

ENGINEERING EVALUATION REPORT

Plant Name:	Veterans Administration Medical Center - Palo Alto
Application Number:	25912
Plant Number:	450

BACKGROUND

The applicant is applying for an Authority to Construct for two new Emergency Stand-By Diesel Power Generator Sets located at the applicant's campus at 3801 Miranda Avenue, Palo Alto, CA 94304. The applicant is requesting an Authority to Construct for the following equipment:

**S-36 Emergency Stand-By Diesel Generator Set; Caterpillar Model 3516C-HD, 3,633 BHP
abated by**

A-36 Diesel Particulate Filter; Miratech CombiKat CBS

**S-37 Emergency Stand-By Diesel Generator Set; Caterpillar Model 3516C-HD, 3,633 BHP
abated by**

A-36 Diesel Particulate Filter; Miratech CombiKat CBS

CRITERIA POLLUTANT EMISSIONS CALCULATIONS

The proposed engines have been not certified by the California Air Resources Board. Manufacturer's ISP 8178 D-2 cycle weighted emission factors were used for all emissions except SO₂. The emission factors used are as follows:

Source(s)	S-36	S-37
EPA Engine Family	CCPXL78.1NZS	CCPXL78.1NZS
CARB Executive Order	N/A	N/A
BHP	3,633	3,633
PM10 ¹ (g/bhp-hr)	0.008	0.008
POC (g/bhp-hr)	0.210	0.210
NOx (g/bhp-hr)	3.963	3.963
SO ₂ ² (g/bhp-hr)	0.005	0.005
CO (g/bhp-hr)	0.469	0.469

¹ PM10 emissions are abated by diesel particulate filters operating at 85% efficiency

² SO₂ emission factor calculated from manufacturer's fuel rate for engine family

SO₂ g/bhp-hr = (173.5 gal/hr)*(7.1 lb/gal)*(0.0015 lb S/100 lb)*(64.06 lb SO₂/lb mol/32.06 lb S/lb mol)*(453.6 g/lb)
*(1/3633 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 Stationary Compression Ignition Engines, 17 CFR 93115, (May 19, 2011). At a 50 hours per year testing and maintenance limitation, criteria emissions are as follows:

TABLE 1 - CRITERIA POLLUTANT EMISSIONS

		PM10	POC	NOX	SO2	CO
SOURCE	BHP	G/BHP-HR	G/BHP-HR	G/BHP-HR	G/BHP-HR	G/BHP-HR
S-36	3633	0.008	0.210	3.969	0.005	0.469
S-37	3633	0.008	0.210	3.969	0.005	0.469
BACT (Current Tier Level)		0.15	0.24	4.56	N/A	2.60
Meets BACT?		YES	YES	YES	N/A	YES
lb/hour per engine		0.067	1.68	31.79	0.04	3.76
lb/day per engine		1.61	40.37	762.93	0.89	90.15
lb/yr per engine		3.4	84.1	1589.4	1.8	187.8
TOTAL lb/hour		0.13	3.36	63.58	0.07	7.51
TOTAL lb/day		3.2	80.7	1525.9	1.8	180.3
TOTAL lb/year		6.73	168.19	3178.88	3.69	375.63
TOTAL TPY		0.003	0.084	1.589	0.002	0.188

These engines trigger BACT for POC, NO_x, and CO, and trigger TBACT for PM₁₀

OLD SOURCES: EMISSION REDUCTIONS

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

S-21 Emergency Stand-By Diesel Generator Set; Cummins Model 250, 568 BHP

S-22 Emergency Stand-By Diesel Generator Set; Cummins Model 250, 568 BHP

S-23 Emergency Stand-By Diesel Generator Set; Cummins Model 250, 568 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 SOURCES S-21 – S-23

ACTUAL DIESEL FUEL USAGE RATES AT EXISTING GENERATORS				
Source #	Period Ending 2/28/2014 (MGAL)	Period Ending 2/28/2013 (MGAL)	Period Ending 2/29/2012 (MGAL)	Average (MGAL)
S-21	0.16	0.80	0.98	0.64
S-22	0.35	0.67	0.87	0.63
S-23	0.49	0.69	1.20	0.79
			TOTAL =	2.07

CONTEMPORANEOUS ON-SITE EMISSION REDUCTIONS FROM EXISTING GENERATORS					
	Per Generator			3 Generators Combined	
	(lb/mgal)	(avg mgal/yr)	(total mgal/yr)	(total lb/yr)	(total TPY)
PM⁽¹⁾	74.78	0.69	2.065	154.42	0.077
POC⁽²⁾	12.33	0.69	2.065	25.47	0.013
NO_x⁽²⁾	438.50	0.69	2.065	905.49	0.453
SO₂⁽²⁾	0.21	0.69	2.065	0.43	0.000
CO⁽²⁾	116.48	0.69	2.065	240.52	0.120

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 will 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 3 - 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	4.272	0.003	0.077	0.000	4.198
POC	0.897	0.084	0.013	0.000	0.968
NPOC	0.000	0.000	0.000	0.000	0.000
NO_x	9.521	1.589	0.453	0.000	10.657
SO₂	0.291	0.002	0.000	0.000	0.293
CO	3.972	0.188	0.120	0.000	4.040

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.

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 one other engine within the last 24 months, under the following application: Application #24432 (Sources S-35, AC granted 8/21/12). 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 PM₁₀ exposure using SCREEN3 meteorological data was used to estimate maximum 1-hour average ambient PM₁₀ 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, both with and without model adjustments for horizontal emissions. 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 vertical emissions using the ISCST3 model with rural terrain dispersion coefficients. This model produced a maximum annual residential GLC of 9.0 µg/m³ per g/sec, resulting in a cancer risk of approximately 1.7 in a million, a maximum annual worker GLC of 111.5 µg/m³ per g/sec, resulting in a cancer risk of approximately 10 in a million, and a maximum annual student GLC of 12.3 µg/m³ per g/sec, resulting in a cancer risk of approximately 0.7 in a million. Associated health hazard indices are less than 1.0 for all cases.

The maximum calculated carcinogenic risk 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.

GREENHOUSE GAS EMISSIONS

Greenhouse gases (GHGs) from the facility are expressed as tons per year of carbon dioxide equivalent (CO₂e). The components of GHGs are biogenic carbon dioxide, methane, and nitrous oxide. Methane and nitrous oxide contributions are multiplied by weighting factors of 21 and 310, respectively, to obtain CO₂e emissions. The total GHG Potential to Emit was estimated using standardized emission factors from 40 CFR 98 Subpart C, Tables C-1 and C-2. A summary to the GHG PTE is shown in Attachment 2.

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. These engines trigger BACT for POC, CO, and NO_x. For compression ignition I.C. engines with firing rates greater than 50 BHP, this means the engines must be fired on ultra-low sulfur diesel fuel (fuel oil with less than 0.0015% by weight sulfur content). BACT/TBACT also requires that the engines meet current tier standards for POC and NO_x emissions, meet the more stringent of either 0.15 g/bhp-hr or the current tier standard for PM₁₀ emissions, and meet the more stringent of 2.75 g/bhp-hr or the current tier standard for CO emissions. For these sources, the current tier standard is Tier 2, and the proposed engines comply with the applicable Tier

standards and meet BACT and TBACT requirements. Tier 2 PM₁₀, NO_x, CO, and POC standards are less than or equal to the District's BACT and 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.

PSD REVIEW

Since the facility will not have the potential to emit more than 100 tons per year of any criteria pollutant or more than 100,000 tons/year of CO₂ equivalent greenhouse gas emissions, the facility is not a "Major Facility" as defined in Regulation 2-1-203, and is not subject to PSD permitting requirements under Regulation 2-2-304.

TITLE V REVIEW

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 Title V permitting requirements under Regulation 2-6-301.

On May 13, 2010, the EPA issued the final Title V Greenhouse Gas Emissions Tailoring Rule, setting the limit of 100,000 tons per year of greenhouse gas (GHG) emissions as the threshold for permitting as a Major Facility under Title V of the Federal Clean Air Act. Any facility with the potential to emit 100,000 tons per year of GHGs is required to apply for a Major Facility permit under Regulation 2, Rule 6-212, or apply for a Synthetic Minor Operating Permit under Regulation 2, Rule 6-231.

This facility's total Potential to Emit for Greenhouse Gases including this application is approximately 75,616 tons/year from all permitted sources. Based on current District permitting policies, this application does not trigger Title V permitting requirements for greenhouse gases.

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 will 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 50 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 will 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 IIII, **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 generators proposed in this application are 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

Conditions 22850 and 24354, setting out the operating conditions and recordkeeping requirements for operations at Sources S-36 and S-37 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-36 Emergency Stand-By Diesel Generator Set; Caterpillar Model 3516C-HD, 3633 BHP
abated by**

A-36 Diesel Particulate Filter; Miratech CombiKat CBS

**S-37 Emergency Stand-By Diesel Generator Set; Caterpillar Model 3516C-HD, 3633 BHP
abated by**

A-36 Diesel Particulate Filter; Miratech CombiKat CBS

subject to Conditions 22850 and 24354.

By _____ Date _____
Catherine S. Fortney

1. The owner/operator shall not exceed 50 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)]

COND# 24354 -----

1. The owner/operator shall abate the particulate emissions from the emergency diesel engine with a Diesel Particulate Filter at all times the engine is in operation.

[Basis: "ATCM for Stationary Compression Ignition Engines" Section 93115.6(a)(3) or 93115.6(b)(3), title 17, CA Code of Regulations]

2. The owner/operator shall install and maintain a backpressure monitor that notifies the owner or operator when the high backpressure limit of the engine is approached. The owner/operator shall maintain records of any corrective action taken after the backpressure monitor has notified the owner or operator that the high backpressure limit of the engine is approached 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).

[Basis: "ATCM for Stationary Compression Ignition Engines" Section 93115.10(e), title 17, CA Code of Regulations; 40 CFR 60.4214c]

ATTACHMENT 1 – 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 ^(1,2)	30	MMBTU/hr	11689	13662	1958.12	1417.06	798.71	2870.30	1545.88	19416.98
18	C1340189	Water Tube Boiler ^(1,2)	30	MMBTU/hr	11689	13662	1958.12	1417.06	798.71	2870.30	1545.88	19416.98
19	C1340189	Water Tube Boiler ^(1,2)	30	MMBTU/hr	11689	13662	1958.12	1417.06	798.71	2870.30	1545.88	19416.98
20	C2240098	Standby Diesel Generator ⁽³⁾	350	BHP	22820	4143	9.72	4.93		168.00	0.08	38.50
24	C2250098	Standby Diesel Generator ⁽³⁾	195	BHP	22820	7717	5.67	9.63		120.90	8.00	26.05
26	C2260098	Standby Diesel Generator ⁽³⁾	805	BHP	22820	7717	22.36	11.33		386.40	0.20	88.55
27	C2260098	Standby Diesel Generator ⁽³⁾	805	BHP	22820	7717	22.36	11.33		386.40	0.20	88.55
28	C2260098	Standby Diesel Generator ⁽³⁾	805	BHP	22820	7717	22.36	11.33		386.40	0.20	88.55
29	C2260098	Standby Diesel Generator ⁽³⁾	805	BHP	22820	7717	22.36	11.33		386.40	0.20	88.55
30	C2260098	Standby Diesel Generator ⁽³⁾	805	BHP	22820	7717	22.36	11.33		386.40	0.20	88.55
32	C2250098	Standby Diesel Generator ⁽³⁾	375	BHP	22820	7717	10.91	18.53		232.50	15.38	50.10
33	C2260098	Standby Diesel Generator ⁽⁴⁾	1502	BHP	22850	22345	16.06	33.28		633.45	0.70	197.52
34	C2250098	Standby Diesel Generator ⁽⁴⁾	550	BHP	22850	22345	8.12	8.61		163.21	0.35	49.71
35	C2250098	Standby Diesel Generator ⁽⁵⁾	1207	BHP	22847	24432	15.85	26.58		505.02	0.65	55.96
36	TBD	Standby Diesel Generator ⁽⁴⁾	3633	BHP	22850	25912	3.36	84.10		1587.03	1.80	187.82
37	TBD	Standby Diesel Generator ⁽⁴⁾	3633	BHP	22850	25912	3.36	84.10		1587.03	1.80	187.82
					TOTAL	LB/YEAR	6,059	16,954	2,396	15,540	4,667	59,487
						TPY	3.03	8.48	1.20	7.77	2.33	29.74
					TOTAL FACILITY PTE =		52.55	TPY				
⁽¹⁾ Excluding diesel back-up fuel usage ⁽²⁾ NOx and CO emissions based on condition limits of 25 ppmv and 100 ppmv respectively. Other emissions from AP 42, Table 1.4-2. ⁽³⁾ Limited to 20 hours per year operation; 0.0015 ppm sulfur fuel ⁽⁴⁾ Limited to 50 hours per year operation; 0.0015 ppm sulfur fuel ⁽⁵⁾ Limited to 42 hours per year operation; 0.0015 ppm sulfur fuel												

ATTACHMENT 2 – FACILITY-WIDE GREENHOUSE GAS EMISSIONS