



west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-3025
Plant ID No.: 039-00003
Applicant: Union Carbide Corporation
Facility Name: South Charleston
Location: Kanawha County
SIC Code: 2869
Application Type: Construction
Received Date: November 29, 2012
Engineer Assigned: Steven R. Pursley, PE
Fee Amount: \$1,000.00
Date Received: November 30, 2012
Complete Date: January 3, 2013
Due Date: April 3, 2013
Applicant Ad Date: November 30, 2012
Newspaper: *Charleston Daily Mail*
UTM's: Easting: 439.67 km Northing: 4,246.72 km Zone: 17
Description: Installation of a groundwater/soil remediation system.

DESCRIPTION OF PROCESS

The target remediation area is located on the southeast portion of the Middle Island Remediation Area of Blaine Island at the South Charleston Facility. Contaminants will be extracted from the groundwater and soil through soil vapor extraction (SVE) wells using a vacuum blower. VOCs and non VOCs (i.e. methane) present in the process vapor stream will be discharged from the vacuum blower to an electric catalytic oxidizer. With an electric catalytic oxidizer, VOCs and non-VOCs in the soil gas vapor stream are introduced into an electric heat exchanger, where the inlet vapor is pre-heated by exhaust gas exiting the oxidizer. Vapor enters an electrically heated chamber where the vent gas temperature is increased to initiate the oxidation process. Hot vapor is subsequently routed through a packed bed containing a precious metal catalyst. In the presence of the high heat and catalyst, oxidation of the target compound is obtained. The catalyst bed exhaust is routed

to the inlet air heat exchanger where energy is transferred to the incoming vapor stream. The catalyst bed (heat exchanger) exhaust is subsequently discharged through a stack to the atmosphere. Note that **no** supplemental fuel (eg natural gas) is used.

SITE INSPECTION

The facility is regularly inspected by DAQ personnel. On September 11, 2012 and September 17, 2012 the facility was inspected by Douglas Hammell of DAQ's Enforcement section. The September 11 inspection specifically included and inspection of the ongoing groundwater remediation activities already taking place at the facility. Both times the facility was determined to be in compliance.

To get to the facility take exit 56 of Interstate 64. Turn right on Montrose Drive and proceed approximately 1/4 mile. The facility is at the intersection of US Route 60.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

VOC and HAP emissions from the catalytic oxidizer were based on soil/groundwater analytical data and assume a flow rate of 600 scfm with a control efficiency of 95%. Hourly VOC and HAP emissions were based on maximum soil/groundwater concentrations while annual emissions were based on average concentrations. SO₂ emissions were based on information provided by the vendor from the conversion of sulfur containing compounds to SO₂ in the oxidizer.

Controlled emissions of criteria pollutants from the remediation system will be as follows:

	lb/hr	tpy
NO _x	0.01	0.01
CO	0.01	0.01
SO ₂	0.01	0.02
PM	0.01	0.01
VOC	0.46	1.24

Controlled emissions of HAPs from the remediation system will be as follows:

	lb/hr	tpy
Acenaphthylene	0.01	0.01
Ethyl Benzene	0.02	0.04
Hexane	0.07	0.23
Naphthalene	0.01	0.02
Styrene	0.01	0.04
Toluene	0.03	0.07
Xylenes	0.02	0.03
Benzene	0.13	0.42
Total HAPs	0.30	0.86

REGULATORY APPLICABILITY

STATE RULES

45CSR4 ***“To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors.”***

§45-4-3.1, states that no person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.

45CSR6 ***“To Prevent and Control Air Pollution from Combustion of Refuse.”***

The catalytic oxidizer is classified as an incinerator under the definitions of 45CSR6 and is required to comply with the emission standards of §45-6-4. Based on the applicants maximum VOC charging rate of 9.3 pounds per hour (0.005 ton/hr) , the allowable particulate emission rate per §45-6-4.1 is 0.025 lb/hr. The permitted particulate emission rate from the oxidizer will be 0.01 lb/hr. The oxidizer should easily comply with the visible emission limitations in §45-6-4.3 and 4.4.

45CSR13 ***Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation)***

The modification is subject to 45CSR13 because uncontrolled VOC emissions would be over 6 pounds per hour and 10 tons per year. Additionally, uncontrolled HAP emissions would be over 2 pounds per hour and 5 tons per year. This is a minor modification to a major source.

As required under §45-13-8.3, Union Carbide placed a Class I legal advertisement in a “newspaper of general circulation in the area where the source is . . . located.” The ad ran on December 17, 2012 in *The Charleston Daily Mail* and the affidavit of publication for this legal advertisement was submitted on December 28, 2012.

45CSR30 ***Requirements for Operating Permits***

The facility is an existing Title V major source. This modification does not change that status.

NONAPPLICABILITY DETERMINATIONS

The modification is **not** subject to the following rules:

45CSR10 ***“To Prevent and Control Air Pollution from the Emission of Sulfur Oxides.”***

Because the process is not a “manufacturing process” as defined by the rule, it is not subject to 45CSR10. Additionally, because the heat input of the catalytic oxidizer is low (far less than 10 MMBTU/hr) and has an SO₂ potential to emit of less than 500 pounds per year, the source would be exempt anyway from all parts of 45CSR10 except §45-10-5. §45-10-5.1 limits the hydrogen sulfide concentration of any process gas stream being combusted to 50 grains per 100 cubic feet of gas. Based on results from preliminary testing the applicant expects no H₂S in the gas stream.

45CSR21 *Regulation To Prevent and Control Air Pollution From The Emission of Volatile Organic Compounds*

§45-21-40.1.d exempts incinerators having a destruction efficiency of 95% or greater. According to the application, the oxidizer has a guaranteed destruction efficiency of 95% with an expected actual destruction efficiency of 99%.

45CSR27 *To Prevent and Control Emissions of Toxic Air Pollutants*

The modification does not meet the definition of Chemical Processing Facility under §45-27-2.4. However, it should be noted that the main requirement of 45CSR27 is the employment of Best Available Technology (BAT). The controls proposed by UCC almost certainly meets this requirement anyway.

40 CFR 61 Subpart V *National Emission Standards for Equipment Leaks*

The remediation system is not a “process unit” as defined by the rule.

40 CFR 61 Subpart FF *National Emission Standard for Benzene Waste Operations*

§61.340(c)(1) exempts waste that is in the form of gases or vapors that is emitted from process fluids.

40 CFR 63 Subpart GGGGG *National Emission Standards for Hazardous Air Pollutants: Site Remediation*

§63.7881(b)(3) exempts site remediation that will be performed under the Resource Conservation and Recovery Act (RCRA) corrective action and is required by a permit. The applicant has indicated that this is the case.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. Union Carbide included the

following HAPs as emitted in substantive amounts in their emissions estimate: Acenaphthylene, Benzene, Ethylbenzene, Toluene, Hexane, Naphthalene, Styrene and Xylene. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

HAPs	Type	Known/Suspected Carcinogen	Classification
Acenaphthylene	VOC	No	Category D - Not Classifiable
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Ethylbenzene	VOC	No	Inadequate Data
Hexane	VOC	No	Inadequate Data
Naphthalene	VOC	No	Inadequate Data
Styrene	VOC	No	Inadequate Data
Toluene	VOC	No	Inadequate Data
Xylenes	VOC	No	Inadequate Data

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health effects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. For a complete discussion of the known health effects of each compound refer to the IRIS database located at www.epa.gov/iris.

AIR QUALITY IMPACT ANALYSIS

Because this is a minor modification to a major stationary source no modeling was performed.

MONITORING OF OPERATIONS

The permittee shall monitor and record the following:

- * Daily average combustion chamber inlet temperature

Additionally, within 180 days of startup, the permittee shall perform a stack test to confirm compliance with the VOC emission limits of the permit.

RECOMMENDATION TO DIRECTOR

Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit R13-3025 for the installation of a Soil Vapor Extraction/Groundwater Remediation System in South Charleston, Kanawha County, be granted to Union Carbide Corporation.

Steven R. Pursley, PE
Engineer

April 24, 2013

Fact Sheet R13-3025
Union Carbide Corporation
South Charleston