Engineering Evaluation
Former UST Site.
Plant Number20608
Application Number 26178

Background

On behalf of UST, Calclean has applied for an Authority to Construct for the following soil remediation project at the site located at of 899 Broadway, Sonoma, CA 95470.

S-1:Dual Phase Extraction (DPE) System consisting of a 450 max scfm blower, and ancillary equipment, abated by A-1 SVE Abatement System, consisting of a natural gas fired Thermal Catalytic Oxidizer.

Both soil and groundwater will be extracted simultaneously using a dual phase extraction system (DPE) under a high vacuum. This will be accomplished by means of a regenerative vacuum blower (S-1,) with a maximum operating capacity of 450 scfm. The vacuum unit is also equipped with a water knockout vessel, inlet filter, dilution air valve, recirculation valve, and flow indicators. The vapor abatement will be achieved by passing the vapors through a water knockout box and then through a Thermal Cat-Ox unit. The Thermal Cat-Ox system will be equipped with continuous temperature monitoring to ensure that BACT destruction efficiencies are met. The condensate from the SVE unit that is in the knockout vessel will be polished by two carbon vessels connected in series prior to being released into the local POTWs wastewater system. The facility has obtained the required permits from the County and EBMUD.

Emission monitoring for operation of the Thermal Cat-Ox unit Calclean will be conducted according to established Source Test methodology. Procedures are outlined in the conditions found below. Monitoring schedule changes will be allowed only after District review of concentration measurements and subsequent receipt of District approval.

Public Notice:

This source is located within 1,000 feet of the outer boundary of the following two schools that are on the same campus Thus this application requires Public Notification in accordance with Reg. 2-1-412.

- Creekside High School and Sonoma Valley High School, 20000 Broadway, Sonoma, CA 95476

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. This Evaluation Report was posted on the District Webpage along with the Public Notice. A phone line was set-up at the District to receive public comments.]

Emission Calculations

For a conservative estimate of yearly emissions, we shall assume that the A-1is operated for the entire year with an inlet concentration corresponding to the initial soil concentration level. Generalized assumptions follow:

- Operating conditions: Pressure = 1 Atm; Inlet Temperature = 21^{O}C; (V/n =RT/P) 387 ft^{3}.
- Molecular weight of TPHg = 102 g/mole (value for "weathered gasoline"). Molecular weight of Benzene = 78.11 g/mole
- Influent values based on operational parameters of equipment and applicant supplied soil vapor test results: influent rate 450 scfm throughout; maximum influent concentration = 150 ppmv TPH(g), and Benzene 0.08 ppmv, Toluene 0.065 ppm(v), Ethylbenzene 1.7 ppm (v), MTBE 0.35 ppm (v), Xylene 1.7 ppm(v); destruction efficiency = 98.5 % throughout.

Emissions of Precursor Organic Compounds: TPH (g)

$$710\text{ E-}6 * \frac{450\text{ ft}^3}{\text{min}} * \frac{1440\text{ min}}{1\text{ day}} * \frac{\text{lb mole}}{387\text{ ft}^3} * \frac{102\text{ lb}}{\text{lb mole}} * (1 - 0.985) = \underline{1.82\text{ lbm/day (abated) or } 664.3\text{ lb/y or } 0.332\text{ t/y}}$$

Emission Calculations spreadsheet for Soil Vapor Extraction System

BAAQMD Plant #	20608										
Application #	26178										
Facility Name	Former UST Site										
Soil Vapor Extraction System			**Abatement Device**								
Data Form G			Data Form A								
Total Flow Rate	450	scfm	*Select the abatement devices for the proposed project:*					Enter the destruction efficiency:			
	450	ft^3/min	Thermal/ Catalytic Oxidizer					Efficiency	98.5%		
								Reduction	1.5%		

	Toxic Air Contaminants (TACs)	Chronic Trigger Level [1] [lb/year]	Chronic Trigger Level [lb/day]	Molecular Weight (MW) [g/mol]
Former Dry Cleaning Sites	PCE	1.80E+01	4.93E-02	165.8
	TCE	5.40E+01	1.48E-01	131.4
	Vinyl Chloride	1.40E+00	3.84E-03	62.5
Former GDFs	Benzene	3.80E+00	1.04E-02	78.1
	Toluene	1.20E+04	3.29E+01	92.1
	Ethyl Benzene	4.30E+01	1.18E-01	106.2
	Xylenes	2.70E+04	7.40E+01	106.2
	MTBE	2.10E+02	5.75E-01	88.2

For unit conversion:

	365	*days/year*
	1440	*mins/day*
1 lb/mole	*386*	*ft^3*
1lb	*0.0005*	*ton*
1 day	*86400*	*s*
1lb	*453.6*	*g*

1.Chronic Trigger level per District's Regulation 2-5, Table 2-5-1, amended 1/6/2010

	Influent vapor concentration [µg/m^3]	Influent vapor concentration [2] [ppmv]		Unabated Emission [lb/day]	Abated Emission [lb/day]	Abated Emission [lb/yr]	Emission exceeds Chronic Trigger Levels [3] (Yes/No)	Unabated Emission Factors [4] [lb/cubic feet]
PCE			0.0E+00	0.000	0.000	0.000	No	0.00E+00
TCE			0.0E+00	0.000	0.000	0.000	No	0.00E+00
Vinyl Chloride [5]			0.0E+00	0.000	0.000	0.000	No	0.00E+00
Benzene	2600	0.8	8.0E-07	0.105	0.002	0.574	No	1.62E-07
Toluene	2400	0.65	6.5E-07	0.101	0.002	0.550	No	1.55E-07
Ethyl benzene	8300	1.9	1.9E-06	0.339	0.005	1.854	No	5.23E-07
Xylenes	17000	4	4.0E-06	0.713	0.011	3.903	No	1.10E-06
MTBE	13000	0.35	3.5E-07	0.052	0.001	0.284	No	7.99E-08
			Total	1.309	0.020	7.165		

2. Unit conversions on the influent vapor concentractions:

[µg/m3] to [ppmv] : Influent vapor concentration [ppmv] = Influent vapor concentration [µg/m3] * 0.02404 / MW

3. If the emission exceeds Chronic Trigger Levels, please consult with the owner/operator if they would accept the trigger level limit in the permit conditions. Otherwise, Health Risk Screening Analysis will be conducted to deteremine the maximum emission limits for the proposed project.

4. Enter the Unabated Emission Factors [lb/ cubic feet] on the Data Form G

5. Please verify if there is an appropriate abatement efficiency for Vinyl Chloride - Using Permangangate will have 99 % destruction efficiency. Using Carbon Vessels will have 0% destruction efficiency.

The following table presents the TAC emissions due to natural gas Combustion at the Former UST Site Natural Gas Fired Cat/Ox System

Former UST Site : Naturla Gas Fired Cat/Ox System
Application #26178

Natural Gas Fired Catalytic Oxidation System

TACs	CATEF Mean Emission Factor[1] (lb/MMcf, NG)	Maximum Annual Emission Rate (lb/yr)	Maximum Hourly Emission Rate (lb/hr)	Chronic Trigger Level (lb/yr)	TAC Triggers Chronic? (yes/no))	Ac
Acetaldehyde	8.83E-01	1.52E+00	1.73E-04	3.80E+01	no	
Acrolein	5.47E-01	9.41E-01	1.07E-04	1.40E+01	no	
Benzene[2]	7.39E-02	2.54E-01	2.90E-05	3.80E+00	no	
1,3 Butadiene	1.04E-01	1.79E-01	2.04E-05	6.30E-01	no	
Ethylbenzene	1.16E-02	2.00E-02	2.28E-06	4.30E+01	no	
Formaldehyde[2]	4.99E-02	1.72E-01	1.96E-05	1.80E+01	no	
Naphthalene	7.65E-02	1.32E-01	1.50E-05	3.20E+00	no	
PAH, as B(a)P	See Below	3.64E-04	4.15E-08	6.90E-03	no	
Propylene	1.60E+01	2.75E+01	3.14E-03	1.20E+05	no	
Toluene	1.07E+00	1.84E+00	2.10E-04	1.20E+04	no	
Xylene (Total)	6.02E-02	1.04E-01	1.18E-05	2.70E+04	no	

Poylcyclic Aromatic Hydrocarbons (PAH)	CATEF (Mean) Emission Factor[1] (lb/MMcf, NG)	PAH Emissions (lb/yr)	Benzo(a)pyrene Equivalency Factor (PEF)	Equivalent PAH Emissions (lb/yr)
Benzo(a)anthracene	2.94E-04	5.06E-04	0.10	5.06E-05
Benzo(b)fluoranthene	2.37E-04	4.08E-04	0.10	4.08E-05
Benzo(k)fluoranthene	1.03E-04	1.77E-04	0.10	1.77E-05
Benzo(a)pyrene	1.15E-04	1.98E-04	1.00	1.98E-04
Chrysene	3.10E-04	5.33E-04	0.01	5.33E-06
Dibenz(a,h)anthracene	1.25E-05	2.15E-05	1.05	2.26E-05
Indeo(1,2,3-cd)pyrene	1.69E-04	2.91E-04	0.10	2.91E-05
			Total =	**3.64E-04**

Maximum Firing Rate	**0.400**	MMBTU/hr
Hours of Operation	**8760.0**	hrs/yr
NG Combustion	**3.4**	MMcf/year

Notes:

1. Emissions factors are from the CARB database of "California Air Toxics Emissions Factors" (CATEF) for Natural Gas Fired 4 Stroke Rich Burn IC
2. Benzene and Formaldehyde emissions are from the CATEF database for 4 Stroke Rich Burn IC Engines <650 HP using NSCR. A catalyst abaten

Secondary Emissions:

From District's Permit Handbook Chapter 9.2:
Reasonably Available Control Technology (RACT) for thermal oxidation:
NOx = 0.2 lb/MMBTU
CO = 0.8 lb/MMBTU

PM10 = 0.075 lb/MMBTU
SO2 = 0.0006 lb/MMBTU
POC = 0.0054 lb/MMBTU

The annual emission from the proposed thermal oxidizer (450,000 BTU/hr)

Es = F x B x H

Where:
Es = Annual emissions for abatement device (lbs/yr)
F = Emission Facotr of Criteria Pollutant (lb/MMBTU)
B = Maximum Firing Rate of Burner in Abatement Device (MMBTU/hr)
H = Maximum Number of Hours the oxidizer will operate = (24 hr/day x 365 day/yr = 8760 hrs/yr)

Pollutant	Emission Factor (F) [lb/MMBtu]	Maximum Firing Rate (B) [MMBtu/hr]	Hours/yr (H) [hrs]	Annual Emission [1] (Es) [lb/yr]	Annual Emissions (t/y)
NOx	0.2	0.4	8760	700.8	0.350
CO	0.8	0.4	8760	2803.2	1.402
PM10	0.075	0.4	8760	262.8	0.131
SO2	0.0006	0.4	8760	2.1	--
POC	0.0054	0.4	8760	18.9	0.009

Cumulative Increase- tons/yr

Pollutant	Existing (t/y)	Current (t/y)	Total (t/y)
NOx	0	0.350	0.350
CO	0	1.402	1.402
PM10	0	0.131	0.131
SO_2	0	--	--
POC	0	0.009	0.009

Compliance

Toxics

This facility Toxic Air Contaminant (TAC) emissions are below the trigger levels listed in Regulation 2-5, Table 2-5-1 and thus does not trigger risk screen. The TAC of importance is benzene emissions. Benzene trigger in Table 2-5-1 is 3.8 lb/y which works out to be an average of 0.01 lb/d. In accordance with the District's Regulation 2-5, the impact is then insignificant if the benzene emission exceed the above limits. Toxics Section has recommended the issuing an A/C for the facility with a benzene emission limit of 0.01 lbs/day or 3.8 lbs/year.

New Source Review

This proposed project will emit over 10 pounds 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 catalytic oxidizer will be conditioned to ensure attainment of the 98.5% destruction.

Offsets

Offsets are not applicable for this application, as emissions do not exceed 10 tons/yr. Thus this facility is not subject to Reg 2-2-302.

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.

Regulation 8-47

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 Catalytic Oxidizer, at all times of operation. This project is within 1,000 feet from the following public schools and is therefore subject to the public notification requirements of Regulation 2-1-412.

In addition, the condensate that is collected from the DPE unit will be polished by two 1000 pound carbon vessels in series prior to being discharged to the local POTW.

Conditions

FormerUST Site.
Plant Number20608
Application Number 26178

Condition Number: **25859**

1. The owner/operator shall abate the Precursor Organic Compound (POC) emissions from Source S-1 Dual Phase Extraction (DPE) system abated by A-1, SVE Abatement System, consisting of a Catalytic Oxidizer 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. The owner/operator shall operate the sources such that the soil vapor flow rate from S-1 shall not exceed 450 scfm. [basis: Cumulative Increase, Regulation. 8-47-301 and 302, TBACT]

2. The owner/operator shall operate A-1 Thermal Oxidizer such that the POC abatement efficiency shall be maintained at a minimum of 98.5% by weight for inlet POC concentrations. 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 the owner/operator emit benzene emissions to the atmosphere exceeding 0.01 pounds per day and MTBE emissions to the atmosphere exceeding 0.5 pounds per day. [basis: Cumulative Increase, Regulation 2-5, TBACT]

3. While operating the Catalytic Oxidizer, the owner/operator shall not operate A-1 below a minimum operating temperature of 600 degrees Fahrenheit. [basis: Cumulative Increase, Regulation 2-5, TBACT]

4. To determine compliance with part 3, the owner/operator shall equip the A-1 Thermal 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]

5. To determine compliance with part 2, within ten days after start-up of the Thermal Oxidizer, and within ten days after start-up of the 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 and POC present.
    c. Calculate both benzene and MTBE emission rates in pounds per day based on the exhaust gas analysis and the operating exhaust flow rate. The owner/operator shall decrease the dual phase extraction unit vapor flow rate, if necessary, to demonstrate compliance with part 2.
    d. Calculate the POC abatement efficiency based on the inlet and exhaust gas analysis. For the purpose of determining compliance with part 2, the owner/operator shall report the POC concentration as hexane.
    e. Submit to the District's Engineering Division the test results and emission calculations within one month from the testing date. The owner/operator shall analyze samples according to modified EPA test methods 8015 and 8020 or their equivalent to determine the concentrations of POC and benzene.

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

6. The owner/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. Total throughput of soil vapor from source S-1 in Standard Cubic Feet.

    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]

7. 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]

8. 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 Authority to Construct/Permit to Operate. All measurements, records and data required to be maintained by the owner/operator shall be retained for at least two years following the date the data is recorded. [basis: Regulation 1-523]

9. Upon final completion of the remediation project, the owner/operator of Source S-1 shall notify the Engineering Division within two weeks of decommissioning the operation. [basis: Cumulative Increase, Regulation 2-5, TBACT]

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 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. 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 Permit to Operate for the following source::

S-1: Dual Phase Extraction (DPE) System consisting of a 450 max scfm blower, and ancillary equipment, abated by A-1 SVE Abatement System, consisting of a natural gas fired Thermal Catalytic Oxidizer.

By Hari S Doss October 15, 2014