ENGINEERING EVALUATION
Facility ID No. 20829
Ensign Sonoma Healthcare Center
1250 Broadway Avenue, Sonoma, CA 95476
Application No. 712408

Background

Ensign Sonoma Healthcare Center (referred to as "facility" hereafter) is applying for Authorities to Construct/Permits to Operate for the following sources:

S-2 65 kilowatts (kW) Micro Turbine, Natural gas-fired, Make: Capstone, Model: C65, Maximum Firing Rate: 0.871 MMBtu/hr

S-3 65 kW Micro Turbine, Natural gas-fired, Make: Capstone, Model: C65, Maximum Firing Rate: 0.871 MMBtu/hr

The two micro turbines will be natural gas fired. As a result, the criteria pollutants associated with S-2 and S-3 are nitrogen oxides (NO_x), precursor organic compounds (POC), carbon monoxide (CO), particulate matter (PM_{10} and $PM_{2.5}$), and sulfur dioxide (SO_2). Natural gas combustion will also release toxic air contaminants (TACs).

Emissions Summary

The maximum daily and annual emissions are based on each micro turbine's maximum power output, maximum fuel consumption. NO_x, CO, and POC emission factors are from the California Air Resources Board (CARB) Executive Order for distributed generation, DG-018 and PM_{10}, $PM_{2.5}$, and SO_2 emission factors are from the latest BAAQMD Permit Handbook, Chapter 2.4.1, Micro Turbines (25-1,000 kW).

Based on the maximum Pacific Gas & Electric (PG&E) natural gas specification for sulfur of 1 grain per 100 standard cubic feet (gr/hundred scf), PM_{10} (as $(NH_4)_2SO_4$) and SO_2 emission factors are calculated as shown below:

$$PM_{10} = \left(1\frac{gr}{100\ scf}\right) \times \left(\frac{lb}{7{,}000\ gr}\right) \times \left(\frac{1\ scf}{1{,}050\ Btu}\right) \times (10^6 \frac{Btu}{MMBtu}) \times \left(\frac{132\ lb\ (NH_4)_2SO_4}{32\ lb\ S}\right)$$
$$= 0.00561 \frac{lb}{MMBtu} = \frac{0.00561\ lb}{MMBtu} * \frac{1{,}050\ Btu}{1\ scf} = 5.89\ lb/MMscf$$

$$SO_2 = \left(1\frac{gr}{100\ scf}\right) \times \left(\frac{lb}{7{,}000\ gr}\right) \times \left(\frac{1\ scf}{1{,}050\ Btu}\right) \times (10^6 \frac{Btu}{MMBtu}) \times \left(\frac{64\ lb\ SO_2}{32\ lb\ S}\right)$$
$$= 0.00272 \frac{lb}{MMBtu} = \frac{0.00272\ lb}{MMBTU} * \frac{1{,}050\ BTU}{scf} = 2.86\ lb/MMscf$$

The following provides a summary of each micro turbine's information used to determine emissions calculations:

<u>S-2 and S-3</u>

- Power Output: 87 horsepower (hp), 65 kW

- Maximum Firing Rating: 0.871 MMBtu/hr
- Heat Capacity of Natural Gas: 1,050 MMBtu/MMscf
- Operation Hours: (24 hrs/day) x (7 days/week) x (52 weeks/year) = 8,760 hours per year (hr/yr)
- Maximum Fuel Consumption: 829.5 scf/hr
- Maximum Fuel Usage Rate: (829.5 scf/hr) x (8,760 hr/yr) = 7,266.6 Mscf/yr

Table 1. Summary of Criteria Pollutant Emissions from S-2

Pollutant	Emission Factors[1,2]		Daily Emissions	Annual Emissions Total	
	lb/MW-hr	lb/MMscf	(lb/day)	(lb/yr)	(tpy)
NOx	0.07		0.11	39.90	0.020
POC	0.02		0.03	11.40	0.006
CO	0.10		0.16	56.94	0.028
PM_{10}		5.89	0.12	42.80	0.021
$PM_{2.5}$[3]		5.89	0.12	42.80	0.021
SO_2		2.86	0.06	20.78	0.010

1. NO_X, POC, and CO emissions factors are from the CARB Executive Order DG-018.
2. PM and SO_2 emission factors per BAAQMD Permit Handbook, Chapter 2.4.1 Micro Turbines (25-1,000 kw). Converted using the heat capacity of natural gas (1,050 MMBtu/MMscf).
3. $PM_{2.5}$ emissions are assumed to be the same as PM_{10}.

Table 2. Summary of Criteria Pollutant Emissions from S-3

Pollutant	Emission Factors[1,2]		Daily Emissions	Annual Emissions Total	
	lb/MW-hr	lb/MMscf	(lb/day)	(lb/yr)	(tpy)
NOx	0.07		0.11	39.90	0.020
POC	0.02		0.03	11.40	0.006
CO	0.10		0.16	56.94	0.028
PM_{10}		5.89	0.12	42.80	0.021
$PM_{2.5}$[3]		5.89	0.12	42.80	0.021
SO_2		2.86	0.06	20.78	0.010

1. NO_X, POC, and CO emissions factors are from the CARB Executive Order DG-018.
2. PM and SO_2 emission factors per BAAQMD Permit Handbook, Chapter 2.4.1 Micro Turbines (25-1,000 kw). Converted using the heat capacity of natural gas (1,050 MMBtu/MMscf).
3. $PM_{2.5}$ emissions are assumed to be the same as PM_{10}.

<u>Toxic Emissions for Health Risk Assessment</u>

The TAC emission factors were obtained from the BAAQMD TAC Emission Factor Guidelines, Appendix A, *Default TAC Emission Factors for Specific Source Categories (August 2020)*. However, using those emission factors resulted in 54 lb/yr of formaldehyde emissions, much greater than the total POC emissions from each of S-2 and S-3, which are 11.4 lb/yr. Since the organic TACs are a subset of the total POC emissions, it is highly unlikely that formaldehyde emissions can be greater than the total

POC emissions. We have conservatively assumed all formaldehyde emissions to be equal to the POC emissions for each of S-2 and S-3. Hourly and annual emission rates are based on the maximum fuel consumption rate and annual emissions assume continuous operation (i.e., 8,760 hr/yr).

As shown in Table 5, the total project TAC emissions from S-2 and S-3 exceed the chronic trigger limit for formaldehyde in Regulation 2, Rule 5. Therefore, a health risk assessment (HRA) is required for formaldehyde. For the purposes of Regulation 2-5, a project includes TAC emissions from all new or modified sources permitted within a 5-year period. There were no related projects within the last five years.

The HRA was conducted on 12/6/24, the results of which showed a maximum cancer risk of 0.92 in a million, an acute hazard index of 0.012 and chronic hazard index of 0.0097. In accordance with Air District Regulation 2-5-301, these are acceptable project risks and S-2, and S-3 do not trigger the best available control technology for toxics (TBACT) because each of the source's risk remains below a cancer risk of 1.0 in a million.

Table 3: Summary of TAC Emissions from S-2

TAC	Emission Factor (lb/MMscf)	Emissions		Table 2-5-1 Thresholds		Acute Triggered?	Chronic Triggered?
		Hourly (lb/hour)	Annual (lbs/year)	Acute (lb/hour)	Chronic (lbs/year)		
Acetaldehyde	1.37E-01	1.13E-04	9.93E-01	2.10E-01	2.90E+01	No	No
Acrolein	1.89E-02	1.57E-05	1.37E-01	1.10E-03	1.40E+01	No	No
Arsenic	2.25E-05	1.87E-08	1.64E-04	8.80E-05	1.60E-03	No	No
Benzene	9.09E-02	7.54E-05	6.60E-01	1.20E-02	2.90E+00	No	No
Beryllium	4.91E-05	4.07E-08	3.57E-04	None	3.40E-02	No	No
1,3-Butadiene	6.19E-05	5.14E-08	4.50E-04	2.90E-01	4.80E-01	No	No
Cadmium	1.92E-04	1.59E-07	1.39E-03	None	1.90E-02	No	No
Chromium 6+	1.88E-05	1.56E-08	1.36E-04	None	5.10E-04	No	No
Copper	1.80E-03	1.49E-06	1.30E-02	4.40E-02	None	No	No
Ethyl Benzene	1.80E-02	1.49E-05	1.30E-01	None	3.30E+01	No	No
Formaldehyde[1]	--	1.30E-03	1.14E+01	2.40E-02	1.40E+01	No	No
n-Hexane	2.59E-01	2.15E-04	1.88E+00	None	2.70E+05	No	No
Lead	5.38E-04	4.46E-07	3.91E-03	None	2.90E-01	No	No
Manganese	1.50E-03	1.24E-06	1.09E-02	None	3.53E+00	No	No
Mercury	1.50E-03	1.24E-06	1.09E-02	2.70E-04	2.10E-01	No	No
Naphthalene	1.66E-03	1.38E-06	1.21E-02	None	None	No	No
Nickel	1.92E-04	1.59E-07	1.39E-03	8.80E-05	3.10E-01	No	No
PAH (as b(a)p-equiv)	2.16E-05	1.79E-08	1.57E-04	None	3.30E-03	No	No
Propylene	7.71E-01	6.40E-04	5.60E+00	None	1.20E+05	No	No
Propylene Oxide	1.99E-02	1.65E-05	1.45E-01	1.40E+00	2.20E+01	No	No
Selenium	3.79E-04	3.15E-07	2.76E-03	None	8.00E+00	No	No
Toluene	7.10E-02	5.89E-05	5.16E-01	2.20E+00	1.60E+04	No	No
Xylenes	2.61E-02	2.17E-05	1.90E-01	9.70E+00	2.70E+04	No	No

1. The project assumes all precursor organic compounds (POC) are formaldehyde emissions.

Table 4: Summary of TAC Emissions from S-3

TAC	Emission Rate (lb/MMscf)	Emissions		Table 2-5-1 Thresholds		Acute Triggered?	Chronic Triggered?
		Hourly (lb/hour)	Annual (lbs/year)	Acute (lb/hour)	Chronic (lbs/year)		
Acetaldehyde	1.37E-01	1.13E-04	9.93E-01	2.10E-01	2.90E+01	No	No
Acrolein	1.89E-02	1.57E-05	1.37E-01	1.10E-03	1.40E+01	No	No
Arsenic	2.25E-05	1.87E-08	1.64E-04	8.80E-05	1.60E-03	No	No
Benzene	9.09E-02	7.54E-05	6.60E-01	1.20E-02	2.90E+00	No	No
Beryllium	4.91E-05	4.07E-08	3.57E-04	None	3.40E-02	No	No
1,3-Butadiene	6.19E-05	5.14E-08	4.50E-04	2.90E-01	4.80E-01	No	No
Cadmium	1.92E-04	1.59E-07	1.39E-03	None	1.90E-02	No	No
Chromium 6+	1.88E-05	1.56E-08	1.36E-04	None	5.10E-04	No	No
Copper	1.80E-03	1.49E-06	1.30E-02	4.40E-02	None	No	No
Ethyl Benzene	1.80E-02	1.49E-05	1.30E-01	None	3.30E+01	No	No
Formaldehyde[1]	--	1.30E-03	1.14E+01	2.40E-02	1.40E+01	No	No
N-Hexane	2.59E-01	2.15E-04	1.88E+00	None	2.70E+05	No	No
Lead	5.38E-04	4.46E-07	3.91E-03	None	2.90E-01	No	No
Manganese	1.50E-03	1.24E-06	1.09E-02	None	3.53E+00	No	No
Mercury	1.50E-03	1.24E-06	1.09E-02	2.70E-04	2.10E-01	No	No
Naphthalene	1.66E-03	1.38E-06	1.21E-02	None	None	No	No
Nickel	1.92E-04	1.59E-07	1.39E-03	8.80E-05	3.10E-01	No	No
PAH (as b(a)p-equiv)	2.16E-05	1.79E-08	1.57E-04	None	3.30E-03	No	No
Propylene	7.71E-01	6.40E-04	5.60E+00	None	1.20E+05	No	No
Propylene Oxide	1.99E-02	1.65E-05	1.45E-01	1.40E+00	2.20E+01	No	No
Selenium	3.79E-04	3.15E-07	2.76E-03	None	8.00E+00	No	No
Toluene	7.10E-02	5.89E-05	5.16E-01	2.20E+00	1.60E+04	No	No
Xylenes	2.61E-02	2.17E-05	1.90E-01	9.70E+00	2.70E+04	No	No

1. The project assumes all precursor organic compounds (POC) are formaldehyde emissions.

Table 5: Summary of Project TAC Emissions

TAC	Emissions		Table 2-5-1 Thresholds		Acute Triggered?	Chronic Triggered?
	Hourly (lb/hour)	Annual (lbs/year)	Acute (lb/hour)	Chronic (lbs/year)		
Acetaldehyde	2.30E-04	2.02E+00	2.10E-01	2.90E+01	No	No
Acrolein	3.18E-05	2.78E-01	1.10E-03	1.40E+01	No	No
Arsenic	3.79E-08	3.32E-04	8.80E-05	1.60E-03	No	No
Benzene	1.53E-04	1.34E+00	1.20E-02	2.90E+00	No	No
Beryllium	8.26E-08	7.24E-04	None	3.40E-02	No	No
1,3-Butadiene	1.04E-07	9.13E-04	2.90E-01	4.80E-01	No	No
Cadmium	3.23E-07	2.83E-03	None	1.90E-02	No	No
Chromium 6+	3.16E-08	2.77E-04	None	5.10E-04	No	No
Copper	3.02E-06	2.65E-02	4.40E-02	None	No	No
Ethyl Benzene	3.02E-05	2.65E-01	None	3.30E+01	No	No
Formaldehyde	2.60E-03	2.28E+01	2.40E-02	1.40E+01	No	Yes
n-Hexane	4.36E-04	3.82E+00	None	2.70E+05	No	No
Lead	9.05E-07	7.93E-03	None	2.90E-01	No	No
Manganese	2.52E-06	2.21E-02	None	3.53E+00	No	No
Mercury	2.52E-06	2.21E-02	2.70E-04	2.10E-01	No	No
Naphthalene	2.80E-06	2.45E-02	None	None	No	No
Nickel	3.23E-07	2.83E-03	8.80E-05	3.10E-01	No	No
PAH (as b(a)p-equiv)	3.64E-08	3.19E-04	None	3.30E-03	No	No
Propylene	1.30E-03	1.14E+01	None	1.20E+05	No	No
Propylene Oxide	3.35E-05	2.93E-01	1.40E+00	2.20E+01	No	No
Selenium	6.39E-07	5.60E-03	None	8.00E+00	No	No
Toluene	1.20E-04	1.05E+00	2.20E+00	1.60E+04	No	No
Xylene	4.40E-05	3.85E-01	9.70E+00	2.70E+04	No	No

Plant Cumulative Increase

The project is located at 1250 Broadway Avenue, Sonoma, CA 95476 and is an existing facility. The existing emissions for plant #20829 along with the cumulative increase in emissions that will result from this application are shown in Table 6 below.

Table 6. Plant Cumulative Emissions Increase, Post 4/5/91

Pollutant	Existing Emissions Post 4/5/91 (tons/yr)	S-2 Emissions (tons/yr)	S-3 Emissions (tons/yr)	Cumulative Emissions (tons/yr)
NOx	0.012	0.020	0.020	0.052
POC	0.000	0.006	0.006	0.011
CO	0.002	0.028	0.028	0.059
PM_{10}	0.000	0.021	0.021	0.043
$PM_{2.5}$	0.000	0.021	0.021	0.043
SO_2	0.000	0.010	0.010	0.021

Statement of Compliance

The owner/operator is expected to comply with all applicable requirements. Key requirements are listed below:

District Rules

Regulation 2, Rule 1 – Permits, General Requirements

California Environmental Quality Act (CEQA Compliance): This permit application is not subject to the California Environmental Quality Act (CEQA) because the Air District's evaluation is a ministerial action (Public Resources Code Section 21080(b)(1) and CEQA Guidelines Section 15268(a)) conducted using the fixed standards and objective measurements in the Air District's rules and regulations.

Public Notification: The public notification requirements of Regulation 2-1-412 apply to applications which result in any increase in TACs or hazardous air contaminant emissions at facilities within, either 1,000 feet of the boundary of a K-12 school, or located in an Overburdened Community (OBC). The project is located within 1,000 feet of multiple schools. Therefore, the project is subject to the public notification requirements of Regulation 2-1-412. A public notice was prepared on XXXX and sent to the following schools within 1,000 feet of the project:

Adele Harrison Middle School
1150 Broadway Avenue
Sonoma, CA 95476

Sonoma Valley High
20000 Broadway Avenue
Sonoma, CA 95476

The public notice period ended on xxxx and xx comments were received. The comments and the Air District's responses to the comments are attached in Appendix A of this evaluation.

Regulation 2, Rule 2 – Permits, New Source Review
Best Available Control Technology (BACT): Per Regulation 2, Rule 2, Section 301 BACT is required for new or modified sources with potential emissions of 10.0 pounds per day or more of POC, NPOC, NO_X, PM_{10}, or SO_2. Referencing Tables 1 and 2, the micro turbines, S-2 and S-3, will not emit more than 10 lbs/day of any criteria pollutant, and therefore, are not subject to BACT requirements.

Offsets: District Regulation 2-2-302 requires offsets for new or modified sources at a facility that has the potential to emit 10 tpy or more of POC and NOx. District Regulation 2-2-303 requires offsets for new or modified sources at a facility that has the potential to emit 100 tpy or more of $PM_{2.5}$, PM_{10}, and SO_2. The facility will not exceed 10 tpy of POC or NOx and 100 tpy of $PM_{2.5}$, PM_{10}, or SO_2 and therefore is not subject to offsets.

Prevention of Significant Deterioration (PSD): This facility will not have the potential to emit more than 100 tons per year of any criteria pollutant, therefore this facility is not a "Major Facility" as defined in the District Regulation 2-2-217 and is not subject to PSD permitting requirements under Regulation 2-2-304.

Regulation 2, Rule 5 – Toxic Risk Assessment
Rule 2-5 applies to new or modified sources of TACs for which an application is submitted on or after July 1, 2005. All TAC emissions from new and modified sources are subject to risk assessment if emissions of any individual TAC exceed the trigger thresholds specified in Table 2-5-1 of Rule 2-5. Pursuant to Regulation 2-5-110, a project shall not be subject to this rule if, for each TAC, the total project emissions are below the acute and chronic trigger levels listed in Table 2-5-1 of this regulation.

As presented in Table 5, formaldehyde emissions from this project exceed the chronic trigger level. Therefore, an HRA is required.

The Air District's Risk Assessment and Reduction Team conducted the HRA for this project. The HRA was conducted 12/6/24 and the results of the HRA showed a maximum cancer risk of 0.92 in a million, an acute hazard index of 0.012 and chronic hazard index of 0.0097. In accordance with Air District Regulation 2-5-301, both S-2 and S-3 do not require TBACT because each of the source's risks are below a cancer risk of 1.0 in a million.

Since the estimated project cancer risk does not exceed 10 in a million and hazard indices do not exceed 1.0, this proposed project complies with the Air District's Regulation 2-5-

302 project risk requirements, for projects not located in an Overburdened Community, as defined in Regulation 2-1-243.

Regulation 6, Rule 1 – General Requirements
Ringelmann No. 1 Limitation: Regulation 6-1-301 states a person shall not emit from any source for a period or aggregate periods of more than 3 minutes in any hour, a visible emission that is as dark or darker than No. 1 on the Ringelmann Chart, or equivalent opacity. The facility is expected to comply with this standard.

Visible Particles: Regulation 6-1-305 prohibits emissions of visible particles from the operator's property causing a nuisance to another property. The facility is expected to comply with this standard as the particulate emissions are fairly low.

Per Air District Regulation 6-1-114, S-2 and S-3 are exempt from Regulations 6-1-310.2 and 6-1-311.2 because they are gas turbines.

Regulation 9, Rule 1– Sulfur Dioxide
Limitations on Ground Level Concentrations: Regulation 9-1-301 states a person shall not emit from sources other than ships, SO_2 in quantities which result in ground level concentrations in excess of 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours. This section shall not apply to ground level concentrations occurring on the property from which such emission occurs, provided such property, from the emission point to the point where the excess occurs, is physically secured against public access by the person responsible for the emission. The two micro turbines, S-2 and S-3 will be enclosed by fencing and secured against public access.

General Emission Limitation: Regulation 9-1-302 states a person shall not emit from any source, other than a ship, a gas stream containing sulfur dioxide in excess of 300 ppm (dry). S-2 and S-3 use only natural gas as fuel. Combustion of natural gas is expected to produce a maximum sulfur content of 1 grain per 100 scf, which is the maximum PG&E natural gas specification for sulfur.

Regulation 9, Rule 9 – NO_x from Stationary Gas Turbines
The purpose of Regulation 9-9 is to limit emissions of NO_X from stationary gas turbines. Per Regulation 9-9-110, this rule does not apply to stationary gas turbines with a heat input less than 5.0 MMBtu/hr. S-2 and S-3 have heat inputs of 0.871 MMBtu/hr each; therefore, the micro turbines are not subject to the requirements of this regulation.

New Source Performance Standards (NSPS)
The following standards may apply to S-2 and S-3.

40 CFR Part 60 Subpart GG: Pursuant to §60.330, an affected facility is all stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 MMBtu/hr), based on the lower heating value (LHV) of the fuel fired. S-2 and S-3 have a heat input of 0.871 MMBtu/hr each. Therefore, S-2 and S-3 are not subject to the requirements of this subpart.

National Emissions Standards for Hazardous Air Pollutants (NESHAP)
The following standards may apply to S-2 and S-3.

40 CFR Part 63 Subpart YYYY: Pursuant to §63.6085, stationary combustion turbines located at a major source of hazardous air pollutants (HAP) are subject to the requirements of this regulation. The facility is not major for HAPs. Therefore, S-2 and S-3 are not subject to this subpart.

Permit Conditions

Permit Condition # 100489

1. The owner/operator of S-2 and S-3 shall operate each of S-2 and S-3 on natural gas fuel exclusively.
   (Basis: Cumulative Increase)

2. The owner/operator of S-2 and S-3 shall operate each of S-2 and S-3 only when a non-resettable totalizing fuel meter is installed on each of S-2 and S-3.
   (Basis: Regulation 2-1-403)

3. The owner/operator of S-2 and S-3 shall not use more than 72,664 therms of natural gas fuel at each of S-2 and S-3 in any consecutive twelve-month period.
   (Basis: Cumulative Increase, Toxics)

4. To determine compliance with the above parts, the owner/operator of S-2 and S-3 shall maintain the following records and provide all of the data necessary to evaluate compliance with the above parts, including the following information:

   a. Natural gas usage, on a monthly basis, for each microturbine;

   All records shall be retained onsite for two (2) years, from the date of entry, and made available for inspection to Air District staff upon request. These recordkeeping requirements shall not replace the recordkeeping requirements contained in any applicable Air District regulations.
   (Basis: Recordkeeping)

Recommendation
The proposed project is expected to comply with all applicable requirements of District, State, and Federal air quality related regulations. I recommend issuing an Authority to Construct for the equipment:

S-2 65 kilowatts (kW) Micro Turbine, Natural gas-fired, Make: Capstone, Model: C65, Maximum Firing Rate: 0.871 MMBtu/hr

S-3 65 kW Micro Turbine, Natural gas-fired, Make: Capstone, Model: C65, Maximum Firing Rate: 0.871 MMBtu/hr

Prepared By: Emily Schwartz, Air Quality Engineer