

Engineering Evaluation
Nova at the Vale - Building C-1
915 De Guigne Dr, Sunnyvale, CA 94085
Plant No. 24830 (Site No. E4830)
Application No. 30832
Project Description: Sub-Slab Depressurization System

Background

Stantec Consulting Services, on behalf of Nova at the Vale, Building C-1 has applied for an Authority to Construct for the following Sub-Slab Depressurization (SSD) System:

S-1 Active Sub-Slab Depressurization System
Three (3) Radon RP140 Blowers, Max 135 CFM each, 405 CFM Total
Unabated

The applicant has proposed to install an active SSD system at a residential building located at a site that is included on the National Priorities List and is a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Superfund Site. The SSD system is being installed to mitigate vapor intrusion into the building and to prevent the accumulation of volatile organic compounds (VOCs) beneath the building slab. Lab analysis from multiple soil-vapor sampling activities show a slight presence of both chlorinated and petroleum hydrocarbons.

The SSD system will be composed of interconnected sub-slab piping system outfitted with three (3) vent risers with blower installations. Each blower is rated for a maximum of 135-cfm, for a total of 405-cfm. No abatement is proposed for this system.

Procedures are outlined in the conditions found below. Effluent VOC concentrations will be monitored with a photoionization detector (PID) and the applicant will be required to stay below the acute and chronic trigger levels of Regulation 2-5. Monitoring schedule changes will be allowed based on monitoring data collected.

Emission Calculations

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 will 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°C; 1 mole occupies 24.15 Liters (or 386.8 ft³/lb-mol)
- POC/NPOC cumulative emissions are based on a 3-ppm effluent concentration, calibrated to isobutylene.
- Toxic Air Contaminants (TAC) emissions will be based on soil vapor data submitted with this application.
- The organic influent flow rate of 405 scfm was used in the calculations.

| Table 1. Emissions Review for Sub-Slab Depressurization S-1 | | | | | | | | | |
|--|----------|-----------------------|------|-----|--|----------------|----------------|----------------|-----------------|
| Pollutant | CAS | Pollutant Designation | | | Inlet Concentration (µg/m ³) | Emission Rate | | | |
| | | POC | NPOC | TAC | | Hourly (lb/hr) | Daily (lb/day) | Annual (lb/yr) | Annual (ton/yr) |
| 1,1,1-Trichloroethane | 71-55-6 | | X | X | 13 | 0.000 | 0.000 | 0.17 | 0.000 |
| Benzene | 71-43-2 | X | | X | 22 | 0.000 | 0.001 | 0.29 | 0.000 |
| cis-1,2-Dichloroethene | 156-59-2 | X | | | 56 | 0.000 | 0.002 | 0.74 | 0.000 |
| Naphthalene | 91-20-3 | X | | X | 19 | 0.000 | 0.001 | 0.25 | 0.000 |
| Tetrachloroethene | 127-18-4 | | X | X | 68 | 0.000 | 0.002 | 0.90 | 0.000 |
| Toluene | 108-88-3 | X | | X | 24 | 0.000 | 0.001 | 0.32 | 0.000 |
| Trichloroethene | 79-01-6 | X | | X | 110 | 0.000 | 0.004 | 1.46 | 0.001 |
| Vinyl chloride | 75-01-4 | X | | X | 0.45 | 0.000 | 0.000 | 0.01 | 0.000 |

Notes:

1. Influent data was obtained from maximum value of all sampling events performed at the site
2. It is assumed the equipment will operate 24 hours a day, 365 days a year.

| Table 2. Organic Emissions Review for S-1 | | | | | |
|--|--|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Pollutant | Effluent Volumetric Concentration (ppmv) | Hourly Emission Rate (lbs/hr) | Daily Emission Rate (lbs/day) | Annual Emission Rate (lbs/yr) | Annual Emission Rate (ton/yr) |
| POC | 3 | 0.011 | 0.254 | 92.63 | 0.046 |
| NPOC | 3 | 0.011 | 0.254 | 92.63 | 0.046 |

Notes:

1. POC and NPOC emissions will be based on an effluent limit of 3 ppmv, measured as isobutylene.

Cumulative Increase

| Table 3. 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 | 0.046 | 0.046 |

Toxic Risk Screening

| Table 4. Toxic Air Contaminant Emissions Review for S-1 | | | | | | |
|--|------------|-------------------------------------|------------------------------------|-------------------------------------|--------------------------------------|--|
| Pollutant | CAS | Hourly Emission Rate (lb/hr) | Acute Trigger Level (lb/hr) | Annual Emission Rate (lb/yr) | Chronic Trigger Level (lb/yr) | Exceeds Acute or Chronic Trigger Level? |
| 1,1,1-Trichloroethane | 71-55-6 | 1.97E-05 | 1.50E+02 | 1.73E-01 | 3.90E+04 | No |
| Benzene | 71-43-2 | 3.33E-05 | 6.00E-02 | 2.92E-01 | 2.90E+00 | No |
| Naphthalene | 91-20-3 | 2.88E-05 | | 2.52E-01 | 2.40E+00 | No |
| Tetrachloroethene | 127-18-4 | 1.03E-04 | 4.40E+01 | 9.03E-01 | 1.40E+01 | No |
| Toluene | 108-88-3 | 3.64E-05 | 8.20E+01 | 3.19E-01 | 1.20E+04 | No |
| Trichloroethene | 79-01-6 | 1.67E-04 | | 1.46E+00 | 4.10E+01 | No |
| Vinyl chloride | 75-01-4 | 6.82E-07 | 4.00E+02 | 5.97E-03 | 1.10E+00 | No |

This project is not expected to exceed applicable toxic trigger levels of Regulation 2-5, Table 2-5-1. Therefore, the requirements of Regulation 2-5 do not apply. The facility will be required to perform laboratory analysis to demonstrate that the project is below the toxic trigger levels of Regulation 2-5, Table 2-5-1.

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).

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

NPOC and POC emissions are expected to be below 10 lb/day. Therefore, a BACT review 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

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. Pursuant to Regulation 8-47-302, any soil vapor extraction operation with a total organic compound emissions greater than 15 pounds per day shall be vented to a control device which reduces the total organic compound emissions to the atmosphere by at least 90 percent by weight.

Based on the information submitted, S-1 is expected to emit less than 15 pounds per day of organic compounds and is not subject to the emission control requirements of Regulation 8-47-302.

However, S-1 is expected to emit benzene, tetrachloroethene, trichloroethene, and vinyl chloride, and would be subject to the emission control requirements of Regulation 8-47-301 but is exempt per the “Less Than One Pound Per Day” exemption of Regulation 8-47-113. Pursuant to Regulation 8-47-113, the provisions of Regulation 8-47-301 shall not apply to operations with total emissions of less than 1 pound per day of the above-mentioned compounds, provided the requirements of Regulation 8-47-402 are satisfied. To satisfy the requirements of Regulation 8-47-402, a source must pass a health risk screening analysis for benzene, vinyl chloride, tetrachloroethene, methylene chloride, and/or trichloroethene emissions that are less than 1 pound per day.

| Table 5. Regulation 8-47 Compound Review | |
|---|--------------------------------------|
| Pollutant | Daily Emission Rate (lbs/day) |
| Benzene | 8.00E-04 |
| Tetrachloroethene | 2.47E-03 |
| Trichloroethene | 4.00E-03 |
| Vinyl chloride | 1.64E-05 |
| TOTAL | 7.29E-03 |

Based on the information submitted, S-1 is expected to emit less than less than 1 pound per day of benzene, tetrachloroethene, trichloroethene, and vinyl chloride. Furthermore, individual emissions of those compounds are all expected to be below the individual toxic trigger levels of Regulation 2-5, Table 2-5-1, and have therefore passed the health risk screening analysis requirements of Regulation 8-47-402. If emissions of the above-mentioned compounds exceed 1 pound per day, then S-1 will be subject to the emission control requirements of 8-47-301.

S-1 will be located within 1,000 feet of Rainbow Montessori C.D.C. (K-6), The Kings Academy (K-12), and San Miguel Elementary School (K-5). The project is subject to public notification requirements of Regulation 2-1-412 due to an increase in toxic emissions. A public notice will be sent to all parents of students of the above-mentioned school(s) and all residents within 1,000 feet of the facility. There will be a 30-day public comment period.

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 #27590

1. The influent vapor flow rate for each blower of the sub-slab depressurization system (S-1) shall not exceed 135 scfm each. The total influent vapor flow rate for S-1 shall not exceed 405 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: Toxics].
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 outlet of each blower 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 Part 1 of this condition. [Basis: Regulation 2-1-403]

3. During operation of S-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 outlet of each blower, 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 these measurements on a daily basis and record these monitor readings in a monitoring log at the time they are taken.
 - a. If the owner/operator can demonstrate one (1) month of consecutive daily monitoring readings lower than 1.5 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 1.5 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 1.5 ppmv, measured as isobutylene, the monitoring frequency may be reduced to monthly.

If any subsequent results from monitoring exceed 1.5 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 owner/operator shall maintain the following information for each month of operation:
- Hours and time of operation.
 - Each emission test, analysis, or monitoring results logged in for the day of operation they were taken.
 - 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]

6. 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]
7. 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]
8. 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/Permit to Operate for the equipment listed below. However, the proposed source will be located within 1,000 feet of at least one 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 for the following source:

**S-1 Active Sub-Slab Depressurization System
Three (3) Radon RP140 Blowers, Max 135 CFM each, 405 CFM Total
Unabated**

By: _____

Date: _____

Cameron Fee
Air Quality Engineer I