DRAFT

Engineering Evaluation
Rainbow 2603 LLC; Plant Number 17038
Application Number 12641

Background

On behalf of Rainbow 2603 LLC, TRC Solutions Inc. (TRC) is applying for an Authority to Construct/Permit to Operate (AC/PO) for equipment necessary for soil and groundwater remediation at the former site of a drycleaning facility located at 2829 24th Street in San Francisco. This facility (White Cleaners) ceased operations in 2001. Remediation activities include a sub-slab vapor displacement system (S-1), and a Soil Vapor Extraction (SVE) system (S-2). S-1 will be installed onsite to remove accumulated vapors in the sub-floors beneath two adjacent properties: Ray's Vast Basement, 2839 24th street; and Margarita's Restaurant, 2833 24th Street. S-1 will consist of three 50 scfm capacity fans operated in parallel. Concentrations in the vapor stream from the sub-floor venting system are expected to be so dilute that vapor abatement will not be required. S-2 is designed to remove vapors from the vadose zone and will operate in conjunction with an ozone sparging system to remediate impacted groundwater beneath the site. The ozone generator for sparging system has a capacity of 0.5 pounds per day, so it is exempt from permitting as per Regulation 2-1-128.17. S-2 will consist of a regenerative vacuum blower with a maximum operating capacity of 400 scfm. The vacuum unit is also equipped with a water knockout vessel, inlet filter, dilution air valve, recirculation valve, and flow indicators. Vapor abatement for S-2 will be achieved by carbon adsorption (carbon). The carbon system will consist of two 2,000 pound capacity activated carbon vessels, and one 1,000 pound vessel connected in series.

The applicant will be conditioned to provide written notification at the start of operation. Effluent from the sub-slab vapor displacement system will be sampled the first three days of operation and monthly thereafter to ensure that emissions do not exceed relevant trigger limits. The carbon unit influent and effluent VOC concentrations will be monitored with a portable flame-ionization detector (OVA-FID) on a schedule reflecting current loading rates and predicted Carbon capacity. To ensure proper operation of equipment and verify attainment of steady-state conditions, Carbon performance will be monitored daily for the first five days. TRC may then elect to change their monitoring schedule based on measured influent concentrations and calculated carbon loading. Monitoring schedule changes will be allowed only after District review of concentration measurements and subsequent receipt of District approval.

This source is located within 1,000 feet of the outer boundary of Saint Peter's Parish Catholic School and as such this application requires Public Notification via Reg. 2-1-412. There are three other schools within ¼ mile of the source: Bryant Elementary School; Meadows-Livingstone School; and Buena Vista Annex. A Public Notice was prepared and sent out to the home address of the students of the schools and to each address within a radius of 1,000 feet of the source. Copies of the Public Notice were sent to the Schools. A phone line was set-up at the district to receive public comments and ?? was received. ?? comments were received by Email.

Attached to this report are copies of the Public Notice, and a summary of the Public comments received. The total cost of the Public Notification amounted to $??.00. This amount exceeded the $2000.00 Public Notice fee. All fees including the standard AC/PO fees of $3,778.00 have been paid.

Emission Calculations

S-1, Sub-slab vapor displacement system

TRC has provided emission estimates based on indoor air sampling performed at the two buildings adjacent to the site. The evaluating engineer has estimated vapor concentrations based on these results combined with conservative engineering judgment. For a conservative estimate of toxic emissions we assume that the system will be operated for the entire year. Generalized assumptions follow:

* Standard conditions: Pressure = 1 Atm; Temperature = 70^{O}F; 1 mole occupies 24.15 L.
* Influent concentrations based on sampling results provided by applicant: trichloroethylene = 2.3E-4 ug/L; perchloroethylene = 6.9E-3 ug/L; Total Organics = 1E-2 ug/L.

* Influent flow rate based on operational parameters of equipment: 50 scfm (maximum) per fan or 150 scfm aggregate.

Abated emissions of individual toxic compounds take the following form:

$C_i * Q * C_o = E$

where:

E = Abated Emissions in #/day;
C_i = Influent Concentration in ug/L;
Q = Flow Rate in scfm (150);
C_o = Dimensional Constant;

$$C_o = \frac{1\ \#}{4.53593E8 ug} * \frac{28.317\ L}{1\ ft^3} * \frac{1440\ min}{1\ day}$$

C_o = 8.99E-5 {#*L*min}/{ug*ft^3*day}.

Thus, for operation of the S-1, we have maximum unabated emissions of:

Compound(s)	Emissions in lbs/day	Emissions in lbs/yr	Trigger
Trichloroethylene	3.1E-6	1.1E-3	9.70E+1
Perchloroethylene	9.3E-5	3.4E-2	3.30E+1
Total Organics	1.4E-4	4.9E-2	

S-2, Soil vapor extraction system

TRC has provided emission estimates based on soil and groundwater sampling performed at the site. The evaluating engineer has estimated vapor concentrations based on these results combined with conservative engineering judgment. For a conservative estimate of toxic emissions we assume that the system will be operated for the entire year. Generalized assumptions follow:

* Standard conditions: Pressure = 1 Atm; Temperature = 70^{o}F; 1 mole occupies 24.15 L.
* Influent concentrations based on estimates provided by applicant: trichloroethylene = 25 ug/L; perchloroethylene = 200 ug/L; Total Organics = 250 ug/L.
* Influent flow rate based on operational parameters of equipment: 400 scfm (maximum); abatement efficiency = 90% for each Carbon Vessel (99% aggregate).

Abated emissions of individual toxic compounds take the following form:

$C_i * Q * C_o * (1 - 0.99) = E$

where:

E = Abated Emissions in #/day;
C_i = Influent Concentration in ug/L;
Q = Flow Rate in scfm (400);
C_o = Dimensional Constant;

$$C_o = \frac{1\ \#}{4.53593E8 ug} * \frac{28.317\ L}{1\ ft^3} * \frac{1440\ min}{1\ day}$$

C_o = 8.99E-5 {#*L*min}/{ug*ft^3*day}.

Thus, for operation of the SVE System, we have maximum abated emissions of:

Compound(s)	Emissions in lbs/day	Emissions in lbs/yr	Trigger
Trichloroethylene	9.0E-3	3.3E+0	9.70E+1
Perchloroethylene	7.2E-2	2.6E+1	3.30E+1
Total Organics	9.0E-2	3.3E+1	

Summary of Emissions of Precursor Organics (both sources combined):

Highest Daily Emissions	**=**	**9.0E-2 #/day**
Annual Average	**=**	**9.0E-2 #/day**
RFP	**=**	**1.6E-2 t/yr**

For operation of the two systems, we have combined maximum toxic emissions of:

Compound(s)	Emissions in lbs/day	Emissions in lbs/yr	Trigger
Trichloroethylene	9.00E-3	3.30E+0	9.70E+1
Perchloroethylene	7.21E-2	2.63E+1	3.30E+1

Toxics

Under the trigger levels as per Regulation 2-1-316, the emissions of toxic substances are not considered sufficient to warrant a Risk Screen Analysis. Perchloroethylene trigger = 0.09 #/day; trichloroethylene trigger = 0.27 #/day. In accordance with the Toxic Section Risk Management Policy, the impact is then insignificant since these emissions are unlikely to cause a risk greater than 1 in a million. This is the maximum acceptable level for sources which do not implement TBACT as is the case with this operation since the sub-slab vapor displacement system will be unabated. Therefore, the Toxics Evaluation Section has recommended the issuing of this A/C with stated emission limits for the unabated system, and standard operating conditions for carbon adsorption vessels.

New Source Review

This proposed project will not emit over 10 lbs per highest day and is therefore not required to implement BACT. Offsets are not required, as emissions of POC's will be well under 10 tons per year.

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.

Compliance

Based on the information submitted, operation of the soil vapor extraction system is expected to be in compliance with Regulation 8-47-301, Emission Control Requirements, Specific compounds, and 8-47-302, Organic compounds. The POC emissions will be vented through a carbon adsorption system at all times of operation. The sub-slab vapor displacement system qualifies for exemption from the requirements of Regulation 8-47-301, Emission Control Requirements, Specific compounds via Regulation 8-47-113. Combined emissions of

benzene, vinyl chloride, perchloroethylene, methylene chloride, and/or trichloroethylene are expected to be less than 1 pound per day and a Risk Screen 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 text found below. The application triggered Public Notification as required by Regulation 2-1-412. The District performed the Public Notification and TRC was invoiced for the services required. Fees in the amount of $??.00 (including the standard A/C and P/O fees) have been paid in full.

Recommendation

Recommend that a conditional Authority to Construct be issued for source:

S-1: Sub-slab vapor displacement system consisting of three 50 max scfm vent fans arranged in parallel, and ancillary equipment.

S-2: Soil Vapor Extraction System consisting of a 400 max scfm vacuum blower, and ancillary equipment, abated by A-1, at least two (180 lb minimum capacity) Carbon Adsorption Vessels.

Conditions

S-1, Sub-slab vapor displacement system:

1. In no event shall emissions to the atmosphere of the following compounds exceed the corresponding emission limits in pounds per day:

Toxic Compound	Emissions in #/day
Benzene	1.8E-2
Vinyl Chloride	6.8E-3
Perchloroethylene	9.0E-2
Methylene Chloride	5.2E-1
Trichloroethylene	2.7E-1

In addition, emissions of total volatile organic compounds shall not exceed 10 pounds per day. Sub-slab vapor flow rate shall not exceed 150 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 for each of the first two days of operation. 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 6 months of operation, the operator may propose for District review that the sampling schedule be reduced from monthly to quarterly. Written authorization must be received from the District before any change in sampling frequency.
   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. Submit to the District's Permit Services Division the test results and emission calculations for the first two days of operation within one month of the testing date. Samples shall be analyzed according to modified EPA test methods TO-15 or equivalent to determine the concentrations 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 Authority to Construct/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.

S-2, SVE system:

1. Source S-2 shall be vented at all times to A-1, at least two (180 lb minimum capacity) activated carbon vessels arranged in series. Influent vapor flow shall not exceed 100 scfm. [basis: Reg. 8-47-301]

2. The operator of this source 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 carbon vessel that is last 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 purpose of these permit conditions.

3. These monitor readings shall be recorded in a monitoring log at the time they are taken. The monitoring results shall be used to estimate the frequency of Carbon change-out necessary to maintain compliance with conditions number 4 and 5, and shall be conducted on a daily basis. The operator of this source may propose for District review, based on actual measurements taken at the site during operation of the source, that the monitoring schedule be changed based on the decline in organic emissions and/or the demonstrated breakthrough rates of the carbon vessels. Written approval by the District's Permit Services Division must be received by the operator prior to a change to the monitoring schedule.

4. The second to last Carbon vessel shall be immediately changed out with unspent Carbon upon breakthrough, defined as the detection at its outlet of the higher of the following:

a. 10 % of the inlet stream concentration to the Carbon vessel.
b. 10 ppmv (measured as C_1).

5. The last Carbon vessel shall be immediately changed out with unspent Carbon upon detection at its outlet of 10 ppmv (measured as C_1).

6. The operator of this source shall maintain the following records for each month of operation of the source:

   a. The hours and times of operation.
   b. Each monitor reading or analysis result for the day of operation they are taken.
   c. The number of Carbon beds removed from service.

   All measurements, records and data required to be maintained by the operator shall be retained and made available for inspection by the District for at least two years following the date the data is recorded. [basis: Reg. 1-523]

7. Any non-compliance of 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.**

8. Upon final completion of the remediation project, the operator of Source S-2 shall notify the Permit Services Division within two weeks of decommissioning the operation.

by_____ date_____

Robert E. Cave
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