



ENGINEERING AND COMPLIANCE DIVISION

APPLICATION PROCESSING AND CALCULATIONS

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This facility is currently subject to Title V, and it is operating under its Facility Permit to Operate (Sections D, and H, Revision #3) which was issued on August 27, 2009. The initial Title V facility permit was issued on April 3, 2007. A CEQA document has been completed and a Negative Declaration was filed on July 23, 2007, which indicated there are no adverse environmental impacts associated with the proposed construction which is part of the plant expansion project.

Applications No.499768, 499769, and 499770, were filed on June 17, 2009, for permits to construct a new digester gas flare, diesel fueled internal combustion engine driving an emergency electric generator, and to revise the Title V facility permit to operate dated August 27, 2009. The diesel fuel engine is certified to meet Tier II emission standards under application No. 470534 issued to the manufacturer of the engine.

**PROCESS DESCRIPTION**

EMWD provides essential public services to the general population. The proposed engine is used to drive an emergency electric generator at the sewage treatment plant. The proposed operating schedule is 3.5 hr/day, 6 hr/month, and 29 hr/year for testing and maintenance.

The exhaust from the diesel fueled engine will be turbocharged and intercooled.

The proposed digester gas flaring system will replace the existing flare system currently operating under SCAQMD application No. 173389.

The proposed flare will be equipped with a natural gas pilot, and it is designed for a maximum flow rate of 5700 scf/hr, and an estimate maximum heat input of 1.7 mmBtu/hr of digester gas. According to the application, the flare will operate between 1800 and 2200 degrees Fahrenheit. The flare uses a Clean Enclosed Burner (CEB) System where the waste gas stream is premixed with the combustion air stream prior to injection onto a permeable metal fiber mesh, and subsequently ignited.

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**EMISSIONS****Diesel Fuel Internal Combustion Engine:**

The VOC, NOx, CO, SOx and PM10 emission rates from the internal combustion engine were estimated based on the certified emissions rate and an operating schedule 3.5 hr/day, 6 hr/month, and 29 hr/year.

**Data**

Variable	Units	Reference
Engine rating	2328 bHP	
Conversion Factor	454 g/lb	
Emission Factor		
Nox	4.00 g/bhp-hr	Current BACT
CO	0.82 g/bhp-hr	Current BACT
VOC	0.19 g/bhp-hr	Current BACT
PM10	0.12 g/bhp-hr	Emiss. Cert.
SOX Emiss. Rate	0.01 g/bhp-hr	Emiss. Cert.
Schedule	3.5 hr/day	
	5.5 hr/month	
	29 hr/year	

**Calculations:****NOx Emissions**

$$\begin{aligned}
 &= [\text{Emission Factor}] \times [\text{Engine rating}] / [\text{Conversion Factor}] \\
 &= [ 4.00 \text{ g/bhp-hr } ] \times [ 2328 \text{ bHP } ] / [ 454 \text{ g/lb} ] \\
 &= [ 20.51 \text{ lb/hr} ] \\
 &= [ 71.7885 \text{ lb/day} ] \text{ (@ 3.5 hr/day)} \\
 &= [ 112.81 \text{ lb/month} ] \text{ (@5.5 hr/month)} \\
 &= [ 4 \text{ lb/day} ] \text{ (30 day average)}
 \end{aligned}$$

**CO Emissions**

$$\begin{aligned}
 &= [\text{Emission Factor}] \times [\text{Engine rating}] / [\text{Conversion Factor}] \\
 &= [ 0.82 \text{ g/bhp-hr } ] \times [ 2328 \text{ bHP } ] / [ 454 \text{ g/lb} ] \\
 &= [ 4.20 \text{ lb/hr} ] \\
 &= [ 14.7167 \text{ lb/day} ] \text{ (@ 3.5 hr/day)} \\
 &= [ 23.13 \text{ lb/month} ] \text{ (@5.5 hr/month)} \\
 &= [ 1 \text{ lb/day} ] \text{ (30 day average)}
 \end{aligned}$$

**VOC Emissions**

$$= [\text{Emission Factor}] \times [\text{Engine rating}] / [\text{Conversion Factor}]$$

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= [ 0.19 g/bhp-hr ] x [ 2328 bHP ] / [ 454 g/lb ]  
= [ 0.97 lb/hr ]  
= [ 3.4100 lb/day ] ( @ 3.5 hr/day )  
= [ 5.36 lb/month ] ( @ 5.5 hr/month )  
= [ 0.18 lb/day ] ( 30 day average )

**pm10 Emissions**

= [ Emission Factor ] x [ Engine rating ] / [ Conversion Factor ]  
= [ 0.12 g/bhp-hr ] x [ 2328 bHP ] / [ 454 g/lb ]  
= [ 0.615 lb/hr ]  
= [ 2.1537 lb/day ] ( @ 3.5 hr/day )  
= [ 3.38 lb/month ] ( @ 5.5 hr/month )  
= [ 0.11 lb/day ] ( 30 day average )

**SOX Emissions**

= [ Emission Factor ] x [ Engine rating ] / [ Conversion Factor ]  
= [ 0.01 g/bhp-hr ] x [ 2328 bHP ] / [ 454 g/lb ]  
= [ 0.026 lb/hr ]  
= [ 0.0897 lb/day ] ( @ 3.5 hr/day )  
= [ 0.14 lb/month ] ( @ 5.5 hr/month )  
= [ 0.005 lb/day ] ( 30 day average )

**Flare Emissions**

Data:				Ref.
Btu rating	1.70	mmbtu/hr		400A
Operating Schedule	24.00	hr/day		
	7.00	day/wk		
	52.00	wk/year		
VOC	0.01	lb/lb		BACT
Nox	0.03	lb/mmbtu		BACT
Sox	40.00	ppm		R431.1
CO	0.06	lb/mmbtu		BACT
PM10	26.00	lb/mmcf		BACT
E.F	0.99	lb/lb		BACT

**Flare Emissions ( continued)**

VOC Emissions (lb/hr)

$$\begin{aligned}
 &= [ \text{Emission factor} ] \times [ \text{flowrate} ] \times [ 60 \text{ min/hr} ] \times [ \text{Mol.Wt} ] / [ \text{mol. Vol} ] \\
 &= [ 0.005 \text{ lb/lb} ] \times [ 95.0 \text{ cfm} ] \times [ 60 \text{ min/hr} ] \times [ 86 \text{ lb/mole} / 379 \text{ cf/mole} ] \\
 &= [ 6.47 \text{ lb/hr} ]
 \end{aligned}$$

VOC Controlled

$$\begin{aligned}
 &= [ \text{Uncontrolled Emissions} ] \times [ 1 - \text{control eff} ] \\
 &= [ 6.47 \text{ lb/hr} ] \times [ 1 - 0.99 ] \\
 &= [ 0.06 \text{ lb/hr} ]
 \end{aligned}$$

VOC Emissions (lb/day)

$$\begin{aligned}
 &= [ \text{VOC Emissions (lb/hr)} ] \times [ \text{hr/day} ] \\
 &= [ 0.0647 \text{ lb/hr} ] \times [ 24 \text{ hr/day} ] \\
 &= [ 1.55 \text{ lb/day} ]
 \end{aligned}$$

Nox Emissions (lb/hr)

$$\begin{aligned}
 &= [ \text{Nox lb/mmbtu} ] \times [ \text{Btu rating} ] \\
 &= [ 0.03 \text{ lb/mmbtu} ] \times [ 1.7 \text{ mmbtu/hr} ] \\
 &= [ 0.04 \text{ lb/hr} ]
 \end{aligned}$$

Nox Emissions (lb/day)

$$\begin{aligned}
 &= [ \text{Nox Emissions (lb/hr)} ] \times [ \text{hr/day} ] \\
 &= [ 0.0425 \text{ lb/hr} ] \times [ 24 \text{ hr/day} ] \\
 &= [ 1.02 \text{ lb/day} ]
 \end{aligned}$$

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**Flare Emissions( continued)**

CO Emissions (lb/hr)

$$\begin{aligned} &= [ \text{CO lb/mmBtu} ] \times [ \text{Btu rating} ] \\ &= [ 0.06 \text{ lb/mmBtu} ] \times [ 1.7 \text{ mmBtu/hr} ] \\ &= [ 0.10 \text{ lb/hr} ] \end{aligned}$$

CO Emissions (lb/day)

$$\begin{aligned} &= [ \text{CO Emissions (lb/hr)} ] \times [ \text{hr/day} ] \\ &= [ 0.1020 \text{ lb/hr} ] \times [ 24 \text{ hr/day} ] \\ &= [ 2.45 \text{ lb/day} ] \end{aligned}$$

Sox Emissions (lb/hr)

$$\begin{aligned} &= [ \text{Emission factor} ] \times [ \text{flowrate} ] \times [ 60 \text{ min/hr} ] \times [ \text{Mol.Wt} ] / [ \text{mol. Vol} ] \\ &= [ 40.00 \text{ ppm} ] \times [ 95.0 ] \times [ 60 \text{ min/hr} ] \times [ 64 \text{ lb/mole} / 379 \text{ cf/mole} ] \\ &= [ 0.04 \text{ lb/hr} ] \end{aligned}$$

Sox Emissions (lb/day)

$$\begin{aligned} &= [ \text{Sox Emissions (lb/hr)} ] \times [ \text{hr/day} ] \\ &= [ 0.0385 \text{ lb/hr} ] \times [ 24 \text{ hr/day} ] \\ &= [ 0.92 \text{ lb/day} ] \end{aligned}$$

PM10 Emissions (lb/hr)

$$\begin{aligned} &= [ 26.00 \text{ lb/mmcf} ] \times [ 1.7 \text{ mmBtu/hr} ] / [ 550 \text{ btu/cf} ] \\ &= [ 0.08 \text{ lb/hr} ] \end{aligned}$$

PM10 Emissions (lb/day)

$$\begin{aligned} &= [ \text{PM10 Emissions (lb/hr)} ] \times [ \text{hr/day} ] \\ &= [ 0.0804 \text{ lb/hr} ] \times [ 24 \text{ hr/day} ] \\ &= [ 1.93 \text{ lb/day} ] \end{aligned}$$

**EVALUATION**

**Rule 212**

No public notice is required because there is no school located within 1000 feet of this facility, and the increase in criteria pollutants is less than the limits in section (g). Therefore, the proposed project complies with Rule 212.

**Rule 1470**

This rule is applicable because Rule 1470 applies to any person who owns or operates a stationary CI engine. In addition to setting sulfur limits in the fuel and stringent criteria pollution limits, this rule also restricts the operating hours to a maximum of 50 hours per year for maintenance and testing requirements if the engine is located more than 500 feet from a school, and sets more stringent PM10 limits if the engine is operated under a demand reduction program.

Since the engine is (1) certified as a Tier II engine with PM10 emissions less than 0.15 g/bhp and not operated as a demand reduction program, (2) fueled with CARB diesel with a sulfur content less than 15 ppm by weight, (3) located more than 500 feet from a school, and (4) limited by permit condition to operate a maximum of 50 hours per year for maintenance and testing, this engine complies with the Rule 1470 requirements.

**Regulation XXX**

Since the cumulative emission increases does not exceed the daily maximum in Table 3-8, and is not subject to RACT, MACT, or NESHAP, the proposed revised facility permit qualifies as a "De minimis significant Permit Revision Criteria."

**40 CFR Part 60 Subpart IIII § 60.4202**

The emissions standard for an engine with a maximum engine power greater than or equal to 37 KW (50 hp), the certification emission standards are listed in 40 CFR 89.112 and 40 CFR 89.113

**40 CFR Part 89 §89.112**

The certified emission limits are less than the emissions limit [6.4 g/Kw-hr for NMHC +Nox, 3.5 g/Kw-hr for CO, and 0.20 g/Kw-hr for PM(10) ]set by Table 1 of this subsection.

**40 CFR Part 89 §89.113**

The normal operation of this engine is expected to comply with the visible emissions limits of this Subsection.

*40 CFR Part 60 - Subpart IIII § 60.4209*

*Applicant will install a non-resettable hour meter prior to start of engine. Compliance can be expected.*

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**40 CFR Part 63 Subpart ZZZZ**

This equipment meets the requirement of this subpart by meeting the requirements of 40 CFR Part 60 Subpart IIII. Compliance can be expected.

**RECOMMENDATION**

Since the proposed new engine is a certified tier II engine, and the new flare system uses a Bekaert flare unit, these permit units are expected to comply with Rules 1303, and the proposed permit limits.

Therefore, applications No.499768, and 499769 are recommended for approval to issue permits to construct with the proposed permit descriptions and conditions, and a significant revision to the Title V Facility Permit is proposed under 499770, subject to EPA review and public notice.

**APPENDIXES**

- A. NSR Transaction Report
- B. Risk Assessment