

**Draft Engineering Evaluation  
Ohm Coffee Roaster  
849 Jackson Street, Suite 1A  
Napa, CA 94559  
Application No. 31906  
Plant No. 25264**

**BACKGROUND**

Ohm Coffee Roaster is applying for an Authority to Construct and Permit to Operate for the following equipment:

- S-1 Batch Coffee Roaster, Loring S-35 Kestrel, 240 lb/hr Capacity with Integral Cyclone Afterburner, 310,000 Btu/hr**
- S-2 Batch Coffee Roaster, Loring S-15 Falcon, 100 lb/hr Capacity with Integral Cyclone Afterburner, 130,000 Btu/hr**

The equipment will be located at 849 Jackson St., Napa, CA 94559

The Loring coffee roasters use 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 1200 to 1400 degrees F. The proposed burner is fueled by natural gas.

**EMISSION CALCULATIONS**

Basis: *Maximum Operating Rate:* 240 lbs/hr and 120 lbs/hr  
*Hours of Operation (52 days/yr, 2 hrs/day):* 104 hrs/yr  
*Coffee Throughput:* 24,960 lbs/yr and 12,480 lbs/yr  
*Roaster Firing Rate:* 0.31 MMBtu/hr and 0.13 MMBtu/hr  
*Yearly Fuel Throughput:* 32.24 MMBtu/yr and 13.52 MMBtu/yr  
*Heat Capacity:* 1,020 MMBtu/MMscf natural gas

Criteria pollutant emissions originate from the two sources S-1 and S-2, batch roasting <sup>1</sup> and gas combustion <sup>2</sup>. A summary of the emissions from batch roasting and gas combustion is given in Table 1.

<b>Table 1. Emissions from Roasting Operation and Natural Gas Combustion for Sources S-1/S-2</b>							
<b>Pollutant</b>	<b>Roasting Operation</b>			<b>Natural Gas Combustion</b>			<b>Total</b>
	<b>Green Bean Throughput (TPY)</b>	<b>Emission Factor <sup>1</sup> (lb/ton)</b>	<b>Emission Rate (lb/yr)</b>	<b>Fuel Usage (MMscf/yr)</b>	<b>Emission Factor <sup>2</sup> (lb/MMscf)</b>	<b>Emission Rate (lb/yr)</b>	<b>Emission Rate (lb/yr)</b>
NO <sub>x</sub>	N/A			0.032/0.013	100.0	3.16/1.33	3.16/1.33
POC	12.48/6.24	0.047	0.59/0.29	0.032/0.013	5.5	0.17/0.07	0.76/0.37

<sup>1</sup> 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.

<sup>2</sup> Emission factors for NO<sub>x</sub> and CO taken from AP-42 1.4-1 for small boilers (<100 MMBtu/hr). Emissions factor for SO<sub>2</sub>, PM<sub>10</sub>, POC and NPOC (Methane) taken from AP-42 Table 1.4-2.

CO	12.48/6.24	0.55	6.86/3.43	0.032/0.013	84.0	2.66/1.11	9.52/4.55
PM <sub>10</sub>	12.48/6.24	0.207	2.58/1.29	0.032/0.013	7.6	0.24/0.10	2.82/1.39
SO <sub>2</sub>	N/A			0.032/0.013	0.6	0.02/0.01	0.02/0.01
Methane	N/A			0.032/0.013	2.3	0.07/0.03	0.07/0.03

<sup>1</sup> Filterable PM from batch roaster with thermal oxidizer (0.12 lb/ton), continuous cooler with cyclone (0.028 lb/ton), and green coffee bean screening, handling, and storage system with fabric filter (0.059 lb/ton)

<sup>2</sup> AP-42 Chapter 1.4 Natural Gas Combustion

### Toxic Risk Screening

Both coffee roasting and gas combustion produce TAC emissions. 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 Air 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 their determined toxic emission factors are used in this calculation.

BAAQMD Toxic Air Contaminant (TAC) Emission Factor Guideline <sup>3</sup> (Appendix A, Default TAC Emission Factors for Specific Source Categories, Table A-1.1), dated August 2020, was referenced for the roaster's natural gas TAC emission factors (Acetaldehyde, Benzene, Formaldehyde, and Toluene).

**Table 2. TAC Emissions from Roasting Operation and Natural Gas Combustion, for S-1/S-2**

TAC	Roasting Operation			Natural Gas Combustion			Total
	Green Bean Throughput (TPY)	Emission Factor (lb/ton)	Emission Rate (lb/yr)	Fuel Usage (MMBtu/yr)	Emission Factor (lb/MMscf)	Emission Rate (lb/yr)	Emission Rate (lb/yr)
Acetaldehyde	12.48/6.24	0.0005	0.006/0.003	32.24/13.52	4.22E-06	0.000/0.000	0.006/0.003
Acrolein				32.24/13.52	2.65E-06	0.000/0.000	0.000/0.000
Arsenic				32.24/13.52	1.96E-07	0.000/0.000	0.000/0.000
Benzene				32.24/13.52	7.84E-06	0.000/0.000	0.000/0.000
Beryllium				32.24/13.52	5.88E-09	0.000/0.000	0.000/0.000
Cadmium				32.24/13.52	1.08E-06	0.000/0.000	0.000/0.000
Copper				32.24/13.52	8.33E-07	0.000/0.000	0.000/0.000
Ethylbenzene				32.24/13.52	9.31E-06	0.000/0.000	0.000/0.000
Formaldehyde	12.48/6.24	0.0008	0.010/0.005	32.24/13.52	2.17E-04	0.007/0.003	0.017/0.008
n-Hexane				32.24/13.52	6.18E-06	0.000/0.000	0.000/0.000
Lead				32.24/13.52	4.90E-07	0.000/0.000	0.000/0.000
Manganese				32.24/13.52	3.73E-07	0.000/0.000	0.000/0.000
Mercury				32.24/13.52	2.55E-07	0.000/0.000	0.000/0.000
Naphthalene				32.24/13.52	5.98E-07	0.000/0.000	0.000/0.000
Nickel				32.24/13.52	2.06E-06	0.000/0.000	0.000/0.000
PAH*				32.24/13.52	6.60E-09	0.000/0.000	0.000/0.000
Propylene				32.24/13.52	7.17E-04	0.023/0.010	0.023/0.010

<sup>3</sup> [https://www.baaqmd.gov/~media/files/ab617-community-health/facility-risk-reduction/documents/tac\\_emission\\_factor\\_guidance\\_appendixa\\_august\\_2020-pdf.pdf?la=en](https://www.baaqmd.gov/~media/files/ab617-community-health/facility-risk-reduction/documents/tac_emission_factor_guidance_appendixa_august_2020-pdf.pdf?la=en)

Selenium				32.24/13.52	1.18E-08	0.000/0.000	0.000/0.000
Toluene				32.24/13.52	3.59E-05	0.001/0.000	0.001/0.000
Vanadium				32.24/13.52	2.25E-06	0.000/0.000	0.000/0.000
Xylenes				32.24/13.52	2.67E-05	0.001/0.000	0.001/0.000

\* As benzo(a) pyrene equivalent.

### Project Potential to Emit

Table 3 summarizes the criteria pollutant and TAC emissions from the new sources S-1 and S-2, total.

Pollutant		Calculated Emissions			
		<i>lb/hr</i>	<i>lb/day</i>	<i>lb/yr</i>	<i>tons/yr</i>
Criteria Pollutants	<b>NO<sub>x</sub></b>	0.0431	0.086	4.49	0.002
	<b>POC</b>	0.0108	0.022	1.13	0.001
	<b>CO</b>	0.1352	0.270	14.06	0.007
	<b>PM<sub>10</sub></b>	0.0405	0.081	4.22	0.002
	<b>SO<sub>2</sub></b>	0.0003	0.001	0.03	0.000
	<b>Methane</b>	0.0010	0.002	0.10	0.000
Toxic Air Contaminants (TACs)	<b>Acetaldehyde</b>	9.19E-05	1.84E-04	9.55E-03	4.78E-06
	<b>Acrolein</b>	1.17E-06	2.33E-06	1.21E-04	6.06E-08
	<b>Arsenic</b>	8.62E-08	1.72E-07	8.97E-06	4.48E-09
	<b>Benzene</b>	3.45E-06	6.90E-06	3.59E-04	1.79E-07
	<b>Beryllium</b>	2.59E-09	5.17E-09	2.69E-07	1.35E-10
	<b>Cadmium</b>	4.75E-07	9.50E-07	4.94E-05	2.47E-08
	<b>Copper</b>	3.67E-07	7.33E-07	3.81E-05	1.91E-08
	<b>Ethylbenzene</b>	4.10E-06	8.19E-06	4.26E-04	2.13E-07
	<b>Formaldehyde</b>	2.39E-04	4.79E-04	2.49E-02	1.25E-05
	<b>n-Hexane</b>	2.72E-06	5.44E-06	2.83E-04	1.41E-07
	<b>Lead</b>	2.16E-07	4.31E-07	2.24E-05	1.12E-08
	<b>Manganese</b>	1.64E-07	3.28E-07	1.71E-05	8.53E-09
	<b>Mercury</b>	1.12E-07	2.24E-07	1.17E-05	5.83E-09
	<b>Naphthalene</b>	2.63E-07	5.26E-07	2.74E-05	1.37E-08
	<b>Nickel</b>	9.06E-07	1.81E-06	9.43E-05	4.71E-08
	<b>PAH</b>	2.90E-09	5.81E-09	3.02E-07	1.51E-10
	<b>Propylene</b>	3.15E-04	6.31E-04	3.28E-02	1.64E-05
<b>Selenium</b>	5.19E-09	1.04E-08	5.40E-07	2.70E-10	
<b>Toluene</b>	1.58E-05	3.16E-05	1.64E-03	8.21E-07	
<b>Vanadium</b>	9.90E-07	1.98E-06	1.03E-04	5.15E-08	
<b>Xylenes</b>	1.17E-05	2.35E-05	1.22E-03	6.11E-07	

### Plant Cumulative Emissions

Project located at 849 Jackson St., Suite 1A, Napa, CA 94559 is a new facility. Therefore, there are no existing emissions at the plant. Table 4 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1 and S-2.

Pollutant	Existing	New	Total
NO <sub>x</sub>	0.000	0.002	0.002
POC	0.000	0.001	0.001
CO	0.000	0.007	0.007
PM <sub>10</sub>	0.000	0.002	0.002
SO <sub>2</sub>	0.000	0.000	0.000

### **HEALTH RISK ASSESSMENT**

Table 5 summarizes the TAC emissions associated with the current application in comparison with the respective HRA trigger levels set forth in BAAQMD Regulation 2-5, Table 1. All TAC emissions are below the respective trigger levels. Therefore, an HRA is not required.

TAC	Total Net Emissions		Trigger Levels		HRSA Triggered? (Yes/No)
	Hourly (lb/hr)	Annual (lb/yr)	Acute	Chronic	
			(lb/hr)	(lb/yr)	
Acetaldehyde	9.19E-05	9.55E-03	2.10E-01	2.90E+01	No
Acrolein	1.17E-06	1.21E-04	1.10E-03	3.00E+01	No
Arsenic	8.62E-08	8.97E-06	8.80E-05	3.10E+01	No
Benzene	3.45E-06	3.59E-04	1.20E-02	3.20E+01	No
Beryllium	2.59E-09	2.69E-07	N/A	3.30E+01	No
Cadmium	4.75E-07	4.94E-05	N/A	3.40E+01	No
Copper	3.67E-07	3.81E-05	4.40E-02	3.50E+01	No
Ethylbenzene	4.10E-06	4.26E-04	N/A	3.60E+01	No
Formaldehyde	2.39E-04	2.49E-02	2.40E-02	3.70E+01	No
n-Hexane	2.72E-06	2.83E-04	N/A	3.80E+01	No
Lead	2.16E-07	2.24E-05	N/A	3.90E+01	No
Manganese	1.64E-07	1.71E-05	N/A	4.00E+01	No
Mercury	1.12E-07	1.17E-05	2.70E-04	4.10E+01	No
Naphthalene	2.63E-07	2.74E-05	N/A	4.20E+01	No
Nickel	9.06E-07	9.43E-05	8.80E-05	4.30E+01	No
PAH	2.90E-09	3.02E-07	N/A	4.40E+01	No
Propylene	3.15E-04	3.28E-02	N/A	4.50E+01	No
Selenium	5.19E-09	5.40E-07	N/A	4.60E+01	No
Toluene	1.58E-05	1.64E-03	2.20E+00	4.70E+01	No
Vanadium	9.90E-07	1.03E-04	1.30E-02	4.80E+01	No
Xylenes	1.17E-05	1.22E-03	9.70E+00	4.90E+01	No

### **GRAIN LOADING RATE**

**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:* 104 hr/yr

*Roaster emission point:* 450 dscfm at 1,400 degrees F

$$[(0.02715 \text{ lb PM}_{10}/\text{hr}) \times (7000 \text{ grain/lb})] / [(60 \text{ min/hr}) \times (450 \text{ dscfm})] = 0.00704 \text{ grain/dscf}$$

Similarly, S-2 emits particulate matter at 0.00504 grain/dscf:

(Basis: *Operating hours:* 104 hr/yr

*Roaster emission point:* 310 dscfm at 1,400 degrees F)

Therefore, neither S-1 nor S-2 emit matter more than 0.15 grain/dscf and complies with Regulation 6-1-310.

**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<sub>x</sub>, CO, SO<sub>2</sub> or PM<sub>10</sub>.

Based on the emissions displayed above, BACT is not triggered for any pollutant since the maximum daily emissions 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 more than 10 tons/yr of POC or NO<sub>x</sub>. Based on the emissions displayed in Table 3, offsets are not required for this application.

**NEW SOURCE PERFORMANCE STANDARDS (NSPS)**

S-1 and S-2 are not affected by any subpart of 40 CFR Part 60.

**NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)**

S-1 and S-2 are not affected by any subpart of 40 CFR Part 63.

**STATEMENT OF COMPLIANCE**

Sources S-1 and S-2 will comply with Regulation 6, Rule 1, since its estimated particulate emissions of  $7.04 \times 10^{-3}$  grain/dscf and  $5.04 \times 10^{-3}$  grain/dscf are less than the limit of 0.15 grains/dscf.

The project is considered to be ministerial under the District's 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 emissions factors and therefore is not discretionary as defined by CEQA. (Permit Handbook Chapter 2.3.1)

The facility is located within 1,000 feet from of the outer boundary of New Technology High School, at: 920 Yount St., Napa, CA 94559, and therefore is subject to public notification requirements of Regulation 2-1-412.

PSD does not apply.

**PERMIT CONDITIONS**

**Condition #00000 -----**

1. The owner/operator shall not roast more green coffee beans than the following, in any consecutive 12-month period:
  - a. Coffee Roaster, S-1: 24,960 pounds
  - b. Coffee Roaster, S-2: 12,480 pounds[Basis: Cumulative Increase]
  
2. The owner/operator shall abate S-1 and S-2 Coffee Roasters at all times while operating by the built-in afterburner.  
[Basis: Cumulative Increase]
  
3. The owner/operator shall maintain a minimum furnace temperature of 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 the afterburners are equipped with temperature-measuring devices capable of continuously measuring and recording the temperature in the thermal oxidizers. These devices 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 a period or periods aggregating more than three minutes in any hour, a visible emission which is as dark or darker than No. 0.5 on the Ringelmann Chart or of such opacity as to obscure an observer's view to an equivalent or greater degree.  
[Basis: BACT]
  
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 and S-2 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 afterburner whenever S-1 Coffee Roasters are 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]

**RECOMMENDATION**

Issue Authority to Construct and Permit to Operate to Ohm Coffee Roaster for the following equipment:

- S-1 Batch Coffee Roaster, Loring S-35 Kestrel, 240 lb/hr Capacity with Integral Cyclone Afterburner, 310,000 Btu/hr**
  
- S-2 Batch Coffee Roaster, Loring S-15 Falcon, 100 lb/hr Capacity with Integral Cyclone Afterburner, 130,000 Btu/hr**

By: \_\_\_\_\_  
Sadegh Sadeghipour  
Air Quality Engineer

Date: 11/15/2022

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