

**Engineering Evaluation Report
Ruby's Roast LLC
2701 8th Street
Berkeley, CA 94710
Plant # 21809
Application Number 25214**

I. BACKGROUND

Ruby's Roast is applying for an Authority to Construct and/or Permit to Operate the following equipment:

S-1 Coffee Roaster: Roaster Authority Victory 10, 88 lb/hr, abated by A-1, Simple Cyclone, 18 inch dia., and A-2, Thermal Oxidizer, Conversion Products, Model TR19/34 V-500MC-60NB, 1.5 MMBTU/hr

The applicant indicates a projected green bean throughput of 91.5 tons per year. To allow for future growth, the throughput will be increased to 200 tons per year.

II. EMISSIONS SUMMARY

Emission increases from combustion of natural gas at the batch roaster and thermal oxidizer:

Basis:

- **S-1**
- 88.0 lbs/hr
- Coffee Throughput = 400,000 lb/yr = 200 tons/yr
- Operation hours = 400,000 lb/yr/88 lb/hr = 4545.5 hours/yr
- Roaster Firing Rate = 0.075 MM BTU/hr
- Afterburner Firing Rate = 1.5 MMBTU/hr
- Total fuel throughput = 0.075 + 1.5 MMBTU/hr (4545.5 hr/yr) = 7159.1 MMBTU/yr of natural gas.
- Heat capacity = 1,050 MMBtu/10⁶ ft³ natural gas
- A-2 VOC Destruction Efficiency 90% by weight
- Emission factors taken from AP-42, Table 1.4-2 (revised 7/1/98) for small boiler <100 MMBtu/hr

$$\text{NOx} = (100 \text{ lb/ MMscf}) / (1050 \text{ MMBtu}/10^6 \text{ ft}^3) = 0.095 \text{ lb/MMBtu}$$

$$\text{CO} = (84 \text{ lb/ MMscf}) / (1050 \text{ MMBtu}/10^6 \text{ ft}^3) = 0.08 \text{ lb/MMBtu}$$

$$\text{SO}_2 = (0.6 \text{ lb/MMscf}) / (1050 \text{ MMBtu}/10^6 \text{ ft}^3) = 5.7 \times 10^{-4} \text{ lb/MMBtu}$$

$$\text{PM}_{10} = (7.6 \text{ lb/MMscf}) / (1050 \text{ MMBtu}/10^6 \text{ ft}^3) = 0.00724 \text{ lb/MMBtu}$$

$$\text{POC} = (5.5 \text{ lb/MMscf}) / (1050 \text{ MMBtu}/10^6 \text{ ft}^3) = 0.00524 \text{ lb/MMBtu}$$

$$\text{NPOC} = (2.3 \text{ lb/MMscf}) / (1050 \text{ MMBTU}/10^6 \text{ ft}^3) = 0.00219 \text{ lb/MMBtu}$$

Combustion Emission Calculations:

Basis: Total Fuel Throughput = 7159.1 MMBTU/yr

Pollutant	EF (lb/MMBTU)	Annual Emissions (lbs/yr)	Maximum Annual Emissions (TPY)
NOx	0.095	680.1	0.340
CO	0.08	572.7	0.286
SO2	0.00057	4.1	0.002
PM10	0.0072	51.8	0.026
POC	0.0052	37.5	0.019
NPOC	0.095	15.7	0.008

Maximum daily emissions are less than 3 lbs per day.

Emission increases from batch roaster:

Emission factors (batch roaster abated by thermal oxidizer) for emissions of particulate and organics are taken from Permit Handbook Section 11.3, "Coffee Roasters" and AP-42 Table 9.13.2-1.

Pollutant	Emission Factors (lb/ton)	Throughput (ton/yr)	Maximum Daily Emissions (lb/day)	Annual Average Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Maximum Annual Emissions (TPY)
PM10 (abated)	0.148**	200	0.1	0.1	29.6	0.015
POC (abated)	0.047	200	<0.1	<0.1	9.4	0.005

** $(0.12 + 0.028 = 0.148)$ - roaster with abatement equipment and cyclone)

Compliance with Regulation 6

Regulation 6-310 Particulate Weight Limitation:

Basis: 1 hour of roaster operation
 88.0 lbs/hr roaster capacity
 roaster emission point: 334 cfm @ 250 degrees F
 Limitation of 0.15 grain/dscf

Grain Loading calculation from coffee roasting process:

$$334 \text{ cfm} [(70+460)/(250+460)] = 249.3 \text{ dscfm}$$

$$[81.4 \text{ lb PM}_{10}/\text{yr} \times 7000 \text{ grain/lb}] / [60 \text{ min/hr} \times 4545.5 \text{ hr/yr} \times 249.3 \text{ dscfm}] = 0.008 \text{ grain/dscf.}$$

III. PLANT CUMULATIVE INCREASE

Pollutant	Current TPY	Annual Emissions (lb/yr)	Annual Emissions (TPY)
NOx	0	680.1	0.340
CO	0	572.7	0.286
SO2	0	4.1	0.002
PM10	0	81.4	0.041
POC	0	46.9	0.023
NPOC	0	15.7	0.008

IV. TOXIC RISK SCREENING ANALYSIS

According to Chapter 9.13.2, Coffee Roasting of AP-42, the roaster is the main source of gaseous pollutants, including aldehydes and acrolein. However, the California Air Resources Board 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 Toxics Emission Factors (CATEF) factors for the aldehydes from coffee roasting. However, source testing was performed at Peets Coffee and Tea, Inc. and determined the following toxic emission factors:

Summary of Toxic Pollutants

Pollutant	Emission Factors (lb/ton)	Throughput (ton/yr)	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)	Trigger Level (lb/hr)	Trigger Level (lb/yr)
Formaldehyde	0.0008	200	0.2	Neg.	0.21	30
Acetaldehyde	0.0005	200	0.1	--	--	64

A toxic risk screen is not triggered.

V. BACT ANALYSIS

BACT is not required for S-1 (Coffee Roaster), because criteria pollutant emissions do not exceed 10 pounds per worst-case day.

VI. OFFSET ANALYSIS

Offsets are not required since facility POC and NOx emissions do not exceed 10 ton/yr.

VII. CEQA REVIEW

This application is considered to be ministerial under the District's CEQA guidelines (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.

VIII. STATEMENT OF COMPLIANCE

S-1 will comply with Regulation 6 as the estimated particulate emission of 0.008 gr/dscf will comply with the 0.15 gr/dscf standard allowed per Regulation 6-310.

NSPS, PSD, and NESHAPS are not triggered.

Ruby's Roast is within 1000 feet of the following school:

***Ecole Bilingue De Berkeley School
1009 Heinz Avenue
Berkeley, CA 94710
Phone # 510-549-3867
School Enrollment: 434
Grades: K-8***

Ruby's Roast is subject to the public notification requirements of Regulation 2-1-412. A public notice will be prepared and posted on the Internet and mailed to all parents and guardians of students enrolled at Ecole Bilingue De Berkeley School. In addition, public notices will be mailed to all residential neighbors located within 1000 feet of Ruby's Roast's facility.

IX. PERMIT CONDITION # 25547

1. The owner/operator shall not roast more than 400,000 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 by properly maintained A-1 simple cyclone and A-2 afterburner. [Basis: Cumulative Increase]
3. The owner/operator of S-1 shall set the minimum furnace temperature of A-2 to be at least 1400 degrees Fahrenheit (° F) or higher. [Basis: Regulation 2-1-403]
4. The owner/operator shall ensure that A-2 is equipped with a temperature-measuring device capable of continuously measuring and recording the temperature in A-2. 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. The permit to operate for S-1 is contingent upon compliance with Regulation 1-301, Standard for Public Nuisance, and Regulation 7, Odorous Substances.

Upon receipt of a violation for either of these statutes, the Air Pollution Control Officer may require the owner/operator to abide by one or more of the following:

- a. Submit within 60 days of notification by the APCO, a permit application for an Authority to Construct additional emission control and/or adjust the minimum temperature specified in Part 3.
- b. Curtail operations until either the operation can be modified or the meteorological conditions change such that the community is no longer adversely impacted.

[Basis: Regulation 1-301, 7-301, 7-302, 7-303]

- 6. 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 usage records shall be totaled for each consecutive 12-month period.
 - c. Records of continuous temperature measurements of A-2, Afterburner, whenever S-1 Coffee Roaster 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 recordkeeping requirements shall not replace the recordkeeping requirements contained in any applicable District Regulations.

[Basis: Cumulative Increase]

X. 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 1000 feet of a school, which triggers the public notification requirements of District Regulation 2-1-412.6. 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:

S-1 Coffee Roaster: Diedrich IR, 12 Kg Capacity; abated by A-1, Catalytic Oxidizer, IR-12

By: _____ Date: _____

Nancy Yee
Senior Air Quality Engineer