DRAFT

Engineering Evaluation
CalClean, Inc.; Plant No. 12568
Application No. 29611

Background

CalClean, Inc. has requested a Change of Condition to an existing Permit to Operate for a Portable Soil Vapor Extraction Unit (S-3) (Application No. 13287, P/O issued on 12/13/2007) to allow the equipment to be operated at 7225 Bancroft Avenue in Oakland. The purpose of this project is to remediate residual concentrations of petroleum hydrocarbons in the gasoline range, such as benzene, toluene, ethylbenzene, xylene (BTEX), and methyl tert-butyl ether (MTBE) compounds, in the subsurface soil and groundwater at the site. The site is a former gasoline service station.

S-3: Portable Dual Phase Extraction System consisting of a 500 max scfm vacuum blower, and ancillary equipment, abated by A-1, Thermal/Catalytic Oxidizer.

This portable soil vapor extraction unit consists of a regenerative vacuum blower (S-3) with a maximum capacity of 500 scfm. Soil vapor and groundwater will be extracted with vapor abatement achieved by thermal/catalytic oxidation. The thermal/catalytic oxidizer will be equipped with continuous temperature monitoring to ensure that Best Available Control Technology (BACT) destruction efficiencies are met. Emission monitoring for operation of the equipment will be conducted according to established Source Test methodology. Procedures are outlined in the conditions.

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 Air Pollution Control Office (APCO) approves the permit, and the source meets the definition of portable equipment."

Permit conditions will ensure that the requirements, and any expressed emission limits of for portable equipment 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 2-5.

For Portable Equipment per Regulation 2-1-413.3: " The source will not 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 will be operated at 7225 Bancroft Avenue in Oakland, California. This location is within 1,000 feet of the outer boundary of Markham Elementary School. This operation, at this location, requires this permit application to amend the permit conditions and to conduct public notification per Regulation 2-1-412.

Regulation 2-1-412.2 requires that the public notice be distributed to all K-12 schools within ¼ mile of this source. There are no other K-12 schools within ¼ mile of this source. A Public Notice will be prepared and will be 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.

Emission Calculations

This portable soil vapor extraction unit has an existing permit.
Emission Calculations from A/N 28010 are as follow:

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^{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 500 scfm throughout; maximum influent concentration = 6000 ppmv VOC, 100 ppmv benzene; destruction efficiency = 98.5% for throughout.

Emissions of Precursor Organics:

$$6000E\text{-}6 * \frac{500\ ft^3}{min} * \frac{1440\ min}{1\ day} * \frac{28.32L}{1\ ft^3} * \frac{1\ mole}{24.15L} * \frac{100g}{mole} * \frac{1\ lb}{454g} * (1 - 0.985) = \textbf{16.7 lb/day}\ (abated)$$

TABLE 1
Criteria Pollutant Emissions For Soil Vapor Extraction System, S-3

Source	POC
S-3 (lb/day)	16.7
S-3 (lb/year)	6,109
S-3, TPY	3.055

TABLE 2
Toxic Pollutant Emissions
Chronic Emissions

Pollutant Name	Project Emissions lb/yr	Chronic Trigger Level (lb/yr)	Chronic Emissions > Trigger Level?
Benzene	1.77	3.80	NO
Toluene	19	12,000	NO
Ethyl Benzene	7	43	NO
Xylene	41	27,000	NO
MTBE	25	210	NO

Acute Emissions

Pollutant Name	Project Emissions lb/hr	Acute Trigger Level (lb/hr)	Acute Emissions > Trigger Level?
Benzene	2.0E-04	2.90E+00	NO
Toluene	2.1E-03	8.20E+01	NO
Ethyl Benzene	8.0E-04	N/A	NO
Xylene	4.7E-03	4.90E+01	NO
MTBE	3.0E-03	N/A	NO

Highest Daily Emissions **=** ***13.9 lb/day***
Annual Emissions **=** ***2.54 tons/yr***

Cumulative Increase

The Air District tracks increases in emissions from each facility. These cumulative emissions were reset on April 5, 1991 for all facilities. For portable equipment, the cumulative emission increases are charged to the plant pursuant to the initial permit application for the portable equipment. In this case, the emissions summarized above were added to the cumulative emission increases for this facility pursuant to Application #16470. These cumulative emission increases will not change for subsequent applications at new locations, unless the operation requires a higher permitted emissions limit. For Application # 29611, the applicant has not requested any increases in emission limits. Therefore, this current application does not result in any cumulative emission increases.

TABLE 3
Cumulative Emission Increases, Plant #12568 (tons per year)

Pollutant	Existing	Proposed Project	Post-Project
PM_{10}	0	0	0.000
POC	3.055	0	3.055
NO_x	0	0	0.000
SO_2	0	0	0.000
CO	0	0	0.000

Health Risk Assessment

A Health Risk Assessment need not be prepared as the applicant has agreed to monitor emissions of benzene and determined the cumulative annual emissions. Annual emissions are conditioned to the toxic trigger level of 2.9 pounds. Highest daily emissions are limited to 0.0079 pounds per day. The equipment will most likely be operated at one location for only a short duration so this annual limit should not be difficult to meet. In accordance the District Regulation 2-5, the impact is then insignificant as emissions do not trigger a risk screen; therefore the Toxics Section has recommended the issuing of this Authority to Construct permit with a benzene emission limit of 0.06 pounds per hour and 2.9 pounds per year. This annual benzene emission limit is equivalent to a daily average emission rate of 0.0079 pounds per day.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

In accordance with Regulation 2, Rule 2, Section 301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NOx, CO, SO_2 or PM_{10}.

As shown in Table 1, the emissions from S-3 and A-3 will exceed 10 pounds/day for precursor organic compounds. Therefore, BACT was required under the initial permit application for this portable equipment. As shown in Table 4 below, S-3 and A-3 satisfy BACT for soil vapor extraction operations.

TABLE 4
BACT for Soil Vapor Extraction
(Document # 151A.1)

Pollutant	BACT1	Typical Technology	BACT2	Typical Technology
POC	<10 ppmv at outlet of control device; or >98.5% capture/destruction efficiency	Two or More Activated Carbon Canister in Series or Thermal Oxidizer	<10 ppmv at outlet of control device; or >98.5% capture/destruction efficiency if inlet VOC >2000 ppmv; or >97% capture/destruction efficiency if inlet VOC >200 to <2000 ppmv; or >90% capture/destruction efficiency if inlet VOC <200 ppmv	Two or More Activated Carbon Canisters in Series or Thermal Oxidizer or Catalytic Oxidizer

BACT is a POC emission concentration less than 10 ppmv at outlet of the control device or a combined capture and destruction efficiency greater than 98.5% by weight. S-3 is abated by a thermal/catalytic oxidizer (A-3) with a guaranteed capture and destruction efficiency of at least 98.5% by weight, which satisfies this POC BACT requirement

OFFSETS

Offsets must be provided for any new or modified source at a facility that emits more than 10 tons/year of POC or NOx per Regulation 2, Rule 2, Section 302. Based on the calculations above, offsets are not required for this application.

California Environmental Quality Act (CEQA)

Air District's Regulation 2, Rule 1, Section 310 specifies that all proposed new and modified sources subject to District permit requirements must be reviewed in accordance with the CEQA requirements, except for ministerial projects or projects exempt from CEQA under Section 2-1-312. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 9.2, Soil Vapor Extraction. Therefore, this application is considered to be ministerial and is exempt from CEQA review.

Statement of 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.

Permit Conditions

Application 29611; Plant 12568: Source S-3, Portable Soil Vapor Extraction System

[Permit Condition #22646]

1. The owner/operator of this source 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 (13287, 16470, 28010, & 29611) and Plant Number (12568).
   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 the assigned Plant Engineer in the Engineering Division. If the start-up is delayed more than 5 days, written notification must be resubmitted. [basis: Reg. 1-523]

2. This equipment shall not 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 2-1-413.7. 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 will lose its portability. [basis: Reg. 2-1-220.2]

3. This portable equipment, S-3, shall operate at all times in conformance with the eligibility requirements set forth in Regulation 2-1-413 for portable equipment. [basis: Reg. 2-1-413]

4. This equipment is not to be operated 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. These notification requirements have been satisfied for operation at 2500 Laurel Street in Napa, CA (94558), 793 South Van Ness Avenue in San Francisco, CA (94110) and 7225 Bancroft Avenue, Oakland, CA (94605). [basis: Reg. 2-1-413.3]

5. This equipment shall be used exclusively for the removal of non-chlorinated volatile organic compounds associated with petroleum products from extracted soil vapor. This shall be demonstrated by onsite sampling required in condition 10 below. [basis: Reg. 2-5]

6. Precursor Organic Compound (POC) emissions from S-3 shall be abated by abatement device A-3, thermal/catalytic oxidizer during all periods of operation. Soil vapor flow rate shall not exceed 500 scfm. [basis: Reg. 8-47-301.1,2 and Cumulative Increase]

7. The POC abatement efficiency of abatement device A-3 shall be maintained at a minimum of 98.5% by weight for inlet POC concentrations greater than or equal to 2000 ppmv (measured as C6). 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 C6). In no event shall benzene emissions to the atmosphere exceed 0.06 pounds per hour or 0.0079 pounds per day. Annual emissions of benzene shall not exceed 2.9 pounds per year. [basis: BACT; Reg. 2-5-110]

8. While operating as a thermal oxidizer, the minimum operating temperature of A-3 shall not be less than 1400 degrees Fahrenheit. While operating as a catalytic oxidizer, the minimum operating temperature of A-3 shall not be less than 600 degrees Fahrenheit. [basis: BACT]

9. To determine compliance with Condition Number 8, 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. [basis Reg. 1-523]

10. To determine compliance with Condition 7, within 24 hours after start-up of the thermal/catalytic oxidizer at any new location, the operator of this source shall:
    a. Analyze the inlet gas stream to determine the vapor 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 7.
    d. Calculate the POC abatement efficiency based on the inlet and exhaust gas sampling 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 8021 or their equivalent to determine the concentrations of POC and benzene.

    [basis: Reg. 1-523]

11. Within 30 days from the completion of each treatment operation at a given location, the operator of this source shall provide the assigned Plant 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 and benzene 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-3 at that location (indicated in cubic feet).
    e. The total emissions of benzene at that location based on the sampling results required by condition 10 above.

    [basis: Reg. 1-523]

12. Within 30 days after the end of every calendar year, the operator of this source shall provide the assigned Plant 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 emissions for the previous four quarters (indicated in pounds).

    [basis: Reg. 1-523]

13. 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. 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. 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. [basis: Reg. 1-523]

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 Authority to Construct/Permit to Operate for the sources listed below. However, the proposed sources will be located within 1,000 feet of a school, which triggers the public notification requirements of District Regulation 2-1-412. After 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 an Authority to Construct/Permit to Operate for the following sources:

S-3: Portable Dual Phase Extraction System consisting of a 500 max scfm vacuum blower, and ancillary equipment, abated by A-1, Thermal/Catalytic Oxidizer.

by_____ date_____

Flora Chan
Senior Air Quality Engineer