

**EVALUATION REPORT
EQUATOR COFFEES AND TEAS
Application #28557 - Plant #15081**

**115 Jordan Street
San Rafael, CA 94901**

I. BACKGROUND

Equator Coffees and Teas (ECT) has applied for an Authority to Construct/Permit to Operate for the following equipment:

S-6 Batch Coffee Roaster, Loring Smart Roast S70 Peregrine with integral cooler/destoner, 0.31 ton/hr, abated by A-6 Cyclone Burner System, 600,000 Btu/hr, Natural Gas.

And condition changes for the following equipment:

S-3 Batch Coffee Roaster, San Franciscan ST75, 35 kilo capacity, 300,000 Btu/hr, abated by A-3 Afterburner with Integral Cyclone, Midco 557-5R, 1.2 MMBtu/hr, Natural Gas.

S-5 Batch Coffee Roaster, Loring Smart Roast Kestrel S35, 245 lb/hr capacity, abated by A-5 Cyclone/Built-in Afterburner, 285,000 Btu/hr, Natural Gas.

ECT currently operate 3 batch coffee roasters (S-3, S-4 and S-5). The company is adding a new batch coffee roaster (S-6) with 570.24 tons of coffee per year in this application. At the same time, ECT proposed to reduce the throughput of S-3 from 224.3 to 100 tons of coffee per year (tpy) and S-5 from 224.3 to 184.76 tpy. The throughput of S-4 will remain the same at 20 tons of coffee per year. The change of condition request is in response to the Notice of Violation #A51894.

The Loring Smart Roasters utilized a unique heat re-circulating process. The burners are in the cyclone such that air within the roaster is drawn through the cyclonic heating chamber where it is reheated. The air then returns to the roaster. The main burner also acts as an afterburner that operates at minimum 1400oF and maintains at least 0.3 second residence time. The internal pressure of the system is balanced by allowing the products of combustion from the burner and the smoke from the roasting process to escape through an "incinerator tube" that operates at after-burner temperatures.

Condition # 21291 for S-3 will be reduced to 100 tpy of throughput and Condition # 23278 for S-5 will be reduced to 184.76 tpy of throughput. The chronic and acute toxic emissions (formaldehyde and acetaldehyde) from the new roaster, S-6, are limited to below the trigger level, so that Toxic Health Risk Analysis is not required.

This application requires public notice requirements of Regulations 2-1-412, since the sources are located within 1,000 feet of a school.

II. EMISSION CALCULATIONS

Emission increases from S-6 roaster:

Pollutant	Emission Factor	Unit	S-6 Emissions			S-6 Increase
			lb/yr	lb/day	lb/hr	tpy
NOx (RACT - 50 ppmvd @ 15% O2)	0.2	lb/MMBtu	374.4	1.44	0.12	0.187
CO (RACT- 350 ppmvd @ 15% O2)	0.8	lb/MMBtu	1497.6	5.76	0.48	0.749
POC	0.047	lb/ton	26.80	0.17	0.01	0.013
SO2	0.6	lb/MMscf	1.10	0.004	0.0004	0.001
PM10 (filterable + condensable)	0.22	lb/ton	125.45	0.82	0.07	0.063
GHG (CO2e)	530.47	lb/ton	302680	1973	164	151.3
NPOC (Methane)	2.3	lb/MMscf	4.22	0.016	0.0014	0.002
Formaldehyde *	0.0004	lb/ton	0.23	0.0015	0.00012	0.00011
Acetaldehyde *	0.0002	lb/ton	0.11	0.00074	0.00006	0.00006
Toxics are based on the yearly chronic trigger levels and max. 570.24 ton/yr of throughput						

Basis:

- * Total fuel throughput (600,000 Btu/hr or 1,872 MMBtu/yr capacity) = 18,720 therm/yr of natural gas = 1.835 MMscf/yr
- * Operation hours = 12 hour/day, 5 day/wk, 52 wk/yr = 3,120 hr/yr
- * Heat capacity = 1,020 MMBtu/10⁶ ft³ natural gas
- * Assume 90% control efficiency for POC at A-6, Cyclone/Afterburner
- * RACT Emissions factors (Permit Handbook) for coffee roasting abated by cyclone/afterburner
NOx = 0.2 lb/MMBtu – 50 ppmv NOx @ 15% O2
CO = 0.8 lb/MMBtu – 350 ppmvd CO @ 15% O2
- * Emission factors taken from AP-42, Table 1.4-2 (revised 7/1/98) for small boiler <100 MMBtu/hr
SO2 = 0.6 lb/MMscf
NPOC (methane) = 2.3 lb/MMscf
N2O (controlled) = 0.64 lb/MMscf
- * Emission factors taken from AP-42, Table 9-13.2-1 and 2-2 (revised 9/95) for Coffee Roasting Operations controlled with thermal oxidizer
CO2 = 530 lb/ton
POC = 0.047 lb/ton bean roasted
PM10 = 0.22 lb/ton bean roasted (0.12 lb/ton front half + 0.1 lb/ton back half)
- * Formaldehyde = 0.025 lb/ton bean roasted – based on EFs from source test result "NTV-1664" of Mountains Brothers Coffees on the same Loring Smart Roast S-70 (A/N 25356), Assume 2X of result for variability
- * Acetaldehyde = 0.051 lb/ton bean roasted – based on EFs from source test result "NTV-1664" of Mountains Brothers Coffees on the same Loring Smart Roast S-70 (A/N 25356), Assume 2X of result for variability
- * See attached spreadsheet calculation

Emission decreases from S-3 and S-5 Coffee Roasters

Pollutant	Emission Factor	Unit	S-3 Emission Reduction		S-5 Emission Reduction		Total Reduction
			tpy	lb/yr	tpy	lb/yr	lbyr
NOx	0.1	lb/ton	-124.3	-12.43	-39.54	-3.95	-16.38

CO	0.55	lb/ton	-124.3	-68.37	-39.54	-21.75	-90.11
VOC	0.047	lb/ton	-124.3	-5.84	-39.54	-1.86	-7.70
SO2	0.0011	lb/ton	-124.3	-0.14	-39.54	-0.05	-0.19
PM10 (filterable)	0.12	lb/ton	-124.3	-14.92	-39.54	-4.74	-19.66
GHG (CO2e)	530.47	lb/ton	-124.3	-65937	-39.54	-20975	-86912
NPOC	0.0044	lb/ton	-124.3	-0.54	-39.54	-0.17	-0.72
Formaldehyde	0.054	lb/ton	-124.3	-6.71	-39.54	-2.14	-8.85
Acetaldehyde	0.051	lb/ton	-124.3	-6.32	-39.54	-2.01	-8.33

Basis:

- * Emission factors for NOx, CO, PM10, VOC and formaldehyde were based on previous Application #15225
- * Emission factors for SO2, GHG (CO2e), NPOC and acetaldehyde are the same as S-6

Net Emissions:

Pollutant	S-3, lb/yr (reduced)	S-5, lb/yr (reduced)	S-6, lb/yr (new)	Net, lb/yr
	lb/yr	lb/yr	lb/yr	lb/yr
NOx	-12.43	-3.95	374.4	358.0
CO	-68.37	-21.75	1497.6	1407.5
VOC	-5.84	-1.86	26.80	19.10
SO2	-0.14	-0.05	1.10	0.91
PM10 (filterable)	-14.92	-4.74	125.45	105.79
GHG (CO2e)	-65937	-20975	302680	215768
NPOC	-0.54	-0.17	4.22	3.51
Formaldehyde	-6.71	-2.14	0.23	-8.62
Acetaldehyde	-6.32	-2.01	0.11	0.08

Grain Loading calculation from S-6 coffee roasting process:

$$[0.07 \text{ lb PM10/hr} \times 7000 \text{ grain/lb}] / [60 \text{ min/hr} \times 966 \text{ dscf/min}] = 0.0082 \text{ grain/dscf.}$$

III. PLANT CUMULATIVE INCREASE

	<u>Current</u> Ton/yr	<u>New</u> Ton/yr	<u>New Total</u> Lbs/yr	<u>Tons/yr</u>
POC =	0.01	0.010	39.1	0.02
NO _x =	0.02	0.179	398	0.199
SO ₂ =	0.00	0.00046	0.915	0.00046
CO =	0.13	0.704	1667.5	0.834
NPOC =	0.00	0.0018	3.51	0.002
PM _{2.5} =	0.00	0.0053	165.8	0.083
PM ₁₀ =	0.03	0.0053	165.8	0.83
GHG (CO ₂ e) =	0.00	108	215,768	107.9

IV. TOXIC RISK SCREENING

A risk screen is not required for this project because the toxic emissions are limited to below the toxic trigger level.

According to Chapter 9.13.2, Coffee Roasting of AP-42, the roasters (S-3, S-5 and S-6) are 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.

<u>Toxic Pollutant</u>	<u>Emissions Rate</u>		<u>Trigger Level</u>	
	<u>lb/hr</u>	<u>lb/yr</u>	<u>lb/hr</u>	<u>lb/yr</u>
Formaldehyde	0.01	14	0.12	14
Acetaldehyde	0.02	29	1.0	29

V. BEST AVAILABLE CONTROL TECHNOLOGY

BACT is not required for S-3, S-5 and S-6, Coffee Roasters since none of the criteria emissions exceed 10 lb/highest day per Regulation 2-2-301.

VI. OFFSETS

Offsets are not required since facility POC and NOx emissions do not exceed 10 ton/yr per Regulation 2-2-302.

VII. STATEMENT OF COMPLIANCE

Sources S-3, S-5 and S-6 will comply with Regulation 6-1-301 for visible emissions that do not exceed Ringelmann 1 for period or periods aggregating more than three minutes in any hour.

Sources S-3, S-5 and S-6 will comply with Regulation 6-1 as their estimated particulate emission of 0.0082 gr/dscf will be well under the 0.15 gr/dscf allowed per Regulation 6-1-310. Compliance with Regulation 7, Odorous Substances, to be confirmed at startup.

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.

School Notification: This project is within 1,000 ft from the nearest K-12 schools and have an increase in toxic emissions. It is therefore subject to the public notification requirements of Regulation 2-1-412, even though the increase in toxic emissions is not large enough to require a Toxic Risk Analysis. The applicant supplied information for the school within 1,000 feet, James B Davidson Middle School and Anova Center for Education. Since the public notice requirements are triggered, notification must also be provided to any other school within ¼ mile of the project. The application indicated that there is one additional schools with that radius, Laurel Dell Elementary. This was confirmed by the district's databank search.

James B. Davidson Middle School, 280 Woodland Ave., (415) 485-2400 - 0.1 mile
 Anova Center for Education (Marin campus), 150 Lovell Ave., (415) 485-1076 – 0.1 mile
 Laurel Dell Elementary, 225 Woodland Ave., (415) 485-2317 – 0.21 mile

PSD, NSPS and NESHAPS do not apply.

VIII. CONDITIONS**Permit Condition 26520****For S-6 Coffee Roaster abated by A-6 Cyclone/Afterburner, Application No. 28557, Equator Coffees & Teas, Plant No. 15081:**

1. The owner/operator shall not exceed the following limits at S-6 coffee roaster and A-6 cyclone/afterburner over any consecutive 12-month period: (Basis: Cumulative Increase)
 - S-6 570.24 tons of coffee bean
 - Natural Gas usage 1.835 MMscf (18,720 therms)
2. The owner/operator shall abate S-6 coffee roaster at all times while operating by A-6 Cyclone/Afterburner. (Basis: Cumulative Increase)
3. The minimum furnace temperature of A-6 shall be at least 1400° F and maintain a residence time of at least 0.3 seconds. This minimum temperature may be adjusted by the District if source test data demonstrate that an alternate temperature is necessary for or capable of maintaining compliance with Part 10. (Basis: Regulation 2-1-403)
4. The owner/operator shall ensure that A-6 Cyclone/Afterburner are equipped with a temperature measuring device 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 may conduct a source test for the purposes of lowering the minimum temperature requirement provided the following has occurred:
 - a. The facility has applied to the Permit Services Division for a change of conditions.
 - b. The Source Test Section was notified at least seven days prior to testing and the test protocol was deemed acceptable.
 - c. The result of the test demonstrated that Thermal Oxidizer A-6 is capable of meeting the emission factor limits imposed in Part 10. (Basis: Regulation 2-1-403)
6. The temperature limit in Part 3 shall not apply during an "Allowable Temperature Excursion", provided that the temperature controller setpoint complies with the temperature limit. An Allowable Temperature Excursion is one of the following:
 - a. A temperature excursion not exceeding 20 degrees F; or
 - b. A temperature excursion for a period or periods which when combined are less than or equal to 15 minutes in any hour; or
 - c. A temperature excursion for a period or periods which when combined are more than 5 minutes in any hour, provided that all three of the following criteria are met.
 - i. the excursion does not exceed 50 degrees F;
 - ii. the duration of the excursion does not exceed 24 hours; and
 - iii. the total number of such excursions does not exceed 12 per calendar year (or any consecutive 12-month period).

Two or more excursions greater than 15 minutes in duration occurring during the same 24-hour period shall be counted as one excursion toward the 12-excursion limit. (Basis: Regulation 2-1- 403)
7. For each Allowable Temperature Excursion that exceeds 20 degrees F and 15 minutes in duration, the owner/operator shall keep sufficient records to demonstrate that they meet the qualifying criteria described above. Records shall be retained for a minimum of two years from the date of entry, and shall be made available to the District upon request. Records shall include at least the following information:

- a. Temperature controller set point;
 - b. Starting date and time, and duration of each Allowable Temperature Excursion;
 - c. Measured temperature during each Allowable Temperature Excursion;
 - d. Number of Allowable Temperature Excursions per month, and total number for the current calendar year; and
 - e. All strip charts or other temperature records.
(Basis: Regulation 2-1-403)
8. The permit to operate for S-6 Coffee Roaster 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 operator to:
- a. Conduct, within 30 days of notification by the APCO, a District-approved source test to establish proper functioning of A-3, Afterburner;
 - b. Submit, within 60 days of notification by the APCO, a permit application for an Authority to Construct additional emission control; and/or
 - c. 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)
9. 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-6 Coffee Roaster.
 - 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 A-6 Afterburner whenever S-6 Coffee Roaster is in operation.
 - e. Source test reports.
- 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)
10. The owner/operator shall not exceed the following limits while operating any roaster or afterburner:
- NO_x = 0.20 lb/MMBTU (Basis: RACT)
CO = 0.80 lb/MMBTU (Basis: RACT)
POC = 0.047 lb/ton of beans roasted
Formaldehyde = 0.0004 lb/ton
Acetaldehyde = 0.0002 lb/ton
- The Formaldehyde and Acetaldehyde limits ensure emissions for these compounds are less than Regulation 2, Rule 5 toxic trigger levels based on permitted throughput. If source testing determines emissions exceed these values, then the facility shall submit a change of conditions permit application. (Basis: Cumulative Increase, RACT)
11. The particulate emissions, as measured by EPA Method 5 front and back half, from the exhaust of Abatement Device A-6 shall not exceed 0.15 gr/dscf.
(Basis: Cumulative Increase, Regulation 6-1)
12. Within 60 days of start-up of each of S-6, the owner/operator shall conduct a District approved source test on the afterburner exhaust stacks to determine the emissions of the following pollutants in the units specified:
Nitrogen Oxides [lb/MMBTU natural gas]
Carbon Monoxide [lb/MMBTU natural gas]

Total Organics [lb/ton coffee roasted]

Formaldehyde [lb/ton coffee roasted]

Acetaldehyde [lb/ton coffee roasted]

The owner/operator shall submit the source test results to the District staff no later than 60 days after the source test. (Basis: Cumulative Increase)

13. Within 60 days of start-up of each of S-6, the owner/operator shall conduct a District approved source test on the cyclone exhaust stacks for A-6 to determine compliance with Part 11. The owner/operator shall submit the source test results to the District staff no later than 60 days after the source test. (Basis: Cumulative Increase)
14. The owner/operator shall obtain approval for all source test procedures from the District's Source Test Section prior to conducting any tests. The owner/operator shall comply with all applicable testing requirements as specified in Volume V of the District's Manual of Procedures. The owner/operator shall notify the District's Source Test Section, in writing, of the source test protocols and projected test dates at least 7 days prior to testing. (Basis: Cumulative Increase)

Permit Condition 21291

Plant #15081, Equator Estate Coffees & Teas, Application #8942, #10790, #15225

S-3, Batch Coffee Roaster, San Franciscan ST 75 Model, 35 kilo, natural gas, 300,000 Btu/hr, abated by A-3, Afterburner with integral Cyclone, Midco 557-5R, 1.2 MMBtu/hr

1. The total amount of green coffee beans roasted at Batch Coffee Roaster, S-3, shall not exceed ~~224.3100~~ tons (~~448,600,200,000~~ pounds) totaled over any consecutive 12-month period. (Basis: Cumulative Increase)
2. The Batch Coffee Roaster, S-3, shall be abated by all times by A-3, Afterburner. (Basis: Cumulative Increase)
3. The volatile organic compound emissions from S-3, Batch Coffee Roaster, shall not exceed 1 pound per 100 pounds of green coffee beans roasted. (Basis: Cumulative Increase)
4. The minimum furnace temperature of A-3 shall be at least 1300 degrees F. This temperature may be adjusted by the District if source test data demonstrate that an alternate temperature is necessary for or capable of maintaining compliance with Condition 3 above. (Basis: Regulation 2-1-403)
5. The A-3, Afterburner, shall be equipped with a temperature measuring device capable of continuously measuring and recording the temperature. This device shall be maintained in accordance with manufacturer's recommendations. This temperature monitor shall be used to determine compliance with the temperature requirements in Condition 4 above. (Basis: Regulation 1 - 521)
6. The Permit to Operate for S-3, Batch Coffee Roaster, 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 (APCO) may require the operator to:
 - a. Conduct, within 30 days of notification by the APCO, a District-approved source test to establish proper functioning of A-3, Afterburner;
 - b. Submit, within 60 days of notification by the APCO, a permit application for an Authority to Construct additional emission control; and/or

- c. 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)
7. In order to demonstrate compliance with the above conditions, the Permit Holder shall maintain the following records in a District approved log 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-3.
 - b. Monthly throughput records shall be totaled for each consecutive 12-month period.
 - c. Temperature records from Condition 5 above. All records shall be retained on-site for a period of 2 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, Regulation 1-441)

Permit Condition 23278

Plant #15081, Equator Estate Coffees & Teas Application #15225

S-5, Coffee Batch Roaster with integral Cooler, Loring Smart Roaster, Kestrel S35, 245 lb/hr capacity, abated by A-5, Cyclone/Built-in Afterburner, 285,000 Btu/hr

1. The owner/operator of S-5 shall not roast more than ~~224.3184.76~~ tons (~~448,600369,520~~ pounds) green coffee beans at Coffee Roaster S-5 totaled over any consecutive 12-month period. [Basis: Cumulative Increase]
2. The owner/operator of S-5 Coffee Roaster shall abate S-5, Coffee Roaster at all times by A-5 Built-in afterburner. [Basis: Cumulative Increase]
3. The owner/operator of S-5 shall set the minimum furnace temperature of A-5 at 1400 degrees F or higher. This minimum temperature may be adjusted by the District if source test data demonstrate that an alternate temperature is necessary for or capable of maintaining compliance with Condition No. #2 above. [Basis: Regulation 2-1-403]
4. The owner/operator shall ensure that A-5 Built-in afterburner is equipped with a temperature-measuring device capable of continuously measuring and recording the temperature in A-5 Built-in afterburner. 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 Condition 3. [Basis: Regulation 1-521]
5. The permit to operate for S-5 Coffee Roaster 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 operator to submit, within 60 days of notification by the APCO, a permit application for an Authority to Construct additional emission control / 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-5
 - b. Monthly usage records shall be totaled for each consecutive 12-month period

- c. Records of continuous temperature measurements of A-5 Thermal Oxidizer whenever S-5 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]

IX. RECOMMENDATION

It is recommended that an Authority to Construct be granted to Equator Coffees and Teas for:

- S-6 Batch Coffee Roaster, Loring Smart Roast S70 Peregrine with integral cooler/destoner, 0.31 ton/hr, abated by A-6 Cyclone Burner System, 600,000 Btu/hr, Natural Gas.**

And conditional changes to the Permits to Operate for:

- S-3 Batch Coffee Roaster, San Franciscan ST75, 35 kilo capacity, 300,000 Btu/hr, abated by A-3 Afterburner with Integral Cyclone, Midco 557-5R, 1.2 MMBtu/hr, Natural Gas.**
- S-5 Batch Coffee Roaster, Loring Smart Roast Kestrel S35, 245 lb/hr capacity, abated by A-5 Cyclone/Built-in Afterburner, 285,000 Btu/hr, Natural Gas.**

Thu H. Bui
 Senior Air Quality Engineer
 Engineering Division
 Date: _____

THB:Disk-e\Equator Coffees and Teas\28557\28557e\