Engineering Evaluation Report
Taylor Made Farms LLC
7190 Keating Avenue
Sebastopol, CA 95472
Plant # 16718
Application Number 23586

I. BACKGROUND

Taylor Made Farm owns and operates a coffee roasting business since 2004. In late 2005, they moved approximately half a mile to the current location. On July 10, 2005, the District issued Taylor Made Farm a P/O to operate the following equipment.

S-1 Coffee Batch Roaster with integral Cooler, Loring Smart Roaster, Kestrel S35, 245 lb/hr capacity, abated by A-1, Cyclone/Built-in Afterburner, 285,000 Btu/hr.

The Kestrel roaster utilizes a unique heat re-circulating process. The burner is 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 1300 ^{o}F 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 "incineration tube" that operates at after-burner temperatures.

Taylor Made received the permit for the roaster with a maximum throughput of 350,000 lb/yr of coffee beans.

In 2008, Taylor Made Farm began receiving a number of odor complaints. It appears that although the emissions from the coffee roaster are abated by a cyclone afterburner during the roasting process, there is no abatement device to alleviate the odors during the cooling process.

To minimize any further odor complaints and to abate odors from freshly roasted coffee beans, Taylor Made Farms installed the following equipment:

A-2 Thermal Oxidizer, InProHeat, Natural Gas, 400,000 BTU/HR abating odors from freshly roasted coffee beans in cooling tray

The thermal oxidizer is used only to abate the odors emissions from the cooling tray.

In early July, the owner was issued a NOV for exceeding their maximum throughput. In light of that, the owner submitted an application to increase the annual throughput to 500,000 lbs. To allow to future growth, the application will be evaluated at 700,000 lbs/yr.

For ease of enforcement, permit conditions for S-1 & A-2 will be combined.

II. EMISSION CALCULATIONS

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

- **S-1**
- 245 lbs/hr
- Coffee Throughput = 700,000 lb/yr = 350 tons/yr
- Operation hours = 700,000 lbs/yr/245 lb/hr = 2857 hours/yr
- Roaster Firing Rate = 0.285 MM BTU/hr
- Afterburner Firing Rate = 0.400 MMBTU/hr
- Total fuel throughput = 0.285 +0.400 MMBTU/hr (2857 hr/yr) = 1957.14 MMBTU/yr of natural gas.
- Heat capacity = 1,050 MMBtu/10^6 ft^3 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

NOx = (100 lb/ MMscf)/(1050 MMBtu/10^6 ft^3) = 0.095 lb/MMBtu
CO = (84 lb/ MMscf)/(1050 MMBtu/10^6 ft^3) = 0.08 lb/MMBtu
SO2 = (0.6 lb/MMscf)/(1050 MMBtu/10^6 ft^3) = 5.7 x 10^{-4} lb/MMBtu
PM10 = (7.6 lb/MMscf)/(1050 MMBtu/10^6 ft^3) = 0.00724 lb/MMBtu
POC = (5.5 lb/MMscf)/(1050 MMBtu/10^6 ft^3) = 0.00524 lb/MMBtu
NPOC = (2.3 lb/MMscf)/(1050 MMBTU/10^6 ft^3) = 0.00219 lb/MMBtu

Combustion Emission Calculations: (Total)

NOx = 1957 MMBtu/yr X 0.095 lb/MMBtu = 185.93 lb/yr
CO = 1957 MMBtu/yr X 0.08 lb/MMBtu = 156.57 lb/yr
SO2 = 1957 MMBtu/yr X 0.00057 lb/MMBtu = 1.12 lb/yr
PM10 = 1957 MMBtu/yr X 0.00724 lb/MMBtu = 14.17 lb/yr
POC = 1957 MMBtu/yr X 0.00524 lb/MMBtu = 10.26 lb/yr
NPOC = 1957 MMBtu/yr X 0.00219 lb/MMBtu = 4.29 lb/yr

All emissions are less than 2 lb per day.

Summary of Combustion Emissions Increases

Pollutant	Lb/day	Lb/yr	(ton/yr)
NOx	0.25	92.96	0.046
CO	0.21	78.29	0.039
SO2	0.00	0.56	n/a
PM10	0.02	7.08	0.004
POC	0.01	5.13	0.003
NPOC	0.01	2.14	0.001

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)	Annual Emissions (lb/yr)	Maximum Annual Emissions (TPY)
PM10 (abated)	0.148**	350	51.8	0.026
POC (abated)	0.047	350	16.5	0.008

**(0.12 + 0.028 = 0.148)

Compliance with Regulation 6 -310 Particulate Weight Limitation:
Limitation of 0.15 grain/dscf

Basis: 1 hour of roaster operation
245 lbs/hr roaster capacity
roaster emission point: 3000 acfm @ 1400 degrees F
750 scfm @ 70 degrees F

Grain Loading calculation from coffee roasting process:
[62.58 lb PM_{10}/yr X 7000 grain/lb] / [60 min/hr X 2857 hr/yr X 750 dscfm]
= 0.003 grain/dscf

III. PLANT CUMULATIVE INCREASE

Pollutant	Current (TPY)	New (TPY)	Total TPY
NOx	0.042	0.046	0.088
CO	0.076	0.039	0.115
SO2	0.002	n/a	0.002
PM10	0.014	0.030	0.044
POC	0.003	0.011	0.014
NPOC	0.001	0.001	0.002

IV. TOXIC RISK SCREENING

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:

For this application, the total throughput of 700K lbs/yr will be used for the toxic screen, since Regulation 2, Rule 5 trigger levels have been lowered since the last toxic screen was done.

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	350	0.28	Neg.	0.21	30
Acetaldehyde	0.0005	350	0.18	--	--	64

A toxic risk screen is not triggered.

V. BEST AVAILABLE CONTROL TECHNOLOGY

BACT is not triggered since emissions are less than 10 lbs per day for all pollutants.

VI. OFFSETS

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

VII. CEQA

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

Source will comply with Regulation 6 as its estimated particulate emission of 0.003 gr/dscf is well under the 0.15 gr/dscf allowed per Regulation 6-310.

NSPS, PSD, and NESHAPS are not triggered

Taylor Made Farms is located within 1000 feet of the following school:

Analy High
6950 Analy Avenue
Sebastopol, CA 95472
School Enrollment: 1280
Grades: 9-12

Sebastopol Independent Charter School
200 Main Street
Sebastopol, CA 95473
School Enrollment 259
Grades: K-8

Taylor Made Farms 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 Analy High School and Sebastopol Independent Charter School. In addition, public notices

were mailed to all residential neighbors located within 1000 feet of Taylor Made Farm's facility.

IX. PERMIT CONDITION # 22191

We are combining Condition ID# 22191 and 22616 into a single set of conditions (Permit Condition # 22191).

S-1 Coffee Batch Roaster with integral Cooler, Loring Smart Roaster, Kestrel S35, 245 lb/hr capacity, abated by:
A-1, Cyclone/Built-in AfterbBurner, 285,000 Btu/hr.
A-2 Thermal Oxidizer, InProHeat, Natural Gas, 400,000 BTU/HR, abating odors from freshly roasted coffee beans in cooling tray

1. The owner/operator of S-1 shall not roast more than 700, 350,000 pounds green coffee beans at Coffee Roaster S-1 totaled over any consecutive 12-month period. [Basis: Cumulative Increase]

2. The owner/operator of S-1 Coffee Roaster shall abate S-1, Coffee Roaster at all times by A-1 Built-in afterburner. [Basis: Cumulative Increase]

(From Condition # 22616)

3. The owner/operator must abate odors at all times from the freshly roasted coffee beans being cooled in the cooling tray with A-2, Thermal Oxidizer, InProHeat, at all times while the roasted coffee beans are in the cooling tray.
[Basis: Regulation 1-301]

4. The owner/operator of S-1 shall set the minimum furnace temperature of A-1 and A-2 each at 1300 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]

5. The owner/operator shall ensure that A-1 Built-in afterburner and A-2, Thermal Oxidizer are each is equipped with a temperature-measuring device capable of continuously measuring and recording the temperature in A-1 Built-in afterburner and A-2, Thermal Oxidizer. 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 Part 34. [Basis: Regulation 1-521]

6. The permit to operate for S-1 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 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.
b. Adjust the minimum temperature specified in Part 4
c. Curtail operations until either the operation can be modified or the meteorological conditions change such that the community if no longer adversely impacted.

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

7. ~~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-1, Afterburner, and A-2, Thermal Oxidizer 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]

~~COND# 22616 ----------~~

~~Taylor Made Farms LLC~~
~~7190 Keating Avenue~~
~~Sebastopol, CA 95472~~
~~Application Number 13121~~
~~Plant # 16718~~
~~Permit Condition # 22616~~

~~These are your permit conditions for the following source:~~

~~A-2 Thermal Oxidizer, InProHeat, Natural Gas,400,000 BTU/HR, abating odors from freshly roasted coffee beans in cooling tray~~

~~1. The owner/operator must abate odors at all times from the freshly roasted coffee beans being cooled in the cooling tray with A-2 [Basis: Regulation 1-301]~~

~~8. 2. The owner/operator shall operate A-2 with aminimum furnace exhaust temperature at 1300 degrees F. [Basis: Regulation 2-1-403]~~

~~3. The owner/operator shall ensure that A-2, thermal oxidizer is equipped with a temperature-measuring device capable of continuously measuring and recording the temperature in A-2, thermal oxidizer. 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 2. [Basis: Regulation 1-521]~~

~~4. To demonstrate compliance with the above conditions, the owner/operator shall maintain the records of continuous temperature measurements of A-2, thermal oxidizer whenever S-1 Coffee Roaster is in operation.~~

~~5. 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]~~

~~END OF CONDITIONS~~

X. RECOMMENDATION

It is recommended that a Change of Conditions for the Permit to Operate for Taylor Made Farm, Inc. be approved for:

S1 Coffee Batch Roaster with integral Cooler, Loring Smart Roaster, Kestrel S35, 245 lb/hr capacity abated by:

A-1 Cyclone/Built-in Afterburner, 285,000 Btu/hr.

A-2 Thermal Oxidizer, InProHeat, Natural Gas, 400,000 BTU/HR abating odors from freshly roasted coffee beans in cooling tray

By: _____ _____

Nancy Yee — Date

Senior Air Quality Engineer