

**Draft Engineering Evaluation: Soil Vapor Extraction
Murex Environmental Inc.
400 East Santa Clara Street, San Jose, CA
Application No. 30229; Plant No. 24575**

Background

Murex Environmental Inc. has applied for an Authority to Construct for soil remediation at the site located at 400 East Santa Clara Street in San Jose, CA. Murex Environmental is a new facility.

S-1 Soil Vapor Extraction System consisting of a 500 max scfm Roots PD Blower Model URAI 59 abated by;

A-1 (2) 2,000 lb capacity Granulated Activated Carbon (GAC) Adsorption vessels arranged in series.

This soil vapor extraction (SVE) unit consists of a positive displacement vacuum blower (S-1) with a maximum capacity 500 scfm. Soil vapor will be extracted with vapor abatement achieved by two 2,000 lb carbon beds in series (A-1). Tetrachloroethylene (PCE) emissions did exceed the District’s Toxic trigger level. As a result, a health risk analysis (HRA) of the proposed SVE system was conducted. The blower will be limited to 350 cfm to avoid cancer risk threshold of 10 in 1 million. Emission monitoring for operation of the equipment will be conducted according to established Source Test methodology. Procedures are outlined in the permit conditions.

The applicant will be conditioned to provide written notification at the start of the operation. Procedures are outlined in the Permit Conditions section. The Carbon unit influent and effluent VOC concentrations will be monitored using a portable photoionization detector (PID) on a schedule reflecting current loading rates and predicted Carbon capacity. Monitoring schedule changes will be allowed only after District review of concentration measurements and subsequent receipt of District approval.

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
- The applicant has committed to a maximum flow rate of 350 scfm and a removal efficiency of 99.4% to comply with emission thresholds set by Health Risk Assessment (HRA) results (See toxic risk screening section for more details). These operation limits along with monthly soil sample results were used in the emission calculations in Table 1.
- Influent concentrations of PCE and trichlorethylene (TCE) can be seen in Table 1.

Table 1 – Emissions from S-1 SVE System

Compound	Influent vapor concentration [µg/m3]	Influent vapor concentration [ppmv]	*Effluent vapor concentration [ppmv]	Unabated Emission [lb/day]	Abated Emission [lb/day]	Abated Emission [lb/yr]
PCE	3,000,000	434.9	2.8	94.2	0.61	223.4
TCE	3,000	0.55	0.004	0.094	0.001	0.22

* Effluent vapor concentration = Influent vapor concentration * (1-Removal Efficiency %)

Table 2 – S-1 Criteria Organic Emissions (TPY)

Compound	lb/day	lb/yr	TPY
NPOCs	0.612	223.4	0.112
POCs	0.001	0.22	0.000

Per Regulation 1-234 and 40 CFR 51.100(s)(1), PCE has been determined to have negligible photochemical reactivity and is considered to be a non-precursor organic compound (NPOC).

Cumulative Increase

Table 3- Plant Cumulative Emissions

Compound	Current Permitted Emissions, Post 4/5/91 (TPY)	New Emission Increase with A/N 30206 (TPY)	Cumulative Emissions (TPY)
NPOCs	0	0.112	0.112
POCs	0	0.000	0.000

Toxic Risk Screening

Table 4 – S-1 Regulation 2 Rule 5 HRA Trigger Levels

Toxic Pollutant	Abated Emission (lb/hr)	Abated Emission (lb/yr)	Acute Trigger lb/hr	Chronic Trigger lb/yr	HRA required
PCE	2.55E-02	223.4	44	14	Y
TCE	2.55E-05	0.22	-	41	N

This project does exceed chronic toxic thresholds for PCE. An HRA was conducted to find the maximum emission rate that is below District cancer risk threshold of 10 in 1 million. It was concluded that this project must be limited to 234 lb/year to stay below the cancer risk threshold. The applicant has committed to an emission rate of 223.4 lb/year which will be enforced in the proposed permit conditions outlined the Permit Conditions section. At this rate, a Cancer Risk of 9.4 in a million was calculated. See attached HRA report for more details.

New Source Review

The proposed project will not emit more than 10 lb/day of any criteria pollutant. Facility not subject to Reg 2-2-301. Offsets are not applicable for this application, as emissions do not exceed 10 tons/yr. Facility not subject to Reg 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.

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 VOC emissions will be vented through a Carbon adsorption system at all times of operation. Adsorption efficiency and influent flow rates will be enforced by the permit conditions outlined below. Since a significant amount of the overall organic mixture composition is PCE, PID monitors will be measured as PCE.

This project is within 1,000 ft from two K-12 grade schools (Horrance Mann Elementary School and St. Patrick Elementary School) and is therefore is subject to the public notification requirements of Regulation 2-1-412.

PSD, NSPS, and NESHAPS are not triggered.

Permit Conditions

Permit Condition # 27188

1. The owner/operator shall abate the Non-precursor Organic Compound (NPOC) and Precursor Organic Compound (POC) emissions from Source S-1 by A-1 SVE Abatement System, consisting of two 2,000-pound Activated Carbon Vessels arranged in series, during all periods of operation. Influent vapor flow shall not exceed 350 scfm. In no event shall Tetrachloroethylene annual emissions exceed 223.4 lb/year to the atmosphere from S-1. In no event shall all other applicable TAC emissions exceed the respective chronic trigger levels in District's Regulation 2-5, Table 2-5-1. [Basis: Cumulative Increase, Regulation 2-5].
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 District's Source Test Manager at the following locations:
 - a. At the inlet to the second to the last carbon vessel in each series.
 - b. At the inlet to the last carbon vessel in each series.
 - c. At the outlet of the carbon vessel that is last in each 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. [Basis: Cumulative Increase, Regulation 2-5, TBACT]

3. The owner/operator shall record these monitor readings in a monitoring log at the time they are taken. The owner/operator shall use the monitoring results 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 for the first week of operation. After demonstrating continuous compliance for the first week, the owner/operator may switch to monitoring to a weekly schedule. 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 Engineering Division must be received by the owner/operator prior to a change to the monitoring schedule. [Basis: Cumulative Increase, Regulation 2-5, TBACT]
4. The owner/operator shall immediately change out the second to last Carbon vessel 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 tetrachloroethylene).
[Basis: Cumulative Increase, Regulation 2-5, TBACT]
5. The owner/operator shall immediately change out the last carbon vessel in each series with unspent Carbon upon detection at each outlet of 2.8 (measured as tetrachloroethylene). [Basis: Cumulative Increase, Regulation 2-5, TBACT]
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.
 - d. Total throughput of soil vapor from source S-1 in Standard Cubic Feet.
 - e. Total tetrachloroethylene emissions in pounds.

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. The owner/operator of S-1 shall report any non-compliance with these conditions to the Compliance and Enforcement Division at the time that it is first discovered. The owner/operator of S-1 shall detail the corrective action taken and include the data showing the exceedance as well as the time of occurrence in the submittal. [Basis: Cumulative Increase, Regulation 2-5]
8. The owner/operator if S-1 shall maintain a file containing all measurements, records and other data that are required to be collected pursuant to the various provisions of this conditional Authority to Construct/Permit to Operate. All measurements, records and data required to be maintained by the owner/operator shall be retained for at least two years following the date the data is recorded. [Basis: Regulation 1-523]
9. 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. [Basis: Cumulative Increase, Regulation 2-5, TBACT]


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 an Authority to Construct/Permit to Operate to change permit conditions for the following source:

S-1 Soil Vapor Extraction System consisting of a 500 max scfm Roots PD Blower Model URAI 59 abated by;

A-1 (2) 2,000 lb capacity Granulated Activated Carbon (GAC) Adsorption vessels arranged in series.

by 

Ali Roohani

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