

. Engineering Evaluation
Union Pacific Rail Road
37105 Mission Blvd.
Fremont, CA 94536
Plant # 23464; Application Number 28625

1. Background:

CH2M Hill on behalf of Union Pacific Railroad obtained a Permit to Operate for the following Soil Vapor Extraction System(SVE) that is being used to clean-up contaminated soil at 37105 Mission Blvd., Fremont, CA 94536 and is presently operating. The permit was issued under Application 27805.

The owner/operator has applied to obtain a modified permit wherein they want to change the abatement equipment from an electric catalytic thermal oxidizer to the following 250,000 Btu/hour gas fired thermal oxidizer.

S-1 Soil Vapor Extraction System with 150 SCFM Regenerative Blower Abated by A-3
A-3 Thermal Oxidizer, 250,000 Btu/h Solleco Thermcat 150.

Table 1 presents the TAC emissions from Application 27805. A risk screen was performed based on the TACs presented in Table 1.

Table 1: TAC Emissions from Application 27805

TAC	Emission, lb/y
Benzene	98.9
Toluene	1.1
Ethyl Benzene	19.1
MTBE	115.2

Since this modification is initiated within 3 years of the original project, in accordance with Regulation 2-5 the project is to be considered as one project. Combustion of natural gas results in TAC emissions. Thus, the existing TAC emission is added to the TAC emissions from the gas fired thermal oxidizer to run the risk screen.

The following school is located within 1000 feet of the source:

Niles Elementary School
37141 2nd Street
Fremont, CA

Public Notification was done for Application 27805. Since there is additional TAC emissions due to combustion, the Public Notice is repeated in accordance with Regulation 2-1-412.

2. Emission Calculations

Table 2 presents the TAC emissions resulting from the combustion of natural gas in the thermal oxidizer A-3.

Table 2: TAC Emission Due to Natural Gas Combustion

Former UST Site : Natural Gas Fired Thermal Oxidizer							
Application #28625							
TACs	CATEF Mean Emission Factor ¹	Maximum Annual Emission Rate	Maximum Hourly Emission Rate	Chronic Trigger Level	TAC Triggers Chronic?	Acute Trigger Level	TAC Triggers Acute?
	(lb/MMcf, NG)	(lb/yr)	(lb/hr)	(lb/yr)	(yes/no)	(lb/h)	(yes/no)
Acetaldehyde	8.83E-01	1.90E+00	2.16E-04	2.90E+01	no	1.00E+00	no
Acrolein	5.47E-01	1.17E+00	1.34E-04	1.40E+01	no	5.50E-03	no
Benzene ²	7.39E-02	1.59E-01	1.81E-05	2.90E+00	no	6 E-2	no
1,3 Butadiene	1.04E-01	2.23E-01	2.55E-05	4.80E-01	no	1.50E+00	no
Ethylbenzene	1.16E-02	2.49E-02	2.84E-06	3.30E+01	no	N/A	N/A
Formaldehyde ²	4.99E-02	1.07E-01	1.22E-05	1.40E+01	no	1.20E-01	no
Naphthalene	7.65E-02	1.64E-01	1.88E-05	2.40E+00	no	N/A	N/A
PAH, as B(a)P	See Below	See Below	See Below	3.90E-03	no	N/A	N/A
Propylene	1.60E+01	3.44E+01	3.92E-03	1.2 E5	no	N/A	N/A
Toluene	1.07E+00	2.30E+00	2.62E-04	1.20E+04	no	8.20E+01	no
Xylene (Total)	6.02E-02	1.29E-01	1.48E-05	2.70E+04	no	4.90E+01	no
Poylcyclic Aromatic Hydrocarbons (PAH)	CATEF (Mean) Emission Factor (lb/MMcf, NG)	PAH Emissions (lb/yr)	benzo(a)pyrene Equivalency Factor (PEF)	Equivalent PAH Emissions (lb/yr)			
Benzo(a)anthracene	2.94E-04	6.31E-04	0.10	6.31E-05			
Benzo(b)fluoranthene	2.37E-04	5.09E-04	0.10	5.09E-05			
Benzo(k)fluoranthene	1.03E-04	2.21E-04	0.10	2.21E-05			
Benzo(a)pyrene	1.15E-04	2.47E-04	1.00	2.47E-04			
Chrysene	3.10E-04	6.66E-04	0.01	6.66E-06			
Dibenz(a,h)anthracene	1.25E-05	2.68E-05	1.05	2.82E-05			
Indeno(1,2,3-cd)pyrene	1.69E-04	3.63E-04	0.10	3.63E-05			
			Total =	4.54E-04			
Maximum Firing Rate	0.250 MMBTU/hr						
Hours of Operation	8760.0 hrs/yr						
NG Combustion	2.15 MMcf/year						

Table 3 presents the Cumulative TAC emissions from S-1 soil vapor extraction unit and thermal oxidizer A-3 natural gas combustion.

Table 3: Cumulative TAC Emissions from S-1 and A-3 Combustion

TACs	A-3 TAC Emission (lb/y)	S-1 TAC Emission (lb/y)	Total TACs (lb/y)
Acetaldehyde	1.90E+00		1.90E+00
Acrolein	1.17E+00		1.17E+00
Benzene	1.59E-01	98.9	9.91E+01
1,3 Butadiene	2.23E-01		2.23E-01
Ethylbenzene	2.49E-02	19.1	1.91E+01
Formaldehyde	1.07E-01		1.07E-01
Naphthalene	1.64E-01		1.64E-01
PAH, as B(a)P	4.54E-04		4.54E-04
Propylene	3.44E+01		3.44E+01
Toluene	2.30E+00	1.1	3.40E+00
Xylene (Total)	1.29E-01		1.29E-01
MTBE	0.00E+00	115.2	1.15E+02
Benzo(a)anthracene	6.31E-04		6.31E-04
Benzo(b)fluoranthene	5.09E-04		5.09E-04
Benzo(k)fluoranthene	2.21E-04		2.21E-04
Benzo(a)pyrene	2.47E-04		2.47E-04
Chrysene	6.66E-04		6.66E-04
Dibenzo(a,h)anthracene	2.68E-05		2.68E-05
Indeo(1,2,3-cd)pyrene	3.63E-04		3.63E-04
		Total	2.75E+02

Table 4 presents the criteria pollutant emissions from A-3, thermal oxidizer, due to natural gas combustion. The emission factors are from the Permit Handbook and conforms with Reasonably Available Control Technology(RACT) standards for the thermal oxidizer. The thermal oxidizer is expected to comply with RACT standards.

Table 4: Criteria Pollutant

Pollutant	Emission Factor lb/MMBtu (Note 1)	Maximum Firing Rate, MMBtu/h	Annual Operating Hours	Annual Emission, lb/y	Annual Emission, t/y
Oxides of Nitrogen (NOx)	0.2	0.25	8760	438	0.219
Carbon Monoxide (CO)	0.8	0.25	8760	1752	0.876
(Particulate Matter) PM10	0.075	0.25	8760	164.25	0.082
Sulfur Dioxide (SO2)	0.0006	0.25	8760	1.314	0.001
Precursor Organic Compound (POC)	0.0054	0.25	8760	11.826	0.006

Note 1: Emission factors from Permit Handbook Chapter 9.1

Total POC emission from S-1 and A-3 = 275 lb/y**/2000 = 0.138 t/y.

**Sum of TAC compounds from Table 3 is used as the total POCs since it is more conservative than the POC compounds listed in Table 4.

3. Cumulative Increase

Table 5 presents the Plant Cumulative Increase.

Table 5: Plant Cumulative Increase (ton/y)

Pollutant	Current	This Application (t/y)	Total (t/y)
POC	3.0550	0.138	3.193
NO _x	0	0.219	0.219
CO	0	0.876	0.876
PM10	0	0.082	0.082
SO ₂	0	0.001	0.001

4. Compliance Statements:

Toxics

At Source S-1, benzene emissions after abatement is 99.1 pound per year. Thus, benzene emission after abatement is above the chronic toxic trigger level of 2.9 pound per year listed in Regulation 2-5, Table 2-5-1. Therefore, benzene emissions are considered significant to warrant a risk screen analysis. Further, the following school is within 1000 feet of the source S-1. Thus, Public Notification is triggered in accordance with Regulation 2-1-412.

Niles Elementary School
37141 2nd Street
Fremont, CA

Risk Screening Analysis

S-1 meets Best Available Control Technology for toxics (TBACT). Estimates of residential risk assume exposure to annual average toxic air contaminant concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimates for offsite workers assume exposure occurs 8 hours per day, 245 days per year, for 40 years. Risk estimates for students assume a higher breathing rate, and exposure is assumed to occur 10 hours per day, 36 weeks per year, for 9 years.

Based on the calculated emissions and operating parameters source S-1 passed the Health Risk Screening Analysis (HRSA) conducted on August 15, 2017 by the District's Toxic Evaluation Section. The source poses no significant toxic risk, since the increased cancer risk to the maximally exposed residential receptor is 8.2 in a million, 0.6 in a million for the maximally exposed worker and 0.5 in a million for the students. Further, the hazard indices are less than 1 for residential, worker and the student receptors. Thus, in accordance with Regulation 2, Rule 5, this source complies with TBACT and project risk requirements.

Best Available Control Technology (BACT)

In accordance with Regulation 2, Rule 2, Section 301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per day of precursor organic compound (POC), non-precursor organic compound (NPOC), oxides of nitrogen (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂) or Particulate Matter (PM₁₀). This project will not emit over 10 pounds per day of the above pollutants. Thus, BACT is not triggered. However, the source is equipped with a thermal oxidizer that will abate the emissions further reducing the POC emissions to the atmosphere.

Reasonably Available Control Technology (RACT)

The thermal oxidizer is an abatement equipment and is exempt from Regulation 2-2-301 in accordance with Regulation 2-2-102. However the secondary emissions from A-3 should comply with RACT standards. The RACT emission factor standards for NO_x and CO are specified in the Permit Handbook Chapter 9.1 as 0.2 and 0.8 pound per million Btu. The thermal oxidizer is expected to comply with the NO_x and CO emission standards thus complying with Regulation 2-2-102. No source test is required in accordance with the District policy since the burner rating is less than 7.5 MMBtu per hour.

Offsets

Offsets must be provided for any new or modified source at a facility that emits more than 10 tons per year of POC or NO_x per Regulation 2-2-302. Table 5 above summarizes increases in criteria pollutant emissions at the plant.

Offsets are not applicable to this application, since the emissions do not exceed 10 tons/yr. Thus, this facility is not subject to Regulation 2-2-302.

California Environmental Quality Act (CEQA)

The project is 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 complies with Chapters 9.1 and 9.2 of the permit handbook.

District Regulations

This operation is expected to comply with Regulation 8-47-301, and 8-47-302. The regulation requires that POC and NPOC emissions be reduced by at least 90% by weight. Since the POC and NPOC emissions are vented through a thermal oxidizer, S-1 is expected to comply with this requirement.

Prevention of Significant Deterioration (PSD), New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAPS) are not triggered for source S-1.

5. Condition

Condition # 26563

1. The owner/operator shall abate Precursor Organic Compound (POC) emissions from Source S-1 by thermal oxidizer A-3 during all periods of operation. Soil vapor flow rate shall not exceed 150 scfm. [Basis: Reg. 8-47-301, 8-47-302]
2. The owner/operator of source S-1 shall maintain POC abatement efficiency of the thermal oxidizer A-3 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). Further the benzene emission shall not exceed 0.007 pounds per day. [Basis: TBACT; Regulation 2-5]
3. The owner/operator of source S-1 shall not operate A-3 thermal oxidizer, below a minimum operating temperature of 1400 degrees Fahrenheit. [Basis: Cumulative Increase, Regulation 2-5, TBACT]
4. The owner operator of source S-1 to determine compliance part 3 of the condition, the thermal 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 2-1-403]
5. To determine compliance with part 2, within ten days after start-up of the Thermal 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 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 information for each month of operation of the Thermal 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.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]
7. The owner/operator of S-1 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]
8. The owner/operator of Source S-1 shall report any non-compliance with these conditions to the Director of 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 at the time of occurrence in the submittal. [Basis: Cumulative Increase, Regulation 2-5, TBACT]
9. The owner/operator of S-1 upon completion of the remediation project, shall notify the Engineering Division within two weeks of decommissioning the operation. [Basis: Cumulative Increase, Regulation 2-5, TBACT]

6. Recommendation

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 District, state, and federal air quality-related regulations. The preliminary recommendation is to issue an Authority to Construct for the equipment listed below subject to Condition 26563. However, the proposed source will be located within 1000 feet of a school, which triggers the public notification requirements of District Regulation 2-1-412.

After the comments are received from the public and reviewed, the District will make a final determination on the permit. I recommend that the District initiate a public notice and consider any comments received prior to taking any final action on issuance of a Permit to Operate for the following source:

S-1 Soil Vapor Extraction System with 150 SCFM Regenerative Blower Abated by A-3
A-3 Thermal Oxidizer, 250,000 Btu/h Solleco Thermcat 150.

By: _____
Hari Doss

September 14, 2017