

DRAFT
ENGINEERING EVALUATION REPORT
EXXON MOBIL OIL CORPORATION
PLANT NUMBER 22530
APPLICATION NUMBER 26416

1201 Tennessee Street
Vallejo, CA 94590

Background

On behalf of Exxon Mobil Oil Corporation, Cardno ERI has applied to obtain an Authority to Construct and a Permit to Operate for an Air Sparge/Dual Phase extraction system operation at the above referenced former gas station contaminated site in Vallejo, CA. The soil vapor extraction system consists of a regenerative vacuum blower with a capacity of up to 120 cfm and water knockout drums. Soil vapor will be extracted and abated by either two (200 pound each) carbon beds arranged in series or an electric catalytic oxidizer. 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 permit conditions.

The Carbon unit influent and effluent VOC concentrations will be monitored with a portable flame-ionization detector (OVA-FID) on a schedule reflecting initial loading rates and predicted Carbon capacity. Monitoring schedule changes will be allowed only after District review of concentration measurements and subsequent receipt of District approval.

The application covers the following source:

- S-1 Air Sparge/ Dual Phase Extraction System Operation – Liquid-Ring vacuum pump; AIRTECH Model 2BL1281 or equivalent, abated by A-1 or A-2**
- A-1 Electric Catalytic Oxidizer, Falmouth Products, FALCO-100, 120 cfm.**
- A-2 Carbon Adsorption Vessels (200 lb each) – 2 in series, Siemens, VSC-200 or equivalent.**

Emission Calculations

For a conservative estimate of yearly emissions, it is assumed that the system is operated for an entire year within an inlet concentrations corresponding to the initial soil vapor concentration levels.

Basis:

- * **Operating conditions:** Pressure = 1 Atm; Inlet Temperature = 21°C
- * **Influent values based on operational parameters of equipment and soil vapor test results:**
Influent rate = 52 cfm maximum;
Influent concentrations:
Total petroleum hydrocarbons as gasoline, TPH = 11 mg/L
Benzene = 0.031 mg/L; Ethylbenzene = 0.051 mg/L; Xylene = 0.72 mg/L; MTBE = 0.01 mg/L
- * Electric catalytic oxidizer destruction efficiency = 98% by wt.

$$\text{Emissions, lb/day} = \text{mg/L} * \text{cfm} * 1440 \text{ min/day} * 28.32 \text{ L/cf} * \text{E-3g/mg} * 1 \text{ lb/454 g} * (1-0.98)$$

Emissions are calculated using the above equation and the basis.

TPH as gasoline emissions (POC) = 11 mg/L*52 cfm*1440 min/day*28.32 L/cf*E-3 g/mg*1 lb/454 g *(1-0.98)
 = 1.03 lb/day
 = 375 lb/yr @365 days/yr
 = 0.188 tpy

Toxics Emissions:

Benzene = 0.0029 lb/day
 = 0.0002 lb/hr
 = 1.06 lb/yr @365 days/yr
Ethylbenzene = 0.0048 lb/day
 = 1.74 lb/yr @365 days/yr
Xylene = 0.067 lb/day
 = 0.0028 lb/hr
 = 24.6 lb/yr @365 days/yr
MTBE = 0.001 lb/day
 = 0.342 lb/yr @365 days/yr

Plant Cumulative Increase

POC = 0.188 tpy

Toxics Emissions and Health Risk Screening Analysis

Benzene, Ethylbenzene, Xylene, and MTBE are the toxic compounds expected to be emitted from the operation and their emissions, as shown below, are below the chronic toxic trigger levels and acute toxic trigger levels given in the Table 2-5-1 of Regulation 2-5. Therefore, a health risk screening is not required.

Toxic Compound	Emission, lb/hr	Acute Trigger level, lb/hr	Emission, lb/yr	Chronic Trigger level, lb/yr
Benzene	0.0002	2.9	1.06	3.8
Ethylbanzene			1.74	43
Xylene	0.0028	49	24.6	2.7E+4
MTBE			0.342	210

BACT

POC emissions from the proposed project will be < 10 pounds per highest day and therefore are not subject to the BACT requirements of Regulation 2-2-301.

2-2-301 Best Available Control Technology Requirement: An applicant for an authority to construct or a permit to operate shall apply BACT to any new or modified source:

301.1 Which results in an emission from a new source or an increase in emissions from a modified source and which has the potential to emit 10.0 pounds or more per highest day of precursor organic compounds (POC), non-precursor organic compounds (NPOC), nitrogen oxides (NOx), sulfur dioxide (SO₂), PM₁₀ or carbon monoxide (CO). BACT shall be applied for any of the above pollutants which meets both criteria.

(Amended 6/15/94; 10/7/98; 5/17/00)

Offsets

Offsets requirements of Regulation 2-2-302 are not triggered for facility wide or permitted POC emissions < 10 tpy.

CEQA

The project is considered to be ministerial under the Districts 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 evaluated as per the guidance in Chapter 9.2 of the permit handbook.

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 an electric catalytic oxidizer or a carbon adsorption system at all times of operation.

The project is located within 1000 feet of the nearest K-12 school, Vallejo High School, and therefore is subject to the public notice requirements of Regulation 2-1-412. A public notice was distributed on-----to the parents and guardians of the students of the schools within ¼ mile of the project and to all the addresses within 1000 feet of the project. The comment period ended on-----and ----- comments were received.

[Discuss comments, if any.]

PSD, NSPS, and NESHAPS are not triggered.

Permit Conditions

S-1 Air Sparge/ Dual Phase Extraction System Operation – Liquid-Ring vacuum pump; AIRTECH Model 2BL1281 or equivalent, abated by A-1 or A-2

A-1 Electric Catalytic Oxidizer, Falmouth Products, FALCO-100, 120 cfm.

A-2 Carbon Adsorption Vessels (200 lb each) – 2 in series, Siemens, VSC-200 or equivalent.

1. The owner/operator shall abate the Precursor Organic Compound (POC) emissions from Source S-1 by A-1 or A-2, SVE Abatement System, consisting of either an Electric Catalytic Oxidizer, or two (200 lbs minimum capacity) Activated Carbon Vessels 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 source such that the soil vapor flow rate from S-1 shall not exceed 52 scfm.
[Basis: Cumulative Increase, Regulation 8-47-301 and 302, TBACT]
2. 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 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 3.8 pounds per year or 0.01 pounds per day.
[Basis: Cumulative Increase, Regulation. 2-5, TBACT]
3. While operating the Electric 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, 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]

5. To determine compliance with part 3, 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 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 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 Electric 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:
 - 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.
 - d. 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]

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 operator of Sources S-1 shall notify the Engineering Division within two weeks of decommissioning the operation.
[Basis: Cumulative Increase, Regulation 2-5, TBACT]

Recommendations

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 the District, State, and federal air-quality related regulations. The preliminary recommendation is to issue an Authority to Construct for the source listed below. However, the source will be located within 1000 feet of a K-12 school, which triggers the public notification requirements of the District Regulation 2-1-412. After the comments are received and reviewed, the District will make a final determination on the permit.

The public notification commenced on ----- and expired on-----, ----- comments were received and after reviewing it is my recommendation that the District issue an Authority to Construct for the following source:

- S-1 Air Sparge/ Dual Phase Extraction System Operation – Liquid-Ring vacuum pump; AIRTECH Model 2BL1281 or equivalent, abated by A-1 or A-2**
- A-1 Electric Catalytic Oxidizer, Falmouth Products, FALCO-100, 120 cfm.**
- A-2 Carbon Adsorption Vessels (200 lb each) – 2 in series, Siemens, VSC-200 or equivalent.**

By: _____
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Aie Quality Engineer II