

DRAFT Engineering Evaluation
City of Richmond Wastewater Treatment Plant
Application No. 31741
Plant No. 2482

BACKGROUND

The City of Richmond Wastewater Treatment Plant (WTP) has applied for a Permit to Operate for the following:

S-16 Emergency Standby Diesel Generator Set
Make: Cummins, Model: QSB5-G13, Model Year: 2022
173 bhp, 7.3 gal/hr

The WTP is located at 601 Canal Boulevard in Richmond, California 94804.

The criteria pollutants are nitrogen oxides (NO_x), carbon monoxide (CO), and precursor organic compounds (POC) from unburned diesel fuel, sulfur dioxide (SO₂), and particulate matter (PM). All of these pollutants are briefly discussed on the District's web site at www.baaqmd.gov.

EMISSIONS CALCULATIONS

The facility has submitted supporting documents for the proposed engine, which include manufacturer specifications and emissions data. The SO_x emissions factor is determined based on the sulfur content of the diesel fuel burned. The engine will burn commercially available California Air Resources Board (CARB) certified low sulfur diesel fuel, where the sulfur content of the diesel fuel will not exceed 0.0015% by weight. The following tables provide a summary of the engine information, which was provided by the applicant.

Table 1: Daily and Annual Emissions from Manufacturer Guaranteed Data for S-16

Pollutant	Emission Factor¹ (g/bhp-hr)	Max Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (tons/yr)
NO _x	2.66	24.3	50.7	0.025
POC	0.14	1.3	2.7	0.001
CO	0.70	6.4	13.3	0.007
PM	0.11 ²	1.0	2.1	0.001
SO _x	0.0040	0.0	0.0	0.000

Basis:

- Annual emissions: Reliability-related activity 50 hours for S-16
- Max daily emissions: 24-hour operation
- 1 pound = 454 grams
- ¹Emission and abatement factors provided by manufacturers' documentation
- ²Diesel particulate emissions factor, PM = PM₁₀ = PM_{2.5}
- ³SO_x emission factor calculated from CARB diesel fuel sulfur content of 0.0015% by weight.

TOXIC RISK SCREENING

The emergency engine will be certified to the Tier 3 standards with a PM emission factor of 0.11 g/hp-hr. Using the PM emission factor for the proposed engine, a 50 hour per year limit for reliability-related activities, and assuming PM is in the form of diesel exhaust PM, the following annual emission rate for diesel exhaust PM was calculated.

S-16

$$\frac{0.11 \text{ g PM}}{\text{hp} - \text{hr}} \times 173 \text{ hp} \times \frac{\text{lb}}{454 \text{ g}} \times \frac{50 \text{ hr}}{\text{yr}} = 2.1 \text{ lb PM/yr}$$

There is one related application permitted within the last three years; A/N 30169 for S-15, Cogeneration Engine. The emergency engine exceeds the diesel exhaust PM chronic trigger level of Table 2-5-1 “Toxic Air Contaminant Trigger Levels” of Regulation 2-5, which is equivalent to 0.26 lb/yr. The overall project emission rate of diesel exhaust PM was calculated to be 2.1 lb/yr.

Although S-15 does not emit diesel exhaust PM, the following TACs were evaluated for A/N 30169:

TAC	E.F. (lb/MMBtu)	Assumed Abatement Eff. (%)	Emissions (lb/hr)	Acute Trigger Level (lb/hr)	TAC Trigger (Y/N)	Emissions (lb/yr)	Chronic Trigger Level (lb/yr)	TAC Trigger (Y/N)
1,1,2,2-Tetrachloroethane	4.00E-05	85	1.85E-05	-	N	1.62E-01	1.40E+00	N
1,1,2-Trichloroethane	3.18E-05	85	1.47E-05	-	N	1.29E-01	5.00E+00	N
1,1-Dichloroethane	2.36E-05	85	1.09E-05	-	N	9.57E-02	5.00E+01	N
1,2-Dichloroethane	2.36E-05	85	1.09E-05	-	N	9.57E-02	4.00E+00	N
1,3-Butadiene	2.67E-04	85	1.24E-04	1.50E+00	N	1.08E+00	4.80E-01	YES
Acetaldehyde	8.36E-03	85	3.87E-03	1.00E+00	N	3.39E+01	2.90E+01	YES
Ammonia	1.41E-02	0	4.34E-02	7.10E+00	N	3.80E+02	7.70E+03	N
Benzene	4.40E-04	85	2.04E-04	6.00E-02	N	1.78E+00	2.90E+00	N
Carbon Tetrachloride	3.67E-05	85	1.70E-05	4.20E+00	N	1.49E-01	1.90E+00	N
Chlorobenzene	3.04E-05	85	1.41E-05		N	1.23E-01	3.90E+04	N
Chloroform	2.85E-05	85	1.32E-05	3.30E-01	N	1.16E-01	1.50E+01	N
Ethylbenzene	3.97E-05	85	1.84E-05	-	N	1.61E-01	3.30E+01	N
Ethylene Dibromide	4.43E-05	85	2.05E-05	-	N	1.80E-01	1.10E+00	N
Formaldehyde	5.28E-02	60 ¹	6.52E-02	1.20E-01	N	5.71E+02	1.40E+01	YES
Hydrogen Sulfide ²	4.39E-04	98	6.51E-04	9.30E-02	N	5.70E+00	3.90E+02	N
Methanol	2.50E-03	85	1.16E-03	6.20E+01	N	1.01E+01	1.50E+05	N
Methylene Chloride	2.00E-05	85	9.26E-06	3.10E+01	N	8.11E-02	8.20E+01	N
n-Hexane	1.11E-03	85	5.14E-04	-	N	4.50E+00	2.70E+05	N
Naphthalene	7.44E-05	85	3.44E-05	-	N	3.02E-01	2.40E+00	N
PAH (AP-42)	2.69E-05	85	1.25E-05	-	N	1.09E-01	3.30E-03	YES
Phenol	2.40E-05	85	1.11E-05	1.30E+01	N	9.73E-02	7.70E+03	N
Styrene	2.36E-05	85	1.09E-05	4.60E+01	N	9.57E-02	3.50E+04	N
Toluene	4.08E-04	85	1.89E-04	8.20E+01	N	1.65E+00	1.20E+04	N
Vinyl Chloride	1.49E-05	85	6.90E-06	4.00E+02	N	6.04E-02	1.10E+00	N
Xylene	1.84E-04	85	8.52E-05	4.90E+01	N	7.46E-01	2.70E+04	N

In addition, the project is located within an Overburdened Community as defined in Regulation 2-1-243. Therefore, the project requires a Health Risk Assessment (HRA).

The results of the HRA were: a Cancer Risk of **2.1 in a million**, a Chronic Hazard Index (HI) of **0.012**, and an Acute HI of **0.24**. In accordance with District Regulation 2-5-301, S-16 is subject to Best Available Control Technology for Toxics (TBACT) as the estimated source risk exceeds a cancer risk of 1.0 in a million. TBACT for this source is presented in the current District BACT/TBACT Workbook for IC Engine-Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump, Document 96.1.3, Revision 8, dated December 22, 2020. PM is the only emission with a TBACT standard. S-16 will satisfy TBACT for PM as the manufacturer specified emission factor of 0.11 g/bhp-hr is less than the TBACT standard of 0.15 g/bhp-hr. Since the estimated project cancer risk does not exceed 6.0 in a million and hazard indices do not exceed 1.0, this project complies with the District's Regulation 2-5-302 project risk requirements for projects located in an Overburdened Community, as defined in Regulation 2-1-243.

PLANT CUMULATIVE EMISSION

The following table summarizes the cumulative increase in BACT pollutant emissions that will result from this application.

Table 3. Cumulative increase in tons/yr

Pollutant	Existing, tpy	New, tpy	Total, tpy
NOx	0.854	0.025	0.879
CO	4.048	0.007	4.055
PM10 and 2.5	0.005	0.001	0.006
SO ₂	0.270	0.000	0.270
POC	0.733	0.001	0.734

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

Pursuant to Regulation 2-2-301, BACT is required for a new source with emission increases that equal 10.0 lbs or greater of any BACT pollutant. The engine is expected to exceed the BACT threshold for NOx and CO.

BACT for this source is presented in the current District BACT/TBACT Workbook for IC Engine-Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump, Document 96.1.3, Revision 8, dated December 22, 2020. For NOx and CO, BACT(2) is the CARB ATCM standard for the respective pollutant at the applicable horsepower rating. The more restrictive BACT(1) standards are not applicable to the engine because it will be limited to operation as an emergency standby engine.

S-16 will satisfy the BACT(2) standard for the following pollutants which exceed 10 lb/day:

Pollutant	Emission Factor	BACT(2) Standard
POC+NO _x ^{1,2}	2.8 g/bhp-hr	3.0 g/bhp-hr
CO	0.7 g/bhp-hr	2.6 g/bhp-hr

¹The actual CARB ATCM standard for NO_x and non-methane hydrocarbons (NMHC) is combined. The NO_x + NMHC standard is equivalent to 3.0 g/hp-hr, which the emergency engine meets.

²NMHC = POC

OFFSETS

Emission offset requirements for POC and NO_x are set out in Regulation 2, Rule 2, Section 302. POC and NO_x offsets are required for new or modified sources at a facility that emits or will be permitted to emit 10 tons per year or more of that pollutant. Offsets for POC and NO_x are not required for this application as the potential to emit (PTE) for POC and NO_x are under 10 tons per year. The PTE analysis is provided in Attachment #1.

The emission offset requirements for PM₁₀, PM_{2.5}, and SO_x are specified in Regulation 2, Rule 2, Section 303. Per Section 303, PM₁₀, PM_{2.5}, and SO_x emission offsets are required for any new or modified source that is a major facility for PM₁₀, PM_{2.5}, or SO_x emissions. This facility is not a major facility for PM₁₀, PM_{2.5}, and SO_x emissions as the PTE for each is less than 10 tons per year. Therefore, offsets for PM₁₀, PM_{2.5}, and SO_x are not required for this application. The PTE analysis is provided in Attachment #1.

STATEMENT OF COMPLIANCE

The owner/operator is expected to comply with all applicable requirements. Key requirements are listed below:

Regulation 1

The engine is subject to and expected to be in compliance with the requirements of Regulation 1-301 (Public Nuisance), which states that no person shall emit such quantities of air contaminants or other material which cause significant nuisance to the public; or which endangers the comfort, repose, health or safety of any such persons or the public, or which causes, or has a natural tendency to cause injury or damage to business or property.

Regulation 2, Rule 1

California Environmental Quality Act (CEQA)

Pursuant to Regulation 2-1-311, an application for a proposed new or modified source will be classified as ministerial and will accordingly be exempt from the CEQA requirement of Regulation 2-1-310 if the District's engineering evaluation and basis for approval or denial of the permit application for the project is limited to the criteria set forth in Regulation 2-1-428 and to the specific procedures, fixed standards, and objective measurements set forth in the District's Permit Handbook and BACT/TBACT Workbook. The evaluation was performed in accordance with the criteria set forth in Chapter 2.3.2 of the Permit Handbook and is considered to be ministerial concerning air quality impacts.

California Health & Safety Code §42301.6 and Regulation 2-1-412

Pursuant to California Health & Safety Code §42301.6(a), prior to approving an application for a permit to construct or modification of a source, which is located within 1,000 feet from the outer boundary of a school site, the District shall prepare a public notice as detailed in §42301.6. §42301.9(a) defines a “school” as any public or private school used for the purposes of the education of more than 12 children in kindergarten or any grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in private homes.

Using the GreatSchools.org website and searching with Google Maps, it has been determined that the source will not be located within 1,000 feet of the outer boundary of a K-12 school. However, the facility is in an overburdened community, and therefore, a public notice is required as per Regulation 2-1-412.

Regulation 2, Rule 2**Prevention of Significant Deterioration (PSD)**

This application is not part of a PSD project as defined in Regulation 2-2-224.

Offset Requirements

Pursuant to Regulation 2-2-302, and 2-2-303, a facility with the potential to emit more than 10 tons per year of NO_x and POC, and 100 tons of PM_{2.5}, PM₁₀, or SO_x, will need to provide offsets. As the facility will operate under the aforementioned limits, the engine is not subject to the offset requirements of 2-2-302 and 2-2-303.

Regulation 6, Rule 1

Pursuant to Regulation 6-1-303 a person shall not emit, from any source, for a period or periods aggregating more than three minutes in any hour, a visible emission that is as dark or darker than No. 2 on the Ringelmann Chart, or of such opacity as to obscure an observer’s view to an equivalent or greater degree, nor shall said emission, as perceived by an opacity sensing device in good working order, where such device is required by District Regulations, be equal to or greater than 40% opacity. The emergency engine is expected to meet the requirements of Regulation 6-1-303.

The engine is not subject to Regulation 6-1-310.2, because the engine does not have a potential to emit of TSP greater than 1,000 kg/yr.

Regulation 9, Rule 1

The engine is subject to the SO₂ limitations of Regulation 9-1-301 (Limitations on Ground Level Concentrations of Sulfur Dioxide) and 9-1-304 (Burning of Solid and Liquid Sulfur Dioxide Fuel).

Pursuant to Regulation 9-1-301, the ground level concentrations of SO₂ shall not exceed 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. Pursuant to Regulation 9-1-304, a person shall not burn any liquid fuel having a sulfur content in excess of 0.5% by weight. Compliance with Regulation 9-1 is expected due to the use of CARB low sulfur diesel fuel with a sulfur content of 0.0015% by weight.

Regulation 9, Rule 8

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. The engine is intended to operate at a specific site for more than one year and will be attached to a foundation at the site. The requirements of this rule apply. In addition, the engine will be used for emergency use and is defined as an emergency standby engine pursuant to Regulation 9-8-230.

According to Regulation 9-8-110.5, emergency standby engines are exempt from the requirements of Regulations 9-8-301 through 305, 9-8-501, and 9-8-503. However, emergency standby engines are subject to the requirements of Regulation 9-8-330. Pursuant to Regulation 9-8-330, the engine will be allowed to operate 50 hours per calendar year for reliability-related activities. The requirements of the CARB ATCM are equivalent to the allowed annual reliability-related activity hours of this rule.

In accordance with Regulation 9-8-530, the engine shall be equipped with a non-resettable totalizing meter that measures hours of operation or fuel usage. Monthly records for the following shall be kept for at least 2 years and be made available to District staff upon request.

- Total hours of operation;
- Emergency hours of operation; and,
- The nature of the emergency condition for each emergency.

The engine is expected to meet the aforementioned requirements.

Federal Requirements

New Source Performance Standards (NSPS) 40 CFR Part 60 Subpart JJJJ

According to §60.4200(a)(1)(i), the emergency engines are subject to the requirements of 40 CFR Part 60 Subpart IIII, "Standards of Performance of Stationary Compression Ignition Internal Combustion Engines."

Pursuant to §60.4205(b), owners or operators of 2007 model year and later stationary emergency diesel engine-generator sets with a displacement of less than 30 liters per cylinder must comply with §60.4202. In accordance with §60.4202(a)(2), the Tier 2 or Tier 3 emission standards for new nonroad compression ignition (CI) engines for the same rated power as described in 40 CFR part 1039, appendix I. Pursuant to 40 CFR part 1039, appendix I, Tier 3 engines with a rated power greater than 130 kW (175 hp) and less than 560 kW (750 hp) must meet the following emission standards.

Table 4. Review of Standards for Engines with Less than 30 L per Cylinder Displacement				
Pollutant	NSPS Emission Standard (g/kW-hr)	NSPS Emission Standard (g/hp-hr)	EPA Certified Emission Rate (unabated) (g/kW-hr)	EPA Certified Emission Rate (unabated) (g/hp-hr)
NMHC+NO _x	4.0	3.0	3.8	2.8
CO	3.5	2.6	1.0	0.7
PM	0.20	0.15	0.15	0.11

The aforementioned analysis demonstrates that the emergency engines will meet the emission standards of 40 CFR part 1039, appendix I. In addition, the emergency engines are expected to meet the following opacity standards identified in 40 CFR 1039.105(b).

Table 5. 40 CFR 1039.105(b) Opacity Standards	
Mode	Opacity (%)
Acceleration	20
Lugging	15
Peak (During acceleration or lugging modes)	50

§60.4206 and §60.4211(a) require the owner or operator to maintain and operate the emergency engines according to the manufacturer's written instructions or owner/operator developed procedures approved by the manufacturer for the entire life of the emergency engines. The emergency engines are expected to be maintained and operated in accordance with the requirements of §60.4206 and §60.4211(a).

§60.4207(b) requires diesel fuel purchased (or otherwise obtained) after October 1, 2010 to meet the requirements of 40 CFR 1090.305, which is a maximum sulfur content of 15 parts per million (ppm). The fuel consumed is expected to meet this requirement.

§60.4209(a) requires the installation of a non-resettable hour meter. This will be included as a permit requirement.

The emergency engines are certified to the requirements of 40 CFR part 1039, appendix I and is expected to comply with §60.4211.

Per §60.4211(f), the emergency engines will be allowed to operate unrestricted during emergencies. In addition, the emergency engines will be limited to less than 100 hours per calendar year for maintenance and testing. However, the requirements of the CARB ATCM may further limit the maintenance and testing hours.

**National Emissions Standards for Hazardous Air Pollutants (NESHAP)
40 CFR Part 63 Subpart ZZZZ**

Pursuant to §63.6585, engines located at an area source are subject to the requirements of 40 CFR Part 63 Subpart ZZZZ, "National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines."

However, according to §63.6590(a)(1)(iii) & §63.6590(c)(1), diesel engines that commenced construction on June 12, 2006 or later and that operate at a facility that emits or has the potential to emit any single hazardous air pollutant (HAP) at a rate of less than 10 tons per year or any combination of HAPs at a rate of less than 25 tons per year, comply with the standard by complying with 40 CFR Part 60 Subpart IIII, "Standards of Performance of Stationary Compression Ignition Internal Combustion Engines."

The emergency engines are expected to meet the requirements of this subpart by meeting the standards of 40 CFR Part 60 Subpart IIII, "Standards of Performance of Stationary Compression Ignition Internal Combustion Engines."

CONDITIONS

Permit Condition 22850 for S-16

1. The owner/operator shall not exceed 50 hours per year per engine for reliability-related testing.
[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]
2. The owner/operator shall operate each emergency standby engine only for the following purposes: to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, State or Federal emission limit, or for reliability-related activities (maintenance and other testing, but excluding emission testing). Operating while mitigating emergency conditions or while emission testing to show compliance with District, State or Federal emission limits is not limited.
[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]
3. The owner/operator shall operate each emergency standby engine only when a non-resettable totalizing meter (with a minimum display

capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained.

[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

4. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been issued a Title V Major Facility Review Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.
 - a. Hours of operation for reliability-related activities (maintenance and testing).
 - b. Hours of operation for emission testing to show compliance with emission limits.
 - c. Hours of operation (emergency).
 - d. For each emergency, the nature of the emergency condition.
 - e. Fuel usage for each engine(s).

[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

5. At School and Near-School Operation:
If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply:

The owner/operator shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:

- a. Whenever there is a school sponsored activity (if the engine is located on school grounds)
- b. Between 7:30 a.m. and 3:30 p.m. on days when school is in session.

"School" or "School Grounds" means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). "School" or "School Grounds" includes any building or

structure, athletic field, or other areas of school property but does not include unimproved school property.
[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

RECOMMENDATION

The 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 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 proposed source will be located in an overburdened community, which triggers the public notification requirements of District Regulation 2-1-412. After the comments are received and reviewed, the District will make a final determination on the permit.

I recommend that the 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 source:

S-16 Emergency Standby Diesel Generator Set
Make: Cummins, Model: QSB5-G13, Model Year: 2022
173 bhp, 7.3 gal/hr

By: _____
Perry Ng
Air Quality Engineer

Date: _____

Attachment #1 – Potential to Emit Analysis

Application Description	A/N	S#	Emission Factor (lb/hr)					PTE (tpy)					
			NOx	NMHC (POC)	CO	PM10	SO2	NOx	POC	CO	PM10	SO2	
Standby Generator	13522	9	4.860	0.440	0.370	0.150	0.000	0.000	0.000	0.000	0.000	0.000	*Archived
Anaerobic Digester	6095	170	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
MWH Boilers	22895	A-10	0.193	0.042	0.395	0.059	0.260	0.846	0.184	1.729	0.258	1.141	
MWH Boilers		A-11	0.193	0.042	0.395	0.059	0.260	0.846	0.184	1.729	0.258	1.141	
Storage Tanks	22929	A-3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Elutriation Basins	22941	A-2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Biofilter	23306	A-4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Dewatering Belt Press	23544	S-161 / A-161	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Alteration of S-170	25358	S-170	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Wet Weather Storage / Engine (S-12)	25964	S-100, S-105, and S-170 (only)						0.007	0.000	0.002	0.000	0.002	
		12	6.719	0.349	0.748	0.166	0.007	0.504	0.026	0.056	0.012	0.001	
COC S-170	26155	S-10, S-11, S-170	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
		100, 110, 120, 130, 140, 150, 141, 160,											
Peroxide Injection	26956	A-6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
		100, 110, 130, A-											
1 and 2 Treatment	29889	13, A-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Digester Gas ICE	30169	S-15, S-170	0.155	0.165	0.919	0.000	25.743	0.679	0.089	4.027	0.001	0.268	
WWTP	7110	110, 110, 120, 130, 140, 150, 160	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sludge Heater	32133	Pre 4/5/91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
								2.882	0.483	7.544	0.529	2.552	

