCR = 10 ppmvd @ 15% O_2 (proposed by applicant)

B. Emission Factors

S-9908-1-0

Digester System and Upgrading Equipment:

- Previous analyses of digester gas have consistently demonstrated that the VOC content of digester gas is very low (less than 1% by weight). District Policy SSP 2015 – Procedures for Quantifying Fugitive VOC Emissions at Petroleum and SOCMI (Synthetic Organic Chemical Manufacturing Industry) Facilities specifies that fugitive VOC emissions are not assessed for piping and components handling fluid streams with a VOC content of 10% or less by weight. Therefore, because of the very low VOC content of the digester gas, fugitive VOC emissions from the digester system and associated equipment are assumed to be negligible, consistent with District Policy SSP 2015.

[3] AP-42, Draft Section 2.4, Municipal Solid Waste Landfills, (October 2008). The value stated (97.7%) has been rounded to 98% as discussed in the BACT determination (Appendix D).

Backup Flare

- The NO_X emission factor (0.06 lb/MMBtu) is based on the Industry Standard NO_X emission factor for biogas flares[4] and District practice for permitting biogas flares
- The SO_X emission factor (0.35 lb/MMBtu) is based on the maximum sulfur content of the dairy digester gas proposed by the applicant to pass the HRA/AAQA (1,200 ppmv as H_2S)
- AP-42 Section 13.5 indicates 0 micrograms of soot per liter of exhaust for smokeless flares and 40 micrograms of soot per liter of exhaust for lightly smoking flares. The emission factor for PM (0.008 lb/MMBtu) is based on District practice assuming 10 micrograms of soot per liter of exhaust and is reasonable for flares limited to no less than 5% opacity visible emissions.
- The emission factor CO (0.0793 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 for the digester gas-fired flare (0.006 lb/MMBtu) is based on the VOC emission for landfill gas and digester gas-fired flares (2.50 g/MMBtu or 0.0055 lb/MMBtu) from the California Air Resources Board (ARB) Low Carbon Fuel Standard (LCFS) pathways for the production of LCFS fuels from landfill gas and digester gas,[5] and was also assumed to be similar to the AP-42 VOC emission factor for digester gas-fired turbines (0.0058 lb/MMBtu). The assumption that the AP-42 VOC emission factor for the digester gas-fired flare is similar to digester gas-fired turbines is conservative because AP-42, Draft Section 2.4 Municipal Solid Waste Landfills (October 2008) lists a typical VOC control efficiency of 97.7% for landfill gas-fired flares compared to 94.4% for landfill gas-fired turbines and greater VOC control efficiency would result in lower VOC emissions. Additionally, as noted above, the VOC content of dairy digester gas is generally negligible to very low; therefore, using a VOC emission factor of 0.006 lb/MMBtu will result in a reasonably conservative estimate of VOC emissions from the digester gas backup flare.

[4] John Zink® has previously indicated that the industry standard NO_X emission factor for biogas flares is 0.06 lb-NO_X/MMBtu. See: John Zink (March 1998) Ultra-Low Emission Enclosed Landfill Gas Flare – A Full Scale Factory Test. Presented at the **Solid Waste Association of North America (SWANA)** 21nd Annual Landfill Gas Symposium, Austin, Texas, March 1998. https://www.johnzinkhamworthy.com/wp-content/uploads/tp_UltraLowEmmission.pdf. John Zink® also stated that one of their standard flares is expected to comply with the 0.06 lb-NO_X/MMBtu emission limit when flaring low Btu gas from a digester gas refining process. See: Sacramento Metropolitan Air Quality management District (SMAQMD) BACT determination for flaring low Btu digester gas (July 25, 2017): http://www.airquality.org/StationarySources/Documents/Flare%20Waste%20Gas%20Low%20BTU%20BACT%20140.pdf

[5] Examples of ARB Low Carbon Fuel Standard (LCFS) pathways for landfill gas and digester gas are available at: https://www.arb.ca.gov/fuels/lcfs/092309lcfs_lfg_lng.pdf and https://www.arb.ca.gov/fuels/lcfs/2a2b/apps/wws2bm-rpt-082514.pdf ; Also see: https://www.arb.ca.gov/fuels/lcfs/2a2b/2a-2b-apps.htm

Emissions Factors for Backup Flare			
Pollutant	lb/MMBtu	lb/scf*	Source
NO_X	0.06	3.48×10^{-5}	Industry Standard/District Practice for Permitting Biogas Flares
SO_X	0.35	-	1,200 ppmvd in flared gas (Proposed by Applicant, see mass balance equation below)
PM_{10}	0.008	1.45×10^{-5}	District Practice
CO	0.0793	4.60×10^{-5}	AP-42 Draft Table 2.4.4 (2008) (Value for Landfill Gas Flares)
VOC	0.006	-	Based on ARB LCFS Pathway Biogas Flare VOC EF/Also Conservatively Assumed to be similar to Digester Gas-Fired Turbines

*lb/scf equivalent = lb/MMBtu x 0.000580 MMBtu/scf

SO_X – 1,200 ppmvd H_2S in flared gas

$$\frac{1{,}200\ \mathrm{ft^3\ H_2S}}{10^6\ \mathrm{ft^3}} \times \frac{32.06\ \mathrm{lb-S}}{\mathrm{lb-mol\ H_2S}} \times \frac{\mathrm{lb-mol}}{379.5\ \mathrm{ft^3}} \times \frac{64.06\ \mathrm{lb-SO_2}}{32.06\ \mathrm{lb-S}} \times \frac{1\ \mathrm{ft^3}}{580\ \mathrm{Btu}} \times \frac{10^6\ \mathrm{Btu}}{\mathrm{MMBtu}} = 0.35\ \frac{\mathrm{lb-SO_X}}{\mathrm{MMBtu}}$$

Digester Gas Upgrading Operation

The tail-gas from the digester gas upgrading equipment has an H2S content of less than 4 ppm (equivalent to 0.0016 lb-SOx/MMBtu). Thus, worst-case SOx emissions from the RTO serving the digester gas upgrading equipment occurs when the unit is fired solely on natural gas, which has a higher emission factor of 0.00285 lb/MMBtu.

Emission Factors for Natural Gas-Fired RTO		
Pollutant	**Post-Project Emission Factors (EF2)**	**Source**
NO_X	0.04 lb-NO_X/MMBtu	Manufacturer's Specification[6]
SO_X	0.00285 lb-SO_X/MMBtu	District Policy APR 1720
PM_{10}	0.0075 lb-PM_{10}/MMBtu	AP-42 (07/98) Table 1.4-2
CO	0.0824 lb-CO/MMBtu	AP-42 (07/98) Table 1.4-1
VOC	0.0054 lb-VOC/MMBtu	AP-42 (07/98) Table 1.4-2

[6] See Appendix E for RTO specification sheet.

S-9908-2-0, -3-0, -4-0 (IC Engines):

The proposed emission limit and the equivalent limit (in lb/MMBtu) are summarized the table below.

Emission Factors for Natural Gas-Fired IC Engines			
Pollutant	**Proposed limit**	**Equivalent Limit (lb/MMBtu)**	**Source**
NO_X	5 ppmv @ 15% O_2	0.018	Applicant Proposed - SCR System
SO_X	0.00285 lb/MMBtu	0.00285	District Policy APR 1720
PM_{10}	0.01 g/bhp-hr	0.003	Manufacturer
CO	90 ppmv @ 15 %O_2	0.20	Manufacturer
VOC	20 ppmv @ 15 % O_2	0.025	Applicant Proposed – Oxidation Catalyst System
NH_3	10 ppmv @ 15% O_2	0.014	Applicant Proposed

NOx: $\frac{5\ ppmvd \times 8578\frac{dscf}{MMBtu} \times 46\frac{lb}{lb-mol} \times \frac{20.95}{20.95-15}}{379.5\frac{dscf}{lb-mol} \times 10^6}$=0.018 lb/MMBtu

PM_{10}: $0.01\ \frac{g}{bhp-hr} \times \frac{bhp-hr}{2{,}545\ Btu-out} \times \frac{0.3\ Btu-out}{Btu-in} \times \frac{10^6 Btu}{MMBtu} \times \frac{lb}{453.6\ g}$= 0.003 lb/MMBtu

CO: $\frac{90\ ppmvd \times 8578\frac{dscf}{MMBtu} \times 28\frac{lb}{lb-mol} \times \frac{20.95}{20.95-15}}{379.5\frac{dscf}{lb-mol} \times 10^6}$=0.20 lb/MMBtu

VOC: $\frac{20\ ppmvd \times 8578\frac{dscf}{MMBtu} \times 16\frac{lb}{lb-mol} \times \frac{20.95}{20.95-15}}{379.5\frac{dscf}{lb-mol} \times 10^6}$=0.025 lb/MMBtu

NH_3: $\frac{10\ ppmvd \times 8578\frac{dscf}{MMBtu} \times 17\frac{lb}{lb-mol} \times \frac{20.95}{20.95-15}}{379.5\frac{dscf}{lb-mol} \times 10^6}$=0.014 lb/MMBtu

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Since all the permit units in this project are new emissions units, PE1 = 0 for all pollutants for all permit units.

2. Post-Project Potential to Emit (PE2)

S-9908-1-0

Digester System with Backup Flare:

As explained above, the applicant has proposed to construct new covered digesters and a hydrolyzer that will have negligible fugitive emissions.

However, the backup flare serving the digester system will have emissions from combustion of the digester gas. The emissions from the backup flare are calculated with the following equations:

Daily PE = EF (lb/MMBtu) × Heat Input (MMBtu/hr) × Op. Sched. (hr/day)
Annual PE = EF (lb/MMBtu) × Annual Heat Input (MMBtu/yr)

Daily PE2 for the Digester System with Backup Flare							
Pollutant	Emission Factor (lb/MMBtu)	x	Hourly Heat Input of Gas Flared (MMBtu/hr)	x	Daily Hours of Operation (hr/day)	=	Daily PE2 (lb/day)
NO_X	0.06	x	34.4	x	24	=	**49.5**
SO_X	0.35	x	34.4	x	24	=	**289.0**
PM_{10}	0.008	x	34.4	x	24	=	**6.6**
CO	0.0793	x	34.4	x	24	=	**65.5**
VOC	0.006	x	34.4	x	24	=	**5.0**

Annual PE2 for the Digester System with Backup Flare					
Pollutant	Emission Factor (lb/MMBtu)	x	Annual Heat Input of Gas Flared (MMBtu/yr)	=	PE2 (lb/year)
NO_X	0.06	x	25,800	=	**1,548**
SO_X	0.35	x	25,800	=	**9,030**
PM_{10}	0.008	x	25,800	=	**206**
CO	0.0793	x	25,800	=	**2,046**
VOC	0.006	x	25,800	=	**155**

<u>Digester Gas Upgrading Operation Served by an RTO</u>

The PE for each pollutant is calculated with the following equation:

PE = EF (lb/MMBtu) × Heat Input (MMBtu/hr) × Op. Sched. (hr/day)

RTO Daily PE2								
NO_x	0.04	(lb/MMBtu) x	2.0	(MMBtu/hr) x	24	(hr/day) =	**1.9**	(lb/day)
SO_x	0.00285	(lb/MMBtu) x	2.0	(MMBtu/hr) x	24	(hr/day) =	**0.1**	(lb/day)
PM_{10}	0.0075	(lb/MMBtu) x	2.0	(MMBtu/hr) x	24	(hr/day) =	**0.4**	(lb/day)
CO	0.0824	(lb/MMBtu) x	2.0	(MMBtu/hr) x	24	(hr/day) =	**4.0**	(lb/day)
VOC	0.0054	(lb/MMBtu) x	2.0	(MMBtu/hr) x	24	(hr/day) =	**0.3**	(lb/day)

RTO Annual PE2									
NO_x	0.04	(lb/MMBtu) x	2.0	(MMBtu/hr) x	8,760	(hr/year) =	**701**	(lb/year)
SO_x	0.00285	(lb/MMBtu) x	2.0	(MMBtu/hr) x	8,760	(hr/year) =	**50**	(lb/year)
PM_{10}	0.0075	(lb/MMBtu) x	2.0	(MMBtu/hr) x	8,760	(hr/year) =	**131**	(lb/year)
CO	0.0824	(lb/MMBtu) x	2.0	(MMBtu/hr) x	8,760	(hr/year) =	**1,444**	(lb/year)
VOC	0.0054	(lb/MMBtu) x	2.0	(MMBtu/hr) x	8,760	(hr/year) =	**95**	(lb/year)

Total Emissions for S-9908-1-0

Total Daily PE Summary for S-9908-1-0			
Pollutant	**Backup Flare (lb/day)**	**RTO (lb/day)**	**Total PE (lb/day)**
NO_X	49.5	1.9	51.4
SO_X	289.0	0.1	289.1
PM_{10}	6.6	0.4	7.0
CO	65.5	4.0	69.5
VOC	5.0	0.3	5.3

Total Annual PE Summary for S-9908-1-0			
Pollutant	**Backup Flare (lb/day)**	**RTO (lb/day)**	**Total PE (lb/day)**
NO_X	1,548	701	2,249
SO_X	9,030	50	9,080
PM_{10}	206	131	337
CO	2,046	1,444	3,490
VOC	155	95	250

S-9908-2-0, -3-0, -4-0 (IC Engines):

The daily PE for each pollutant for each engine is calculated as follows:

PE (lb/day) = [EF (lb/MMBtu) x Rating (MMBtu/hr) x Operation schedule (hrs/day)]

The daily PE is summarized in the following table:

Daily PE Summary – Each IC Engine							
Pollutant	**Emission Factor (lb/MMBtu)**	**x**	**Rating (MMBtu/hr)**	**x**	**Op. Schedule (hrs/day)**	**=**	**PE (lb/day)**
NO_X	0.018	x	4.627	x	24	=	2.0
SO_X	0.00285	x	4.627	x	24	=	0.3
PM_{10}	0.003	x	4.627	x	24	=	0.3
CO	0.20	x	4.627	x	24	=	22.2
VOC	0.025	x	4.627	x	24	=	2.8
NH_3	0.014	x	4.627	x	24	=	1.6

The annual PE for each pollutant for each engine is calculated as follows:

PE (lb/year) = [EF (lb/MMBtu) x Rating (MMBtu/hr) x Operation schedule (hrs/year)]

The annual PE is summarized in the following table:

Annual PE Summary – Each IC Engine							
Pollutant	**Emission Factor (lb/MMBtu)**	**x**	**Rating (MMBtu/hr)**	**x**	**Op. Schedule (hrs/year)**	**=**	**PE (lb/year)**
NO_X	0.018	x	4.627	x	8,760	=	730
SO_X	0.00285	x	4.627	x	8,760	=	116
PM_{10}	0.003	x	4.627	x	8,760	=	122
CO	0.20	x	4.627	x	8,760	=	8,107
VOC	0.025	x	4.627	x	8,760	=	1,013
NH_3	0.014	x	4.627	x	8,760	=	567

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

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

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

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

Pursuant to District Rule 2201, the SSPE2 is the PE from all units with valid ATCs or PTOs at the Stationary Source and the quantity of ERCs which have been banked since

September 19, 1991 for AER that have occurred at the source, and which have not been used on-site.

SSPE2 (lb/year)						
Permit Unit	**NO_X**	**SO_X**	**PM_{10}**	**CO**	**VOC**	**NH3**
S-9908-1-0	2,249	9,080	337	3,490	250	0
S-9908-2-0	730	116	122	8,107	1,013	567
S-9908-3-0	730	116	122	8,107	1,013	567
S-9908-4-0	730	116	122	8,107	1,013	567
SSPE2	**4,439**	**9,428**	**703**	**27,811**	**3,289**	**1,701**

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), pursuant to the Clean Air Act, Title 3, Section 302, US Codes 7602(j) and (z)
- Fugitive emissions, except for the specific source categories specified in 40 CFR 70.2

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	4,439	9,428	703	703	27,811	3,289
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 tpy for any regulated NSR pollutant.

PSD Major Source Determination (tons/year)						
	NO_2	VOC	SO_2	CO	PM	PM_{10}
Estimated Facility PE before Project Increase	0	0	0	0	0	0
PSD Major Source Thresholds	250	250	250	250	250	250
PSD Major Source?	No	No	No	No	No	No

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

6. Baseline Emissions (BE)

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

Pursuant to District Rule 2201, BE = PE1 for:

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

otherwise,

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

Since these are new emissions units, BE = PE1 = 0 for all pollutants.

7. SB 288 Major Modification

40 CFR Part 51.165 defines a SB 288 Major Modification 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 and no further discussion is required.

8. Federal Major Modification / New Major Source

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.

As defined in 40 CFR 51.165, Section (a)(1)(v) and part D of Title I of the CAA, a Federal Major Modification is 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. The significant net emission increase threshold for each criteria pollutant is included in Rule 2201.

Since this facility is not a Major Source for any pollutants, this project does not constitute a Federal Major Modification and no further discussion is required.

New Major Source

As demonstrated above, this facility is not becoming a Major Source as a result of this project, therefore, this facility is not a New Major Source pursuant to 40 CFR 51.165 a(1)(iv)(A)(3).

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)

- NO_2 (as a primary pollutant)
- SO_2 (as a primary pollutant)
- CO
- PM
- PM_{10}
- Hydrogen sulfide (H_2S)
- Total reduced sulfur (including H_2S)

I. Project Emissions Increase - New Major Source Determination

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

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

PSD Major Source Determination: Potential to Emit (tons/year)						
	NO_2	VOC	SO_2	CO	PM	PM_{10}
Total PE from New and Modified Units	2.2	1.6	4.7	13.9	0.4	0.4
PSD Major Source threshold	250	250	250	250	250	250
New PSD Major Source?	No	No	No	No	No	No

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 G.

VIII. Compliance Determination

Rule 2020 Exemptions

<u>Boilers</u>
Pursuant to Section 6.1.1 of this Rule, a permit is not required for boilers that have a maximum heat input rating of 5.0 MMBtu/hr or less and is equipped to be fired exclusively with natural gas containing 5% by weight of hydrocarbons heavier than butane and no more than 1.0 gr-S/100 scf. Since the proposed boilers are fired solely on PUC-quality natural gas with a maximum heat input less than 5.0 MMBtu/hr, they are exempt from permitting and NSR requirements.

<u>Manure Dryers</u>
Additionally, pursuant to Section 6.19 of this Rule, a permit is not required for a low emitting unit which does not cause a significant health risk to the public. Section 3.10 of this Rule defines a low emitting unit as an emissions unit with an uncontrolled emissions rate of each air contaminant, less than or equal to two pounds per day, or if greater than two pounds per day, is less than or equal to 75 pounds per year. The PE for the dryer is calculated below:

Emission Factors:

Burner Emission Factors		
Operation	Emission Rate	Source
Natural gas combustion in the burner	0.10 lb-NO_x/MMBtu	AP-42, Table 1.4-1 & -2 (7/98)
	0.00285 lb-SO_x/MMBtu	APR-1720 (12/01)
	0.0076 lb-PM_{10}/MMBtu	AP-42, Table 1.4-1 & -2 (7/98)
	0.084 lb-CO/MMBtu	AP-42, Table 1.4-1 & -2 (7/98)
	0.0055 lb-VOC/MMBtu	AP-42, Table 1.4-1 & -2 (7/98)

Potential to Emit:

Daily PE2 from the dryer is calculated using the following equation and summarized in the table below.

$PE2_{Dryer}$ (lb/day) = EF (lb/MMBtu) x Maximum Heat Input (MMBtu/day)

Daily PE2 Natural Gas-Fired Dryer			
Pollutant	EF (lb/MMBtu)	Max Heat Input (MMBtu/day)	PE2 (lb/day)
NO_x	0.1	20	2.0
SO_x	0.00285	20	0.1
PM_{10}	0.0076	20	0.2
CO	0.084	20	1.7
VOC	0.0055	20	0.1

As shown above, emissions from the dryer does not exceed two pounds per day for any air contaminant with a daily limit of 20 MMBtu/day, and as shown in Appendix F, the operation does not cause a significant health impact to the public. Therefore, the dryer is exempt from permitting and NSR requirements.

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

Pursuant to District Rule 2201, Section 4.1, BACT requirements are triggered on a pollutant-by-pollutant basis and on an emissions unit-by-emissions unit basis. Unless specifically exempted by Rule 2201, BACT shall be required for the following actions*:

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

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

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

S-9908-1-0
The proposed operation is considered as two emissions units as discussed below.

Digester System and Backup Flare
Under normal operation all biogas is routed to the upgrading operation and there are no emissions from the digester system. If the upgrading operation is unable to accept produced biogas it vented to the backup flare. Emissions via the backup flare are of two categories: combustion products from the natural gas fuel, and emissions originating from the decomposition of manure within the digester.

The flare is an emissions control device used to mitigate risks from the gas from the digester system. Per Section 3.46.2 of District Rule 1020, an emissions control device is not a source operation; consequently, it does not meet the definition of an emission unit per Section 3.17 of District Rule 2201. Therefore, emissions from natural gas combustion in the flare are not subject to BACT.

The emissions originating from the decomposition of liquid manure have previously been accounted for in the host dairy's liquid manure handling permit (S-6548-3) which includes open lagoons. Though the digester permit of this project and the pre-existing liquid manure handling permit will be active simultaneously and each permitted to process the full volume produced by the dairy, the overall volume of liquid manure is unchanged. Thus, the magnitude of emissions from decomposition of liquid manure is not expected to vary from current levels.

The sulfur concentration of the liquid manure is dependent on the dietary requirements of the dairy cows. The PE of sulfur compounds associated with this project, in this project in the form of SOx, are expected to be of similar magnitude as the displaced PE of sulfur compounds from the lagoons. The displaced potential H2S of the lagoon and potential SOx of this project exist in a precursor-secondary air contaminant relationship. Despite the accelerated oxidation provided by the flare, displaced H2S emissions from the lagoons would have naturally oxidized to a similar amount of SOx in the environment. Precursor-secondary pollutants are allowed simultaneous consideration for new source review purposes (per Section 3.31 of District Rule 2201,). Similarly, precursor-secondary relationships exist for other emissions displaced from the existing lagoons and the NOx and PM10 of this project. Therefore, the NOx, SOx, and PM10 resulting from combustion of biogas in the backup flare are not considered new emissions and are not subject to BACT.

Though PE of VOC from the digester also displaces PE from the pre-existing liquid manure handling permits, the design of the digester may be optimized to maximize gaseous hydrocarbon production (primarily the exempt organic compound methane). Thus the PE of VOC from the digester (controlled with 98% efficiency by the flare) may reflect increased emissions and is subject to BACT. The controlled emissions exceed 2.0 lb-VOC/day, thus BACT is triggered.

Potential emissions of CO are greater than 2 lb/day. However, BACT is not triggered for CO since the SSPE2 for CO is not greater than 200,000 lb/year, as demonstrated in Section VII.C.5 above.

Digester Gas Upgrading Operation Served by an RTO

The applicant proposes to install a digester gas upgrading operation served by an RTO to control primarily H_2S and NH_3 emissions. The control device (RTO) has emissions greater than 2.0 lb/day; however, the source operation (digester gas upgrading operation) will not have any emissions greater than 2.0 lb/day; therefore, BACT is not triggered by this source operation.

S-9908-2-0, -3-0, -4-0 (Natural Gas-Fired IC Engines)

The applicant proposes to install three natural gas-fired IC engines powering electrical generators, each with a PE greater than 2 lb/day for CO and VOC. BACT is triggered for VOC since the PE for VOC is greater than 2 lb/day. However BACT is not triggered for CO since the SSPE2 for CO is not greater than 200,000 lb/year, as demonstrated in Section VII.C.5 above.

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

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

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

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

d. SB 288/Federal Major Modification

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

2. BACT Guideline

Digester System and Backup Flare

BACT Guideline 5.8.12 applies to dairy manure digesters with backup/emergency flares (see Appendix B).

Natural Gas-Fired IC Engines

The District does not currently have an approved BACT Guideline for this source category. Therefore, a project-specific BACT analysis is required for the proposed 770 bhp natural gas-fired IC engines. The project-specific BACT analysis for the proposed IC engines will be based on the District's review of information that was available when the application for this project was deemed complete.

3. Top-Down BACT Analysis

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

Digester System and Backup Flare

Pursuant to the attached BACT Determination (see Appendix C), BACT has been satisfied with the following:

VOC: Open flare (98% control efficiency)

Natural Gas-Fired IC Engines

Pursuant to the attached BACT Determination (see Appendix C), BACT has been satisfied with the following:

VOC: 20 ppmv, which is demonstrated in Appendix C to be equivalent to 0.1 lb/MW-hr

B. Offsets

1. Offset Applicability

Pursuant to District Rule 2201, Section 4.5, offset requirements shall be triggered on a pollutant by pollutant basis and shall be required if the SSPE2 equals or exceeds the offset threshold levels in Table 4-1 of Rule 2201.

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

Offset Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
SSPE2	4,439	9,428	703	27,811	3,289
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets Triggered?	No	No	No	No	No

2. Quantity of District Offsets Required

As discussed above, the SSPE2 is not greater than the offset thresholds for all pollutants; therefore, District offsets are not triggered. In addition, as demonstrated above, this project does not trigger Federal Major Modification or New Major Source requirements. In conclusion, offsets will not be required for this project and no further discussion is required.

C. Public Notification

1. Applicability

Pursuant to District Rule 2201, Section 5.4, public noticing is required for:

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

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

As shown in Section VII.C.5 above, the SSPE2 of this new facility is not greater than the Major Source threshold for any pollutant. Therefore, this new facility is not a New

Major Source and public noticing for this project for New Major Source, Federal Major Modification, or SB 288 Major Modification purposes is not required.

b. PE > 100 lb/day

Applications which include a new emissions unit with a PE greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. As seen in Section VII.C.2 above, this project includes a new digester system with a backup flare which has daily emissions greater than 100 lb/day for SOx, therefore public noticing for PE > 100 lb/day purposes is required.

c. Offset Threshold

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

Offset Thresholds				
Pollutant	**SSPE1 (lb/year)**	**SSPE2 (lb/year)**	**Offset Threshold**	**Public Notice Required?**
NO_X	0	4,439	20,000 lb/year	No
SO_X	0	9,428	54,750 lb/year	No
PM_{10}	0	703	29,200 lb/year	No
CO	0	27,811	200,000 lb/year	No
VOC	0	3,289	20,000 lb/year	No

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

d. SSIPE > 20,000 lb/year

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

SSIPE Public Notice Thresholds					
Pollutant	**SSPE2 (lb/year)**	**SSPE1 (lb/year)**	**SSIPE (lb/year)**	**SSIPE Public Notice Threshold**	**Public Notice Required?**
NO_x	4,439	0	4,439	20,000 lb/year	No
SO_x	9,428	0	9,428	20,000 lb/year	No
PM_{10}	703	0	703	20,000 lb/year	No
CO	27,811	0	27,811	20,000 lb/year	Yes
VOC	3,289	0	3,289	20,000 lb/year	No
NH3	1,701	0	1,701	20,000 lb/year	No

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

e. Title V Significant Permit Modification

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

2. Public Notice Action

As discussed above, public noticing is required for this project for SO_X emissions in excess of 100 lb/day and an increase in SO_X and CO emissions in excess 20,000 lb/year. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be electronically published on the District's website prior to the issuance of the ATC for this equipment.

D. Daily Emission Limits (DELs)

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

Proposed Rule 2201 (DEL) Conditions:

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

- The sulfur content of the digester gas combusted in the flare shall not exceed 1,200 ppmv as H2S. The permittee 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 and 4801]
- A flame shall be present at all times whenever combustible gases are vented through the flare. [District Rules 2201 and 4311]
- 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 Rules 2201 and 4311]
- 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 quantity of digester gas flared. [District Rule 2201]
- Unless the flare is equipped with a flow-sensing ignition system, the flare shall be equipped and operated with a heat sensing device such as a thermocouple, ultraviolet beam sensor, infrared sensor, or an equivalent device, capable of continuously detecting at least one pilot flame. [District Rules 2201 and 4311]
- The flare shall be operated only for testing and maintenance, backup, and emergency purposes. [District Rule 2201]
- Flares that use flow-sensing automatic ignition systems and which do not use a continuous flame pilot shall use purge gas for purging. [District Rules 2201 and 4311]
- Open flares (air-assisted, steam-assisted, or non-assisted) in which the flare gas pressure is less than 5 psig shall be operated in such a manner that meets the provisions of 40 CFR 60.18. [District Rules 2201 and 4311]
- Upon request, the operator of an open flare in which the flare gas pressure is less than 5 psig shall make available records that demonstrate compliance with the provisions of 40 CFR 60.18, (c)(3) through (c)(5). [District Rules 2201 and 4311]
- Emissions rates from the combustion of digester gas in the flare shall not exceed any of the following limits: 0.06 lb-NOx/MMBtu, 0.35 lb-SOx/MMBtu, 0.008 lb-PM10/MMBtu, 0.0793 lb-CO/MMBtu, or 0.006 lb-VOC/MMBtu. [District Rules 2201 and 4311]
- Flare shall not operate with visible emissions darker than 5% opacity or 1/4 Ringelmann for a period or periods aggregating more than three minutes in any one hour. [District Rule 2201]
- Only PUC quality natural gas shall be used in the RTO as supplemental fuel. [District Rules 2201 and 4801]
- The RTO shall be operated with a combustion chamber temperature of no less than 1600 degrees F and the retention time shall be no less than 0.5 seconds. [District Rule 2201]
- The RTO shall be heated to the proper operating temperature prior to introducing the contaminated air stream. [District Rule 2201]
- Emissions from the RTO shall not exceed any of the following limits: 0.04 lb-NOx/MMBtu, 0.00285 lb-SOx/MMBtu, 0.0075 lb-PM10/MMBtu, 0.0824 lb-CO/MMBtu, or 0.0054 lb-VOC/MMBtu. [District Rule 2201]

Since the flare can operate a maximum capacity for 24 hours/day, no daily limit is required; however, since the flare's annual operation is limited, the following condition will be included as a mechanism to ensure compliance:

- Flaring of digester gas shall not exceed 44.48 million standard cubic feet (MMscf) per year (equivalent to 25,800 MMBtu/year). [District Rule 2201]

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- 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]
- This engine shall be fired only on PUC quality natural gas fuel. [District Rules 2201, 4702, and 4801]
- The maximum fuel consumption of this engine shall not exceed 4.627 MMBtu/hr. [District Rule 2201]
- Emissions from this IC engine shall not exceed any of the following limits: 0.018 lb-NOx/MMBtu (equivalent to 5 ppmvd NOx @ 15% O2), NOx referenced as NO2; 0.003 lb-PM10/MMBtu; 0.20 lb-CO/MMBtu (equivalent to 90 ppmvd CO @ 15% O2); or 0.025 lb-VOC/MMBtu (equivalent to 20 ppmvd VOC @ 15% O2), VOC referenced as CH4. [District Rules 2201 and 4702]
- Ammonia (NH_3) emissions from this engine shall not exceed 10 ppmvd @ 15% O2. [District Rule 2201]

E. Compliance Assurance

1. Source Testing

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Pursuant to District Policy APR 1705, source testing is required for units equipped with afterburner, thermal incinerator, or catalytic incinerator for controlling VOCs. The RTO proposed in this project is not used to control VOCs, but is proposed to control H_2S and NH_3 emissions to minimize the health risk associated with those compounds; therefore, source testing of the RTO is not required. Additionally, source testing is not required for any other unit in this operation.

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

The engines are not served by any control devices for PM_{10} emissions. Therefore, it is not expected that the PM_{10} emissions will change much over time as long as the quality of the gas combusted in this unit remains consistent. Therefore, ongoing periodic source testing for PM_{10} emissions will not be required.

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

- Source testing to measure NO_X, CO, VOC, PM10 and ammonia (NH_3) emissions from this unit shall be conducted within 60 days of initial startup operation. [District Rules 1081, 2201, and 4702]
- Source testing to measure NO_X, CO, VOC, and ammonia (NH_3) emissions from this unit shall be conducted at least once every 24 months. [District Rules 1081, 2201, and 4702]
- 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 Rules 2201 and 4702]
- The results of each source test shall be submitted to the District within 60 days after completion of the source test. [District Rule 1081]
- {109} Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081]
- For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC emissions shall be reported as methane. NOx, CO, VOC, and NH3 concentrations shall be reported in ppmv, corrected to 15% oxygen. [District Rules 2201 and 4702]
- The following methods shall be used for source testing: NOx (ppmv) - EPA Method 7E or ARB Method 100; CO (ppmv) - EPA Method 10 or ARB Method 100; VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100; stack gas oxygen - EPA Method 3 or 3A or ARB Method 100; stack gas velocity - EPA Method 2 or EPA Method 19; stack gas moisture content - EPA Method 4; NH3 - BAAQMD ST-1B or SCAQMD Method 207-1. Alternative test methods as approved by the District may also be used to address the source testing requirements of this permit. [District Rules 1081 and 4702]
- The exhaust stack shall be equipped with permanent provisions to allow collection of stack gas samples consistent with EPA test methods and shall be equipped with safe permanent provisions to sample stack gases with a portable NOx, CO, and O2 analyzer during District inspections. The sampling ports shall be located in accordance with the CARB regulation titled California Air Resources Board Air Monitoring Quality Assurance Volume VI, Standard Operating Procedures for Stationary Emission Monitoring and Testing. [District Rule 1081]

2. Monitoring

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Because of the variable content of digester gas, monitoring of the fuel sulfur content will be required. The following conditions will be placed on the permit as a mechanism 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]

Additionally, the following condition will be placed on the permit as a mechanism to ensure compliance:

- The RTO temperature shall be monitored and recorded utilizing a continuous monitoring and recording device. The monitoring and recording device shall be maintained in proper operating condition at all times. [District Rule 2201]

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The proposed digester gas-fired IC engines are subject to District Rule 4702 – Internal Combustion Engines. Monitoring in compliance with Rule 4702 will satisfy monitoring for Rule 2201. Rule 4702 requires the following:

- Section 5.8.2 requires engines rated at less than 1,000 bhp to monitor operational characteristics recommended by the engine manufacturer or emission control system supplier, and approved by the APCO.
- Section 6.5.3 requires monthly monitoring for engines equipped with non-certified control devices.

Therefore, the following conditions will be included on each IC engine permit as a mechanism to enforce compliance with the monitoring requirements of Rule 2201 and 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 Rules 2201 and 4702]
- The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]
- The permittee shall monitor and record the stack concentration of NH3 at least once every calendar quarter in which a source test is not performed. NH3 monitoring shall be conducted utilizing District approved gas-detection tubes or a District approved equivalent method. Monitoring shall not be required if the unit is not in operation, i.e. the unit need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the unit unless monitoring has been performed within the last quarter. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rule 2201]
- If the NOx, CO, or NH_3 concentrations, as measured by the portable analyzer or the District approved ammonia monitoring equipment, exceed the allowable emission concentration, the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours after detection. If the portable analyzer readings continue to exceed the allowable emissions concentration after 8 hours, the permittee shall notify the District within the following 1 hour, and conduct a certified source test within 60 days of the first exceedance. In lieu of conducting a source test, the permittee may stipulate a violation has occurred, subject to enforcement action. The permittee must then correct the violation, show compliance has been re-established, and resume monitoring procedures. If the deviations are the result of a qualifying breakdown condition pursuant to Rule 1100, the permittee may fully comply with Rule 1100 in lieu of performing the notification and testing required by this condition. [District Rules 2201 and 4702]
- {modified 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 Rules 2201 and 4702]

3. Recordkeeping

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

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- Permittee shall maintain annual records of the quantity of digester gas combusted in the flare in standard cubic feet (scf). [District Rules 1070 and 2201]
- 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]
- The RTO temperature shall be monitored and recorded utilizing a continuous monitoring and recording device. The monitoring and recording device shall be maintained in proper operating condition at all times. [District Rule 2201]
- All records shall be maintained and retained for a minimum of five (5) years, and shall be made available for District inspection upon request. Records may be maintained and submitted in an electronic format approved by the District. [District Rules 1070, 2201, and 4311]

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- 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 NOx, CO, O2, and NH3 measurements, (2) the O2 concentration in percent and the measured NOx, CO, and NH3 concentrations corrected to 15% O2, (3) make and model of exhaust gas analyzer, (4) exhaust gas analyzer calibration records, (5) the method of determining the NH3 emission concentration, and (6) a description of any corrective action taken to maintain the emissions within the acceptable range. [District Rules 2201 and 4702]
- The permittee shall maintain an engine operating log to demonstrate compliance. The engine operating log shall include, on a monthly basis, the following information: the

total hours of operation, the type and quantity of fuel used, maintenance and modifications performed, monitoring data, compliance source test results, and any other information necessary to demonstrate compliance. Quantity of fuel used shall be recorded in standard cubic feet using a non-resettable, totalizing mass or volumetric fuel flow meter or other APCO approved-device. [District Rules 2201 and 4702]

- All records shall be maintained and retained for a minimum of five (5) years, and shall be made available for District inspection upon request. All records may be maintained and submitted in an electronic format approved by the District. [District Rules 1070, 2201, and 4702]

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis (AAQA)

Section 4.14 of District Rule 2201 requires that an AAQA be conducted for the purpose of determining whether a new or modified Stationary Source will cause or make worse a violation of an air quality standard. The District's Technical Services Division conducted the required analysis. Refer to Appendix F of this document for the AAQA summary sheet.

The proposed location is in an attainment area for NO_X, CO, and SO_X. As shown by the AAQA summary sheet the proposed equipment will not cause a violation of an air quality standard for NO_X, CO, or SO_X.

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

Rule 2410 Prevention of Significant Deterioration

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

Rule 2520 Federally Mandated Operating Permits

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

Rule 4001 New Source Performance Standards (NSPS)

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

No subparts of 40 CFR Part 60 apply to digester gas-fired flares or natural gas-fired RTOs. Therefore, no discussion is required for permit unit S-9908-1. The following subpart is applicable to stationary spark ignition IC engines.

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 770 bhp SI IC engines that are constructed after June 12, 2006 and manufactured after January 1, 2008; 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 permit. However, the applicant will be responsible for compliance with the applicable requirements of this regulation.

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

This rule incorporates NESHAPs from Part 61, Chapter I, Subchapter C, Title 40, CFR and the NESHAPs from Part 63, Chapter I, Subchapter C, Title 40, CFR; and applies to all sources of hazardous air pollution listed in 40 CFR Part 61 or 40 CFR Part 63.

No subparts of 40 CFR Part 61 or Part 63 apply to digester gas-fired flares or natural gas-fired RTOs. Therefore, no discussion is required for permit unit S-9908-1. The following subpart is applicable to stationary spark ignition IC engines listed under permit S-9908-2-0, -3-0, and -4-0.

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

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

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

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

Rule 4101 Visible Emissions

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

Since the flare will only combust digester gas, visible emissions are not expected to exceed Ringelmann 1 or 20% opacity.

Additionally, as the RTO and the IC engines will be fired solely on natural gas fuel, visible emissions are not expected to exceed Ringelmann 1 or 20% opacity. Also, based on past District inspections of natural gas-fired RTOs and IC engines, compliance is expected. The following condition will be listed on the permits as a mechanism to enforce compliance:

S-9908-1-0, -2-0, -3-0, -4-0:

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

Rule 4102 Nuisance

Rule 4102 prohibits discharge of air contaminants which could cause injury, detriment, nuisance or annoyance to the public. Public nuisance conditions are not expected as a result of these operations, provided the equipment is well maintained. Therefore, compliance with this rule is expected. The following conditions will be included on each permit in this project as a mechanism to enforce compliance.

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

California Health & Safety Code 41700 (Health Risk Assessment)

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

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification of an existing source shall not result in an increase in cancer risk greater than the District's significance level (20 in a million) and shall not result in acute and/or chronic risk indices greater than 1.

According to the Technical Services Memo for this project, 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 resulting prioritization score, acute hazard index, chronic hazard index, and cancer risk for this project is shown below.

Health Risk Assessment Summary	
	Worst Case Potential
Prioritization Score	>1
Cancer Risk	1.77 in a million
Acute Hazard Index	0.24
Chronic Hazard Index	0.05
T-BACT Required?	No*

* Although the total cancer risk is greater than 1 in a million, the cancer risk from each permit is less than 1 in a million; therefore, T-BACT is not required.

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.

In accordance with District policy APR 1905, no further analysis is required, and compliance with District Rule 4102 requirements is expected.

See Appendix F: Health Risk Assessment Summary

The following permit conditions are required to ensure compliance with the assumptions made for the risk management review:

<u>S-9908-1-0:</u>

- The exhaust stacks of the flare and RTO 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]

<u>S-9908-2-0, -3-0, and -4-0:</u>

- {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]

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.

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.

<u>S-9908-1-0:</u>
<u>Digester System and Backup/Emergency Flare</u>

For the following calculation, PM_{10} is conservatively assumed to be 50% of PM, per Section 4.11 of Rule 2201.

$$PM\ Concentration = \frac{0.008\ lb - PM}{MMBtu} \times \frac{MMBtu}{9{,}100\ dscf} \times \frac{7{,}000\ grain}{lb}$$

$$= \frac{0.006\ grain - PM}{dscf} < \frac{0.1\ grain - PM}{dscf}$$

Since 0.006 grain-PM/dscf is less than 0.1 grain-PM/dscf, the flare is expected to comply with this rule.

<u>Natural Gas-Fired RTO</u>

For the following calculation, PM_{10} is conservatively assumed to be 50% of PM, per Section 4.11 of Rule 2201.

$$PM\ Concentration = \frac{0.0075\ lb - PM}{MMBtu} \times \frac{MMBtu}{8{,}578\ dscf} \times \frac{7{,}000\ grain}{lb}$$

$$= \frac{0.006\ grain - PM}{dscf} < \frac{0.1\ grain - PM}{dscf}$$

Since 0.006 grain-PM/dscf is less than 0.1 grain-PM/dscf, compliance with this rule is expected.

S-9908-2-0, -3-0, -4-0 (Natural Gas-Fired IC Engines)

For the following calculation, PM_{10} is conservatively assumed to be 50% of PM, per Section 4.11 of Rule 2201.

$$PM\ Concentration = \frac{0.01\ g - PM}{bhp - hr} \times \frac{bhp - hr}{2{,}545\ Btu} \times \frac{1E6\ Btu}{9{,}100\ dscf} \times \frac{0.30\ Btu_{out}}{Btu_{in}} \times \frac{15.43\ grain}{g}$$

$$= \frac{0.002\ grain - PM}{dscf} < \frac{0.1\ grain - PM}{dscf}$$

Since 0.002 grain-PM/dscf is less than 0.1 grain-PM/dscf, compliance with this rule is expected.

The following condition will be included on each permit as a mechanism to enforce compliance:

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

Rule 4311 Flares

The purpose of this rule to limit the emissions of volatile organic compounds (VOC), oxides of nitrogen (NO_X), and sulfur oxides (SO_X) from the operation of flares.

The proposed backup flare listed under ATC S-9908-1 is subject to Rule 4311. The requirements of Rule 4311 that apply to the proposed backup flare are discussed below.

Section 5.0 - Requirements

Pursuant to Section 5.1, flares that are permitted to operate only during an emergency are not subject to the requirements of Sections 5.7, 5.8, 5.9 and 5.10. The proposed backup flare will be permitted to allow limited operation during times that are not emergencies. Therefore, this section does not apply to the proposed flare.

Pursuant to Section 5.2, flares that are operated 200 hours or less per calendar year as specified in the Permit to Operate, or with an annual throughput limit equivalent to 200 hours per year at flare rating (MMBtu/hr) as specified in the Permit to Operate, are exempt from the requirements of Sections 5.9 and 5.10 provided that one of the following two conditions are satisfied.

5.2.1 For the 200 hours per year validation, the operator shall use a calibrated non-resettable totalizing time meter or equivalent method approved in writing by the APCO; or

5.2.2 For the annual throughput limit equivalent to 200 hours per year validation, the operator shall use a calibrated fuel meter or equivalent method approved in writing by the APCO.

The proposed backup flare may operate more than 200 hours/year. Therefore, this exemption does not apply and the flare is subject to 5.9 and 5.10.

Section 5.3 requires that a flame always be present in the flare whenever combustible gases are present. The following condition will be included on the ATC as a mechanism to ensure compliance:

- A flame shall be present at all times in the flare whenever combustible gases are vented through the flare. [District Rules 2201 and 4311]

Section 5.4 requires that the flare be equipped with either an automatic ignition system or operated with a continuous pilot. Per the applicant, this unit is equipped with an automatic ignition system. The following condition will be included on the ATC as a mechanism to ensure compliance:

- 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 Rules 2201 and 4311]

Section 5.5 requires that, except for flares equipped with a flow-sensing ignition system, flares must be equipped with a device to monitor and confirm operation of the pilot flame. The following condition will be included on the ATC as a mechanism to ensure compliance:

- Unless the flare is equipped with a flow-sensing ignition system, the flare shall be equipped and operated with a heat sensing device such as a thermocouple, ultraviolet beam sensor, infrared sensor, or an equivalent device, capable of continuously detecting at least one pilot flame. [District Rules 2201 and 4311]

Section 5.6 requires that flares that use flow-sensing automatic ignition systems and which do not use a continuous flame pilot must use purge gas for purging. The following condition will be included on the ATC as a mechanism to ensure compliance:

- Flares that use flow-sensing automatic ignition systems and which do not use a continuous flame pilot shall use purge gas for purging. [District Rules 2201 and 4311]

Section 5.7 requires open flares (air-assisted, steam-assisted, or non-assisted) in which the flare gas pressure is less than 5 psig to be operated in such a manner that meets the provisions of 40 CFR 60.18. The following condition will be included on the ATC as a mechanism to ensure compliance:

- Open flares (air-assisted, steam-assisted, or non-assisted) in which the flare gas pressure is less than 5 psig shall be operated in such a manner that meets the provisions of 40 CFR 60.18. [District Rules 2201 and 4311]

Section 5.8 establishes emission limits for ground-level enclosed flares. The proposed flare is not a ground level enclosed flare. Therefore, the requirements of Section 5.7 are not applicable to the proposed flare.

Section 5.9 requires, except for flares that meet the emission limits specified in Table 3, operators of flares located at operations specified in Table 2 shall complete one of the following options:

5.9.1 Submit an ATC application to limit flaring annual throughput through an enforceable Permit to Operate limit, to levels not to exceed those specified in Table 2 for two consecutive calendar years, per the compliance schedule in Section 7.2; or

5.9.2 Replace or modify the existing flare to meet Table 3 emission limits per the compliance schedule in Section 7.3.

Rule 4311, Table 2 – Flare Annual Throughput Thresholds (MMBtu/calendar year)	
Flare Category	**MMBtu/yr**
A. Flares used at Oil and Gas Operations, and Chemical Operations	25,000
B. Flares used at Landfill Operations	90,000
C. Flares used at Digester Operations	100,000
D. Flares used at Organic Liquid Loading Operations	25,000

Rule 4311, Table 3 – VOC and NOx Emissions Requirements for Flares		
Flare Category	**VOC (lb/MMBtu)**	**NOx (lb/MMBtu)**
A. Flares at Oil and Gas Operations or Chemical Operations	0.008	0.018
B. Flares at Landfill Operations	0.038	0.025
C. Flares at Digester Operations (Located at a Major Source)	0.038	0.025
D. Flares at Digester Operations (Not located at a Major Source)	N/A	0.060
E. Flares at Organic Liquid Loading Operations	**Pounds/1,000 gallons loaded**	
	N/A	0.034

The proposed flare meets the requirements of Table 3, thus compliance with Section 5.9 is expected. The following condition will be included on the ATC as a mechanism to ensure compliance:

- Emissions rates from the combustion of digester gas in the flare shall not exceed any of the following limits: 0.06 lb-NOx/MMBtu, 0.35 lb-SOx/MMBtu, 0.008 lb-PM10/MMBtu, 0.0793 lb-CO/MMBtu, or 0.006 lb-VOC/MMBtu. [District Rules 2201 and 4311]

Section 5.10 applies to operators of flares that opt to comply with section 5.9.1. The proposed equipment meets the requirements of Table 3, thus is not subject to 5.9.1, and therefore, 5.10.

Section 5.10 provides additional requirements for flares that exceed the annual throughput thresholds specified in Table 2 above, for two consecutive calendar years. The proposed flare does not have the capacity to exceed the annual throughput threshold in Table 2.

Section 5.11 prohibits flaring unless it is consistent with an approved flare minimization plan (FMP), pursuant to Section 6.5 or is caused by an emergency and is necessary to prevent an accident, hazard, or release of vent gas directly to the atmosphere. Section 6.5 specifies that a flare minimization plan is required for refinery flares and flares at a major source. The proposed flare is not a refinery flare and is not at a major source. Therefore, a flare minimization plan is not required and this section does not apply.

Section 5.12 establishes SO_2 emission reduction standards for petroleum refinery flares. The proposed flare is not a petroleum refinery flare. Therefore, this section does not apply.

Section 5.13 requires the operator of a flare subject to flare minimization requirements pursuant to Section 5.11 to monitor the vent gas flow to the flare with a flow measuring device and to maintain records pursuant to Section 6.1.7. Flares that the operator can verify, based on permit conditions, are not capable of producing reportable flare events pursuant to Section 6.2.2 shall not be required to monitor vent gas flow to the flare. As discussed above, the proposed flare is not subject to flare minimization requirements pursuant to Section 5.11. Therefore, this section does not apply.

Section 5.14 requires the operator of a flare subject to the annual throughput thresholds in Table 2 to monitor the vent gas flow rate to the flare with a flow measuring device. Flares that the operator can verify are not capable of exceeding the annual throughput thresholds are not required to monitor the vent gas flow to the flare. Since the flare is not capable of flaring enough gas to exceed the threshold in Table 2, this section does not apply.

Section 5.15 requires the operator of a petroleum refinery or a flare with a flaring capacity equal to or greater than 50 MMBtu/hr to monitor the flare pursuant to Sections 6.6, 6.7, 6.8, 6.9, and 6.10. The proposed flare is not a petroleum refinery flare. Therefore, this section does not apply.

Section 6.0 - Administrative Requirements

Section 6.1 requires the operator of a flare to maintain certain records for five years. The following condition will be placed on the permit as a mechanism to ensure compliance:

- All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rules 1070, 2201, 4311]

Section 6.1 also states that the operator of a flare subject to this rule shall maintain the following records:

6.1.1 Copy of the compliance determination conducted pursuant to Section 6.4.1
6.1.2 Copy of the source testing result conducted pursuant to Section 6.4.2
6.1.3 For flares used during an emergency, record of the duration of flare operation, amount of gas burned, and the nature of the emergency situation
6.1.4 Operators claiming an exemption pursuant to Section 4.3 shall record annual throughput, material usage, or other information necessary to demonstrate an exemption under that section
6.1.5 A copy of the approved flare minimization plan pursuant to Section 6.5
6.1.6 Where applicable, a copy of annual reports submitted to the APCO pursuant to Section 6.2
6.1.7 Where applicable, monitoring data collected pursuant to Sections 5.13, 5.14, 6.6, 6.7, 6.8, 6.9, and 6.10

The proposed flare is not subject to any of the sections or requirements listed above; therefore, these recordkeeping requirements are not applicable.

Section 6.2.1 requires the operator of a flare subject to flare minimization plans pursuant to Section 5.8 to notify the APCO of an unplanned flaring event within 24 hours after the start of the next business day or within 24 hours of their discovery, whichever occurs first. As discussed above, the proposed flare is not subject to flare minimization requirements pursuant to Section 5.8. Therefore, this section does not apply.

Section 6.2.2 states that effective on and after July 1, 2012, and annually thereafter, the operator of a flare subject to flare minimization plans pursuant to Section 5.11 shall submit an annual report to the APCO that summarizes all Reportable Flaring Events as defined Section 3.0 that occurred during the previous 12 month period. As discussed above, the proposed flare is not subject to flare minimization requirements pursuant to Section 5.11. Therefore, this section does not apply.

Section 6.2.3 states that effective on and after July 1, 2012, and annually thereafter, the operator of a flare subject to flare monitoring requirements pursuant to Sections 5.13, 5.14, 6.6, 6.7, 6.8, 6.9, and 6.10, as appropriate, shall submit an annual report to the APCO within 30 days following the end of each 12 month period. The proposed flare is not a petroleum refinery flare and is not located at a major source. Therefore, the flare is not subject to the requirements of Sections 5.13, 5.14, 6.6, 6.7, 6.8, 6.9, and 6.10 and the requirements of this section are not applicable.

Section 6.3 specifies test methods to demonstrate compliance with Rule 4311. The proposed flare is not a ground level enclosed flare and is not subject the testing or monitoring requirements of this section; therefore, this section does not apply.

Section 6.4.1 requires the operator of flares that are subject to Section 5.6 to make available to the APCO upon request the compliance determination records that demonstrate compliance with the provisions of 40 CFR 60.18, (c)(3) through (c)(5). The following condition will be included on the ATC to ensure compliance with the requirements of Section 6.4.1:

- Upon request, the operator of an open flare in which the flare gas pressure is less than 5 psig shall make available records that demonstrate compliance with the provisions of 40 CFR 60.18, (c)(3) through (c)(5). [District Rules 2201 and 4311]

Section 6.4.2 requires the operator of ground-level enclosed flares, or flares subject to the emission limits in Table 3 to conduct source testing at least once every 12 months to demonstrate compliance with Section 5.8. As discussed above, the proposed flare is not a ground level enclosed flare and is not subject to the emission limits in Table 3; therefore, this section does not apply.

Section 6.5 specifies requirements for operators of flares that are subject to the flare minimization plan (FMP) provisions of District Rule 4311. As discussed above, the proposed flare is not subject to flare minimization requirements pursuant to Section 5.8. Therefore, this section does not apply.

Sections 6.6, 6.7, 6.8, 6.9, and 6.10 require additional monitoring for petroleum refinery flares and any flare located at a major source. The proposed flare is not a petroleum refinery flare and is not located at a major source. Therefore, these sections do not apply.

Compliance with the requirements of this Rule 4311 is expected.

Rule 4701 Internal Combustion Engines – Phase I

<u>S-9908-2-0, -3-0, -4-0:</u>
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 engine is subject to both Rules 4701 and 4702, compliance with Rule 4702 is sufficient to demonstrate compliance with this rule.

Rule 4702 Internal Combustion Engines

<u>S-9908-2-0, -3-0, -4-0:</u>
The purpose of this rule is to limit the emissions of nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC), and sulfur oxides (SOx) from IC engines.

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

Section 5.2.2.1 requires that 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 NOx, CO, and VOC emission limits pursuant to Table 2;
5.2.2.1.2 SOx 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. The applicant has not proposed to comply with the fee paying option allowed by this section.

Section 5.2.2.3 allows that in lieu of complying with the NO_X, CO, and VOC limits of Table 2, an operator may elect to implement an alternative emission control plan (AECP) pursuant to Section 8.0. The applicant has proposed to comply with the Table 2 emissions limits and has not proposed an AECP.

The following table summarizes the emission limits from Table 2 of Rule 4702 that are applicable to the IC engines in this project:

Rule 4702, Table 2 Emission Limits/Standards for Spark-Ignited IC Engines rated >50 bhp Used in Non-Agricultural Operations			
Engine Type	NOx Emission Limit (ppmv @ 15% O_2, dry)	CO Emission Limit (ppmv @ 15% O_2, dry)	VOC Emission Limit (ppmv @ 15% O_2, dry)
2. e.Lean-Burn, Not Listed Above	11 ppmv	2,000 ppmv	750 ppmv

Since the proposed engines will be operated as part of a stationary source that is separate from the host dairy, they are non-agricultural engines. The engines are required to comply with the emission limits from Table 2, Row 2.e. The following condition will be included on each IC engine permit as a mechanism to enforce compliance with these limits:

- Emissions from this IC engine shall not exceed any of the following limits: 0.018 lb-NOx/MMBtu (equivalent to 5 ppmvd NOx @ 15% O2), NOx referenced as NO2; 0.003 lb-PM10/MMBtu; 0.20 lb-CO/MMBtu (equivalent to 90 ppmvd CO @ 15% O2); or 0.025 lb-VOC/MMBtu (equivalent to 20 ppmvd VOC @ 15% O2), VOC referenced as CH4. [District Rules 2201 and 4702]

Section 5.2.3 contains requirements for agricultural IC engines. As stated above, the proposed engines will be operated as part of a non-agricultural stationary source. Therefore, the requirements of Section 5.2.3 are not applicable.

Section 5.2.4 contains requirements for certified compression-ignited IC engines. The engines in this project are spark-ignited IC engines. Therefore, the requirements of Section 5.2.4 are not applicable.

Section 5.3 contains requirements for continuous emission monitoring systems (CEMS) emissions measurements. The applicant has proposed APCO-approved alternate emissions monitoring for the engines in this project; therefore, the engines will not be equipped with CEMS and Section 5.3 is not applicable.

Sections 5.4 and 5.5 contain requirements for engines that will use percent emission reductions to comply with the NO_X emission limits of Section 5.2. The proposed engines will not use percent emission reductions for compliance; therefore, Sections 5.4 and 5.5 are not applicable.

Section 5.6 specifies procedures for compliance with the fee paying option. The proposed engines will not utilize the fee paying option for compliance; therefore, Section 5.6 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.

Section 5.8 applies to Particulate Matter (PM) control requirements. The proposed engines are spark-ignited engines and will comply with Section 5.7; therefore, the engines will be in compliance with Section 5.8.1.

The proposed engines will be fired exclusively on PUC-quality natural gas. The following condition will be included on each IC engine permit as a mechanism to enforce compliance:

- This engine shall be fired only on PUC quality natural gas fuel. [District Rules 2201 and 4702]

Section 5.9 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 5.9.1 through 5.9.11.

Section 5.9.1 requires engines rated at less than 1,000 bhp to monitor operational characteristics recommended by the engine manufacturer or emission control system supplier, and approved by the APCO. Additionally, the engines are subject to section 6.5.3 which requires monthly monitoring for engines equipped with non-certified control devices. Compliance with this section is demonstrated with compliance with section 6.5.3 as established further in this document.

Section 5.9.3 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 applicant has proposed to utilize a pre-approved alternate emissions monitoring plan for each engine; therefore, the requirements of Section 5.9.3 are satisfied.

Section 5.9.4 contains requirements for the operation of a CEMS. The proposed engines will not be equipped with CEMS; therefore, the requirements of Section 5.8.4 are not applicable.

Section 5.9.5 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 previously stated, the proposed engine will use a pre-approved alternate emissions monitoring plan. Therefore, the requirements of Section 5.8.5 are satisfied.

Section 5.9.6 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. Each proposed engine will be equipped with a nonresettable elapsed operating time meter. The following condition will be included on each IC engine permit as a mechanism to enforce compliance:

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

Section 5.9.7 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.

Section 5.9.8 requires that for each engine, the permittee shall collect data through the I&M plan in a form approved by the APCO.

Section 5.9.9 requires for each non-agricultural spark-ignited IC engine, the permittee shall use a portable NOx analyzer to take NOx 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 NOx 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 NOx emissions readings shall be reported to the APCO in a manner approved by the APCO. NOx 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.

The following conditions will be included on each IC engine permit as a mechanism to enforce compliance:

- The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]
- {modified 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 Rules 2201 and 4702]

Section 5.9.10 specifies requirements for APCO approval of an alternative monitoring system. The applicant has proposed to utilize a pre-approved alternate monitoring system; therefore, Section 5.9.10 is not applicable.

Section 5.9.11 contains requirements for engines utilizing an Alternate Emission Control Plan (AECP). The proposed engines are not subject to an AECP; therefore, the requirements of Section 5.9.11 are not applicable.

Section 5.10 specifies monitoring requirements for all other engines that are not subject to the requirements of Section 5.8. The proposed engines are subject to the requirements of Section 5.8; therefore, the requirements of Section 5.9 are not applicable.

Section 5.11 specifies SOx Emissions Monitoring Requirements. An operator of a non-agricultural IC engine shall comply with the following requirements:

5.11.1 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, 5.11.2 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

5.11.3 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.

Since the engines are not complying with this Rule through Sections 5.7.2, 5.7.5 or 5.7.6, Section 5.10 is not applicable.

Section 5.11 contains requirements for engines that are not required to have a Permit to Operate pursuant to California Health and Safety Code Section 42301.16. The proposed engines are required to have a PTO; therefore, Section 5.11 are 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 (ECP) of all actions to be taken to satisfy the emission requirements of Section 5.2 and the compliance schedules of Section 7.0. With the submittal of the complete ATC application, the requirement for an approvable ECP are satisfied.

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 included on each IC engine permit as a mechanism to enforce compliance:

- The permittee shall maintain an engine operating log to demonstrate compliance. The engine operating log shall include, on a monthly basis, the following information: the total hours of operation, the type of fuel used, maintenance and modifications performed, monitoring data, compliance source test results, and any other information necessary to demonstrate compliance. [District Rules 2201 and 4702]
- The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every calendar quarter (in which a source test is not performed) using a portable

emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]

Section 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 condition will be included on each IC engine permit as a mechanism to enforce 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 Rule 2201 and 4702]

Section 6.2.3 contains requirements for operators that claim an exemption under Section 4.2 or Section 4.3. There are no applicable exemption criteria for the IC engines in this project; therefore, Section 6.2.3 is not applicable.

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 compliance testing requirements. 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 on each IC engine permit as a mechanism to enforce compliance:

- Source testing to measure NOx, CO, VOC, PM10, and ammonia (NH3) emissions from this unit shall be conducted within 60 days of initial startup operation. [District Rules 1081, 2201, and 4702]
- Source testing to measure NOx, CO, 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. 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 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 shall be reported as methane. VOC, NOx, and CO concentrations shall be reported in ppmv, corrected to 15 percent oxygen. The following conditions will be included on each IC engine permit as a mechanism to enforce compliance:

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

Section 6.3.4 requires that 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 requirements for engines that are limited by Permit-to-Operate condition to be fueled exclusively with PUC quality natural gas. Since the proposed engines will be required to be fired exclusively with PUC quality natural gas will not have such a limit.

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. This project includes 3 identical IC engines. The applicant has not proposed representative testing for the proposed engines. Therefore, Section 6.3.6 is not applicable.

Section 6.4 specifies source testing procedures for compliance testing. The following conditions will be included on each IC engine permit as a mechanism to enforce compliance:

- The following methods shall be used for source testing: NOx (ppmv) - EPA Method 7E or ARB Method 100; CO (ppmv) - EPA Method 10 or ARB Method 100; VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100; stack gas oxygen - EPA Method 3 or 3A or ARB Method 100; stack gas velocity - EPA Method 2 or EPA Method 19; stack gas moisture content - EPA Method 4; PM10 (filterable and condensable) - EPA Method 201 and 202, 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, 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. 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 proposed engines will be equipped with an SCR system for control of NO_X and oxidation catalyst for control of CO and VOC. Therefore, the requirements of Sections 6.5.2 through 6.5.9 are applicable to the engines.

Section 6.5.2 specifies 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 specifies 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.

Each proposed engine will be equipped with an SCR system for the control of NOx emissions and an oxidation catalyst for the control of CO and VOC emissions. The applicant has proposed the following alternate monitoring program to ensure compliance with Sections 6.5.2 and 6.5.3 of the Rule:

Alternate Monitoring: NOx Emissions

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

1. Measurement of NOx emissions concentrations with a portable analyzer at least once every calendar quarter.

2. To ensure that NOx emissions concentrations are not being exceeded between periodic NOx 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 NOx emissions. The appropriate ranges for each operating load will be established during performance testing and will be monitored at least once per month.

Alternate Monitoring: 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.

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 NOx, 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 NOx, CO, VOC, or oxygen concentrations.

The applicant has proposed that the alternate monitoring program will ensure compliance with Sections 6.5.3, 6.5.4, and 6.5.5. The following conditions will be included on each IC engine permit as a mechanism to enforce compliance:

- During initial performance testing, and during subsequent performance tests as needed, the SCR system reagent injection rate shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the NOx 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 NOx emission limit(s) shall be maintained and made available for inspection upon request. [District Rule 4702]

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

- If the inlet temperature to the catalyst control system and/or the back pressure of the exhaust upstream of the catalyst control system is outside of the established acceptable ranges established during the initial compliance test, the permittee shall return the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system back to the acceptable range as soon as possible, but no longer than 8 hours after detection. If the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system are not returned to within acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of CO and O2 at least once every month. Monthly monitoring of the stack concentration of CO and O2 shall continue until the operator can show that the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system are returned to operating within the acceptable ranges specified within this permit. [District Rule 4702]
- The permittee shall monitor and record the 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 Rules 2201 and 4702]
- The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]
- The permittee shall monitor and record the stack concentration of NH3 at least once every calendar quarter in which a source test is not performed. NH3 monitoring shall be conducted utilizing District approved gas-detection tubes or a District approved equivalent method. Monitoring shall not be required if the unit is not in operation, i.e. the unit need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the unit unless monitoring has been performed within the last quarter. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rule 2201]
- If the NOx, CO, or NH3 concentrations corrected to 15% O2, as measured by the portable analyzer or the District approved ammonia monitoring equipment, exceed the allowable emission concentration(s), the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours after detection. If the portable analyzer readings continue to exceed the allowable emissions concentration(s) after 8 hours, the permittee shall notify the District within the following 1 hour, and conduct a certified source test within 60 days of the first exceedance. In lieu of conducting a source test, the permittee may stipulate a violation has occurred, subject to enforcement action. The permittee must then correct the violation, show compliance has been re-established, and resume monitoring procedures. If the deviations are the result of a qualifying breakdown condition pursuant to Rule 1100, the permittee may fully comply with Rule 1100 in lieu of performing the notification and testing required by this condition. [District Rules 2201 and 4702]

- {modified 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 Rules 2201 and 4702]

Section 6.5.6 requires procedures and corrective maintenance performed for the purpose of maintaining an engine in proper operating condition. The applicant has proposed that each engine will be operated and maintained per the specifications of the manufacturer or emissions control system supplier. The following conditions will be included on each IC engine permit as a mechanism to enforce compliance:

- {4261} This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702]
- {3203} This engine shall be operated within the ranges that the source testing has shown result in pollution concentrations within the emissions limits as specified on this permit. [District Rule 4702]

Section 6.5.7 requires procedures and a schedule for using a portable NOx analyzer to take NOx 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 condition will be placed on the permit to ensure continued compliance:

- 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 Rules 2201 and 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 included on each IC engine permit as a mechanism to enforce compliance:

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

Section 6.5.9 specifies procedures for revising the I&M plan. The I&M plan shall be updated to reflect any change in operation. The I&M plan shall be updated prior to any planned change in operation. An engine operator that changes significant I&M plan elements must notify the District no later than seven days after the change and must submit an updated I&M plan to the APCO no later than 14 days after the change for approval. The date and time of the change to the I&M plan shall be recorded in the engine operating log. For new engines and modifications to existing engines, the I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit-to-Operate. 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 included on each IC engine permit as a mechanism to enforce compliance:

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

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

Section 8.0 specifies requirements for use of an Alternative Emission Control Plan (AECP). An AECP will not be used for the engines in this project; therefore, Section 8.0 is not applicable.

Section 9.0 specifies requirements for certification of exhaust control systems for compliance with District Rule 4702. No certification of an emissions control system is proposed with this project; therefore, Section 9.0 is not applicable.

As discussed above, the proposed engines are expected to comply with the applicable requirements of this rule upon initial startup and during subsequent continued operation.

Rule 4801 Sulfur Compounds

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

Volume of SO_X as (SO_2) = $(n \times R \times T) \div P$

Where:

N = moles SOx

T = standard temperature: 60 °F or 520 °R

R = universal gas constant: $\frac{10.73\, psi \cdot ft^3}{lb \cdot mol \cdot °R}$

S-9908-1-0:

Digester System and Backup/Emergency Flare

To demonstrate compliance with the sulfur compound emission limit of Rule 4801, the maximum sulfur compound emissions from the flare will be calculated using the maximum sulfur content allowed for the digester gas.

$$\frac{0.35\ lb{-}SO_x}{MMBtu} \times \frac{MMBtu}{9{,}100\ scf{-}exhaust} \times \frac{lb{-}mol}{64\ lb{-}SO_2} \times \frac{10.73\ psi{-}ft^3}{lb{-}mol\ x\ °R} \times \frac{520\ °R}{14.7\ psi}\ x\ 10^6\ ppm = 228\ ppmv$$

Since 228 ppmv is less than 2000 ppmv, the flare is expected to comply with Rule 4801.

Natural Gas-Fired RTO

To demonstrate compliance with the sulfur compound emission limit of Rule 4801, the maximum sulfur compound emissions from each engine will be calculated using the maximum sulfur content allowed for the natural gas, which is 0.00285 lb-SOx/MMBtu.

$$\frac{0.00285\ lb}{MMBtu}\ x\ \frac{1\ MMBtu}{8{,}578\ scf}\ x\ \frac{1\ lb{-}mol}{64\ lb{-}SO2}\ x\ \frac{10.73\ psi{-}ft^3}{lb{-}mol{-}°R}\ x\ \frac{520\ °R}{14.7\ psi}\ x\ 10^6\ ppm = 1.97\ ppmv$$

Since 1.97 ppmv is less than 2000 ppmv, the engines are expected to comply with Rule 4801.

S-9908-2-0, -3-0, -4-0 (Natural Gas-Fired IC Engines)

To demonstrate compliance with the sulfur compound emission limit of Rule 4801, the maximum sulfur compound emissions from each engine will be calculated using the maximum sulfur content allowed for the natural gas, which is 0.00285 lb-SOx/MMBtu.

$$\frac{0.00285\ lb}{MMBtu}\ x\ \frac{1\ MMBtu}{8{,}578\ scf}\ x\ \frac{1\ lb{-}mol}{64\ lb{-}SO2}\ x\ \frac{10.73\ psi{-}ft^3}{lb{-}mol{-}°R}\ x\ \frac{520\ °R}{14.7\ psi}\ x\ 10^6\ ppm = 1.97\ ppmv$$

Since 1.97 ppmv is less than 2000 ppmv, the engines are expected to comply with Rule 4801.

The following conditions will be included on each permit as shown as a mechanism to enforce compliance.

S-9908-1-0:

- The sulfur content of the digester gas combusted in the flare shall not exceed 1,200 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 and 4801]
- Only PUC quality natural gas shall be used in the RTO as supplemental fuel. [District Rules 2201 and 4801]

S-9908-2-0, -3-0, -4-0: Digester Gas-Fired IC Engines

- This engine shall be fired only on PUC quality natural gas fuel. [District Rules 2201, 4702, and 4801]

California Health & Safety Code 42301.6 (School Notice)

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

California Environmental Quality Act (CEQA)

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

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

Greenhouse Gas (GHG) Significance Determination

It is determined that no other agency has 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 an digester system at an existing dairy facility in which the captured digester gas will be sent to a biogas upgrading plant to produce renewable natural gas (RNG). The proposed project will involve diverting manure from existing open basin(s) and pond(s) at the dairy to a covered lagoon 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. The ultimate fate of the upgraded biogas will be combustion as fuel. Combustion of the dairy digester gas 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 digester portion of 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.

Additionally for the natural gas-fired engines, on December 17, 2009, the District's Governing Board adopted a policy, APR 2005, *Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency,* for addressing GHG emission impacts when the District is Lead Agency under CEQA and approved the District's guidance document for use by other agencies when addressing GHG impacts as lead agencies under CEQA. Under this policy, the District's determination of significance of project-specific GHG emissions is founded on the principal that projects with GHG emission reductions consistent with AB 32 emission reduction targets are considered to have a less than significant impact on global climate change. Consistent with District Policy 2005, projects complying with an approved GHG emission reduction plan or GHG mitigation program, which avoids or substantially reduces GHG emissions within the geographic area in which the project is located, would be determined to have a less than significant individual and cumulative impact for GHG emission.

The California Air Resources Board (ARB) adopted a Cap-and-Trade regulation as part one of the strategies identified for AB 32. This Cap-and-Trade regulation is a statewide plan, supported by a CEQA compliant environmental review document, aimed at reducing or mitigating GHG emissions from targeted industries. Facilities subject to the Cap-and-Trade regulation are subject to an industry-wide cap on overall GHG emissions. Any growth in emissions must be accounted for under that cap such that a corresponding and equivalent reduction in emissions must occur to allow any increase. Further, the cap decreases over time, resulting in an overall decrease in GHG emissions.

Under District policy APR 2025, *CEQA Determinations of Significance for Projects Subject to ARB's GHG Cap-and-Trade Regulation*, the District finds that the Cap-and-Trade is a regulation plan approved by ARB, consistent with AB32 emission reduction targets, and supported by a CEQA compliant environmental review document. As such, consistent with District Policy 2005, projects complying with Cap-and-Trade requirements are determined to have a less than significant individual and cumulative impact for GHG emissions.

The GHG emissions increases associated with the IC engines in this project result from the combustion of fossil fuel, other than jet fuel, delivered from suppliers subject to the Cap-and-Trade regulation. Therefore, as discussed above, consistent with District Policies APR 2005 and APR 2025, the District concludes that the GHG emissions increases associated with this project would have a less than significant individual and cumulative impact on global climate change.

District CEQA Findings

The District performed an Engineering Evaluation (this document) for the proposed project and determined that the project will not have a significant effect on the environment. The District finds that the project is exempt per the common sense exemption that CEQA applies only to projects which have the potential for causing a significant effect on the environment (CEQA Guidelines §15061(b)(3)).

Indemnification Agreement/Letter of Credit Determination

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

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

To ensure that issuance of this permit does not conflict with any conditions imposed by any local agency permit process, the following permit condition will be included on each permit.

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

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful NSR Public Noticing period, issue ATCs S-9908-1-0, -2-0, -3-0, and -4-0 subject to the permit conditions on the attached draft ATCs in Appendix A.

X. Billing Information

Annual Permit Fees			
Permit Number	**Fee Schedule**	**Fee Description**	**Annual Fee**
S-9908-1-0	3020-02-H	36.4 MMBtu/hr	$1,238
S-9908-2-0	3020-10-D	770 bhp IC engine	$577
S-9908-3-0	3020-10-D	770 bhp IC engine	$577
S-9908-4-0	3020-10-D	770 bhp IC engine	$577

Appendices

A: Draft ATCs
B: BACT Guideline
C: BACT Analysis
D: Engine Specifications Sheet
E: RTO Specifications Sheet
F: HRA and AAQA Summary
G: Quarterly Net Emissions Change

APPENDIX A
Draft ATCs

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-9908-1-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: BROWNIE LLC
MAILING ADDRESS: 1128 CLAPP LANE, BOX 315
MANOTICK, ONTARIO, CANADA, K4M-1A4

LOCATION: 11450 JUMPER AVENUE
WASCO, CA 93280

EQUIPMENT DESCRIPTION:
DIGESTER SYSTEM CONSISTING OF A COVERED DIGESTER LAGOON, HYDROLYZER(S), ONE 34.4 MMBTU/HR DIGESTER GAS-FIRED BACKUP FLARE, PERMIT EXEMPT BOILERS (NATURAL GAS-FIRED, 5 MMBTU/HR OR LESS), AND A DIGESTER GAS UPGRADING OPERATION CONSISTING OF FEED GAS BLOWERS, COMPRESSORS, COOLERS, CHILLERS, IRON SPONGE H2S REMOVAL, A MEMBRANE CO2 REMOVAL SYSTEM, PRODUCT GAS COMPRESSORS, AND A 2.0 MMBTU/HR TRITON 6.95 NATURAL GAS-FIRED REGENERATIVE THERMAL OXIDIZER (RTO)

CONDITIONS

1. {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]
2. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
3. {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]
4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. The exhaust stacks of the flare and RTO 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]
6. The VOC content of the digester gas produced by the digester system shall not exceed 10% by weight. [District Rule 2201]
7. The flare shall be operated only for testing and maintenance, backup, and emergency purposes. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

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

Samir Sheikh, Executive Director / APCO

DRAFT

Brian Clements, Director of Permit Services

8. Flaring of digester gas shall not exceed 44.483 MMscf in any year (equivalent to 25,800 MMBtu/year). [District Rule 2201]

9. 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 quantity of digester gas flared. [District Rule 2201]

10. Emissions rates from the combustion of digester gas in the flare shall not exceed any of the following limits: 0.06 lb-NOx/MMBtu, 0.35 lb-SOx/MMBtu, 0.008 lb-PM10/MMBtu, 0.0793 lb-CO/MMBtu, or 0.006 lb-VOC/MMBtu. [District Rules 2201 and 4311]

11. The sulfur content of the digester gas combusted in the flare shall not exceed 1,200 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 and 4801]

12. 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]

13. 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]

14. A flame shall be present at all times whenever combustible gases are vented through the flare. [District Rules 2201 and 4311]

15. 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 Rules 2201 and 4311]

16. Unless the flare is equipped with a flow-sensing ignition system, the flare shall be equipped and operated with a heat sensing device such as a thermocouple, ultraviolet beam sensor, infrared sensor, or an equivalent device, capable of continuously detecting at least one pilot flame. [District Rules 2201 and 4311]

17. Flares that use flow-sensing automatic ignition systems and which do not use a continuous flame pilot shall use purge gas for purging. [District Rules 2201 and 4311]

18. Open flares (air-assisted, steam-assisted, or non-assisted) in which the flare gas pressure is less than 5 psig shall be operated in such a manner that meets the provisions of 40 CFR 60.18. [District Rules 2201 and 4311]

19. Upon request, the operator of an open flare in which the flare gas pressure is less than 5 psig shall make available records that demonstrate compliance with the provisions of 40 CFR 60.18, (c)(3) through (c)(5). [District Rules 2201 and 4311]

20. Only PUC quality natural gas shall be used in the RTO as supplemental fuel. [District Rules 2201 and 4801]

21. The RTO shall be operated with a combustion chamber temperature of no less than 1600 degrees F and the retention time shall be no less than 0.5 seconds. [District Rule 2201]

22. The RTO shall be heated to the proper operating temperature prior to introducing the contaminated air stream. [District Rule 2201]

23. Emissions from the RTO shall not exceed any of the following limits: 0.04 lb-NOx/MMBtu, 0.00285 lb-SOx/MMBtu, 0.0075 lb-PM10/MMBtu, 0.0824 lb-CO/MMBtu, or 0.0054 lb-VOC/MMBtu. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

24. The RTO temperature shall be monitored and recorded utilizing a continuous monitoring and recording device. The monitoring and recording device shall be maintained in proper operating condition at all times. [District Rule 2201]

25. Permittee shall maintain annual records of the quantity of digester gas combusted in the flare in standard cubic feet (scf). [District Rules 1070 and 2201]

26. 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]

27. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

AUTHORITY TO CONSTRUCT

PERMIT NO: S-9908-2-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: BROWNIE LLC
MAILING ADDRESS: 1128 CLAPP LANE, BOX 315
MANOTICK, ONTARIO, CANADA, K4M-1A4

LOCATION: 11450 JUMPER AVENUE
WASCO, CA 93280

EQUIPMENT DESCRIPTION:
770 BHP 2G ENERGY MODEL AVUS 500PLUS NATURAL GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM AND AN OXIDATION CATALYST SYSTEM POWERING AN ELECTRICAL GENERATOR AND PROVIDING HEAT FOR THE DIGESTER SYSTEM PERMITTED UNDER S-9908-1

CONDITIONS

1. 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]
2. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
3. {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]
4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. {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]
6. This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702]
7. 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]
8. {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]

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.

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services

9. {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]

10. This engine shall be fired only on PUC quality natural gas fuel. [District Rules 2201, 4702, and 4801]

11. The maximum fuel consumption of this engine shall not exceed 4.627 MMBtu/hr. [District Rule 2201]

12. Emissions from this IC engine shall not exceed any of the following limits: 0.018 lb-NOx/MMBtu (equivalent to 5 ppmvd NOx @ 15% O2), NOx referenced as NO2; 0.003 lb-PM10/MMBtu; 0.20 lb-CO/MMBtu (equivalent to 90 ppmvd CO @ 15% O2); or 0.025 lb-VOC/MMBtu (equivalent to 20 ppmvd VOC @ 15% O2), VOC referenced as CH4. [District Rules 2201 and 4702]

13. Ammonia (NH3) emissions from this engine shall not exceed 10 ppmvd @ 15% O2. [District Rule 2201]

14. Source testing to measure NOx, CO, VOC, PM10, and ammonia (NH3) emissions from this unit shall be conducted within 60 days of initial startup operation. [District Rules 1081, 2201, and 4702]

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

16. 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 Rules 2201 and 4702]

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

18. {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]

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

20. The following methods shall be used for source testing: NOx (ppmv) - EPA Method 7E or ARB Method 100; CO (ppmv) - EPA Method 10 or ARB Method 100; VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100; stack gas oxygen - EPA Method 3 or 3A or ARB Method 100; stack gas velocity - EPA Method 2 or EPA Method 19; stack gas moisture content - EPA Method 4; 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]

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

22. The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]

CONDITIONS CONTINUE ON NEXT PAGE

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

24. If the NOx, 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]

25. 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 Rules 2201 and 4702]

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

27. During initial performance testing, and during subsequent performance tests as needed, the SCR system reagent injection rate shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the NOx 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 NOx emission limit(s) shall be maintained and made available for inspection upon request. [District Rule 4702]

28. The SCR system reagent injection rate may be reestablished during a performance test by monitoring the SCR system reagent injection rate concurrently with each testing run to reestablish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges may be reestablished for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable SCR system reagent injection rate(s) demonstrated during the performance test that result in compliance with the NOx emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]

29. If the SCR system reagent injection rate is outside of the established acceptable range, the permittee shall return the SCR system reagent injection rate to within the established acceptable range as soon as possible, but no longer than 8 hours after detection. If the SCR system reagent injection rate is not returned to within acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of NOx and O2 at least once every month. Monthly monitoring of the stack concentration of NOx and O2 shall continue until the operator can show that the SCR system reagent injection rate is returned to operating within the acceptable range demonstrated to result in compliance with the NOx emission limits of this permit. [District Rule 4702]

CONDITIONS CONTINUE ON NEXT PAGE

30. During initial performance testing, and during subsequent performance tests as needed, the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system shall be monitored concurrently with each testing run to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limits stated in this permit. Acceptable values and ranges shall be established for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable inlet temperature and back pressure demonstrated during the initial compliance test that result in compliance with the CO and VOC emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]

31. The inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system may be reestablished during a performance test by monitoring concurrently with each testing run to reestablish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges may be reestablished for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system demonstrated during the performance test that result in compliance with the CO and VOC emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]

32. If the inlet temperature to the catalyst control system and/or the back pressure of the exhaust upstream of the catalyst control system is outside of the established acceptable ranges established during the initial compliance test, the permittee shall return the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system back to the acceptable range as soon as possible, but no longer than 8 hours after detection. If the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system are not returned to within acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of CO and O2 at least once every month. Monthly monitoring of the stack concentration of CO and O2 shall continue until the operator can show that the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system are returned to operating within the acceptable ranges specified within this permit. [District Rule 4702]

33. 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 Rules 2201 and 4702]

34. {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]

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

36. 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]

37. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-9908-3-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: BROWNIE LLC
MAILING ADDRESS: 1128 CLAPP LANE, BOX 315
MANOTICK, ONTARIO, CANADA, K4M-1A4

LOCATION: 11450 JUMPER AVENUE
WASCO, CA 93280

EQUIPMENT DESCRIPTION:
770 BHP 2G ENERGY MODEL AVUS 500PLUS NATURAL GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM AND AN OXIDATION CATALYST SYSTEM POWERING AN ELECTRICAL GENERATOR AND PROVIDING HEAT FOR THE DIGESTER SYSTEM PERMITTED UNDER S-9908-1

CONDITIONS

1. 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]
2. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
3. {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]
4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. {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]
6. This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702]
7. 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]
8. {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]

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.

Samir Sheikh, Executive Director / APCO

DRAFT

Brian Clements, Director of Permit Services

S-9908-3-0 : Mar 31 2023 10:10AM -- GARCIAJ : Joint Inspection NOT Required

9. {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]

10. This engine shall be fired only on PUC quality natural gas fuel. [District Rules 2201, 4702, and 4801]

11. The maximum fuel consumption of this engine shall not exceed 4.627 MMBtu/hr. [District Rule 2201]

12. Emissions from this IC engine shall not exceed any of the following limits: 0.018 lb-NOx/MMBtu (equivalent to 5 ppmvd NOx @ 15% O2), NOx referenced as NO2; 0.003 lb-PM10/MMBtu; 0.20 lb-CO/MMBtu (equivalent to 90 ppmvd CO @ 15% O2); or 0.025 lb-VOC/MMBtu (equivalent to 20 ppmvd VOC @ 15% O2), VOC referenced as CH4. [District Rules 2201 and 4702]

13. Ammonia (NH3) emissions from this engine shall not exceed 10 ppmvd @ 15% O2. [District Rule 2201]

14. Source testing to measure NOx, CO, VOC, PM10, and ammonia (NH3) emissions from this unit shall be conducted within 60 days of initial startup operation. [District Rules 1081, 2201, and 4702]

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

16. 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 Rules 2201 and 4702]

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

18. {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]

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

20. The following methods shall be used for source testing: NOx (ppmv) - EPA Method 7E or ARB Method 100; CO (ppmv) - EPA Method 10 or ARB Method 100; VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100; stack gas oxygen - EPA Method 3 or 3A or ARB Method 100; stack gas velocity - EPA Method 2 or EPA Method 19; stack gas moisture content - EPA Method 4; 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]

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

22. The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]

CONDITIONS CONTINUE ON NEXT PAGE

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

24. If the NOx, 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]

25. 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 Rules 2201 and 4702]

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

27. During initial performance testing, and during subsequent performance tests as needed, the SCR system reagent injection rate shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the NOx 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 NOx emission limit(s) shall be maintained and made available for inspection upon request. [District Rule 4702]

28. The SCR system reagent injection rate may be reestablished during a performance test by monitoring the SCR system reagent injection rate concurrently with each testing run to reestablish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges may be reestablished for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable SCR system reagent injection rate(s) demonstrated during the performance test that result in compliance with the NOx emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]

29. If the SCR system reagent injection rate is outside of the established acceptable range, the permittee shall return the SCR system reagent injection rate to within the established acceptable range as soon as possible, but no longer than 8 hours after detection. If the SCR system reagent injection rate is not returned to within acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of NOx and O2 at least once every month. Monthly monitoring of the stack concentration of NOx and O2 shall continue until the operator can show that the SCR system reagent injection rate is returned to operating within the acceptable range demonstrated to result in compliance with the NOx emission limits of this permit. [District Rule 4702]

CONDITIONS CONTINUE ON NEXT PAGE

30. During initial performance testing, and during subsequent performance tests as needed, the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system shall be monitored concurrently with each testing run to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limits stated in this permit. Acceptable values and ranges shall be established for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable inlet temperature and back pressure demonstrated during the initial compliance test that result in compliance with the CO and VOC emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]

31. The inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system may be reestablished during a performance test by monitoring concurrently with each testing run to reestablish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges may be reestablished for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system demonstrated during the performance test that result in compliance with the CO and VOC emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]

32. If the inlet temperature to the catalyst control system and/or the back pressure of the exhaust upstream of the catalyst control system is outside of the established acceptable ranges established during the initial compliance test, the permittee shall return the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system back to the acceptable range as soon as possible, but no longer than 8 hours after detection. If the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system are not returned to within acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of CO and O2 at least once every month. Monthly monitoring of the stack concentration of CO and O2 shall continue until the operator can show that the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system are returned to operating within the acceptable ranges specified within this permit. [District Rule 4702]

33. 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 Rules 2201 and 4702]

34. {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]

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

36. 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]

37. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: S-9908-4-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: BROWNIE LLC
MAILING ADDRESS: 1128 CLAPP LANE, BOX 315
MANOTICK, ONTARIO, CANADA, K4M-1A4

LOCATION: 11450 JUMPER AVENUE
WASCO, CA 93280

EQUIPMENT DESCRIPTION:
770 BHP 2G ENERGY MODEL AVUS 500PLUS NATURAL GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM AND AN OXIDATION CATALYST SYSTEM POWERING AN ELECTRICAL GENERATOR AND PROVIDING HEAT FOR THE DIGESTER SYSTEM PERMITTED UNDER S-9908-1

CONDITIONS

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4. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
5. {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]
6. This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702]
7. 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]
8. {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]

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.

Samir Sheikh, Executive Director / APCO

Brian Clements, Director of Permit Services

9. {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]

10. This engine shall be fired only on PUC quality natural gas fuel. [District Rules 2201, 4702, and 4801]

11. The maximum fuel consumption of this engine shall not exceed 4.627 MMBtu/hr. [District Rule 2201]

12. Emissions from this IC engine shall not exceed any of the following limits: 0.018 lb-NOx/MMBtu (equivalent to 5 ppmvd NOx @ 15% O2), NOx referenced as NO2; 0.003 lb-PM10/MMBtu; 0.20 lb-CO/MMBtu (equivalent to 90 ppmvd CO @ 15% O2); or 0.025 lb-VOC/MMBtu (equivalent to 20 ppmvd VOC @ 15% O2), VOC referenced as CH4. [District Rules 2201 and 4702]

13. Ammonia (NH3) emissions from this engine shall not exceed 10 ppmvd @ 15% O2. [District Rule 2201]

14. Source testing to measure NOx, CO, VOC, PM10, and ammonia (NH3) emissions from this unit shall be conducted within 60 days of initial startup operation. [District Rules 1081, 2201, and 4702]

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

16. 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 Rules 2201 and 4702]

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

18. {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]

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

20. The following methods shall be used for source testing: NOx (ppmv) - EPA Method 7E or ARB Method 100; CO (ppmv) - EPA Method 10 or ARB Method 100; VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100; stack gas oxygen - EPA Method 3 or 3A or ARB Method 100; stack gas velocity - EPA Method 2 or EPA Method 19; stack gas moisture content - EPA Method 4; 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]

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

22. The permittee shall monitor and record the stack concentration of NOx, CO, and O2 at least once every calendar quarter (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall be performed not less than once every month for 12 months if two consecutive deviations are observed during quarterly monitoring. Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month if on a monthly monitoring schedule, or within the last quarter if on a quarterly monitoring schedule. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201 and 4702]

CONDITIONS CONTINUE ON NEXT PAGE

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

24. If the NOx, 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]

25. 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 Rules 2201 and 4702]

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

27. During initial performance testing, and during subsequent performance tests as needed, the SCR system reagent injection rate shall be monitored to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the NOx 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 NOx emission limit(s) shall be maintained and made available for inspection upon request. [District Rule 4702]

28. The SCR system reagent injection rate may be reestablished during a performance test by monitoring the SCR system reagent injection rate concurrently with each testing run to reestablish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges may be reestablished for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable SCR system reagent injection rate(s) demonstrated during the performance test that result in compliance with the NOx emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]

29. If the SCR system reagent injection rate is outside of the established acceptable range, the permittee shall return the SCR system reagent injection rate to within the established acceptable range as soon as possible, but no longer than 8 hours after detection. If the SCR system reagent injection rate is not returned to within acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of NOx and O2 at least once every month. Monthly monitoring of the stack concentration of NOx and O2 shall continue until the operator can show that the SCR system reagent injection rate is returned to operating within the acceptable range demonstrated to result in compliance with the NOx emission limits of this permit. [District Rule 4702]

CONDITIONS CONTINUE ON NEXT PAGE

30. During initial performance testing, and during subsequent performance tests as needed, the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system shall be monitored concurrently with each testing run to establish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limits stated in this permit. Acceptable values and ranges shall be established for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable inlet temperature and back pressure demonstrated during the initial compliance test that result in compliance with the CO and VOC emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]

31. The inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system may be reestablished during a performance test by monitoring concurrently with each testing run to reestablish acceptable values and ranges that provide a reasonable assurance of ongoing compliance with the emissions limitations stated in this permit. Acceptable values and ranges may be reestablished for each load that the engine is expected to operate at, in a minimum of 10% increments (e.g. 70%, 80%, and 90%). The acceptable inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system demonstrated during the performance test that result in compliance with the CO and VOC emission limits shall be imposed as a condition in the Permit to Operate. [District Rule 4702]

32. If the inlet temperature to the catalyst control system and/or the back pressure of the exhaust upstream of the catalyst control system is outside of the established acceptable ranges established during the initial compliance test, the permittee shall return the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system back to the acceptable range as soon as possible, but no longer than 8 hours after detection. If the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system are not returned to within acceptable range within 8 hours, the permittee shall notify the District within the following 1 hour and begin monitoring and recording the stack concentration of CO and O2 at least once every month. Monthly monitoring of the stack concentration of CO and O2 shall continue until the operator can show that the inlet temperature to the catalyst control system and the back pressure of the exhaust upstream of the catalyst control system are returned to operating within the acceptable ranges specified within this permit. [District Rule 4702]

33. 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 Rules 2201 and 4702]

34. {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]

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

36. 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]

37. {3658} This permit does not authorize the violation of any conditions established for this facility in the Conditional Use Permit (CUP), Special Use Permit (SUP), Site Approval, Site Plan Review (SPR), or other approval documents issued by a local, state, or federal agency. [Public Resources Code 21000-21177: California Environmental Quality Act]

APPENDIX B
BACT Guideline

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.8.12*

Last Update: 8/2/2018

Dairy Manure Digester with Backup/Emergency Flare

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Open flare (98% control efficiency)	Ultra-low emissions (ULE) enclosed flare (99% control efficiency)	

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**

APPENDIX C
BACT Analysis

BACT Analysis for Dairy Manure Digester with Backup/Emergency Flare

Top-Down BACT Analysis for VOC Emissions

Step 1 - Identify all control technologies

The following options were identified to reduce VOC emissions:
1) Open flare (Achieved in Practice)
2) Enclosed flare (Technologically Feasible)
3) Ultra-low emissions (ULE) enclosed flare (Technologically Feasible)

Step 2 - Eliminate technologically infeasible options

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

Step 3 - Rank remaining options by control effectiveness

1) Ultra-low emissions (ULE) enclosed flare (99% control efficiency) (Technologically Feasible)
2) Open flare(Achieved in Practice) or enclosed flare[7] (Technologically Feasible) (98% control efficiency)

Step 4 - Cost Effectiveness Analysis

Option 1: Ultra-low emissions (ULE) enclosed flare (99% control efficiency) (Technologically Feasible)

Emission Reductions:

Uncontrolled VOC emission rate = (0.006 lb/MMBtu)/(1 – 0.98) = 0.3 lb/MMBtu

ULE enclosed flare VOC emission rate = (0.3 lb/MMBtu) x (1 – 0.99) = 0.003 lb/MMBtu

VOC reduction = [(0.006 – 0.003) lb/MMBtu] x 34.4 MMBtu/hr x 750 hrs/yr x (1 ton/2,000 lb) = 0.04 tons-VOC/year

Capital Cost

Several flare manufacturers were contacted for cost estimates in Project C-1162454, which was finalized in November 2018, which was for a similar operation, but with a smaller flare (12.25 MMBtu/hr vs 34.4 MMBtu/hr). Cost information was also obtained for the development of Rule 4311 for a 16.5 MMBtu/hr flare. A summary of the cost estimates

[7] As stated in the original bact determination, the available data demonstrate that enclosed flares have the same VOC control efficiency as open flares (98%).

received are summarized below:

Cost Summary		
Flare Size	**Installed Cost**	**Source**
12 MMBtu/hr	$240,000	Project C-11692454: Aereon Representative
13 MMBtu/hr	$355,000	Project C-11692454: John Zink Representative
16.5 MMBtu/hr	$361,858	District Rule 4311 Staff Report

Since these costs are for flares less than half the size of the proposed flare, these cost estimates are conservative estimates for this project. Therefore, the lowest cost listed above, $240,000 will be used for this analysis, excluding any adjustment for inflation.

Annualized Capital Cost

Pursuant to District Policy APR 1305, Section X (dated June 1, 2021), which was in effect at the time that the application for this project was deemed complete, the capital cost for the purchase of the ULE flare will be spread over the expected life of the flare using the capital recovery equation. The expected life of the flare will be estimated at 10 years. A 4% 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.

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

Where: A = Annual Cost
P = Present Value
i = Interest Rate (4%)
N = Equipment Life (10 years)
A = $[\$240,000 \times 0.04(1.04)^{10}]/[(1.04)^{10}-1]$
= $29,591/year

No operation costs are included at this time. If the technology is determined to not be cost effective based on the capital costs alone, then consideration of the operation costs will not be necessary, since such additional costs would only remove the technology even further from the cost effectiveness threshold.

Cost Effectiveness VOC Reductions based on District Standard Emission Reductions

Cost Effectiveness VOC reductions from replacing the proposed flare with a ULE flare is calculated below.

$29,591/year ÷ 0.04 ton-VOC/year
= $739,775/year

As shown above, the annualized capital cost of this alternate option exceeds the District's VOC cost-effectiveness threshold of $22,600/ton. Therefore, this VOC control option is not cost effective and is being removed from consideration for this project. 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.

Step 5 - Select BACT

Pursuant to the above BACT Analysis, BACT for VOC emissions from the proposed flare is an open flare with a 98% control efficiency. The applicant has proposed an open flare with a 98% control efficiency. Therefore, the BACT requirements for VOC are satisfied.

BACT Analysis for Natural Gas-Fired IC Engines

Top Down BACT Analysis for VOC Emissions

Previous District BACT Guideline 3.3.12 – Non-Agricultural Fossil Fuel-Fired IC Engines > 50 bhp, which was rescinded on March 7, 2019, listed the BACT requirements for full-time fossil fuel-fired IC engines. Because there is no existing District BACT Guideline that applies to the proposed natural gas-fired IC engine, a project-specific BACT analysis will be performed in accordance the District BACT policy to determine the BACT requirements for the proposed engine when it is fueled with natural gas.

Step 1 - Identify All Possible Control Technologies

The District's rescinded BACT guideline 3.3.12 listed the existing BACT requirements for VOC from full-time fossil-fuel fired IC engines.

Previous SJVAPCD BACT Guideline 3.3.12 for Fossil Fuel-Fired IC Engines VOC Emission Requirements		
Achieved in Practice	Technologically Feasible	Alternate Basic Equipment
1. For all Compression Ignited engines: Use of an engine meeting the latest Tier standard 2. For all Spark Ignited engines: 25 ppmvd @ 15% O2 or 0.15 g/bhp-hr	1. For all Compression Ignited Engines: 50 percent reduction of latest Tier standard for VOC emissions using a catalytic oxidation system 2. For Rich Burn Spark Ignited engines: 12 ppmvd @ 15% O2 or 0.069 g/bhp-hr	Electric Motor (except for engines that will be used to generate electricity)

The USA Environmental Protection Agency (USEPA) RACT/BACT/LAER, California Air Pollution Control Officers Association (CAPCOA) BACT Clearinghouse, the California Air Resources Board (CARB) BACT Clearinghouse, the South Coast Air Quality Management District (SCAQMD), the Ventura County Air Pollution Control District (VCAPCD), the Bay Area Air Quality Management District (BAAQMD) BACT Guidelines were reviewed to determine potential control technologies for this class and category of operation. Additionally, the District reviewed the applicable IC engine Rules from BAAQMD and SCAQMD, and Sacrament Metropolitan AQMD. The following table summarizes the results of the review of these BACT Clearinghouses and District Rules:

BACT Guideline Source	**Equipment Rating**	**VOC Control Technology/Requirement**
District Rule 4702	> 50 bhp	750 ppmvd @ 15% O_2
SCAQMD BACT Guidelines Part B - IC Engine, Stationary, Non-Emergency, Electrical Generators (2-5-2021)	147 bhp and 385 bhp	0.1 lb-VOC/MW-hr (Tecogen Ultera Emissions Retrofit Kit control system, comprised of Three-Way Catalyst with Air/Fuel Ratio Controller and Oxidation Catalyst)
SCAQMD BACT Guidelines Part D IC Engine, Stationary, Non-Emergency, Electrical Generators (2-2-2018)	> 50 bhp	Compliance with SCAQMD Rule 1110.2 (2-2-2018)

BACT Guideline Source	Equipment Rating	VOC Control Technology/Requirement
SCAQMD Rule 1110.2	New non-emergency Electrical Generators > 2/1/2008	VOC Emission Standard: 0.10 lb-VOC/MW-hr *When determining compliance with the lb/MW-hr VOC requirement, engines with heat recovery may include one megawatt-hour (MW-hr) for each 3.4 million Btus of useful heat recovered (MW_{th}-hr) in addition to each MW-hr of net electricity produced (MW_{e-hr})
Sacramento Metropolitan AQMD BACT Determination 143 (Expired)	> 50 bhp	25 ppmvd @ 15% O_2
Sacramento Metropolitan AQMD Rule 412	> 50 bhp	750 ppmv @ 15% O_2
Bay Area AQMD BACT Workbook Spark Ignition – Natural Gas Fired (Lean Burn)	≥ 50 bhp	<u>Achieved in Practice</u> 0.15 g/bhp-hr (32 ppmv @ 15% O_2)
Bay Area AQMD BACT Workbook Spark Ignition, Natural Gas-Fired (Rich Burn)	≥ 50 bhp	<u>Achieved in Practice</u> 0.15 g/bhp-hr (25 ppmv @ 15% O_2) <u>Technologically Feasible</u> 0.069 g/bhp-hr (12 ppmv @ 15% O_2)
Bay Area AQMD BACT Workbook Internal Combustion Engine Stationary prime, Non-Agricultural (Compression Ignited)	> 50 bhp	Latest Tier Standard (Achieved in Practice) 50% reduction of current Tier Standard (Technologically Feasible)
Bay Area AQMD Regulation 9, Rule 8	> 50 bhp	None
Santa Barbara APCD (From CARB BACT Clearinghouse) ICE: 881 BHP Lean Burn IC Engine used for Cogeneration (2015)	N/A	0.115 g/bhp-hr
EPA New Source Performance Standards (NSPS) 40 CFR Part 60 Subpart IIII	N/A	Compliance with Latest Tier Emission limits (Tier 4) 3.5 g/bhp-hr (NOx + VOC) for Compression Ignited Engines rated between 50 BHP and 75 BHP 0.14 g-VOC/bhp-hr for Compression Ignited Engines rated at 75 BHP and greater
EPA New Source Performance Standards (NSPS) 40 CFR Part 60 Subpart JJJJ	N/A	0.7 g-VOC/bhp-hr or 60 ppmvd (as propane) @ 15% O_2
EPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) 40 CFR Part 63 Subpart ZZZZ	N/A	None

Additionally, the District performed a detailed industry survey and review of IC engines permitted within the District that are used for electric power generation. The following survey is divided into two subcategories:

- **Table 1:** IC engines with heat recovery
- **Table 2:** IC engines without heat recovery

For cogeneration units with a heat recovery system, the quantity of heat recovered was determined either from manufacturers data provided in the original permitting action, or from information that was provided by the facility for previous analyses.

As part of the industry survey, the District reviewed up to three of the more recent emissions source tests to gather the VOC emissions data for each engine. The following tables summarize the Districts review of VOC emissions from permitted engines used for power generation.

NOTE:

For each table below:

Green Highlight	IC Engine Achieves 0.02 lb-VOC/MW-hr or less
Red Highlight	IC Engine Does not Achieve 0.02 lb-VOC/MW-hr

Table 1: VOC data for Engines Used for Power Generation With a Heat Recovery System

Facility and Permit Unit	HP Rating	Generator Rating (kW)	Permitted VOC Limit (ppmv at 15% O_2)	Heat Recovered -Design Value (MMBtu/hr)	Lb-VOC/MW-hr (based on permitted VOC limit, with heat recovery)	VOC Source Test data (ppmv at 15% O_2)		Lb-VOC/MW-hr (based on highest VOC source test result, with heat recovery)
						Year	Result	
Atwater High N-1306-2-2	86	60	30	0.44	0.153	2013	**0.05**	0.0003
Ripon Unified N-686-3-0	122	60	30	0.366	0.179	2014	**1.73**	0.0104
						2016	0.61	
Dynatect Ro-Lab Inc. N-704-10-0	108	75	30	0.49	0.16	2014	0.4	0.0389
						2016	0.504	
						2018	**7.4**	
Dynatect Ro-Lab Inc N-704-11-0	108	75	30	0.49	0.16	2014	0.66	0.0440
						2016	1.07	
						2018	**8.36**	
Valley Chrome Plating C-1318-7-1	108	75	25	0.49	0.132	2013	**0.99**	0.0052
						2015	0.9	
						2017	0.9	
Yosemite Union High School C-1801-4-2	122	90	34	0.499	0.186	2012	**3.4**	0.0187
						2014	0.2	
						2016	0.5	
Yosemite Union High School C-1801-5-1	122	90	34	0.499	0.186	2013	**2.2**	0.0121
						2015	0.5	
						2017	0.5	
Pacific Choice Brands C-906-9-1	197	140	30	0.67	0.169	2011	**0.3**	0.0017
						2013	0.3	
						2016	0.03	

Table 5: VOC data for Engines Used for Power Generation With a Heat Recovery System (Continued)								
Facility and Permit Unit	HP Rating	Generator Rating (kW)	Permitted VOC Limit (ppmv at 15% O_2)	Heat Recovered -Design Value (MMBtu/hr)	Lb-VOC/MW-hr (based on permitted VOC limit, with heat recovery)	VOC Source Test data (ppmv at 15% O_2)		Lb-VOC/MW-hr (based on highest VOC source test result, with heat recovery)
						Year	Result	
Super Store Industries N-3232-5-1	379	280	25	0.31824	0.23	2014	0.88	0.0437
						2016	1.01	
						2018	**4.72**	
Super Store Industries N-3232-6-1	379	280	25	0.31824	0.23	2014	3.01	0.0374
						2016	**4.04**	
						2018	2.88	
Super Store Industries N-3232-7-1	379	280	25	0.31824	0.23	2014	0.31	0.0496
						2016	4.03	
						2018	**5.36**	
Super Store Industries N-3232-8-1	379	280	25	0.31824	0.23	2014	1.41	0.0182
						2016	**1.97**	
						2018	1.49	
County of Tulare S-1609-4-1	1049	759	30	2	0.117	2011	**5.13**	0.0200
						2012	0.21	
						2013	2.42	
Western Co-Gen C-4161-1-3	1529	1140	25	2.41	0.117	2010	**15.1**	0.0709
						2011	10.8	
						2012	6.1	
Western Co-Gen C-4161-2-3	1529	1140	25	2.41	0.117	2013	4.4	0.0254
						2014	**5.4**	
						2015	1.02	
Fresno County Maintenance C-1629-6-1	1737	1250	25	2.57	0.178	2013	**45***	0.3216*
						2014	2.7	
						2015	3.2	
Hilmar Cheese Turlock N-9141-3-1	3681	2652	25	8.542	0.142	2016	**2.8**	0.0159
						2018	1.9	
Hilmar Cheese Turlock N-9141-4-1	3681	2652	25	8.542	0.142	2016	2	0.0142
						2018	**2.5**	

*Unit C-1629-6-1 failed their 2013 source test.

Table 2: VOC data for Engines Used for Power Generation Without a Heat Recovery System							
Facility and Permit Unit	**HP Rating**	**Generator Rating (kW)**	**Permitted VOC Limit (ppmv at 15% O_2)**	**Lb-VOC/MW-hr (based on permitted limit)**	**VOC Source Test data (ppmv at 15% O_2)**		**Lb-VOC/MW-hr (based on highest source test result)**
					Year	**Result**	
California Power Holdings C-3775-1-9	4157	3100	30	0.355	2013	0.5	0.0106
					2015	**0.9**	
					2017	0.5	
California Power Holdings C-3775-2-9	4157	3100	30	0.355	2013	0.5	0.0237
					2015	**2**	
					2017	0.5	
California Power Holdings C-3775-3-9	4157	3100	30	0.355	2013	**0.7**	0.0083
					2015	0.7	
					2017	0.5	
California Power Holdings C-3775-4-9	4157	3100	30	0.355	2013	0.49	0.0059
					2015	0.3	
					2017	**0.5**	
California Power Holdings C-3775-5-9	4157	3100	30	0.355	2013	**0.5**	0.0059
					2015	0.4	
					2017	0.5	
California Power Holdings C-3775-6-9	4157	3100	30	0.355	2013	0.5	0.0106
					2015	**0.9**	
					2017	0.5	
California Power Holdings C-3775-7-9	4157	3100	30	0.355	2013	0.91	0.0414
					2015	**3.5**	
					2017	0.5	
California Power Holdings C-3775-8-9	4157	3100	30	0.355	2013	0.51	0.2377
					2015	**20.1**	
					2017	0.5	
California Power Holdings C-3775-9-9	4157	3100	30	0.355	2013	0.97	0.0438
					2015	**3.7**	
					2017	0.5	
California Power Holdings C-3775-10-9	4157	3100	30	0.355	2013	0.81	0.1963
					2015	**16.6**	
					2017	0.5	
California Power Holdings C-3775-11-9	4157	3100	30	0.355	2013	0.5	0.0449
					2015	**3.8**	
					2017	0.5	
California Power Holdings C-3775-12-9	4157	3100	30	0.355	2013	0.51	0.0154
					2015	**1.3**	
					2017	0.5	
California Power Holdings C-3775-13-9	4157	3100	30	0.355	2013	0.5	0.0083
					2015	**0.7**	
					2017	0.5	
California Power Holdings C-3775-14-9	4157	3100	30	0.355	2013	**0.81**	0.0096
					2015	0.3	
					2017	0.5	
California Power Holdings C-3775-15-9	4157	3100	30	0.355	2013	**0.59**	0.0070
					2015	0.3	
					2017	0.5	

Table 6: VOC data for Engines Used for Power Generation Without a Heat Recovery System (Continued)							
Facility and Permit Unit	**HP Rating**	**Generator Rating (kW)**	**Permitted VOC Limit (ppmv at 15% O_2)**	**Lb-VOC/MW-hr (based on permitted limit)**	**VOC Source Test data (ppmv at 15% O_2)**		**Lb-VOC/MW-hr (based on highest source test result)**
					Year	**Result**	
California Power Holdings C-3775-16-9	4157	3,100	30	0.355	2013	0.82	0.0106
					2015	**0.9**	
					2017	0.5	
Modesto Irrigation District N-3233-6-3	11667	8,440	20	0.219	2016	**2.1**	0.0230
					2017	1.8	
					2018	1.3	
Modesto Irrigation District N-3233-7-3	11667	8,440	20	0.219	2016	**2.4**	0.0263
					2017	2	
					2018	1.3	
Modesto Irrigation District N-3233-8-3	11667	8,440	20	0.219	2016	**2.1**	0.0230
					2017	1.9	
					2018	1.2	
Modesto Irrigation District N-3233-9-3	11667	8,440	20	0.219	2016	1	0.0306
					2017	**2.8**	
					2018	1.3	
Modesto Irrigation District N-3233-10-3	11667	8,440	20	0.219	2016	0.011	0.0646
					2017	2.4	
					2018	**5.9**	
Modesto Irrigation District N-3233-11-3	11667	8,440	20	0.219	2016	3	0.0339
					2017	**3.1**	
					2018	2.8	

Based on an extensive review of California Air District rules, BACT guidelines, and an industry survey of IC engines permitted in the District, the following VOC control options were identified:

VOC Control Option #1:

- For all Compression Ignited Engines: Use of an engine meeting the latest Tier standard;
- For all spark ignited engines: 25 ppmvd VOC @ 15% O2 or 0.15 g/bhp-hr

This option is based upon the District's existing BACT Guideline requirements and has been achieved by multiple units within the District.

VOC Control Option #2:

- For Compression Ignited Engines: 50 percent reduction of latest Tier standard for VOC emissions using a catalytic oxidation system;
- For rich burn spark ignited engines: 12 ppmvd @ 15% O2 or 0.069 g/bhp-hr

This option is based on the District's existing technologically feasible BACT Guideline requirements. No full-time compression ignited engines were identified in the District's survey of permitted units. The rich-burn engines within the District are meeting this level of VOC control.

VOC Control Option #3:

- 0.10 lbs-VOC/MW-hr

This option is based on SCAQMD Rule 1110.2 and the SCAQMD BACT requirements for IC engines installed after February 1, 2008 that are used for non-emergency electrical generation.

South Coast AQMD Rule 1110.2 allows operators of IC engines used to generate both heat and electric power to demonstrate compliance with the VOC emissions standard of 0.10 lb/MW-hr by taking credit for the recovered thermal energy at the of one MW-hr for each 3.4 million Btus of heat recovered.

Nearly all of the units operating within the District have source tested at levels that achieve the 0.10 lb-VOC/MW-hr limit of South Coast AQMD Rule 1110.2. Furthermore, South Coast AQMD provided the following list of engines powering electrical generators that are currently complying with Rule 1110.2 requirements.

Facility	Engine/Control Equipment	bhp	VOC Emission Limit
Palm Springs City (Facility ID 42218)	Lean-Burn GE Jenbachher Model #JMS416B86 Engine with SCR	1,573	0.17 lb/MW_e-hr*
Play Capital Company (Facility ID 176353)	Rich Burn GE/Tecogen Model 7400 Engine with a 3-way catalyst	108	0.444 lb/MW_e-hr*
Southern California Gas Company – Aliso Canyon (Facility ID 800128)	Engine #1: Rich-Burn Generac Model 6.8GNGD-100 Engine with a 3-way catalyst	147	0.20 lb/MW-hr
Southern California Gas Company – Aliso Canyon (Facility ID 800128)	Engine #2: Rich-Burn Generac Model 6.8GNGD-100 Engine with a 3-way catalyst	147	0.20 lb/MW-hr
Southern California Gas Company – Aliso Canyon (Facility ID 800128)	Engine #3: Rich-Burn Generac Model 6.8GNGD-130 Engine with a 3-way catalyst	189	0.20 lb/MW-hr
Southern California Gas Company – Aliso Canyon (Facility ID 800128)	Engine #4: Rich-Burn Generac Model 6.8GNGD-130 Engine with a 3-way catalyst	189	0.20 lb/MW-hr
Southern California Gas Company – Aliso Canyon (Facility ID 800128)	Engine #5: Rich-Burn Generac Model 13.3 GTA-250 Engine with a 3-way catalyst	385	0.20 lb/MW-hr
Coachillin' Holdings (Facility ID 187790)	Engine #1: Lean-Burn Mechanishe Werstatte Mannheim Model TCG-2016-V16 Engine with SCR and Oxidation Catalyst	1,107	0.43 lb/MW_e-hr*
Coachillin' Holdings (Facility ID 187790)	Engine #2: Lean-Burn Mechanishe Werstatte Mannheim Model TCG-2016-V16 Engine with SCR and Oxidation Catalyst	1,107	0.43 lb/MW_e-hr*

* This engine is complying with the overall SCAQMD Rule 1110.2 Rule limit of 0.10 lb-VOC/MW-hr by using a thermal credit as specified in the Rule. SCAQMD used the quantity of heat recovered for this cogeneration system to calculate a lb-VOC/MW_e-hr emission limit that is equivalent to the 0.10 lb-VOC/MW-hr Rule limit.

VOC Control Option #4:

- 0.02 lb-VOC/MW-hr (Fuel Cell)

This option is based upon the VOC emission level listed in CARB's Distributed Generation (DG) Certification Regulation. The requirements of CARB's DG Certification Regulation only apply to units that do not require permits from Air Districts.

CARB's DG Certification Regulation allows operators of IC engines used to generate both heat and electric power to demonstrate compliance with the CO emissions standard of 0.02 lb/MW-hr by taking credit for the recovered thermal energy at the of one MW-hr for each 3.4 million BTUs of heat recovered.

VOC Control Option #5:

- Electric Motor (except for engines that will be used to generate electricity)

This option is was listed as Alternate Basic Equipment basic equipment in the District's previous BACT Guideline 3.3.12, but is not applicable for engines used to generate electricity.

Step 2 - Eliminate Technologically Infeasible Options

VOC Control Option #1, Part 1 (For Compression-Ignited Engines):

The first part of Control Option #1 - Use of an engine meeting the latest Tier standard for all compression ignited engines is not applicable for the proposed engine because it is a spark-ignited engine; therefore, this option will be removed from consideration for this BACT analysis.

VOC Control Option #2 (For Compression-Ignited Engines and Spark-Ignited Rich-Burn IC Engines):

Control Option #2 – 50% reduction of latest Tier standard for VOC emissions using a catalytic oxidation system for compression ignited engines and a VOC limit of 12 ppmvd @ 15% O_2 or 0.069 g/bhp-hr for rich-burn spark ignited engines is not applicable for the proposed engine because it is a spark-ignited lean-burn IC engine; therefore, this option will also be removed from consideration for this BACT analysis.

VOC Control Option #5: Electric Motor (except for engines that will be used to generate electricity) (Alternate Basic Equipment)

Option #5, Electric Motor, is not feasible for the project since the proposed engine will be used to generate electric power; therefore, this option will be eliminated from consideration.

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

1) Fuel Cell (≤ 0.02 lb-VOC/MW-hr)

2) 0.010 lb-VOC/MW-hr* (approximately 10 ppmvd VOC @ 15% O_2 for units without heat recovery and 20 ppmv VOC @ 15% O_2 for units with heat recovery) (based on SCAQMD Rule 1110.2 - Achieved in Practice)

   *When determining compliance with the lb/MW-hr VOC requirement, engines with heat recovery may include up to one megawatt-hour (MW-hr) for each 3.4 million Btus of useful heat recovered (MW_{th}-hr) in addition to each MW-hr of net electricity produced ($MW_{e\text{-}hr}$)

3) 25 ppmvd VOC @ 15% O2 or 0.15 g/bhp-hr (for all spark-ignited engines)

Step 4 - Cost Effectiveness Analysis

Option 1: Fuel Cell (≤ 0.10 lb-CO/MW-hr) (Alternate Basic Equipment)

Pursuant to Disctrict Policy APR 1305, *Best Available Control Technology (BACT)*, the cost effectiveness of alternate basic equipment shall use the following formula:

CE_{alt} = ($COST_{alt}$ - $COST_{basic}$) / ($EMISSION_{basic}$ - $EMISSION_{alt}$) where:

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

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

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

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

$EMISSION_{alt}$ = the emissions from the alternate basic equipment

The following cost analysis demonstrates that replacement of the proposed engine with a fuel cell is not cost effective even when the additional operational costs of a fuel cell are not considered.

Assumptions

- 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: 3,412.14 Btu/kW-hr

- The initial capital costs and the operation costs for the natural gas-fueled IC engine and fuel cells will be based on information given in the US EPA Combined Heat and Power Partnership Catalog of CHP Technologies**Error! Bookmark not defined.** and the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report]**Error! Bookmark not defined.**

- Price for electricity: \$30/MW-hr (based on the current Net Surplus Compensation[8])

Assumptions for the Proposed Natural Gas-Fired IC Engines

- The IC engine will operate at up to full load for 24 hour/day and 8,760 hour/year (applicant's proposal)

- Higher Heating Value (hhv) efficiency for the IC engine: 30% (assumed based on District typical value)

- The maximum daily amount of natural gas used to fuel the engine will be: 156.8 MMBtu/day (*770* bhp_{out} *x 1* bhp_{in}*/0.30* bhp_{out} *x 2,545* Btu_{in}/bhp_{in}*-hr x 1 MMBtu/*10^6 *Btu x 24 hr/day*)

- The maximum annual amount of natural gas used by the engine will be: 57,221.8 MMBtu/year (*770* bhp_{out} *x 1* bhp_{in}*/0.30* bhp_{out} *x 2,545* Btu_{in}/bhp_{in}*-hr x 1 MMBtu/*10^6 *Btu x 8,760 hr/year*)

- Estimated purchase and installation cost for CHP IC engine producing approximately 550 kWe without add-on air pollution control equipment: \$2,879/kW (*Average of interpolated costs from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies (\$2,256/kW in 2013)[9] and the SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] (\$2,526/kW in 2015)[10] adjusted to 2022 based on US Consumer Price Index (CPI) Inflation Calculator[11]*)

- Estimated operation costs for CHP IC engine that can produce 550 kWe without add-on air pollution control costs: \$0.026/kW-hr (*average of interpolated values from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies(\$0.021/kW-hr in 2013)[12] and SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] (\$0.021/kW-hr in 2015)[10] adjusted to 2022 based on US CPI Inflation Calculator*)

- Rule 4702 VOC emission limit for non-agricultural, lean burn IC engines: 750 ppmv @ 15% O_2 as CH_4 = 1.012 lb/MMBtu

[8] See the California Public Utilities Commission (CPUC) webpage at https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/net-energy-metering.

[9] Table 2-4: https://www.epa.gov/sites/default/files/2015-07/documents/catalog_of_chp_technologies_section_2._technology_characterization_-_reciprocating_internal_combustion_engines.pdf.

[10] Table A-14: https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/2/7889-20151119finalfullreport-1-.pdf.

[11] https://www.bls.gov/data/inflation_calculator.htm

[12] Table 2-6

- 40 CFR 60 Subpart JJJJ VOC emission limit for natural gas-fired IC engines: 1.0 g/bhp-hr (or 86 ppmv @ 15% O_2 reported as propane)

Assumptions for Fuel Cell System

- Net electrical hhv efficiency for a fuel cell: 49% (2016-2017 Self Generation Incentive Program Impact Evaluation[13] (September 28, 2018) submitted to the Pacific Gas and Electric Company SGIP Working Group reports lower heating value (LHV) efficiencies for Fuel Cells used only for electrical generation of 54% in 2016 and 55% in 2017. This results in an average LHV efficiency of 54.5% for 2016-2017 and an estimated average higher heating value (HHV) efficiency of 49% for 2014-2015)

- Size of fuel cell system needed to replace the proposed 550 kWe IC engine: 938 kW (estimated based on 156.8 MMBtu/day and 49% efficiency: 156.8 MMBtu/day x 10^6 Btu/MMBtu x 1 day/24 hr x 1 kW-hr/3,412.14 Btu x 0.49)

- Estimated Purchase and Installation Cost for a 938 kW Molten Carbonate Fuel Cell: $8,027/kW (*Average of interpolated costs for fuel cells from US EPA Combined Heat and Power Partnership Catalog of CHP Technologies ($6,868/kW in 2014)[14] and SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report] ($6,507 in 2015)[15] adjusted to 2022 dollars based on CPI Inflation Calculator; Note: the U.S. Department of Energy Federal energy management Program (FEMP) document "Fuel Cells and Renewable Energy" (last updated 10-21-2016 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 falls within the expected range and is below recently reported costs for some fuel cells.*)

- Typical operation costs for natural gas-fueled fuel cells, including stack replacement costs: $0.048/kW-hr (*SGIP 2015 Self-Generation Incentive Program Cost Effectiveness Study [Final Report][16] adjusted to 2022 dollars based on CPI inflation calculator*)

- Fuel Cell VOC emissions: 0.02 lb-VOC/MW-hr ($\leq$ 2.0 ppmv VOC @ 15% O_2 as CH_4 based on ARB Distributed Generation Certification level and emission tests on fuel cells)

[13] Self Generation Incentive Program Impact Evaluation (September 28, 2018) Prepared by Itron, submitted to the Pacific Gas and Electric Company SGIP Working Group, Section 4 – Generation Project Energy Impacts, Figure 4-34 - 2017 Overall and Component LHV Efficiencies by Technology. https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/self-generation-incentive-program/self-generation-incentive-program-evaluation-reports

[14] Table 6-4: https://www.epa.gov/sites/default/files/2015-07/documents/catalog_of_chp_technologies_section_6._technology_characterization_-_fuel_cells.pdf.

[15] Table A-7: https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/2/7889-20151119finalfullreport-1-.pdf.

[16] https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/2/7889-20151119finalfullreport-1-.pdf.

Capital Cost

The estimated increased incremental capital cost for replacement of the proposed IC 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:

(938 kW x $8,027/kW) - (550 kW x $2,879/kW) = $5,945,876

Annualized Capital Cost

Pursuant to District Policy APR 1305, Section X (dated June 1, 2021), which was in effect at the time that the application for this project was deemed complete, 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 4% 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.

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

Where:
- A = Annual Cost
- P = Present Value
- I = Interest Rate (4%)
- N = Equipment Life (10 years)

$$A = [\$5,945,876 \times 0.04(1.04)^{10}]/[(1.04)^{10}-1]$$
$$= \mathbf{\$731,343/year}$$

Annual Costs

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

Proposed IC Engines Producing 550 kWe
550 kWe x 8,760 hr/yr = 4,818,000 kW-hr/year

Fuel Cells (Alternate Equipment)
156.8 MMBtu/day x 10^6 Btu/MMBtu x 1 day/24 hr x 1 kW-hr/3,412.14 Btu x 0.49 (electrical efficiency) = 938 kWe

57,221.8 MMBtu/yr x 10^6 Btu/MMBtu x 1 kW-hr/3,412.14 Btu x 0.49 (electrical efficiency) = 8,217,330 kW-hr/year

Cost (Decrease) from Increased Revenue for Power Generation from Replacing the Proposed 550 kW Engine with a Fuel Cell System
(4,818,000 kW-hr/yr – 8,217,330 kW-hr/yr) x 1 MW/1,000 kW x $30/MW-hr =

-$101,980/year

Annual Operation and Maintenance Cost
The annual operation and maintenance costs for each option are calculated as follows:

Proposed IC Engines Producing 550 kWe
4,818,000 kW-hr/yr x $0.026/kW-hr = $125,268/year

Fuel Cells (Alternate Equipment)
8,217,330 kW-hr/yr x $0.048/kW-hr = $394,432/year

Annual Costs of Increased Maintenance
$394,432/yr - $125,268/yr = $269,164/year

Total Increased Annual Costs for Fuel Cell as an Alternative to Proposed IC Engine
$COST_{alt}$ - $COST_{basic}$ = $731,343/year + (-$101,980/year) + $269,164/year
$COST_{alt}$ - $COST_{basic}$ = $898,527/year

Emission Reductions:

VOC Emission Factors:

Pursuant to the District’s Policy APR 1305 (dated June 1, 2021), which was in effect at the time that he application for this project was deemed complete, District Standard Emissions that will be used to calculate the emission reductions from alternative equipment.

The District Standard Emissions for VOC emissions from the engines will be based on the New Source Performance Standard (NSPS) VOC emission limits for natural gas-fired IC engines from 40 CFR 60 Subpart JJJJ, since these limits are applicable and are more representative of the emissions than the current applicable VOC emission limits of District Rule 4702.

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

District Standard Emissions:
VOC: 1.0 g-VOC/bhp-hr

Emissions from Fuel Cells as Alternative Equipment:
VOC: 0.02 lb-VOC/MW-hr

Emission Reductions:

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

VOC Emission Reductions (1.0 g-VOC/bhp-hr → 0.02 lb-VOC/MW-hr)
$EMISSION_{basic}$ - $EMISSION_{alt}$ = (770 bhp x 8,760 hr/yr x 1.0 g-VOC/bhp-hr x 1 lb/453.59 g) – (8,217,330 kW-hr/yr x 1 MW/1,000 kW x 0.02 lb-VOC/MW-hr)
$EMISSION_{basic}$ - $EMISSION_{alt}$ = 14,706 lb-VOC/year (7.4 ton-VOC/year)

Cost Effectiveness VOC Reductions based on District Standard Emission Reductions

Cost Effectiveness VOC reductions from replacing the proposed IC engines with fuel cells is calculated below.

CE_{alt} = ($COST_{alt}$ - $COST_{basic}$) ÷ ($EMISSION_{basic}$ - $EMISSION_{alt}$)
CE_{alt} = ($898,527/year) ÷ (7.4 ton-VOC/year)
CE_{alt} = $121,423/year

As shown above, the annualized capital cost of this alternate option exceeds the District's VOC cost-effectiveness threshold of $22,600/ton. Therefore, this VOC control option is not cost effective and is being removed from consideration for this project. Therefore, this option is not cost effective and is being removed from consideration.

The applicant has proposed the highest remaining ranked control option above; therefore, no cost effectiveness analysis is required.

Step 5 - Select BACT

Pursuant to the above BACT Analysis, BACT for VOC emissions from each proposed engine is 0.10 lb-VOC/MW-hr which is demonstrated above to be equivalent to 20 ppmv @ 15% O2. The applicant has proposed an emission limit of 20 ppmv @ 15% O2 for VOC for each engine. Therefore, the BACT requirements for VOC are satisfied for each engine.

APPENDIX D
Engine Specifications Sheet

Received

DEC 16 2021

SJVAPCD
Southern Region

MANUFACTURER'S EMISSIONS CERTIFICATE

PREPARED FOR:

HARTMAN ENGINEERING

LANNY SIMPSON

EQUIPMENT INFORMATION:

DATE:	**12/15/2021**
2G CHP MODEL:	**Avus 500plus**
FUEL TYPE:	**Natural Gas**
PRIME MOVER MODEL:	**2G 412**
MANUFACTURING DATE:	***TBD***
EMISSIONS CONTROL TECHNOLOGY:	**SCR Catalyst**
PROJECT REFERENCE:	**Solo Digester Project**

2G Energy confirms that the pollutants, in the amounts listed below, are confirmed as valid "NOT TO EXCEED" values, for stationary applications per engine, and based on fuel compositions that meets manufacturer's requirements.

Engine Raw Emissions		
Pollutant	**Emission Limit per Engine (g/bhp-hr)**	**Applied EPA Method**
NOx	<1.0 g/bhp-hr	7E
CO	<2.3 g/bhp-hr	10
NMNEHC (VOC)	<0.7 g/bhp-hr	

Engine Emissions after SCR catalyst		
Pollutant	**Emission Limit per Engine**	**Applied EPA Method**
NOx	< 5 ppm	7E
CO	< 90 ppm	10
NMNEHC (VOC)	< 20 ppm	

*****) Evaluated using single determination of C x H y from dry exhaust gas with GC-WLD or GC-FID. Every component must be calibrated. Collective test over 30 minutes or the average of 10 single measurements within 30 minutes.***

Definitions:

NMNEHC Non-Methane-Non-Ethane-Hydrocarbons (only C x H y species with x>2 + C2H4), calculated as C3H8

2G ENERGY, Inc.
205 Commercial Drive
St. Augustine, FL 32092

Tel: +1-904-579-3217
Fax: +1-904-406-8727
info@2g-cenergy.com
www.2g-energy.com
Updated: 10/2015

Physical Information

The following criteria apply for demonstration purposes:

(1) Emissions are based on standard biogas quality with CH4 contents of minimum 50%
(2) Raw Emissions shown in units of g/bhp-hr, values are valid between 80% and 100% rated stable load (not for island mode)
(3) Please note that the raw CO levels are for start-up only and are expected to drift slowly upwards as deposits build up in the engine and as the engine experiences normal wear. CO drift can be decreased by following OEM specific maintenance and repair schedules along with the use of genuine OEM parts and components.
(4) Please note that the raw NOx level is expected to drift slowly upwards as deposits caused by contamination in the gas build up in the engine and as the engine experiences normal wear. NOx drift can be compensated up to a certain extend by calibrations to the engine operating parameters carried out during OEM standard maintenance procedures.
(5) Maintenance and component repairs for the 2G Energy equipment is carried out by qualified personnel strictly according to the schedules and repair requirements set by the OEM along with the use of genuine OEM parts and components.
(6) Testing to determine compliance with this commitment will be at the expense of the customer and accomplished by a certified laboratory chosen by the customer. The system is to be in good working order consistent with OEM recommended maintenance practices prior any testing. 2G Energy reserves the right to participate and/or challenge the results of any testing.

If the engine fails to meet the emissions representations the customer must provide the following supporting documentation to 2G Energy:

(1) Fuel gas samples
(2) Complete maintenance records
(3) A full report including the calculations and results of any emissions testing

2G Energy will be given a reasonable amount of time to take any or all of the following actions:

1. *Perform additional testing in an effort demonstrate the emissions representations. If this testing demonstrates compliance with no adjustments required to the engine, customer will pay for added testing. If testing fails to demonstrate compliance with the emissions representations, the testing will be paid for by 2G Energy*
2. *Make such adjustments to the engine so as to bring the engine into compliance with the emission limits provided in this letter.*

Conformity Declaration (acc. ISO/IEC 17050-1:2004)

We hereby confirm that the engine complies with 40 CFR Part 60, subpart JJJJ and be labeled as follows:

"THIS ENGINE IS EXCLUDED FROM THE REQUIREMENT OF 40 CFR PART 1048 AS A "STATIONARY ENGINE". INSTALLING OR USING THIS ENGINE IN ANY OTHER APPLICTAION MAY BE A VIOLATION OF FEDERAL LAW SUBJECTED TO CIVIL PENALTY AND THE OWNER/OPERATORS MUST COMPLY WITH THE REQUIREMENT OF CFR PART 60. THIS ENGINE IS NOT PART OF A REQUIRED OR VOLUNTARY CERTIFICATION PROGRAM AND IS CLASSIFIED AS NON-CERTIFIED PER 40 CFR, SUBPART JJJJ"

2G ENERGY, Inc.
205 Commercial Drive
St. Augustine, FL 32092

Tel: +1-904-579-3217
Fax: +1-904-406-8727
info@2g-cenergy.com
www.2g-energy.com

Technical specification

avus 500plus NG | ct80-1

(*)

Design:

550 kW el.
60 Hz / 480 V
natural gas
Calorific Value = 990 BTU/ft³
NOx < 1.0 g/BHP-h
Exhaust cooling to 248 °F

Subject to technical changes!

Note: Figure on cover page may differ

1. Genset

	50 %	75 %	100 %	Load
Electrical power	275	413	550	kW (5)
Recoverable thermal output	1214	1624	2141	MBTU/hr (2)
Fuel cosumption	2505	3553	4627	MBTU/hr (1)
Efficiency Electrical	37.5	39.6	40.6	% (1)
Efficiency Thermal	48.4	45.7	46.3	% (1), (2)
Efficiency Combined (el. + th.)	85.9	85.3	86.9	% (1), (2)

	NOx	CO	VOC (8)	
Exh. emissions without catalytic converter	< 1.0	< 2.0	< 0.7	g/BHP-h
	< 91	< 300		ppm (4),(6)
Exh. emissions with catalytic converter	< 1.0	< 0.5	< 0.7	g/BHP-h
	< 91	< 75		ppm (4),(6)

1.1 Engine

Engine manufacturer	2G	
Engine type	agenitor 412	
Type	V engine	
No. of cylinders	12	
Operating method	4-stroke	
Engine displacement	25007	ccm
Bore	5.12	in
Stroke	6.18	in
RPM	1800	1/min
ISO standard power (mech.)	770	bhp
compression ratio	13 : 1	
average effective pressure	212.7	psi
average piston speed	30.9	ft/s
body of balance wheel	SAE 1	
Direction of rotation (based on balance wheel)	left	
tooth rim with number of teeth	137	
Engine dead weight	4740	lbs
Mixture cooling to	50	°F
Engine surface noise **	112	dB(A) (7)
Engine surface noise with sound enclosure (optional) ***	70	dB(A) (7)

** Total sound power level at full engine load in accordance with DIN EN ISO 3746

*** Average sound pressure level under open area conditions at distance of 1 m in accordance with DIN 45635
An increased noise load must be taken into account with fresh air intake from the installation room.

1.2 Generator (utility planning data)

Manufacturer	Leroy Somer	
Type	LSA 49.3 M6/4p	
Generator type	Synchronous, directly coupled	
Voltage regualtor (AVR)	D510C	
Rated speed	1800	1/min
Frequency	60	Hz
Effective electrical power	550	kW
Apparent electrical power (cos φ 0.8)	688	kVA
Apparent electrical power (cos φ 1.0)	550	kVA
Rated generator current (cos φ 0.8)	827	A
Rated generator current (cos φ 1.0)	662	A
Rated generator voltage (± 10 %)	480	V
Subtransient reactance X"d	11.1	%
Short-circuit current Ik"3	9.3	kA
Power factor cos φ (lagging / leading)	0.8 / 0.95	
Generator circuit breaker	1000	A
Efficiency (full load) at Cos φ = 1	95.80	%
Mass moment of inertia	215.23	lb · ft²
Ambient air temperature	104	°F
Stator circuit	star	
Protection class	IP 23	
Generator weight	3563	lbs
Compensation	not available	
Engine startup	not available	

2 Mixture composition

2.1 Combustion air

Combustion air mass flow	6477	lbs/hr
Combustion air volume flow (25 °C, 1013 mbar)	1460	SCFM

2.2 Fuel

Fuel requirements in accordance with 'TA-004 Gas'

Reference methane number - minimum methane number	80 / 80	
Combustible mass flow	234.1	lbs/hr (1)
Combustible volume flow	77.9	SCFM (6) (1)
Gas pressure at rated load min. *	0.290	psig
Gas flow pressure at rated load max. *	1.015	psig
Gas regulation line safety pressure	7.252	psig

* At the inlet to the gas regulation line

3 Integrated heat extraction

3.1 Customer Heat Recovery Circuit

Heating water requirements in accordance with 'TA-002 Heating circuit'

Heating water volume flow (at Δt = 36 °F)	118.7	gpm
Heating water return temperature (max)	158	°F
Heating water flow temperature (max) **	194	°F (9)
Safety valve	87.02	psi
Operating pressure (min.)	14.50	psi
Internal pressure loss in heating circuit (approx.) *	4.351	psig
Pressure reserve (approx.) *	8.70	psi

3.2 Engine circuit

Coolant requirements in accordance with 'TA-001 Coolant'

Jacket Water Heat	791.3	MBTU/hr
Engine inlet temperature (min.)	176	°F
Engine outlet temperature (max.)	190	°F
Differential inlet / outlet (max.)	10.8	°F
Engine jacket water flow (min.)	170.2	gpm
Total cooling water circulation volume	276.2	gpm
Operating pressure (max.)	29.0	psi
Operating pressure (min.)	14.50	psi
Safety valve	43.51	psi
Safety temperature limiter	230	°F
Intercooler heat high temperature circuit	247	MBTU/hr
Intercooler inlet high water temperature (max.)	180	°F
Intercooler coolant flow high temperatue circuit (min.)	106.1	gpm

3.3 Mixture cooling water circuit - low temperature (LT)

Coolant requirements in accordance with 'TA-001 Coolant'

Intercooler heat low temperature circuit	175.487	MBTU/hr
Intercooler inlet low water temperature	38	°F
Intercooler outlet low water temperature	41	°F
Intercooler coolant flow low temperature circuit (min.)	75.5	gpm
Safety valve	44	psi

* Up to / from module interface

** depending on the design of the heating circuit pump group, information applies to design by 2G. Heating water supply temperature max., in partial load operation < 194 °F (9)

4. Exhaust system

Exhaust gas temperature after turbo charger	863	°F (3)
Exhaust temperature after exhaust heat exchanger	248	°F
Exhaust Gas Heat up to 248°F	1102.99	MBTU/hr
exhaust gas volume flow wet	1409	SCFM (6)
exhaust gas volume flow dry	1262	SCFM (6)
exhaust gas mass flow wet	6711	lbs/hr
exhaust gas mass flow dry	6239	lbs/hr
Exhaust back pressure downstream of turbine max.	0.87	psig
Pressure reserve approx. *	0.87	psig
Exhaust outlet noise **	130	dB (7)

5 Ventilation

Radiation heat of engine and generator (approx.)	306	MBTU/hr
Supply air volume flow min. (at Δt = 27 °F)	12098	SCFM

6 Operating fluids

Lubricating oil approvals, see 'TA-003 Lubricating oil'		
Lubrication oil consumption (max.)	0.20	g/kWh
Filling capacity lubricant (max.)	23.78	gallons
Lubricating oil filling tank fill capacity (optional)	50.19	gallons
Lubricating oil volume extension tank (optional) (optional)	50.19	gallons
Coolant approvals, see 'TA-001 Coolant'		

7 Electronics and software

Generator Protection Relay	Bachmann GSP | optional redundant Relay SEL 700GT	
Touchscreen display	10	"
Protection class Control cabinet	Type 12	
Protection class Power switch cabinet	Type 1	
Switch cabinet environmental temperature	32 - 95	°F
Switch cabinet relative air humidity (max.)	65	%

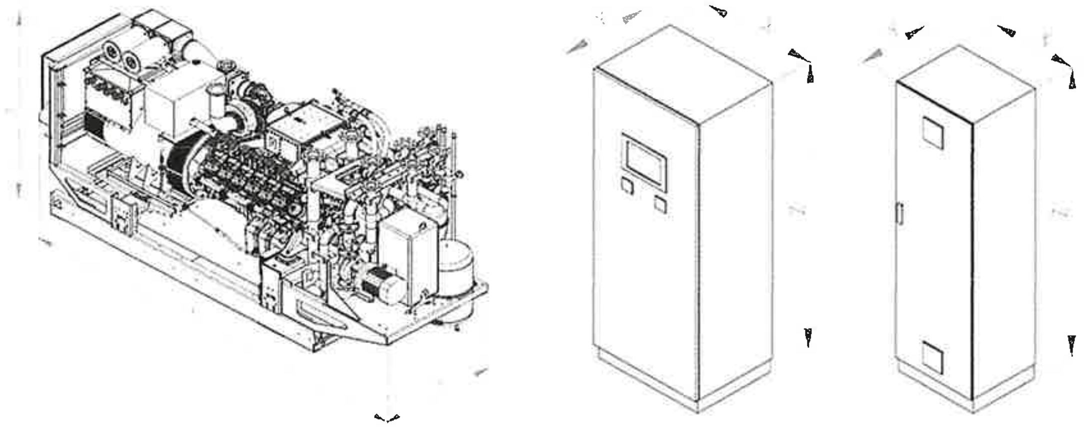
* From module interface (exhaust heat exchanger / catalytic converter in standard version and new condition)

** Total sound power level at full engine load in accordance with DIN 45635-11 Annex A

8 Interfaces

8.1 Dimensions and weights

(Figures may differ)



Length Module	X	178.94	in
Width Module	Y	51.57	in
Height Module	Z	86.61	in
Weight Module (without operating fluids)		13669	lbs
Weight Module with sound enclosure (optional)		16535	lbs
Powder-coated CHP frame		RAL 6002	

Width Control cabinet	X	31.50	in
Depth Control cabinet	Y	23.62	in
Height Control cabinet	Z	78.74	in
Weight Control cabinet		441	lbs
Control cabinet powder coated		RAL 7035	

Width Power switch cabinet	X	23.62	in
Depth Power switch cabinet	Y	19.69	in
Height Power switch cabinet	Z	78.74	in
Weight Power switch cabinet		331	lbs
Power switch cabinet powder coated		RAL 7035	

8.2 Mechanical Connections

Interface Gas	50 / 10	DN / PN
Interface Exhaust	/	DN / PN
Interface Heating circuit	80 / 16	DN / PN
Interface Emergency cooling circuit	80 / 16	DN / PN
Interface Mixture cooling circuit LT	50 / 16	DN / PN

8.3 Electrical connections / utility interface

Grid connection with pre-fuse (customer-provided)	60 Hz / 480 V	
Grid system	Y	
Short-circuit proof Icc (max.)	50	kA

8.4 Data interfaces

Remote maintenance access (optional) *	DSL / UMTS (SIM)
Interfaces / Data interfaces (optional):	- Profibus - Profinet - Modbus RTU - Modbus TCP - Ethernet IP - Hardware signals
Access virtual power plant (optional)	Possible after technical clarification (bus or hardware signals)

* Access for remote maintenance must be provided by the customer

9 Technical boundary conditions

Unless otherwise specified, all data is based on full engine load with the respective indicated media temperatures and subject to technical improvements. The generator output measured at the generator terminals serves as the basis for the delivered electrical power. All power and efficiency specifications are gross specifications. The fuel gas quality must conform to the specifications of 'TA-004 Gas'. The operating fluids and plant system layout must conform to the 'Technical instructions' of 2G.

(1) Performance conditions in accordance with DIN ISO 3046. Tolerance for specific fuel use amounts to + 5% of nominal performance. Efficiency specifications are based on an engine in new condition. An abatement in efficiency over the service life is reduced with observance of the maintenance requirements.

(2) The tolerance for usable heat output is +/- 8 % under normal load.

(3) The tolerance for the exhaust temperature is +/- 8 %.

(4) Corresponding to a residual oxygen concentration in the exhaust of 15 %.

(5) Electrical generator terminal power at cos φ = 1.0

(6) Volume specifications for normal status:

Pressure	14.69 psig
Temperature	32 °F

(7) Standard deviation of reproducibility 4 dB in accordance with DIN EN ISO 3746

(8) Assumed gas composition (VOC calculated as NMHC):
CH_4=90 %, C_2H_6=3 %, C_3H_8=2 %, C_4H_{10}=0,5 %, CO_2+N_2=4,5 %

Power specifications in this document relate to standard reference conditions.

Standard reference conditions in accordance with DIN ISO 3046-1:

Air pressure	14.50 psig
Air temperature	77 °F
Relative air humidity	30 %

Power reduction

Power reduction due to installation at altitude > 958ft a.s.l. and/or air suction temperature > 77°F shall be determined specifically for each project according "TI-049 Load reduction".

(*) It is possible to retrofit the 2G plant onsite for operation with up to 100% hydrogen. Performance data and interfaces may change.

APPENDIX E
RTO Specifications Sheet

Catalytic Products
INTERNATIONAL

TRITON 6.95
Regenerative Thermal Oxidizer

Presented To:

Mike St. André
CEI Builders
8545 South Eastern Avenue, Suite 107
Las Vegas, NV 89123

John Brewer, C.E.T.
Vice President, Engineering
CH Four Biogas
Manotick, ON K4M 1A4
Canada

For:

Hilltop Dairy (MD) Dairy – Oakdale, CA 95361
Air Pollution Control Project

Prepared By:

Catalytic Products International
980 Ensell Road
Lake Zurich, Illinois 60047

Steve Klostermeyer
Vice President, Sales & Marketing
847-550-4106
sklostermeyer@cpilink.com

Sean T. Gribbon
Senior Applications Engineer
847-550-4330
sgribbon@cpilink.com

October 22, 2021

Section 2: Basis of Design

Project Background

Solo Dairy will be operating a biogas purification system in Wasco, California. The Regenerative Thermal Oxidizer (RTO) will abate the methane emissions from the waste gas stream.

Exhaust Characteristics

The final normal process conditions are summarized in the table below, based on the Granite Fuels Upgrader data PDF supplied to CPI. There is a potential for variation in the CH4 levels during operation, reaching as high as 10%, therefore CPI recommends the use of a 6,000 SCFM RTO.

Flow Rate	SCFM	373
Fresh Air Added for Dilution - Maximum	SCFM	5,627
Total Flow Rate to the RTO	SCFM	6,000
Process Temperature	°F	205
RTO Inlet Temperature - Approximate	°F	78
Gas Composition - Normal		
Methane (CH4)	%	5.5
Carbon Dioxide (CO2)	%	94.1
Nitrogen (N2)	%	0.06
Oxygen (O2)	%	0.12
Maximum Methane (CH_4) Loading	%	13.9

Plant Information

Plant Location		Wasco, CA
Plant Elevation	'ASL	200
Process		Biogas Upgrading
Ambient Temperature Range - Average	°F	45 - 105
Design Wind Velocity	mph	90
Electrical Area Classification		Unclassified
Equipment Location		Outdoors at grade

Basis of Recommendation

Catalytic Products International (CPI) has worked with a variety of industries to develop a proven and innovative technique to eliminate VOC emissions and for this operation CPI has selected the regenerative thermal oxidizer. Regenerative Thermal Oxidization has been selected for this application due to the relatively low solvent loading and the high integral heat recovery of an RTO unit while providing a long lasting, high uptime air pollution control system.

The final design engineering as noted in this proposal will incorporate all the necessary components to successfully destroy the solvents listed above from the facility while using our proven and innovative design features to provide a long lasting - highly reliable system. The TRITON will decrease total solvent emissions by the level noted in Section 7: Performance Guarantee of this proposal.

TRITON 10,000 SCFM RTO with HGBP for reference (control house shown as option)

The TRITON Regenerative Thermal Oxidization System recommended in this proposal will allow:

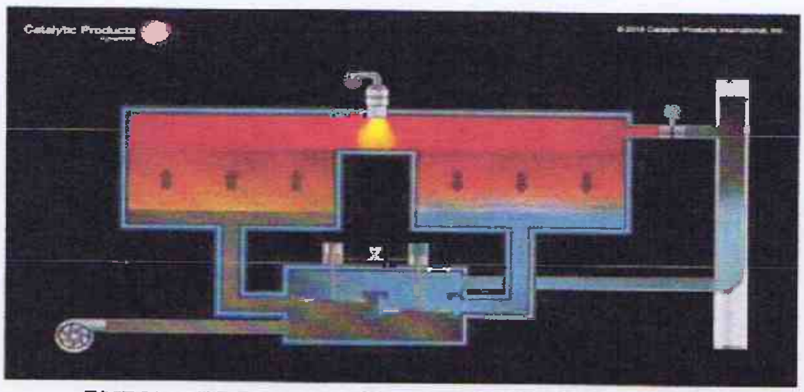
- Continuous solvent destruction abatement across operational range
- Low cost of operation
- Fully automatic operation - with no operating interface required.
- Highest reliability with minimal maintenance

The TRITON system designed will include our innovative design features allowing for continuous VOC destruction. This continuous destruction ability is key to air pollution control design.

The systems low cost of operation will center on the use of a 95% primary heat exchanger. The heat exchanger is made up of a thermally stable structured ceramic. This special heat exchange system will provide very low burner heating demands and provides very low static pressures for reduced electrical consumption. Sophisticated control logic constantly analyzes the regenerator temperature profiles from several thermocouple inputs and constantly adjusts valve timing to maximize the thermal rate efficiency of the system.

The system will incorporate our TSS control package supplied with all PLC logic, relays, and wiring for automated control.

Each TRITON system is designed to allow the highest uptime reliability with minimal maintenance. The maintenance requirements will be fully described in the supplied operator manuals, and only includes normal fan maintenance, linkage tightening, and fan bearing lubrication. The system uses a few moving parts, and all these parts are accessible from outside of the system. There is no need to enter the oxidizer for normal maintenance.



TRITON RTO Diagram with Hot Gas Bypass for reference

Unique Features of the TRITON – Series Regenerative Thermal Oxidizer

The TRITON Series is designed to be very easy to assemble, and is comprised of one modular unit:

- The Regenerator, which holds the media and the Combustion Chamber which is on top of the Regenerator along with the Even-Flo manifolds, which contain the Posi-Seal Valves ship as on assembled skid with the heat recovery media shop installed.

Each TRITON system is designed to allow the highest uptime reliability with minimal maintenance. The maintenance requirements will be fully described in the supplied operator manuals, and only includes normal fan maintenance, linkage tightening, and bearing lubrication. The system uses a few moving parts, and all these parts are accessible from outside of the system. There is no need to enter the oxidizer for normal maintenance.

Section 3: Equipment Specifications

TRITON RTO Model		TRITON 6.95
Maximum VOC Load – Base Bid 95% TER	MM Btu/h	< 2.794
Operating Temperature – normal	°F	1,600
Operating Temperature – maximum	°F	2,000
Residence Time	sec	>0.5
Heat Exchanger Effectiveness	%	95
Heat Exchanger		High temperature ceramic structured media
Heat exchanger media	Ft^3	200
Heat Exchanger Media Weight - approximate	#	9,000
RTO Destruction Efficiency	%	See Section 7: Performance Guarantee
Insulation – Type		Ceramic Fiber
Insulation – Thickness	"	6
Insulation – Density	lb/ft3	10
Materials of Construction (MOC)		
Housing – Media Chamber		316L stainless steel
Housing – Combustion Chamber		316L stainless steel
Housing Structural – Media Chamber		A36 steel
Housing Structural – Combustion Chamber		A36 steel
Media Chamber Base Frame		A36 steel
Poppet Housing		316L stainless steel
Poppet Base Frame		A36 steel
Poppet Valve Support Structural		316L stainless steel
Poppet Valve Discs		316L stainless steel
Cold Face Support		316L stainless steel
Cold Face Expanded Metal		316L stainless steel
Fan Housing		A36 steel
Fan Structural		A36 steel
Hot Gas Bypass Damper		A36 steel
Hot Gas Bypass Damper insulation		Castable Refractory
Hot Gas By-pass Damper blade		800HT
Hot Gas Bypass Damper shaft		800HT
Exhaust Stack		316L stainless steel
Exhaust Stack Structural		304L stainless steel
Burner		Access Combustion KX04 Low NOx
Burner Quantity		1
Burner Size		3"
Burner Capacity – Installed	MMBtu/h	2.0
Combustion Blower	hp	7.5

Burner Emissions		
NOx	#/MMBtu (ppm@3% O_2)	0.04 (30)
CO	#/MMBtu (ppm@3% O_2)	0.04 (50)
Forced Draft Booster Fan – Arrangement		1
Forced Draft Booster Fan	hp	30
TSS Panel		NEMA 4
TSS Panel Location		Prewired on RTO Skid
PLC		Allen-Bradley Compact Logix
HMI		Allen-Bradley 7 Plus, 12" Color
Flame Safety		Honeywell
Data Recorder		Honeywell TVEZ Single Pen
VFD for RTO Fan Volume Control		Siemens G120X
Hot Gas Bypass Damper – Port Opening	Inches	14 x 14
Actuator		Pneumatic Double Acting with positioner and feedback
Bearings		Carbon Sleeve
Exhaust Stack – Diameter at Discharge	Inches	26
Exhaust Stack – Height at Discharge	Feet	30
Oxidizer Pad Size - Approximate	Feet	20 x 35
Oxidizer Installed Weight – Approximate	Pounds	32,000

Utilities

Fuel		Natural Gas
Fuel Pressure	psig	1,000 Btu/ft^3 @ 10 psig
Fuel Requirements	CFH	1,250
Electrical		480 V, 3-Ph, 60 Hz 120 V, 1-Ph, 60 Hz
Electrical Requirements	Amps	50
Compressed Air @ -40 °F dewpoint, clean and dry	psig	80 – 90
Compressed Air Requirements	CFM	10 – 12

Section 4: Equipment Description

General Description

TRITON Regenerative Thermal Oxidizers are specially designed systems that provide industry leading VOC destruction, the lowest operating cost, and the highest uptime reliability.

The Regenerative process starts by using a system booster fan to draw in process emissions and force these gasses into the Even Flo manifolds. The process emissions are directed into one set of Posi-Seal Valves, for distribution into one of two regenerator columns. Posi-Seal Valves in conjunction with the Even Flo manifolds are the basis for all TRITON systems ability to provide continuous VOC destruction stated in Section V: Performance Guarantee of this proposal. The design of these two revolutionary components takes advantage of leak-free construction and minimal flushing volumes. The results provide the user with only high performance and minimized costs.

From the exit of the Posi-Seal Valves, the un-treated exhaust enters one of the ceramic media filled regenerator columns. Here the exhaust stream is heated from approximately the inlet temperature to within approximately 70 °F of the combustion chamber set-point. The structured ceramic media used in the TRITON Series Regenerative Thermal Oxidizer provides low (flange to flange) static pressures and the highest thermal rate efficiency. TRITON systems pack more thermal heat transfer in a smaller package.

Upon exiting the regenerator column, the exhaust will be oxidized in the combustion chamber, where the temperature will be raised to the combustion chamber set-point. At this temperature the VOC will be destroyed to meet the destruction removal efficiency (DRE) stated in Section 6: Performance Guarantee of this proposal When solvent loads are sufficient (approximately 3% of the LEL) the natural gas burner system can be shut off and self-sustaining operation is achieved.

These combusted VOC are then forced into the second regenerator column to give up the heat to the incoming un-treated air. The whole process is controlled via the TSS control system. Posi-Seal Valve positioning is monitored for precise destruction and thermal exchange effectiveness. No input is required by operators.

Main Booster FD Fan

The booster fan will be a New Yok Blower or equivalent manufacturer fan complete with the following features and accessories:

- Heavy-duty, all-welded construction
- Punched, flanged inlet and outlet
- Shaft / bearing guards
- Bolted access door
- Housing drain
- Ceramic felt shaft seal
- Constant speed, V-belt drive package
- Inlet V- bank filter box
  - Galvanized steel construction
  - Access doors
  - Filter bank with 2" disposable filters
  - Support legs to grade
  - Weather cover/rain hood
  - Inlet mist eliminators
- 1,800 RPM, TEFC, VFD rated, PE motor

TRITON 10.95 Biogas RTO with Process Injector

Note: The RTO booster fan will be capable of providing up to -2.0" w.c. at the fan inlet to adequately clear the exhaust ductwork and provide for future capture considerations, if necessary.

Process Inlet Injector

The process tail gas will be injected into the dilution air stream via a stainless-steel injector lance. The lance will be deigned to ensure mixing of the tail gas with the dilution air. The dilution air volume will be fixed to ensure the mixed stream of tail gas and dilution air will be approximately 18% of the LEL or less.

Even-Flo Manifolds

The start of the TRITON regenerative oxidation process begins with the introduction of process exhaust through the EvenFlo inlet manifolds. The basis of the EvenFlo design takes advantage of duct-under construction to minimize flushing air volume while maximizing flushing efficiency. The EvenFlo manifolds are specially designed for even air distribution to the regenerator beds. Each manifold is constructed and designed for maximum performance, durability, and easy access. The EvenFlo manifolds are shop fitted to the Posi-Seal Valves. The EvenFlo inlet manifolds are supplied shop insulated to minimize heat losses during operation, work to minimize organic condensation, and provide a safe temperature during high inlet temperature operations.

Vertical Posi-Seal Valves

This perhaps is the most important feature about any TRITON system, the highly reliable regenerator valves use the concepts that we made famous in our FLOATING TUBE recuperative heat exchangers, stress free designs with zero leakage. When compared to less reliable butterfly or other poppet valve assemblies, Posi-Seal valves provide a level of sophistication that is un-matched.

Posi-Seal Valving Technology

Posi-Seal valves are designed to take advantage of a vertical axis that allows for soft seating action with self-centering guidance. The innovative feature about all Posi-Seal valves is the airtight machined seal that eliminates valve bypass and maintenance intensive gaskets. The Posi-Seal valve will be pneumatically operated and will cycle open or closed based on the program logic called for in this application. Each Posi-Seal Valve will include the following:

- 1/4-inch thick platter reinforced with 3/8" thick coupling plates are bolted together with aircraft style wire tie of all fasteners
- Heavy Duty Construction including:
  - 2-inch diameter damper shafts
  - High temperature linear bearings with air cooling rated for 600° F Bake-Off (when required)
- Pneumatically operated air actuators
- Proximity switches to prove position
- Two compressed air holding tanks, one piped and wired to each Posi-Seal Valve
- Each valve is factory adjusted for: stroke, proximity switch position, and soft seating guidance.
- NEMA 4 Junction box will be mounted to the poppet valve chamber. All low voltage and 120V chamber related electrical components will be prewired and tested in CPI's factory prior to shipment. This will expedite field installation.

Posi-Seal Valving Technology

Superior design and high-quality construction allow TRITON Systems to effectively treat very large exhaust streams with the same performance as smaller Regenerative Thermal Oxidizers.

All TRITON Systems utilize air actuators pre-set at the factory
Actuators are pre- piped and wired

Pneumatic POSI-SEAL Valve Operator and Compressed Air Holding Tank

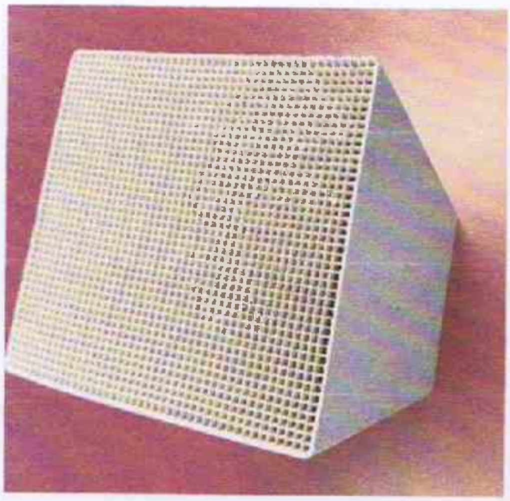
High temperature linear bearing package insures smooth linear action
Bearings used at two points to provide extraordinary support of the valve

Bearing air seal and valve position indicators all visible through clear Plexiglas Protective Cover

Cold Face Support Grid

The cold face support grid is another innovative technique developed to allow high support strength and low pressure drop. While conventional systems use a low cost expanded metal support, the TRITON's cold face support grid is a fabricated structure made of 3" x 3/8" bar stock on top of a unique system of I-beam support. The advantages offered in our cold face support grid are high strength, lowest pressure drop, and plugging elimination.

Regenerator Heat Exchange Media



The TRITON Series Regenerative Thermal Oxidizer utilizes a special ceramic heat exchange media system which is developed to provide reduced pressure drops and the highest thermal efficiencies. The media is chemically inert and thermally to temperatures in excess of 2,000° F.

Regenerator and Combustion Chamber

The main housing consists of two (2) internally insulated regenerators connected by a common insulated combustion chamber. The combustion chamber is designed in conjunction with the nozzle mix burner system for even temperature uniformity, leading to high performance and lower operating cost. The unit is shop assembled to simplify field erection.

The construction of the regenerators and combustion chamber is made up of the following materials:

- The regenerator towers and combustion chamber are fabricated from at least 3/16" thick steel shell reinforced with external structural framing.

- The combustion chamber will be supplied with a 24" x 24" hinged access door to the combustion chamber.
- Painted carbon steel I-beam skid frame.
- Three (3) dual element thermocouples are provided in each media bed for precise temperature profiling of the ceramic media.
- Three (3) dual element thermocouples are provided in the combustion chamber. (two for temperature control and one for high temp limit)
- Two (2) dual element thermocouples will also be provided for monitoring Oxidizer inlet and outlet temperatures.
- Two (2) 1/4 NPT pressure ports will be provided above and below each media bed for manual pressure monitoring.
- Burner site glass will be provided.
- Junction boxes will be mounted to both the regenerator chamber and combustion chamber. All low voltage and 120V chamber related electrical components will be prewired and tested in CPI's factory prior to shipment. This will expedite field installation.

All TRITON Systems are fully insulated with high-quality ceramic insulation lining to prevent shell deformation and growth.

Burner System

The burner will be a gas burner system. A nozzle mix burner uses external combustion air to provide sufficient oxygen even in an oxygen-deficient air stream and to provide a stable flame pattern throughout the operating range of the system. The burner is designed to promote mixing when fired horizontally into the combustion chamber and provides even heating during regenerator switching. This design provides the high velocity which creates a tremendous amount of turbulence and leads to the excellent temperature uniformity for which TRITON RTOs are known.

The burner allows for a turndown of at least 20:1, requires low gas pressure, and emits low levels of NOx and CO in oxidizer applications.

The burner will include the following:

- One (1) burner with ceramic discharge sleeve pre-mounted into the combustion chamber
- Self-checking UV scanner with air purge for flame supervision
- External combustion air blower
  - The combustion air blower will be a New York Blower or equivalent, pressure type blower fan complete with skid mounting of the following equipment:
    - Direct drive TEFC motor
    - Flanged inlet & outlets
    - Punched, flanged inlet and discharge
- The combustion air blower will be mounted on top of the Even-Flo Manifold or at grade – allowing convenient connection to the gas burner. The auxiliary equipment includes:
  - Painted carbon steel weather hood with personnel protection
  - Carbon steel manual control damper with locking lever arm
  - Flex connection
  - Painted carbon steel combustion air blower ducting from discharge of blower to inlet of burner.

- Includes flanged connection and pre-mounting of the following air control valve:
  - Carbon steel Siiemens combustion air control valve and actuator
  - Welded pressure ports as necessary
  - Welded pressure ports as necessary
- A proof of air flow pressure switch will be provided in an NEMA 4 enclosure

Burner Gas Train

This natural gas train is designed pursuant to NFPA-86 and will include the following components:

- The gas train will be schedule 40 BI, threaded construction:
  - Pre-piped and mounted on a pipe rack
    - The pipe rack will be located adjacent to the burner, mounted on the EvenFlo Manifold
    - Gas pipe from the gas train outlet to the burner inlet is factory installed
    - Stainless steel flex connection mounted at burner elevation for both main gas and pilot
    - Pre-wired to a NEMA 4 Flex I/O boxes. The Flex I/O box will be mounted onto the combustion chamber.
  - 6000V ignition transformer (mounted at on the gas train stand) in an enclosure with ignition wire to burner
  - Pre-mounted gas control valve:
    - Carbon steel gas control valve with a Siemens gas flow control valve and actuator
  - Shop leak tested prior to shipment.
- Main shut-off valve
- Inlet Strainer
- Main Gas Train:
  - Main gas regulator
  - Low gas pressure switch
  - Two (2) automatic shut-off valves
  - High gas pressure switch
  - Main gas shut-off valve
- Pilot Gas Train:
  - Two (2) Pilot gas shut-off valve
  - Pilot gas regulator
  - Two (2) pilot solenoids
  - Three (3) pressure indicator gauges with manual shut-off

Volume Control

The volume control will be provided by a variable frequency drive controlled by the PLC receiving a signal from the inlet duct pressure transmitter. The system will include the following:

- The VFD will be mounted in the TSS panel.
- Pressure transmitter

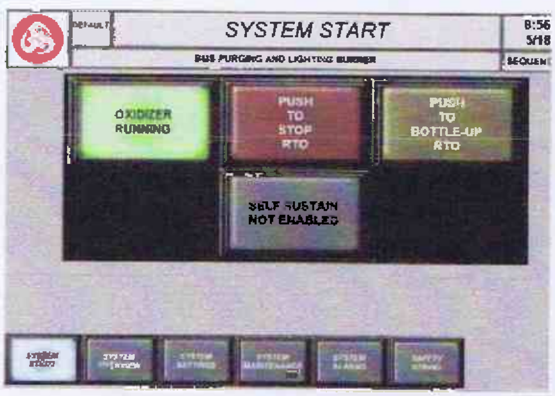
Bottle Up Mode

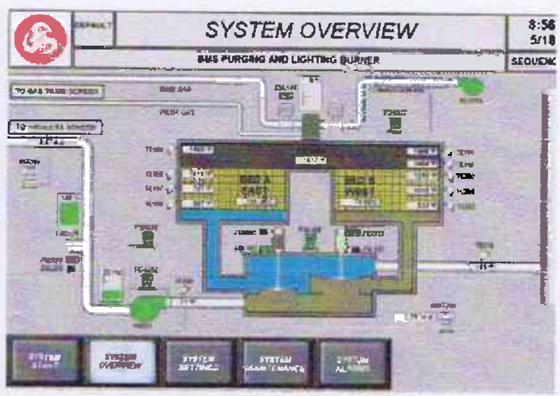
The TRITON RTO has a special operation mode called bottle-up. When the system is placed into standby (operator initiated long term idle) the TRITON RTO is in bottle-up mode conserving the heat that is stored in the heat recovery media and therefore minimizing the auxiliary fuel needed to restart the unit. This method of operation saves a considerable amount of fuel and further improves the fuel efficiency of the TRITON RTO.

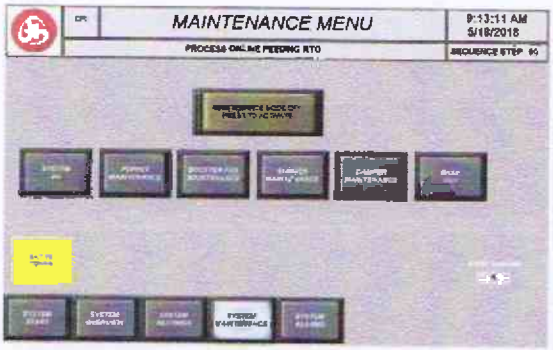
System Control

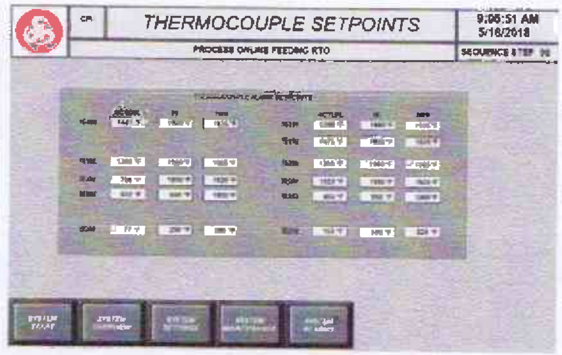
The TRITON Series Regenerative Thermal Oxidizer comes equipped, as standard, with a special control and monitoring package called Temperature Safety System (TSS). It has been developed for the use of protecting the oxidizer and providing self-diagnostics.

The TSS-PLC panel allows the entire oxidizer system to be a one-button start/stop operation. This provides user-friendly operation and avoids costly operator errors. TSS controls temperature programming during all phases of the oxidizer's warm up, operating, and cool down cycles. This minimizes thermal stress on components and provides long equipment life. TSS will also integrate the process with the operation of the oxidizer for safe, economical operation.









The TRITON Series Regenerative Thermal Oxidizer process begins with the touch of a button, which activates the system's PLC-based Temperature Safety System (TSS). The TSS control system automatically retrieves media temperatures, selects the hottest bed for damper positioning, opens the fresh air purge/idle damper, energizes the booster fan, purges the system with fresh air, ignites the burner, cycles the valves, and gradually brings the system up to the correct operating temperature. The TSS also monitors the temperature in the regenerators, combustion chamber in three places, and in the valve assembly's inlet and outlet. This helps safeguard the system from extreme temperature fluctuations that cause thermal stress and overall system fatigue.

As soon as the required operating temperature is reached, the TSS enables the process lines to feed into the oxidizer or holds the system in idle mode until production is ready. When production is ready the fresh air purge damper closes and one or more of the diverting dampers open to draw the volatile organic compounds (VOCs) off of the process lines.

A booster fan draws one or more VOC-laden exhaust from your process lines into the system at a fixed duct static pressure through one of the systems regenerators (an internally insulated vessel containing ceramic media). The contaminated gases are passed through the first regenerator where energy is transferred from the ceramic media to the gas in order to elevate the temperature.

This elevated temperature approaches the ignition level for most solvents and then is directed from the ceramic bed into the combustion chamber. As the stream exits the ceramic bed and travels through the internally lined combustion chamber minimal heat is added to ensure a proper oxidation temperature and a designed dwell time is maintained for the ultimate destruction of the streams VOCs. The resultant clean, oxidized gases are redirected into a second regenerator bed to continue the energy transfer and oxidation cycle before passing through the fan to be released to the atmosphere.

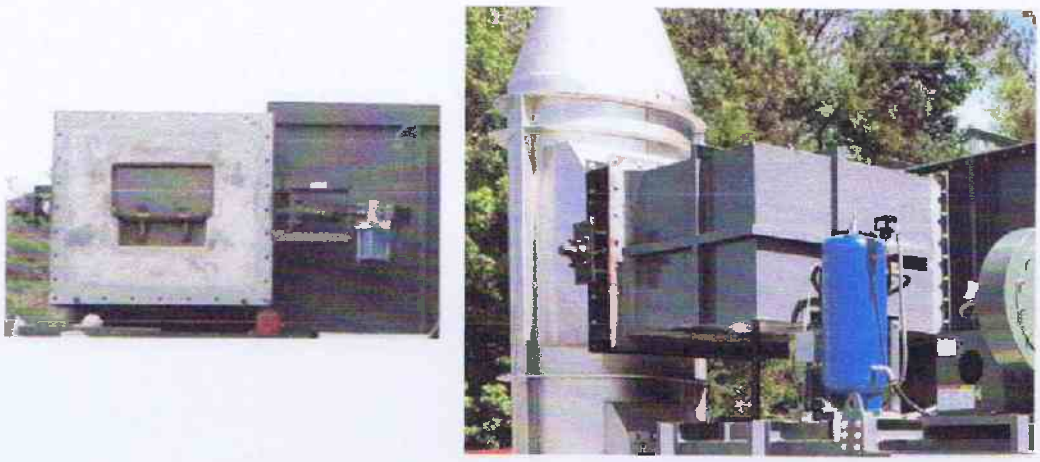
The TSS control panel will include the following components:

- NEMA 4 rated, painted carbon steel enclosure will be mounted on the oxidizer. The devices on the oxidizer skid and will be shop wired to junction boxes on the unit where practical
    - Color: CPI standard gray epoxy
    - Codes – TSS control panels are designed to NEC standards. Unless specifically mentioned below, no other codes or standards apply
    - Main 120V circuit breaker
- PLC with the following:
    - Inputs and outputs as required for managing the oxidizer system and interlocks for inlet prefilter and bypass T-damper.
    - Remote Service Access via VPN internet broadband web port with integral Ethernet switch
- HMI will include the following:
    - Door mounted in the main control panel
    - Start/Stop functions
    - PID Loop Control of:
        - Burner Temperature Control
        - VF Drive Speed Control
        - Valve Switching
        - Bake-out Feature
    - Text messaging of system status on individual graphic screens
        - System overview screen with First Fault Annunciation and Trouble Alarm History
        - Combustion system detail screen
        - Booster fan detail screen
        - Maintenance screen
        - Secure PID access screen
- High temperature limit shut off
- Single pen graphical chart recorder:
    - Combustion Chamber Temperature
- Flame safety system
- Door mounted alarm horn

High VOC Hot Gas Bypass

- One (1) internally insulated high VOC Hot Gas Bypass will be provided to bypass clean hot air directly into the exhaust stack to de-rate the thermal efficiency of the Oxidizer. Included in the Hot Gas Bypass System will be the following components:
    - Internally cast opening
    - 8" high density ceramic refractory with step seat
    - Reinforced blade

- ¼" 316L stainless steel frame
- 2-1/2" diameter full length steel shaft
- Two (2) bolt compression packing glands with 4 Graphoil packing rings
- High temperature sleeve bearings in 4 bolt housings mounted on standoffs over adjusting glands.
- Double acting pneumatic actuator with I/P positioner



Typical Hot Gas By-Pass Damper Assembly

Exhaust Stack

One (1) oxidizer exhaust stack

- 304L stainless steel base rings
- False bottom with drain
- Two Breeches
- Internal ceramic insulation at the hot gas by-pass breech
- Two (2) 3" diameter test ports located 90 degrees apart

APPENDIX F
HRA and AAQA Summary

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

To:	Jesse Garcia – Permit Services
From:	Adrian Ortiz – Technical Services
Date:	June 27, 2022
Facility Name:	CH4 BIOGAS (SOLO DAIRY)
Location:	11450 JUMPER AVENUE, WASCO
Application #(s):	S-9908-1-0, -2-0, -3-0, -4-0, -5-0
Project #:	S-1213498

1. Summary

1.1 Risk Management Review (RMR)

Units	Prioritization Score	Acute Hazard Index	Chronic Hazard Index	Maximum Individual Cancer Risk	T-BACT Required	Special Permit Requirements
1-0	4.37	0.01	0.00	1.18E-07	No	Yes
2-0	31.32	0.08	0.02	5.51E-07	No	Yes
3-0	31.32	0.08	0.02	5.49E-07	No	Yes
4-0	31.32	0.08	0.02	5.47E-07	No	Yes
Project Totals	98.32	0.24	0.05	1.77E-06		
Facility Totals	>1	0.24	0.05	1.77E-06		

1.2 Ambient Air Quality Analysis (AAQA)

Pollutant	Air Quality Standard (State/Federal)				
	1 Hour	3 Hours	8 Hours	24 Hours	Annual
CO	Pass		Pass		
NO_x	Pass				Pass
SO_x	Pass	Pass		Pass	Pass
PM10				Pass	Pass
PM2.5				Pass	Pass

Notes:
1. Results were taken from the attached AAQA Report.
2. The criteria pollutants are below EPA's level of significance as found in 40 CFR Part 51.165 (b)(2) unless otherwise noted below.
3. Modeled PM10 concentrations were below the District SIL for non-fugitive sources of 5 μg/m^3 for the 24-hour average concentration and 1 μg/m^3 for the annual concentration.
4. Modeled PM2.5 concentrations were below the District SIL for non-fugitive sources of 1.2 μg/m^3 for the 24-hour average concentration and 0.2 μg/m^3 for the annual concentration.

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

<u>Unit # 1-0, 2-0, 3-0, & 4-0</u>

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.

2. Project Description

Technical Services received a request on April 1, 2022 to perform a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) for the following:

- Unit -1-0: DIGESTER SYSTEM CONSISTING OF A COVERED DIGESTER LAGOON, HYDROLYZER(S), ONE 34.4 MMBTU/HR DIGESTER GAS-FIRED BACKUP FLARE, PERMIT EXEMPT BOILERS (NATURAL GAS-FIRED, 5 MMBTU/HR OR LESS), AND A DIGESTER GAS UPGRADING OPERATION CONSISTING OF FEED GAS BLOWERS, COMPRESSORS, COOLERS, CHILLERS, IRON SPONGE H2S REMOVAL, A MEMBRANE CO2 REMOVAL SYSTEM, PRODUCT GAS COMPRESSORS, AND A 2.0 MMBTU/HR TRITON 6.95 NATURAL GAS-FIRED REGENERATIVE THERMAL OXIDIZER (RTO)
- Unit -2-0: 770 BHP 2G ENERGY MODEL AVUS 500PLUS NATURAL GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM AND AN OXIDATION CATALYST SYSTEM POWERING AN ELECTRICAL GENERATOR AND PROVIDING HEAT FOR THE DIGESTER SYSTEM PERMITTED UNDER S-9908-1
- Unit -3-0: 770 BHP 2G ENERGY MODEL AVUS 500PLUS NATURAL GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM AND AN OXIDATION CATALYST SYSTEM POWERING AN ELECTRICAL GENERATOR AND PROVIDING HEAT FOR THE DIGESTER SYSTEM PERMITTED UNDER S-9908-1
- Unit -4-0: 770 BHP 2G ENERGY MODEL AVUS 500PLUS NATURAL GAS-FIRED LEAN-BURN IC ENGINE WITH A SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM AND AN OXIDATION CATALYST SYSTEM POWERING AN ELECTRICAL GENERATOR AND PROVIDING HEAT FOR THE DIGESTER SYSTEM PERMITTED UNDER S-9908-1

3. RMR Report

3.1 Analysis

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

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

Then, generally no further analysis is required.

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

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

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

- Dairy biogas process rates for the proposed operation were provided by the Permit Engineer. These process rates were speciated into toxic air contaminants using emission factors derived from the 2009 report, Dairy Biomethane characterization in Pipeline Quality Biomethane: North American Guidance Document for Introduction of Dairy Waste Derived Biomethane Into Existing Natural Gas Networks.
- Fuel usage rates for the proposed operation were provided by the Permit Engineer. These usage rates were speciated into toxic air contaminants (TACs) using emission factors derived from the 2000 AP42 emission factors for Natural Gas Fired Internal Combustion Engines. The use of a catalyst reduced TACs by 76% (NESHAP).

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

The AERMOD model was used, with the parameters outlined below and meteorological data for 2007-2011 from Wasco (rural dispersion coefficient selected) to determine the dispersion factors (i.e., the predicted concentration or X divided by the normalized source strength or Q) for a receptor grid. These dispersion factors were input into the SHARP Program, which then used the Air Dispersion Modeling and Risk Tool (ADMRT) of the Hot Spots Analysis and Reporting Program Version 2 (HARP 2) to calculate the chronic and acute hazard indices and the carcinogenic risk for the project.

The following parameters were used for the review:

Source Process Rates					
Unit ID	**Process ID**	**Process Material**	**Process Units**	**Hourly Process Rate**	**Annual Process Rate**
1-0	1	Dairy Gas (Flare)	MMscf	0.06	44
1-0	2	Dairy Gas (RTO)	MMscf	0.02	196
2-0	1	Natural Gas	MMscf	0.005	41
3-0	1	Natural Gas	MMscf	0.005	41
4-0	1	Natural Gas	MMscf	0.005	41

Point Source Parameters						
Unit ID	**Unit Description**	**Release Height (m)**	**Temp. (°K)**	**Exit Velocity (m/sec)**	**Stack Diameter (m)**	**Vertical/ Horizontal/ Capped**
1-0	Digester Flare	11.89	1255	13.91	0.20	Vertical
1-0	Digester RTO	9.14	533	15.08	0.51	Vertical
2-0	770 BHP NG IC Engine	10.06	393	10.19	0.27	Vertical
3-0	770 BHP NG IC Engine	10.06	393	10.19	0.27	Vertical
4-0	770 BHP NG IC Engine	10.06	393	10.19	0.27	Vertical

4. AAQA Report

The District modeled the impact of the proposed project on the National Ambient Air Quality Standard (NAAQS) and/or California Ambient Air Quality Standard (CAAQS) in accordance with District Policy APR-1925 (Policy for District Rule 2201 AAQA Modeling) and EPA's Guideline for Air Quality Modeling (Appendix W of 40 CFR Part 51). The District uses a progressive three level approach to perform AAQAs. The first level (Level 1) uses a very conservative approach. If this analysis indicates a likely exceedance of an AAQS or Significant Impact Level (SIL), the analysis proceeds to the second level (Level 2) which implements a more refined approach. For the 1-hour NO_2 standard, there is also a third level that can be implemented if the Level 2 analysis indicates a likely exceedance of an AAQS or SIL.

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

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

Monitoring Stations				
Pollutant	**Station Name**	**County**	**City**	**Measurement Year**
CO	Bakersfield-Muni	Kern	Bakersfield	2018
NOx	Bakersfield-California	Kern	Bakersfield	2018
PM10	Bakersfield-California	Kern	Bakersfield	2018
PM2.5	Bakersfield-Airport (Planz)	Kern	Bakersfield	2018
SOx	Fresno - Garland	Fresno	Fresno	2018

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

Emission Rates (lbs/hour)						
Unit ID	**Process**	**NOx**	**SOx**	**CO**	**PM10**	**PM2.5**
1	1	2.10	14.65	2.70	0.30	0.30
1	2	0.08	0.01	0.16	0.02	0.02
2	1	0.08	0.01	0.93	0.01	0.01
3	1	0.08	0.01	0.93	0.01	0.01
4	1	0.08	0.01	0.93	0.01	0.01

Emission Rates (lbs/year)						
Unit ID	**Process**	**NOx**	**SOx**	**CO**	**PM10**	**PM2.5**
1	1	1,548	10,836	2046	206	206
1	2	701	50	1,444	131	131
2	1	730	116	8,107	122	122
3	1	730	116	8,107	122	122
4	1	730	116	8,107	122	122

The AERMOD model was used to determine if emissions from the project would cause or contribute to an exceedance of any state of federal air quality standard. The parameters outlined below and meteorological data for 2007-2011 from Wasco (rural dispersion coefficient selected) were used for the analysis:

The following parameters were used for the review:

Point Source Parameters						
Unit ID	**Unit Description**	**Release Height (m)**	**Temp. (°K)**	**Exit Velocity (m/sec)**	**Stack Diameter (m)**	**Vertical/ Horizontal/ Capped**
1	Digester Flare	9.14	533	15.08	0.51	Vertical
1	Digester RTO	11.89	1255	13.91	0.20	Vertical
2	770 BHP NG IC Engine	10.06	393	10.19	0.27	Vertical
3	770 BHP NG IC Engine	10.06	393	10.19	0.27	Vertical
4	770 BHP NG IC Engine	10.06	393	10.19	0.27	Vertical

5. Conclusion

5.1 RMR

The cumulative acute and chronic indices for this facility, including this project, are below 1.0; and the cumulative cancer risk for this facility, including this project, is less than 20 in a million. In addition, the cancer risk for each unit in this project is less than 1.0 in a million. **In accordance with the District's Risk Management Policy, the project is approved without Toxic Best Available Control Technology (T-BACT).**

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

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

5.2 AAQA

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

6. Attachments

A. Modeling request from the project engineer

B. Additional information from the applicant/project engineer

C. Prioritization score w/ toxic emissions summary

D. Facility Summary

E. AAQA results

APPENDIX G
Quarterly Net Emissions Change (QNEC)

Quarterly Net Emissions Change (QNEC)

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

QNEC = PE2 - PE1, where:

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

Using the values in Sections VII.C.2 and VII.C.1 in the evaluation above, quarterly PE2 and quarterly PE1 can be calculated as follows:

$PE2_{quarterly}$ = $PE2_{annual}$ ÷ 4 quarters/year

$PE1_{quarterly}$ = $PE1_{annual}$ ÷ 4 quarters/year

Quarterly NEC [QNEC] for S-9908-1-0			
Pollutant	**PE2 (lb/qtr)**	**PE1 (lb/qtr)**	**QNEC (lb/qtr)**
NO_X	562.25	0	562.25
SO_X	2,270.00	0	2,270.00
PM_{10}	84.00	0	84.00
CO	872.50	0	872.50
VOC	62.50	0	62.50

Quarterly NEC [QNEC] for each S-9908-2-0, -3-0, -4-0			
Pollutant	**PE2 (lb/qtr)**	**PE1 (lb/qtr)**	**QNEC (lb/qtr)**
NO_X	182.50	0	182.50
SO_X	29.00	0	29.00
PM_{10}	30.50	0	30.50
CO	2,026.75	0	2,026.75
VOC	253.25	0	253.25