

## ENGINEERING EVALUATION REPORT

<b>Plant Name:</b>	<b>Veterans Administration Medical Center – Palo Alto</b>
<b>Application Number:</b>	<b>24432</b>
<b>Plant Number:</b>	<b>450</b>

### BACKGROUND

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

**S-35 Emergency Stand-By Diesel Generator Set; Mitsubishi Model S12A2-Y2PTAW-2, 1207 BHP**

### CRITERIA POLLUTANT EMISSIONS CALCULATIONS

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

<b>Source(s)</b>	<b>S-35</b>
<b>EPA Engine Family</b>	<b>AMVXL33.9BBA</b>
<b>CARB Executive Order</b>	<b>U-R-035-0302</b>
<b>PM10</b>	<b>0.127</b>
<b>POC</b>	<b>0.213</b>
<b>NOx</b>	<b>4.038</b>
<b>SO2<sup>1</sup></b>	<b>0.005</b>
<b>CO</b>	<b>0.447</b>

The applicant requested operation at 50 hours per year, which is consistent with the California Air Resources Board Air Toxic Control Measure for Stationary Compression Ignition Engines, 17 CFR 93115, (December 4, 2004). However, a toxic Health Risk Screening Assessment indicates that this would result in a cancer risk

<sup>1</sup> SO<sub>2</sub> emission factor calculated from fuel rate for CARB certified engine

SO<sub>2</sub> g/bhp-hr = (462 lb/hr)\*(0.0015 lb S/100 lb)\*(64.06 lb SO<sub>2</sub>/lb mol/32.06 lb S/lb mol)\*(453.6 g/lb)

\*(1/1207 BHP) = 0.005 g/bhp/hr

exceeding 10 in a million (see Toxic Risk Calculations discussion below). The applicant has agreed to limit use of the generator to no more than 47 hours per year. 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 47 hours per year testing and maintenance limitation, criteria emissions are as follows:

**TABLE 1 – CRITERIA POLLUTANT EMISSIONS**

SOURCE	BHP	PM <sub>10</sub> G/BHP-HR	POC G/BHP-HR	NO <sub>x</sub> G/BHP-HR	SO <sub>2</sub> G/BHP-HR	CO G/BHP-HR
S-35	1207	0.127	0.213	4.038	0.005	0.447
<b>BACT (Current Tier Level)</b>		<b>0.15</b>	<b>0.24</b>	<b>4.56</b>	<b>N/A</b>	<b>2.60</b>
<b>Meets BACT?</b>		<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>N/A</b>	<b>YES</b>
<b>TOTAL lb/hour</b>		<b>0.34</b>	<b>0.57</b>	<b>10.75</b>	<b>0.01</b>	<b>1.19</b>
<b>TOTAL lb/day</b>		<b>8.10</b>	<b>13.57</b>	<b>257.88</b>	<b>0.33</b>	<b>28.57</b>
<b>TOTAL lb/year</b>		<b>15.85</b>	<b>26.58</b>	<b>505.02</b>	<b>0.65</b>	<b>55.96</b>
<b>TOTAL TPY</b>		<b>0.008</b>	<b>0.013</b>	<b>0.253</b>	<b>3.3E-04</b>	<b>0.028</b>

\*This engine triggers BACT for POC, NO<sub>x</sub>, and CO, and triggers TBACT for PM<sub>10</sub>

**OLD SOURCES: EMISSION REDUCTIONS**

The applicant is planning to shut down the following source on start-up of the new sources:

**S-31 Emergency Stand-By Diesel Generator Set; Detroit Diesel Model 250DT80DD, 140 BHP**

Emission reduction credits for the reduction in criteria emissions were calculated using the procedures set out in Regulation 2-2-605, Emission Calculation Procedures, Emission Reduction Credits. This regulation defines the baseline period as the three-year period immediately preceding the date that the application is complete. The baseline throughput is the lesser of the actual average throughput during the baseline period, or the average permitted throughput during the baseline period, if permitted by permit condition.

Based on these calculation procedures, the contemporaneous on-site emission reductions for the existing engine are as follows:

**TABLE 2 - CONTEMPORANEOUS ON-SITE EMISSION REDUCTIONS FROM SHUTDOWN OF SOURCE S-31**

	Emission Factor (lb/mgal)	SOURCE S-31 (avg lb/year)	TOTAL REDUCTIONS (avg TPY)
PM <sub>10</sub>	74.78	30.50	0.015
POC	12.33	5.03	0.003
NO <sub>x</sub>	438.50	178.83	0.089
SO <sub>2</sub>	0.21	0.08	0.000
CO	116.48	47.50	0.024

Baseline throughput calculations and contemporaneous reduction credit calculations are shown in Attachment 1.

**OFFSETS**

The total Potential to Emit for the facility after start-up of the new source will be less than 100 TPY for each criteria pollutant and less than 10 TPY for each ozone precursor (NO<sub>x</sub> and POC) (see Attachment 2).

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<sub>x</sub> 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 PM<sub>10</sub> or SO<sub>2</sub> offsets under Regulation 2-2-303.

**CUMULATIVE EMISSIONS INCREASE**

Changes to the cumulative emissions inventory are as follows:

**TABLE 3 - CUMULATIVE EMISSION INCREASE INVENTORY**

<b>Pollutant</b>	<b>Current Emissions (TPY)</b>	<b>Application Emissions Increase (TPY)</b>	<b>Onsite Emissions Reductions Credits (TPY)</b>	<b>Offsets From DSFB (TPY)</b>	<b>Final Emissions (TPY)</b>
<b>PM<sub>10</sub></b>	<b>4.260</b>	<b>0.008</b>	<b>0.015</b>	<b>0.000</b>	<b>4.253</b>
<b>POC</b>	<b>2.672</b>	<b>0.013</b>	<b>0.003</b>	<b>0.000</b>	<b>2.682</b>
<b>NPOC</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
<b>NO<sub>x</sub></b>	<b>13.768</b>	<b>0.253</b>	<b>0.089</b>	<b>0.000</b>	<b>13.932</b>
<b>SO<sub>2</sub></b>	<b>0.291</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.291</b>
<b>CO</b>	<b>9.644</b>	<b>0.028</b>	<b>0.024</b>	<b>0.000</b>	<b>9.648</b>

**TOXIC RISK CALCULATIONS**

The District uses PM<sub>10</sub> emissions as a proxy for toxic emission exposure to surrounding residential and industrial populations. A PM<sub>10</sub> 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 permitted operation, the application exceeds a PM<sub>10</sub> emission level of 0.34 lbs/year and so requires that a health risk screening assessment be performed.

The District requires that all similar projects submitted to the District within the past 24 months be considered as a "related project" for the purposes of risk analysis. Veterans Administration Medical Center – Palo Alto has requested an Authority to Construct for two other engines within the last 24 months, under the following application: Application #22345 (Sources S-33 and S-34, AC granted 2/4/2011). A risk assessment for all three engines was performed to assess the potential health risk effects of the project under the provisions of Regulation 2, Rule 5.

Because no representative meteorological data was available for this site, an ISCST3 model for PM<sub>10</sub> exposure using SCREEN3 meteorological data was used to estimate maximum 1-hour average ambient PM<sub>10</sub> concentrations. 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 Palo Alto sub area. Model runs were made with both urban and rural dispersion coefficients. 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 TAC 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 with rural terrain dispersion coefficients. This model produced a maximum annual worker GLC of 65.28 µg/m<sup>3</sup> per g/sec, resulting in a cancer risk of approximately 10.6 in a million. This maximum project cancer risk is not acceptable under Regulation 2, Rule 5-302.1. If the maximum operating hours for maintenance and testing of Source 35 are reduced to 47 hours per year, the maximum annual worker GLC will be reduced to 62.9 µg/m<sup>3</sup> per g/sec, resulting in a maximum worker cancer risk of approximately 10.0 in a million. The model will then produce an annual residential GLC of 15.3 µg/m<sup>3</sup> per g/sec, resulting in a maximum residential cancer risk of approximately 5.0 in a million, and an annual student GLC of 27.4 µg/m<sup>3</sup> per g/sec, resulting in a maximum student cancer risk of approximately 2.8 in a million. Associated health hazard indices are less than 1.0 for all cases. The applicant has agreed to limit the total annual use of Source 35 to 47 hours per year for testing and maintenance operations.

The maximum calculated carcinogenic risk of the project as amended is below 10 in a million and the maximum calculated chronic hazard index is less than 1.0, and so the engines as proposed are acceptable under Regulation 2, Rule 5.

## **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. This engine triggers BACT/TBACT for POC, NO<sub>x</sub>, CO, and PM<sub>10</sub>. 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 PM<sub>10</sub> 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<sub>x</sub>, and CO for the engine at the applicable horsepower rating and model year. The proposed engine meets the CARB ATCM emission standards and the District's BACT/TBACT limits.

## **PUBLIC NOTIFICATION REQUIREMENTS**

The proposed generator set is 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**

This generator is 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 generator is governed by and complies 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 42 hours per year except for operations under emergency conditions will be included as part of the permit conditions.

The generator is governed by and complies with the provisions of **Regulation 2, Rule 5, "New Source Review for Toxic Air Contaminants."**

The generator is exempt from the emission limitations of **Regulation 9, Rule 8-305, 8-501, and 8-503**, since it meets the provisions of **Regulation 9, Rule 8-110.5, "Exemptions: Emergency Standby Engines."**

The generator is 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+NOx emissions less than 6.4 g/kW-hr, and CO emissions less than 3.5 g/kW-hr). The generator proposed in this application is certified to these emission levels.

Visible emissions will be required to meet Ringelmann 1 limitation per **Regulation 6-301**.

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 #22847, setting out the operating conditions and recordkeeping requirements for operations at Source S-35 shall be made part of the source's Authority to Construct/Permit 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 source 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 source:

**S-35 Emergency Stand-By Diesel Generator Set; Mitsubishi Model S12A2-Y2PTAW-2, 1207 BHP**

subject to Condition #22847.

By \_\_\_\_\_ Date \_\_\_\_\_  
*Catherine S. Fortney*

1. The owner/operator shall not exceed 47 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 – CONTEMPORANEOUS EMISSION  
REDUCTION CREDIT CALCULATIONS**

<b>ACTUAL DIESEL FUEL USAGE RATES AT EXISTING GENERATOR(S)</b>				
<b>Source #</b>	<b>Period Ending 1/29/2012 (MGAL/YR)</b>	<b>Period Ending 12/31/2010 (EST) (MGAL/YR)</b>	<b>Period Ending 12/31/2009 (MGAL/YR)</b>	<b>Average (MGAL/YR)</b>
<b>S-31</b>	<b>0.24</b>	<b>0.29</b>	<b>0.69</b>	<b>0.41</b>

<b>CONTEMPORANEOUS ON-SITE EMISSION REDUCTIONS EXISTING GENERATOR(S)</b>			
	<b>Emission Factor (lb/mgal)</b>	<b>SOURCE S-31 (avg lb/year)</b>	<b>TOTAL REDUCTIONS (avg TPY)</b>
<b>PM<sup>(1)</sup></b>	<b>74.78</b>	<b>30.50</b>	<b>0.015</b>
<b>POC<sup>(2)</sup></b>	<b>12.33</b>	<b>5.03</b>	<b>0.003</b>
<b>NOx<sup>(2)</sup></b>	<b>438.50</b>	<b>178.83</b>	<b>0.089</b>
<b>SO2<sup>(2)</sup></b>	<b>0.21</b>	<b>0.08</b>	<b>0.000</b>
<b>CO<sup>(2)</sup></b>	<b>116.48</b>	<b>47.50</b>	<b>0.024</b>

<sup>(1)</sup> From Policy Memorandum issued By Brian Bateman, January 9, 2006

<sup>(2)</sup> From AP 42, Table 3.4-1

Emission Factor Equations:

PM10       $(0.63 \text{ g/bhp-hr}) / (2545 \text{ btu/bhp-hr}) * (1.37 * 10^8 \text{ btu/mgal}) / (453.6 \text{ g/lb}) = 74.78 \text{ lb PM10/mgal}$

POC         $(0.09 \text{ lbs/MM btu}) / (0.0193 \text{ MM btu/lb}) (7.1 \text{ lb/gal}) (1000 \text{ gal/mgal}) = 12.333 \text{ lb POC/mgal}$

NOx         $(3.2 \text{ lbs/MM btu}) / (0.0193 \text{ MM btu/lb}) (7.1 \text{ lb/gal}) (1000 \text{ gal/mgal}) = 438.496 \text{ lb NOx/mgal}$

SO2         $(1.01 * 0.0015 \text{ lbs/MM btu}) / (0.0193 \text{ MM btu/lb}) (7.1 \text{ lb/gal}) (1000 \text{ gal/mgal}) = 0.208 \text{ lb SO2/mgal}$

CO          $(0.85 \text{ lbs/MM btu}) / (0.0193 \text{ MM btu/lb}) (7.1 \text{ lb/gal}) (1000 \text{ gal/mgal}) = 116.476 \text{ lb CO/mgal}$

## ATTACHMENT 2 – FACILITY-WIDE 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)
9	TC000000	GASOLINE DISPENSING ISLAND	952,000	gal/year	11453	17100		12376				
17	C1340189	Water Tube Boiler <sup>(1,2)</sup>	30	MMBTU/hr	11689	13662	1958.12	1417.06	798.71	2870.30	1545.88	19416.98
18	C1340189	Water Tube Boiler <sup>(1,2)</sup>	30	MMBTU/hr	11689	13662	1958.12	1417.06	798.71	2870.30	1545.88	19416.98
19	C1340189	Water Tube Boiler <sup>(1,2)</sup>	30	MMBTU/hr	11689	13662	1958.12	1417.06	798.71	2870.30	1545.88	19416.98
20	C2240098	Standby Diesel Generator <sup>(3)</sup>	350	BHP	22820	4143	9.72	4.93		168.00	0.08	38.50
21	C2250098	Standby Diesel Generator <sup>(3)</sup>	568	BHP	22820	7717	15.78	8.00		272.64	0.14	62.48
22	C2250098	Standby Diesel Generator <sup>(3)</sup>	568	BHP	22820	7717	15.78	8.00		272.64	0.14	62.48
23	C2250098	Standby Diesel Generator <sup>(3)</sup>	568	BHP	22820	7717	15.78	8.00		272.64	0.14	62.48
24	C2250098	Standby Diesel Generator <sup>(3)</sup>	195	BHP	22820	7717	5.67	9.63		120.90	8.00	26.05
26	C2260098	Standby Diesel Generator <sup>(3)</sup>	805	BHP	22820	7717	22.36	11.33		386.40	0.20	88.55
27	C2260098	Standby Diesel Generator <sup>(3)</sup>	805	BHP	22820	7717	22.36	11.33		386.40	0.20	88.55
28	C2260098	Standby Diesel Generator <sup>(3)</sup>	805	BHP	22820	7717	22.36	11.33		386.40	0.20	88.55
29	C2260098	Standby Diesel Generator <sup>(3)</sup>	805	BHP	22820	7717	22.36	11.33		386.40	0.20	88.55
30	C2260098	Standby Diesel Generator <sup>(3)</sup>	805	BHP	22820	7717	22.36	11.33		386.40	0.20	88.55
32	C2250098	Standby Diesel Generator <sup>(3)</sup>	375	BHP	22820	7717	10.91	18.53		232.50	15.38	50.10
33	C2260098	Standby Diesel Generator <sup>(4)</sup>	1502	BHP	22850	22345	16.06	33.28		633.45	0.70	197.52
34	C2250098	Standby Diesel Generator <sup>(4)</sup>	550	BHP	22850	22345	8.12	8.61		163.21	0.35	49.71
35	C2250098	Standby Diesel Generator <sup>(5)</sup>	1207	BHP	22847	24432	15.85	26.58		505.02	0.65	55.96
					TOTAL	LB/YEAR	6,100	16,809	2,396	13,184	4,664	59,299
						TPY	3,050	8,405	1,198	6,592	2,332	29,649
					TOTAL FACILITY PTE =		51.23	TPY				
<sup>(1)</sup> Excluding diesel back-up fuel usage <sup>(2)</sup> NOx and CO emissions based on condition limits of 9 ppmv and 100 ppmv respectively. Other emissions from AP 42, Table 1.4-2. <sup>(3)</sup> Limited to 20 hours per year operation; 0.0015 ppm sulfur fuel <sup>(4)</sup> Limited to 50 hours per year operation; 0.0015 ppm sulfur fuel <sup>(5)</sup> Limited to 42 hours per year operation; 0.0015 ppm sulfur fuel												