

Engineering Evaluation
M & J Land and Equipment Leasing LP
954 Villa Street, Mountain View, CA 94041
Application No. 30944; Plant No. 24881

Background

M & J Land and Equipment Leasing LP has applied for an Authority to Construct for a sub-slab depressurization at the site located at 954 Villa Street in Mountain View, CA. M & J Land and Equipment Leasing LP is a new facility.

S-1 Sub-Slab Depressurization System
Consisting of Seven (7) Fantech, RN1 Inline Radon Fan
Total System Maximum Flowrate: 160 CFM

A-1 Activated Carbon Vessels
Minimum of Two (2) 100-Pound Activated Carbon Vessels Arranged in Series

The proposed site was a former dry leaning facility. Soil vapor samples taken for lab analysis have shown slight concentrations of petroleum and chlorinated hydrocarbons underneath the property building. The sub-slab depressurization (SSD) system proposed to mitigate this site consists of seven (7) fans with a total limited capacity of 160 cfm. The influent will be abated by two (2) 100-pound activated carbon vessels. Each fan will have the capability of exceeding the 160-cfm system capacity. However, the facility will be limited to 160 cfm and will be required to monitor the exhaust flowrate.

The applicant will be conditioned to provide written notification at the start of the operation. Procedures are outlined in the conditions found below. The carbon unit influent and effluent organic concentrations will be monitored with a portable photoionization detector (PID) on a schedule reflecting current loading rates. Monitoring schedules may changes based on monitoring data.

Emission Calculations

For a conservative estimate of annual 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 = 24.15 L
- An influent flow rate of 160 cfm was used to estimate emissions with an abatement efficiency of 90% from A-1.
- Concentration for Hexane is from the effluent. Therefore, the concentration will be used to estimate emissions to the atmosphere.
- Precursor organic compound (POC) and non-precursor organic compound (NPOC) cumulative increase emissions are based on a 5-ppm effluent concentration since the last carbon threshold changeout level on the last abatement vessel will be limited 5 ppm, calibrated to isobutylene.
- Tetrachloroethene (PCE) and Tetrachloroethylene (TCE) were reported in soil vapor laboratory results submitted by the applicant. Maximum concentrations found in the report

were 5300 and 170 ug/m³ respectively. However, both pollutant concentration will be assumed near toxic trigger level as a worst-case scenario as seen in Table 1. Maximum reported lab concentration results for Methyl Ethyl Ketone, Toluene, and Trichlorofluoromethane will be used. Example calculations can be seen below.

$$25,000 \frac{\mu g}{m^3} (PCE) \times 160 \frac{ft^3}{min} \times 1440 \frac{min}{day} \times \frac{1}{35.31} \frac{m^3}{ft^3} \times \frac{1}{4.54 \times 10^8} \frac{lb}{\mu g} = 0.36 (PCE; unabated)$$

$$0.36 \frac{lb}{day} (PCE) \times (1 - 90\%) \times 365 \frac{day}{year} = 13.14 \frac{lb}{year} (PCE; abated)$$

$$3.62ppmv(PCE\ influent) \times (1 - 90\%) = 0.362ppmv(PCE\ effluent)$$

Table 1. SSD System Emissions						
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)
Acetone	67-64-1	17	0.00	0.00	0.09	0.000
Tetrachloroethene (PCE)	127-18-4	25000	0.01	0.36	131.13	0.066
Hexane	110-54-3	8.6	0.00	0.00	0.05	0.000
2-Butanone (MEK)	78-93-3	86	0.00	0.00	0.45	0.000
Trichlorofluoromethane	75-69-4	990	0.00	0.01	5.19	0.003
Tetrahydrofuran	109-99-9	32	0.00	0.00	0.17	0.000
Trichloroethene (TCE)	79-01-6	73000	0.04	1.05	382.90	0.191
Toluene	108-88-3	6.5	0.00	0.00	0.03	0.000
tert-Butanol	75-65-0	5.1	0.00	0.00	0.03	0.000
Xylenes (total)	1330-20-7	2.5	0.00	0.00	0.01	0.000
Abated Emissions						
Pollutant	CAS #	Abated Efficiency (% w/w)	Hourly Emission Rate (lb/hr)	Daily Emission Rate (lb/day)	Annual Emission Rate (lb/yr)	Annual Emission Rate (ton/yr)
Acetone	67-64-1	90%	0.00	0.00	0.01	0.000
Tetrachloroethene (PCE)	127-18-4	90%	0.00	0.04	13.11	0.007
Hexane	110-54-3	0%	0.00	0.00	0.05	0.000
2-Butanone (MEK)	78-93-3	90%	0.00	0.00	0.05	0.000
Trichlorofluoromethane	75-69-4	90%	0.00	0.00	0.52	0.000
Tetrahydrofuran	109-99-9	90%	0.00	0.00	0.02	0.000
Trichloroethene (TCE)	79-01-6	90%	0.00	0.10	38.29	0.019
Toluene	108-88-3	90%	0.00	0.00	0.00	0.000
tert-Butanol	75-65-0	90%	0.00	0.00	0.00	0.000
Xylenes (total)	1330-20-7	90%	0.00	0.00	0.00	0.000

Per Regulation 1-234 and 40 CFR 51.100(s)(1), PCE, Trichlorofluoromethane, and Acetone have been determined to have negligible photochemical reactivity and are NPOCs.

Table 2. Organic Compound Emissions Review					
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	5	0.01	0.17	60.99	0.030
NPOC	5	0.01	0.17	60.99	0.030

Cumulative Increase

Table 3. Cumulative Increase			
Compound	Current Permitted Emissions, Post 4/5/91 (ton/yr)	New Emission Increase with this Application (ton/yr)	Total Emissions Increase (ton/yr)
POC	0.000	0.030	0.030

Toxic Risk Screening

Table 4. Regulation 2-5 Acute Emissions Review				
Pollutant	CAS #	Hourly Emission Rate (lb/hr)	Acute Trigger Level (lb/hr)	Exceeds Acute Trigger Level?
Tetrachloroethene (PCE)	127-18-4	1.5E-03	4.4E+01	No
Hexane	110-54-3	5.1E-06		N/A
2-Butanone (MEK)	78-93-3	5.1E-06	2.9E+01	No
Trichloroethene (TCE)	79-01-6	4.4E-03		N/A
Toluene	108-88-3	3.9E-07	8.2E+01	No
Xylenes (total)	1330-20-7	1.5E-07	4.9E+01	No

Table 5. Regulation 2-5 Chronic Emissions Review				
Pollutant	CAS #	Annual Emission Rate (lb/yr)	Chronic Trigger Level (lb/yr)	Exceeds Chronic Trigger Level?
Tetrachloroethene (PCE)	127-18-4	1.3E+01	1.4E+01	No
Hexane	110-54-3	4.5E-02	2.7E+05	No
2-Butanone (MEK)	78-93-3	4.5E-02		N/A
Trichloroethene (TCE)	79-01-6	3.8E+01	4.1E+01	No
Toluene	108-88-3	3.4E-03	1.2E+04	No
Xylenes (total)	1330-20-7	1.3E-03	2.7E+04	No

The proposed project is not expected to exceed a toxic trigger level of Table 2-5-1 of Regulation 2-5. Therefore, this project is not subject to the requirements of Regulation 2-5 pursuant to Regulation 2-5-110.

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 PM₁₀, PM_{2.5}, or sulfur dioxide (SO₂).

Based on emissions in Table 1, the facility is not expected to have a Potential to Emit (PTE) greater than 10 tons per year of POC or NO_x, nor is the facility a major facility of PM₁₀, PM_{2.5}, and SO₂. Therefore, the requirements of Regulations 2-2-302 and 2-2-303 do not apply.

Best Available Control Technology

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 (SO₂), particulate matter less than 10 micrometer (PM₁₀) and particulate matter less than 2.5 micrometer (PM_{2.5}).

The proposed project will not emit more than 10 lb/day of any criteria pollutant. BACT is not required.

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 the 90% control requirements of Regulations 8-47-301 and 8-47-302. The volatile organic compound (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.

This project is within 1,000 ft of Khan Lab School and a quarter mile of Mountain View Academy. The facility will be subject to the school public noticing requirements of Regulation 2-1-412.

Permit Conditions

Permit Condition # 27558

1. The owner/operator shall abate the precursor organic compound (POC) and non-precursor organic compound (NPOC) emissions from the Sub-Slab Depressurization System (S-1) with the Activated Carbon Vessel (A-1), consisting of a minimum of two (2) 100-lbs activated carbon vessels in series, during all periods of operation. The influent vapor flow rate shall not exceed 160 scfm. In no event shall 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 2-5-110, 8-47-301 and 8-47-302].
2. 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.

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 and 6 of this condition. [Basis: Regulation 2-1-403]

3. During operation of A-1, the owner/operator 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 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.

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

4. The owner/operator shall conduct monitoring on a daily basis in accordance with Part 3 of this condition. 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, 5, and 6 of this condition.
 - a. If the owner/operator can demonstrate one (1) month of consecutive daily monitoring readings lower than 2.5 ppmv, measured as isobutylene, 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 lower than 2.5 ppmv, measured as isobutylene, 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 lower than 2.5 ppmv, measured as isobutylene, the monitoring frequency may be reduced to monthly.
 - d. If any subsequent results from monitoring exceed 2.5 ppmv, measured as isobutylene, 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 4(a) through (c) of this condition.

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

5. The second to last carbon vessel shall be immediately changed out with unspent carbon upon breakthrough, defined as the detection at its outlet in excess of the higher of the following limits:
 - a. 10 % of the inlet stream concentration to the carbon bed.
 - b. 10 ppmv (measured as Isobutylene).

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

6. The last carbon vessel shall be immediately changed out with unspent carbon upon detection at its outlet of 5 ppmv or greater (measured as Isobutylene). [Basis: Cumulative Increase and Regulations 1-523 and 2-1-403]

7. 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. The number of carbon vessels removed from service.
 - d. 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]

8. 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]
9. 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]
10. 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]

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 is located within 1,000 feet of a school, which triggers the public notification requirements of District Regulation 2-1-412. After the comments are received from the public 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 an Authority to Construct for the following equipment:

S-1 Sub-Slab Depressurization System
Consisting of Seven (7) Fantech, RN1 Inline Radon Fan
Total System Maximum Flowrate: 160 CFM

A-1 Activated Carbon Vessels
Minimum of Two (2) 100-Pound Activated Carbon Vessels Arranged in Series

By Isis Virrueta
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