DRAFT Engineering Evaluation
Arcadis U.S., Inc.
1550 Space Park Drive, Santa Clara, California 95054
Plant No. 24864 (Site No. E4864)
Application No. 30926
Project Description: Soil Vapor Extraction System

Background

Arcadis U.S., Inc. has applied for an Authority to Construct for the following equipment:

S-1 Soil Vapor Extraction System
Mako 400CFM MKVES Blower, Maximum 400 CFM
Abated by A-1, Activated Carbon Vessels

A-1 Activated Carbon Vessels
Minimum of Two (2) 2,000-Pound Activated Carbon Vessels Arranged in Series

S-1 will operate at the southern end of a building located at 1550 Space Park Drive in Santa Clara, CA.

S-1 will include a 400-cfm vacuum blower which will be abated by two (2) 2,000-lb carbon vessels in series. Emissions are based on laboratory results and pilot test data submitted in this application for the site. The applicant will be required to stay below the acute and chronic trigger levels of Regulation 2-5.

Procedures are outlined in the conditions found below. Effluent volatile organic compound (VOC) concentrations will be monitored with a photoionization detector (PID) on a schedule reflecting current loading rates and predicted carbon capacity. Monitoring schedule changes will be allowed based on monitoring data collected.

Emission Calculations

Soil vapor data will be used to estimate precursor organic compound (POC), non-precursor organic compound (NPOC), and toxic air contaminant (TAC) emissions. It is assumed that the equipment can operate 24 hours a day, 365 days a year. The following are assumptions used to estimate emissions.

- Operating conditions: Pressure = 1 Atm; Inlet Temperature = 21^{O}C; 1 mole occupies 24.15 Liters (or 386.8 ft3/lb-mol)
- Hydrocarbons will be abated by two (2) 2,000-lb minimum activated carbon vessels in series. POC/NPOC cumulative emissions are based on a 3-ppm effluent concentration since the last carbon threshold changeout level on the last abatement vessel will be limited 3 ppm, calibrated to isobutylene.
- Toxic Air Contaminants (TAC) emissions will be based on soil vapor data submitted with this application.
- The organic influent flow rate of 400 scfm and abatement efficiency of 90% was used in the calculations.

Table 1. Emissions from Soil Vapor Extraction S-1						
Pollutant	CAS #	Abated Emissions				
		Inlet Conc. (ug/m3)	Hourly Emission Rate (lb/hr)	Daily Emission Rate (lb/day)	Annual Emission Rate (lb/yr)	Annual Emission Rate (ton/yr)
1,1,1-Trichloroethane	71-55-6	70	0.00	0.00	0.09	0.000
1,1-Dichloroethane	75-34-3	100	0.00	0.00	0.13	0.000
1,1-Dichloroethene	75-35-4	460	0.00	0.00	0.60	0.000
1,2,4-Trimethylbenzene	95-63-6	4.6	0.00	0.00	0.01	0.000
1,2-Dichlorobenzene	95-50-1	660	0.00	0.00	0.87	0.000
1,3,5-Trimethylbenzene	108-67-8	2.6	0.00	0.00	0.00	0.000
4-Ethyltoluene	622-96-8	4.1	0.00	0.00	0.01	0.000
Acetone	67-64-1	440	0.00	0.00	0.58	0.000
Benzene	71-43-2	22	0.00	0.00	0.03	0.000
Carbon Disulfide	75-15-0	33	0.00	0.00	0.04	0.000
cis-1,2-Dichlorothene	156-59-2	5500	0.00	0.02	7.21	0.004
Ethyl Acetate	141-78-6	220	0.00	0.00	0.29	0.000
Ethylbenzene	100-41-4	13	0.00	0.00	0.02	0.000
Freon 113	76-13-1	9600	0.00	0.03	12.59	0.006
Freon 12	75-71-8	200	0.00	0.00	0.26	0.000
m,p-Xylene	Note	48	0.00	0.00	0.06	0.000
Methylene Chloride	75-09-2	460	0.00	0.00	0.60	0.000
n-Hexane	110-54-3	34	0.00	0.00	0.04	0.000
o-Xylene	95-47-6	16	0.00	0.00	0.02	0.000
Propylene	115-07-1	82	0.00	0.00	0.11	0.000
Styrene	100-42-5	1.4	0.00	0.00	0.00	0.000
Tetrachloroethene	127-18-4	2100	0.00	0.01	2.75	0.001
Toluene	108-88-3	140	0.00	0.00	0.18	0.000
trans-1,2-Dichloroethene	156-60-5	540	0.00	0.00	0.71	0.000
Trichloroethene	79-01-6	19000	0.00	0.07	24.91	0.012
Vinyl Chloride	75-01-4	250	0.00	0.00	0.33	0.000
Xylene	1330-20-7	64	0.00	0.00	0.08	0.000

Notes:

1. Influent data was obtained from 11 samples collected by the applicant.
2. It is assumed that equipment will operate 24 hours a day, 365 days a year.
3. The CAS number for m-xylene and p-xylene are 106-42-3 and 108-38-3, respectively.

Table 2. Organic Emissions Review –Soil Vapor Extraction System					
Pollutant	Effluent Volumetric Concentration (ppmv)	Hourly Emission Rate (lb/hr)	Daily Emission Rate (lb/day)	Annual Emission Rate (lb/yr)	Annual Emission Rate (ton/yr)
POC	3	0.01	0.25	91.49	0.046
NPOC	3	0.01	0.25	91.49	0.046

Notes:

1. POC and NPOC emissions will be based on an effluent limit of 3 ppmv, measured as isobutylene.

Cumulative Increase

Table 3. Cumulative Increase			
Pollutant	**Current Permitted Emissions, Post 4/5/1991 (ton/yr)**	**Application New Emissions Increase (ton/yr)**	**New Cumulative Increase (ton/yr)**
POC	0.000	0.046	0.046

Toxic Risk Screening

Table 4. Project Toxic Air Contaminant Emissions from Soil Vapor Extraction						
Pollutant	**CAS #**	**Hourly Emission Rate (lb/hr)**	**Acute Trigger Level (lb/hr)**	**Annual Emission Rate (lb/yr)**	**Chronic Trigger Level (lb/yr)**	**Exceeds Acute or Chronic Trigger Level?**
1,1,1-Trichloroethane	71-55-6	1.0E-05		9.2E-02		No
1,1-Dichloroethane	75-34-3	1.5E-05		1.3E-01	5.00E+01	No
1,1-Dichloroethene	75-35-4	6.9E-05		6.0E-01	2.70E+03	No
1,2,4-Trimethylbenzene	95-63-6	6.9E-07		6.0E-03		No
1,2-Dichlorobenzene	95-50-1	9.9E-05		8.7E-01		No
1,3,5-Trimethylbenzene	108-67-8	3.9E-07		3.4E-03		No
4-Ethyltoluene	622-96-8	6.1E-07		5.4E-03		No
Acetone	67-64-1	6.6E-05		5.8E-01		No
Benzene	71-43-2	3.3E-06	6.0E-02	2.9E-02	2.90E+00	No
Carbon Disulfide	75-15-0	4.9E-06	1.4E+01	4.3E-02	3.10E+04	No
cis-1,2-Dichlorothene	156-59-2	8.2E-04		7.2E+00		No
Ethyl Acetate	141-78-6	3.3E-05		2.9E-01		No
Ethylbenzene	100-41-4	1.9E-06		1.7E-02	3.30E+01	No
Freon 113	76-13-1	1.4E-03		1.3E+01		No
Freon 12	75-71-8	3.0E-05		2.6E-01		No
m,p-Xylene	Note	7.2E-06	4.9E+01	6.3E-02	2.70E+04	No
Methylene Chloride	75-09-2	6.9E-05	3.1E+01	6.0E-01	8.20E+01	No
n-Hexane	110-54-3	5.1E-06		4.5E-02	2.7E+5	No
o-Xylene	95-47-6	2.4E-06	4.9E+01	2.1E-02	2.70E+04	No
Propylene	115-07-1	1.2E-05		1.1E-01	1.20E+05	No
Styrene	100-42-5	2.1E-07	4.6E+01	1.8E-03	3.50E+04	No
Tetrachloroethene	127-18-4	3.1E-04	4.4E+01	2.8E+00	1.40E+01	No
Toluene	108-88-3	2.1E-05	8.2E+01	1.8E-01	1.20E+04	No
trans-1,2-Dichloroethene	156-60-5	8.1E-05		7.1E-01		No
Trichloroethene	79-01-6	2.8E-03		2.5E+01	4.1E+01	No
Vinyl Chloride	75-01-4	3.7E-05	4.0E+02	3.3E-01	1.1E+00	No
Xylene	1330-20-7	9.6E-06	4.9E+01	8.4E-02	2.7E+04	No

This project is not expected to exceed applicable toxic trigger levels of Regulation 2-5, Table 2-5-1. Therefore, the requirements of Regulation 2-5 do not apply. The facility will be required to perform laboratory analysis to demonstrate that the project is below the toxic trigger levels of Regulation 2-5, Table 2-5-1.

Offsets

Pursuant to Regulation 2-2-302, offsets must be provided for any new or modified source at a facility that emits, or is permitted to emit, more than 10 tons per year of precursor organic compounds (POCs) or nitrogen oxides (NO_X). Furthermore, pursuant to Regulation 2-2-303 offsets must be provided for any new or modified source at a major facility with a cumulative increase that exceeds 1.0 ton per year of PM_{10}, $PM_{2.5}$, or sulfur dioxide (SO_2).

The facility is not expected to have a PTE greater than 10 tons per year of POC or NO_X, nor is the facility a major facility of PM_{10}, $PM_{2.5}$, and SO_2. Therefore, the requirements of Regulations 2-2-302 and 2-2-303 do not apply.

Best Available Control Technology (BACT)

In accordance with Regulation 2-2-301, Best Available Control Technology (BACT) is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxides (SO_2), particulate matter less than 10 micrometer (PM_{10}) and particulate matter less than 2.5 micrometer ($PM_{2.5}$).

NPOC and POC emissions are expected to be below 10 lb/day. Therefore, a BACT review is not required.

California Environmental Quality Act (CEQA)

This project is classified as ministerial under the District Regulation 2-1-311, because the engineering review for this project requires only the application of standard emission factors and established formulas as specified in Chapter 9.2 of the District's Permit Handbook. This project does not trigger BACT or TBACT and is not subject to the health risk assessment requirements of Regulation 2, Rule 5. This review follows objective procedures and applies standard permit conditions; and therefore, the review of this project is not discretionary as defined by CEQA. Since this project is ministerial, it is not subject to CEQA review requirement of Regulation 2-1-310, and no further CEQA analysis is required.

Compliance

Based on the information submitted, this operation is expected to meet the 90% control requirement of Regulations 8-47-301 and 8-47-302. Emissions will be vented through a carbon adsorption system at all times of operation.

S-1 will be located within 1,000 feet of Granada Islamic School (Private Kindergarten through Grade 8 School). The project is subject to public notification requirements of Regulation 2-1-412 due to an increase in toxic emissions. A public notice will be sent to all parents of students of the above-mentioned school(s) and all residents within 1,000 feet of the facility. There will be a 30-day public comment period.

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

Permit Conditions

Permit Condition #27547

1. The owner/operator shall abate the precursor organic compound (POC)/non-precursor organic compound (NPOC) emissions from the soil vapor extraction system (S-1) with the Activated Carbon Vessel (A-1), consisting of a minimum of two (2) 2,000 lb activated carbon vessels in

series, during all periods of operation. The influent vapor flow rate shall not exceed 400 scfm. In no event shall the toxic air contaminant (TAC) emissions to the atmosphere from S-1 exceed the trigger levels listed in District Regulation 2-5, Table 2-5-1. [Basis: Regulations 8-47-301 and 8-47-302 and Toxics].

2. Upon initial start-up, the owner/operator shall take air samples from S-1 for laboratory analysis using EPA Method TO-15. The air samples shall be taken at the following locations:

   a. At the inlet to the first carbon vessel in series.
   b. At the outlet of the carbon vessel that is last in series prior to venting to the atmosphere.

   The owner/operator shall use the results from the laboratory report to calculate TAC emissions emitted to the atmosphere, using the maximum design flowrate of S-1. The owner/operator shall submit the laboratory report and calculated TAC emissions within 21 days of the initial startup, to demonstrate compliance with Parts 1 and 6 of this condition. [Basis: Regulation 2-1-403]

3. During operation of A-1, the owner/operator 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 last carbon vessel 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: Regulations 1-523 and 2-1-403]

4. The owner/operator shall conduct monitoring on a daily basis in accordance with Part 3 of this condition. 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 1, 5, and 6 of this condition.

   a. If the owner/operator can demonstrate one (1) month of consecutive daily monitoring readings lower than 1.5 ppmv, measured as isobutylene, the monitoring frequency may be reduced to weekly.
   b. After the monitoring frequency has been reduced to weekly, if the owner/operator can demonstrate one (1) month of consecutive weekly monitoring readings lower than 1.5 ppmv, measured as isobutylene, the monitoring frequency may be reduced to once every two (2) weeks.
   c. After the monitoring frequency has been reduced to once every two (2) weeks, if the owner/operator can demonstrate one (1) month of consecutive bi-weekly readings lower than 1.5 ppmv, measured as isobutylene, the monitoring frequency may be reduced to monthly.
   d. If any subsequent results from monitoring exceed 1.5 ppmv, measured as isobutylene, the owner/operator shall revert to daily monitoring. If monitoring reverts back to daily, the owner/operator may reduce the monitoring frequency in accordance with Parts 4(a) through (c) of this condition.

   [Basis: Cumulative Increase, Toxics, and Regulations 1-523 and 2-1-403]

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5. The second to last carbon vessel shall be immediately changed out with unspent carbon upon breakthrough, defined as the detection at its outlet in excess of the higher of the following limits:

   a. 10 % of the inlet stream concentration to the carbon bed.
   b. 10 ppmv (measured as Isobutylene).
   [Basis: Cumulative Increase and Regulations 1-523 and 2-1-403]

6. The last carbon vessel shall be immediately changed out with unspent carbon upon detection at its outlet of 3 ppmv or greater (measured as Isobutylene). [Basis: Cumulative Increase and Regulations 1-523 and 2-1-403]

7. The owner/operator shall maintain the following information for each month of operation:

   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 (2) years following the date the data is recorded. [Basis: Recordkeeping]

8. The owner/operator shall report any noncompliance 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: Regulation 2-1-403]

9. 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 condition. All measurements, records and data required to be maintained by the operator shall be retained for at least two (2) years following the date the data is recorded. [Basis: Regulation 1-523]

10. Upon final completion of the remediation project, the operator shall notify the Engineering Division within two weeks of decommissioning the operation. [Basis: Regulation 2-1-403]

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/Permit to Operate for the equipment listed below. However, the proposed source will be located within 1,000 feet of at least one school, which triggers the public notification requirements of District Regulation 2-1-412. After the comments are received 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 an Authority to Construct/Permit to Operate for the following source:

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S-1 Soil Vapor Extraction System
Mako 400CFM MKVES Blower, Maximum 400 CFM
Abated by A-1, Activated Carbon Vessels

A-1 Activated Carbon Vessels
Minimum of Two (2) 2,000-Pound Activated Carbon Vessels Arranged in Series

By: _____ Date: _____

Alfonso Borja
Supervising Air Quality Engineer

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