

**Engineering Evaluation
Terra Pacific Group
Plant # 19154
Application Number 18377**

DRAFT

Background

On behalf of Pacific Gas & Electric, Terra Pacific Group Incorporated (TPG) has applied for an A/C for equipment necessary for soil remediation at the site located at 111 Santa Rosa Avenue in Santa Rosa, CA.. Treatment will consist of a Soil Vapor Extraction (SVE) system. This system will also include a heating element so that organics will off gas into the vadose zone more readily. The SVE system includes a 250 CFM liquid ring blower to extract soil vapor from the subsurface. Vapor abatement will be achieved by means of two Thermal Oxidation (Therm-Ox) or Catalytic Oxidation (Cat-Ox) systems in parallel. As the concentration decreases, one of the thermal oxidizers will be removed. Any water that is collected during the SVE process will be collected and placed in containers and disposed offsite. TPG will heat the subsurface by use of 31 electrodes installed to soil depths as deep as 29 feet. This will result in soil heating up and VOCs being off gassed to the SVE system for treatment.

The Therm-Ox and Cat-Ox will be equipped with continuous temperature monitoring to ensure that BACT destruction efficiencies are met. The abatement system(s) 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 Luther Burbank 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 school and to each address within a radius of 1,000 feet of the source. This Evaluation Report is 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 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^oC; (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 250 scfm throughout; maximum influent concentration = 3000 ppmv VOC, 1885 ppmv benzene; destruction efficiency = 98.5% throughout.

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

Emissions of Precursor Organics:

$$3000E-6 * \frac{250 \text{ ft}^3}{\text{min}} * \frac{1440 \text{ min}}{1 \text{ day}} * \frac{\text{lb mole}}{387 \text{ ft}^3} * \frac{102.2 \text{ lb}}{\text{lb mole}} * (1 - 0.985) = \mathbf{4.28 \text{ \#/day (abated)}}$$

Emissions of Toxic Air Contaminants (benzene):

$$1885E-6 * \frac{250\text{ft}^3}{\text{min}} * \frac{1440 \text{ min}}{1 \text{ day}} * \frac{1\text{lb mole}}{387\text{ft}^3} * \frac{78.11 \text{ lb}}{\text{lb mole}} * (1 - 0.985) = 2.05 \text{ lbm/day (abated)}$$

Compounds	Abated lbm/yr	Trigger Level Chronic lbm/yr
Carbon Disulfide	0.93056 9	3.10E+0 4
Methylene Chloride	43.7619 11.8956	180.00 7.70E+0
Ethyl benzene	4 391.673	4 5.3
Napthalene	5 749.915	5.3
Benzene	9 3.07657	6.4 3.50E+0
Styrene	8 54.4355	4 1.20E+0
Toluene	7 5.51525	4 2.70E+0
MP xylene	2 3.67686	4 2.70E+0
O xylene	9	4

Emission calculations from abatement equipment (Thermal/Catalytic Oxidizer) A-1 and A-2

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	5.5 lb/MMscf	0.0054 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 = 0.0054 lb/MMBTU (0.5 MMBTU/hr)(8760 hr/yr) = 23.62 lbm/yr or 0.0118 TPY

$$\text{PM}_{10} = 0.0075 \text{ lb/MMBTU} (0.5 \text{ MMBTU/hr})(8760 \text{ hr/yr}) = 32.64 \text{ lbm/yr or } 0.0163 \text{ TPY}$$

$$*\text{SO}_2 = 0.00059 \text{ lb/MMBTU} (0.5 \text{ MMBTU/hr})(8760 \text{ hr/yr}) = 2.58 \text{ lbm/yr or } 0.0013 \text{ TPY}$$

Emissions from 2 Thermal Oxidizers and SVE system

Compound	lbm/day	lbm/yr	tons/yr
POCs	4.408	1608.76	0.804
NOX	4.8	1752.0	0.876
CO	19.2	7008.0	3.504
PM-10	0.179	65.27	0.033
SO2	0.014	5.153	0.00258

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 does not exceed 10 in a million. The facility has agreed to accept a limitation of emissions for the following compounds: benzene, naphthalene and methylene chloride. Therefore, the Toxics Section has recommended the issuing of this A/C with a benzene emission limit of 2.05 lbm/day, for naphthalene the emission limit is 1.07 lbm/day and for methylene chloride the limit can not exceed 0.12 lbm/day.

The ISCST3 air dispersion computer model was used to estimate annual average ambient air concentrations. Since the ISCST3 model does not estimate air concentrations within a building cavity region, where potential receptors are located, the ISC Prime model was also run. The model was run with Santa Rosa (2003) meteorological data, and Santa Rosa terrain data. Model runs were made with both urban and rural dispersion coefficients. The highest concentrations occur for the model run using the rural dispersion coefficients, therefore these values were used in the health risk calculations. Stack and building parameters for the analysis were based on information provided by the applicant.

New Source Review

This proposed project will not emit over 10 lbs per highest day for the SVE system. Secondary emissions from the abatement equipment result in cumulative increases in excess of 10 lbm/day and the facility is complying with RACT per Reg 2-2-112. BACT is not required for the facility though it 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. 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 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. Public notification was performed.

PSD, NSPS, and NESHAPS are not triggered.

Recommendation

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

S-1: Soil Vapor Extraction System consisting of a 250 max scfm vacuum blower, and ancillary equipment, abated by A-1, SVE Abatement System, consisting of a Thermal Oxidizer or Catalytic Oxidizer, and or A-2, SVE Abatement System, consisting of a Thermal Oxidizer or Catalytic Oxidizer

And recommend that a C/E be issued for:

S-2: Enclosed Storage Drums less than 260 gallons 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 and or A-2 SVE Abatement Systems, consisting of either a Thermal Oxidizer(s) or Catalytic Oxidizer(s). Vapor flow rate shall not exceed 250 scfm. [Basis. Cumulative Increase, BACT/TBACT]

2. The POC abatement efficiency of abatement devices A-1 and A-2 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 2.05 pounds per day, naphthalene emissions into the atmosphere can not exceed 1.07 pounds per day and methylene chloride emissions into the atmosphere can not exceed 0.12. [Basis. Cumulative Increase, Regulation 2-5, TBACT]
3. While operating as a Thermal Oxidizer(s), the minimum operating temperature of A-1 and A-2 shall not be less than 1400 degrees Fahrenheit. While operating as a Catalytic Oxidizer(s), the minimum operating temperature of A-1 and A-2 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(s) 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(s), and within ten days after start-up of the Catalytic Oxidizer(s), 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, naphthalene, methylene chloride and POC present.
 - c. Calculate the benzene, naphthalene and methylene chloride emission rates 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, benzene, methylene chloride and naphthalene.[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(s):
 - 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 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]
8. 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].
9. 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].
10. 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 8/20/08

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