Engineering Evaluation
Former Norton Industries
1833 Stearman Avenue, Hayward, CA 94545
Plant No. 202921
Application No. 672567
Project Description: Soil Vapor Extraction System

Background

Pangea Environmental Services has applied for an Authority to Construct for the following equipment:

S-1 Soil Vapor Extraction System
Pentair Sweetwater Series 73C, Maximum 350 CFM
Abated by:

A-1 Two (2) 1000 lbs of Granulated Activated Carbon vessels in series.

S-1 will operate at 1833 Stearman Avenue, Hayward, CA 94545. This is considered an Overburdened Community. The facility is in a commercial/industrial area of Hayward, California and is currently unoccupied. A soil vapor extraction system (SVE) is proposed to target residual tetrachloroethene (PCE) vapors that persist above screening levels in Sub-Slab system and soil gas. The system will include a 350-cfm vacuum blower abated by two (2) 1000 lbs Granulated Activated Carbon Vessels in series. The main compound found in the soil was Tetrachloroethylene (PCE), expected emissions were based on laboratory results from samples taken at the site. Emissions of PCE are expected to be above the Chronic Trigger Level in Regulation 2-5, Table 1, therefore a Health Risk Assessment (HRA) is required.

Procedures are outlined in the conditions found below. The applicant will be required to provide written notification at the start of the operation. The applicant will be required to stay below the acute and chronic trigger levels of Regulation 2-5. Effluent volatile organic compound (VOC) concentrations will be monitored with a flame-ionization detector (FID) on a schedule reflecting current loading rates and predicted carbon capacity.

Emission Calculations

Initial soil vapor data will be used to estimate precursor organic compound (POC), non-precursor organic compound (NPOC), and toxic air contaminant (TAC) emissions. It is assumed that the equipment can operate 24 hours a day, 365 days a year. The following are assumptions used to estimate emissions.

- Operating conditions: Pressure = 1 Atm; Inlet Temperature = 21^{O}C; 1 mole occupies 24.15 Liters (or 386.8 ft3/lb-mol)
- Toxic Air Contaminants (TAC) emissions will be based on soil vapor data submitted with this application.
- The organic influent flow rate of 350 scfm.
- The system will be abated by two (2) 1000 lbs of Granulated Activated Carbon vessels in series pursuant to Regulation 8-47-301.
- Emissions are from the Analytical Report created for Pangea Environmental Svcs., Inc. by McCambell Analytical Inc., in July 2020.

Table 1. SVE System Unabated Emissions for S-1						
Pollutant	CAS #	Unabated Emissions				
		Inlet Conc. (ug/m3)	Hourly Emission Rate (lb/hr)	Daily Emission Rate (lb/day)	Annual Emission Rate (lb/yr)	Annual Emission Rate (ton/yr)
Tetrachloroethylene (PCE)	127-18-4	60000	7.9E-02	1.9E+00	6.9E+02	3.4E-01
Trichloroethene (TCE)	79-01-6	320	4.2E-04	1.0E-02	3.7E+00	1.8E-03
1,1,1-Trichloroethane	71-55-6	5700	7.5E-03	1.8E-01	6.5E+01	3.3E-02

Table 2. SSD System Abated Emissions for S-1						
Pollutant	CAS #	Abated Emissions				
		Abatement Efficiency (%)	Hourly Emission Rate (lb/hr)	Daily Emission Rate (lb/day)	Annual Emission Rate (lb/yr)	Annual Emission Rate (ton/yr)
Tetrachloroethylene (PCE)	127-18-4	90	7.9E-03	1.9E-01	6.9E+01	3.4E-02
Trichloroethene (TCE)	79-01-6	90	4.2E-05	1.0E-03	3.7E-01	1.8E-04
1,1,1-Trichloroethane	71-55-6	90	7.5E-04	1.8E-02	6.5E+00	3.3E-03

Notes:

1. Influent data for PCE was obtained from Samples SV-1, SV-4, SV-11, SV-14. This data will be used as the pre abatement concentration.
2. It is assumed that equipment will operate 24 hours a day, 365 days a year.
3. Per Regulation 1-234 and 40 CFR 51.100(s)(1), PCE and 1,1,1-Trichloroethane have been determined to have negligible photochemical reactivity and is considered a Non-Precursor Organic Compound (NPOC).

Table 3. Organic Emissions Review for S-1					
Pollutant	Effluent Volumetric Concentration (ppmv)	Hourly Emission Rate (lb/hr)	Daily Emission Rate (lb/day)	Annual Emission Rate (lb/yr)	Annual Emission Rate (ton/yr)
POC	0.05	4.2E-05	1.0E-03	0.37	0.000
NPOC	9.88	8.6E-03	2.1E-01	75.38	0.038
Total	9.93	8.6E-03	2.1E-01	7.6E+01	0.038

Notes:

1. POC and NPOC emissions are based on the laboratory test results considering an abatement efficiency of 90%. The effluent volumetric concentrations are measured as methane.
2. POC and NPOC Annual Emission Rates will be rounded up to 0.4 lb/yr and 75.4 lb/yr respectively to be used as condition limit.
3. The total effluent volumetric concentration will be used to set the GAC vessels breakthrough monitoring condition.

Cumulative Increase

Table 4. Cumulative Increase			
Pollutant	Current Permitted Emissions, Post 4/5/1991 (ton/yr)	Application New Emissions Increase (ton/yr)	New Cumulative Increase (ton/yr)
POC	0.000	0.000	0.000

Toxic Risk Screening

At the given rates in Table 6, the tetrachloroethylene emissions exceed the Chronic Trigger Levels in Regulation 2-5, Table 2-5-1. Consequently, the project was subject to a refined Health Risk Assessment (HRA).

Table 5. Project Acute Emissions Review - Regulation 2-5

Pollutant	CAS #	Hourly Emission Rate (lb/hr)	Acute Trigger Level (lb/hr)	Exceeds Acute Trigger Level?
Tetrachloroethylene (PCE)	127-18-4	7.9E-03	8.8E+00	No
Trichloroethene (TCE)	79-01-6	4.2E-05	N/A	No
1,1,1-Trichloroethane	71-55-6	7.5E-04	3.0E+01	No

Table 6. Project Chronic Emissions Review - Regulation 2-5

Pollutant	CAS #	Annual Emission Rate (lb/yr)	Chronic Trigger Level (lb/yr)	Exceeds Chronic Trigger Level?
Tetrachloroethylene (PCE)	127-18-4	6.9E+01	1.4E+01	YES
Trichloroethene (TCE)	79-01-6	3.7E-01	4.1E+01	No
1,1,1-Trichloroethane	71-55-6	6.5E+00	3.9E+04	No

Results from the HRA indicate that the project cancer risk is estimated at 0.19 in a million, the project chronic hazard index (HI) is estimated at 0.0045, and the project acute HI is estimated at 0.00024. In accordance with the District's Regulation 2-5-301, this source does not require TBACT because the estimated source risk does not exceed a cancer risk of 1.0 in a million, and/or chronic hazard index of 0.20. Since the estimated project cancer risk does not exceed 6.0 in a million and hazard indices do not exceed 1.0, this project complies with the District's Regulation 2-5-302 project risk requirements, for projects located in an Overburdened Community, as defined in Regulation 2-1-243.

Offsets

Pursuant to Regulation 2-2-302, offsets must be provided for any new or modified source at a facility that emits, or is permitted to emit, more than 10 tons per year of precursor organic compounds (POCs) or nitrogen oxides (NO_X). Furthermore, pursuant to Regulation 2-2-303 offsets must be provided for any new or modified source at a major facility with a cumulative increase that exceeds 1.0 ton per year of PM_{10}, $PM_{2.5}$, or sulfur dioxide (SO_2).

The facility is not expected to have a PTE greater than 10 tons per year of POC or NO_X, nor is the facility a major facility of PM_{10}, $PM_{2.5}$, and SO_2. Therefore, the requirements of Regulations 2-2-302 and 2-2-303 do not apply.

Best Available Control Technology (BACT)

In accordance with Regulation 2-2-301, Best Available Control Technology (BACT) is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxides (SO_2), particulate matter less than 10 micrometer (PM_{10}) and particulate matter less than 2.5 micrometer ($PM_{2.5}$).

NPOC and POC emissions are expected to be below 10 lb/day for S-1. Therefore, BACT is not required.

California Environmental Quality Act (CEQA)

This project is classified as ministerial under the District Regulation 2-1-311, because the engineering review for this project requires only the application of standard emission factors and established formulas as specified in Chapter 9.2 of the District's Permit Handbook. This project does not trigger BACT or TBACT and is not subject to the health risk assessment requirements of Regulation 2, Rule 5. This review follows objective procedures and applies standard permit conditions; and therefore, the review of this project is not discretionary as defined by CEQA. Since this project is ministerial, it is not subject to CEQA review requirement of Regulation 2-1-310, and no further CEQA analysis is required.

Compliance

While this project is not located within 1000 feet of a school, it is located within an Overburdened Community (OBC) as defined in Regulation 2-1-243 and required an HRA, therefore the project is subject to the school public noticing requirement of the California Health & Safety Code and Regulation 2-1-412. OBC is defined in Regulation 2-1-243.

Pursuant to Regulation 8-47-301, any soil vapor extraction operation which emits benzene, vinyl chloride, tetrachloroethene, methylene chloride, and/or trichloroethene shall be vented to a control device which reduces emissions to the atmosphere by at least 90 percent by weight. The facility has proposed to install Activated Carbon Vessels to reduce emissions.

The facility is required to keep the pertinent records per condition #27803 pursuant to Regulation 8-47-501.

Prevention of Significant Deterioration (PSD), New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAPS) are not triggered.

Permit Conditions

Permit Condition #27885 for S-1

1. The influent vapor flow rate shall not exceed 350 scfm from the blower of S-1. [Basis: Cumulative Increase, Regulation 2-5].

2. The owner/operator shall abate the precursor organic compound (POC)/non-precursor organic compound (NPOC) emissions from the soil vapor extraction systems with the Activated Carbon Vessels (A-1) during all periods of operation as follows:

   S-1 shall be abated by A-1, consisting of a minimum of two (2) 1000 lb activated carbon vessels in series.

   [Basis: Regulations 8-47-301 and 8-47-302 and Regulation 2-5].

3. In no event shall tetrachloroethylene (PCE) emissions to the atmosphere from S-1 exceed 68.8 pounds per 12-month consecutive period. [Basis: Regulations 8-47-301 and 8-47-302 and Toxics].

4. In no event shall the rest of the toxic air contaminant (TAC) emissions to the atmosphere from S-1 exceed the trigger levels listed in District Regulation 2-5, Table 2-5-1. [Basis: Regulations 8-47-301 and 8-47-302 and Toxics].

5. The owner/operator shall not emit from S-1 more than 0.4 pounds of precursor organic compounds (POC) and 75.4 pounds of non-precursor organic compounds (NPOC) per 12-month consecutive period. [Basis: Cumulative Increase]

6. Upon initial start-up, the owner/operator shall take air samples from S-1 for laboratory analysis using EPA Method TO-15. The air samples shall be taken at the following locations:

    a. At the inlet to the first carbon vessel in series.
    b. At the outlet of the carbon vessel that is last in series prior to venting to the atmosphere.

    [Basis: Regulation 2-1-403, Regulation 8-47-301].

7. The owner/operator shall use the results from the laboratory report to calculate TAC emissions emitted to the atmosphere, using the maximum design flowrate of S-1. The owner/operator shall submit the laboratory report and calculated TAC emissions within 21 days of the initial startup, to demonstrate compliance with Parts 1, 2, and 4 of this condition. [Basis: Regulation 2-1-403, Regulation 2-5].

8. During operation of A-1, the owner/operator shall monitor with a 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 last carbon vessel in series.
    b. At the inlet to the last carbon vessel in series.
    c. At the outlet of the last carbon vessel in series, prior to venting to the atmosphere.

    [Basis: Regulations 1-523 and 2-1-403]

9. 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 Parts 1 through 6 of this condition and shall be conducted on a daily basis.

    a. If the owner/operator can demonstrate one (1) month of consecutive daily monitoring readings where the sum of monitoring results of S-1 is lower than 5 ppmv, measured as methane, the monitoring frequency may be reduced to weekly.
    b. After the monitoring frequency has been reduced to weekly, if the owner/operator can demonstrate one (1) month of consecutive weekly monitoring readings of S-1 is lower than 5 ppmv, measured as methane, the monitoring frequency may be reduced to once every two (2) weeks.
    c. After the monitoring frequency has been reduced to once every two (2) weeks, if the owner/operator can demonstrate one (1) month of consecutive bi-weekly readings where the monitoring results of S-1 is lower than 5 ppmv, measured as methane, the monitoring frequency may be reduced to monthly.

    If any subsequent results from monitoring where the sum of monitoring results of S-1 exceed 5 ppmv, measured as methane, the owner/operator shall revert to daily monitoring. If monitoring reverts back to daily, the owner/operator may reduce the monitoring frequency in accordance with Parts 9(a) through (c) of this condition.

    [Basis: Cumulative Increase, Toxics, and Regulations 1-523 and 2-1-403]

10. The owner/operator shall maintain the following information for each month of operation:

    a. Hours and time of operation.

b. Each emission test, analysis, or monitoring results logged in for the day of operation they were taken.
c. Total throughput of soil vapor from source S-1 in standard cubic feet.

Such records shall be retained and made available for inspection by the District for two (2) years following the date the data is recorded. [Basis: Recordkeeping]

11. The owner/operator shall report any noncompliance with these conditions to the Compliance and 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 as the time of occurrence in the submittal. [Basis: Regulation 2-1-403]

12. The owner/operator shall maintain a file containing all measurements, records and other data that are required to be collected pursuant to the various provisions of this condition. All measurements, records and data required to be maintained by the operator shall be retained for at least two (2) years following the date the data is recorded. [Basis: Regulation 1-523]

13. Upon final completion of the remediation project, the operator shall notify the Engineering Division within two weeks of decommissioning the operation. [Basis: Regulation 2-1-403]

End of Conditions

Recommendation

The Air 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 an Overburdened Community and requires an HRA which triggers the public notification requirements of Regulation 2-1-412. After the comments are received from the public and reviewed, the Air District will make a final determination on the permit.

I recommend that the District initiates a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct and/or a Permit to Operate for the following equipment:

S-1 Soil Vapor Extraction System
Pentair Sweetwater Series 73C, Maximum 350 CFM
Abated by:

A-1 Two (2) 1000 lbs of Granulated Activated Carbon vessels in series.

By Isis Virrueta, AQ Engineer I
April 2023