

**Engineering Evaluation
Exxon Mobil Oil Corp
Plant # 19494
Application Number 19769**

DRAFT

Background

Exxon Mobil Oil Corp, has applied for an A/C for equipment necessary for soil remediation at the site located at 1690 Sullivan Avenue in Daly City CA. Treatment will consist of a dual-phase extraction (DPE) system (equipment consisting of a soil vapor extraction unit (SVE)/ groundwater (GW) treatment unit). The dual phase (DPE) system will use a liquid ring vacuum pump to extract soil vapor and groundwater from the subsurface at monitoring well # MW2. This site previously had an SVE system that was closed in Feb 2001 under A/N 17763. Under A/N 17763 a risk screen analysis and Public Notice were performed as emissions exceeded the toxic trigger level and emissions from the previous application are provided for informational purposes only (benzene concentration at 150 ppmv and for TPH at 6000 ppmv). A 120 cfm maximum blower flow rate will abate the vapors by either using two 200 lb minimum granular activated carbon vessels in series or an electric thermal/catalytic oxidizer. The condensate from the DPE unit will run through two 500 lbs carbon vessels in series prior to being transferred to a closed 6500 gallon holding tank. The treated wastewater in the closed holding tank will contain less than 1 percent by weight of organic compounds. The treated wastewater will be transferred offsite with a pump truck for disposal.

The Therm-Ox and Cat-Ox will be equipped with continuous temperature monitoring to ensure that BACT destruction efficiencies are met. The abatement system would use natural gas and not be electrical. Thus, emissions from the abatement source also need to be calculated.

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. Exxon Mobile Environmental Services 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.

This source is located within 1,000 feet of the outer boundary of a school and as such, this application requires Public Notification via Reg. 2-1-412. 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. This Evaluation Report will be posted on the District Webpage along with the Public Notice. A phone line is set-up at the District to receive public comments.

Emission Calculations

For a conservative estimate of yearly emissions, we shall assume that the carbon unit or Thermal/Catalytic Oxidizer is 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°C; (V/n =RT/P) 387 ft³.
- Molecular weight of TPHg = 102.2 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 120 scfm throughout; maximum influent concentration = 827 ppmv VOC, 1 ppmv benzene; destruction efficiency = 97.0% throughout.

S-1 Emissions Dual Phase Extraction System- see attached spreadsheet for detail of calculations

Emissions of Precursor Organics:

$$827E-6 * \frac{120 \text{ ft}^3}{\text{min}} * \frac{1440 \text{ min}}{1 \text{ day}} * \frac{\text{lb mole}}{387 \text{ ft}^3} * \frac{102.2 \text{ lb}}{\text{lb mole}} * (1 - 0.97) = \mathbf{1.103 \text{ \#/day}} \text{ (abated)}$$

Emissions of Toxic Air Contaminants (benzene):

$$1E-6 * \frac{120 \text{ ft}^3}{\text{min}} * \frac{1440 \text{ min}}{1 \text{ day}} * \frac{1 \text{ lb mole}}{387 \text{ ft}^3} * \frac{78.11 \text{ lb}}{\text{lb mole}} * (1 - 0.97) = \mathbf{0.001 \text{ lbm/day}} \text{ (abated)}$$

Storage Tank Emissions

Concentrations found in the groundwater at MW-2 for the following constituents include: TPH 690 ppb, MTBE 1200 ppb and Tert Butyl Alcohol 370 ppm. These compounds are pumped at a rate not to exceed 5 gpm and are abated by carbon vessels in series prior to being stored in the closed holding tank for discharge offsite.

Groundwater Treatment	
days/yr	365
Treatment Unit gal/min	5
2 Carbon Units Efficiency	99%

Groundwater Extraction Unit

Chemicals	Trigger Level lbm/yr	Trigger Level lbm/day	Abatement			
			ppm in H2o	lbm/day	Efficiency 95%	lbm/day in H2O phase
TPH			0.69	0.041	0.041	4.143E-04
T-butyl alcohol			0.37	0.022	0.022	2.222E-04
BTME methyl-tert-butyl ether	3.60E+0 2	9.86E- 01	1.2	0.072	0.071	7.206E-04

S-2 Emissions from the storage tank are negligible as this is an enclosed storage tank with capacity of 6500 gallons and aqueous phase is less than 1% (wt) organic compounds. Exempt per 2-1-123.2.

Cumulative Increase:

POCs **0.201 tons/yr**

Toxics

No emissions exceed the toxic trigger level and no risk analysis is required. The facility is in compliance with District's Regulation 2 Rule 5 and the impact is insignificant. The source will be implementing TBACT level control. Therefore, the Toxics Section has recommended the issuing of this A/C with a Benzene emission limit of **0.017#/day or 6.4 lbm/yr**.

New Source Review

This proposed project will emit over 10 lbs per highest day before abatement and is therefore required to implement BACT; facility will comply with TBACT. For Soil Vapor Extraction operations, BACT is defined as attainment of set destruction efficiencies corresponding to set influent concentration values. Operation of the electric Thermal/Catalytic Oxidizer or carbon vessels arranged in series, 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. Offsets need not be imposed as annual emissions will not exceed 10 tons.

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 n electric Thermal or Catalytic oxidizer at all times of operation or two (200 lbs) carbon vessels in series. In addition, the facility is complying with Reg 2-2-212, as cumulative emissions for the abatement device are included in plant emissions.

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.

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 or Catalytic Oxidizer at all times of operation.

The tank will have a capacity of 6500 gallons and MTBE emissions in water will be less than 1.2 ppm. The groundwater is treated with two aqueous phase granulated activated carbon units in series. This results in emissions being below the trigger level and the facility meets the exemption criteria of 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 source:

- S-1: Dual Phase Extraction System consisting of a 120 max scfm vacuum blower, and ancillary equipment, abated by A-1, SVE Abatement System, consisting of either an electric Thermal/Catalytic Oxidizer or A-2 SVE Abatement System, consisting of two (200 lb minimum capacity) activated carbon vessels arranged in series,

And recommend that a C/E be issued for:

- S-2: Groundwater Treatment –pump rate to abatement device shall not exceed 5 gpm; abated by 2 carbon beds in series- and contained in a closed 6500 Gallon Holding Tank exempt per 2-1-123.2

Conditions for S-1:

1. Precursor Organic Compound (POC) emissions from Source S-1 shall be abated by either Abatement device A-1 SVE Abatement System, consisting of either an electric Thermal Oxidizer or electric Catalytic Oxidizer or A-2 SVE Abatement System, consisting of two (200 lb minimum capacity) activated carbon vessels arranged in series. Vapor flow rate shall not exceed 120 scfm. [Basis. Cumulative Increase, BACT/TBACT]
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 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 0.017 pounds per day or 6.4 pounds per year for source S-1. [Basis. Cumulative Increase, Regulation 2-5, TBACT]
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. The District may adjust this minimum temperature, if source test data demonstrates that an alternate temperature is necessary for or capable of maintaining compliance with Part 2 above. [basis: Cumulative Increase; Regulation 2-5, TBACT]
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. [basis: Regulation 1-523]
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.

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

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. 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 A-2, 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 Air Pollution Control Officer 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, BACT/TBACT)

8. The owner/operator shall record these monitor readings 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 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 Permit Services Division must be received by the owner/operator prior to a change to the monitoring schedule. In no event shall the owner/operator emit benzene emissions to the atmosphere exceeding 0.0175 pounds per day or 6.4 pounds per year for S-1. (basis: Cumulative Increase, Regulation 2-5, BACT/TBACT)
9. The owner/operator shall 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 vessel.
 - b. 10 ppmv or greater (measured as hexane).[basis: Cumulative Increase, Regulation 2-5, TBACT]

10. The owner/operator shall change out the last carbon vessel with unspent carbon upon detection at its outlet of 10 ppmv or greater (measured as hexane).
[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 source:
 - a. The hours and times of operation.
 - b. Each monitor reading or analysis result for the day of operation they are taken.
 - c. The number of carbon beds removed from service.
 - d. Total throughput of soil vapor from source S-1 in Standard Cubic Feet.

All measurements, records and data required to be maintained by the owner/operator shall be retained and made available for inspection by the District for at least two years [Note: This is five years for Title V facilities] following the date the data is recorded.
(basis: Cumulative Increase, BACT/TBACT, Regulation 1-523)

- 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.** [basis: Cumulative Increase, Regulation 2-5].
- 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: Cumulative Increase, BACT/TBACT, Regulation 1-523].
- 14. Upon final completion of the remediation project, the operator of Source S-1 shall notify the Engineering Division within two weeks of decommissioning the operation. [basis: Cumulative Increase, Regulation 2-5, TBACT]

by _____
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