

DRAFT ENGINEERING EVALUATION
Sextant Coffee Roasters
Application No. 27216
Plant No. 23071

BACKGROUND

Sextant Coffee Roasters has applied for an Authority to Construct/Permit to Operate for the following equipment:

S-1 Coffee Roaster, Probat L12, 12 kg capacity; abated by A-1, Direct Flame Afterburner, Selkirk, 2.00 MMBtu/hr Firing Rate.

The equipment is located at 1415 Folsom Street, San Francisco, CA 94103.

Coffee roasting operations processed through S-1 are initially expected to be around 100 lbs of coffee beans per week, or 2.6 tons per year. To allow for future growth, permit conditions will limit throughput to 10 tons/yr.

Coffee roaster S-1 will be subject to attached condition no. 26204.

EMISSIONS CALCULATIONS

Basis:

- Emission factors are from the Permit Handbook, Chapter 11.3, which are taken from AP-42, Chapter 9.13.2 (Coffee Roasting)
- The annual emissions are based on an annual throughput of 10 tons of green coffee beans per year.
- The maximum daily emissions are estimated using the maximum capacity of the coffee roaster. S-1 can process up to 12 kg per batch. It takes 15 minutes to complete one batch. Since no daily limit will be imposed, the roaster can be operated 24 hours per day. Therefore, the maximum daily throughput is 1.3 tons for S-1.

Table 1. Annual and daily criteria pollutants from S-1

Pollutant	Emissions Factor (lb/ton)	Emissions (lb/yr)	Emissions (TPY)	Emissions (lb/day)
PM10	0.12 (abated)	1.200	0.001	0.156
POC	0.047 (abated)	0.470	0.000	0.061

Emissions will also occur due to the combustion of natural gas in the roaster/afterburner. The maximum firing rates of the roaster and afterburner are 0.096 MMBtu/hr and 2.00 MMBtu/hr, respectively. Since the facility will not be limited on natural gas usage, it will be assumed that the roaster will run 24 hours per day, 365 days/yr. Table 2 below provides a summary of potential emissions from the combustion of natural gas for S-1. The emission factors are based on the EPA's AP-42, Volume 1, Chapter 1, Section 4: Natural Gas Combustion. Potential emissions are based on a maximum operating time of 8,760 hours per year. Full combustion emission calculations can be found in the spreadsheet attached to the end of this report.

Table 2. Natural Gas Combustion Emissions from S-1 and A-1

Pollutant	Emission Factor		Emission Rate		
	lb/MM cu. ft.	lb/MMBtu	max lb/day	lb/yr	tons/yr
NO _x	100	0.098	4.93	1800	0.898
CO	84	0.082	4.14	1510	0.754
POC	5.5	0.005	0.27	99	0.049
PM10	7.6	0.007	0.38	136	0.068
SO ₂	0.6	0.001	0.03	11	0.005

TOXIC RISK SCREENING ANALYSIS

Emissions from coffee roasting may contain formaldehyde, acetaldehyde, and acrolein, which are defined as toxic air contaminants in Regulation 2-5. Emission factors have been developed by the Puget Sound Clean Air Agency through source testing at Java Trading Co in Renton, Washington. These factors are more conservative than those listed in the Permit Handbook, Chapter 11.3.

As indicated below, even with using the increased emission factors, the toxic compound emissions are well below their chronic and acute trigger levels; therefore, a health risk screening analysis is not required.

Table 3. Toxic emissions from S-1

HAP	Emission Factor (lb/ton)	Annual Emissions (lb/yr)	Chronic Trigger Levels (lb/yr)	Chronic Triggered?	Hourly Emissions (lb/hr)	Acute Trigger Levels (lb/hr)	Acute Triggered?
Formaldehyde	0.062	0.62	1.80E+01	no	1.06E-03	1.20E-01	no
Acetaldehyde	0.036	0.36	3.80E+01	no	6.18E-04	1.00E+01	no
Acrolein	0.018	0.18	1.40E+01	no	3.09E-04	5.50E-03	no

To estimate Hazardous Air Pollutants (HAPs) or Toxic Air Contaminants (TACs) emissions from the combustion of natural gas, emission factors from EPA's AP-42 Table 1.4-3 for natural gas combustion are used. The results are summarized below in Table 4. Full combustion emission calculations can be found in the spreadsheet attached to the end of this report.

Table 4. Toxic emissions due to combustion from S-1 and A-1

HAP	Emissions (lb/hr)	Acute Trigger Level (lb/hr)	HRSA Triggered? (Yes/No)	Emissions (lb/yr)	Chronic Trigger Level (lb/yr)	HRSA Triggered? (Yes/No)
Benzene	4.3E-06	2.9E+00	No	3.8E-02	3.8E+00	No
Formaldehyde	1.5E-04	1.2E-01	No	1.3E+00	1.8E+01	No
Toluene	7.0E-06	8.2E+01	No	6.1E-02	1.2E+04	No

While formaldehyde is released both due to the combustion of natural gas and from the roasting process, the combined emissions are still below the chronic and acute trigger levels.

PLANT CUMULATIVE EMISSIONS

S-1 and A-1 located at "1415 Folsom Street, San Francisco, CA 94103" is a new facility. Therefore, there are no existing emissions at the plant. Table 5 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1.

Table 5. Cumulative increase in tons/year

Pollutant	Existing	New	Total
PM10	0.000	0.069	0.069
POC	0.000	0.049	0.049
NOx	0.000	0.898	0.898
CO	0.000	0.754	0.754
SO2	0.000	0.005	0.005

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

In accordance with Regulation 2-2-301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NO_x, CO, SO₂ or PM₁₀.

Based on the emission displayed above, BACT is not triggered for any pollutant since the maximum daily emission of each pollutant does not exceed 10 lbs/day.

OFFSETS

Per Regulation 2-2-302, offsets must be provided for any new or modified source at a facility that emits or is permitted to emit more than 10 tons/yr of POC or NO_x. Although the facility has equipment which is exempt from permitting requirements, facility-wide emissions are not expected to exceed those calculated in the cumulative increase. Based on the emissions displayed in Table 5, offsets are not required for this application.

STATEMENT OF COMPLIANCE

S-1 is subject to Regulation 6-1 (*Particulate Matter – General Requirements*) and is expected to comply with the following standards: 6-1-301 (*Ringelman No. 1 limitation*), 6-1-302 (*Opacity limitation*), 6-1-303 (*Ringelman No. 2 limitation*), 6-1-305 (*Visible particles*), 6-1-310 (*Particulate weight limitation*) and 6-1-311 (*General operations*).

This application is considered to be ministerial under the District's California Environmental Quality Act (CEQA) regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors and therefore is not discretionary as defined by CEQA. (Permit Handbook Chapter 11.3)

Because this equipment will be located within 1,000 feet of Presidio Knolls School and AltSchool SOMA, the project is subject to the public notification requirements of Regulation 2-1-412 due to the increase in emissions from the project. A public notice will be sent to all parents of students of the above mentioned school and all residents within 1,000 feet of the facility. There will be a 30-day public comment period.

Prevention of Significant Deterioration (PSD), New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAPs) do not apply.

PERMIT CONDITIONS

COND# 26204

1. The owner/operator shall not exceed the following limits at source S-1 over any consecutive 12-month period:

Green Coffee Beans:	10 tons/yr
Natural Gas Usage (facility-wide)	18.0 MM scf/yr

[basis: Cumulative Increase]

2. The owner/operator shall abate S-1 Coffee Roaster at all times while operating A-1 afterburner. [basis: Cumulative Increase]

3. The owner/operator shall maintain a minimum furnace temperature of the afterburner to be 1200°F and maintain a residence time of at least 0.3 seconds. [basis: Regulation 2-1-403]

4. The owner/operator shall ensure that A-1 is equipped with a temperature-measuring device capable of continuously measuring and recording the temperature in the thermal oxidizers. This device shall be accurate to within 10 degrees Fahrenheit (° F) and shall be maintained in accordance with manufacturer's recommendations. This temperature monitor shall be used to determine compliance with the temperature requirements in Part 3. [basis: Regulation 1-521]

5. To demonstrate compliance with the above conditions, the owner/operator shall maintain the following records and provide all of the data necessary to evaluate compliance with the above conditions, including the following information:

- a. Monthly records of the quantity of green coffee beans roasted at S-1.
 - b. Monthly records of natural gas usage.
 - c. Monthly usage records shall be totaled for each consecutive 12-month period.
 - d. Records of continuous temperature measurements of the afterburner whenever S-1 is in operation.
- All records shall be retained onsite for two years from the date of entry, and made available for inspection by District staff upon request. These record-keeping requirements shall not replace the record keeping requirements contained in any applicable District Regulations. [basis: Cumulative Increase]

End of Conditions

Sextant Coffee Roasters

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RECOMMENDATION

The District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the 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 1,000 feet of at least one school, which triggers the public notification requirements of Regulation 2-1-412. After the comments are received and reviewed, the District will make a final determination on the permit.

I recommend that the District initiate a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct for the following equipment:

S-1 Coffee Roaster, Probat L12, 12 kg capacity; abated by A-1, Direct Flame Afterburner, Selkirk, 2.00 MMBtu/hr Firing Rate.

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