DRAFT
Engineering Evaluation
GeoRestoration, Inc.
Plant No. 21197
Application No. 25225

Background

GeoRestoration has applied for a modification to the permit conditions for an existing Authority to Construct for a Portable Soil Vapor Extraction Unit (Application No. 24290, A/C granted on 06/22/2012):

S-1 Portable Soil Vapor Extraction system – 350 scfm vacuum blower abated by
A-1 SVE Abatement System consisting of an Electric Catalytic Oxidizer or a Carbon Adsorption System, consisting of two (200 lbs minimum capacity) Activated Carbon Vessels connected in series.

This portable soil vapor extraction unit will be located at:

2790 Homestead Road
Santa Clara, CA 95051

For Portable Equipment per Regulation 2-1-220.4: " The equipment is not to be operated within 1000 feet of the outer boundary of any K-12 school site, unless the applicable notice requirements of Health and Safety Code Section 42301.6 have been met."

This portable soil vapor extraction unit is within 1,000 feet of the outer boundary of the following school:

St. Justin's Elementary School,
located at 2655 Homestead Road, Santa Clara, CA.

To meet the requirements of Regulation 2-1-412, for operation of the source at the proposed location, a public notification shall be conducted. There are no other K-12 schools within ¼ mile of this source. A Public Notice has been 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.

The following information is based on information provided by GeoRestoration, Inc to County of Santa Clara Department of Environmental Health. The site was a former service station and is currently occupied by commercial businesses including a fast food restaurant, drive-thru coffee shop and others. The former service station had four underground fuel storage tanks (USTs). Three contained gasoline and one contained waste oil. This site has been investigated since 1986. The USTs were removed in 1987. Soil samples contained gasoline range hydrocarbons (TPHg) ranging up to 1900 mg/kg. Interim remediation at the site from 1993 to 2008 has significantly reduced concentrations of dissolved-phase hydrocarbons found in the groundwater.

The portable soil vapor extraction unit consists of a positive displacement vacuum blower (S-1) with a maximum capacity of 350 scfm. The vacuum unit is also equipped with a water knockout vessel, inlet filter, dilution air valve, recirculation valve, and flow indicators. Groundwater will be treated by liquid phase carbon and discharged to sanitary sewer per wastewater discharge

permit requirements. Soil vapor will be controlled using either electric catalytic oxidation or carbon adsorption. The oxidizer is 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.

Emission monitoring for operation of the equipment 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. GeoRestoration 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.

Written notification at the start of each phase of abatement system operation is required in the permit conditions for this source. Operating conditions will be worded to ensure that the requirements, and any expressed emission limits of that section are satisfied, through proper notification, source testing and recordkeeping practices. Regarding emission limits, those of primary concern are the 10 tons per year limit for criteria pollutants, as well as the emission rates corresponding to the acceptable risk level as per Regulation 2, Rule 5.

The system is expected to operate for not more than 6 months at this proposed location.

Emission Calculations

S-1 Soil Vapor Extraction System

This portable soil vapor extraction unit has an existing Authority to Construct (A/N 24290). Emission Calculations from A/N 24290 are as follows:

For a conservative estimate of yearly emissions, we assume that the system is operated for an entire year with an inlet concentration corresponding to the soil concentration level as demonstrated in the most recent sample levels.
Generalized assumptions follow:

* Operating conditions: Pressure = 1 Atm; Inlet Temperature = 21^{o}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 350 scfm,
Maximum influent TPHg concentration = 1343 ppmv VOC,

Destruction efficiency of Thermal/Catalytic Oxidizer 98.5%

Emissions of Precursor Organics:

(1343 ft3/1E6 ft3) * (350 ft3/min) * (1440 min/day) * (28.32 L/ft3) * (1 mole/24.15 L) * (100 g/mole) * (1 lb/454 gm) * (1 - 0.985) = **2.63 lbs/day** (abated)
(2.63 lb/day) * 365 days/yr = 956 lb/yr = 0.48 tons/yr

Emissions of Toxic Air Contaminants (benzene):

Reg 2-5-1 Chronic Trigger level for Benzene = 3.8 lb/year
Acute (1-hr max) Trigger Level (lb/hr) = 2.9 lb/hr

The following emission calculations are based on laboratory test data submitted with this permit application for this site.

13.6E-6 * (350 ft3/min) * (1440 min/1 day) * (28.32 L/ 1 ft3) * (1 mole/24.15 L) * (78gm/mole) * (1 lb/454g) * (1 – 0.985) = 0.021 lb/day (abated)

Benzene emissions will be conditioned not to exceed 3.8 lbs/yr.
Ethylbenzene emissions will be conditioned not to exceed 43 lbs/yr.

Applic 2552	ppmv	gm mole/L	ft3/min	lb/gm	g/mole	min/day	L/ft^3	lb/day unabated	lb/day abated 98.5%	lb/yr unabated	lb/year abated 98.5%	Trigger Level lbs/yr
TPHg	1343	0.0414	350	2.20E-03	100	1440	28.32	1.75E+02	2.62E+00	6.39E+04	9.58E+02	
Benzene	13	0.0414	350	2.20E-03	78.1	1440	28.32	1.38E+00	2.08E-02	2.53E+02	3.80E+00	3.8
Toluene	200	0.0414	350	2.20E-03	92.1	1440	28.32	2.40E+01	3.60E-01	8.76E+03	1.31E+02	1.20E+04
Ethylbenzene	110	0.0414	350	2.20E-03	106	1440	28.32	1.52E+01	2.28E-01	2.78E+03	4.18E+01	4.30E+01
Total xylenes	530	0.0414	350	2.20E-03	106	1440	28.32	7.33E+01	1.10E+00	2.68E+04	4.01E+02	2.70E+04
MTBE	5	0.0414	350	2.20E-03	88.2	1440	28.32	5.74E-01	8.61E-03	2.10E+02	3.14E+00	2.10E+02

There are no secondary emissions from the use of either electric catalytic oxidation or carbon adsorption.

Highest Daily Emissions = 2.63 lb/day
Annual Average = 2.63 lb/day
Maximum Annual Emissions = 960 lbs/yr
RFP = 0.48 tons/yr

New Source Review

This proposed project is expected to emit over 10 lbs per highest day if unabated; and therefore, BACT is required. For Soil Vapor Extraction operations, BACT is defined as attainment of set destruction efficiencies corresponding to set influent concentration values. Operation of the Catalytic Oxidizer is conditioned to ensure attainment of the following required destruction efficiencies: ≥98.5% if inlet POC ≥2000; ≥97% if inlet POC ≥200 to ≥2000; ≥90% if inlet POC <200 ppmv. Operation of carbon vessels will be conditioned to ensure attainment of an outlet concentration not to exceed 10 ppmv POC to ensure that the carbon is not saturated.

Offsets are not required as annual emissions will not exceed 10 tons.

Toxic Substances

The emissions of toxic substances listed above will be below the trigger levels listed in Regulation 2, Rule 5, Table 2-5-1. Therefore the emissions of toxic substances are not considered sufficient to warrant a Risk Screen Analysis. In accordance with the District's Regulation 2-5, the impact is then insignificant since the risk is within the threshold of 10 in a million as required for sources implementing TBACT. The applicant has agreed to monitor emissions of benzene and ethylbenzene, and to determine the cumulative annual emissions. Annual emissions are conditioned not to exceed the toxic trigger levels for benzene of 3.8 pounds/year and ethyl benzene of 43 pounds/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. Evaluation of this project is consistent with Chapter 9.2 of the permit handbook.

Compliance

District Rules and Regulations Applicable Requirements: Soil vapor extraction operations are subject to Regulation 8-47 (Air Stripping and Soil Vapor Extraction Operations). 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 an Electric Catalytic Oxidizer, or Carbon adsorption system at all times of operation, which will achieve above 90% reduction efficiency.

In accordance with Regulation 2-1-413, the District may issue "a single portable permit which will allow the source to operate anywhere in the District, provided the APCO approves the permit, and the source meets the definition of portable equipment set forth in Section 2-1-220." This SVE unit meets the requirements of the Definition of Portable Equipment (Regulation 2-1-220).

Conditions:

COND# 25284 ----------

1. The owner/operator of this source (S-1) shall provide written notification to the Engineering Division at least 3 days prior to start-up of operation at any new location. The notification shall include:
   a. Application Number 24290 and Plant Number 21197.
   b. Street address including zip code, for the location where the equipment will be operated.
   c. The name and telephone number of a contact person where the equipment will be operated.
   d. The date of initial start-up and estimated duration of operations at that location.
   e. The distance from the source to the outer boundary of the nearest K-12 school, or indication that the distance is greater than 1500 feet.

   In the event that the start-up is delayed less than 5 days, the operator may provide telephone notice of said change to assigned Plant Engineer in the Engineering Division. If the start-up is delayed more than 5 days, written notification must be resubmitted.

2. The owner/operator shall not allow this equipment to remain at any single location for a period in excess of 12 consecutive months, following the date of initial operation, except as allowed under Section 2-1-220.10. If this portable equipment remains at any fixed location for more than 12 months, the portable permit will automatically revert to a conventional permanent location permit and the owner/operator will lose the portability of this permit. [Basis: Regulation 2-1-220.2]

3. The owner/operator shall operate this portable equipment, S-1, at all times in conformance with eligibility requirements set forth in Regulation 2-1-220 for portable equipment. [Basis: Regulation 2-1-220]

4. The owner/operator shall not operate this equipment within 1000 feet of the outer boundary of any K-12 school, unless the applicable requirements of the California Health and Safety Code Section 42301.6 have been met. This will require the submittal of an application for a revised permit to operate. [Basis: Regulation 2-1-220.4] These notification requirements have been satisfied for operation at 2790 Homestead Road, Santa Clara, CA . [Basis: Regulation 2-1-220.4]

5. The owner/operator shall use this equipment exclusively for removal of non-chlorinate volatile organic compounds associated with petroleum products from extracted soil vapor. This shall be demonstrated by onsite sampling required in condition 10 below. [Basis: Regulation 2-5]

6. The owner/operator shall abate the Precursor Organic Compound (POC) emissions from Source S-1 by A-1, SVE abatement System, consisting of either an Electric Catalytic Oxidizer, or at least two (200 lbs minimum capacity) Activated Carbon Vessels during all periods of operations. 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. Soil vapor flow rate shall not exceed 350 scfm. [Basis: Regulation 8-47-301.1, and 302]

7. The owner/operator shall operate A-1 Electric Catalytic Oxidizer such that the POC abatement efficiency shall be maintained at a minimum of 98.5% by weight for in let 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 by the owner/operator. For inlet concentrations below 200 ppmv, a minimum abatement efficiency of 90% shall be maintained by the owner/operator. 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 3.8 pounds per year for source S-1. In no event shall ethylbenzene emissions to the atmosphere exceed 43 pounds per year for source S-1.
[Basis: Cumulative Increase, Regulation 2-5, TBACT]

8. The owner/operator shall not operate A-1 Electric Catalytic Oxidizer below a minimum operating temperature of less than 600 degrees Fahrenheit. [Basis: Cumulative Increase, Regulation 2-5, TBACT]

9. To determine compliance with part 8, the owner/operator shall equip the A-1 Electric Catalytic Oxidizer with continuous measuring and temperature recording instrumentation. The owner/operator shall collect and maintain the temperature data from the temperature recorder 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.

[Basis: Regulation 1-523]

10. To determine compliance with part 7, within ten days after start-up of the electric catalytic oxidizer, the owner/operator of this source 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, Ethylbenzene and POC present.
    c. Calculate the benzene and ethylbenzene emission rate in pounds per day based on the exhaust gas analysis and the operating exhaust flow rate. The owner/operator shall decrease the soil vapor flow rate, if necessary, to demonstrate compliance with Condition 7.
    d. Calculate the POC abatement efficiency based on the inlet and exhaust gas analysis. For the purpose of determining compliance with condition 7, 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, Benzene and ethylbenzene.

    [Basis: Cumulative Increase, Regulation 2-5, TBACT]

11. The owner/operator of this source shall maintain the following records for each month of operation of the 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]

12. During the operation of the A-1 Activated Carbon Vessels, the owner/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 purposes of these permit conditions. [Basis: Cumulative Increase, Regulation 2-5, TBACT]

13. The owner/operator shall record these monitor readings in a monitoring log at the time they are taken. The owner/operator shall use the monitoring results to estimate the frequency of carbon change-out necessary to maintain compliance with parts 14 and 15, and shall be conducted on a daily basis. The owner/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. [Basis: Cumulative Increase, Regulation 2-5, TBACT]

14. The owner/operator shall immediately change out the second to last Carbon vessel 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).
    [Basis: Cumulative Increase, Regulation 2-5, TBACT]

15. The owner/operator shall immediately change out the last Carbon vessel with unspent Carbon upon detection at its outlet of 10 ppmv (measured as hexane). [Basis: Cumulative Increase, Regulation 2-5, TBACT]

16. The owner/operator of this source shall maintain the following information for each month of operative 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: Regulation 1-523]

17. Within 30 days from the completion of each treatment operation at a given location, the owner/operator of this source shall provide the assigned Permit Engineer in the Engineering Division with a summary showing the following information:

    a. The dates and total number of days that the equipment was at that location and the dates, and total number of days that the equipment was operated at that location.
    b. A summary of the abatement efficiency, benzene and ethylbenzene emission rate as determined and reported in the start-up sampling report required by condition 10e above.
    c. The results of any additionally performed emission test, analysis, or monitoring result logged in for the day of operation they were taken.
    d. The total throughput of contaminated soil vapor processed by S-1 at that location (indicated in cubic feet).
    e. The total emissions of benzene and ethylbenzene at that location based on the sampling results required by conditions 10 above.

    [Basis: Regulation 1-523]

18. Within 30 days after the end of every calendar year, the owner/operator of this source shall provide the assigned Permit Engineer in the Engineering Division a year-end summary showing the following information:
    a. The location(s) at which the equipment was operated including the dates operated at each location.
    b. The total throughput of contaminated soil vapor for the previous four quarters (indicated in cubic feet).
    c. The total benzene and ethylbenzene emissions for the previous four quarters (indicated in pounds).

    [Basis: Regulation 1-523]

19. 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 conditional Permit to Operate. The owner/operator shall maintain and retain all measurements, records and data required for at least two years following the date the data is recorded. [Basis Regulation 1-523]

20. The owner/operator shall report any non-compliance 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: Cumulative Increase, Regulation 2-5, TBACT]

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

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 Change of Condition for the equipment listed below. However, the proposed source will be located within 1000 feet of a school which triggers the public notification requirements of District Regulation 2-1-412.6. 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 a Change of Condition for the following source:

S-1 Portable Soil Vapor Extraction system consisting of a 350 max scfm vacuum blower, and ancillary equipment, abated by
A-1 Portable SVE Abatement System consisting of an Electric Catalytic Oxidizer or a Carbon Adsorption System, consisting of two (200 lbs minimum capacity) Activated Carbon Vessels connected in series.

By _____ Date _____

Judith A. Cutino, PE
Senior Air Quality Engineer