

ENGINEERING EVALUATION REPORT

Plant Name:	MILLS PENINSULA HEALTH CENTER
Application Number:	22161
Plant Number:	10327

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-13 Emergency Stand-By Diesel Generator Set; Cummins Model QSK50G4 NR2, 2220 BHP abated by

A-13 Diesel-Catalyzed Particulate Filter; DCL Mine-X Soot Filter, 12065 CFM

CRITERIA POLLUTANT EMISSIONS CALCULATIONS

The proposed engine has been certified by the California Air Resources Board (CARB) under Executive Order U-R-002-0525 (EPA Engine Family ACEXL050.AAD). CARB certified emission factors for the engine were used for all criteria pollutant emission calculations. The engine will abate the diesel particulate matter with a diesel-catalyzed particulate filter. The effective emission factors used are as follows:

PM10	0.006	g/bhp-hr
NMHC	0.227	g/bhp-hr
NOX	4.321	g/bhp-hr
SO2 ¹	0.005	g/bhp-hr
CO	0.895	g/bhp-hr

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). At a 50 hours per year testing and maintenance limitation, criteria emissions are as follows:

¹ SO2 emission factor calculated from fuel rate for CARB certified engine
SO2 g/bhp-hr = (777.3 lb/hr)*(0.0015 lb S/100 lb)*(64.06 lb SO2/lb mol/32.06 lb S/lb mol)*(453.6 g/lb)
*(1/2220 BHP) = 0.005 g/bhp/hr

TABLE 1 - CRITERIA POLLUTANT EMISSIONS

SOURCE	BHP	PM10 G/BHP-HR	POC G/BHP-HR	NOX G/BHP-HR	SO2 G/BHP-HR	CO G/BHP-HR
S-13	2220	0.006	0.227	4.321	0.005	0.895
TOTAL G/HR		13	505	9,594	11	1,987
BACT (Tier 2-g/bhp-hr)		0.15	0.24	4.56		2.60
Meets BACT?		YES	YES	YES		YES
TOTAL LB/HR		0.03	1.11	21.15	0.02	4.38
TOTAL LB/DAY		0.70	26.72	507.59	0.56	105.11
TOTAL LB/YEAR		1.460	55.66	1,057.49	1.16	218.98
TOTAL TPY		0.001	0.028	0.529	0.001	0.109

EXISTING SOURCES: EMISSION REDUCTIONS

The applicant plans to shut down the following three sources on start-up of the new generator:

- S-9 Emergency Stand-By Diesel Generator Set; Cummins Model VTA12-800GS, 800 BHP**
- S-10 Emergency Stand-By Diesel Generator Set; Cummins Model VTA12-800GS, 800 BHP**
- S-11 Emergency Stand-By Diesel Generator Set; Cummins Model VTA1710 PG700, 700 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 restricted by permit condition.

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

**TABLE 2 - CONTEMPORANEOUS ON-SITE EMISSION REDUCTIONS
FROM SHUT-DOWN OF SOURCES S-9, S-10, AND S-11**

	S-9 Generator (lb/yr)	S-10 Generator (lb/yr)	S-11 Generator (lb/yr)	TOTAL (lb/yr)	TOTAL (tpy)
PM	24.38	24.38	24.38	73.13	0.037
POC	4.02	4.02	4.02	12.06	0.006
NOX	142.95	142.95	142.95	428.85	0.214
SO2	0.07	0.07	0.07	0.20	0.000
CO	37.97	37.97	37.97	113.91	0.057

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 sources will be less than 100 TPY for each criteria pollutant and less than 10 TPY for each ozone precursor (NOx and POC). (see Attachment 2).

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 NOx 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/DECREASE

All of the existing sources were permitted as "Loss of Exemption," therefore the current Cumulative Emissions Inventory is zero for all criteria pollutants. After start-up of the new engine, the Cumulative Emissions inventory will be as follows:

TABLE 3 - CUMULATIVE EMISSIONS INCREASE/DECREASE INVENTORY

Pollutant	Current Emissions (tpy)	Applications Emissions Increase (tpy)	Onsite Emissions Reductions Credits (tpy)	Offsets From DSFB (tpy)	Final Emissions (tpy)
PM10	0	0.001	0.037	0	-0.036
POC	0	0.028	0.006	0	0.022
NPOC	0	0	0	0	0
NOx	0	0.529	0.214	0	0.315
SO2	0	0.001	0	0	0.001
CO	0	0.109	0.057	0	0.052

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 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.

Representative meteorological data was available for this site, and an ISCST3 model for PM10 exposure using local (MST) meteorological data was used to estimate maximum annual average ambient PM10 concentrations. Since the ISCST3 model does not estimate air concentrations within a building cavity region, where potential receptors are located, the ISC Prime model was also run. Elevated terrain was considered using 10m DEM input from the USGS San Mateo sub area. Model runs were made with both urban and rural dispersion coefficients, with emission rate scalars to account for operations that occur only during normal working hours. Stack and building parameters for the analysis were based on information provided by the applicant.

Estimates of residential risk assume that potential exposure to annual average PM10 concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimates for offsite workers assume that potential exposure occurs 8 hours per day, 245 day per year, for 40 years. Since the diesel engine is

located within 500 feet of school grounds, statewide regulation prohibits non-emergency operation of this engine between the hours of 7:30 a.m. and 3:30 p.m. on days when the school is in session. Therefore, potential exposure to students is considered negligible. 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 residential risks were obtained by modeling emissions with the ISC Prime model using urban terrain dispersion coefficients. This model produced a maximum annual residential GLC of 26.3 $\mu\text{g}/\text{m}^3$ per g/sec, resulting in a cancer risk of approximately 0.31 in a million. The highest worker were obtained by modeling emissions with the ISCST3 model using rural terrain dispersion coefficients. This model produced a maximum annual worker GLC of 49.2 $\mu\text{g}/\text{m}^3$ per g/sec, corresponding to a cancer risk of approximately 0.28 in a million. Associated health hazard indices are less than 1.0 for all cases. A summary of risk results is presented in Attachment 3.

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 engine as proposed is 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 source triggers BACT for CO and NOx. For compression ignition I.C. engines with firing rates greater than 50 BHP, this means the engine 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 engine meet current tier standards for POC and NOx 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 this engine, the current tier standard is Tier 2. The proposed engine complies with the applicable Tier standards and meets BACT and TBACT requirements. Tier 3 PM10, NOx, CO, and NMHC standards are less than or equal to the District's BACT and TBACT limits.

COMPLIANCE DETERMINATION

The 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 50 hours per year except for operations under emergency conditions (Reg 9-8-330) will be included as part of the permit conditions.

The generator is also 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 District **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 (0.15 g/bhp-hr), NMHC+NOx emissions less than 6.4 g/kW-hr (4.8 g/bhp-hr), and CO emissions less than 3.5 g/kW-hr (2.6 g/bhp-hr)]. The generator proposed in this application is certified to these emission levels.

Visible emissions from the generator will be required to meet Ringelmann 1.0 limitation per **Regulation 6-301**.

Sulfur emissions will be controlled by the requirement that any fuel used in the engine 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 Source S-13 shall be made part of the source's authority to construct/permit to operate.

RECOMMENDATION

I recommend that an Authority to Construct be issued for the following source:

S-13 Emergency Stand-By Diesel Generator Set; Cummins Model QSK50G4 NR2, 2220 BHP abated by

A-13 Diesel-Catalyzed Particulate Filter; DCL Mine-X Soot Filter, 12065 CFM

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, playground, 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)]

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 - BASELINE CALCULATIONS FOR EMISSIONS
REDUCTION CREDITS FOR EXISTING GENERATORS**

ACTUAL DIESEL FUEL USAGE RATES AT EXISTING GENERATORS				
Source #	Period Ending 12/31/2009 (MGAL)	Period Ending 12/31/2008 (MGAL)	Period Ending 12/31/2007 (MGAL)	Average (MGAL)
S-9	0.37	0.36	0.25	0.33
S-10	0.37	0.36	0.25	0.33
S-11	0.37	0.36	0.25	0.33

CONTEMPORANEOUS ON-SITE EMISSION REDUCTIONS FROM EXISTING GENERATORS				
Per Generator				3 Generators Combined
Pollutant	(lb/mgal)	(avg mgal/year)	(lb/year)	(lb/year)
PM ⁽¹⁾	74.78	0.33	24.38	73.13
POC ⁽²⁾	12.33	0.33	4.02	12.06
NOx ⁽²⁾	438.50	0.33	142.95	428.85
SO2 ⁽²⁾	0.21	0.33	0.07	0.20
CO ⁽²⁾	116.48	0.33	37.97	113.91

⁽¹⁾ From Policy Memorandum issued By Brian Bateman, January 9, 2006

⁽²⁾ 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 TOTAL POTENTIAL TO EMIT

ATTACHMENT 3 - SUMMARY OF TOXIC HEALTH RISKS

	RURAL TERRAIN OPTION			URBAN TERRAIN OPTION		
	ISCST3 - NO RAINCAPS			ISCST3 - NO RAINCAPS		
TOTAL RISK	<i>Max Cancer Risk (per million)</i>	<i>Max Chronic Non-cancer Hazard Quotient</i>	<i>Max Acute Non-Cancer Hazard Quotient</i>	<i>Max Cancer Risk (per million)</i>	<i>Max Chronic Non-cancer Hazard Quotient</i>	<i>Max Acute Non-Cancer Hazard Quotient</i>
RESIDENTIAL	0.085	3.0E-05	N/A	0.079	2.8E-05	N/A
WORKER	0.284	2.0E-04	N/A	0.283	2.0E-04	N/A
STUDENT	Negligible	Negligible	N/A	Negligible	Negligible	N/A

	RURAL TERRAIN OPTION			URBAN TERRAIN OPTION		
	ISC PRIME - NO RAINCAPS			ISC PRIME - NO RAINCAPS		
TOTAL RISK	<i>Max Cancer Risk (per million)</i>	<i>Max Chronic Non-cancer Hazard Quotient</i>	<i>Max Acute Non-Cancer Hazard Quotient</i>	<i>Max Cancer Risk (per million)</i>	<i>Max Chronic Non-cancer Hazard Quotient</i>	<i>Max Acute Non-Cancer Hazard Quotient</i>
RESIDENTIAL	0.259	9.2E-05	N/A	0.312	1.1E-04	N/A
WORKER	0.143	1.0E-04	N/A	0.171	1.2E-04	N/A
STUDENT	Negligible	Negligible	N/A	Negligible	Negligible	N/A

	MAX CANCER RISK	MAX CHRONIC NON-CAN RISK	MAX ACUTE NON-CAN RISK
RESIDENTIAL	0.312	1.1E-04	N/A
WORKER	0.284	2.0E-04	N/A
STUDENT	Negligible	Negligible	N/A