

**Engineering Evaluation
Atlantic Richfield Co.
Plant # 18740
Application Number 16832**

Background

On behalf of Atlantic Richfield Co, Secor International Incorporated has applied for an A/C for equipment necessary for soil remediation at the site located at 230 South El Camino Real in San Mateo 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 350 CFM liquid ring blower to extract soil vapor and groundwater from the subsurface. Vapor abatement will be achieved by means of a Thermal Oxidation (Therm-Ox) or Catalytic Oxidation (Cat-Ox) system. The extracted groundwater chemicals will be collected and pumped through two aqueous phase granulated activated carbon units in series then placed in a closed holding tank of 150 gallon capacity and disposed of in accordance with the local POTW requirements.

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.

This source is located within 1,000 feet of the outer boundary of St. Matthew's Episcopal Day School, and as such this application requires Public Notification via Reg. 2-1-412. A Public Notice will be 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.

Emission Calculations

For a conservative estimate of yearly emissions, we shall assume that the 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 350 scfm throughout; maximum influent concentration = 1700 ppmv VOC, 23 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:

$$1700E-6 * \frac{350 \text{ ft}^3}{\text{min}} * \frac{1440 \text{ min}}{1 \text{ day}} * \frac{\text{lb mole}}{387 \text{ ft}^3} * \frac{102.2 \text{ lb}}{\text{lb mole}} * (1 - 0.97) = \mathbf{6.79 \text{ \#/day}} \text{ (abated)}$$

Emissions of Toxic Air Contaminants (benzene):

$$23E-6 * \frac{350 \text{ ft}^3}{\text{min}} * \frac{1440 \text{ min}}{1 \text{ day}} * \frac{1 \text{ lb mole}}{387 \text{ ft}^3} * \frac{78.11 \text{ lb}}{\text{lb mole}} * (1 - 0.97) = \mathbf{0.07 \text{ lbm/day}} \text{ (abated)}$$

min 1 day 387ft³ lb mole

Emission calculations from abatement equipment (Thermal/Catalytic Oxidizer) A-1

Emission Factors are Taken From AP-42 Table 1.4-2 Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion. AP-42 Chapter 1.4 Natural Gas Combustion: RACT emissions for NOx is 0.20 lb/MMBTU and RACT emissions for CO is 0.80 lb/MMBTU. Facility is complying with RACT requirements per April 13, 1999 District Policy. Memo included in evaluation.

	Fuel Input <u>Table 1.4-2</u>	<u>Table 1.5-1</u>
NOx		0.20 lb/MMBTU
CO		0.80 lb/MMBTU
POC	5.7 lb/MMscf	0.0056 lb/MMBTU
PM10	7.6 lb/MMscf	0.0075 lb/MMBTU
SO2	0.6 lb/MMscf	0.00059 lb/MMBTU

Hours of Operation = 24 hr/yr
Heating Value = 1020 BTU/scf
Heat Input = 0.5 MMBtu/hr

Emissions from Abatement Device Thermal/Cat Oxidizer A-1:

NOx = 0.2 lb/MMBTU (0.5 MMBTU/hr)(8760 hr/yr) = 876 lbm/yr or 0.438 TPY
CO = 0.80 lb/MMBTU (0.5 MMBTU/hr)(8760 hr/yr) = 3504.0 lbm/yr or 1.752 TPY
POC = 0.0056 lb/MMBTU (0.5 MMBTU/hr)(8760 hr/yr) = 24.48 lbm/yr or 0.0122 TPY
PM10 = 0.0075 lb/MMBTU (0.5 MMBTU/hr)(8760 hr/yr) = 32.64 lbm/yr or 0.0163 TPY
*SO2 = 0.00059 lb/MMBTU (0.5 MMBTU/hr)(8760 hr/yr) = 2.58 lbm/yr or 0.0013 TPY

Compound	s	lbm/day	lbm/yr	tons/yr
POCs		6.855	2502.075	1.251038
NOX		2.4	876	0.438
CO		9.6	3504	1.752
PM-10		0.0894	32.631	0.016316
SO2		0.00705	2.57325	0.001287

S-2 Emissions negligible as it is an enclosed storage tank with capacity 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

Although the benzene emissions would ordinarily warrant a Toxic Risk Screen Analysis, the applicant has indicated that he believes the concentrations will drop rapidly, and would prefer to accept a benzene emission rate equal to the Toxic Trigger level. Influent flow to the oxidizer may easily be diluted to achieve this lower emission rate. In accordance with the District's Regulation 2 Rule 5, the impact is then insignificant since the emission rate is below the trigger level requiring a Risk Analysis. 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 Thermal/Catalytic Oxidizer, 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 Thermal or Catalytic oxidizer at all times of operation. Emissions of the thermal/cat oxidizer is in compliance with Reg 2-2-112 as RACT is being used RACT. RACT for NO_x is 0.20 lb/MMBTU and for CO it is 0.8 lb/MMBTU. Emission factors were taken from AP-42 Table 1.4-2. 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 150 gallons and benzene emissions in water will be less than 28 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 2-1-123.1 (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 source:

S-1: Dual Phase Extraction System consisting of a 350 max scfm vacuum blower, and ancillary equipment, abated by A-1, SVE Abatement System, consisting of either a Thermal Oxidizer or Catalytic Oxidizer,

And recommend that a C/E be issued for:

S-2: Enclosed Holding Tank exempt per 2-1-123.1 and 2-1-123.2

Conditions for S-1:

1. Precursor Organic Compound (POC) emissions from Source S-1 shall be abated by Abatement device A-1 SVE Abatement System, consisting of either a Thermal Oxidizer or Catalytic Oxidizer. Vapor flow rate shall not exceed 350 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:
- Days and hours of operation.
 - Each emission test, analysis or monitoring results logged-in for the day of operation they were taken.
 - 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. Nitrogen oxides (NO_x) emissions from thermal/Cat oxidizer A-1 shall not exceed 50 ppmvd @ 15% O₂ (0.20 lbm/MMBtu) [basis: RACT, Source Test Method 13A]
8. Carbon Monoxide (CO) emissions from the thermal/Cat oxidizer A-1 shall not exceed 350 ppmvd @ 15% O₂ (0.80 lbm/MMBtu) [basis: RACT, Source Test Method 6]
9. Not later than 60 days from the startup of A-1, the owner/operator shall conduct District approved source tests to determine initial compliance with the Conditions 7 and 8. The owner/operator shall submit the source test results to the District staff no later than 60 days after the source test. [basis: RACT, Cumulative Increase]
10. The owner/operator shall obtain approval for all source test procedures from the District's Source Test Section prior to conducting any tests. The owner/operator shall comply with all applicable testing requirements as specified in Volume V of the District's Manual of Procedures. The owner/operator shall notify the District's Source Test Section, in writing, of the source test protocols and projected test dates at least 7 days prior to testing. [basis: RACT, Cumulative Increase]
11. 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].
12. 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].
13. 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 _____ date 4/3/08

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