

DRAFT
Engineering Evaluation
Robinson's Family Trust
Plant No. 19735; Application No. 20744

Background

Robinson's Family Trust has applied for an authority to construct for soil remediation at the site located at 1720 El Camino Real, San Bruno, California. Treatment will consist of an Ozone generator (S-1) and Soil vapor extraction will be accomplished by means of a regenerative vacuum blower (S-2) with a maximum capacity of 500 scfm. The vacuum unit is also equipped with a water knockout vessel, inlet filter, dilution air valve, recirculation valve, and flow indicators. Vapor abatement will be achieved by three different means of abatement processes: Thermal Oxidation (Therm-Ox); Catalytic Oxidation (Cat-Ox); and Carbon Adsorption (Carbon). These will be applied according to equipment availability. The Therm-Ox and Cat-Ox will be equipped with continuous temperature monitoring to ensure that BACT destruction efficiencies are met. The Carbon adsorption system will consist of two 200 pound minimum capacity activated carbon vessels connected in series.

The applicant will be conditioned to provide written notification at the start of each phase of abatement. Emission monitoring for operation of the Therm-Ox, and the Cat-Ox will be conducted according to established Source Test methodology. Procedures are outlined in the conditions found below. 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. Robinson's Family Trust 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.

Emission Calculations

For a conservative estimate of yearly 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 occupies 24.15L
- * Molecular weight of TPHg = 100 g/mole (value for "weathered gasoline"). Molecular weight of Benzene = 78 g/mole.
- * Influent values based on operational parameters of equipment and applicant supplied soil vapor test results: influent rate 500 scfm throughout; maximum influent concentration = 1275 ppmv VOC, 133.5 ppmv benzene; destruction efficiency = 97.0% throughout.
- * Ozone generation 2 lbs/day of ozone produced-injected into vadoze zone.

S-1 Ozone Generator

	Emission (lb/day)	Emission (lb/yr)	Trigger Level (lb/yr)
ozone	2	730	7000

S-2 Soil Vapor Extraction System

Emissions of Precursor Organics:

$$1275E-6 * \frac{500 \text{ ft}^3}{\text{min}} * \frac{1440 \text{ min}}{1 \text{ day}} * \frac{28.32L}{1 \text{ ft}^3} * \frac{1 \text{ mole}}{24.15L} * \frac{100g}{\text{mole}} * \frac{1 \text{ lb}}{454g} * (1 - 0.97) = \mathbf{7.114 \text{ lb/day}} \text{ (abated)}$$

Emissions of Toxic Air Contaminants (benzene):

$$133.5E-6 * \frac{500 \text{ ft}^3}{\text{min}} * \frac{1440 \text{ min}}{1 \text{ day}} * \frac{28.32L}{1 \text{ ft}^3} * \frac{1 \text{ mole}}{24.15L} * \frac{78g}{\text{mole}} * \frac{1 \text{ lb}}{454g} * (1 - 0.97) = \mathbf{0.581 \text{ lb/day}} \text{ (abated)}$$

Emissions of Toxic Air Contaminants (base on the toxic risk screening results):

	Emission (lb/day) (with abated)	Emission (lb/yr) (with abated)	Emission (g/s) (with abated)
Benzene	0.581	212.206	3.05E-03
Toluene	1.314	479.429	6.90E-03
Ethyl-benzene	0.323	117.892	1.70E-03
Xylenes	1.227	447.991	6.44E-03

Highest Daily Emissions = **7.114 lb/day**
Annual Average = **7.114 lb/day**
RFP = **1.298 tons/yr**

Toxics

Under the trigger levels as per Regulation 2-1-316, the emissions of toxic substances (Benzene) are considered sufficient to warrant a Risk Screen Analysis. Benzene trigger = 0.018 lb/day. A Health Risk Screen was performed for this application to determine the risk to the maximally exposed industrial and residential receptors. The ISCST3 air dispersion models were used to estimate the pollutant concentrations in the area surrounding the site for a unit emission rate. It was determined that benzene emissions as calculated above corresponded to a risk of 2.8 in a million to the maximally exposed industrial receptor. This emission rate would result in maximum risk of 9.9 in a million to the maximally exposed residential receptor. This source is unlikely to cause an acute risk for benzene emissions, as the hourly trigger for benzene is 2.9 pounds per hour. In accordance with the District's Regulation 2-5, the impact is then insignificant since this risk is within the threshold of 10 in a million as required for sources implementing TBACT; therefore, the Toxics Section has recommended the issuing of this A/C with a Benzene emission limit of 0.581 lb/day.

New Source Review

This proposed project will emit over 10 lbs per highest day and is therefore required to implement BACT. For Soil Vapor Extraction operations, BACT is defined as attainment of set destruction efficiencies corresponding to set influent concentration values. Operation of the Thermal/Catalytic Oxidizer, I.C.E., and the Carbon vessels will be conditioned to ensure attainment of the following required destruction efficiencies: ≥98.5% if inlet POC ≥2000; ≥97% if inlet POC ≥200 to <2000 ppmv; ≥90% if inlet POC <200 ppmv. Offsets need not be imposed as annual emissions will not exceed 10 tons.

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 Chapters 9.2 of the permit handbook.

Compliance

Based on the information submitted, this operation 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 Thermal Oxidizer, Catalytic Oxidizer, or Carbon adsorption system at all times of operation.

The sources are located within 1,000 feet of a school. Therefore distribution of a public notice is required per BAAQMD regulation 2-1-412.

Recommendation

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

- S-1 Ozone Generator – Maximum of 2 pounds per day of ozone.
- S-2: Soil Vapor Extraction System consisting of a 500 max scfm vacuum blower, and ancillary equipment, abated by A-1, SVE Abatement System, consisting of either a Thermal Oxidizer, Catalytic Oxidizer, or at least two (200 lb minimum capacity) Carbon Adsorption Vessels arranged in series.

Conditions:

1. S-1 Ozone generation shall not exceed 2 pounds per day. Precursor Organic Compound (POC) emissions from Source S-2 shall be abated by Abatement device A-1 SVE Abatement System, consisting of either a Thermal Oxidizer, Catalytic Oxidizer, or at least two (200 lbs minimum capacity) Activated Carbon Vessels during all periods of operation. Start-up and subsequent operation of each abatement device shall take place only after written notification of same has been received by the District's Engineering Division. Influent vapor flow shall not exceed 500 scfm. [Basis. Reg 8-47-301,302].
2. The POC abatement efficiency of abatement device A-1 shall be maintained at a minimum of 98.5% by weight for inlet POC concentrations greater than or equal to 2000 ppmv (measured as hexane). For inlet concentrations below 2000 ppmv and greater than or equal to 200 ppmv, a minimum abatement efficiency of 97% shall be maintained. For inlet concentrations below 200 ppmv, a minimum abatement efficiency of 90% shall be maintained. The minimum abatement efficiency shall be waived if outlet POC concentrations are shown to be less than 10 ppmv (measured as hexane). In no event shall Benzene emissions to the atmosphere exceed 0.581 pounds per day.
3. While operating as a Thermal Oxidizer, the minimum operating temperature of A-1 shall not be less than 1400 degrees Fahrenheit. While operating as a Catalytic Oxidizer, the minimum operating temperature of A-1 shall not be less than 600 degrees Fahrenheit.
4. To determine compliance with Condition Number 3, the Thermal/Catalytic Oxidizer shall be equipped with continuous measuring and temperature recording instrumentation. The temperature data collected from the temperature recorder shall be maintained in a file which shall

be available for District inspection for a period of at least 2 years following the date on which such data are recorded.

5. To determine compliance with Condition 2, within ten days after start-up of the Thermal Oxidizer, and within ten days after start-up of the Catalytic Oxidizer, the operator of these sources shall:
 - a. Analyze inlet gas stream to determine the flow rate and concentration of POC present.
 - b. Analyze exhaust gas to determine the flow rate, and the concentration of Benzene and POC present.
 - c. Calculate the Benzene emission rate in pounds per day based on the exhaust gas analysis and the operating exhaust flow rate. The soil vapor flow rate shall be decreased, if necessary, to demonstrate compliance with Condition 2.
 - d. Calculate the POC abatement efficiency based on the inlet and exhaust gas analysis. For the purpose of determining compliance with condition 2, the POC concentration shall be reported as hexane.
 - e. Submit to the District's Engineering Division the test results and emission calculations within one month from the testing date. Samples shall be analyzed according to modified EPA test methods 8015 and 8020 or their equivalent to determine the concentrations of POC and Benzene.
6. The operator of this source shall maintain the following records for each month of operation of the Thermal/Catalytic Oxidizer:
 - a. Days and hours of operation.
 - b. Each emission test, analysis or monitoring results logged-in for the day of operation they were taken.
 - c. Analysis results for any catalyst plugs removed from the bed to determine remaining life of the catalyst.

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]

7. During operation of the Activated Carbon Vessels, 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.

8. 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 9 and 10, 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 Engineering Division must be received by the operator prior to a change to the monitoring schedule.
9. 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 hexane).

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

11. The operator of this source shall maintain the following information for each month of operation of the Activated Carbon Vessels:
 - 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.

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.523]

12. 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.**

13. 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 operator shall be retained for at least two years following the date the data is recorded [basis: Reg 1-523].

14. Upon final completion of the remediation project, the operator of Source S-1 and S-2 shall notify the Engineering Division within two weeks of decommissioning the operation.

by _____ date 12/8/10

Flora Chan
Air Quality Engineer