

Engineering Evaluation
Chevron Environmental Management Company
Plant # 20316
Application Number 22293

Background

On behalf of Chevron Service Station 9-8247, Stantec Consulting Corporation has applied for an Authority to Construct an SVE system abated by an electric catalytic oxidizer. This soil vapor extraction unit consists of a regenerative vacuum blower (S-1) with a maximum capacity of 300 scfm. Soil vapor will be extracted with vapor abatement achieved by electric catalytic oxidation or a minimum of two (200 pound) carbon beds in series. Any liquid phase wastewater that is collected from the knockout drums will be collected in 55 gallon drums and disposed off-site for treatment. Emission monitoring for operation of the equipment will be conducted according to established Source Test methodology. Procedures are outlined in the conditions

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

This source is located within 1,000 feet of the outer boundary of Thomas P Ryan Elementary School, and within ¼ mile of Mildred Gross Elementary School, and as such this application requires Public Notification via Reg. 2-1-412. 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.

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: influent rate = 209 scfm (maximum); maximum influent concentration = 4000 ppmv POC, 44 ppmv benzene destruction efficiency = 97% for throughout.

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MW TPH	102
efficiency	97.00%
air flow rate	209
days/yr	365

Soil Vapor Extraction

Compound	MW	ppm (V)	unabated lbm/day	abated lbm/day	abated lbm/yr	abated tons/yr	Trigger Level lbm/yr
TPH	102	4000	317.29116	9.518735	3474.33823	1.737169	
Benzene	78.11	44	2.6727425	0.080182	29.2665309	0.014633	3.8
Toluene	92.1402	41	2.9378581	0.088136	32.1695466	0.016085	12000
Ethylbenzene	106.167	11	0.908197	0.027246	9.94475671	0.004972	43
Xylene	106.167	37.7	3.1126387	0.093379	34.0833935	0.017042	27000

Facility has accepted a reduced flowrate to pass risk:

MW TPH	102
efficiency	97.00%
air flow rate	150
days/yr	365

Soil Vapor Extraction

Compound	MW	ppm (V)	unabated lbm/day	abated lbm/day	abated lbm/yr	abated tons/yr	Trigger Level lbm/yr
TPH	102	4000	227.72093	6.831628	2493.54419	1.246772	
Benzene	78.11	44	1.9182363	0.057547	21.0046873	0.010502	3.8
Toluene	92.1402	41	2.1085106	0.063255	23.0881913	0.011544	12000
Ethylbenzene	106.167	11	0.651816	0.019554	7.1373852	0.003569	43
Xylene	106.167	37.7	2.2339512	0.067019	24.4617656	0.012231	27000

Compound	Tons/yr
POCs	1.25

Cumulative Increase- tons/yr

	<i>Current</i>	<i>Total</i>
POCs	1.25	1.25

S-2 Emissions from the storage drums are exempt as the drum is closed and hauled offsite for disposal and the capacity is less than 260 gallons and aqueous phase is less than 1% (wt) organic compounds. Exempt per 2-1-123.1 and per 2-1-123.2.

Toxics

Emissions of these toxic compounds warrant a Toxic Risk Screen Analysis, as the emissions are above the trigger level from Regulation 2 Rule 5 Table 2-5-1. A risk screen analysis was performed, and it was determined the risk

was 8.8 in a million if facility reduced flowrate to 150 scfm. The facility is utilizing TBACT. Emissions have been reduced so that the risk does not exceed 10 in a million. The facility is in compliance with Regulation 2 Rule 5. A condition limit of benzene not to exceed 0.057 pounds per day or 21.004 pounds per year will be included in the permit condition. The Toxics Section has recommended the issuing of this A/C with a compound emission limits.

The ISCST3 air dispersion computer model was used to estimate annual average ambient air concentrations. The model was run with [screen](#) meteorological data. Elevated terrain was considered using 10m DEM input from the USGS San Jose East, San Jose West, Milpitas, Calaveras Reservoir areas. Model run was made with [rural](#) dispersion coefficient as Urban/Rural classification was determined based on the typing scheme proposed by Auer. Stack and building parameters for the analysis were based on information provided by the applicant.

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 Carbon vessels will be conditioned to ensure attainment of the following required destruction efficiencies: $\geq 98.5\%$ if inlet POC ≥ 2000 ; $\geq 97\%$ if inlet POC ≤ 2000 to >200 ppmv; $\geq 90\%$ if inlet POC <200 ppmv. Manufacturer literature state destruction efficiency of the catalytic oxidizer is greater than 99% and the facility would be in compliance with BACT guidelines.

Based on the information submitted, this operation is 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 Catalytic oxidizer or carbon beds arranged in series at all times of operation.

Offsets

Offsets are not applicable for this application, as emissions do not exceed 10 tons/yr. Facility 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 Chapter 9.2 of the permit handbook for soil treatment systems.

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 an electric Catalytic Oxidizer, or Carbon adsorption system at all times of operation. The POC emissions will be vented through a Thermal/Cat Ox or Carbon adsorption system at all times of operation.

The storage drums will have a capacity less than 260 gallons. This results in emissions being below the trigger level and the facility meets the exemption criteria of Regulation 2-1-123.1 (Tank less than 260 gallons capacity) and Regulation 2-1-123.2 (aqueous solution contains less than 1% (wt) organic compounds).

This project is within 1,000 ft from the nearest public school and is therefore subject to the public notification requirements of Regulation 2-1-412.

PSD, NSPS, and NESHAPS are not triggered.

Recommendation

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

- S-1: Soil Vapor Extraction System consisting of a 300 max scfm vacuum blower, and ancillary equipment, abated by A-1, SVE Abatement System, consisting of electric Catalytic Oxidizer or a minimum of two 200 lb capacity Carbon Adsorption Vessels arranged in series

And recommend that a C/E be issued for:

Enclosed Storage Drums less than 260 gallons exempt per 2-1-123.1 and 2-1-123.2

Conditions for S-1:

1. The owner/operator shall abate the Precursor Organic Compound (POC) emissions from Source S-1 Soil Vapor Extraction System by A-1, SVE Abatement System, consisting of either an electric Catalytic Oxidizer, or two (200 lbs minimum capacity) Activated Carbon Vessels arranged in series 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 SVE system shall not exceed 150 scfm [basis: Cumulative Increase, Regulation. 8-47-301 and 302, TBACT]
2. The owner/operator shall operate A-1 Catalytic Oxidizer such that the POC abatement efficiency 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 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 the owner/operator emit benzene emissions to the atmosphere exceeding 0.057 pounds per day or 21.004 pounds per year, for source S-1. [basis: Cumulative Increase, Regulation 2-5, TBACT]
3. While operating the Thermal Oxidizer, the owner/operator shall not operate A-1 SVE Abatement System below a minimum operating temperature of less than 1400 degrees Fahrenheit. While operating the Catalytic Oxidizer, the owner/operator shall not operate A-1 Abatement System 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 the benzene 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 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, benzene, ethyl benzene, MTBE,. [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 Oxidizer or 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. During operation of the 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 purpose of these permit conditions. [basis: Cumulative Increase, Regulation 2-5, TBACT]

8. 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 10 and 11, 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 owner/operator prior to a change to the monitoring schedule. [basis: Cumulative Increase, Regulation 2-5, TBACT]
9. 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 of the higher of the following:
- a. 10 % of the inlet stream concentration to the carbon bed.
 - b. 10 ppmv (measured as hexane).
- [basis: Cumulative Increase, Regulation 2-5, TBACT]
10. 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]

11. The owner/operator of this source shall maintain the following information for each month of operation of the Activated Carbon Vessels:
- Hours and time of operation.
 - Each emission test, analysis or monitoring results logged in for the day of operation they were taken.
 - The number of Carbon vessels removed from service.
 - Total throughput of soil vapor from sources S-1 SVE system in Standard Cubic Feet.

The owner/operator shall retain and make available for inspection by the District such records for two years following the date the data is recorded. [basis: Regulation 1-523]

12. 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]
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 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]
14. Upon final completion of the remediation project, the owner/operator of Source S-1 SVE system, shall notify the Engineering Division within two weeks of decommissioning the operation. [basis: Cumulative Increase, Regulation 2-5, TBACT]

by _____
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