DRAFT ENGINEERING EVALUATION

Fairfield Suisun Sewer District, Plant # 1404
1010 Chadbourne Rd, Fairfield, CA 94534
Application # 31318

BACKGROUND

Fairfield Suisun Sewer District (hereafter referred to as "FSSD") has applied for an Authority to Construct (ATC) and/or Permit to Operate (PTO) for the following new equipment:

S-63 Biogas Conditioning System, consisting of iron sponge and carbon adsorbers and fugitive components

S-64 Cogeneration Engine # 3, Jenbacher JMS416, 1,573 bhp, 9.63 MM BTU/hr, 4-stroke, lean-burn; fired on treated digester gas and/or natural gas; abated by A-3, A-4

A-3 Oxidation Catalyst, abating S-64

A-4 Selective Catalytic Reduction (SCR), abating S-64

The sources will be located at 1010 Chadbourne Road, Fairfield, CA 94534.

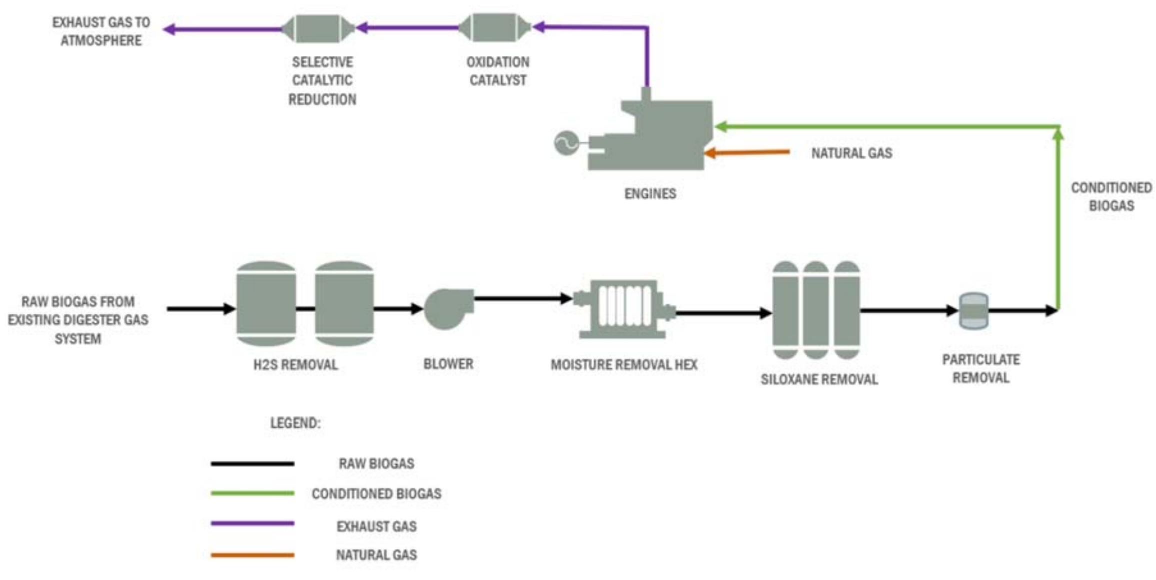

Figure 1. Process Flow Diagram

S-64 will be fired on a combination of digester gas and natural gas and will be equipped with an oxidation catalyst (A-3) to control carbon monoxide (CO), volatile organic compounds (VOC), and formaldehyde emissions, and a selective catalytic reduction (SCR) system (A-4) to control emissions of nitrogen oxides (NO_x). As shown in Figure 1, a biogas conditioning system (S-63) will reduce hydrogen sulfide (H_2S) in the biogas and reduce sulfur dioxide (SO_2) as a result, and particulate matter (PM) emissions in the biogas before it is routed to and combusted in S-64.

The facility decommissioned two of the existing cogeneration engines, S-3 and S-54, on May 4, 2023.

S-3 Cogeneration Engine # 2, 706 hp, Cooper Superior, digester gas fired
S-54 Cogeneration Engine # 3, 1,268 hp, Waukesha L7042GLD, Turbocharged and Intercooled Lean Burn Engine, natural gas and digester gas fired

Gas Treatment System

FSSD currently doses ferric chloride ($FeCl_3$) in the digesters. Historical sampling (using Draeger Tubes) data for H_2S concentration in gas phase (head space of digesters) shows that the H_2S average concentration is approximately 230 parts per million by volume (ppmv) with a minimum of 100 ppmv and a maximum of 400 ppmv, which is within the typical range for municipal wastewater treatment plant biogas evaluated in District permits. The H_2S removal system will be designed for an inlet concentration of 400 ppmv based on sampling data collected from October to December 2020.

H_2S Removal in Biogas Conditioning
H_2S and organic sulfur is removed from biogas to prevent corrosion within combustion equipment and reduce sulfur dioxide (SO_2) emissions from biogas combustion. This will be achieved in the first step of the biogas conditioning process as shown in Figure 1. Iron oxide media (both granular and pellet) will be used for this purpose. When the iron oxide media is exhausted, the spent media will be disposed of in an offsite landfill.

Gas Pressurization and Moisture Removal
The next step in the biogas conditioning process, as shown in Figure 1, consists of compression and moisture removal. Biogas from the digesters needs to be compressed and brought to a higher pressure before combusting in S-64 because biogas typically has a relatively high water vapor content, and the moisture in the biogas must be removed primarily to protect the activated carbon in the downstream siloxane removal system.

This is achieved by boosting the biogas pressure by a gas blower and removing the moisture from the biogas with a moisture separation system. The moisture separation system includes a glycol chiller unit, glycol circulation pump, gas-to-gas heat exchanger to pre-cool the warm biogas and reheat the subsequently chilled biogas, and gas-to-liquid heat exchanger to reduce the biogas temperature to a dew point temperature of 40 to 45 degrees Fahrenheit (°F) for moisture condensation. The biogas is re-warmed through the gas-to-gas heat exchanger to increase the temperature to 75°F to 80°F for siloxane removal.

Siloxane Removal
Because silica particle buildup can cause significant damage to the engine (S-64) and emission control catalysts in A-3 and A-4, siloxanes must be removed before biogas is used as fuel in S-64.

Siloxane removal will be accomplished through adsorption with activated carbon media. Once the activated carbon is exhausted it will be replaced with fresh media. The used media will be transported offsite for regeneration/disposal. Three stainless steel activated carbon vessels will be installed in series to effectively remove siloxane compounds. Two siloxane removal tanks will typically be online as a lead/lag system, with the third to serve as an optional polishing step and provide redundancy. Gas samples taken downstream of the first vessel will indicate if first-stage breakthrough has occurred and media replacement is required.

EMISSIONS CALCULATIONS

Criteria Air Pollutants

The potential to emit for PM_{10}, $PM_{2.5}$, SO_2, and ammonia (NH_3) summarized in Table 1 is based on abated emission factors guaranteed by the engine manufacturer. The potential to emit for NO_x, CO, and POC is based on BACT avoidance limit. Although the manufacturer guaranteed lower emission factors, the Air District has used BACT avoidance limits at the behest of the facility to provide them with operational flexibility. Emission factors for the operation of the cogeneration engine running on 100% digester gas or blended digester gas, considered the primary mode of operation, do not vary with the digester gas and natural gas blend mix. While operating under 100% natural gas, emissions from the cogeneration engine will be equal or less than emissions from the primary mode of operation. Hence, the potential to emit has been calculated based on a 100% digester gas use.

Table 1. Potential to Emit for Jenbacher JMS416 Engine

Pollutant	Abated Emission Factor	Emissions		
	g/bhp-hr	(lb/day)[(a)]	(lb/year)	(tons per year)
NO_x	0.11	9.14	3,334.63	1.667
CO	0.11	9.14	3,334.63	1.667
VOC	0.11	9.14	3,334.63	1.667
PM_{10}	0.03	2.49	909.45	0.455
$PM_{2.5}$	0.03	2.49	909.45	0.455
SO_2[(b)]	100 ppmv as TS	5.98	2,183.22	1.092
NH_3[(c)]	10 ppm 15% O_2	2.26	823.18	0.412

Basis:

- 1,573 bhp
- 24 hours per day and 365 days per year of operation
- Fuel gas high heating value (HHV): 640 BTU/scf
- Fuel Gas Consumption rate: 250.83 scfm, 15,050 scfh
- Heat Input of the engine: 9.632 MM BTU/hr
- [(a)] Daily Emissions were calculated as follows, for example, for NO_x

$$\frac{\mathbf{0.11\ g}}{\mathbf{bhp-hr}} * \mathbf{1,573\ bhp} * \frac{\mathbf{24\ hours}}{\mathbf{day}} * \frac{\mathbf{0.0022\ lb}}{\mathbf{1\ g}} = \mathbf{9.14} \frac{\mathbf{lb}}{\mathbf{day}}$$

- [(b)] SO_2 Emissions were calculated assuming the biogas will contain 100 ppmv total sulfur (TS) as follows:

$$\frac{100\ ppmv}{10^6} * \frac{15{,}050\ scf}{hour} * \frac{24\ hours}{day} * \frac{32\ lb\ of\ TS}{lb\text{–}mol\ of\ TS} * \frac{lb\text{–}mol}{386.9\ scf} = \mathbf{2.987} \frac{lb}{day}\text{TS}$$

$$\frac{2.987\ lb\ of\ TS}{day}\ x\ \frac{64\ lb\ of\ SO2}{32\ lb\ of\ TS} = 5.975\ lb\ SO2/day$$

- [c] Ammonia emissions from S-64 are calculated as follows:
  Basis: Exhaust gas flow rate of S-64 = 2,866 cfm at 862 ºF
  Moisture = 12.5%
  Ammonia Slip, guaranteed by manufacturer = 10 ppmv @ 15% O_2

Ammonia mass emissions at 15% O_2 =

$$\frac{\mathbf{10}\ \boldsymbol{ppmv}}{\mathbf{10^6}} * \frac{\mathbf{20.9\%-0\%}}{\mathbf{20.9\%-15\%}} * \frac{\mathbf{2{,}866}\ \boldsymbol{acf}}{\boldsymbol{min}} * \frac{\mathbf{(460.67+70)}}{\mathbf{(460.67+862)}} * (\mathbf{1-0.125}) * \frac{\mathbf{60}\ \boldsymbol{min}}{\boldsymbol{hr}} * \frac{\mathbf{17}\ \boldsymbol{lb}}{\boldsymbol{lb-mol}} * \frac{\boldsymbol{lb-mol}}{\mathbf{386.9}\ \boldsymbol{scf}} = \mathbf{0.09}\frac{\boldsymbol{lb}}{\boldsymbol{hr}} = \mathbf{2.26}\ \boldsymbol{lb/day}$$

Annual Ammonia Emissions = 0.09 lb/hr × 8,760 hr/yr = 823.18 lb/year

Fugitive Emissions

As previously discussed, FSSD will partially treat the digester gas before it is routed to the cogeneration engine in order to remove some impurities such as siloxanes and moisture which can harm the engine. The gas conditioning system will have fugitive leaks from flanges, valves, compressors, pumps, and other connections. Fugitive emissions were calculated using California Air Pollution Control Officers Association (CAPCOA) correlation equations in Table IV-3.a. for refineries and marketing terminals, and pegged emission factors for leaks greater than 10,000 ppmv in Table IV-3.a. for the oil and gas production industry. The fugitive component counts by type summarized in Table 3 was provided by the facility. The Air District has used higher screening values of 1,000 ppmv for each of the component type to give the facility some flexibility in operation. In addition, the use of CAPCOA emission factors results in a conservative estimate in this case since the facility is a wastewater treatment facility and not a refinery.

Table 2. Fugitive Components THC Emission Rate

Component	Correlation Equation per Component	Screening Values (SV)	Emission Rate per Component	Pegged Factor (>10,000 ppm)[1]	Assuming 1 pegged leaker	Pegged Rate	Emission Rate[2]
	kg/hr	ppm	lbs/hour	lbs/hr		lbs/hour	lbs/hr
Valves	$2.27E\text{-}06*(SV)^{0.747}$	1000	8.72E-04	0.14	0.00	0.00E+00	8.72E-04
Flanges	$4.53E\text{-}06*(SV)^{0.706}$	1000	1.31E-03	0.21	0.00	0.00E+00	1.31E-03
Connectors	$1.53E\text{-}06*(SV)^{0.736}$	1000	5.45E-04	0.066	1.00	6.60E-02	6.60E-02
Compressors	$8.69E\text{-}06*(SV)^{0.642}$	1000	1.62E-03	0.18	0.00	0.00E+00	1.62E-03

[1] Rounded up per Regulation 8-18-306.2 guidance and pegged leaker emissions estimated using the highest component emission factor.

[2] 10,000 ppmv pegged factor provided in Table IV-3a of CAPCOA document.

This facility will not be subject to Regulation 8, Rule 18, *Equipment Leaks*. However, for the purposes of determining the cumulative increase, screening values of 1,000 ppmv for valves, flanges, connectors, and compressors were used in place of screening values in the CAPCOA correlation equations to obtain emission factors for non-pegged components. For the facility's equipment, the Air District assumed one maximum leaking connector assuming the pegged component would leak for a maximum of 90-days at which point the leaking component would be identified and repaired. As per Regulation 8-18-401.6, connectors are required to be inspected annually for leaks. However, the applicant has agreed to inspect and fix leaks sooner than required per the rule in order to keep the emissions lower.

Table 3. Fugitive Emissions from S-63

Component	Emission Rate per Component	Component Counts	Hourly Emissions	Daily Emissions	Annual Emissions[(a)]	
	lbs/hour		lb/hr	lb/day	lb/yr	tpy
Valves	8.72E-04	61	0.05	1.28	465.79	0.233
Flanges	1.31E-03	218	0.29	6.86	2,502.61	1.251
Connectors	6.60E-02	14	0.93	1.75	208.17	0.104
Compressors	1.62E-03	2	0.00	0.08	28.31	0.014
Total			**1.27**	**9.96**	**3,204.87**	**1.602**

(a) Annual emissions are based on 90 days of pegged leakers leaking

Fugitive emissions summarized in Table 3 was estimated as follows:

1. Calculate the "pegged" emission rate for connectors. Estimate connector emissions assuming 1 connector will be pegged and will leak for 90-days (and leak at the unpegged emission rate for 275 days i.e., 365-90), and the remaining 13 connectors will leak at an emission rate that was derived using CAPCOA correlation equations by subbing the Regulation 8-18 standard for the "screening value" for 365-days.
2. Calculate non-connector i.e., valves, flanges, and compressors by assuming no pegged leakers and that each one of the above components will leak at an emission rate that was derived using CAPCOA correlation equations by subbing the Regulation 8-18 standard for the "screening value" for 365-days.

<u>Greenhouse Gas Emissions</u>
Digester gas contains approximately 64% methane (CH_4) and 34% carbon dioxide (CO_2) which are both greenhouse gases (GHGs). During the combustion of digester gas, methane is converted to CO_2. The CO_2 that is present in digester gas and the CO_2 produced during combustion of digester gas are both derived from the decomposition of organic waste materials (primarily vegetable matter). This CO_2 is considered to be biogenic CO_2. Small traces of nitrous oxide (N_2O) are also found in digester gas (roughly 0.001%). During the combustion of digester gas, nitrous oxide is converted to NO_2.

The maximum potential GHG emissions would occur if the new cogeneration engine is operated at full capacity for an entire year. The worst-case emissions are based on the engines consuming 100% digester gas. The applicant provided the average annual digester gas production rate for this facility (251 scfm, 131,925,600 scf/yr) which has been used to calculate worst case GHG emissions. GHG emissions from the engine were calculated using standard EPA emission factors for biomass gases. The emissions of methane and nitrous oxide are converted to a carbon dioxide equivalent emission rate using the global warming potentials (GWP) of 25 for methane and 298 for nitrous oxide.

Table 4. GHG Emissions

GHG	Fuel Use (scf/yr)	HHV (MMBtu/yr)[(a)]	Emission Factor (kg /MMBtu)[(b)]	Emissions (tons)	GWP	CO_2e Emissions (metric tons)
CO_2	131,925,600	84,432.38	52.07	4,846.19	1	4,846
CH_4	131,925,600	84,432.38	0.0032	0.30	25	7
N_2O	131,925,600	84,432.38	0.00063	0.06	298	17
Total						**4,871**

(a) $\boldsymbol{HHV = \frac{131{,}925{,}600\ scf}{yr} * \frac{640\ BTU}{scf} = \frac{84{,}432.38\ MMBTU}{yr}}$
(b) Emission Factors from U.S EPA 40 CFR Part 98, Tables C-1 and C-2.

Toxic Air Contaminants (TACs)

Since there are no TAC emission factors available for biogas combustion in AP-42, TAC emissions from S-64 were estimated using AP-42 emission factors from Chapter 3.2 Natural Gas Fired Reciprocating Engine, Table 3.2-2 assuming 100% natural gas combustion (shown in Table 5). Though A-3 (oxidation catalyst system) is guaranteed by Johnson Matthey to reduce 98%, 95%, and 80% emissions of formaldehyde, acrolein, and PAHs, respectively, an abatement efficiency of 50% has been conservatively applied to all other TACs.

Some metal TAC emissions from S-64 were also estimated using emission factors from SCAQMD's "Supplemental Instructions, Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory", Table B-7: Default EF for Digester Gas Combustion. These are shown in Table 6. Fugitive TAC emissions from S-63 were estimated by multiplying the TAC weight percentages found in site-specific digester gas laboratory analysis results with the fugitive emission rates and are shown in Table 7. Table 8 below shows the total project TAC emissions. The total TAC emissions are 0.816 tons per year.

As shown in Table 8, a health risk assessment (HRA) was required because 1,1,2,2-tetrachloroethane, 1,3-butadiene, acetaldehyde, acrolein, benzene, benzo(e)pyrene, benzo(g,h,i)perylene, ethylene dibromide, formaldehyde, naphthalene, PAHs, vinyl chloride, arsenic, and cadmium equaled and/or exceeded their respective chronic trigger levels set forth in Table 2-5-1.

A HRA was completed for this application on October 28, 2022. Results from the HRA indicated that the maximum cancer risk for the project is 0.81 in a million, the chronic hazard index is 0.15, and the acute hazard index is 0.43. In accordance with Regulations 2-5-301 and 302, the HRA concluded the above are acceptable project risks.

Note: The acute trigger limits for benzene and chloroform were higher at the time this project was evaluated for HRA. There were no acute or chronic trigger limits for 1,3-butadiene at the time. Thus, acute and chronic TAC trigger limits cited in Tables 5, 6, and 8 are those that were in place at the time of HRA review.

Table 5. S-64 TAC Emissions based on AP-42 Emission Factors

Toxic Air Contaminants from Table 2-5-1	Emission Limit (ppm)	AP-42 Emission Factor (lb/MMBTU)	PAH Potency Equivalency Factor	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	Acute Trigger Level (lb/hr)	Chronic Trigger Level (lb/yr)	Acute HRA Triggered?	Chronic HRA Triggered?
1,1,2,2-Tetrachloroethane	-	4.00E-05	-	1.93E-04	1.69E+00	-	1.40E+00	-	**Yes**
1,1,2-Trichloroethane (Vinyl trichloride)	-	3.18E-05	-	1.53E-04	1.34E+00	-	5.00E+00	-	No
1,1-Dichloroethane (Ethylidene dichloride)	-	2.36E-05	-	1.14E-04	9.95E-01	-	5.00E+01	-	No
1,2-Dichloroethane (Ethylene Dichloride)	-	2.36E-05	-	1.14E-04	9.95E-01	-	4.00E+00	-	No
1,3-Butadiene	-	2.67E-04	-	1.29E-03	1.13E+01	-	4.80E-01	-	**Yes**
Acetaldehyde	-	8.36E-03	-	4.03E-02	3.53E+02	1.00E+00	2.90E+01	No	**Yes**
Ammonia	10	-	-	9.40E-02	8.23E+02	7.10E+00	7.70E+03	No	No
Acrolein	-	7.50E-03	-	3.61E-03	3.16E+01	5.50E-03	1.40E+01	No	**Yes**
Benzene	-	4.40E-04	-	2.12E-03	1.86E+01	6.00E-02	2.90E+00	No	**Yes**
Benzo(b)fluoranthene	-	1.66E-07	0.1	7.99E-08	7.00E-04	-	3.30E-03	-	No
Benzo(e)pyrene	-	4.15E-07	-	2.00E-06	1.75E-02	-	3.30E-03	-	**Yes**
Benzo(g,h,i)perylene	-	4.14E-07	-	1.99E-06	1.75E-02	-	3.30E-03	-	**Yes**
Carbon Tetrachloride	-	3.67E-05	-	1.77E-04	1.55E+00	4.20E+00	1.90E+00	No	No
Chlorobenzene	-	3.04E-05	-	1.46E-04	1.28E+00	-	3.90E+04	-	No
Chloroethane (Ethyl chloride)	-	1.87E-06	-	9.00E-06	7.89E-02	-	1.20E+06	-	No
Chloroform	-	2.85E-05	-	1.37E-04	1.20E+00	3.30E-01	1.50E+01	No	No
Chrysene	-	6.93E-07	0.01	3.34E-08	2.92E-04	-	3.30E-03	-	No
Ethylbenzene	-	3.97E-05	-	1.91E-04	1.67E+00	-	3.30E+01	-	No
Ethylene Dibromide (1,2-dibromoethane)	-	4.43E-05	-	2.13E-04	1.87E+00	-	1.10E+00	-	**Yes**
Formaldehyde	-	1.15E-01	-	2.21E-02	1.94E+02	1.20E-01	1.40E+01	No	**Yes**
Methanol (Methyl alcohol)	-	2.50E-03	-	1.20E-02	1.05E+02	6.20E+01	1.50E+05	No	No
Methylene Chloride (dichloromethane)	-	2.00E-05	-	9.63E-05	8.44E-01	3.10E+01	8.20E+01	No	No
Hexane	-	1.11E-03	-	5.34E-03	4.68E+01	-	2.70E+05	-	No
Naphthalene	-	7.44E-05	-	3.58E-04	3.14E+00	-	2.40E+00	-	**Yes**
PAH (AS B(a)P-EQUIV)	-	2.69E-05	-	5.18E-05	4.54E-01	-	3.30E-03	-	**Yes**
Phenol	-	2.40E-05	-	1.16E-04	1.01E+00	1.30E+01	7.70E+03	No	No
Styrene	-	2.36E-05	-	1.14E-04	9.95E-01	4.60E+01	3.50E+04	No	No
Toluene	-	4.08E-04	-	1.96E-03	1.72E+01	8.20E+01	1.20E+04	No	No
Xylenes	-	1.84E-04	-	8.86E-04	7.76E+00	4.90E+01	2.70E+04	No	No

Table 6. S-64 TAC Emissions based on SCAQMD Emission Factors

Toxic Air Contaminants from Table 2-5-1	Fuel Use (scf/hr)	Hours of Operation	Emission Factor (lb/MMscf)	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	Acute Trigger Level (lb/hr)	Chronic Trigger Level (lb/yr)	Acute HRA Triggered?	Chronic HRA Triggered?
1,3-Butadiene	15,050	8,760	5.88E-03	4.42E-05	3.88E-01	1.50E+00	4.80E-01	No	No
1,4-Dichlorobenzene	15,050	8,760	1.20E-02	9.03E-05	7.91E-01	-	7.20E+00	-	No
Acetaldehyde	15,050	8,760	3.18E-02	2.39E-04	2.10E+00	1.00E+00	2.90E+01	No	No
Ammonia	15,050	8,760	3.20E+00	2.41E-02	2.11E+02	7.10E+00	7.70E+03	No	No
Arsenic	15,050	8,760	1.38E-03	2.08E-05	1.82E-01	4.00E-04	1.60E-03	No	**Yes**
Cadmium	15,050	8,760	3.48E-04	5.24E-06	4.59E-02	-	1.90E-02	-	**Yes**
Carbon Tetrachloride	15,050	8,760	1.20E-02	9.03E-05	7.91E-01	4.20E+00	1.90E+00	No	No
Chloroform	15,050	8,760	1.02E-02	7.68E-05	6.72E-01	3.30E-01	1.50E+01	No	No
Ethylene Dichloride	15,050	8,760	9.00E-03	6.77E-05	5.93E-01	-	4.00E+00	-	No
Formaldehyde	15,050	8,760	1.14E-01	3.43E-05	3.01E-01	1.20E-01	1.40E+01	No	No
Lead	15,050	8,760	2.04E-03	3.07E-05	2.69E-01	-	2.90E-01		No
Methylene Chloride (dichloromethane)	15,050	8,760	7.80E-03	5.87E-05	5.14E-01	3.10E+01	8.20E+01	No	No
Nickel	15,050	8,760	1.20E-03	1.81E-05	1.58E-01	3.10E-05	3.10E-01	No	No
Selenium	15,050	8,760	6.60E-03	9.93E-05	8.70E-01	-	8.00E+00	-	No
Tetrachloroethane	15,050	8,760	1.26E-02	9.48E-05	8.31E-01	4.40E+01	1.40E+01	No	No
Trichloroethene	15,050	8,760	1.08E-02	8.13E-05	7.12E-01	-	4.10E+01	-	No
Vinyl Chloride	15,050	8,760	2.16E-02	1.63E-04	1.42E+00	4.00E+02	1.10E+00	No	**Yes**

Table 7. Fugitive Emissions from S-63

TACs	% by wt.[a]	Emissions	
		lb/hour[b]	lb/year[c]
Propene	0.0000717	9.13E-07	2.30E-03
2-Propanol	0.00034	4.33E-06	1.09E-02
Carbon Disulfide	0.0000913	1.16E-06	2.93E-03
Ethylbenzene	0.0000182	2.32E-07	5.83E-04
Xylene	0.000082	1.04E-06	2.63E-03
MTBE	0.0000166	2.11E-07	5.32E-04
Benzene	0.0000937	1.19E-06	3.00E-03
Toluene	0.0000819	1.04E-06	2.62E-03
1,2,4-Trimethylbenzene	0.0000165	2.10E-07	5.29E-04

[a] Based on gas analysis results provided by the facility for raw biogas samples collected on June 8, 2021.
[b] Acute Fugitive Emissions of propene =

$$0.0000717\% * Total\ hourly\ Fugitive\ Emissions\ 1.27\frac{lbs}{hour} = 9.13E-07\frac{lb}{hour}$$

[c] Chronic Fugitive Emissions of propene =

$$0.0000717\% * Total\ annual\ Fugitive\ Emissions\ 3{,}204.87\frac{lbs}{year} = 2.30E-03\ lb/year$$

Table 8. Project TAC Emissions

Toxic Air Contaminants from Table 2-5-1	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	Acute Trigger Level (lb/hr)	Chronic Trigger Level (lb/yr)	Acute HRA Triggered?	Chronic HRA Triggered?
1,1,2,2-Tetrachloroethane	1.93E-04	1.69E+00	-	1.40E+00	-	**Yes**
1,1,2-Trichloroethane (Vinyl trichloride)	1.53E-04	1.34E+00	-	5.00E+00	-	No
1,1-Dichloroethane (Ethylidene dichloride)	1.14E-04	9.95E-01	-	5.00E+01	-	No
1,2-Dichloroethane (Ethylene Dichloride)	1.14E-04	9.95E-01	-	4.00E+00	-	No
1,3-Butadiene	1.29E-03	1.13E+01	-	4.80E-01	-	**Yes**
1,4-Dichlorobenzene	9.03E-05	7.91E-01	-	7.20E+00	-	No
2-propanol	4.05E-06	1.09E-02	1.40E+00	2.70E+05	No	No
Acetaldehyde	4.03E-02	3.53E+02	1.00E+00	2.90E+01	No	**Yes**
Ammonia	9.40E-02	8.23E+02	7.10E+00	7.70E+03	No	No
Acrolein	3.61E-03	3.16E+01	5.50E-03	1.40E+01	No	**Yes**
Arsenic	2.08E-05	1.82E-01	4.00E-04	1.60E-03	No	**Yes**
Benzene	2.12E-03	1.86E+01	6.00E-02	2.90E+00	No	**Yes**
Benzo(b)fluoranthene	7.99E-08	7.00E-04	-	3.30E-03	-	No
Benzo(e)pyrene	2.00E-06	1.75E-02	-	3.30E-03	-	**Yes**
Benzo(g,h,i)perylene	1.99E-06	1.75E-02	-	3.30E-03	-	**Yes**
Cadmium	5.24E-06	4.59E-02	-	1.90E-02	-	**Yes**
Carbon Disulfide	1.09E-06	2.91E-03	2.70E+00	3.10E+04	No	No
Carbon Tetrachloride	1.77E-04	1.55E+00	4.20E+00	1.90E+00	No	No
Chlorobenzene	1.46E-04	1.28E+00	-	3.90E+04	-	No
Chloroethane (Ethyl chloride)	9.00E-06	7.89E-02	-	1.20E+06	-	No
Chloroform	1.37E-04	1.20E+00	3.30E-01	1.50E+01	No	No

Toxic Air Contaminants from Table 2-5-1	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	Acute Trigger Level (lb/hr)	Chronic Trigger Level (lb/yr)	Acute HRA Triggered?	Chronic HRA Triggered?
Chrysene	3.34E-08	2.92E-04	-	3.30E-03	-	No
Ethylbenzene	1.91E-04	1.67E+00	-	3.30E+01	-	No
Ethylene Dibromide (1,2-dibromoethane)	2.13E-04	1.87E+00	-	1.10E+00	-	**Yes**
Formaldehyde	2.21E-02	1.94E+02	1.20E-01	1.40E+01	No	**Yes**
Hexane	5.34E-03	4.68E+01	-	2.70E+05	-	No
Lead	3.07E-05	2.69E-01	-	2.90E-01	-	No
Methanol (Methyl alcohol)	1.20E-02	1.05E+02	6.20E+01	1.50E+05	No	No
Methylene Chloride (dichloromethane)	9.63E-05	8.44E-01	3.10E+01	8.20E+01	No	No
MTBE	1.97E-07	5.30E-04	-	1.60E+02	-	No
Nickel	1.81E-05	1.58E-01	3.10E-05	3.10E-01	No	No
Naphthalene	3.58E-04	3.14E+00	-	2.40E+00	-	**Yes**
PAH (AS B(a)P-EQUIV)	5.18E-05	4.54E-01	-	3.30E-03	-	**Yes**
Phenol	1.16E-04	1.01E+00	1.30E+01	7.70E+03	No	No
Propene	8.53E-07	2.29E-03	-	1.20E+05	-	No
Selenium	9.93E-05	8.70E-01	-	8.00E+00	-	No
Styrene	1.14E-04	9.95E-01	4.60E+01	3.50E+04	No	No
Tetrachloroethane	9.48E-05	8.31E-01	4.40E+01	1.40E+01	No	No
Trichloroethene	8.13E-05	7.12E-01	-	4.10E+01	-	No
Toluene	1.96E-03	1.72E+01	8.20E+01	1.20E+04	No	No
Vinyl Chloride	1.63E-04	1.42E+00	4.00E+02	1.10E+00	No	**Yes**
Xylenes	8.86E-04	7.76E+00	4.90E+01	2.70E+04	No	No

PLANT CUMULATIVE INCREASE

Contemporaneous On-site Emission Reductions for S-3 and S-54

S-3 and S-54 were decommissioned on May 4, 2023. Baseline emissions from the removal of S-3 and S-54 form the basis for the contemporaneous emission reductions. The baseline emissions are based on annual reported throughput for S-3 and S-54. The most recent annual throughputs for the years 2020, 2021, and 2022 were used to estimate the baseline actual emissions from S-3 and S-54. South Coast Air Quality Management District (SCAQMD) Rule 1110.2 limits NO_x and POC emissions from biogas-fired engines to 11 ppmvd and 30 ppmvd, at 15% oxygen, respectively. S-54 was source tested in 2003. The results of this test are not available. S-3 was source tested in 2007 (NTV-403) and the test results indicated 98.3 ppmv of NO_x and <80 ppmv of POC. As the SCAQMD limits are lower than S-3's source-tested limits and achieved in practice, these have been used as Reasonably Available Control Technology (RACT) for both S-3 and S-54.

The RACT adjusted emissions from S-3 – a 706 bhp engine, are summarized in Table 9. The RACT adjusted emissions from S-54, a 1,268 bhp engine, are summarized in Table 10.

Table 9. RACT Adjusted Emissions from S-3

Source # 3	Digester Gas Usage (thousand scf/year)	Emissions[a]	
		NO_x (tpy)	POC (tpy)
2022	4,174	0.061	0.043
2021	34,999	0.509	0.362
2020	4,660	0.068	0.048
Average		**0.213**	**0.151**

[a] Assuming a F_d value of 9,810 dscf/MMBTU and a heat content of 640 BTU/scf for biogas, the NO_x and POC baseline emissions were calculated as:

$$NOx\ Emissions\ in\ 2022 = \frac{11}{10^6} * \frac{(20.9-0)}{(20.9-15)} * \frac{9{,}810\ dscf}{MMBTU} * \frac{46.04\ lb}{lb-mol} * \frac{lb-mol}{386.9\ scf} * \frac{4{,}174{,}000\ scf}{year} * \frac{0.000640\ MMBTU}{scf} * \frac{1\ ton}{2{,}000\ lb} = 0.061\ tpy$$

$$POC\ Emissions\ in\ 2022 = \frac{30}{10^6} * \frac{(20.9-0)}{(20.9-15)} * \frac{9{,}810\ dscf}{MMBTU} * \frac{12\ lb}{lb-mol} * \frac{lb-mol}{386.9\ scf} * \frac{4{,}174{,}000\ scf}{year} * \frac{0.000640\ MMBTU}{scf} * \frac{1\ ton}{2{,}000\ lb} = 0.043\ tpy$$

Table 10. RACT Adjusted Emissions from S-54

Source # 54	Digester Gas Usage (thousand scf/year)	NG Usage (thousand scf/year)	Emissions[a]	
			NO_x (tpy)	POC (tpy)
2022	41,017	16,965	0.844	0.176
2021	30,422	8,720	0.570	0.090
2020	68,737	29,732	1.433	0.308
Average			**0.949**	**0.191**

[a] Since S-54 used a blend of NG and DG, the total throughput was added to calculate the NO_x and POC emitted from S-54.

Plant Cumulative Increase

Table 11 summarizes the cumulative increase from the proposed new equipment.

Table 11. Cumulative Increase Summary

Pollutant	Existing Cumulative Emissions, (tpy)	Current Application Emissions, tpy		On-Site Emissions Reduction Credits, (tpy)		Cumulative Increase (tpy)
		S-63	S-64	S-3	S-54	
NO_x	0.643	0.000	1.667	0.213	0.949	1.148
CO	0.142	0.000	1.667			1.809
POC	0.089	1.602	1.667	0.151	0.191	3.016
PM_{10}	0.029	0.000	0.455			0.484
$PM_{2.5}$	0.028	0.000	0.455			0.483
SO_2	0.033	0.000	1.092			1.125

STATEMENT OF COMPLIANCE

Regulation 2, Rule 1 – (CEQA)
This application is not considered to be ministerial under the District's Regulation 2-1-311 and, therefore, is subject to a CEQA review. FSSD has provided a Notice of Exemption for this project stating that the project meets a categorical exemption under California Code of Regulations Title 14 § 15329(a). The application also meets categorical exemption requirements under Regulation 2-1-312.8. In accordance with Regulation 2-1-426, the applicant has provided an Appendix H form.

In making the determination that this application is categorically exempt: 1) the Air District reviewed the CEQA-related information (Appendix H) from the applicant (Regulation 2-1-426.1) indicating that there is no potential for a significant adverse environmental impact from the project; 2) a formal health risk assessment was approved by the Air District; and 3) the Air District determined that the cumulative impacts from this project and related operation of the facility will not result in significant adverse environmental impacts.

Regulation 2, Rule 1: School and Overburdened Communities Public Notice Requirements
The public notification requirements of Regulation 2-1-412 apply to new or modified sources which result in any increase in toxic air contaminant or hazardous air contaminant emissions at facilities within 1,000 feet of the boundary of a K-12 school, or to new or modified sources located in an overburdened community (OBC). Since TAC emissions summarized in Table 8 triggered an HRA, an OBC notification was required pursuant to the requirements of Regulations 2-1-412. A public notice was prepared and distributed for public comments on December 7, 2023. Public responses were due by January 8, 2024.

Regulation 2, Rule 2: Best Available Control Technology (BACT) Requirements
In accordance with Regulation 2-2-301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more of a BACT pollutant on any day. Per information summarized in Tables 1 and 3, S-63 and S-64 do not trigger BACT.

Regulation 2, Rule 2: Offsets
In accordance with Regulation 2-2-302.1.1 and when the facility's potential to emit (PTE) is > 10 tpy but < 35 tpy, the NO_x and POC offsets will be provided from the Small Facilities Banking Account (SFBA) in the District's Emissions Bank if the applicant (or any entity controlling, controlled by, or under common control with the applicant) does not own or control offsets. As shown in Table 12, the facility's PTE for NO_x and POC is 21.094 tpy and 7.059 tpy, respectively. Thus, the facility is subject to NO_x offsets. The facility owns NO_x credits in the amount of 0.16 tpy in an existing Certificate # 1200. Therefore, this certificate will be used to offset 0.160 tpy of the 1.148 tpy NO_x offsets owed (1.667 from Table 11 + 0.643 from Table 13 – 0.213 from Table 9 – 0.949 from Table 10). The remainder of 0.988 tpy (1.148 – 0.160) of NO_x offsets will be provided from the SFBA per Regulation 2-2-302.1.1 as shown in Table 13.

Table 12: Potential to Emit Analysis

Pollutant	Permitted Sources, (tpy)	LOEs, (tpy)	Grandfathered Sources, (tpy)	Registered Sources, (tpy)	Current Application, (tpy)	Total PTE (tpy)
NO_x	3.483	11.835		4.109	1.667	21.094
POC	0.285	0.966	2.444	0.096	3.269	7.059

Table 13. Offsets

Pollutant	Existing Permitted and offset Facility Emissions, (tpy)	Un-Offset emissions (tpy)	Current Application Emissions, (tpy)	On-Site Emissions Reduction Credits, (tpy)		Offsets owned by facility, (tpy)	Offsets to be provided from SFBA (tpy)
				S-3	S-54		
NO_x	0.514	0.643	1.667	0.213	0.949	0.160	0.988
CO	0.142		1.667				
POC	0.026	0.087	3.269	0.151	0.191		
PM_{10}	0.029		0.455				
$PM_{2.5}$	0.028		0.455				
SO_2	0.033		1.092				

Regulation 2, Rule 2: Prevention of Significant Deterioration (PSD) Requirements:
The PSD requirements in District Regulation 2, Rule 2, Sections 304 and 305 apply to major modifications at a major facility. Wastewater treatment plants are not one of the 28 PSD source categories that are subject to the 100 tons/year threshold. Therefore, the PSD thresholds for this facility are 250 tons/year for criteria pollutants. The PTE for all criteria pollutants is less than 100 tons/year for each pollutant. Since the CO PTE does not exceed 250 tons/year, this site is not currently subject to PSD. As a result, Regulation 2-2-304 and 2-2-305 do not apply.

Regulation 2, Rule 5: Health Risk Assessment Requirements
All TAC emissions from new sources are subject to risk assessment review if emissions of one/more TACs from the project are equal to and/or exceed the acute or chronic emission thresholds specified in Table 2-5-1 of Regulation 2, Rule 5. As shown in Table 8, an HRA was required because 1,1,2,2-tetrachloroethane, 1,3-butadiene, acetaldehyde, acrolein, benzene, benzo(e)pyrene, benzo(g,h,i)perylene, ethylene dibromide, formaldehyde, naphthalene, PAHs, vinyl chloride, arsenic, and cadmium equaled and/or exceeded their respective chronic trigger levels set forth in Table 2-5-1.

A HRA was completed for this application on October 28, 2022. Results from the HRA indicated that the maximum cancer risk for the project is 0.81 in a million, the chronic hazard index is 0.15, and the acute hazard index is 0.43. In accordance with Regulations 2-5-301 and 302, the HRA concluded the above are acceptable project risks.

Regulation 6, Rule 1: Particulate Matter – General Requirements
S-64 is subject to Regulation 6, Rule 1. Opacity and visible emissions are limited by Regulations 6-1-303.1 (displacement greater than 25 liters) to Ringelmann 1.

Regulation 6-1-305 prohibits emission of particles from any operation in sufficient number to cause annoyance to any other person where the particles are large enough to be visible as individual particles at the emission point, or of such size and nature as to be visible individually as incandescent particles. S-64 is not expected to produce visible emissions or fallout in violation of this regulation and is thus expected to be in compliance with Regulation 6-1-305.

S-64 is also subject to the Regulation 6-1-310.1 particulate weight limitation of 0.15 grains/dscf. Compliance with this limit is expected as at the current emission rate, the grain loading will be 0.012 grains/dscf i.e., 12 grains/minute ÷ 1005 dscf/min. In addition, compliance with Regulation 6-1 standards will also be determined by initial source testing at S-64 and subsequent periodic testing of the engine required by the proposed permit conditions.

The District's Compliance and Enforcement staff will verify compliance with the applicable Regulation 6, Rule 1 standards during their routine inspections of the facility.

Regulation 8, Rule 18: Equipment Leaks
This rule limits emissions of total organic compounds from equipment leaks at refineries, chemical plants, bulk plants, and bulk terminals. This facility does not fall into any of these categories and thus, 8-18 does not apply here. However, since this project will result in a number of fugitive components being used which will come in contact with the biogas and organic compounds as a result, fugitive emissions were calculated for the purposes of calculating the cumulative emissions increase and TAC emissions from this project and to check if fugitive emissions will trigger BACT. Permit conditions have been added that are similar to the requirements contained in Regulation 8-18 but the basis is cumulative increase.

Regulation 9, Rule 1: Sulfur Dioxide
In accordance with Regulation 9-1-301, a person shall not emit from sources, other than ships, SO_2 in quantities which result in ground level concentrations in excess of 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours. In accordance with Regulation 9-1-302, a person shall not emit from any source, a gas stream containing SO_2 in excess of 300 ppm (dry). The proposed permit conditions will require annual source testing and quarterly analyses of the fuel sulfur content to ensure compliance with these limits.

Regulation 9, Rule 2: Inorganic Gaseous Pollutants: Hydrogen Sulfide
This rule limits ground level concentrations of hydrogen sulfide to 0.06 ppm averaged over three consecutive minutes or 0.03 ppm averaged over any 60 consecutive minutes. Past Air District evaluations have determined that digester gas usually is low in hydrogen sulfide. H_2S emissions are expected to be negligible from the new equipment, therefore, ambient concentrations of H_2S are expected to be negligible.

Regulation 9, Rule 8: Nitrogen Oxides and Carbon Monoxide from Stationary IC Engines
This rule limits the emissions of NO_x and CO from stationary internal combustion engines with an output rated by the manufacturer at more than 50 brake horsepower.

Digester gas and blended digester gas/natural gas qualifies as a waste-derived fuel per Regulation 9-8-302. Per Regulation 9-8-302, spark-ignited lean-burn stationary internal combustion engines such as S-64 fired on waste derived fuels or any combination of waste and fossil-derived gaseous fuels and liquid fuels are required to meet the following NO_x and CO concentration limits:

- NO_x emissions shall not exceed 70 ppmv as corrected to 15% O_2, dry basis.
- CO emissions shall not exceed 2,000 ppmv as corrected to 15% O_2, dry basis.

The oxidation catalyst (A-3) and SCR (A-4) are each guaranteed by Johnson Matthey to have abated NO_x and CO concentrations (corrected to 15% O_2) less than 15 ppmvd and 25 ppmvd, respectively. Therefore, the proposed engine will comply with the requirements of Regulation 9, Rule 8 as discussed above, and will be required by the proposed permit conditions to demonstrate compliance with Regulation 9-8 via the initial source test and quarterly monitoring requirements of Regulation 9-8-501 and 9-8-503, respectively.

Though the Johnson Matthey NO_x emissions guarantee of 15 ppmvd at 15% oxygen is higher than the NO_x limit of 11 ppmvd at 15% oxygen in SCAQMD Rule 1110.2 that was discussed under "Contemporaneous On-site Emission Reductions" in the "Plant Cumulative Increase" discussion, S-64 did not trigger BACT as shown in Table 1. Therefore, S-64 will be subject to the Johnson Matthey NO_x emissions guarantee of 15 ppmvd at 15% oxygen and will be required by the proposed permit conditions to demonstrate initial and subsequent compliance with the Johnson Matthey guarantee.

New Source Performance Standards (NSPS)

The 40 CFR, Part 60, Subpart JJJJ (NSPS JJJJ) for spark-ignition (SI) internal combustion engines (ICE) applies to both engine manufacturers and engine owners. This discussion covers the requirements for owners and operators. Section 60.4230(a)(4)(i) of Subpart JJJJ applies to owners/operators of engines that commence construction after June 12, 2006, where the engine power rating is greater than 500 hp and the engine is manufactured after July 1, 2007. The proposed cogeneration engine, S-64, meets these criteria. In accordance with 40 CFR Part 60.4233(e), SI ICE meeting the above criteria must comply with the emission limits in Table 1 of Subpart JJJJ. For landfill/digester gas fired engines ≥ 500 bhp, the Subpart JJJJ, Table 1 standards below are effective as of 7/1/2010:

Table 13. Proposed Engine Limits Compared to Applicable NSPS Limits

Pollutant	Abated emission factors for S-64 from Table 1	NSPS Limits: 40 CFR Part 60, Subpart JJJJ, Table 1	
	g/bhp-hr	g/bhp-hr	ppmv at 15% O_2
NO_x	0.11	2.0	150
CO	0.11	5.0	610
VOC	0.11	1.0	80

As shown in Table 13 above, the proposed emission limits for the cogeneration engine are well below the applicable NSPS limits.

The owner/operator of S-64 is subject to Section 60.4243(b) and must demonstrate compliance with the Subpart JJJJ, Table 1 limits by complying with 60.4243(b)(2)(ii) and using the test procedures in 60.4244. Pursuant to 60.4243(b)(2)(ii), the operator must keep a maintenance plan and records of maintenance conducted. These requirements have been incorporated into the proposed permit conditions. The operator must also conduct initial and subsequent performance tests (every 8,760 hours of operation or every 3 years, whichever comes first). The testing requirements have been incorporated into the proposed permit conditions.

In accordance with 40 CFR 60.4245(a), the operator of S-64 must maintain records of: all notifications, all maintenance conducted on the engine, and all performances tests. Initial notification is required pursuant to 40 CFR 60.4245(c) and 60.7(a)(1). The record keeping and notification requirements have been incorporated into the proposed permit conditions.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

The biogas engine is subject to the emission or operating limitations in 40 CFR 63, Subpart ZZZZ, NESHAPs for Stationary Reciprocating Internal Combustion Engines, and it is also subject to Subpart JJJJ (See 40 CFR 63.6590(c)(1)). The biogas engine complies with Subpart ZZZZ by meeting Subpart JJJJ requirements discussed in the preceding paragraph.

PERMIT CONDITIONS

Permit Condition #xxxxx

Equipment included in this permit condition:

S-64 Cogeneration System #3, Jenbacher JM416, 1,573 bhp, 9.63 MM BTU/hr, 4-stroke, lean-burn; fired on treated digester gas and/or natural gas;

A-3 Oxidation Catalyst, abating S-64

A-4 Selective Catalytic Reduction (SCR), abating S-64

1. The owner/operator of S-64 shall exclusively fire S-64 "Cogeneration Prime Engine" on digester gas from S-190, Anaerobic Digesters, and/or pipeline quality natural gas.
   (Basis: Cumulative Increase)
2. The owner/operator of S-64 shall not allow the heat input to exceed the following throughput limits:
   a. 231 million BTU (HHV) during any consecutive 24-hour period.
   b. 84,359 million BTU (HHV) during any consecutive 12-month period.
   (Basis: Cumulative Increase)
3. The owner/operator of S-64 shall properly install, properly maintain, and properly operate per manufacturer's specifications, dedicated continuous fuel flow monitors and recorders on S-64 which shall each measure the amount of digester gas and natural gas routed to S-64. The heat input of S-64 in Part 2 shall be calculated by assuming the higher of 640 BTU/scf of digester gas or heat input as observed during the most recent testing from Part 14 or Part 15.
   (Basis: Cumulative Increase)
4. The owner/operator of S-64 shall ensure all digester gas combusted in S-64 is first treated by the properly installed, properly operated, and properly maintained S-63 "Biogas Conditioning System", per manufacturer's specifications prior to combustion.
   (Basis: Cumulative Increase)
5. The owner/operator shall properly install, properly maintain and properly operate A-3 and A-4 in accordance with the manufacturer's specifications and shall serially abate S-64's emissions with A-3, Oxidation Catalyst, and A-4, SCR, during all periods of operation. The owner/operator shall not regenerate A-4 media on site.
   (Basis: Regulation 2-1-320, Cumulative Increase)
6. The owner/operator shall abate all NO_x emissions from S-64 by A-4 at all times of operation except during startup and shutdown of S-64. The owner/operator shall ensure that the SCR catalyst bed is equipped with a properly installed, properly operated, and properly maintained temperature monitor and continuous recorder that is operated in accordance with the manufacturer's specifications that accurately measures and records the temperature of exhaust gas from the catalyst during all periods of operation.
   (Basis: Cumulative Increase)
7. The owner/operator shall abate all CO and organic compound emissions from S-64 by A-3 at all times of operation except during startup and shutdown of S-64.
   (Basis: Cumulative Increase)
8. The owner/operator shall ensure abated NO_x emissions from S-64 exiting out of A-4 does not exceed an emission rate of 0.11 grams of NO_x (calculated as NO_2) per brake-horsepower-hour, or

the equivalent outlet concentration of 15 ppmv of NO_x, corrected to 15% oxygen, dry basis, averaged over the duration of the source test.
(Basis: BACT Avoidance, Cumulative Increase)

9. The owner/operator shall ensure abated CO emissions from S-64 exiting out of A-3 does not exceed an emission rate of 0.11 grams of CO per brake-horsepower-hour, or the equivalent outlet concentration of 25 ppmv of CO, corrected to 15% oxygen, dry basis, averaged over the duration of the source test.
(Basis: BACT Avoidance, Cumulative Increase)

10. Upon completing the initial source test and demonstrating compliance with applicable limits per Part 14 of this permit condition, the owner/operator of S-64 shall demonstrate ongoing compliance with the limits in Parts 8 and 9, by using a properly installed, properly operated, and properly maintained portable analyzer that is operated in accordance with the manufacturer's specifications to take NO_x and CO emission readings at least once during any quarter in which the engine has operated but a source test has not been conducted. All emission readings shall be taken with the engine operating at conditions representative of normal operations. NO_x and CO emission readings shall be averaged over a consecutive 15-minute period and shall be corrected to 15% oxygen.
(Basis: Cumulative Increase, and Regulation 2-1-403 and 9-8-503)

11. The owner/operator shall ensure PM_{10} or $PM_{2.5}$ emissions from S-64 do not exceed 0.03 grams of PM_{10} or $PM_{2.5}$ per brake-horsepower-hour per pollutant. This includes condensable and filterable PM.
(Basis: Cumulative Increase)

12. The owner/operator of S-64 shall ensure POC measured as non-methane non-ethane hydrocarbon (NMNEHC) emissions from S-64 do not exceed 0.11 grams of POC per brake-horsepower-hour, or the equivalent outlet concentration of 43 ppmv of POC (as methane), corrected to 15% oxygen, dry basis, averaged over the duration of the source test. The owner/operator shall ensure formaldehyde emissions from S-64 do not exceed 0.022 pounds per hour.
(Basis: BACT Avoidance, Cumulative Increase)

13. The owner/operator of S-64 shall not allow the ammonia (NH_3) concentration in the exhaust from S-64 to exceed 10 ppmv, corrected to 15% oxygen, dry basis.
(Basis: Regulation 2-1-403)

14. In order to demonstrate compliance with Parts 8, 9, 11, 12, 13, and Regulations 6-1-310.1, 9-1-302, 9-8-302.1, 9-8-302.3, and 40 CFR 60, Subpart JJJJ the owner/operator of S-64 shall ensure that an Air District approved source test is conducted at S-64 within 60-days of starting up S-64 and once every 8,760 hours of consecutive operation or once every three years thereafter, whichever comes first. The owner/operator of S-64 shall conduct an Air District approved source test for formaldehyde at least once every 36 consecutive months. Each Air District approved source test shall be conducted at the outlet of A-4 while S-64 is operating at conditions representative of normal operations while fired on digester gas from S-190, Anaerobic Digesters, and/or pipeline quality natural gas. The owner/operator of S-64 shall use only Air District approved source test methods and source test procedures when conducting Air District approved source tests. The Manager of the Air District's Source Test Section shall be notified of the scheduled test date at least 21 days in advance of each source test. Source test reports for compliance testing shall be submitted to the

Source Test Section within 60 days of the source test date. Each source test shall demonstrate compliance with Parts 8, 9, 11, 12, and 13 and all requirements identified below:

a. Actual gross electrical output (kW-hrs) from S-64 during the test period and the calculated power output (bhp) from S-64 determined using the following equation: bhp = 1.34 * kW;

b. Total flow rate (standard cubic feet per minute, dry basis, or sdcfm) of all gaseous fuel to S-64;

c. Concentrations (percent by volume or ppmv, dry basis) of carbon dioxide (CO_2), nitrogen (N_2), oxygen (O_2), methane (CH_4), total non-methane organic compounds (NMOC), and total sulfur compounds (TS) in the gaseous fuel burned in S-64;

d. Higher heating value (BTU/scf) for the biogas as per Part 15;

e. Heat input rate (BTU/hour, HHV) to S-64 averaged over the test period;

f. Exhaust gas flow rate (dscfm) from S-64 based on EPA Method 2 or Method 19;

g. Raw and corrected (to 15% O_2) concentrations (in ppmv or percent by volume, dry basis) of abated NO_x, CO, CH_4, C_2H_6, NMNEHC, SO_2, NH_3, formaldehyde, and O_2 in the exhaust gas from S-64 exiting out of A-4 and 0.03 g/bhp-hour of PM_{10};

h. Average temperature of the SCR catalyst exhaust gas temperature for S-64 during the source test;

i. During the source test, the owner/operator shall concurrently also measure concentrations of NO_x, CO, and O_2 (ppmv) in the exhaust from S-64 using the portable analyzer procedures described in Part 10. The portable analyzer measurements of corrected O_2, NO_x, and CO concentrations shall be compared to the values measured pursuant to Part 14g.

(Basis: Cumulative Increase, and Regulations 2-1-403, 9-1-302, 9-8-302.1, and 9-1-302.3)

15. The owner/operator of S-64 shall monitor and record the heat content of the digester gas at least once each calendar quarter using an Air District approved method.
(Basis: Cumulative Increase)

a. If results of testing the heat content of the digester gas do not exceed the threshold in Part 3 (640 Btu/scf, HHV) after four consecutive quarterly tests, the facility may request the Air District to reduce the frequency of testing for heat content of the digester gas to occur on an annual basis.

b. Any heat content (HHV) results determined to be greater than 640 Btu/scf will result in reverting to quarterly monitoring of heat content of the digester gas.

16. The owner/operator of S-64 shall maintain the following plans and records on-site for a minimum of 24-months from the date of entry. The plans and records shall be made available to District staff upon request.

a. Records of fuel flow rate of natural gas and digester gas to S-64 collected and determined via dedicated fuel flowmeters required under Part 3.

b. Using information collected as per Part 15, records of heat input to S-64 for each calendar month and for each rolling 12-month period. Heat input shall be calculated using Air District approved procedures based on measured digester gas flow rate data and measured digester gas methane concentration data. The calculated heat input rates shall be recorded in a data acquisition system or electronic spreadsheet and used to demonstrate compliance with Part 2 on a rolling 24-hour and 12-month basis.

c. Records of all monitoring or source testing conducted to demonstrate compliance with this permit condition and District rules.

d. An engine maintenance plan required by NSPS JJJJ.

e. Records of all maintenance conducted on S-64 required by NSPS JJJJ.

f. Records of start-ups, shut-downs, and malfunctions for S-64 required by NSPS JJJJ. For any malfunction, the records shall include the root cause analysis of the malfunction, the actions taken to correct the malfunction, the date and time that the malfunction was corrected, and the actions taken to prevent such malfunctions in the future.

(Basis: 2-1-403, NSPS JJJJ Part 60.4243(b)(2)(ii))

Permit Condition #yyyyy

Equipment included in this permit condition:
S-63 (Biogas Conditioning System, consisting of iron sponge and carbon adsorbers and fugitive components)

1. The owner/operator of S-63 shall ensure that precursor organic compounds (POC) emissions from all fugitive components combined do not exceed 1.602 tons in any consecutive 12-month period. For the purposes of these conditions POC is assumed to be equivalent to non-methane organic compounds (NMOC).
(Basis: Cumulative Increase)

2. The owner/operator of S-63 shall demonstrate compliance with the above emission rate limit in Part 1 by using the following procedures:
   a. The owner/operator of S-63 shall not exceed the following fugitive component/equivalent counts and/or leak rates except as provided in Part 2(c) at the facility:

Component	Total Facility Count	Maximum Emission Limit (ppmv)*
Valves	61	1,000
Flanges	218	1,000
Connectors	14	1,000
Compressors	2	1,000

* Concentrations noted are concentration levels above background levels

   b. The owner/operator of S-63 shall not exceed emission limits in Parts 1 and/or Part 2.a. These emission limits in Part 2.a. include fugitive component emissions from default zero components, non-pegged leaking components, and from pegged leaking components. Pegged leaking components (pegged leakers) are defined as components leaking at or greater than the maximum useful range of the monitoring instrument (or 10,000 ppmv measured as C1). The owner/operator shall calculate the POC fugitive emissions from non-pegged leaking fugitive components by using the correlation equations provided in

Table IV-3a. of the California Air Pollution Control Officers Association (CAPCOA) document titled "California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities" dated February 1999 in concert with the actual screening levels including default zeros measured by the facility's Leak Detection and Repair (LDAR) program, or employ any other Air District approved method to measure and quantify such emissions. The owner/operator shall calculate the POC fugitive emissions from pegged leaking fugitive components by using the correlation equations provided in Table IV-3a. in the above CAPCOA document for leak rates greater than or equal to 10,000 ppmv, or employ any other Air District approved method to measure and quantify such emissions. The owner/operator of S-63 shall use the midpoint method to determine the length of time that a fugitive component is assumed to be leaking for the purposes of compliance with these conditions. These calculations shall be conducted on a bi-annual basis.
(Basis: Regulation 2-1-403, Cumulative Increase)

c. The owner/operator of S-63 shall not use any fugitive component that emits total organic compounds in excess of 5 pounds per day per component (or exceeds a portable analyzer reading of 10,000 ppmv or the range of the analyzer, whichever is less). The owner/operator shall ensure all pegged leakers are repaired or replaced as soon as possible and under no circumstance shall a pegged leaker be allowed to continue to leak for more than 90 calendar days after discovery. Emissions from the pegged leaker shall be calculated using the midpoint method referenced in Part 2(b) above to estimate the time that the component had been leaking and shall be used to demonstrate compliance with Part 2(a).
(Basis: Cumulative Increase, Regulation 2-1-403)

d. The owner/operator of S-63 shall assign a unique identification code to each fugitive component (vessel, valve, flange, connector, compressor, pump seal, and equipment item) catalogued in the owner/operator's computerized maintenance management system. The facility shall keep the following records: The equipment component identification code, the date of each system inspection, and corresponding leak location(s), concentration measured. Records shall be maintained for at least 2 years from the date of entry and shall be made available for inspection by District staff upon request.
(Basis: Regulation 2-1-403, Cumulative Increase, Recordkeeping)

e. The owner/operator of S-63 shall inspect all fugitive components (pumps, valves, miscellaneous components, and compressors) for leaks at least once every quarter using a handheld hydrocarbon analyzer. The owner/operator of S-63 shall inspect all flanges and connectors on a biannual basis.
(Basis: Cumulative Increase, Regulation 2-1-403)

f. To determine compliance with the above parts, the owner/operator of S-63 shall maintain a quarterly log of all inspections. The following records as well as any data necessary to evaluate compliance with the above parts, including the following information shall be included in the log:
   i. Unique identification code of each component.

ii. Date of each inspection, and the corresponding location of each leak concentration measured based on its location with respect to adjacent maintainable equipment component(s).
iii. Number of days that each individual component leaked at or greater than 10,000 ppmv (measured as C1), type of component, identification number of component.
iv. The total number of days component identified in Part 2(f)(iii) leaked. Date of repair.
v. All fugitive emission calculations required per Part 2(b).

All records shall be retained on-site for a minimum of 24 months from the date of entry and made available for inspection by District staff upon request. These recordkeeping requirements shall not replace the recordkeeping requirements contained in any applicable District Regulations.
(Basis: Recordkeeping)

3. Within 30 days of the completion of the installation of all fugitive components, the owner/operator of S-63 shall submit a final component count and POC emissions estimate to the Air District. If any of the fugitive component counts exceed a count stated in Part 2(a), the plant's cumulative increase emissions shall be adjusted as needed, subject to APCO approval, to reflect only the difference between emissions based on predicted component counts versus actual component counts. If any of the fugitive component counts are less or greater than a count stated in Part 2(a), the cumulative increase in emissions associated with this application (# 31318) may be adjusted accordingly.
(Basis: Cumulative Increase, Offsets, Rule 2-5)

RECOMMENDATION

The Air District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable requirements of Air District, state, and federal air quality-related regulations. The preliminary recommendation is to issue an Authority to Construct for the equipment listed below. However, the toxic air contaminant emissions from the proposed source triggered an HRA and since the facility is located within an Overburdened Community (OBC), public notification requirements of District Regulation 2-1-412 apply. After the comments are received and reviewed, the Air District will make a final determination on the permit.

I recommend that the Air District initiate a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct for the following equipment:

S-63 Biogas Conditioning System, consisting of iron sponge and carbon adsorbers and fugitive components

S-64 Cogeneration System #3, Jenbacher JMS416, 1,573 bhp, 9.63 MM BTU/hr, 4-stroke, lean-burn; fired on treated digester gas and/or natural gas; abated by A-3, A-4

A-3 Oxidation Catalyst, abating S-64

A-4 Selective Catalytic Reduction (SCR), abating S-64

By: ______________________________ Date: ______________________
Nimrat Sandhu
Senior Air Quality Engineer