DRAFT
Engineering Evaluation
Andytown LLC
Plant No. 23766; Application No. 28382
3016 Taraval Street, San Francisco, CA 94116

BACKGROUND

Andytown LLC has applied for a Permit to Operate for the following equipment:

S-1 Batch Coffee Roaster, Loring Kestrel S35,
250 lb/hr capacity with integral afterburner, 300,000 Btu/hr

The above equipment will be located at 3016 Taraval Street, San Francisco, CA 94116

The Loring coffee roaster uses a closed-loop technology to heat the roasting process. A single burner, located in the cyclone, provides the hot air for the roasting chamber and acts as an afterburner, incinerating the process smoke and odor in the recirculated air. This process operates at temperatures of 1,400 to 1,700 degrees F. The proposed burner is fueled by natural gas.

Incineration is included in the design. The owner/operator cannot measure the temperature at the actual incineration is taking place due to the patented Cyclone Burner System. The manufacturer proposed to use probe in stack to measure where the temperature is lower at 900 degree F to show compliance. The District staff visited one of the Loring roasters and found no smoke or odor. The District agrees with modified conditions proposed by the manufacturer.

EMISSION CALULATIONS

Emission from Natural Gas Combustion:
Basis:
- Maximum Operating Rate: 250 lbs/hr
- Hours of Operation: 8,760 hr/yr
- Coffee Throughput: 2,190,000 lbs/yr
- Roaster Firing Rate: 0.3 MMBtu/hr
- Yearly Fuel Throughput: 2,628 MMBtu/yr
- Heat Capacity: 1050 MMBtu/MMscf Natural Gas

Emission Factors for NOx and CO are taken from EPA AP-42 Table 1.4-1 for small boilers (< 100 MMBtu/hr)
Emission Factors for SO2, PM10, POC and Methane are taken from EPA AP-42 Table 1.4-2

Emissions per MMBtu of Natural Gas

NO_x = (100 lb/MMscf)/(1050 MMBtu/MMscf) = 0.095 lb/MMBtu
CO = (84 lb/MMscf)/(1050 MMBtu/MMscf) = 0.08 lb/MMBtu
SO_2 = (0.6 lb/MMscf)/(1050 MMBtu/MMscf) = 0.00057 lb/MMBtu
PM_{10} = (7.6 lb/MMscf)/(1050 MMBtu/MMscf) = 0.00724 lb/MMBtu
POC = (5.5 lb/MMscf)/(1050 MMBtu/MMscf) = 0.00524 lb/MMBtu
Methane = (2.3 lb/MMscf)/(1050 MMBtu/MMscf) = 0.00219 lb/MMBtu

Calculating Yearly Combustion Emission Calculations

NO_x= (2,628 MMBtu/yr)(0.095 lb/MMBtu) = 250.3 lb/yr
CO = (2,628 MMBtu/yr)(0.08 lb/MMBtu) = 210.2 lb/yr
SO_2 = (2,628 MMBtu/yr)(5.7 x 10^-4 lb/MMBtu) = 1.5 lb/yr
PM_{10} = (2,628 MMBtu/yr)(0.00724 lb/MMBtu) = 19.0 lb/yr
POC = (2,628 MMBtu/yr)(0.00524 lb/MMBtu) = 13.8 lb/yr
Methane = (2,628 MMBtu/yr)(0.00219 lb/MMBtu) = 5.8 lb/yr

Table 1. Annual and maximum daily emissions from operation of S-1

Pollutant	Annual Emissions [lb/yr]	Daily Emissions [lb/day]	Annual Emissions [TPY]
NO_X	250.3	0.688	0.125
CO	210.2	0.578	0.105
SO_2	1.5	0.004	0.0008
PM	19.0	0.052	0.010
POC	13.8	0.038	0.007
Methane	5.8	0.016	0.003

Emissions from Batch Roaster

Emission factors (batch roaster with thermal oxidizer and continuous cooler with cyclone) for emissions of particulate and organics are taken from AP-42 Table 9.13.2-1 and Table 9.13.2-2.

Table 2. Emissions from Batch Roaster

Pollutant	Emission Factors [lb/ton]	Throughput [TPY]	Annual Emissions [lb/year]	Maximum Annual Emissions [TPY]
PM	0.148	1095.000	162.060	0.081
POC	0.047	1095.000	51.465	0.026
CO	0.550	1095.000	602.250	0.301

Compliance with Regulation 6-1-310 Particulate Weight Limitations

Regulation 6-1-310, Particulate Weight Limitation, states that any source may not emit matter in excess of 0.15 grain/dscf of exhaust gas volume.

Basis: *Operating hours:* 8,760 hr/yr

Roaster emission point: 493 acfm at 1700 degrees F

Scfm = acfm X ((68 +460) / (T_{actual} + 460))
Scfm = 493 X [(68+460) / (1700+460)] = 120.51 scfm

[(19 + 162) lb PM_{10}/yr X 7000 grain/lb] / [60 min/hr X 8,760 hr/yr X 120.51 scfm] = 0.02 grain/dscf

Therefore, S-1 does not emit matter in excess of 0.15 grain/dscf and complies with Regulation 6-1-310.

PLANT CUMULATIVE EMISSIONS

Andytown LLC located at 3016 Taraval Street, San Francisco, CA 94116 is a new facility. Therefore, there are no existing emissions at the plant. Table 3 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1.

Table 3. Cumulative Emissions Increase in tons/year

Pollutant	Existing Emissions [TPY]	New Emissions [TPY]	Total Emissions [TPY]
NO_X	0.000	0.125	0.125
CO	0.000	0.406	0.406
SO_2	0.000	0.0008	0.0008
PM	0.000	0.091	0.091
POC	0.000	0.033	0.033
Methane	0.000	0.003	0.003

TOXIC RISK SCREENING

According to Chapter 9.13.2 of AP-42, Coffee Roasting, the roaster is the main source of gaseous pollutants, including aldehydes and acrolein. However, the California Air Resources Board (CARB) has invalidated the source test method for acrolein. Until CARB approves a new test method and acrolein emissions are estimated from factors developed using the new test method, the District is not evaluating risk for acrolein. There are no California Air Toxic Emission Factors (CATEF) factors for the aldehydes from coffee roasting. However, source testing was performed at Peet's Coffee and Tea, Inc. and determined the following toxic emission factors:

Table 4. Emissions from Batch Roaster

Pollutant	Emission Factors (lb/ton)	Coffee Throughput (TPY)	Annual Emissions (lb/yr)	Trigger Level (lb/yr)	Hourly Emissions (lb/hr)	Trigger Level (lb/hr)
Formaldehyde	0.0008	1095	0.876	18	0.0001	0.12
Acetaldehyde	0.0005	1095	0.548	38	Neg.	1.00

Table 5. Emission from TACs from Miscellaneous Natural Gas Combustion source

Basis: Policy: Emission Factors for Toxic Air Contaminants from Miscellaneous Natural Gas Combustion source, approved on 2/28/2008.

TAC	Emission Factors [lb/Mscf]
Benzene	2.10E-06
Formaldehyde	7.50E-05
Toluene	3.40E-06

	Annual Emissions [lbs/year]	Trigger Level [lbs/year]	Hourly Emissions [lbs/hour]	Trigger Level [lbs/hour]
Benzene	5.79E-03	3.80E+00	6.62E-07	2.90E+00
Formaldehyde	2.07E-01	1.80E+01	2.36E-05	1.20E-01
Toluene	9.38E-03	1.20E+04	1.07E-06	8.20E+01

Emissions of toxic air contaminants from S-1 do not exceed any District trigger level in Regulation 2-5. Therefore, toxic risk screen is not required.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

In accordance with Regulation 2, Rule 2, Section 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, NOx, CO, SO_2 or PM_{10}.

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

OFFSETS

Offsets must be provided for any new or modified source at a facility that emits more than 10 tons/year of POC or NOx per Regulation 2, Rule 2, Section 302. Based on the calculations above, offsets are not required for this application.

New Source Performance Standards (NSPS)

S-1 is not affected by any subpart of 40 CFR Part 60.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

S-1 is not affected by any subpart of 40 CFR Part 63.

STATEMENT OF COMPLIANCE

S-1 will comply with Regulation 6, Rule 1, since its estimated particulate emissions of 0.00046 grain/dscf are less than the limit of 0.15 grains/ dscf.

This application is considered to be ministerial under the District's 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 in accordance with Permit Handbook Chapter 11.3.

This source is located within 1,000 feet from the nearest school (listed below) and therefore is subject to public notification requirements of Regulation 2-1-412. A public notice was prepared and will be sent to the parents or guardians of children enrolled in any school within one-quarter mile of the source and to each address within a radius of 1,000 feet of the source.

St. Gabriel Elementary School
2550 41st Avenue
San Francisco, CA 94116

PSD is not triggered.

PERMIT CONDITIONS

S-1 will be subject to permit conditions #26413 as shown below.

CONDITION 26413 ----------

1. The owner/operator shall not roast more than 2,190,000 pounds of green coffee beans at Coffee Roaster, S-1 in any consecutive 12-month period. [Basis: Cumulative Increase]

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

3. The owner/operator shall maintain a minimum of 900° F stack temperature during all times that the beans are roasting. [Basis: Regulation 2-1-403]

4. The owner/operator shall ensure that the exhaust stack is equipped with a temperature-measuring device capable of continuously measuring and recording the temperature in the incineration zone when roasting. This device shall be accurate to within 10 degrees Fahrenheit (° F) and shall be maintained in accordance with manufacturer's recommendations. These temperature monitors shall be used to determine compliance with the temperature requirements in Part 3. [Basis: Regulation 1-521]

5. The owner/operator shall not emit from any source for period or periods aggregating more than three minutes in any hour, a visible emission which is as dark or darker than No. 1.0 on the Ringelmann Chart of of such opacity as to obscure an observer's view to an equivalent or greater degree. [Basis: Regulation 6-1]

6. The owner/operator shall not exceed the following limits while operating any roaster or afterburner:
   NOx = 0.095 lb/MMBTU
   CO = 0.08 lb/MMBTU
   POC =0.047 lb/ton of beans roasted
   Formaldehyde = 0.0008 lb/ton
   Acetaldehyde = 0.0005 lb/ton
   [Basis: Cumulative Increase, BACT]

7. 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 Coffee Roasters.
   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 exhaust stack whenever S-1 Coffee Roaster is roasting coffee beans.

   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]

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 a school, which triggers the public notification requirements of District 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 source:
recommend that the issuance of an Authority to Construct for the following source:

S-1 Batch Coffee Roaster, Loring Kestrel S35,
250 lb/hr capacity with integral afterburner, 300,000 Btu/hr

Prepared by: _____ Date: _____

Flora Chan
Air Quality Engineer