

ENGINEERING EVALUATION REPORT

Plant Name:	Sonoma Valley Hospital District
Application Number:	24361
Plant Number:	3893

BACKGROUND

The applicant is applying for an Authority to Construct for two new Emergency Stand-By Diesel Power Generator Sets. The applicant is requesting an Authority to Construct for the following equipment:

- S-6 Emergency Stand-By Diesel Generator Set; Cummins Model QST30-G5 NR2, 1490 BHP abated by**
- A-6 Diesel-Catalyzed Particulate Filter; Johnson-Mathey Model CRT+**
- S-7 Emergency Stand-By Diesel Generator Set; Cummins Model QSL9-G3 NR3, 399 BHP**

CRITERIA POLLUTANT EMISSIONS CALCULATIONS

The proposed engines have been certified by the California Air Resources Board. CARB certified emission factors for the engines were used for all criteria pollutant emission calculations. The emission factors used are as follows:

Source(s)	S-6	S-7
EPA Engine Family	ACEXL030.AAD	8CEXL0275AAG
CARB Executive Order	U-R-002-0535	U-R-002-0442
BHP	1490	399
PM ₁₀	0.009 ¹	0.134
POC	0.220	0.127
NO _x	4.180	2.409
SO ₂	0.005 ²	0.005 ³
CO	0.522	1.417

¹ Source S-6 is abated by a diesel-catalyzed particulate filter operating at 90% abatement efficiency

² SO₂ emission factor calculated from fuel rate for CARB certified engine

SO₂ g/bhp-hr = (517.1 lb/hr)*(0.0015 lb S/100 lb)*(64.06 lb SO₂/lb mol/32.06 lb S/lb mol)*(453.6 g/lb)
*(1/1490 BHP) = 0.005 g/bhp/hr

³ SO₂ emission factor calculated from fuel rate for CARB certified engine

SO₂ g/bhp-hr = (145.2 lb/hr)*(0.0015 lb S/100 lb)*(64.06 lb SO₂/lb mol/32.06 lb S/lb mol)*(453.6 g/lb)
*(1/399 BHP) = 0.005 g/bhp/hr

The applicant requested operation at 50 hours per year per engine, which is consistent with the California Air Resources Board Air Toxic Control Measure for Diesel Particulate Matter, 17 CFR 93115, Air Toxic Control Measure for Stationary Compression Ignition Engines (December 4, 2004). However, a toxic Health Risk Screening Assessment indicates that this would result in a cancer risk exceeding 10 in a million (see Toxic Risk Calculations discussion below). The applicant has agreed to limit use of the generators to no more than 32 hours per year per generator. With this limitation, the maximum project cancer risk will be less than 10 in a million, therefore the application, as amended, will be acceptable under the provisions of Regulation 2, Rule 5.

At a testing and maintenance restriction of 32 hours per year per generator, criteria emissions for the project are as follows:

TABLE 1 – CRITERIA POLLUTANT EMISSIONS

SOURCE	BHP	PM ₁₀ G/BHP-HR	POC G/BHP-HR	NO _x G/BHP-HR	SO ₂ G/BHP-HR	CO G/BHP-HR
S-6	1490	0.009	0.220	4.180	0.005	0.522
BACT (Tier 2)		0.15	0.24	4.56	N/A	2.60
Meets BACT?		YES	YES	YES	N/A	YES
S-7	399	0.134	0.127	2.409	0.005	1.42
BACT (Tier 3)		0.15	0.15	2.85	N/A	2.60
Meets BACT?		YES	YES	YES	N/A	YES
S-6 (lb/day)		0.71	17.34	329.52	0.37	41.15
S-7 (lb/day)		2.83	2.68	50.85	0.10	29.91
TOTAL (lb/day)		3.54	20.02	380.37	0.48	71.07
TOTAL (lb/year)		4.7	26.7	507.2	1.0	94.8
TOTAL TPY		0.002	0.013	0.254	4.96E-04	0.047

Source S-6 triggers BACT for POC, NO_x, and CO, and triggers TBACT for PM₁₀. Source S-7 triggers BACT for NO_x and CO, and triggers TBACT for PM₁₀.

OLD SOURCES: EMISSION REDUCTIONS

The applicant is not planning to shut down any existing sources on start-up of the new engines, therefore no contemporaneous on-site emission reductions were calculated for this project.

OFFSETS

The total Potential to Emit for the facility after start-up of the new sources will be less than 100 TPY for each criteria pollutant and less than 10 TPY for each ozone precursor (NO_x and POC) (see Attachment 1).

Since the facility does not have the potential to emit more than 10 tons per year of nitrogen oxide or precursor organic compounds emissions on a pollutant-specific basis, the facility is not subject to NO_x or POC offsets under Regulation 2-2-302.

Since the facility will not have the potential to emit more than 100 tons per year of any criteria pollutant, the facility is not a "Major Facility" as defined in Regulation 2-1-203, and is not subject to PM₁₀ or SO₂ offsets under Regulation 2-2-303.

CUMULATIVE EMISSIONS INCREASE

Changes to the cumulative emissions inventory are as follows:

TABLE 2 - CUMULATIVE EMISSION INCREASE INVENTORY

Pollutant	Current Emissions (TPY)	Application Emissions Increase (TPY)	Onsite Emissions Reductions Credits (TPY)	Offsets From DSFB (TPY)	Final Emissions (TPY)
PM₁₀	0.120	0.002	0.000	0	0.122
POC	0.232	0.013	0.000	0	0.245
NPOC	0.000	0.000	0.000	0	0.000
NO_x	2.833	0.254	0.000	0	3.087
SO₂	0.131	0.000	0.000	0	0.131
CO	0.603	0.047	0.000	0	0.650

TOXIC RISK MODELING

The District uses PM₁₀ emissions as a proxy for toxic emission exposure to surrounding residential and industrial populations. A PM₁₀ emissions level of 0.34 lbs/year automatically triggers a health risk screening assessment pursuant to Regulation 2, Rule 5. At a maximum 50 hours per year per engine permitted operation, the application exceeds a PM₁₀ emission level of 0.34 lbs/year and so requires that a health risk screening assessment be performed.

Because no representative meteorological data was available for this site, an ISCST3 model for PM₁₀ exposure using SCREEN3 meteorological data was used to estimate maximum 1-hour average ambient PM₁₀ concentrations. Since the ISCST3 model does not estimate air concentrations within building cavity regions, where potential receptors are located, the ISC Prime model was also run. Annual average concentrations were estimated to be equal to ten percent of the predicted maximum 1-hour maximum average concentration at each receptor. Distance and directionality were used as the primary considerations to determine sites of maximum exposure. Elevated terrain was considered using 10m DEM input from the USGS Sonoma sub area. Model runs were made with rural dispersion coefficients to best represent the land use in the area. Stack and building parameters for the analysis were based on information provided by the applicant.

Estimates of residential risk assume potential exposure to annual average toxic air contaminant concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimates for offsite workers assume potential exposure occurs 8 hours per day, 245 day per year, for 40 years. Risk estimates for students assume a higher breathing rate, and potential exposure is assumed to occur 10 hours per day, 36 weeks per year, for 9 years. Cancer risk adjustment factors (CRAFs) were used to calculate all cancer risk estimates. The CRAFs are age-specific weighting factors used in calculating cancer risks from exposures of infants, children and adolescents, to reflect their anticipated special sensitivity to carcinogens.

The highest risks were obtained by modeling emissions using the ISCST3 model. This model produced a maximum annual residential GLC of 261.2 µg/m³ per g/sec, resulting in a cancer risk of approximately 15.6 in a million. This risk is unacceptable under the provisions of Regulation 2-5-302.1. If the applicant limits testing and maintenance operations to 32 hours per year per generator, the maximum annual residential cancer risk will be reduced to 10.0 in a million, and the maximum annual worker cancer risk will be approximately 2.2 in a million. Associated health hazard indices are less than 1.0 for all cases. These risks are acceptable under Regulation 2-5-302.1. The applicant has agreed to accept these operational restrictions.

Since the proposed sources are within 500 feet of a school, the permit holder/operator will be prohibited from operating the engines during normal school hours (7:30 a.m. to 3:30 p.m. on hours when school is in session), therefore the risks to students is judged to be negligible.

BACT/TBACT REVIEW

Under Regulation 2, Rule 2, any new source which results in an increase of more than 10 lbs per day of any criteria pollutant must be evaluated for adherence to BACT and TBACT control technologies. Source S-6 triggers BACT/TBACT for POC, NO_x, CO, and PM₁₀, and Source S-7 triggers BACT/TBACT for NO_x, CO, and PM₁₀. For compression ignition internal combustion engines with firing rates greater than 50 bhp, this means that the engine must be fired on ultra-low sulfur fuel (fuel oil with less than 0.0015% by weight sulfur content). Additionally, BACT/TBACT limits the PM₁₀ emission rate to no more than 0.15 g/bhp-hr, and requires that the engine meet the CARB ATCM emission standards for POC, NO_x, and CO for the engine at the applicable horsepower rating and model year. The proposed engines meet the CARB ATCM emission standards and the District's BACT/TBACT limits.

PUBLIC NOTIFICATION REQUIREMENTS

The proposed generator sets are located within 1,000 feet of one or more schools providing educational services to students enrolled in kindergarten or grades 1 through 12. Under Section 42301.6 of the California Health and Safety Code, notification of the proposed new sources must be mailed to the parents or guardians of all children enrolled in any school within one-quarter mile of the sources, and to each address within a radius of 1,000 feet of the sources, in order to give these parties an opportunity to provide public comment on the proposed actions. All comments received within 30 days of the publication of this notice will be reviewed and considered in the final evaluation and approval or denial of the application.

COMPLIANCE DETERMINATION

The generators are covered under ministerial exemption, Chapter 2.3.1 of the BAAQMD Permit Handbook. CEQA is not triggered for emergency standby generators under this provision.

The generators are governed by and comply with the **California Air Resources Board's Air Toxic Control Measure for Stationary Compression Ignition Engines, CCR Title 17, Section 93115**. The explicit annual equipment usage limitation of 32 hours per year per generator except for operations under emergency conditions will be included as part of the permit conditions.

The generators are governed by and comply with the provisions of **Regulation 2, Rule 5, "New Source Review for Toxic Air Contaminants."**

The generators are exempt from the emission limitations of **Regulation 9, Rule 8-305, 8-501, and 8-503**, since they meet the provisions of **Regulation 9, Rule 8-110.5, "Exemptions: Emergency Standby Engines."**

The generators are required to meet NSPS requirements as set out in 40 CFR Part 60, Subpart IIIIG, **Standards of Performance for Stationary Compression-Ignition Internal Combustion Engines, Set G, 2007 and Later Model Non-Fire Pump Emergency Less than 10L per Cylinder**, since the rated engine power is greater than 25 BHP. Under 40 CFR 60.4211(c), the applicant may show compliance by buying and operating engines certified to the emission standards for new non-road CI engines for the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 (PM10 emissions less than 0.2 g/kW-hr, NMHC+NO_x emissions less than 6.4 g/kW-hr, and CO emissions less than 3.5 g/kW-hr). The generators proposed in this application are certified to these emission levels.

Visible emissions from Source S-6 will be required to meet Ringelmann 1 limitation per **Regulation 6-301**. Visible emissions from Source S-7 will be required to meet Ringelmann 2 limitation per **Regulation 6-303.1**.

Sulfur emissions will be controlled by the requirement that any fuel used in the engines meet California Clean Air fuel content of 0.0015% bw sulfur, as required by the **California Air Resources Board's Air Toxic Control Measure for Stationary Compression Ignition Engines, CCR Title 17, Section 93115.**

CONDITIONS

Condition #22832, setting out the operating conditions and recordkeeping requirements for operations at Sources S-6 and S-7 shall be made part of the sources' authority to construct/permits to operate.

RECOMMENDATION

The proposed 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 sources will be located within 1000 feet of a school, which triggers the public notification requirements of Regulation 2-1-412.

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

S-6 Emergency Stand-By Diesel Generator Set; Cummins Model QST30-G5 NR2, 1490 BHP

abated by

A-6 Diesel-Catalyzed Particulate Filter

S-7 Emergency Stand-By Diesel Generator Set; Cummins Model QSL9-G3 NR3, 399 BHP

subject to Condition #22832.

By _____ Date _____
Catherine S. Fortney

1. The owner/operator shall not exceed 32 hours per year per engine for reliability-related testing.
[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]
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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]
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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(G)(1)]
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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(I), (or, Regulation 2-6-501)]
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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(1)] or (e)(2)(B)(2)]

ATTACHMENT 1

PLANT #3893 – POTENTIAL TO EMIT

SOURCE	S CODE	SOURCE DESCRIPTION	THRUPUT	UNITS	COND	APPLIC	PM10 (lb/yr)	POC (lb/yr)	NPOC (lb/yr)	NOX (lb/yr)	SO2 (lb/yr)	CO (lb/yr)	
2	C1250189	Hot Water Boiler ^(1,2)	2.5	MM BTU/hr	14816	17134	163.18	118.09	66.56	797.27	12.88	809.03	
3	C1250189	Hot Water Boiler ^(1,3)	8.4	MM BTU/hr	14816	17134	548.27	396.78	223.64	1339.45	43.28	2718.34	
4	C22BG098	Standby Diesel Generator ⁽⁴⁾	740	BHP	22820	4117	20.56	10.42		355.20	0.18	81.40	
5	C22AG098	Standby Diesel Generator ⁽⁴⁾	375	BHP	22820	4117	10.42	5.28		180.00	0.09	41.25	
6	TBD	Standby Diesel Generator ⁽⁵⁾	1490	BHP	22832	24361	0.94	23.12		439.36	0.50	54.87	
7	TBD	Standby Diesel Generator ⁽⁵⁾	399	BHP	22832	24361	3.78	3.57		67.80	0.14	39.88	
TOTAL							LB/YEAR	747	557	290	3,179	57	3,745
							TPY	0.37	0.28	0.15	1.59	0.03	1.87
TOTAL FACILITY PTE =								4.29	TPY				

(1) Excluding diesel back-up fuel usage
(2) NOx and CO emissions based on condition limits of 30 ppmv and 50 ppmv respectively. Other emissions from AP 42, Table 1.4-2.
(3) NOx and CO emissions based on condition limits of 15 ppmv and 50 ppmv respectively. Other emissions from AP 42, Table 1.4-2.
(4) Limited to 20 hours per year operation; 0.0015 ppm sulfur fuel
(5) Limited to 32 hours per year operation; 0.0015 ppm sulfur fuel