DRAFT Engineering Evaluation
Ceatrice Polite Apts
321 Clementina Street, San Francisco, CA 94103
Plant No. 19987
Application No. 679453
Project Description: Soil Vapor Extraction System

Background

Ceatrice Polite Apartments has applied for an Authority to Construct for the following equipment:

S-2 Sub-Slab Depressurization System
Obar, GBR76UD, 195 cfm

The facility is located at 321 Clementina Street in San Francisco, San Francisco County, California and consists of an approximately 0.358-acre tract of land developed with a nine-story apartment complex occupied by the Ceatrice Polite Apartments. The first floor of the apartment complex includes two commercial spaces and the southeastern exterior of the site is developed with a courtyard and concrete paved parking lot. The facility is proposing an S-2 Sub-Slab Depressurization System (SSD) to reduce the potential of intrusion of soil gas into the indoor air of the onsite apartment building. The SSD system will include a 195 cfm vacuum blower without any abatement.

The main compound found in the soil was isopropanol. Emissions calculations were based on laboratory results from samples taken at the site. No emissions are expected to trigger Health Risk Assessment per Regulation 2-5, Table 1.

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).

The facility is located within the boundary of an overburdened community. In addition, this facility is located within 1,000 feet of Bessie Carmichael Filipino Education Center. Therefore, public notification is required, per Regulation 2-1-412.

Emission Calculations

Initial soil vapor data is 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 assumptions are used to estimate emissions.

- Operating conditions: Pressure = 1 Atm; Inlet Temperature = 21^{O}C; 1 mole occupies 24.15 Liters (or 386.8 ft3/pound-mol).

- Toxic Air Contaminants (TAC) emissions will be based on soil vapor data submitted with this application.
- The organic influent flow rate of 195 scfm.
- The SSD system will have no abatement.
- Emissions are from a pilot TO-15 test completed in June and August of 2022 for Ceatrice Polite Apartments by Terracon Consultants, Inc.

Table 1. SVE System Unabated Emissions for S-2

Pollutant	CAS #	Unabated Emissions				
		Inlet Conc. (ug/m3)	Hourly Emission Rate (pound/hour)	Daily Emission Rate (pound/day)	Annual Emission Rate (pound/year)	Annual Emission Rate (ton/year)
Acetone	67-64-1	271	2.0E-04	4.7E-03	1.7E+00	8.7E-04
Benzene	71-43-2	12.3	9.0E-06	2.15E-04	7.86E-02	3.93E-05
Toluene	108-88-3	8.36	6.1E-06	1.46E-04	5.34E-02	2.67E-05
Xylenes	1330-20-7	2.04	1.5E-06	3.57E-05	1.30E-02	6.52E-06
Chloroform	67-66-3	28.8	2.1E-05	5.04E-04	1.84E-01	9.21E-05
Chloromethane	74-87-3	2.21	1.6E-06	3.87E-05	1.41E-02	7.06E-06
Cyclohexane	110-82-7	5.65	4.1E-06	9.90E-05	3.61E-02	1.81E-05
1,1-Dichloroethene	75-35-4	0.931	6.8E-07	1.63E-05	5.95E-03	2.98E-06
1,4-Dioxane	123-91-1	1.61	1.2E-06	2.82E-05	1.03E-02	5.15E-06
Ethanol	64-17-5	155	1.1E-04	2.71E-03	9.91E-01	4.95E-04
Trichlorofluoromethane	75-69-4	2.83	2.1E-06	4.96E-05	1.81E-02	9.05E-06
Dichlorodifluoromethane	75-71-8	16.2	1.2E-05	2.84E-04	1.04E-01	5.18E-05
Heptane	142-82-5	8.34	6.1E-06	1.46E-04	5.33E-02	2.67E-05
Hexane	110-54-3	8.34	6.1E-06	1.46E-04	5.33E-02	2.67E-05
Methylene Chloride	75-09-2	10	7.3E-06	1.75E-04	6.39E-02	3.20E-05
2-Butanone (MEK)	78-93-3	21.3	1.6E-05	3.73E-04	1.36E-01	6.81E-05
2-Propanol (isopropanol)	67-63-0	48900	3.6E-02	8.56E-01	3.13E+02	1.56E-01
Propene	115-07-1	2.5	1.8E-06	4.38E-05	1.60E-02	7.99E-06
Perchloroethylene (PCE)	127-18-4	68.6	5.0E-05	1.20E-03	4.39E-01	2.19E-04
Trichloroethene (TCE) (Trichloroethylene)	79-01-6	4.17	3.0E-06	7.30E-05	2.67E-02	1.33E-05

Notes:

1. It is assumed that equipment will operate 24 hours a day, 365 days a year.
2. Non-Precursor Organic Compounds (NPOCs) have been determined based on Regulation 1-234 and 40 CFR 51.100(s)(1). NPOCs have negligible photochemical reactivity.

Table 2. Organic Emissions Review for S-2					
Pollutant	**Effluent Volumetric Concentration (ppmv)**	**Hourly Emission Rate (pound/hour)**	**Daily Emission Rate (pound/day)**	**Annual Emission Rate (pounds/year)**	**Annual Emission Rate (ton/year)**
POC	0.393	1.91E-04	0.005	1.672	0.001
NPOC	74.197	0.036	0.863	314.955	0.157
Total	74.590	0.036	0.868	316.627	0.158

Notes:
1. POC and NPOC emissions are based on the laboratory test results with no abatement.
2. POC and NPOC Annual Emission Rates will be rounded up to 1.7 pound per year and 315 pound per year respectively to be used as condition limit.

Cumulative Increase

Table 3. Cumulative Increase			
Pollutant	**Current Permitted Emissions, Post 4/5/1991 (ton/year)**	**Application New Emissions Increase (ton/year)**	**New Cumulative Increase (ton/year)**
POC	0.000	0.001	0.001

There is an emergency standby diesel generator set (Source #1) located at this facility. S-1 is an LOE (Loss of Exemption) engine permitted back in 1984. Therefore, the emissions from S-1 do not count towards the cumulative increase of the facility.

Toxic Risk Screening

No toxic air contaminant emissions exceed the Chronic Trigger Levels in Regulation 2-5, Table 2-5-1. Therefore, no Health Risk Assessment (HRA) was triggered for this project.

Table 4. Project Toxics Emissions Review - Regulation 2-5

Pollutant	CAS #	Hourly Emission Rate (pound/hour)	Acute Trigger Level (pound/hour)	Exceeds Acute Trigger Level?	Annual Emission Rate (pound/year)	Chronic Trigger Level (pound/year)	Exceeds Chronic Trigger Level?
Acetone	67-64-1	1.98E-04	N/A	No	1.73E+00	N/A	No
Benzene	71-43-2	8.98E-06	1.20E-02	No	7.86E-02	2.90E+00	No
Toluene	108-88-3	6.10E-06	2.20E+00	No	5.34E-02	1.60E+04	No
Xylenes	1330-20-7	1.49E-06	9.70E+00	No	1.30E-02	2.70E+04	No
Chloroform	67-66-3	2.10E-05	6.60E-02	No	1.84E-01	1.50E+01	No
Chloromethane	74-87-3	1.61E-06	N/A	No	1.41E-02	N/A	No
Cyclohexane	110-82-7	4.12E-06	N/A	No	3.61E-02	N/A	No
1,1-Dichloroethene	75-35-4	6.79E-07	N/A	No	5.95E-03	2.70E+03	No
1,4-Dioxane	123-91-1	1.17E-06	1.30E+00	No	1.03E-02	1.10E+01	No
Ethanol	64-17-5	1.13E-04	N/A	No	9.91E-01	N/A	No
Trichlorofluoromethane	75-69-4	2.07E-06	N/A	No	1.81E-02	N/A	No
Dichlorodifluoromethane	75-71-8	1.18E-05	N/A	No	1.04E-01	N/A	No
Heptane	142-82-5	6.09E-06	N/A	No	5.33E-02	N/A	No
Hexane	110-54-3	6.09E-06	N/A	No	5.33E-02	2.70E+05	No
Methylene Chloride	75-09-2	7.30E-06	6.20E+00	No	6.39E-02	8.20E+01	No
2-Butanone (MEK)	78-93-3	1.55E-05	5.80E+00	No	1.36E-01	N/A	No
2-Propanol (isopropanol)	67-63-0	3.57E-02	1.40E+00	No	3.13E+02	2.70E+05	No
Propene	115-07-1	1.82E-06	N/A	No	1.60E-02	1.20E+05	No
Perchloroethylene (PCE)	127-18-4	5.01E-05	8.80E+00	No	4.39E-01	1.40E+01	No
Trichloroethene (TCE) (Trichloroethylene)	79-01-6	3.04E-06	N/A	No	2.67E-02	4.10E+01	No

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.

Table 5. Facility PTE Breakdown

Source #	Description	PM10	PM2.5	POC	NOx	SO2	CO	Relevant Application	Comments
1	Emergency Standby Diesel Generator Set [Loss of Exemption]	0.020	0.020	0.060	0.279	6.00E-05	0.022	App. 21281	Table 1 on Page 4 of Application 21281 lists the emission calculation for this LOE engine based on 20 hours of operation. Emission values were multiplied by 120 hours/20 hours = 6 to calculate the PTE at 120 hours/year.
2	Sub-Slab Depressurization	0.000	0.000	0.001	0.000	0.000	0.000	App. 679453	Current Application.
SUM		0.020	0.020	0.061	0.279	6.00E-05	0.022		

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 pound/day for S-2. 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

This project is located within 1,000 feet of Bessie Carmichael Filipino Education Center (824 Harrison Street, San Francisco, CA 94103). Therefore, this project is subject to the school public noticing requirement of the California Health & Safety Code and Regulation 2-1-412.

While the project is also located within 1,000 feet of AltSchool (300 4th Street, San Francisco, CA 94107), all AltSchool locations in San Francisco are closed, per California Department of Education website.
The website address is as follows:
https://www.cde.ca.gov/SchoolDirectory/districtschool?allSearch=altschool&multif=&simpleSearch=Y.

In addition, this project is located within the boundaries of an Overburdened Community (OBC) as defined in Regulation 2-1-243. Therefore, this project also triggers OBC public notification.

Regulation 8-47-301 requires that 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. However, Regulation 8-47-113 exempts operations with total emissions of less than 1 pound per day of the pollutants listed above, given that Section 8-47-301 is satisfied. The proposed SSD operation results in the maximum potential daily benzene emission of 2.15E-04 pound, perchloroethylene emission of 0.439 pound, methylene chloride emission of 1.75E-04 pound, and trichloroethylene emission of 0.027 pound without abatement and does not trigger health risk assessment. Therefore, the project does not warrant an abatement device with 90 percent control efficiency.

The facility is required to keep the pertinent records per condition # 100129 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 # 100129 for S-2

1. The influent vapor flow rate shall not exceed 195 scfm from the blower of S-2. [Basis: Cumulative Increase, Regulation 2-5].

2. In no event shall benzene, vinyl chloride, perchloroethylene, methylene chloride, and trichloroethylene emissions to the atmosphere from S-2 exceed 1 pound per day. [Basis: Regulations 8-47-301, 8-47-113 and Toxics].

3. In no event shall the toxic air contaminant (TAC) emissions to the atmosphere from S-2 exceed the trigger levels listed in District Regulation 2-5, Table 2-5-1. [Basis: Regulation 2-5].

4. The owner/operator shall not emit from S-2 more than 1.7 pounds of precursor organic compounds (POC) and 315.0 pounds of non-precursor organic compounds (NPOC) per 12-month consecutive period. [Basis: Cumulative Increase]

5. 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-2. 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, 3, and 4 of this condition. [Basis: Regulation 2-1-403, Regulation 2-5].

6. 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-2 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]

7. 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]

8. 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]

9. 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 triggers public notification requirements per 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-2 Sub-Slab Depressurization System
Obar, GBR76UD, 195 cfm

Youjin Kim, Air Quality Engineer
July 17, 2023