

**Engineering Evaluation
Former Caine Cleaners
Application #23712
Plant #20929**

BACKGROUND

RRM Consultants on behalf of former Caine Cleaners has applied for an Authority to Construct the following source:

**S-1 Sub-Slab Depressurization System consisting of
Rotron Regenerative Blower, Model EN303, 100 scfm or equivalent
unabated**

located at:

**1319 Howard Avenue
Burlingame, CA 94010**

In response to the County of San Mateo Groundwater Protection Program request, a sub-slab depressurization system is proposed for this site. The purpose of the proposed system is to mitigate potential tetrachloroethylene (PCE) vapors from entering the building at the site or at buildings adjacent to the site. A former dry cleaning facility was the source of perchloroethylene (PCE), trichloroethylene (TCE), and cis-1,2-dichloroethylene (cis-1,2-DCE) from beneath the building foundation and shallow soil at this property. The Sub-Slab Depressurization (SSD) system is proposed to mitigate residual PCE emissions potentially impacting indoor air quality for new commercial/industrial land use at this site and potential migration of subsurface vapors to the nearby area. Sub-slab soil gas sample (SS-2) collected beneath the concrete floor of the building near the former source area contained PCE at a concentration of 25,000 µg/m³. According to the RRM, Inc response to San Mateo County, the soil gas Environmental Screening Level (ESL) for vapor intrusion concerns for PCE at a commercial/industrial property is 1,400 µg/m³ (Source: Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, California Regional Water Quality Control Board, San Francisco Bay Region, Revised May 2008).

A Remedial Action Plan (RAP) for this site was not written because a comprehensive source removal program was implemented in July 2007. At that time, 318 tons of PCE impacted soil was removed by shaft excavation to a depth of 25 feet below ground surface (bgs) and disposed of as hazardous waste. The shaft excavation work was extended to the most practical extent, considering equipment limitations and protection of the structural integrity of the building. RRM states that the residual soil contamination at the site is not reasonably or safely accessible using proven remediation techniques, additional remedial efforts would be impractical and ineffective. Sub-slab depressurization system was recommended for the monitoring and management of the residual soil and groundwater contamination.

The source (S-1) consists of a blower 100 cfm capacity, which actively extracts contaminated vapors beneath the ground-floor commercial spaces of the building. The suction pipe is a few inches below the slab. Two to four vent connections will be made through the building slab to access the airspace directly underneath the slab. The vents will be connected by vent piping that extends through an exterior wall of the building into a small moisture separator, and routed to the intake side of a sealed ½ horsepower regenerative blower with a capacity up to 100 standard cubic feet per minute or equivalent.

The blower is controlled by a variable speed drive, so any flow rate below the maximum stated capacity is possible.

The SSD system is designed to run indefinitely while the building is occupied until the concentrations have been reduced to acceptable levels, or until a more detailed risk assessment is conducted. Typically the highest concentrations from SSD operations are observed at startup and steadily decline over time. SSD systems are specifically designed to maintain the minimum required sub-slab vacuum (≥ 0.01 inches of water) and flow rate to prevent vapors from accumulating immediately beneath the slab.

SSD systems are not designed for mass removal; they are intended to prevent vapor intrusion. Some mass removal is a secondary benefit. The suction pits only penetrate and influence the permeable sub-slab materials, not the contaminated soil in the vadose (unsaturated) zone. The depth to water at this site ranged from about 13.45 feet below the top of casing measurement to 15.30 feet below grade. Groundwater elevations ranged from 20.74 feet to 23.68 feet above mean sea level.

Unabated emissions of toxic air contaminants from this SSD system will be limited to below the Trigger Levels as per Regulation 2-1-316. Operation of this source will be conditioned to collect bag samples of effluent from the blower for subsequent laboratory analysis on a monthly schedule. After three months of operation this schedule may be reduced to quarterly analysis, pending District approval.

The SSD operation qualifies for an exemption from Regulation 8-47-301 (which requires at least 90% abatement) via Regulation 8-47-113 (combined emissions of benzene, vinyl chloride, perchloroethylene, methylene chloride, and trichloroethylene will be less than 1 pound per day).

This source is located within 1000 feet of a school: St. Catherine of Siena School, **1300 Bayswater Avenue, Burlingame, CA 94010**; therefore, this application required Public Notification per Reg. 2-1-412. St. Catherine of Siena School is located approximately 300 feet southeast of the site. A Public Notice was prepared and sent out to the home address of the students of the school and to each address within a radius of 1,000 feet of the source. Public notices were distributed to **xxxx recipients**. Since the toxic VOC emissions are limited by permit conditions to less than 1 lb per day, the impacts are anticipated to be negligible.

EMISSION CALCULATIONS

S-1_Sub-Slab Depressurization System

For a conservative estimate of yearly emissions, assume that the system is operated for an entire year with an inlet concentration corresponding to the maximum permitted level not to exceed the Chronic Trigger Level for any toxic pollutant listed in Regulation 2-5, Table 1. Generalized assumptions follow:

Operating conditions: Pressure = 1 Atm; Inlet Temperature 21°, 1 mole occupies 24.15L
Influent values based on operational parameters of equipment and applicant supplied soil vapor test results: Maximum influent flow rate 100 cfm.
Maximum allowed influent PCE concentration = 5.48 $\mu\text{g/L}$

Emissions of Toxic Air Contaminants: The following emission calculations are based on the maximum Condition Limits:

e.g. PCE

$$5.48 \mu\text{g/L} \text{ (gm/1.00E6}\mu\text{g)}(1\text{lb/453.6 gm})(28.317 \text{ L/ft}^3) = 3.47\text{E-7 lb/ ft}^3$$

$$3.47\text{E-7 lb/ ft}^3 \text{ (100 ft}^3\text{/min) (1440 min /day)(365 days/yr) = 18 lb/yr unabated}$$

$$= 0.049 \text{ lbs/day unabated}$$

Reg 2-5-1 Chronic Trigger level for PCE = 18 lb/year
 Chronic Trigger level for TCE = 54 lb/year

Table 1 Maximum Allowed Emission from the Sub-Slab Depressurization System

	ug/L	cfm	lb/gm	g/ug	min/day	L/ft ³	lbs/day	lb/yr	Chronic Trigger Level
PCE									
Tetrachloroethylene	5.48	100	2.20E-03	1.00E-06	1440	28.317	4.93E-02	1.80E+01	1.80E+01
Vinyl chloride	0.3	100	2.20E-03	1.00E-06	1440	28.317	2.70E-03	9.84E-01	1.40E+00
1,1 Dichloroethene	0.25	100	2.20E-03	1.00E-06	1440	28.317	2.25E-03	8.20E-01	2.70E+03
trans 1,2 Dichloroethene	1.5	100	2.20E-03	1.00E-06	1440	28.317	1.35E-02	4.92E+00	
1,1 Dichloroethane	12	100	2.20E-03	1.00E-06	1440	28.317	1.08E-01	3.94E+01	6.60E+01
cis 1,2 Dichloroethene	23	100	2.20E-03	1.00E-06	1440	28.317	2.07E-01	7.55E+01	
Trichloroethene	16.46	100	2.20E-03	1.00E-06	1440	28.317	1.48E-01	5.40E+01	5.40E+01
							5.30E-01	1.94E+02	

TOXICS

The toxic emissions from this source are conditioned not to exceed the chronic trigger levels as stated in Regulation 2-5, Table 1. Therefore, the emissions of all toxic substances are not considered sufficient to warrant a Health Risk Screen Analysis. In accordance with the exemption in Regulation 2-5-110, the source is not subject to the provisions of this regulation.

New Source Review

The proposed project may not exceed more than 10 pounds per day without abatement; therefore, implementation of BACT is not required. Offsets are not required as annual emissions will not exceed 10 tons.

CEQA

The project is considered to be ministerial under the Districts 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.

STATEMENT OF COMPLIANCE

Based on the information submitted, this operation may not exceed the exemption level in Regulation 8-47-301, Emission Control Requirements, and Specific compounds via Regulation 8-47-113. In accordance with Section 113, combined emissions of benzene, vinyl chloride, perchloroethylene, methylene chloride, and/or trichloroethylene are expected to be less than 1 pound per day and a health risk screen analysis is not needed as emissions of toxic compounds will be limited to the established trigger levels. The emission rates for each toxic compound corresponding to the trigger are included in the operating condition.

Recommendation

It is recommended that a conditional Authority to Construct be issued for Former Caine Cleaners for the following:

- S-1 Sub-Slab Depressurization System consisting of a Rotron Regenerative Blower, Model EN303, 100 scfm and ancillary equipment or equivalent unabated**

Condition #25094:

1. In no event shall emissions to the atmosphere of the following compounds exceed the corresponding Toxic Air Contaminant Trigger Levels from Table 2-5-1 in pounds per day:

Toxic Compound	Emissions #/day
Perchloroethylene	4.93E-2
Vinyl Chloride	3.84E-3
Trichloroethylene	1.48E-1
1,1 Dichloroethene	7.40E+0
1,1 Dichloroethane	1.81E-1

In addition, total emissions of Benzene, vinyl chloride, perchloroethylene, methylene chloride and/or trichloroethylene shall not exceed 1 pound per day. Emissions of total volatile organic compounds shall not exceed 10 pounds per day. The soil vapor flow rate shall not exceed 100 scfm. [basis: Reg. 2-1-316, 2-2-301, 8-47-113]

2. To determine compliance with Condition 1, the operator of this source shall:
 - a. Analyze exhaust gas to determine the concentration of the compounds listed in Condition 1 and the total volatile organic compounds present once for the first two weeks after receipt of the initial annual permit to operate. Thereafter, the exhaust gas shall be analyzed to determine the concentration of the compounds listed in Condition 1 and total volatile organic compounds present once every 30 days. After 3 months of operation, the operator may propose for District review that the sampling schedule be reduced from monthly to quarterly (at least once every 120 days of operation). Written authorization must be received from the District before any change in sampling frequency occurs.
 - b. Emissions in pounds per day shall be calculated for those compounds listed in Condition 1 as well as the total volatile organic compounds.
 - c. Within one month of the testing date, submit to the District's Engineering Division the test results and emission calculations for the first two weeks of operation following issuance of the annual permit. Samples shall be analyzed according to modified EPA test methods TO-15 or equivalent to determine the concentrations of those compounds listed in Condition 1 as well as the total volatile organic compounds.

3. The operator of this source shall maintain the following information in a District-approved log for each month of operation of the source:
 - a. dates of operation;
 - b. exhaust flow rate;
 - c. exhaust sampling date;
 - d. analysis results;
 - e. calculated emissions of POC and listed compounds in pounds per day.

Such records shall be retained and made available for inspection by the District for two years following the date the data is recorded. [basis: Reg. 1-523]

4. Any non-compliance with these conditions shall be reported to the Compliance and Enforcement Division at the time that it is first discovered. The submittal shall detail the corrective action taken and shall include the data showing the exceedance as well as the time of occurrence.
5. The 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 conditional Permit to Operate. All measurements, records and data required to be maintained by the applicant shall be retained for at least two years following the date the data is recorded. [basis: Reg. 1-523]
6. Upon final completion of the remediation project, the operator of Source S-1 shall notify the district within two weeks of decommissioning the operation.

by _____ date _____

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