

## ENGINEERING EVALUATION REPORT

<b>Plant Name:</b>	<b>Kaiser Permanente San Leandro Medical Center</b>
<b>Application Number:</b>	<b>23045</b>
<b>Plant Number:</b>	<b>20428</b>

### BACKGROUND

The applicant, Kaiser Permanente San Leandro Medical Center, is constructing a new medical center in San Leandro.

Under this application, the applicant has applied for an Authority to Construct for two new 268 BHP Microturbines.

The applicant is requesting an Authority to Construct for the following equipment:

**S-10 MICROTURBINE, Capstone Model C200LP, 2.28 MM BTU/hour**

**S-11 MICROTURBINE, Capstone Model C200LP, 2.28 MM BTU/hour**

### CRITERIA POLLUTANT EMISSION CALCULATIONS

The PM10 and SO2 emission factors for the new microturbines are based on the maximum PG&E natural gas sulfur content of 1 gr/100 SCF. The NOx emission factor is from the manufacturer's specifications for the engines. The CO emission factor is from AP 42, Table 3.1-1, and the POC and NPOC emission factors are from AP 42, Table 3.1-2a. The emission factors used are as follows:

	S-10 and S-11
Manufacturer	Capstone
Model	C200LP
BHP	268
Firing Rate	2.28 MM BTU/hr
CARB Certification	Not Available
PM <sub>10</sub>	5.78 E-3 lb/mm btu <sup>1</sup>
POC	2.10 E-3 lb/mm btu
NPOC	8.90 E-3 lb/mm btu
NO <sub>x</sub>	1.47 E-2 lb/mm btu
SO <sub>2</sub>	2.80 E-3 lb/mm btu <sup>2</sup>
CO	8.20 E-2 lb/mm btu

<sup>1</sup> PM<sub>10</sub> emission factor calculated from maximum PG&E sulfur content for natural gas of 1 gr/100 scf  
 $PM_{10} \text{ lb/mm btu} = (1 \text{ gr/100 scf})(1 \text{ lb/7000 gr})(1/1020 \text{ btu/scf})(1 \times 10^6 \text{ btu/mm btu})(132 \text{ lb PM}_{10}/\text{lb mol}) / (32 \text{ lb S/lb mol}) = 2.80 \text{ E-3 lb}$

<sup>2</sup> SO<sub>2</sub> emission factor calculated from maximum PG&E sulfur content for natural gas of 1 gr/100 scf  
 $SO_2 \text{ lb/mm btu} = (1 \text{ gr/100 scf})(1 \text{ lb/7000 gr})(1/1020 \text{ btu/scf})(1 \times 10^6 \text{ btu/mm btu})(64 \text{ lb SO}_2/\text{lb mol}) / (32 \text{ lb S/lb mol}) = 2.80 \text{ E-3 lb}$

A summary of the criteria pollutant emissions for the new sources is as follows:

**TABLE 1 - CRITERIA POLLUTANT EMISSIONS**

SOURCE	mmbtu/hr	PM (total) (lb/mmbtu)	POC (lb/mmbtu)	NPOC (lb/mmbtu)	NOX (lb/mmbtu)	SO2 (lb/mmbtu)	CO (lb/mmbtu)
S-10	2.28	5.78E-03	2.10E-03	8.90E-03	1.47E-02	2.80E-03	8.20E-02
S-11	2.28	5.78E-03	2.10E-03	8.90E-03	1.47E-02	2.80E-03	8.20E-02
<b>TOTAL LB/HOUR</b>		<b>0.026</b>	<b>0.010</b>	<b>0.041</b>	<b>0.067</b>	<b>0.013</b>	<b>0.374</b>
<b>TOTAL LB/DAY</b>		<b>0.63</b>	<b>0.23</b>	<b>0.97</b>	<b>1.61</b>	<b>0.31</b>	<b>8.97</b>
<b>LB/DAY/SOURCE</b>		<b>0.32</b>	<b>0.11</b>	<b>0.49</b>	<b>0.80</b>	<b>0.15</b>	<b>4.49</b>
<b>TOTAL LB/YEAR</b>		<b>231</b>	<b>84</b>	<b>356</b>	<b>587</b>	<b>112</b>	<b>3,276</b>
<b>TOTAL TPY</b>		<b>0.115</b>	<b>0.042</b>	<b>0.178</b>	<b>0.294</b>	<b>0.056</b>	<b>1.638</b>

BACT/TBACT is not triggered for these turbines.

**OLD SOURCES: EMISSION REDUCTIONS**

The applicant is not proposing to shut down any of its currently permitted sources, therefore no on-site emission reduction credits were calculated.

**OFFSETS**

A summary of the facility's total criteria Potential to Emit is provided in Attachment 1.

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.

The facility will have the potential to emit more than 10 tons per year but less than 35 tons per year of NO<sub>x</sub> emissions on a pollutant-specific basis, therefore the facility is subject to NO<sub>x</sub> offsets under Regulation 2-2-302. Offsets will be provided by the District's Small Facility Banking Account at a 1.0:1.0 ratio for the new NO<sub>x</sub> emissions plus pre-existing cumulative increase.

The facility will not have the potential to emit more than 10 tons per year of precursor organic compounds on a pollutant-specific basis, therefore the facility is not subject to POC offsets under Regulation 2-2-302.

**CUMULATIVE EMISSIONS INCREASE**

Changes to the cumulative emissions inventory are as follows:

**TABLE 2 - CUMULATIVE EMISSION INCREASE INVENTORY**

Pollutant	Current Emissions (TPY)	Applications Emissions Increase (TPY)	Onsite Emissions Reductions Credits (TPY)	Offsets From DSFB (TPY)	Final Emissions (TPY)
PM10	1.115	0.115	0	0	1.230
POC	0.793	0.042	0	0	0.835
NPOC	0.000	0.178	0	0	0.178
NOx	4.852	0.294	0	5.146	0.000
SO2	1.054	0.056	0	0	1.110
CO	13.338	1.638	0	0	14.976

## **TOXIC RISK MODELING**

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. Kaiser Permanente San Leandro Medical Center has requested an Authority to Construct for three standby generators and four space heat boilers under the following application: Application #22622 (Sources S-1 through S-7, AC granted 4/29/2011). A risk assessment for all nine sources was performed to assess the potential health risk effects of the project under the provisions of Regulation 2, Rule 5.

The District uses PM<sub>10</sub> emissions as a proxy for toxic emission exposure to surrounding residential and industrial populations from diesel-fired generators, and benzene, formaldehyde, and toluene emissions as a proxy for toxic emission exposure to surrounding residential and industrial populations from natural-gas fired boilers. Toxic emission exposure from the microturbine engines was estimated using emission factors from the California Air Toxic Emission Factor Database (CATEF).

A summary of the estimated toxic pollutant emissions for this project is shown in Attachment 2. At a maximum 50 hours per year permitted operation per generator, and 8,760 hours per year permitted operation per boiler and microturbine, these sources exceed several of the risk screening trigger levels set out in Regulation 2, Rule 5, Table 2-5-1, and therefore require that a health risk screening assessment be performed. The application does not exceed any acute risk trigger level.

Representative meteorological data was available for this site, and an ISCST3 model for normalized toxic emissions exposure using “OAK” meteorological data was used to estimate maximum cancer and noncancer risks. 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 San Leandro 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 residential cancer risk and all worker and student risks were obtained by modeling emissions using the ISCST3 model with urban terrain dispersion coefficients. The highest residential chronic health risk was obtained by modeling emissions using the ISCST3 model with rural terrain dispersion coefficients. Based on operation of 50 hours per year per generator, and 8,760 hours per year per boiler and microturbine, maximum cancer risk and hazard indices for this project are as follows:

**TABLE 4 - ISCST3 RISK MODELING RESULTS**

	<b>MAX CANCER RISK</b>	<b>MAX CHRONIC NON-CAN RISK</b>	<b>MAX ACUTE NON-CAN RISK</b>
<b>RESIDENTIAL<sup>3</sup></b>	<b>4.377</b>	<b>4.44E-03</b>	<b>N/A</b>
<b>WORKER</b>	<b>4.078</b>	<b>4.11E-03</b>	<b>N/A</b>
<b>STUDENT</b>	<b>2.222</b>	<b>2.51E-03</b>	<b>N/A</b>

<sup>3</sup> Residential risk from the microturbines only is approximately 0.26 in a million. The remaining residential risk is due to previously permitted generators and boilers.

Because the maximum annual cancer risk from this project is less than 10 in a million and the maximum annual chronic hazard index is less than 1.0, the project risks are acceptable under Regulation 2, Rule 5-302. Since the cancer risk from the microturbines is less than 1.0 in a million, and the non-cancer chronic hazard index from the microturbines is less than 0.2, the TBACT requirements in Regulation 2-5-301.1 do not apply to the proposed microturbines.

### **BACT REVIEW**

Under Regulation 2, Rule 2, any new source which results in an increase of 10 lbs/day or more of any criteria pollutant must be evaluated for adherence to BACT control technologies. Based on Table 1 above, the microturbines do not trigger BACT for any criteria pollutant emissions.

### **PUBLIC NOTIFICATION REQUIREMENTS**

The proposed microturbines 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 microturbine engines in this application are covered under ministerial exemption, Chapter 2.1 of the BAAQMD Permit Handbook. CEQA is not triggered for small microturbines under this provision.

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

The microturbine engines are exempt from the provisions of District **Regulation 9, Rule 9, “Nitrogen Oxides from Stationary Gas Turbines,”** since they are rated at less than 5 MM BTU/hour ( **Regulation 9, Rule 9-110**)

The microturbines are not subject to 40 CFR, Part 60, Subpart KKKK, since the microturbine maximum firing rate is less than 10 MM BTU/hour per source.

Since the total Potential to Emit for greenhouse gases (GHGs) is less than 100,000 tons per year, Title V and PSD requirements are not triggered.

### **CONDITIONS**

Nitrogen oxides, carbon monoxide, and precursor organic compound emission factors for microturbines permitted for operation in the BAAQMD are usually based on California Air Resources Board (CARB) certified data for distributed generation combustion devices. These emission factors are low enough that operation of microturbines do not usually require permit conditions<sup>4</sup>. However, CARB has not yet certified the emissions from this microturbine for combustion operations fired by natural gas (although it has been certified for operations on landfill gas and digester gas).

Based on default emission factors set out in AP 42, Chapter 3.1, the microturbines do not have the potential to emit more than 10 lbs per highest day of any criteria pollutant except nitrogen oxides. However, the manufacturer guarantees NO<sub>x</sub> emissions of no more than 4 ppmv at 15% O<sub>2</sub>, which results in a maximum potential to emit of less

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<sup>4</sup> BAAQMD Permit Handbook, Chapter 2.4.1.

than 10 pounds per highest day for NO<sub>x</sub> emissions. Therefore a condition limit restricting NO<sub>x</sub> emissions to no more than 10 pounds per highest day has been added to these sources.

Condition #25029, setting out the operating conditions and recordkeeping requirements for operations at Sources S-10 and S-11, 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. I recommend that an Authority to Construct be issued for the following sources:

**S-10 MICROTURBINE, Capstone Model C200LP, 2.28 MM BTU/hour**

**S-11 MICROTURBINE, Capstone Model C200LP, 2.28 MM BTU/hour**

subject to Condition #25029.

By \_\_\_\_\_  
*Catherine Fortney*

\_\_\_\_\_ *Date*

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1. Sources S-10 and 11 shall burn only natural gas.  
(Cumulative Increase)
2. Emissions of nitrogen oxides (NO<sub>x</sub>) shall not exceed 10  
pounds per highest day per microturbine. (Basis:  
Regulation 2, Rule 3-301.1)

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**ATTACHMENT 1 – FACILITY-WIDE POTENTIAL TO EMIT**

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**ATTACHMENT 2 – TOXIC POLLUTANT EMISSIONS**

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