

**DRAFT**  
**Engineering Evaluation**  
**Fremont Corners Shopping Center**  
**Plant No. 20844**  
**Application No. 23520**

***Background***

Geologica has applied for an Authority to Construct for a Soil Vapor Extraction Unit located at Fremont Corners Shopping Center, 110 E. Fremont Avenue in Sunnyvale. Soil vapor extraction (SVE) will be accomplished by means of a regenerative vacuum blower (S-1) with a maximum operating capacity of 250 scfm. The vacuum unit is also equipped with a water knockout vessel, inlet filter, dilution air valve, recirculation valve, and flow indicators. Vapor abatement will be achieved by Carbon Adsorption (Carbon). The Carbon adsorption system will consist of two 1000-pound capacity activated carbon vessels connected in series.

The applicant will be conditioned to provide written notification at the start of operation. The carbon unit influent and effluent VOC concentrations will be monitored with a portable flame-ionization detector (OVA-FID) on a schedule reflecting current loading rates and predicted Carbon capacity. To ensure proper operation of equipment and verify attainment of steady-state conditions, Carbon performance will be monitored daily for the first five days. Fremont Corners Shopping Center may then elect to change their monitoring schedule based on measured influent concentrations and calculated carbon loading. Monitoring schedule changes will be allowed only after District review of concentration measurements and subsequent receipt of District approval.

This source is located within 1,000 feet of the outer boundary of Fremont High School and Lamb-O Academy, and as such this application requires Public notification via Reg. 2-1-412. A Public Notice was prepared and sent out to the home address of the students of the schools and to each address within a radius of 1,000 feet of the source.

***Emission Calculations***

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:

- \* Operating conditions: Pressure = 1 Atm; Inlet Temperature = 21°C; 1 mole occupies 24.15L
- \* Molecular weight of Tetrachloroethylene (PCE) = 165.8 g/mole.  
Molecular weight of Trichloroethylene (TCE) = 131.4 g/mole.
- \* Influent values based on operational parameters of equipment and applicant supplied soil vapor test results: influent rate 250 scfm throughout; maximum influent concentration = 32 ppmv tetrachloroethylene (NPOC); destruction efficiency = 99.0% throughout.

**Emissions of Toxic Air Contaminants (Tetrachloroethylene):**

$$32\text{E-}6 * \frac{250 \text{ ft}^3}{\text{min}} * \frac{1440 \text{ min}}{1 \text{ day}} * \frac{28.32\text{L}}{1 \text{ ft}^3} * \frac{1 \text{ mole}}{24.15\text{L}} * \frac{165.8\text{g}}{\text{mole}} * \frac{1 \text{ lb}}{454\text{g}} * (1 - 0.99) = \mathbf{0.049 \text{ lb/day}} \text{ (abated)}$$

**Emissions of Toxic Air Contaminants (Trichloroethylene):**

$$121\text{E-}6 * \frac{250 \text{ ft}^3}{\text{min}} * \frac{1440 \text{ min}}{1 \text{ day}} * \frac{28.32\text{L}}{1 \text{ ft}^3} * \frac{1 \text{ mole}}{24.15\text{L}} * \frac{131.4\text{g}}{\text{mole}} * \frac{1 \text{ lb}}{454\text{g}} * (1 - 0.99) = \mathbf{0.148 \text{ lb/day}} \text{ (abated)}$$

<b>Highest Daily Emissions</b>	=	<b>0.148 lb/day</b>
<b>Annual Average</b>	=	<b>0.148 lb/day</b>
<b>RFP</b>	=	<b>0.027 tons/yr</b>

### ***Toxics***

This facility would have Tetrachloroethylene (PCE) and Trichloroethylene (TCE) emissions below the trigger levels listed in Regulation 2-5, Table 2-5-1. Therefore the emissions of toxic substances PCE and TCE are not considered sufficient to warrant a Risk Screen Analysis. PCE trigger = 0.049 lb/ day and TCE trigger = 0.148 lb/day. In accordance with the District's Regulation 2-5, the impact is then insignificant since this risk is within the threshold of 10 in a million as required for sources implementing TBACT; therefore, the Toxics Section has recommended the issuing of this A/C with a Tetrachloroethylene (PCE) and Trichloroethylene (TCE) emission limit of 0.0049 lb/day and 0.148 lb/day respectively.

### ***New Source Review***

This proposed project will not emit over 10 lbs per highest day and is therefore not required to implement BACT. For Soil Vapor Extraction operations, BACT is defined as attainment of set destruction efficiencies corresponding to set influent concentration values. Operation of carbon vessels will be conditioned to ensure attainment of an outlet concentration not to exceed 10 ppmv NPOC. Offsets need not be imposed as annual emissions will not exceed 10 tons.

### ***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 Chapters 9.2 of the permit handbook.

### ***Compliance***

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 a Carbon adsorption system at all times of operation.

### ***Recommendation***

Recommend that a Authority to Construct be issued for sources:

- S-1: Soil Vapor Extraction System consisting of a 250 max scfm vacuum blower, and ancillary equipment, abated by A-1, at least two (200 lb minimum capacity) Carbon Adsorption Vessels arranged in series.

**Conditions:**

1. Source S-1 at all times to Abatement device A-1, at least two (200 lb minimum capacity) activated carbon vessels arranged in series. Influent vapor flow shall not exceed 250 scfm. In no event shall Tetrachloroethylene (PCE) and Trichloroethylene (TCE) emissions to the atmosphere exceed 0.049 pounds per day and 0.148 pounds per day for S-1 respectively. [basis: Regulation 8-47-301]
2. 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 the second to last carbon vessel in series.
  - b. At the inlet to the last carbon vessel in series.
  - c. At the outlet of the carbon vessel that is last in series prior to venting to the atmosphere.

When using an FID to monitor breakthrough, readings may be taken with and without a carbon filter tip fitted on the FID probe. Concentrations measured with the carbon filter tip in place shall be considered methane for the purposes of these permit conditions.

3. These monitor readings in a monitoring log at the time they are taken. The monitoring results shall be used to estimate the frequency of carbon change-out necessary to maintain compliance with conditions number 4 and 5, and shall be conducted on a daily basis. The owner/operator of this source may propose for District review, based on actual measurements taken at the site during operation of the source, that the monitoring schedule be changed based on the decline in organic emissions and/or the demonstrated breakthrough rates of the carbon vessels. Written approval by the District's Permit Services Division must be received by the owner/operator prior to a change to the monitoring schedule.
4. The second to last carbon vessel shall be immediately changed out with unspent carbon upon breakthrough, defined as the detection at its outlet of the higher of the following:
  - a. 10 % of the inlet stream concentration to the Carbon vessel.
  - b. 10 ppmv or greater (measured as hexane).
5. The last carbon vessel shall be immediately changed out with unspent carbon upon detection at its outlet of 10 ppmv (measured as hexane).
6. The owner/operator of this source shall maintain the following records for each month of operation of the source:
  - a. The hours and times of operation.
  - b. Each monitor reading or analysis result for the day of operation they are taken.
  - c. The number of carbon beds removed from service.

All measurements, records and data required to be maintained by the owner/operator shall be retained and made available for inspection by the District for at least two years following the date the data is recorded.  
[basis: Regulation 1-523]

7. Any non-compliance of these conditions shall be reported to Compliance & Enforcement Division at the time that it is discovered. The submittal shall detail the corrective action taken and shall include the data showing the exceedance as well as the time of occurrence.
8. Upon final completion of the remediation project, the operator of Source S-1 shall notify the Engineering Division within two weeks of decommissioning the operation.

by \_\_\_\_\_ date \_\_\_\_\_

Flora Chan  
Air Quality Engineer II