

**Engineering Evaluation  
EBA Engineering Inc.  
Plant # 21895  
Application Number 26297**

**1. Background:**

EBA has applied for a permit to operate the following mobile soil vapor extraction unit at 1175 Sebastopol Road, Santa Rosa, CA 95407. The unit utilizes a 150 ACFM blower to extract the vapors from the soil. The VOC emissions are abated using a 400,000 Btu/h thermal oxidizer.

S-1: Soil Vapor Extraction System consisting of a 150 SCFM Dekkar VMXO153K Positive Displacement Blower, and ancillary equipment, abated by A-1 Thermal Oxidizer 400,000 Btu/h Thermox RF2 Group  
A-1: Thermal Oxidizer 400,000 Btu/h Thermox RF2 Group

The applicant will be conditioned to provide written notification at the start of the operation. Procedures are outlined in the conditions found below.

Source S-1 is within 1000 feet of the following school. Thus a Public Notification is required for this application.

Roseland Elementary School  
950 Sebastopol Road  
Santa Rosa, CA 95407

**2. Emission Calculations**

Emissions of Precursor Organics Compounds (POC):

SVE system POC and Toxic Air Contaminant (TAC) emissions are based on the highest pilot test results submitted by the applicant. The maximum amount that can potentially be emitted is calculated below. With the Thermal Oxidizer 98.5% abatement efficiency for benzene destruction does not trigger the risk screen at an influent flow of ppm of benzene. The applicant has agreed to accept benzene emission limit of 3.8 pound per year which is the toxic trigger level to perform risk screen. Thus with this condition as well as basing the benzene emission on the pilot test it can be concluded that the benzene emission level is less than the trigger level of 3.8 pounds per year

For a conservative estimate of yearly emissions, we shall assume that the system is operated for an entire year within an inlet concentration corresponding to the initial soil concentration level. Generalized assumptions follow:  
Total petroleum hydrocarbon = 1940 ppm Operating conditions: Pressure = 1 Atm; Inlet Temperature = 21<sup>0</sup>C; 1 mole occupies 24.15L Molecular weight of TPHg = 100 g/mole (value for "weathered gasoline"). Molecular weight of Benzene = 78 g/mole. Influent values based on operational parameters of equipment and applicant supplied soil vapor test results: influent rate 51 scfm throughout; maximum influent concentration = ppmv VOC, 186 mg/m<sup>3</sup> benzene; destruction efficiency = 98.5 %.

$$\text{POC} = (1940 \text{ E-6}) \times (51 \text{ cu.ft/min}) \times (1,440 \text{ min/day}) \times (28.32 \text{ liters/cu.ft}) \times (1 \text{ mole}/24.15 \text{ liters}) \times (100 \text{ g/mole}) \times (\text{lb}/453.6 \text{ g}) \times (1 - 0.985)$$

**POC Emission = 0.55 lb/day**

$$\begin{aligned} \text{Maximum benzene emission} &= (186 \text{ mg/m}^3)(51 \text{ ft}^3/\text{mt.})(0.0283 \text{ m}^3/\text{ft}^3)(1 \text{ lb}/453,592 \text{ mg})(1440 \text{ mts}/\text{day}) \\ &= 0.85 \text{ lb/day unabated} \end{aligned}$$

At 99% efficiency that was demonstrated during the pilot test benzene emissions are = **0.0085 lb/day or 3.1 lb/yr**



**Table 1: CATEF TAC Emissions Estimates - Natural Gas Firing**

TACs	CATEF Mean Emission Factor <sup>1</sup> (lb/MMcf, NG)	Maximum Annual Emission Rate (lb/yr)	Maximum Hourly Emission Rate (lb/hr)	Chronic Trigger Level (lb/yr)	TAC Triggers Chronic? (yes/no)	Acute Trigger Level (lb/yr)	TAC Triggers Acute? (yes/no)
Acetaldehyde	8.83E-01	1.52E+00	1.73E-04	3.80E+01	no	1.00E+00	no
Acrolein	5.47E-01	9.41E-01	1.07E-04	1.40E+01	no	5.50E-03	no
Benzene <sup>2</sup>	7.39E-02	2.54E-01	2.90E-05	3.80E+00	no	2.90E+00	no
1,3 Butadiene	1.04E-01	1.79E-01	2.04E-05	6.30E-01	no	N/A	N/A
Ethylbenzene	1.16E-02	2.00E-02	2.28E-06	4.30E+01	no	N/A	N/A
Formaldehyde <sup>2</sup>	4.99E-02	1.72E-01	1.96E-05	1.80E+01	no	1.20E-01	no
Naphthalene	7.65E-02	1.32E-01	1.50E-05	3.20E+00	no	N/A	N/A
PAH, as B(a)P	See Below	3.64E-04	4.15E-08	6.90E-03	no	N/A	N/A
Propylene	1.60E+01	2.75E+01	3.14E-03	1.20E+05	no	N/A	N/A
Toluene	1.07E+00	1.84E+00	2.10E-04	1.20E+04	no	8.20E+01	no
Xylene (Total)	6.02E-02	1.04E-01	1.18E-05	2.70E+04	no	4.90E+01	no

Polycyclic Aromatic Hydrocarbons (PAH)	CATEF (Mean) Emission Factor <sup>1</sup> (lb/MMcf, NG)	PAH Emissions (lb/yr)	Benzo(a)pyrene Equivalency Factor (PEF)	Equivalent PAH Emissions (lb/yr)
Benzo(a)anthracene	2.94E-04	5.06E-04	0.10	5.06E-05
Benzo(b)fluoranthene	2.37E-04	4.08E-04	0.10	4.08E-05
Benzo(k)fluoranthene	1.03E-04	1.77E-04	0.10	1.77E-05
Benzo(a)pyrene	1.15E-04	1.98E-04	1.00	1.98E-04
Chrysene	3.10E-04	5.33E-04	0.01	5.33E-06
Dibenz(a,h)anthracene	1.25E-05	2.15E-05	1.05	2.26E-05
Indeo(1,2,3-cd)pyrene	1.69E-04	2.91E-04	0.10	2.91E-05
<b>Total =</b>				<b>3.64E-04</b>

**Maximum Firing Rate** 1.000 MMBTU/hr  
**Hours of Operation** 8760.0 hrs/yr  
**NG Combustion** 3.4 MMcf/year

**Notes:**

1. Emissions factors are from the CARB database of "California Air Toxics Emissions Factors" (CATEF)

Criteria pollutant emission due to LPG combustion:

The emission factors listed in Table 2 is from EPA AP-42, Table 1.4-2 for natural gas combustion for commercial boilers ranging from 0.3 to 10 MMBtu/h for low NO<sub>x</sub> burners.

**Table 2 Thermal Oxidizer Combustion Criteria Pollutant Emissions**

Pollutant	Emission Factor (lb/10 <sup>6</sup> cf)	Emissions		t/y
		Lb/y Based on 3.4 MM cf/y	Lb/d Based on 365 days/y operation	
PM <sub>10</sub>	12.0	40.8	0.11	0.02
VOC	5.5	18.7	0.05	0.009
SO <sub>2</sub>	0.6	2.4	Negligible	Negligible
NO <sub>x</sub>	204	604	1.7	0.302
CO	816	2774.4	7.6	1.387

Combined emission rate of Benzene from soil vapors and due to LPG combustion is below the trigger level of 3.8 lb/y.

**3. Cumulative Increase- tons/yr**

Table 2 presents the plant cumulative increase:

**Table 2 Cumulative Increase (tons)**

<b>Pollutant</b>	<b>Current</b>	<b>This Application</b>	<b>Total</b>
PM <sub>10</sub>	0.003	0.02	0.023
VOC	2.583	0.109	2.692
SO <sub>2</sub>	0	Negligible	0
NO <sub>x</sub>	0.037	0.302	0.339
CO	1.46	1.387	2.847

**4. Compliance Statements:**

**Toxics**

Benzene, Toluene, Ethyl benzene, Xylenes, MTBE emitted are listed toxic air contaminants. Benzene at the highest tested influent level is 5.6 ppm and the emission does not exceed the toxic trigger level at 99.0% abatement efficiency. The applicant has agreed to maintain the benzene emission level below the trigger level or 3.8 pounds per year by adjusting the blower output if necessary as well as by proper monitoring. Thus the applicant will be conditioned not to exceed 3.8 pounds per year benzene emission at the outlet of A-1 Thermal Oxidizer while at 150 cfm blower capacity. The applicant has agreed for this limit.

However, the following school is within 600 feet of the source S-1. Since there are TAC emissions from the source a Public Notification is triggered in accordance with Regulation 2-1-412.

Roseland Elementary School  
 950 Sebastopol Road  
 Santa Rosa, CA 95407

**New Source Review**

**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 day of POC, NPOC, NO<sub>x</sub>, CO, SO<sub>2</sub> or PM<sub>10</sub>.

This proposed project will not emit over 10 pounds per day of POC, NO<sub>x</sub> or CO. Thus BACT is not triggered. The source is equipped with a Thermal Oxidizer or abatement operating at all times the blower is operating further reducing the TAC emissions to the atmosphere.

**Offsets**

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> per Regulation 2-2-302. Table 2 above summarizes increases in criteria pollutant emissions at the plant. Offsets are not applicable to this application, since the emissions do not exceed 10 tons/yr. Thus this facility is not subject to Regulation 2-2-302.

**CEQA**

The project is considered to be ministerial under the Districts proposed 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 emission factors and therefore is not discretionary as defined by CEQA. This project is in compliance with Chapter 9.2 of the permit handbook.

### **District Regulations**

Based on the information submitted, this operation is expected to be in compliance with Regulation 8-47-301, Emission Control Requirements, Specific compounds, and 8-47-302, Organic compounds. The POC emissions will be vented through the thermal oxidizer system at all times of operation.

PSD, NSPS, and NESHAPS are not triggered.

### **5. Condition**

**EBA Engineering  
Plant # 21895  
Application # 26297**

**Condition # 25876**

Condition applies to the following source:

S-1: Soil Vapor Extraction System consisting of a 150 scfm Dekkar VMXO153K Positive Displacement Blower, and ancillary equipment, abated by A-1 Thermal Oxidizer 400,000 Btu/h Thermox RF2 Group  
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Condition for S-1 Abated Using Electric Catalytic Oxidizer

1. Precursor Organic Compound (POC) emissions from Source S-1 shall be abated by abatement device A-1, thermal oxidizer during all periods of operation. Soil vapor flow rate shall not exceed 150scfm. [Basis: Reg. 8-47-301.1,2]
2. The POC abatement efficiency of abatement device A-1 shall be maintained at a minimum of 99% by weight for inlet POC concentrations greater than or equal to 2000 ppmv (measured as C6). For inlet concentrations below 2000 ppmv and greater than or equal to 200 ppmv, a minimum abatement efficiency of 97% shall be maintained. For inlet concentrations below 200 ppmv, a minimum abatement efficiency of 90% shall be maintained. The minimum abatement efficiency shall be waived if outlet POC concentrations are shown to be less than 10 ppmv (measured as C6). [Basis: BACT; Regulation 2-5]
3. The owner/operator shall not exceed 3.8 pound per year of benzene emission. Records shall be rigidly maintained to demonstrate adherence to this condition.
4. To determine compliance with part 2 of the condition, the owner/operator of this source shall monitor with a photo-ionization detector (PID), flame-ionization detector (FID), or other method approved in writing by the Air Pollution Control Officer at the following locations:
  - a. At the inlet to A-1 electric catalytic or thermal oxidizer
  - b. At the outlet from A-1 electric catalytic or thermal oxidizer[Basis: Cumulative Increase, Regulation 2-5, TBACT]
5. The owner/operator shall maintain a minimum of 1400<sup>0</sup>F in the chamber where the organics are destroyed. [Basis: Cumulative Increase, Regulation 2-5, TBACT]
6. To determine compliance part 4 of the condition, the thermal oxidizer shall be equipped with continuous measuring and temperature recording instrumentation. The temperature data collected from the temperature recorder shall be maintained in a file which shall be available for District inspection for a period of at least 2 years following the date on which such data are recorded. [Basis: Regulation 2-1-403]
7. The owner/operator of this source shall maintain the following records for each month of operation of the source:
  - a. Days and hours of operation.
  - b. Each monitor reading or analysis result for the day of operation they are taken.Such records shall be retained and made available for inspection by the District for at least two years following the date that data is recorded. [Basis: Regulation 1-523]
8. The owner/operator shall report any non-compliance with parts 2 to the Director of the Compliance & Enforcement Division at the time that it is first discovered. The owner/operator shall detail the corrective

action taken and include the data showing the exceedance as well at the time of occurrence in the submittal. [Basis: Cumulative Increase, Regulation 2-5, TBACT]

9. Upon final completion of the remediation project, the owner/operator of Source S-1 shall notify the Engineering Division within two weeks of decommissioning the operation. [Basis: Cumulative Increase, Regulation 2-5, TBACT]

## 5. 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. 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 a Permit to Operate for the following source:**

- S-1: Soil Vapor Extraction System consisting of a 150 SCFM Dekkar VMXO153K Positive Displacement Blower, and ancillary equipment, abated by A-1 Thermal Oxidizer 400,000 Btu/h Thermox RF2 Group**
- A-1: Thermal Oxidizer 400,000 Btu/h Thermox RF2 Group**

I recommend that a conditional Permit to Operate be issued to the following source, Subject to Condition number 25876 after the Public Notification period is over and all the concerns of the citizens are addressed.

- S-1: Soil Vapor Extraction System consisting of a 150 scfm Dekkar VMXO153K Positive Displacement Blower, and ancillary equipment, abated by A-1 Thermal Oxidizer 400,000 Btu/h Thermox RF2 Group
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by \_\_\_\_\_  
By: Hari Doss  
Engineering

October 7, 2014