Permit Writer	Edward Andrews
Email Address	Edward.s.andrews@wv.gov
Company Name	Union Carbide Corporation
Company ID	039-00003
Permit Number	R13-3308
Facility Name	Institute Plant
County	Kanawha County
Newspaper	The Charleston Gazette
Company Contact & Email	JPFedczak@dow.com
Consultant Email Address	N/A
Regional Office	N/A

Copy Dan Bauerle @ Dan.C.Bauerle@wv.gov

Publish Wed Dec 28 2016
30 days Fri Jan 27 2017

INTERNAL PERMITTING DOCUMENT TRACKING MANIFEST

Company Name Union Carbide Corp

Permitting Action Number RB-3308 Total Days 108 DAQ Days 60

Permitting Action:

- ❍ Permit Determination
- ❍ General Permit
- ❍ Administrative Update
- ❍ Temporary
- ❍ Relocation
- ☒ Construction
- ❍ Modification
- ❍ PSD (Rule 14)
- ❍ NNSR (Rule 19)

Documents Attached:

- ☒ Engineering Evaluation/Memo
- ☒ Draft Permit
- ☒ Notice
- ❍ Denial
- ❍ Final Permit/General Permit Registration
- ☒ Completed Database Sheet
- ❍ Withdrawal
- ❍ Letter
- ❍ Other *(specify)*

Date	From	To	Action Requested
12/19	Ed	Bev	Please Review for Approval for Public Comment
12/21	Bev	Ed	See Comments - Address - Go to Notice

NOTE: Retain a copy of this manifest for your records when transmitting your document(s).

Permit / Application Information Sheet
Division of Environmental Protection
West Virginia Office of Air Quality

Company:	Union Carbide Corporation			**Facility:**	South Charleston
Region:	4	**Plant ID:**	039-00003	**Application #:**	13-3308
Engineer:	Andrews, Edward S.			**Category:**	Chemical
Physical Address:	437 MacCorkle Ave, SW South Charleston WV 25303			**SIC:** [2869] CHEMICALS AND ALLIED PRODUCTS - INDUSTRIAL ORGANIC CHEMICALS,NEC **NAICS:** [325110] Petrochemical Manufacturing **SIC:** [2821] CHEMICALS AND ALLIED PRODUCTS - PLASTICS MATERIALS AND RESINS **NAICS:** [325211] Plastics Material and Resin Manufacturing	
County:	Kanawha				
Other Parties:	ENV_CONT - Fedczak, Jay 304-747-1354 Auth Rep - Putnam, Jon 304-747-1165				

Information Needed for Database and AIRS
1. Pending result code (99) more than two months old

Regulated Pollutants

BZ	Benzene (including Benzene from gasoline)	1.740 TPY
CO	Carbon Monoxide	0.010 Lbs/Hr
VOC	Volatile Organic Compounds (Reactive organic gases)	1.850 TPY
THAP	Total HAP Pollutants	1.920 TPY
NOX	Nitrogen Oxides (including NO, NO2, NO3, N2O3, N2O4, and N2O5)	0.010 Lbs/Hr
CO2E	Carbon Dioxide Equivalents	119.100 TPY

Summary from this Permit 13-3308

Air Programs	**Applicable Regulations**
MACT	06 63 A
TITLE V	
Title V/Major	

Fee Program	**Fee**	**Application Type**
3A	$3,500.00	CONSTRUCTION

Notes from Database
Permit MM Note: This action is for the construction of a treatment system to handle contaminated groundwater. The system is subject to Subpart GGGGG of Part 63.

Activity Dates

APPLICATION RECIEVED	04/11/2016
APPLICANT PUBLISHED LEGAL AD	04/11/2016
APPLICATION FEE PAID	04/13/2016 1000
ASSIGNED DATE	04/13/2016
APPLICATION RESUBMITTAL	09/02/2016
APPLICATION FEE PAID	09/09/2016 2500
APPLICATION DEEMED COMPLETE	10/20/2016

NON-CONFIDENTIAL

Please note, this information sheet is not a substitute for file research and is limited to data entered into the AIRTRAX database.

Company ID: 039-00003
Company: Union Carbide Corporation
Printed: 12/19/2016
Engineer: Andrews, Edward S.

West Virginia Department of Environmental Protection

Earl Ray Tomblin
Governor

Division of Air Quality

Randy C. Huffman
Cabinet Secretary

Permit to Construct

R13-3308

This permit is issued in accordance with the West Virginia Air Pollution Control Act (West Virginia Code §§22-5-1 et seq.) and 45 C.S.R. 13 – Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits and Procedures for Evaluation. The permittee identified at the above-referenced facility is authorized to construct the stationary sources of air pollutants identified herein in accordance with all terms and conditions of this permit.

Issued to:
Union Carbide Corporation
South Charleston Site
039-00003

William F. Durham
Director

Issued: DRAFT

Facility Location:	437 MacCorkle Avenue South West South Charleston, Kanawha County, West Virginia
Mailing Address:	P.O. Box 8361 South Charleston, WV 25303
Facility Description:	Chemical Manufacturing Facility
NAICS Codes:	325199
UTM Coordinates:	440.026 km Easting • 4,246.927 km Northing • Zone 17
Permit Type:	Construction
Description of Change:	This action is for the construction of a treatment process unit to process contaminated groundwater.

Any person whose interest may be affected, including, but not necessarily limited to, the applicant and any person who participated in the public comment process, by a permit issued, modified or denied by the Secretary may appeal such action of the Secretary to the Air Quality Board pursuant to article one [§§22B-1-1 et seq.], Chapter 22B of the Code of West Virginia. West Virginia Code §§22-5-14.

The source is subject to 45CSR30. Changes authorized by this permit must also be incorporated into the facility's Title V operating permit. Commencement of the operations authorized by this permit shall be determined by the appropriate timing limitations associated with Title V permit revisions per 45CSR30.

Table of Contents

1.0. Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity	Control Device
MIGCS	MIGCS1	Ground Water Containment System	2017	100 gpm	MIGCS CO
MIGCS CO	MIGCS1	Anguil Model OA10 (Electric Catalytic Oxidizer)	2017	600 scfm	None

2.0. General Conditions

2.1. Definitions

2.1.1. All references to the "West Virginia Air Pollution Control Act" or the "Air Pollution Control Act" mean those provisions contained in W.Va. Code §§ 22-5-1 to 22-5-18.

2.1.2. The "Clean Air Act" means those provisions contained in 42 U.S.C. §§ 7401 to 7671q, and regulations promulgated thereunder.

2.1.3. "Secretary" means the Secretary of the Department of Environmental Protection or such other person to whom the Secretary has delegated authority or duties pursuant to W.Va. Code §§ 22-1-6 or 22-1-8 (45CSR§30-2.12.). The Director of the Division of Air Quality is the Secretary's designated representative for the purposes of this permit.

2.2. Acronyms

CAAA	Clean Air Act Amendments
CBI	Confidential Business Information
CEM	Continuous Emission Monitor
CES	Certified Emission Statement
C.F.R. *or* CFR	Code of Federal Regulations
CO	Carbon Monoxide
C.S.R. *or* CSR	Codes of State Rules
DAQ	Division of Air Quality
DEP	Department of Environmental Protection
dscm	Dry Standard Cubic Meter
FOIA	Freedom of Information Act
HAP	Hazardous Air Pollutant
HON	Hazardous Organic NESHAP
HP	Horsepower
lbs/hr	Pounds per Hour
LDAR	Leak Detection and Repair
M	Thousand
MACT	Maximum Achievable Control Technology
MDHI	Maximum Design Heat Input
MM	Million
MMBtu/hr *or* mmbtu/hr	Million British Thermal Units per Hour
MMCF/hr *or* mmcf/hr	Million Cubic Feet per Hour
NA	Not Applicable
NAAQS	National Ambient Air Quality Standards
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NO_X	Nitrogen Oxides
NSPS	New Source Performance Standards
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter less than 2.5 µm in diameter
PM_{10}	Particulate Matter less than 10µm in diameter
Ppb	Pounds per Batch
Pph	Pounds per Hour
Ppm	Parts per Million
Ppm_V or ppmv	Parts per Million by Volume
PSD	Prevention of Significant Deterioration
Psi	Pounds per Square Inch
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
TAP	Toxic Air Pollutant
TPY	Tons per Year
TRS	Total Reduced Sulfur
TSP	Total Suspended Particulate
USEPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator
VEE	Visual Emissions Evaluation
VOC	Volatile Organic Compounds
VOL	Volatile Organic Liquids

2.3. Authority

This permit is issued in accordance with West Virginia Air Pollution Control Act W.Va. Code §§ 22-5-1. et seq. and the following Legislative Rules promulgated thereunder:

2.3.1. 45CSR13 – *Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits and Procedures for Evaluation*;

2.3.2. 45CSR14 – *Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration;*

2.4. Term and Renewal

2.4.1. This Permit shall remain valid, continuous and in effect unless it is revised, suspended, revoked or otherwise changed under an applicable provision of 45CSR13 or any other applicable legislative rule;

2.5. Duty to Comply

2.5.1. The permitted facility shall be constructed and operated in accordance with the plans and specifications filed in Permit Application R13-3308, and any modifications, administrative updates, or amendments thereto. The Secretary may suspend or revoke a permit if the plans and specifications upon which the approval was based are not adhered to;
[45CSR§§13-5.11 and 10.3.]

2.5.2. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the West Virginia Code and the Clean Air Act and is grounds for enforcement action by the Secretary or USEPA;

2.5.3. Violations of any of the conditions contained in this permit, or incorporated herein by reference, may subject the permittee to civil and/or criminal penalties for each violation and further action or remedies as provided by West Virginia Code 22-5-6 and 22-5-7;

2.5.4. Approval of this permit does not relieve the permittee herein of the responsibility to apply for and obtain all other permits, licenses, and/or approvals from other agencies; i.e., local, state, and federal, which may have jurisdiction over the construction and/or operation of the source(s) and/or facility herein permitted.

2.6. Duty to Provide Information

The permittee shall furnish to the Secretary within a reasonable time any information the Secretary may request in writing to determine whether cause exists for administratively updating, modifying, revoking, or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the Secretary copies of records to be kept by the permittee. For information claimed to be confidential, the permittee shall furnish such records to the Secretary along with a claim of confidentiality in accordance with 45CSR31. If confidential information is to be sent to USEPA, the permittee shall directly provide such information to USEPA along with a claim of confidentiality in accordance with 40 C.F.R. Part 2.

2.7. Duty to Supplement and Correct Information

Upon becoming aware of a failure to submit any relevant facts or a submittal of incorrect information in any permit application, the permittee shall promptly submit to the Secretary such supplemental facts or corrected information.

2.8. Administrative Update

The permittee may request an administrative update to this permit as defined in and according to the procedures specified in 45CSR13.
[45CSR§13-4.]

2.9. Permit Modification

The permittee may request a minor modification to this permit as defined in and according to the procedures specified in 45CSR13.
[45CSR§13-5.4.]

2.10 Major Permit Modification

The permittee may request a major modification as defined in and according to the procedures specified in 45CSR14 or 45CSR19, as appropriate.
[45CSR§13-5.1]

2.11. Inspection and Entry

The permittee shall allow any authorized representative of the Secretary, upon the presentation of credentials and other documents as may be required by law, to perform the following:

a. At all reasonable times (including all times in which the facility is in operation) enter upon the permittee's premises where a source is located or emissions related activity is conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times (including all times in which the facility is in operation) any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and

d. Sample or monitor at reasonable times substances or parameters to determine compliance with the permit or applicable requirements or ascertain the amounts and types of air pollutants discharged.

2.12. Emergency

2.12.1. An "emergency" means any situation arising from sudden and reasonable unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error.

2.12.2. Effect of any emergency. An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology-based emission limitations if the conditions of Section 2.12.3 are met.

2.12.3. The affirmative defense of emergency shall be demonstrated through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An emergency occurred and that the permittee can identify the cause(s) of the emergency;

b. The permitted facility was at the time being properly operated;

c. During the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in the permit; and

d. The permittee submitted notice of the emergency to the Secretary within one (1) working day of the time when emission limitations were exceeded due to the emergency and made a request for variance, and as applicable rules provide. This notice must contain a detailed description of the emergency, any steps taken to mitigate emissions, and corrective actions taken.

2.12.4. In any enforcement proceeding, the permittee seeking to establish the occurrence of an emergency has the burden of proof.

2.12.5 The provisions of this section are in addition to any emergency or upset provision contained in any applicable requirement.

2.13. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a permittee in an enforcement action that it should have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. However, nothing in this paragraph shall be construed as precluding consideration of a need to halt or reduce activity as a mitigating factor in determining penalties for noncompliance if the health, safety, or environmental impacts of halting or reducing operations would be more serious than the impacts of continued operations.

2.14. Suspension of Activities

In the event the permittee should deem it necessary to suspend, for a period in excess of sixty (60) consecutive calendar days, the operations authorized by this permit, the permittee shall notify the Secretary, in writing, within two (2) calendar weeks of the passing of the sixtieth (60) day of the suspension period.

2.15. Property Rights

This permit does not convey any property rights of any sort or any exclusive privilege.

2.16. Severability

The provisions of this permit are severable and should any provision(s) be declared by a court of competent jurisdiction to be invalid or unenforceable, all other provisions shall remain in full force and effect.

2.17. Transferability

This permit is transferable in accordance with the requirements outlined in Section 10.1 of 45CSR13. **[45CSR§13-10.1.]**

2.18. Notification Requirements

The permittee shall notify the Secretary, in writing, no later than thirty (30) calendar days after the actual startup of the operations authorized under this permit.

2.19. Credible Evidence

Nothing in this permit shall alter or affect the ability of any person to establish compliance with, or a violation of, any applicable requirement through the use of credible evidence to the extent authorized by law. Nothing in this permit shall be construed to waive any defense otherwise available to the permittee including, but not limited to, any challenge to the credible evidence rule in the context of any future proceeding.

3.0. Facility-Wide Requirements

3.1. Limitations and Standards

3.1.1. **Open burning.** The open burning of refuse by any person, firm, corporation, association or public agency is prohibited except as noted in 45CSR§6-3.1.
[45CSR§6-3.1.]

3.1.2. **Open burning exemptions.** The exemptions listed in 45CSR§6-3.1 are subject to the following stipulation: Upon notification by the Secretary, no person shall cause, suffer, allow or permit any form of open burning during existing or predicted periods of atmospheric stagnation. Notification shall be made by such means as the Secretary may deem necessary and feasible.
[45CSR§6-3.2.]

3.1.3. **Asbestos.** The permittee is responsible for thoroughly inspecting the facility, or part of the facility, prior to commencement of demolition or renovation for the presence of asbestos and complying with 40 C.F.R. § 61.145, 40 C.F.R. § 61.148, and 40 C.F.R. § 61.150. The permittee, owner, or operator must notify the Secretary at least ten (10) working days prior to the commencement of any asbestos removal on the forms prescribed by the Secretary if the permittee is subject to the notification requirements of 40 C.F.R. § 61.145(b)(3)(i). The USEPA, the Division of Waste Management, and the Bureau for Public Health - Environmental Health require a copy of this notice to be sent to them.
[40CFR§61.145(b) and 45CSR§34]

3.1.4. **Odor.** 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.
[45CSR§4-3.1] ***[State Enforceable Only]***

3.1.5. **Permanent shutdown.** A source which has not operated at least 500 hours in one 12-month period within the previous five (5) year time period may be considered permanently shutdown, unless such source can provide to the Secretary, with reasonable specificity, information to the contrary. All permits may be modified or revoked and/or reapplication or application for new permits may be required for any source determined to be permanently shutdown.
[45CSR§13-10.5.]

3.1.6. **Standby plan for reducing emissions.** When requested by the Secretary, the permittee shall prepare standby plans for reducing the emissions of air pollutants in accordance with the objectives set forth in Tables I, II, and III of 45CSR11.
[45CSR§11-5.2.]

3.2. Monitoring Requirements

[Reserved]

3.3. Testing Requirements

3.3.1. **Stack testing.** As per provisions set forth in this permit or as otherwise required by the Secretary, in accordance with the West Virginia Code, underlying regulations, permits and orders, the permittee shall conduct test(s) to determine compliance with the emission limitations set forth in this permit and/or established or set forth in underlying documents. The Secretary, or his duly authorized representative, may at his option witness or conduct such test(s). Should the Secretary exercise his option to conduct such test(s), the operator shall provide all necessary sampling

connections and sampling ports to be located in such manner as the Secretary may require, power for test equipment and the required safety equipment, such as scaffolding, railings and ladders, to comply with generally accepted good safety practices. Such tests shall be conducted in accordance with the methods and procedures set forth in this permit or as otherwise approved or specified by the Secretary in accordance with the following:

a. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with 40 C.F.R. Parts 60, 61, and 63 in accordance with the Secretary's delegated authority and any established equivalency determination methods which are applicable. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4. or 45CSR§13-5.4 as applicable.

b. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with applicable requirements which do not involve federal delegation. In specifying or approving such alternative testing to the test methods, the Secretary, to the extent possible, shall utilize the same equivalency criteria as would be used in approving such changes under Section 3.3.1.a. of this permit. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4. or 45CSR§13-5.4 as applicable.

c. All periodic tests to determine mass emission limits from or air pollutant concentrations in discharge stacks and such other tests as specified in this permit shall be conducted in accordance with an approved test protocol. Unless previously approved, such protocols shall be submitted to the Secretary in writing at least thirty (30) days prior to any testing and shall contain the information set forth by the Secretary. In addition, the permittee shall notify the Secretary at least fifteen (15) days prior to any testing so the Secretary may have the opportunity to observe such tests. This notification shall include the actual date and time during which the test will be conducted and, if appropriate, verification that the tests will fully conform to a referenced protocol previously approved by the Secretary.

d. The permittee shall submit a report of the results of the stack test within sixty (60) days of completion of the test. The test report shall provide the information necessary to document the objectives of the test and to determine whether proper procedures were used to accomplish these objectives. The report shall include the following: the certification described in paragraph 3.5.1.; a statement of compliance status, also signed by a responsible official; and, a summary of conditions which form the basis for the compliance status evaluation. The summary of conditions shall include the following:

1. The permit or rule evaluated, with the citation number and language;
2. The result of the test for each permit or rule condition; and,
3. A statement of compliance or noncompliance with each permit or rule condition.

[WV Code § 22-5-4(a)(14-15) and 45CSR13]

3.4. Recordkeeping Requirements

3.4.1. **Retention of records.** The permittee shall maintain records of all information (including monitoring data, support information, reports, and notifications) required by this permit recorded in a form suitable and readily available for expeditious inspection and review. Support information

includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation. The files shall be maintained for at least five (5) years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. At a minimum, the most recent two (2) years of data shall be maintained on site. The remaining three (3) years of data may be maintained off site, but must remain accessible within a reasonable time. Where appropriate, the permittee may maintain records electronically (on a computer, on computer floppy disks, CDs, DVDs, or magnetic tape disks), on microfilm, or on microfiche.

3.4.2. **Odors.** For the purposes of 45CSR4, the permittee shall maintain a record of all odor complaints received, any investigation performed in response to such a complaint, and any responsive action(s) taken.
[45CSR§4. *State Enforceable Only.*]

3.5. Reporting Requirements

3.5.1. **Responsible official.** Any application form, report, or compliance certification required by this permit to be submitted to the DAQ and/or USEPA shall contain a certification by the responsible official that states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

3.5.2. **Confidential information.** A permittee may request confidential treatment for the submission of reporting required by this permit pursuant to the limitations and procedures of W.Va. Code § 22-5-10 and 45CSR31.

3.5.3. **Correspondence.** All notices, requests, demands, submissions and other communications required or permitted to be made to the Secretary of DEP and/or USEPA shall be made in writing and shall be deemed to have been duly given when delivered by hand, or mailed first class with postage prepaid to the address(es) set forth below or to such other person or address as the Secretary of the Department of Environmental Protection may designate:

If to the DAQ:
Director
WVDEP
Division of Air Quality
601 57th Street
Charleston, WV 25304-2345

If to the US EPA:
Associate Director
Office of Air Enforcement and Compliance Assistance (3AP20)
U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029

3.5.4. Operating Fee

3.5.4.1. In accordance with 45CSR30 – Operating Permit Program, the permittee shall submit a certified emissions statement and pay fees on an annual basis in accordance with the submittal requirements of the Division of Air Quality. A receipt for the appropriate fee shall be maintained on the premises for which the receipt has been issued, and shall be made immediately available for inspection by the Secretary or his/her duly authorized representative.

3.5.5. **Emission inventory.** At such time(s) as the Secretary may designate, the permittee herein shall prepare and submit an emission inventory for the previous year, addressing the emissions from the facility and/or process(es) authorized herein, in accordance with the emission inventory submittal

requirements of the Division of Air Quality. After the initial submittal, the Secretary may, based upon the type and quantity of the pollutants emitted, establish a frequency other than on an annual basis.

4.0. Source-Specific Requirements

4.1. Limitations and Standards

4.1.1. The permittee shall comply with the following requirements for the Middle Island Groundwater Containment System (MIGCS):

a. The average total volatile organic hazardous air pollutant (VOHAP) of the contaminated groundwater entering the system shall not exceed 500 ppmw on a monthly basis. The monthly average total VOHAP concentration shall be determined using no less than four samples collected during each calendar month. Such sampling and analysis shall be conducted in accordance with Condition 4.2.1.
[40 CFR 63.7886(b)(2) &63.7943(b)(1)(ii)]

b. The groundwater flow rate into the MIGCS shall not exceed an average monthly flow rate of 50 gpm with no individual hourly rates greater than 100 gpm.

c. Each piece of equipment of the MIGCS except for the horizontal contact beds shall be equipped with a cover vent that routes all vapors and gases from the piece of equipment to a the MIGCS CO through a closed-vent system. This closed vent system shall route these vapors and gases to the MIGCS without any by-passes or pressure relief devices. This closed-vent system shall be operated and maintained to one of the following standards:

i. A closed-vent system that is designed to operate with no detectable organic emissions using the procedure specified in 40 CFR §63.694(k); or

ii. A closed-vent system that is designed to operate at a pressure below atmospheric pressure. The system shall be equipped with at least one pressure gauge or other pressure measurement device that can be read from a readily accessible location to verify that negative pressure is being maintained in the closed-vent system when the control device is operating.

d. The permittee shall make first efforts at repair of the defect or detected leak no later than 5 calendar days after detection and repair shall be completed as soon as possible but no later than 45 calendar days after detection except as allowed under item e. of this condition.

e. Delay of repair (DOR) of the closed vent system for which leaks have been detected is allowed if the repair is technically infeasible without a process shutdown or if the permittee determines that emissions resulting from the immediate repair would be greater than the fugitive emissions likely to result from the DOR. Repair of such equipment shall be complete by the end of the next process shutdown.

f. The horizontal contact beds of the MIGCS shall be covered by a membrane. The floating membrane cover shall be designed to float on the liquid surface during normal operations, and form a continuous barrier over the entire surface area of the liquid.

i. The cover shall be fabricated from a synthetic membrane material that is either:

1. High density polyethylene (HDPE) with a thickness no less than 2.5 millimeters (mm); or

2. A material or a composite of different materials determined to have both organic permeability properties that are equivalent to those of the material listed in Condition 4.1.c.1.; and chemical and physical properties that maintain the material integrity for the intended service life of the material.

3. The cover shall be installed in a manner such that there are no visible cracks, holes, gaps, or other open spaces between cover section seams or between the interface of the cover edge and its foundation mountings.

4. Except as provided for in Condition 4.1.1.f.i.5., each opening in the floating membrane cover shall be equipped with a closure device designed to operate such that when the closure device is secured in the closed position there are no visible cracks, holes, gaps, or other open spaces in the closure device or between the perimeter of the cover opening and the closure device.

5. The membrane cover may be equipped with one or more emergency cover drains for removal of stormwater. Each emergency cover drain shall be equipped with a slotted membrane fabric cover that covers at least 90 percent of the area of the opening or a flexible fabric sleeve seal.

6. The closure devices shall be made of suitable materials that will minimize exposure of the regulated-material to the atmosphere, to the extent practical, and will maintain the integrity of the equipment throughout its intended service life. Factors to be considered when selecting the materials for and designing the cover and closure devices shall include: organic vapor permeability; the effects of any contact with the liquid and its vapor managed in the surface impoundment; the effects of outdoor exposure to wind, moisture, and sunlight; and the operating practices used for the surface impoundment on which the floating membrane cover is installed.

g. The aerating air for the Cascade Aerator shall be optimized to minimize the amount of VOHAP being stripped out of the groundwater with a flow rate of no greater than 475 standard cubic feet per minute.

h. The concentration of VOHAP in the outlet of the MIGCS shall be no greater than 10 ppmw.

4.1.2. The permittee shall operate and maintain the control device MIGCS CO for the MIGCS unit in accordance with the following emission limitations and operating parameters.

a. Emissions of VOC from MIGCS shall not exceed 0.65 pounds per hour. Annual VOC emissions from the MIGCS CO shall not exceed 1.85 tons per year.

b. Total hazardous air pollutants (HAPs), which include BTEX, from the flare shall not exceed 0.69 pounds per hour. Annual HAP emissions from the MIGCS CO shall not exceed 1.92 tons per year.

c. Emissions of NO_x from MIGCS shall not exceed 0.01 pounds per hour. Annual NO_x emissions from the MIGCS CO shall not exceed 0.04 tons per year.

d. Emissions of CO from MIGCS shall not exceed 0.01 pounds per hour. Annual CO emissions from the MIGCS CO shall not exceed 0.04 tons per year.

e. Particulate matter emissions from the MIGCS CO shall not exceed 0.01 pounds per hour. Compliance with this limit is satisfied by complying with requirements of Condition 4.1.2.f. **[45 CSR §6-4.3.]**

f. The effluent routed to MIGCS CO shall not contain hydrogen sulfide greater than 50 grains per 100 cubic feet of gas. Compliance with this limit shall be sampling of the inlet to the MIGCS for sulfur containing compounds. **[45 CSR §10-5.1.]**

g. The permittee shall operate and maintain MIGCS CO in a manner to achieve at the minimum, 95% destruction efficiency for VOCs and volatile HAPs or an outlet concentration of 20 ppm. Such operation of the control device shall constitute the following:

i. MIGCS CO shall not exhibit any visible emissions, expect for periods not to exceed a total of 5 minutes during two consecutive hours.
[45 CSR §6-4.3.]

ii. The permittee shall operate the MIGCS at all times with the daily average temperature difference across the catalyst bed greater than or equal to the daily average minimum temperature difference established during performance testing. Until the permittee establishes the minimum temperature difference across the catalyst bed, the MIGCS CO shall be operated with a daily average temperature difference of no less than 420^0 F.

iii. The actual flowrate of effluent to MIGCS CO shall not exceed 1,000 standard cubic feet per minute, which is the maximum flowrate rated by the manufacturer.

4.1.3. **Operation and Maintenance of Air Pollution Control Equipment.** The permittee shall, to the extent practicable, install, maintain, and operate all pollution control equipment listed in Section 1.0 and associated monitoring equipment in a manner consistent with safety and good air pollution control practices for minimizing emissions, or comply with any more stringent limits set forth in this permit or as set forth by any State rule, Federal regulation, or alternative control plan approved by the Secretary.
[45CSR§13-5.11.]

4.2. Monitoring Requirements

4.2.1. For the purpose of demonstrating compliance with Condition 4.1.1.a., the permittee shall determine the average total VOHAP concentration of a remediation material using direct measurement on a monthly basis. The permittee shall use the following procedures:

a. Sampling. Samples of each material stream must be collected from the container, pipeline, or other device used to deliver each material stream prior to entering the remediation material management unit or treatment process in a manner such that volatilization of organics contained in the sample is minimized and an adequately representative sample is collected and maintained for analysis by the selected method.

i. The monthly averaging period to be used for determining the average total VOHAP concentration for the material stream on a mass-weighted average basis must be designated and recorded.

ii. No less than four samples must be collected to represent the complete range of HAP compositions and HAP quantities that occur in each material stream during the entire averaging period due to normal variations in the material stream(s). Examples of such normal variations are variation of the HAP concentration within a contamination area.

iii. All samples must be collected and handled according to written procedures you prepare and document in a site sampling plan. This plan must describe the procedure by which representative samples of the material stream(s) are collected such that a minimum loss of organics occurs throughout the sample collection and handling process and by which sample integrity is maintained. A copy of the written sampling plan must be maintained on site in the facility operating records. An example of an acceptable sampling plan includes a plan incorporating sample collection and handling procedures according to the guidance

found in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication No. SW-846 or Method 25D in 40 CFR part 60, Appendix A.

b. Analysis. Each collected sample must be prepared and analyzed according to either one of the methods listed in 40 CFR §63.694(b)(2)(ii), or any current EPA Contracts Lab Program method (or future revisions) capable of identifying all the HAP in Table 1 of Subpart GGGGG of Part 63.

c. Calculations. The average total VOHAP concentration ($\bar{C}$) on a mass-weighted basis must be calculated by using the results for all samples analyzed according to item b of this condition and Equation 4.2.1.c. as follows:

$$\bar{C} = \frac{1}{Q_T} \times \sum_{i=1}^{n}(Q_i \times C_i) \quad \text{(Equation 4.2.1.c.)}$$

Where:

$\bar{C}$ = Average VOHAP concentration of the material on a mass-weighted basis, ppmw.

i = Individual sample "i" of the material.

n = Total number of samples of the material collected (at least 4 per stream) for the averaging period (not to exceed 1 year).

Q_i = Mass quantity of material stream represented by Ci, kilograms per hour (kg/hr).

Q_T = Total mass quantity of all material during the averaging period, kg/hr.

C_i = Measured VOHAP concentration of sample "i" as determined according to the requirements of paragraph (b)(2) of this section, ppmw.

Records of such sampling and analysis to shall be maintain in accordance with Condition 3.4.1. **[40 CFR §63.7943(b)]**

4.2.2. The permittee shall continuously measure and record the water flow rate into the MIGCS for the purposed of demonstrating compliance with Condition 4.1.1.b. The permittee shall take four reading (once every 15 minutes) in equal time intervals for each hour. Using these readings, the permittee shall develop an hourly flow rate. Every hourly flow rate shall be used to determine the average monthly flow rate to demonstrate compliance with the limit. The permittee shall substitute each missing hour with the maximum design flow rate of the MIGCS in the determining the average monthly flow rate. Records of such every reading, calculations used to determine the hourly rate and average monthly rates to shall be maintain in accordance with Condition 3.4.1.

4.2.3. The permittee shall continuously measure and record the hourly temperatures at the inlet of the catalyst bed and outlet of the catalysis bed for the purpose of determine the daily average temperature difference across the catalyst bed of the MIGCS CO. These hourly temperature readings shall be used to determine the hourly and daily average temperature difference across the catalysis bed. Records of such every reading, calculations used to determine the hourly and daily average temperature differences to shall be maintain in accordance with Condition 3.4.1.

4.2.4. For the purpose of demonstrating proper operation of MIGCS CO, the permittee shall conduct a visible emission observation using Section 11 of Method 22 for one hour once every calendar quarter in which the dehydration unit operates. If during the first 30 minutes of the observation there were no visible emissions observed, the permittee may stop the observation.

If at the end of the observation and visible emission were observed for more than 2.5 minutes, then the permittee shall follow manufacturer's repair instructions, if available or best combustion

engineering practice as outline in the unit inspection and maintenance plan. To return the flare to compliant operation, the permittee shall repeat the visible emission observation. Records of such monitoring and repair activities shall be maintained in accordance with Condition 3.4.1.

4.2.5. For the purposes of demonstrating compliance with the requirements of the closed vent system in Condition 4.1.1.c.i., the permittee shall conduct the following:

a. Conduct an initial inspection for initial compliance of Condition 4.1.1.c.i. within 180 days of start-up of the MIGCS. This inspection shall be conduction using procedure outline in 40 CFR §63.694(k) and Method 21 of 40 CFR Part 60, Appendix A.

b. After the conducting the initial inspection:

i. Closed-vent system joints, seams, or other connections that are permanently or semi-permanently sealed (e.g., a welded joint between two sections of hard piping or a bolted and gasketed ducting flange) shall be visually inspected at least once per year to check for defects that could result in air emissions. The permittee shall monitor a component or connection using the procedures specified in 40 CFR §63.694(k) to demonstrate that it operates with no detectable organic emissions following any time the component is repaired or replaced (e.g., a section of damaged hard piping is replaced with new hard piping) or the connection is unsealed (e.g., a flange is unbolted).

ii. Closed-vent system components or connections other than those specified in Condition 4.2.5.c.i., shall be monitored at least once per year using the procedures specified in 40 CFR §63.694(k) to demonstrate that components or connections operate with no detectable organic emissions.

iii. The permittee shall conduct install, continuously operate and maintain a continuously monitoring system that monitor and record either the instantaneous data value at least once every 15 minutes or an average value for intervals of 15 minutes or less that the close vent system

c. The permittee shall make first efforts at repair of the defect or detected leak no later than 5 calendar days after detection and repair shall be completed as soon as possible but no later than 45 calendar days after detection.

d. Delay of repair (DOR) of the closed vent system for which leaks have been detected is allowed if the repair is technically infeasible without a process shutdown or if the permittee determines that emissions resulting from the immediate repair would be greater than the fugitive emissions likely to result from the DOR. Repair of such equipment shall be complete by the end of the next process shutdown.

e. Records of such inspections shall be maintained in accordance with 3.4.1.

4.2.6. For the purposes of demonstrating compliance with the requirements of the closed vent system in Condition 4.1.1.c.ii., the permittee shall conduct the following activities:

a. The owner or operator shall visually inspect the closed-vent system to check for defects that could result in air emissions. Defects include, but are not limited to, visible cracks, holes, or gaps in ductwork or piping; loose connections; or broken or missing caps or other closure devices.

b. The owner or operator must perform an initial inspection following installation of the closed-vent system. Thereafter, the permittee must perform the inspections at least once every calendar year.

c. In the event that a defect is detected, the owner or operator shall repair the defect in accordance with the requirements of Conditions 4.2.5.c. and 4.2.5.d.

d. The permittee shall maintain a record of the inspection in accordance with Condition 3.4.1.

4.2.7. For the purposes of demonstrating compliance with Condition 4.1.1.h., the permittee shall sample and analyze the outlet of the MIGCS within 12 months after startup of the MIGCS and annual thereafter to determine the total VOHAP concentration. Annual shall mean between eleven (11) and thirteen (13) months. Such sampling and analytical analysis shall be conducted in accordance with the appropriate procedures outline in Condition 4.2.1. Records of such sampling and analysis be maintained in accordance with Condition 3.4.1.

4.3. Testing Requirements

4.3.1. For the purposes of demonstrating proper operation of the MIGCS CO (catalytic oxidizer), the permittee shall conduct an initial performance test within 180 days after initial startup of the flare. The permittee shall conduct a Method 22 of Appendix A to Part 60 to determine if the flare is operating within compliance of Condition 4.1.2.f.i. The observation period for this demonstration is 2 hours. During the observation, the MIGCS shall be operated at 90 percent of the unit's design capacity or the maximum anticipated rate. Such demonstration shall be conducted in accordance with the applicable portions of Condition 3.3.1. Records of such demonstration shall be maintained in accordance with Condition 3.4.1.

4.3.2. For the purposes of demonstrating initial compliance with the VOC, total HAP (to included HCl), NOx, and CO emission limits of Condition 4.1.2., demonstrate compliance with the destruction efficiency requirement of the MIGCS CO in Condition 4.1.2.g. and to established the daily average temperature difference across the catalyst bed in Condition 4.1.2.g.ii., the permittee shall conduct an initial performance test within 180 days after initial startup of the MIGCS. The permittee shall conduct a Method 320 of Appendix A to Part 60, which shall include all other reference methods need to complete shall testing to determine if the MIGCS CO is operating within compliance of Condition 4.1.2. During shall testing, the MIGCS shall be operated at 90 percent of the unit's design capacity or the maximum anticipated rate and records of all operating parameters of the MIGCS and MIGCS CO shall be recorded and included in the test report. Such demonstration shall be conducted in accordance with the applicable portions of Condition 3.3.1. Records of such demonstration shall be maintained in accordance with Condition 3.4.1.

4.3.3. The permittee shall repeat the testing in Condition 4.3.2. within 90 days after determining the VOHAP concentration of third consecutive monthly average is at or above a total VOHAP concentration of 400 ppmw.

4.3.4. For purposes of re-establishing the daily average temperature difference across the catalyst bed in Condition 4.1.2.g.ii., the permittee shall repeat the testing as outlined in Condition 4.3.2.

4.4. Recordkeeping Requirements

4.4.1. **Record of Monitoring.** The permittee shall keep records of monitoring information that include the following:

a. The date, place as defined in this permit, and time of sampling or measurements;

b. The date(s) analyses were performed;

c. The company or entity that performed the analyses;

d. The analytical techniques or methods used;

e. The results of the analyses; and

f. The operating conditions existing at the time of sampling or measurement.

4.4.2. **Record of Maintenance of Air Pollution Control Equipment.** For all pollution control equipment listed in Section 1.0, the permittee shall maintain accurate records of all required pollution control equipment inspection and/or preventative maintenance procedures.

4.4.3. **Record of Malfunctions of Air Pollution Control Equipment.** For all air pollution control equipment listed in Section 1.0, the permittee shall maintain records of the occurrence and duration of any malfunction or operational shutdown of the air pollution control equipment during which excess emissions occur. For each such case, the following information shall be recorded:

a. The equipment involved.

b. Steps taken to minimize emissions during the event.

c. The duration of the event.

d. The estimated increase in emissions during the event.

For each such case associated with an equipment malfunction, the additional information shall also be recorded:

e. The cause of the malfunction.

f. Steps taken to correct the malfunction.

g. Any changes or modifications to equipment or procedures that would help prevent future recurrences of the malfunction.

4.5. Reporting Requirements

4.5.1. Any exceedance(s) of the allowable visible emission requirement for the MIGCS CO discovered during observations using 40CFR Part 60, Appendix A, Method 9 or 22 shall be reported in writing to the Director of the Division of Air Quality as soon as practicable, but within ten (10) calendar days of the occurrence and shall include, at a minimum, the following information: the results of the visible determination of opacity of emissions, the cause or suspected cause of the violation(s), and any corrective measures taken or planned.

4.5.4. Any exceedance(s) of the design and operation criteria in Condition 4.1.1 of the MIGCS or Condition 4.1.2. of the MIGCS CO shall be reported in writing to the Director as soon as practicable, but within ten (10) calendar days.

CERTIFICATION OF DATA ACCURACY

I, the undersigned, hereby certify that, based on information and belief formed after reasonable inquiry, all information contained in the attached _____, representing the period beginning _____ and ending _____, and any supporting documents appended hereto, is true, accurate, and complete.

Signature[1] (please use blue ink) _____ Responsible Official or Authorized Representative _____ Date

Name & Title (please print or type) _____ Name _____ Title

Telephone No. _____ Fax No. _____

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[1] This form shall be signed by a "Responsible Official." "Responsible Official" means one of the following:

a. For a corporation: The president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:

   (i) the facilities employ more than 250 persons or have a gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), or

   (ii) the delegation of authority to such representative is approved in advance by the Director;

b. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

c. For a municipality, State, Federal, or other public entity: either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of U.S. EPA); or

d. The designated representative delegated with such authority and approved in advance by the Director.

west virginia department of environmental protection

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ENGINEERING EVALUATION/FACT SHEET

B ACKGROUND INFORMATION

Application No.:	R13-3308
Plant ID No.:	039-00003
Applicant:	Union Carbide Corporation
Facility Name:	South Charleston Site
Location:	South Charleston
NAICS Code:	325199
Application Type:	Construction
Received Date:	April 11, 2016
Resubmitted:	September 9, 2016
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	$3,500.00
Date Received:	September 9, 2016
Complete Date:	October 20, 2016
Due Date:	January 1, 2017
Applicant Ad Date:	April 11, 2016
Newspaper:	*The Charleston Gazette*
UTM's:	Easting: 440.026 km Northing: 4,246.927 km Zone: 17
Description:	The application is for the construction of a treatment system to handle contaminated groundwater.

DESCRIPTION OF PROCESS

Union Carbide Corporation (UCC) owns and operates the South Charleston Site, which is located in South Charleston of Kanawha County in West Virginia. UCC operates several chemical manufacturing units and support activities at this location. In 1999, UCC entered into a "Facility Lead Agreement" with U.S. EPA Region III to investigate, and ,if necessary, develop workplans to remediate the release of waste and/or waste constituents from the South Charleston Site. The proposed treatment system is one of the projects that UCC has agreed to perform under this "Lead Agreement" with U.S. EPA.

The Middle Island Groundwater Containment System (MIGCS) is proposed in this permit application as a new system that will be associated with the Middle Island Area of the South Charleston Site. Groundwater from the area will be pulled to the surface through groundwater extraction wells that will impart a reverse gradient inward toward the center of the island to provide groundwater plume containment (Equipment Identification MIGCS). The extracted groundwater will be treated using vertical flow and horizontal flow vegetated contact beds (VCB/HCB)/treatment wetlands to reduce volatile organic compound (VOC) and hazardous air pollutant (HAP) concentrations,. prior to discharge to the facility's process sewers. No surface water will be exposed to the atmosphere in the wetland environment. Note: All HAPs emitted are VOC HAPs.

The full groundwater treatment train will include an oil/water separator, cascade aerator for iron removal, circular clarifier, and VCB/HCB/treatment wetland. Air emissions from the treatment train will be collected and routed to an electric catalytic oxidizer for. With an electric catalytic oxidizer, VOCs and HAPs 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 processes. 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 compounds is obtained. The catalyst bed exhaust gas 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 atmosphere. The catalytic oxidizer will be the only point sources of air emissions from the MIGCS (Emission Control MIGCSCO/Emission Point MIGCS1).

SITE INSPECTION

South Charleston Site is classified as a Major Title V facility, which requires the agency to conduct routine inspections to ensure compliance with all applicable rules and regulations. This facility was last inspected by Mr. Dan Bauerle, a Technical Analyst for the Compliance & Enforcement Section. This particular inspection included multiple visits to the facility by Mr. Bauerle, which included one on July 20, 2016 that this writer accompanied Mr. Bauerle on. At this time, Mr. Bauerle is still reviewing the information and data that was collected during his visit to determine whether the facility has been operating within compliance of its Title V Operating Permit.

ESTIMATE OF EMISSION BY REVIEWING ENGINEER

The applicant has been conducting groundwater sampling ongoing at the Middle Island Main Source area since December 16, 2002. Concentrations of the containments from 2012 were used in the development of the design basis for the Groundwater Collection System because this year included a full data set for volatile organic compounds and was determined to be representative of the groundwater plume.

For Phase 1, the area was divided into 3 groundwater capture zones based on groundwater modeling conducted using the MODFLOIV-NWT code in conjunction with the Groundwater Vista pre- and post-processing software. The average concentration for each capture zone was determined based on the groundwater analytical data applicable to that capture zone. The predicted groundwater influent flowrate is anticipated to be 30 gallons per minute (gpm) total from the 3 capture zones.

However, UCC scaled this value up for design purposes to 100 gpm. (Thus, the mass basis of contaminants more than doubled based on this contingency factor for the flow rate). The process train is meant to treat the VOCs in aqueous form; however, there are high iron concentrations in the groundwater. Iron can negatively affect the wetland performance; as a result, a cascade aerator is included to oxidize the iron, which is then precipitated and settled out in the clarifier. A maximum of 470 standard cubic feet per minute (scfm) of atmospheric air will be introduced into the aerator and as a side effect, a portion of the VOCs will volatilize during this process. The emission estimates submitted in April 2016 with the original permit application conservatively assumed 99.99% of the VOCs would volatilize.

Subsequent to that submittal, the design has progressed and equipment vendors have been selected. The cascade aerator vendor has indicated a range of 20 to 40% of benzene would volatilize based on their equipment design. To be conservative, revised emission estimates were based on 40% volatilization of benzene through the cascade aerator, with volatilization rates for other VOCs being scaled based on each chemical's Henry's Law constant in relation to benzene's Henry's Law constant.

As noted above, prior to detailed design and availability of vendor information, we had conservatively estimated emissions at nearly 100% volatilization along with the scaled up groundwater flowrate of 100 gpm. Per the DAQ subsequent request on September 20, 2016, UCC have prepared an emissions scenario that evaluates emissions using the modeled rate of groundwater flow from the capture zones with 99.99% volatilization to demonstrate that total uncontrolled VOCs emissions are below 40 TPY. The model predicted a flowrate of approximately 30 gpm; however, 50 gpm was utilized in this emissions scenario to be conservative. At this flow rate and assuming 99.99% volatilization, total uncontrolled VOC emissions are 33 TPY. It should be noted that this estimate does not appropriately estimate emissions under operating conditions, as the goal of the treatment system is to treat VOCs in the aqueous form.

This writer used the process data provided in the application and developed a process simulation using ProMax 4.0 from Bryan Engineering and Research. This simulation used the concretizations of the contaminants which are presented in the following table:

Table #1 – Maximum Concentration of Containments & Projected Inlet loading to the Oxidizer		
Contaminate	Max. Weighted Conc. in Groundwater (mg/L or ppmw)	Loading Rate in Air to Oxidizer (lb/hr)
1,2-Dichloroethane	1.78	0.04
1,3-Dichlorobenzene*	1.78	0.04
1,4-Dichlorobenzene	1.78	0.04
2-Butanone*	17.77	0.44
Acetone	44.43	1.11
Benzene	242.69	6.07
Chlorobenzene	1.78	0.04
cis-1,2-Dichloroethylene	1.78	0.04
Ethylbenzene	3.44	0.09
Naphthalene	1.16	0.03
Styrene	2.07	0.05
Toluene	19.18	0.48
Xylene	9.15	0.23
Total	348.79	8.70
Total VOC	304.36	7.59
Total VOHAP	283.03	

Using an inlet water flow rate of 50 gpm, the simulation predicted a VOC potential to emit of 33.34 tons per year from the three contamination zones. Using maximum design conditions of the treatment system (100 gpm of water & 475 cfm of air) and Peng-Robinson equation of state to predict the streams with the simulation, the simulation predicted a VOC loading to the oxidizer of 7.63 pounds per hour. The applicant predicted a maximum inlet load of the 5.74 pound per hour. The applicant based this approach on Westech (a water treatment equipment manufacturer) estimate of 20 to 40% removal of benzene and Henry's Constant of benzene relative to the other VOC Henry's Constants.

This writer concluded that the applicant's approach of predicting is under predicting the short-tern inlet loading of the VOC and VOHAPs going to the oxidizer at the maximum operating conditions of the treatment system.

Before developing emission rates from the oxidizer, a review of UCC's compliance strategy with regards to meeting the emission standard under Subpart GGGGG – National Emission Standard for Hazardous Air Pollutants: Site Remediation of Part 63 was conducted. UCC believes that the total average VOHAP concentration of remediation material managed (contaminated groundwater from all three zones entering the treatment system) will be less than 500 ppmw, which is one of the options under 40 CFR §63.7886(b).

The writer adjusted the concentration of benzene so that the total concentration of VOHAPs in the contaminated groundwater would be less than 500 ppm (499.8 ppm) in the

simulation with the flow rate at the inlet at 100 gpm to established worst case short term emissions of VOHAPs from the oxidizer. This simulation yields an hourly emissions rate of 0.69 pounds of HAPs per hour, which included hydrogen chloride (HCl). HCl is generated from the incineration of chlorinated compounds (i.e. chlorobenzene).

For establishing annual emission limits, the writer adjusted the inlet flow rate to 50 gpm in the simulation with the concentration of the VOHAPs at 499.8 ppm. This simulation yielded an annual emission rate of 1.92 tons of total HAPs per year and 1.85 tons of VOCs per year. Of the total HAPs, benzene emissions accounts for 1.74 tons of the 1.92 tons per year.

Table #2 – Maximum Predicted Inlet loading to the Oxidizer & Outlet from the Oxidizer		
Contaminate	Inlet Loading to the Oxidizer (lb/hr)	Emission Rate from the Oxidizer (lb/hr)
1,2-Dichloroethane	0.01791	0.0009
1,3-Dichlorobenzene*	0.000004	0.0000002
1,4-Dichlorobenzene	0.000005	0.0000003
2-Butanone*	0.0011	0.00006
Acetone*2	0.0763	0.0038
Benzene	7.9637	0.3982
Chlorobenzene	0.0002	0.00001
cis-1,2-Dichloroethylene*	0.0068	0.0003
Ethylbenzene	0.03211	0.0016
Naphthalene	0.0012	0.00006
Styrene	0.0244	0.0012
Toluene	0.2998	0.0150
Xylene	0.0943	0.0047
Hydrogen Chloride[1]	0	0.0175
Total	8.52	0.44
Total VOC	8.44	0.44
Total HAP	8.44	0.44

* Compound is not classified as HAP.
1 Hydrogen Chloride emissions a produce from combusting chloride compounds (i.e. 1,3-Dichlorobenzene, Chlorobenzene).
2 Compound is not classified as a VOC.

Other emissions from the oxidizer are products of complete or incomplete combustion, which are carbon monoxide (CO), oxides of nitrogen (NO_x), particulate matter (PM), PM less than 10 micros (PM_{10}), PM less than 2.5 micros ($PM_{2.5}$), and carbon dioxide (CO_2) as a greenhouse gas. The applicant claimed that formation of PM, CO and NO_x would not occur in the proposed oxidizer. The writer does not agree with the applicant predicted emission rates.

The proposed oxidizer will use electric heating elements to maintain the temperature to promote the oxidation reaction. The excess air (oxygen and nitrogen) that inject in the cascade aerator will be routed to the oxidizer with the striped out hydrocarbons. Based on the

combustion analysis tool in ProMax, the effluent stream being routed to the oxidizer contains sufficient amount of oxygen for stoichiometric combustion to occur.

ProMax predicted the carbon dioxide, which is a greenhouse gas, emissions rate from the oxidizer to be 119.1 tons per year. To account for other products of combustion from the oxidizer, the hourly CO and NO_x emission rate were assumed to not be greater than 0.01 pounds per hour with the annual rates annualized to 0.04 tons per year. Particulate matter (PM) in a filterable form would be nearly zero based on the components in the effluent stream. There could be condensable PM (PMC) in the exhaust from the combustion from the chlorinated compounds. The writer had assumed this 100% of the combustion chlorine in the effluent be converted into HCl, which is listed in Table #2.

The writer predicted the emissions associated with the oil stream from the oil/water separator VOC emissions from an oil holding tank to be 0.002 tons per year due to working and breathing losses of the tank. Loading losses from the oil holding tank were estimated to be 0.002 tons of VOC's be year.

The following table is a summary of the emissions associated with this project.

Table #3 – Summary of Emissions		
Pollutant	Hourly Rate (lb/hr)	Annual Rate (tpy)
NO_x	0.01	0.04
CO	0.01	0.04
VOC	0.65	1.85
Total HAP	0.69	1.92
Benzene	0.61	1.74
Carbon Dioxide equivalents (CO_2e)	42.15	119.1

The hourly emissions for VOC, HAPs and CO2e were based on the design of the system handling 100 gpm of groundwater. The annual emissions were based on maximum anticipated flow rate of 50 gpm of groundwater entering the system.

REGULATORY APPLICABLILITY

The South Charleston Site is a major source under Rule 14(PSD 45 CSR 14) and Rule 30 (Title V Operating Permit Program 45CSR30). The total potential VOCs before controls from this project is 33.43 tons per year. The potential to emit of VOC, which is classified as a precursor to ozone, is less than the 40 tons per year significance threshold for Ozone under Rule 14 (45 CSR §14-2,74.a.). Thus, this project does not represent a "significant emission increase" for any regulated pollutant under Rule 14 and therefore no further evaluation of this project for applicability under Rule 14 is required.

The South Charleston Site is and will remain classified as a Major Source under Title V for criteria and hazardous air pollutants. Union Carbide Corporation is required to incorporate this permit into the facility Title V Operation Permit. The applicant will be required to incorporate the applicable requirements into the facility's Title V Operating Permit within 12-months after start-up of the system.

In the original application, UCC claimed to be exempt from the requirements of Subpart GGGGG of Part 63 by an exclusion under 40 CFR 63.7881(b)(3). The writer requested a copy of the Resource Conservation and Recovery Act (RCRA) order that required the applicant to conduct the proposed remediation. The applicant produced an October 26, 1999 Letters of Commitment for Union Carbide's Technical Center, South Charleston Plant and PTO Facility.

The writer did not consider the letters as an official order from the Administrator that required action on the applicant part. Basically, the letter is UCC is written request to participate in U.S. EPA Region III's Facility Lead Program. Thus, the Letter of Commitment is not binding and therefore is not considered as an order.

Therefore, the proposed groundwater remediation project is subject to Subpart GGGGG. 40 CFR 63.7886 outlines the general standards for the source to comply with in Subpart GGGGG. UCC has selected to meet the less than 500 ppmw (part per million by weight) of average total VOHAP option (See 40 CFR §63.7886(b)(2)). If the inlet concentration of the media being remediated is less than 500 ppmw, than all remediation material management units downstream from the point of determination managing this material meets this standard unless additional material is added that potentially could increase this concentration. For this proposed project, UCC will not be adding additional containment groundwater downstream of the oil/water separator.

UCC is believes that the VOHAP concentration in the groundwater entering the treatment system to be less than 300 ppmw, see Table #1 in the "ESTIMATE OF EMISSION BY REVIEWING ENGINEER" section of this evaluation. Thus, the applicant should not have any issues meeting the standard under 40 CFR §63.7886(b)(2). The applicant will be required to conduct measurement to demonstrate compliance with the 500 ppmw standard as outlined in 40 CFR §63.7943.

This subpart has a requirement for equipment leaks as outlined in 40 CFR §63.7882(a)(3). Equipment in contact with a remediation material that has or potential to have a total HAP concentration of 10% by weight or greater is subject the Leak Detection and Repair Program (LDAR) of this subpart. The writer estimated the maximum concentration of total HAP to be less than 3% by weight and therefore the LDAR requirements of Subpart GGGGG do not apply.

No other federal regulations are applicable to the proposed treatment process. However, the catalytic oxidizer is subject to 45 CSR 6 for particulate matter and visible emissions. 45 CSR §6-4.1 establishes allow PM rate based on incinerator capacity. The allowable standard for this oxidizer would be 0.04 pounds per hour, which is based on the 13.07 pounds of containments

being vented to the oxidizer while the treatment is operating at 100 gpm. The visible emissions standard under 45 CSR §6-4.3. is less than 20% opacity. UCC has anticipated the visible emissions to be zero and has proposed to use Method 22 to identify if visible emissions are present. The writer agrees with the applicant that no visible emissions should be emited when operated properly for this particular effluent stream. There is no other state rule applicable to this proposed oxidizer or groundwater treatment process.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The MIGCS and MIGCS CO will not emit any pollutants that aren't already being emitted by the existing emission units at the facility. Therefore, no information about the toxicity of the hazardous air pollutants (HAPs) is presented in this evaluation.

AIR QUALITY IMPACT ANALYSIS

The writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed change does not meet the definition of a major source as defined in 45CSR14.

MONITORING OF OPERATIONS

The writer believes that the monitoring of the operations should include monitoring of the inlet conditions and concentrations of the groundwater entering the system, the system, and the oxidizer.

Subpart GGGGG outlines specific procedures on sampling and analytic methods in determining the VOHAP at the inlet to the treatment process. The writer proposes to determine the average total concentration of VOHAP in the groundwater on a monthly basis. This conforms to 40 CFR §63.7943(b)(1)(i). According to 40 CFR §63.7943(b)(1)(ii) requires that the average be based on no less than 4 samples to be collected to represent the complete range of HAP compositions and HAP quantities that occur in the material stream during the entire averaging period. Thus, collecting weekly would satisfy this requirement under 63.7943(b)(1)(ii).

The mass rate of VOCs and VOHAPs going to the oxidizer is dependent on the flow rate of the groundwater going to the treatment system and air being introduced to the cascade aerator. Monitoring the flow of the groundwater would determine the actual mass rate of the VOCs and VOHAPs being introduced into the system. The emissions hourly VOC and HAP emission limits are based on the groundwater flow rate at 100 gpm, which accounts for times when the treatment system is operating at maximum capacity but at a normal operating mode. The annual limits were based on maximum predicted flowrate of groundwater, which is 50 gpm. Thus, it is important to continuously monitor the groundwater flowrate.

The flowrate of aerator air needs to be sufficient to completely oxidize the iron in the groundwater before it is introduced to the vertical flow vegetated contact beds. This flow rate should be regulated based on the amount of iron in the water. The writer modeled the cascade aerator at the maximum air flow rate. Thus, the maximum air flow rate is fixed and the oxidizer should be designed and constructed to allow additional combustion air to completely oxidize the organics in the effluent. The writer believes that additional monitoring would not add any benefit in determining compliance than the typical monitored parameters for oxidizers (i.e. visible emissions & temperature).

Monitoring the daily average temperature difference across each catalyst bed and comparing it to the minimum temperature difference established during the design evaluation or performance testing to ensure the catalyst is maintaining it reactively towards the contaminants. In addition to monitoring the temperature difference, the applicant proposed to sample and analyze the catalyst from each of the bed on an annual basis to determine when the catalyst beds need to be replaced.

The writer has proposed to require the applicant to conduct an initial performance test to demonstrate initial compliance with the emission limits and to established the minimum temperature difference. The writer proposed a requirement to conduct subsequent testing be based on the VOHAP concentration in the groundwater entering the system rather than a set frequency. The writer proposes to set this concentration at 80% of the Subpart GGGGG trigger level of 500 ppmw, which equates to 400 ppmw.

To ensure that the permittee maintain a closed-vent system with no detectable leaks, the writer adopted leak detection and repair (LDAR) from Subpart GGGGG which refers to Subpart DD of Part 63.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates the proposed changes of the facility will meet all the requirements of the applicable rules and regulations when operated in accordance with the permit application. Therefore, the writer recommends granting Union Carbide Corporation a Rule 13 Construction Permit for the construction of a groundwater remediation system at South Charleston Site located in South Charleston, WV.

Edward S. Andrews, P.E.
Engineer

December 23, 2016
Date

Andrews, Edward S

From: Fedczak, James (JP) <JPFedczak@dow.com>
Sent: Friday, October 21, 2016 3:34 PM
To: Andrews, Edward S
Subject: RE: WV DAQ NSR Permit Application Complete for Union Carbine Corporation - South Charleston

Thank you, Ed. This is very good news.

Have a good weekend!

Jay

From: Andrews, Edward S [mailto:Edward.S.Andrews@wv.gov]
Sent: Friday, October 21, 2016 2:35 PM
To: Putnam, Jon (J)
Cc: McKeone, Beverly D; Fedczak, James (JP); Cibrik, Jerome (JE)
Subject: WV DAQ NSR Permit Application Complete for Union Carbine Corporation - South Charleston

RE: Application Status: Complete
Union Carbine Corporation
Permit Application R13-3308
Plant ID No. 039-00003

Mr. Putnam

Your application for a construction permit for a groundwater remediation system was received by this Division on April 11, 2016, and assigned to the writer for review. Upon review of said application and additional submittals, it has been determined that the application is complete. Therefore, the statutory review period commenced on October 20, 2016

In the case of this application, the agency believes it will take approximately 90 days to make a final permit determination.

This determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit determination.

Should you have any questions, please contact Ed Andrews at (304) 926-0499 ext. 1214 or reply to this email.

Sincerely,

Edward S. Andrews, P.E.
Engineer
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE

Charleston, WV 25304
304.926.0499 ext. 1214

Andrews, Edward S

From: Fedczak, James (JP) <JPFedczak@dow.com>
Sent: Thursday, October 20, 2016 12:51 PM
To: McKeone, Beverly D; Andrews, Edward S; Durham, William F
Subject: RE: more Electric Catalytic Oxidizer info

Director Durham/Bev/Ed,

The application that UCC provided did not supply estimates for the emissions of NOx and CO because we believe, based on sound engineering principles, there will be none (or, if any, negligible). Since this is an electric unit, there is no fuel NOx. The gas stream being controlled does not consist of nitrogen containing compounds. Information has also been submitted to the DAQ which shows there will be no formation of thermal NOx due to low operating temperature. As for CO emissions, catalytic oxidation converts VOC/HAP to CO_2 and H_2O through direct conversion which does not involve combustion.

Regards,

Jay

Jay Fedczak, P.E.
EH&S Environmental Specialist
Union Carbide Corporation
A Wholly Owned Subsidiary of The Dow Chemical Company
South Charleston, WV 25303
O: 304-747-1354, Email: JPFedczak@dow.com

From: McKeone, Beverly D [mailto:Beverly.D.Mckeone@wv.gov]
Sent: Wednesday, October 19, 2016 2:54 PM
To: Fedczak, James (JP); Andrews, Edward S
Cc: Durham, William F
Subject: RE: more Electric Catalytic Oxidizer info

Jay,

Please understand. It is the responsibility of the applicant to estimate all possible emissions a source will have and to show justification, in writing, signed by a responsible official for those emissions. Whether the DAQ will set those emissions as permit requirements is a completely different question.

But the emission estimates, MUST be provided. The DAQ cannot make a judgement that the emissions are the same as another permitted source or just set emissions rates at what we think they should be. We review the emission estimates submitted by the company.

The DAQ is waiting on such information from DOW and cannot process the application further until such information is provided.

Bev

Bev McKeone P. E.
Environmental Protection
NSR Program Manager
Environmental Protection
(304) 926-0499 Ext 1260 Work
(681) 313-9077 Mobile
Beverly.D.McKeone@wv.gov
601 57th St. SE
Charleston, WV 25304

From: Fedczak, James (JP) [mailto:JPFedczak@dow.com]
Sent: Wednesday, October 19, 2016 12:55 PM
To: Andrews, Edward S <Edward.S.Andrews@wv.gov>
Subject: more Electric Catalytic Oxidizer info

Ed,

Please see message below from the oxidizer vendor. The vendor states there is very little CO. If there needs to be limits in the permit for NOx and CO, I would suggest establishing limits similar to those in R13-3025. Please let me know your thoughts. Thanks.

Jay

Retention Policy: Dow Inbox Policy (60 days) Expires: 12/18/2016

From: "Weinhouse, Elizabeth/NYC" <Elizabeth.Weinhouse@CH2M.com>
Date: October 19, 2016 at 11:20:36 AM EDT
To: "McMackin, Stephanie/DAY" <Stephanie.McMackin@CH2M.com>
Subject: RE: Air Permitting Inquiry [EXTERNAL]

See vendor response to this morning's inquiry. Let me know if you need anything further.
Beth

From: Jeff Kudronowicz [mailto:Jeff.Kudronowicz@anguil.com]
Sent: Wednesday, October 19, 2016 11:15 AM
To: Weinhouse, Elizabeth/NYC <Elizabeth.Weinhouse@CH2M.com>
Cc: Mike Disabato <mike.disabato@anguil.com>
Subject: FW: Air Permitting Inquiry [EXTERNAL]
Importance: High

Hi Beth,

Just got back in the office this morning.

The catalyst used is a good oxidation catalyst where CO is easier to oxidize than the VOCs. So we would expect to see very little CO e

Concerning NOx and SOx, there doesn't appear to be any nitrogen or sulfur bearing compounds in the list that will oxidize to these compounds. And, there is no thermal NOx formation that you might expect from an open burner flame since we are using electric hea

Andrews, Edward S

From: Fedczak, James (JP) <JPFedczak@dow.com>
Sent: Wednesday, October 19, 2016 11:36 AM
To: Andrews, Edward S
Subject: VOC emissions estimates for MIGCS

Hi Ed,

At this point have we satisfactorily proven to DAQ that our VOC emissions will be less than the 40 tons and therefore are under the PSD significance level?

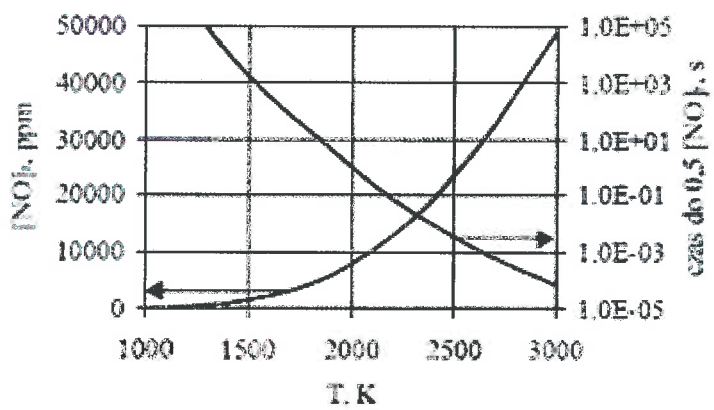
Regarding NOx emissions, there are no nitrogen compounds being oxidized. The following screen shot shows that at our maximum operating temperature of 1,200 F (922 K), there will be no concentration of NOx.

RATE OF NO_X FORMATION via ZELDOVICH MECHANISM

Rate of NO_x formation by thermal mechanism

$$d[NO]/dt = k_p[O_2]^{1/2}[N_2]$$

where $k_p \equiv 2K_5^{1/2}k_2$, which is in accord with the experimental.



Equilibrium concentration of NO, $[NO]_e$, and time to reach $0.5[NO]_e$ versus the temperature

It shows that the Zeldovich mechanism becomes important when the temperature reaches the range of 1600-1800 K.

I will follow up regarding CO emissions from any possible incomplete oxidation.

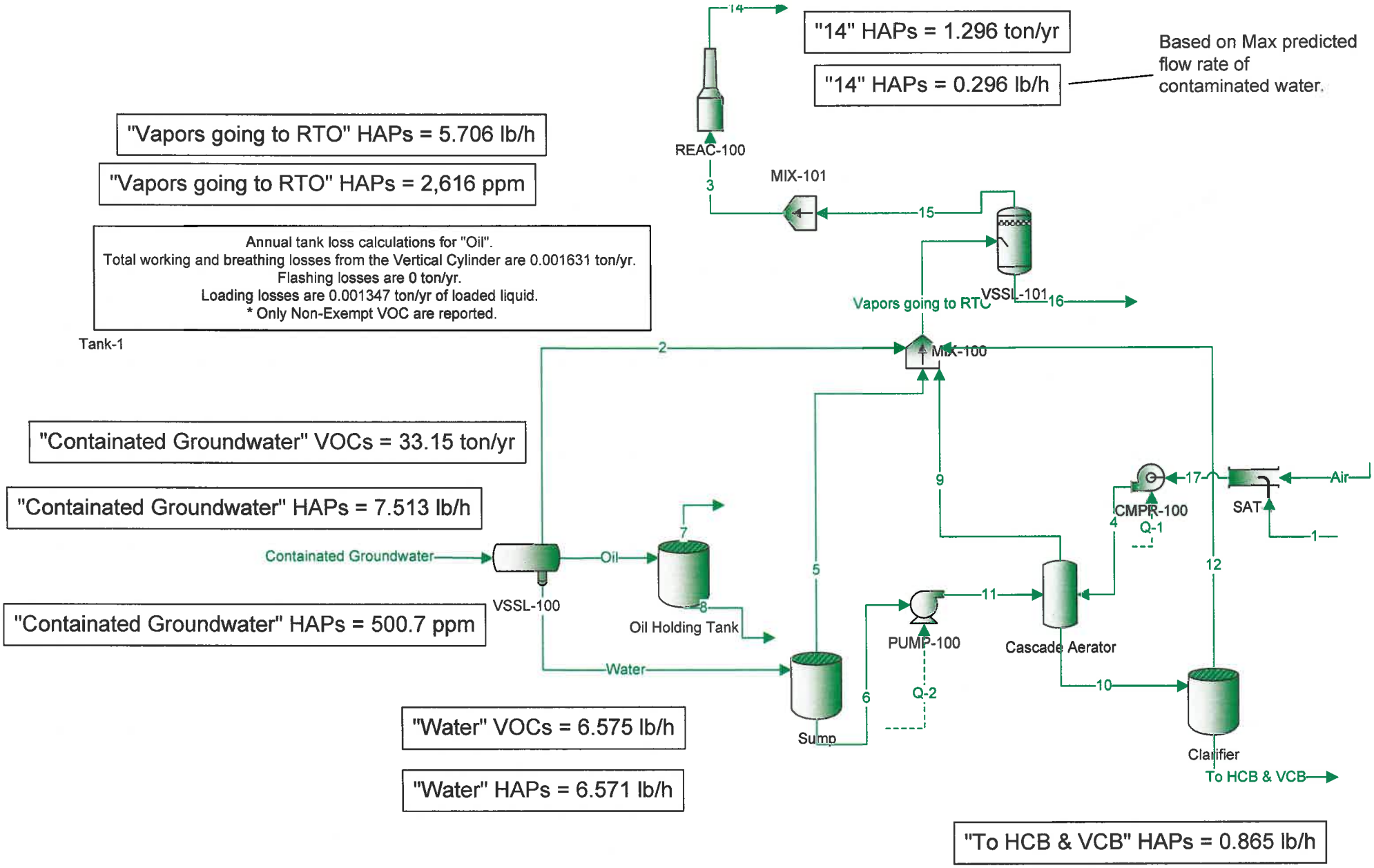
Our oxidizer capacity is designed at 0.005 ton/hr. The Rule 6 emission limit for particulate matter would be 0.03 lb/hour (rounded).

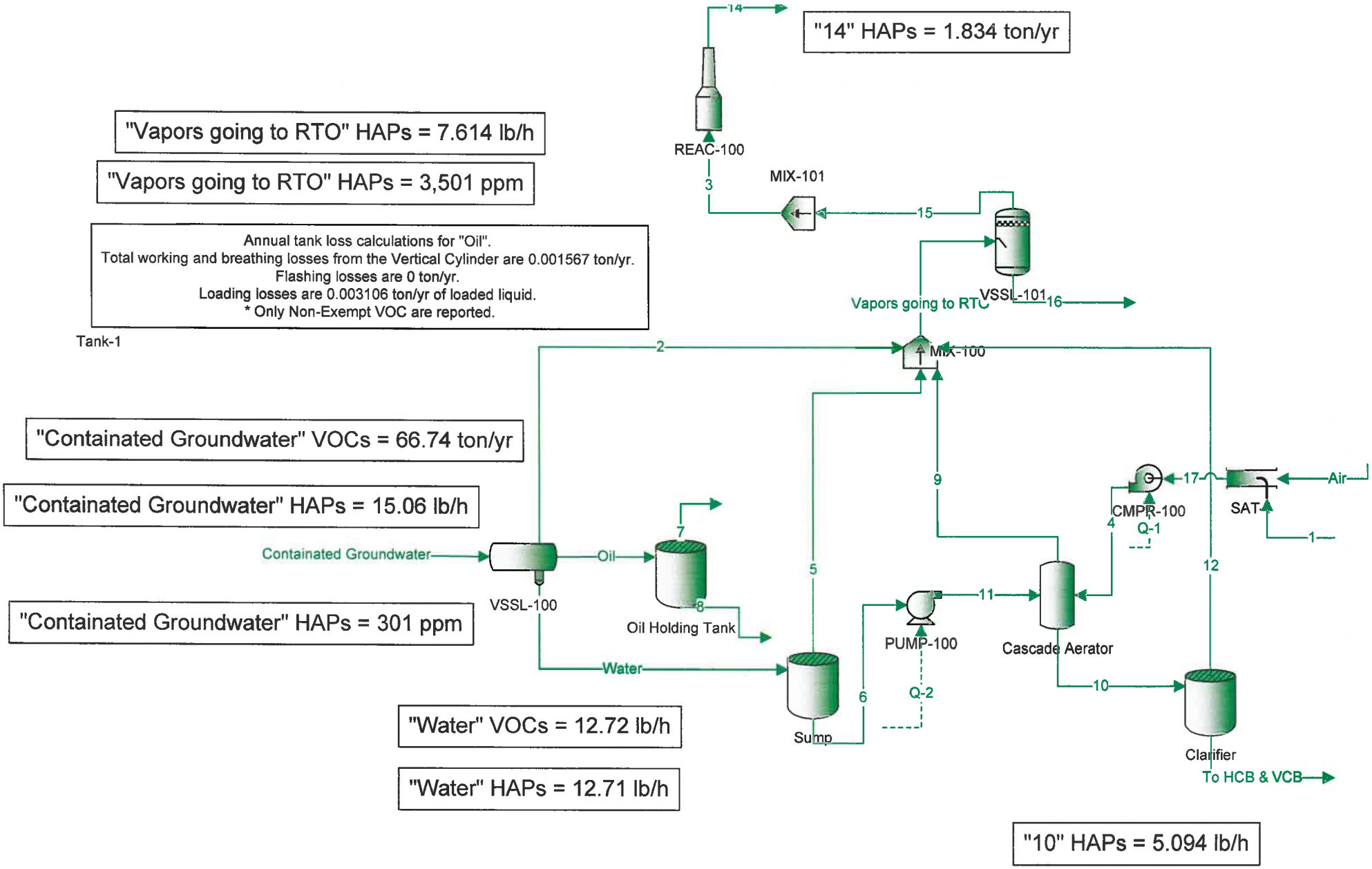
Thank you in advance for your prompt response.

Jay

Jay Fedczak, P.E.

EH&S Environmental Specialist
Union Carbide Corporation
A Wholly Owned Subsidiary of The Dow Chemical Company
South Charleston, WV 25303
O: 304-747-1354, Email: JPFedczak@dow.com


"14" HAPs = 1.296 ton/yr
"14" HAPs = 0.296 lb/h
Based on Max predicted flow rate of contaminated water.
"Vapors going to RTO" HAPs = 5.706 lb/h
"Vapors going to RTO" HAPs = 2,616 ppm
Annual tank loss calculations for "Oil".
Total working and breathing losses from the Vertical Cylinder are 0.001631 ton/yr.
Flashing losses are 0 ton/yr.
Loading losses are 0.001347 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.
Tank-1
"Containated Groundwater" VOCs = 33.15 ton/yr
"Containated Groundwater" HAPs = 7.513 lb/h
"Containated Groundwater" HAPs = 500.7 ppm
"Water" VOCs = 6.575 lb/h
"Water" HAPs = 6.571 lb/h
"To HCB & VCB" HAPs = 0.865 lb/h
14
REAC-100
3
MIX-101
15
VSSL-101
16
Vapors going to RTO
2
MIX-100
9
17
Air
CMPR-100
Q-1
SAT
1
4
12
Containated Groundwater
Oil
7
8
VSSL-100
Oil Holding Tank
5
11
PUMP-100
Cascade Aerator
Water
6
Q-2
10
Sump
Clarifier
To HCB & VCB


"14" HAPs = 1.834 ton/yr
"Vapors going to RTO" HAPs = 7.614 lb/h
"Vapors going to RTO" HAPs = 3,501 ppm
Annual tank loss calculations for "Oil".
Total working and breathing losses from the Vertical Cylinder are 0.001567 ton/yr.
Flashing losses are 0 ton/yr.
Loading losses are 0.003106 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.
Tank-1
"Containated Groundwater" VOCs = 66.74 ton/yr
"Containated Groundwater" HAPs = 15.06 lb/h
"Containated Groundwater" HAPs = 301 ppm
"Water" VOCs = 12.72 lb/h
"Water" HAPs = 12.71 lb/h
"10" HAPs = 5.094 lb/h
14
REAC-100
3
MIX-101
15
VSSL-101
16
Vapors going to RTO
2
MIX-100
Containated Groundwater
VSSL-100
Oil
7
8
Oil Holding Tank
Water
5
Sump
6
Q-2
PUMP-100
11
Cascade Aerator
9
4
CMPR-100
Q-1
17
SAT
Air
1
12
10
Clarifier
To HCB & VCB

"14" HAPs = 3.009 ton/yr

"14" HAPs = 0.6871 lb/h

Based on Max predicted flow rate of contaminated water @VOHAP conc. of <500 ppm.

"Vapors going to RTO" VOCs = 13.07 lb/h

"Vapors going to RTO" HAPs = 5,986 ppm

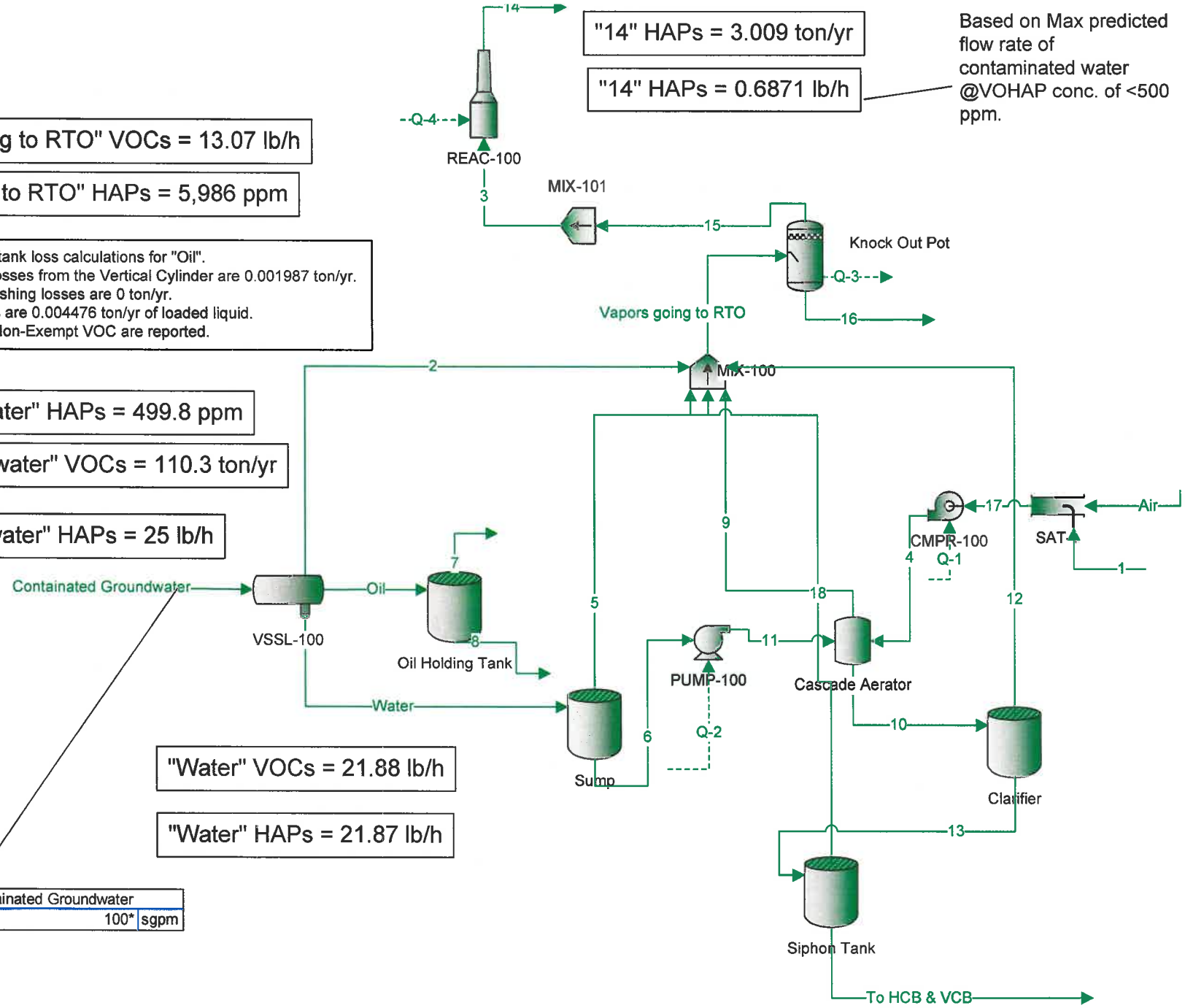
Annual tank loss calculations for "Oil".
Total working and breathing losses from the Vertical Cylinder are 0.001987 ton/yr.
Flashing losses are 0 ton/yr.
Loading losses are 0.004476 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.

Tank-1

"Contaminated Groundwater" HAPs = 499.8 ppm

"Contaminated Groundwater" VOCs = 110.3 ton/yr

"Contaminated Groundwater" HAPs = 25 lb/h

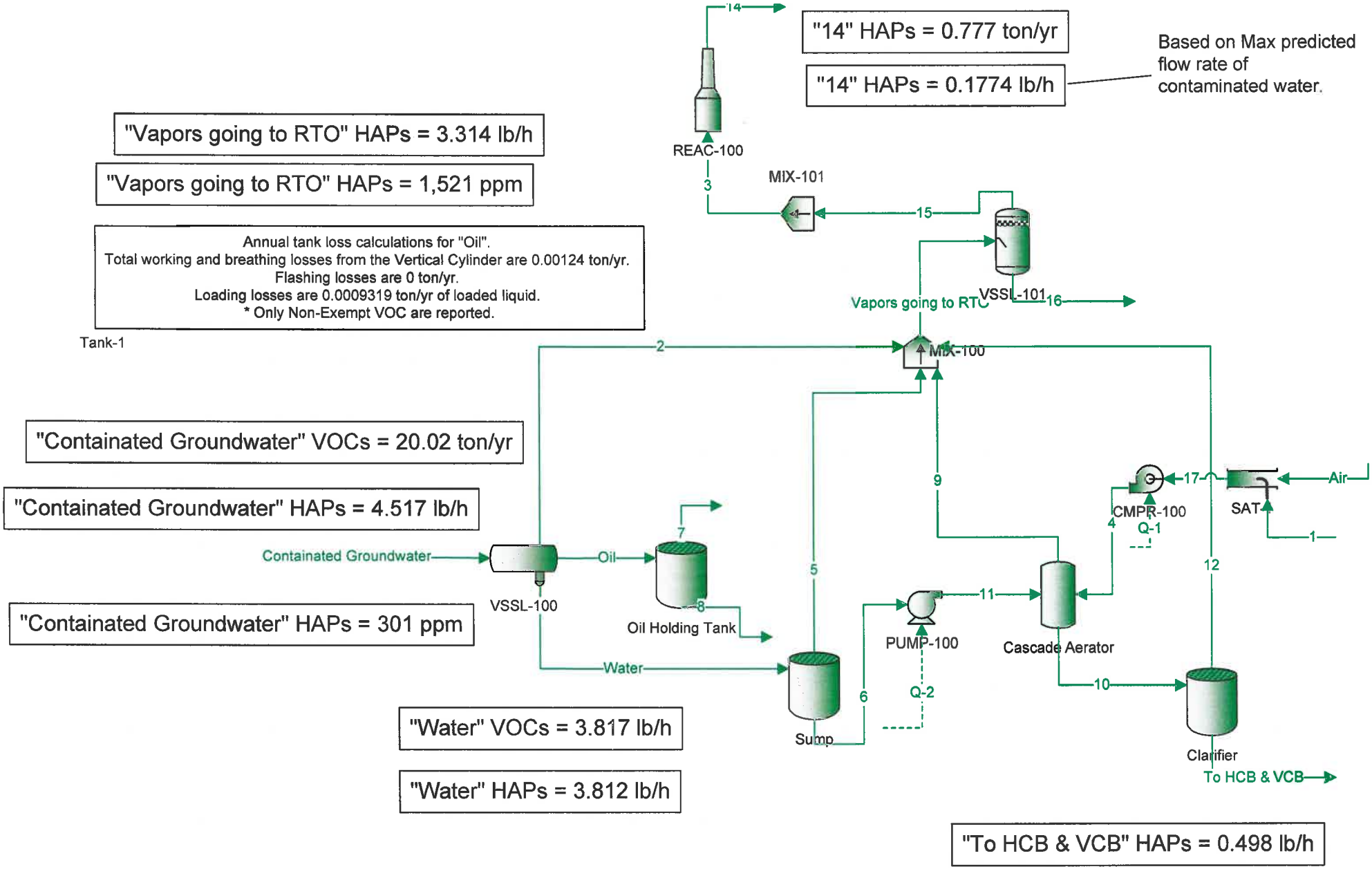


"Water" VOCs = 21.88 lb/h

"Water" HAPs = 21.87 lb/h

Properties	Contaminated Groundwater	
Std Liquid Volumetric Flow(Total)	100*	sgpm

"To HCB & VCB" HAPs = 8.814 lb/h


"14" HAPs = 0.777 ton/yr
"14" HAPs = 0.1774 lb/h
Based on Max predicted flow rate of contaminated water.
"Vapors going to RTO" HAPs = 3.314 lb/h
"Vapors going to RTO" HAPs = 1,521 ppm
Annual tank loss calculations for "Oil".
Total working and breathing losses from the Vertical Cylinder are 0.00124 ton/yr.
Flashing losses are 0 ton/yr.
Loading losses are 0.0009319 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.
Tank-1
"Containated Groundwater" VOCs = 20.02 ton/yr
"Containated Groundwater" HAPs = 4.517 lb/h
"Containated Groundwater" HAPs = 301 ppm
"Water" VOCs = 3.817 lb/h
"Water" HAPs = 3.812 lb/h
"To HCB & VCB" HAPs = 0.498 lb/h
14
REAC-100
3
MIX-101
15
VSSL-101
16
Vapors going to RTO
2
MIX-100
9
17
Air
CMPR-100
Q-1
SAT
4
1
Containated Groundwater
Oil
7
8
VSSL-100
Oil Holding Tank
5
12
11
PUMP-100
Cascade Aerator
Water
6
Q-2
10
Sump
Clarifier
To HCB & VCB

"14" HAPs = 1.834 ton/yr

"14" HAPs = 0.4188 lb/h

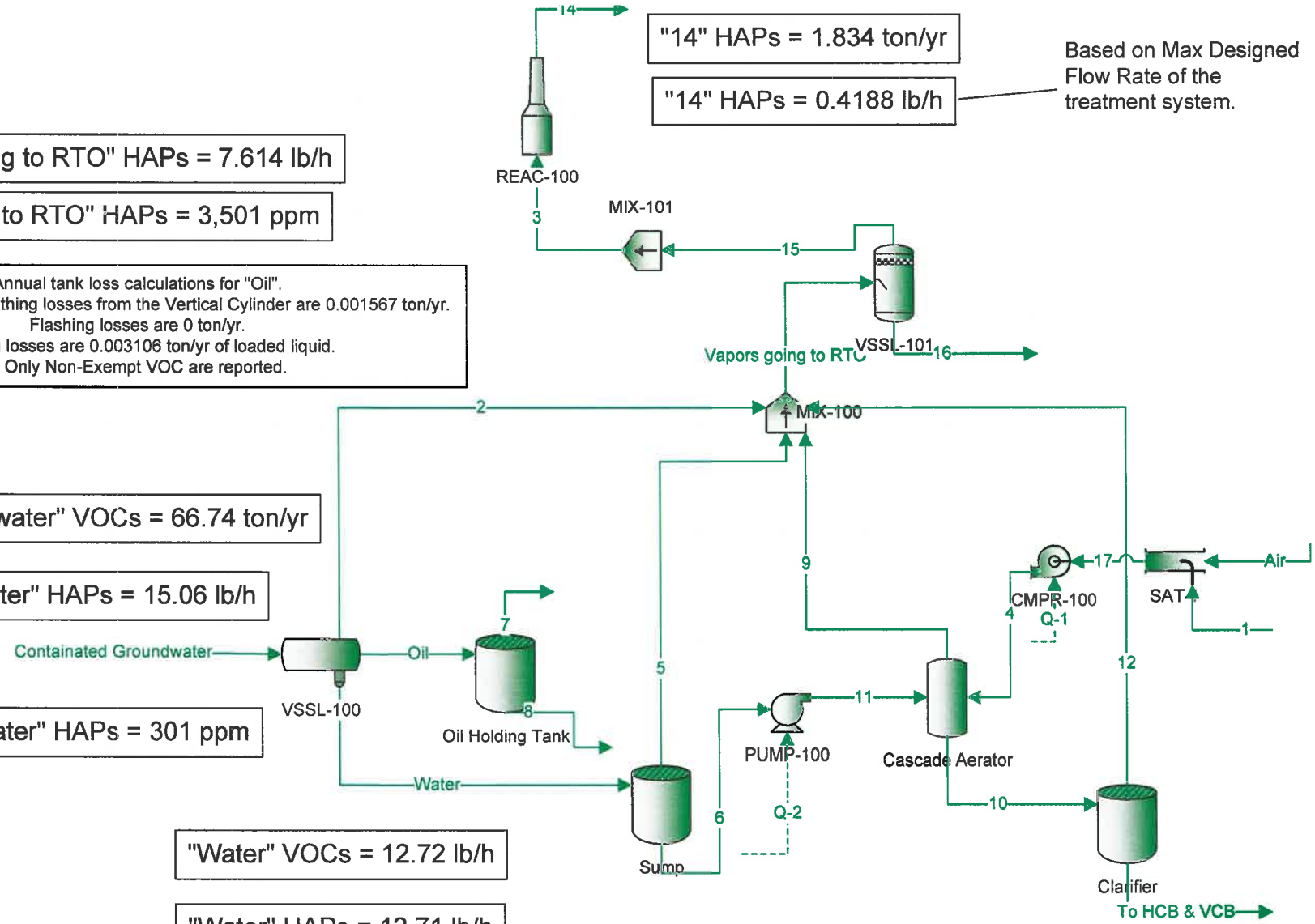
Based on Max Designed Flow Rate of the treatment system.

"Vapors going to RTO" HAPs = 7.614 lb/h

"Vapors going to RTO" HAPs = 3,501 ppm

Annual tank loss calculations for "Oil".
Total working and breathing losses from the Vertical Cylinder are 0.001567 ton/yr.
Flashing losses are 0 ton/yr.
Loading losses are 0.003106 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.

Tank-1



"Containated Groundwater" VOCs = 66.74 ton/yr

"Containated Groundwater" HAPs = 15.06 lb/h

"Containated Groundwater" HAPs = 301 ppm

"Water" VOCs = 12.72 lb/h

"Water" HAPs = 12.71 lb/h

"To HCB & VCB" HAPs = 5.093 lb/h

"14" HAPs = 1.834 ton/yr

"14" HAPs = 0.4188 lb/h

Based on Max Designed Flow Rate of the treatment system.

"Vapors going to RTO" HAPs = 7.614 lb/h

"Vapors going to RTO" HAPs = 3,501 ppm

Annual tank loss calculations for "Oil".
Total working and breathing losses from the Vertical Cylinder are 0.001567 ton/yr.
Flashing losses are 0 ton/yr.
Loading losses are 0.003106 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.

Tank-1

"Containated Groundwater" VOCs = 66.74 ton/yr

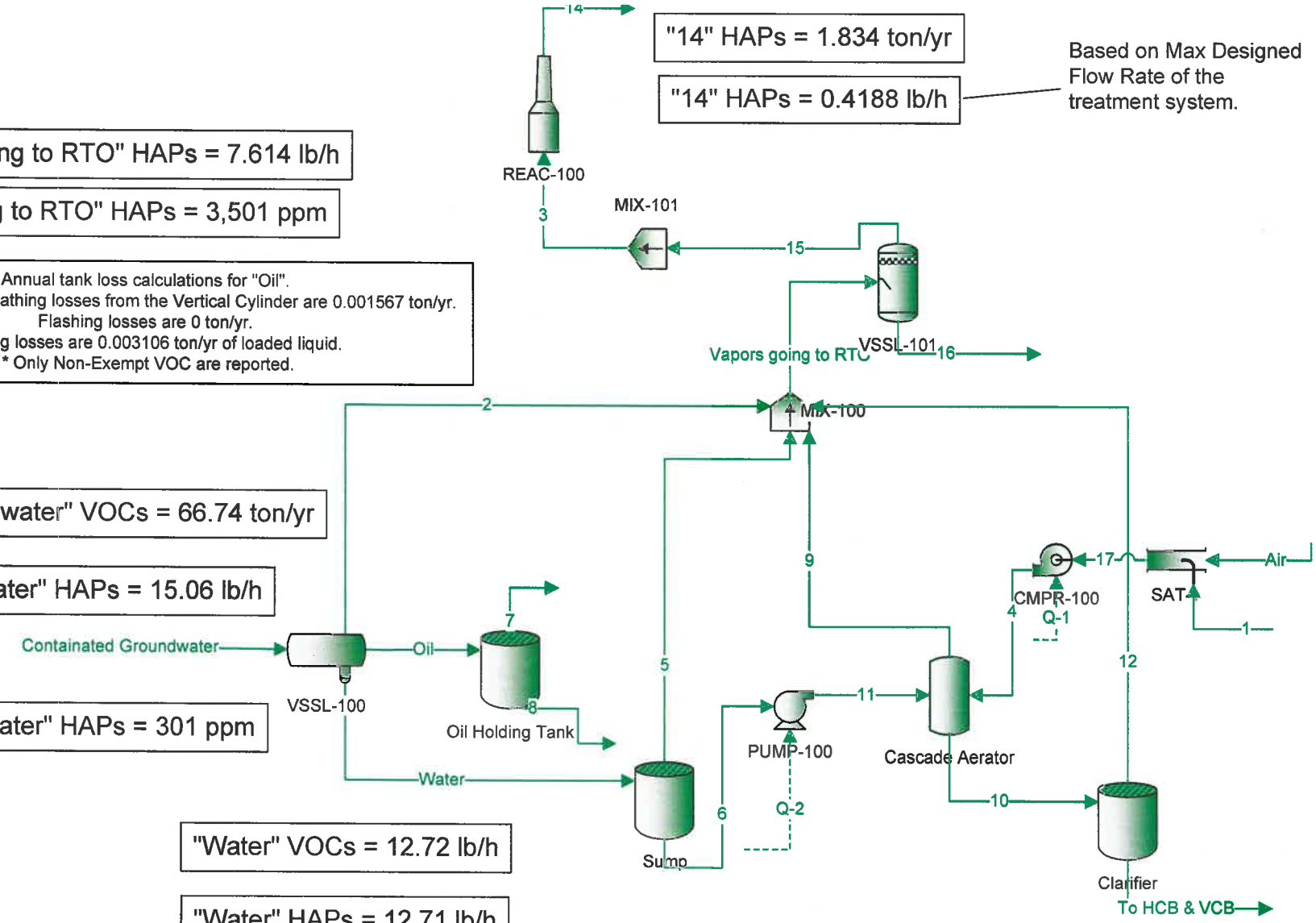
"Containated Groundwater" HAPs = 15.06 lb/h

"Containated Groundwater" HAPs = 301 ppm

"Water" VOCs = 12.72 lb/h

"Water" HAPs = 12.71 lb/h

"To HCB & VCB" HAPs = 5.093 lb/h



"14" HAPs = 1.924 ton/yr

"14" HAPs = 0.4392 lb/h

Based on Max predicted flow rate of contaminated water @VOHAP conc. of <500 ppm.

"14" Greenhouse Gases = 119.1 ton/yr

"14" VOCs = 1.849 ton/yr

"Vapors going to RTO" VOCs = 8.442 lb/h

"Vapors going to RTO" HAPs = 3,868 ppm

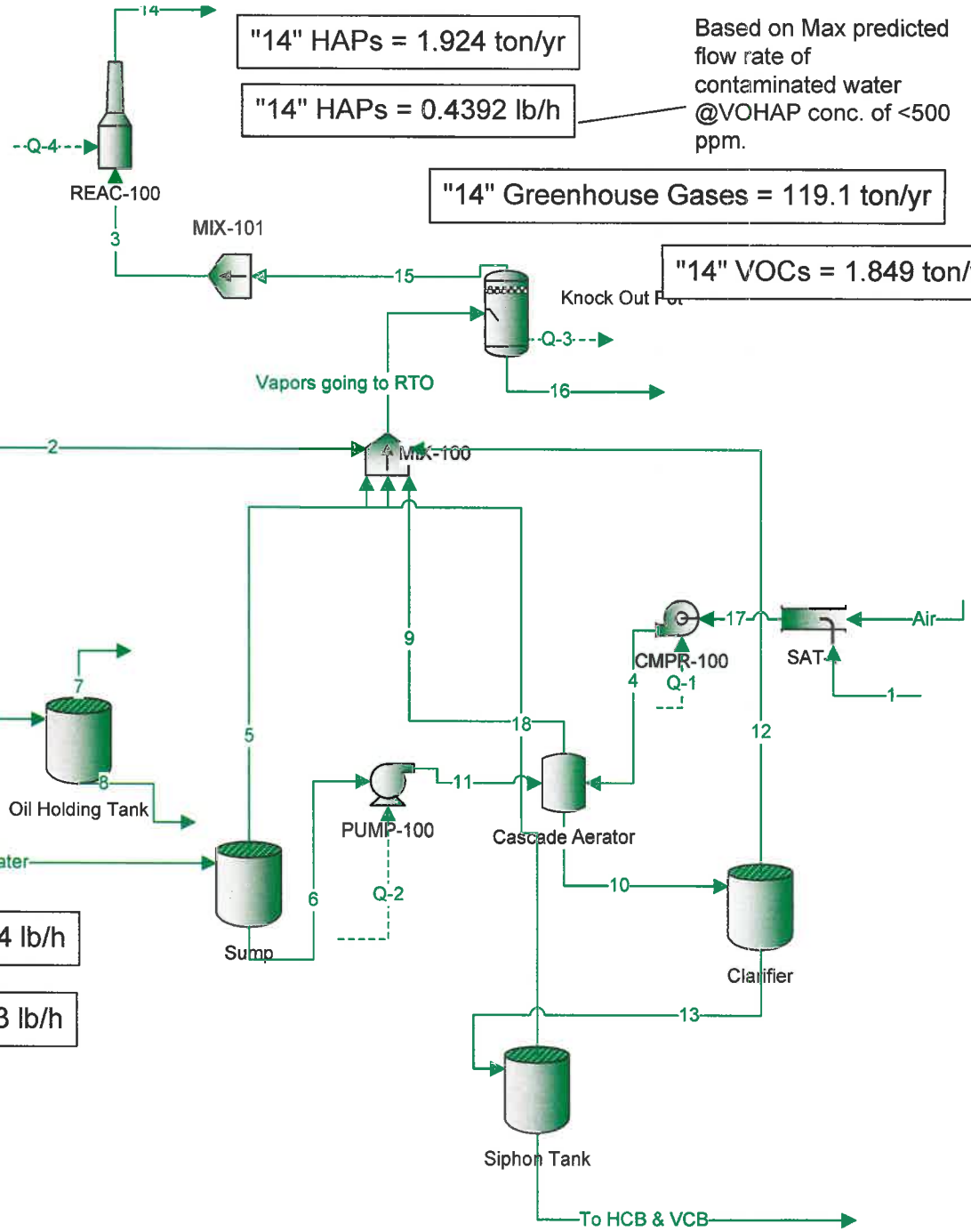
Annual tank loss calculations for "Oil".
Total working and breathing losses from the Vertical Cylinder are 0.001731 ton/yr.
Flashing losses are 0 ton/yr.
Loading losses are 0.002238 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.

Tank-1

"Containated Groundwater" HAPs = 499.8 ppm

"Containated Groundwater" VOCs = 55.14 ton/yr

"Containated Groundwater" HAPs = 12.5 lb/h



"Water" VOCs = 10.94 lb/h

"Water" HAPs = 10.93 lb/h

Properties	Containated Groundwater	
Std Liquid Volumetric Flow(Total)	50*	sgpm

"To HCB & VCB" HAPs = 2.499 lb/h

"14" VOCs = 299.6 ppm

"14" VOCs = 0.6534 lb/h

"14" Greenh

"Vapors going to RTO" VOCs = 13.07 lb/h

"Vapors going to RTO" HAPs = 13.05 lb/h

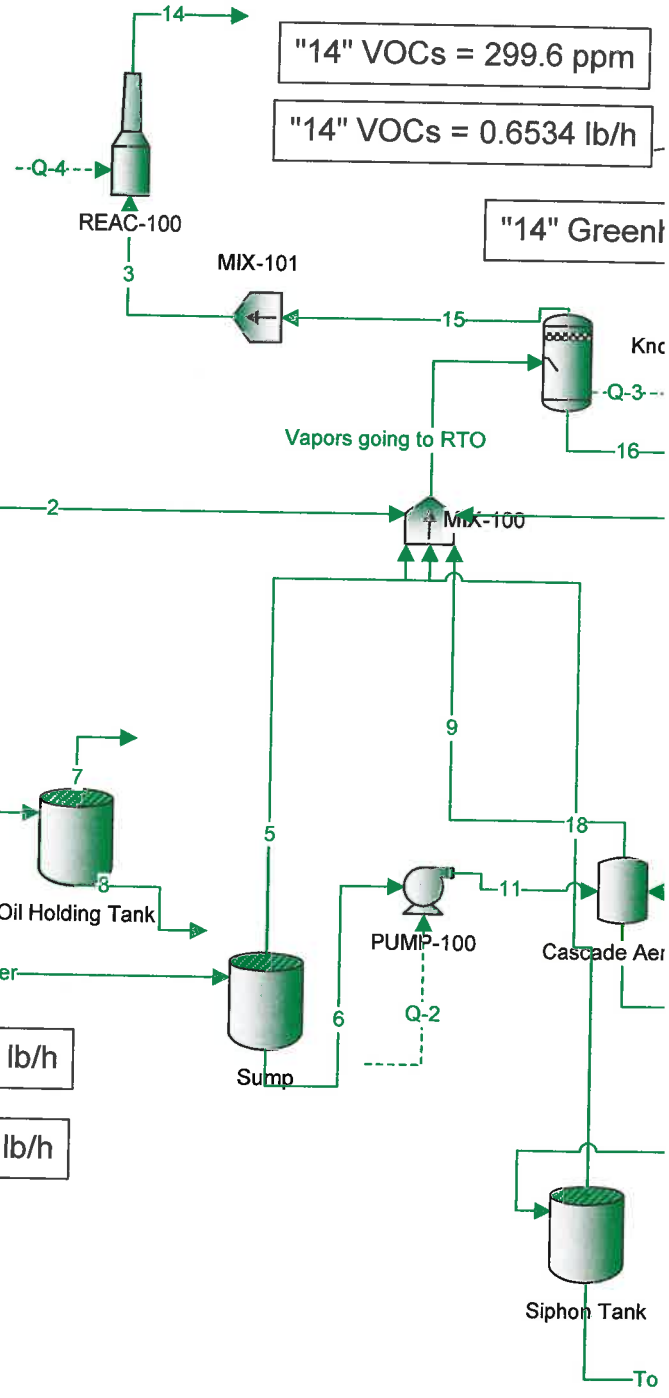
Annual tank loss calculations for "Oil".
Total working and breathing losses from the Vertical Cylinder are 0.001987 ton/yr.
Flashing losses are 0 ton/yr.
Loading losses are 0.004476 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.

Tank-1

"Containated Groundwater" HAPs = 0.04998 %

"Containated Groundwater" VOCs = 110.3 ton/yr

"Containated Groundwater" HAPs = 25 lb/h



"Water" VOCs = 21.88 lb/h

"Water" HAPs = 21.87 lb/h

Properties	Containated Groundwater	
Std Liquid Volumetric Flow(Total)	100*	sgpm

"To HCB & V

Union Carbide Corporation
A Subsidiary of The Dow Chemical Company
P.O. Box 8004
437 MacCorkle Avenue, SW
South Charleston, WV 25303
USA

Certified Mail – Return Receipt Requested
7010 2780 0001 8879 2970

September 28, 2016

Mr. Ed Andrews
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

RE: Application Status: Incomplete, Union Carbide Corporation – South Charleston Permit Application No. R13-3308, Plant ID No. 039-00003

Dear Mr. Andrews:

The following has been prepared per your recent data and information request related to the construction permit application for a groundwater remediation project at Union Carbide Corporation. Each of your questions is listed along with the response and additional information.

1. The revised emission estimates provided on September 9, 2016 lacks justification. The emission estimate needs to be made based on the best available information. The use of someone's experience is not acceptable. Each point/process step where there is potential for organics from the groundwater to be entrained into the air needs to be evaluated as a potential source of air emissions. This justification should explain why UCC is changing its approach in estimating emissions from the estimated made in the April 11, 2016 submittal.

Groundwater sampling has been ongoing at the Middle Island Main Source area since 12/16/2002. Concentrations from 2012 were used in the development of the design basis for the Groundwater Collection System because this year included a full data set for volatile organic compounds and was determined to be representative of the groundwater plume. For Phase 1, the area was divided into 3 groundwater capture zones based on groundwater modeling conducted using the MODFLOW-NWT code in conjunction with the Groundwater Vista pre- and post-processing software. The average concentration for each capture zone was determined based on the groundwater analytical data applicable to that capture zone. The predicted groundwater influent flowrate is anticipated to be 30 gpm total from the 3 capture zones; however, this value was scaled up for design purposes to 100 gpm. (Thus, the mass basis of contaminants more than doubled based on this contingency factor for the flowrate). The process train is meant to treat the VOCs in aqueous form; however, there are high iron concentrations in the groundwater. Iron can negatively affect the wetland performance; as a result, a cascade aerator is included to oxidize the iron, which is then precipitated and settled out in the clarifier. A vacuum truck will be used to dispose of the precipitated iron oxide. A maximum of 470 scfm of atmospheric air will be introduced into the aerator and as a side effect, a portion of the VOCs

will volatilize during this process. The emission estimates submitted in April 2016 with the original permit application conservatively assumed 99.99% of the VOCs would volatilize.

Subsequent to that submittal, the design has progressed and equipment vendors have been selected. The cascade aerator vendor has indicated a range of 20 to 40% of benzene would volatilize based on their equipment design. To be conservative, revised emission estimates were based on 40% volatilization of benzene through the cascade aerator, with volatilization rates for other VOCs being scaled based on each chemical's Henry's Law constant in relation to benzene's Henry's Law constant.

As noted above, prior to detailed design and availability of vendor information, we had conservatively estimated emissions at nearly 100% volatilization along with the scaled up groundwater flowrate of 100 gpm. Per your subsequent request on 09/20/16, we have prepared an emissions scenario that evaluates emissions using the modeled rate of groundwater flow from the capture zones with 99.99% volatilization to demonstrate that total uncontrolled emissions are below 40 TPY (See Enclosure 1). The model predicted a flowrate of approximately 30 gpm; however, 50 gpm was utilized in this emissions scenario to be conservative. At this flow rate and assuming 99.99% volatilization, total uncontrolled VOC emissions are 33 TPY. It should be noted that this estimate does not appropriately estimate emissions under operating conditions, as the goal of the treatment system is to treat VOCs in the aqueous form.

2. The concentrations of the constituents in Table N-3 submitted on May 11, 2016 are higher than on Page N-3 of the September 9, 2016 submittal. There is no explanation in the recent submittal for the decrease in the concentration of constituents and none of the submittal provided to the DAQ for this project include any sampling results of the contaminated groundwater. Please explain why the initial load of the constituents has decreased from the loading provided on April 11, 2016.

This is a significant figure issue due to the difference in units (mg/L vs. µg/L); however, we have reverted to what was originally provided to be conservative. See attached revision dated 09/20/16 (Enclosure 2).

3. Your revised application notes that the remediation material's average total volatile organic hazardous air pollutant (VOHAP) concentration will be less than 500 parts per million by weight (ppmw), which is based on current data. Please provide this data that the VOHAP concentration indicates that the concentration will be less than 500 ppmw.

Refer to attachment N (page N-3 of Enclosure 2) and the groundwater concentrations. If the VOHAP concentrations are summed, the value is 284,270 µg/L on a mass basis. Converting this to ppm results in a value of 284.27 ppm.

The following summarizes the additional information you requested during the conference call on 09/20/2016:

- ***Pressure of the incoming groundwater-*** *The maximum incoming groundwater pressure is 65 psi; cascade aerator pressure is 3/8 inches of water*
- ***Oil/Water Separator Details-*** *The Oil/Water Separator itself is 1,000 gallons and is used for removal of any non-aqueous phase liquid (NAPL or free product) that may be entrained in extracted groundwater. The collected NAPL will be drummed, sampled and removed per normal waste management procedures. The drumming of NAPL will be a manual process as there is not expected to be a significant amount. The drums are not vented.*

Lastly, see Enclosure 3 for revised page N-1 of Attachment N and page 1 of 2 of Attachment J of the application which reflects a slight increase of annual VOC emissions from 1.25 tons per year to 1.26 tons per year due to rounding.

Should you have any questions on this submittal or need additional information, please contact Jay Fedczak at (304) 747-1354.

Regards,

Jon Putnam
WVO Responsible Care Leader

CC: Jerome Cibrik/Union Carbide Corporation

Enclosure 1

Emissions using a ground water flow of 50 gpm.

ANALYSIS OF 100% VOC VOLATILIZATION AT 50 GPM GROUNDWATER INFLUENT

Summary of Emission Estimates, CatOx

South Charleston Facility, Middle Island Groundwater Containment System, South Charleston, WV

Revised 09/26/16

Total by Regulatory Classification

	lb/hr	TPY
VOC	0.38	1.67
HAP	0.35	1.55
TAP	0.31	1.34
NRC	0.06	0.24

Total by Chemical

		Uncontrolled		Controlled[1]	
Chemical	Regulatory Classification	Emission Rate (lb/hr)	Emission Rate (tpy)[2]	Emission Rate (lb/hr)	Emission Rate (tpy)[2]
1,2-Dichloroethane	VOC/HAP/TAP	0.04	0.19	0.00	0.01
1,3-Dichlorobenzene	VOC	0.04	0.19	0.00	0.01
1,4-Dichlorobenzene	VOC/HAP	0.04	0.19	0.00	0.01
2-Butanone	VOC	0.44	1.95	0.02	0.10
Acetone	NRC	1.11	4.87	0.06	0.24
Benzene	VOC/HAP/TAP	6.07	26.58	0.30	1.33
Chlorobenzene	VOC/HAP	0.04	0.19	0.00	0.01
cis-1,2-Dichloroethylene	VOC	0.04	0.19	0.00	0.01
Ethylbenzene	VOC/HAP	0.09	0.38	0.00	0.02
Naphthalene	VOC/HAP	0.03	0.13	0.00	0.01
Styrene	VOC/HAP	0.05	0.23	0.00	0.01
Toluene	VOC/HAP	0.48	2.10	0.02	0.11
Xylenes, Total	VOC/HAP	0.23	1.00	0.01	0.05
Total HAP		**7.09**	**31.04**	**0.35**	**1.55**
Total VOC		**7.63**	**33.41**	**0.38**	**1.67**

1 - CatOx provides a VOC/HAP control efficiency of 95%

2- Emission rates account for a 24 hour per day, 365 day per year operating schedule

3- NRC - Non-regulated contaminant

ANALYSIS OF 100% VOC VOLATILIZATION AT 50 GPM GROUNDWATER INFLUENT

Summary of Vapor Emission Estimates - using Groundwater Concentrations

South Charleston Facility, Middle Island Groundwater Containment System, South Charleston, WV

Revised 09/26/16

Total Maximum Water Flow = 50 gpm
189.25 lpm

Constituent	Max. Weighted Conc. in Groundwater (mg/L)*	Loading Rate in Air to CATOX (lb/hr)
1,2-Dichloroethane	1.78	0.04
1,3-Dichlorobenzene	1.78	0.04
1,4-Dichlorobenzene	1.78	0.04
2-Butanone	17.77	0.44
Acetone	44.43	1.11
Benzene	242.69	6.07
Chlorobenzene	1.78	0.04
cis-1,2-Dichloroethylene	1.78	0.04
Ethylbenzene	3.44	0.09
Naphthalene	1.16	0.03
Styrene	2.07	0.05
Toluene	19.18	0.48
Xylenes, Total	9.15	0.23
	Total air emissions	**8.74**

Notes:

Air Emission Rate (lb/hr) = pollutant GW conc. (mg/l) * % that vaporizes (99.99%) * water flow (lpm) * g/1000 mg * lb/454 g * 60 min/hr

*Loading estimate are based on analytical groundwater data representative of the containment area.

Green shading = 4 Max contributors: Benzene, Acetone, 2-butanone, toluene

ANALYSIS OF 100% VOC VOLATILIZATION AT 50 GPM GROUNDWATER INFLUENT

Summary of Pollutant Groundwater Concentrations

South Charleston Facility, Middle Island Groundwater Containment System, South Charleston, WV

Revised 09/26/16

Capture Zone/Loc - #	Adjusted Flow Rate, SUM = 100 GPM	Adjusted Flow Rate, 12% in-flow from River*	Flow Rate (GPD)	Predicted Flow Rate based on Modeling (GPM)
0	45.8	40.3	58,080	13.2
2	38.9	34.2	49,280	11.2
3	15.3	13.4	19,360	4.4
Total	**100.0**		**126,720**	28.8

Notes:

Flowrate anticipated to be around 30 gallons per minute; however, it was scaled up to a design flowrate of 100 gallons per minute, which includes 12% in-flow from the river

Constituent	Unit	Capture Zone 0 - Optimized Average Concentration	Capture Zone 2 - Optimized Average Concentration	Capture Zone 3 - Optimized Average Concentration	Weighted Conc. in Groudwater (mg/L)
1,2-Dichloroethane	UG/L	2,250	1,329	1,500.0	1.8
1,3-Dichlorobenzene	UG/L	2,250	1,329	1,500.0	1.8
1,4-Dichlorobenzene	UG/L	2,250	1,329	1,500.0	1.8
2-Butanone	UG/L	22,503	13,286	15,000.0	17.8
Acetone	UG/L	56,256	33,214	37,500.0	44.4
Benzene	UG/L	315,786	162,072	226,500.0	242.7
Chlorobenzene	UG/L	2,251	1,329	1,500.0	1.8
cis-1,2-Dichloroethylene	UG/L	2,250	1,329	1,500.0	1.8
Ethylbenzene	UG/L	3,325	4,255	1,680.0	3.4
Naphthalene	UG/L	1,233	1,170	920.8	1.2
Styrene	UG/L	2,250	1,329	3,415.0	2.1
Toluene	UG/L	21,925	14,976	21,650.0	19.2
Xylenes, Total	UG/L	11,251.6	7,324	7,500.0	9.2

Notes:

Weighted Concentration (mg/l) = (Zone 0 Average Concentration (ug/l) * zone 0 flow (gpd) + Zone 2 Average Concentration (ug/l) * zone 2 flow (gpd) + Zone 3 Average Concentration (ug/l) * zone 3 flow (gpd)) / total flow (gpd) / 1000 ug/mg

Green shading = 4 Max contributors: Benzene, Acetone, 2-butanone, toluene

Enclosure 2

Revised emissions estimates to revert to original rounding (pages N-2 and N-3 of Attachment N).

Table N-1
Summary of Emission Estimates
South Charleston Facility, Middle Island Groundwater Containment System, South Charleston, WV
Revised 09/26/16 to fix rounding errors in groundwater concentrations
Total by Regulatory Classification

	lb/hr	TPY
VOC	0.29	1.26
HAP	0.29	1.25
TAP	0.24	1.07

Total by Chemical

		Uncontrolled		Controlled[1]	
Chemical	**Regulatory Classification**	**Emission Rate (lb/hr)**	**Emission Rate (tpy)[2]**	**Emission Rate (lb/hr)**	**Emission Rate (tpy)[2]**
1,2-Dichloroethane	VOC/HAP/TAP	0.0064	0.028	3.20E-04	0.001
1,3-Dichlorobenzene	VOC	0.020	0.089	0.001	0.004
1,4-Dichlorobenzene	VOC/HAP	0.016	0.070	7.94E-04	0.003
Acetone	NRC	0.006	0.028	3.18E-04	0.001
Benzene	VOC/HAP/TAP	4.850	21.241	0.242	1.062
Chlorobenzene	VOC/HAP	0.024	0.106	0.001	0.005
cis-1,2-Dichloroethylene	VOC	0.027	0.117	0.001	0.006
Ethylbenzene	VOC/HAP	0.100	0.437	0.005	0.022
Methylene chloride	NRC/HAP/TAP	0.036	0.157	0.002	0.008
Toluene	VOC/HAP	0.469	2.056	0.023	0.103
Xylenes, Total	VOC/HAP	0.227	0.994	0.011	0.050
Total HAP		5.73	25.09	**0.29**	**1.25**
Total VOC		5.74	25.14	**0.29**	1.26

1 - Catalytic oxidizer provides a minimum VOC/HAP control efficiency of 95%
2- Emission rates account for a 24 hour per day, 365 day per year operating schedule
3- NRC - Non-regulated contaminant

Table N-2
Vapor Emissions Estimates
Middle Island Groundwater Containment System
Revised 09/26/16 to fix rounding errors in groundwater concentrations

Groundwater VOCs	Site Groundwater Conc (ug/L)*	Initial Groundwater Loading to Cascade Aerator at 100 gpm (lbs/hr)	Estimated 40% Stripped to Air in Cascade Aerator**	Henrys Constant atm -m3/mol	Ratio to Benzene	Initial Loading - CatOx Influent Air (lbs/hr)
1,2-Dichloroethane	1,776	0.09	7.2118	0.0010	0.1803	0.0064
1,3-Dichlorobenzene	1,776	0.09	22.8361	0.0031	0.5709	0.0203
1,4-Dichlorobenzene	1,776	0.09	17.9006	0.0024	0.4475	0.0159
Acetone	44,490	2.22	0.2858	3.88E-05	0.0071	0.0064
Benzene	242,690	12.12	40.0000	0.0054	1.0000	4.8495
Chlorobenzene	1,777	0.09	27.2560	0.0037	0.6814	0.0242
cis-1,2-Dichloroethylene	1,776	0.09	30.0552	0.0041	0.7514	0.0267
Ethylbenzene	3,440	0.17	58.0479	0.0079	1.4512	0.0998
Methylene chloride	4,441	0.22	16.1326	0.0022	0.4033	0.0358
Toluene	19,210	0.96	48.9134	0.0066	1.2228	0.4694
Xylenes, Total	9,160	0.46	49.5764	0.0067	1.2394	0.2269
TOTAL VOCs	--	**17.68**	--	--	--	**5.74**
Total HAPs ug/L	**284,270**					
Total HAPs ppm	**284.27**					

* Based on Table A-1 Estimated Influent Groundwater Concentrations
** Based on Westech estimate of 20 to 40% removal for benzene and the Henry's Constant of benzene relative to other VOC Henry's Constants.
Initial Loading Equation:

$$Inital\ Loading\ to\ Aerator\left(\frac{lbs}{day}\right) = \frac{avg\ site\ concentration\left(\frac{\mu g}{L}\right) * 3.78\left(\frac{L}{gal}\right) * 100\left(\frac{gal}{min}\right) * 1440\left(\frac{min}{day}\right)}{454{,}000{,}000\left(\frac{\mu g}{lbs}\right)}$$

Enclosure 3

Revised Attachment N (page N-1) and Attachment J (page 1) showing slight increase in tons per year of VOC emissions.

ATTACHMENT N – Emissions Estimates

Vapor emission estimates were based on analytical groundwater data representative of the containment area. Hourly and annual VOC and HAP emissions are based on maximum groundwater pollutant concentrations from groundwater samples collected within the full-scale remedy target treatment zone for the GCS area. Emissions were estimated based on data from the vendor which indicates a range of 20-40% of benzene in the groundwater will be stripped in the Cascade Aerator. The maximum stripping rate was used to be conservative. The stripping rate for other pollutants was estimated by developing a ratio of Henry's law constant for each compound to benzene and multiplying it by the 40% removal rate for benzene. Emissions from the remaining process units are expected to be minimal as they are primarily water treatment processes with no agitation or aeration to promote volatilization. Although emissions from remaining treatment units are assumed to be negligible, they will still be part of the closed system and routed to the Catalytic Oxidizer. Contaminants remaining in groundwater will be removed by microbial processes in the vertical and horizontal flow vegetated contact beds.

Air emissions from each stage of the groundwater treatment process are collected and routed to the catalytic oxidizer; as a result, there are no anticipated fugitives from the process. Controlled emissions reflect a minimum reduction efficiency of 95 percent by the GCS catalytic oxidizer.

Note, as the proposed project has progressed further in design, emissions were updated to reflect a more in-depth understanding of the treatment process and vendor estimates of equipment emission rates.

The below table summarizes requested controlled emission rates. Detailed emission estimates are also attached.

Chemical	Emission Rate (lbs/hour)	Emission Rate (TPY)
Benzene	0.24	1.06
Toluene	0.02	0.10
Total HAPs	**0.29**	**1.25**
Total VOCs	**0.29**	**1.26**

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data															
Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)**	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
MIGCS1	Upward Vertical Stack	MIGCS	Vent Gas	MIGCS CO	Electric Catalytic Oxidizer	C	8,760	Total HAPs	5.71	25.02	0.29	1.25	Gas	EE	--
								Total VOCs	5.72	25.07	0.29	1.26			--

*HAPs – See Attachment N for full list of speciated HAPs and VOCs as well as concentrations.

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

[3] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

[4] Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[5] Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[6] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Andrews, Edward S

From: Fedczak, James (JP) <JPFedczak@dow.com>
Sent: Wednesday, September 28, 2016 11:40 AM
To: Andrews, Edward S
Cc: 'Stephanie.McMackin@CH2M.com'; Cibrik, Jerome (JE)
Subject: FW: Scanned from Xerox PCSF
Attachments: img-928102840-0001.pdf

Ed,

Here is UCC's response to the incomplete letter for the Middle Island Ground water remediation project and additional information requested during our call on 9/20. The original will be mailed today.

Jay

Jay Fedczak, P.E.
EH&S Environmental Specialist
Union Carbide Corporation
A Wholly Owned Subsidiary of The Dow Chemical Company South Charleston, WV 25303
O: 304-747-1354, Email: JPFedczak@dow.com

-----Original Message-----
From: Fedczak, James (JP)
Sent: Wednesday, September 28, 2016 10:29 AM
To: Fedczak, James (JP)
Subject: Scanned from Xerox PCSF

Please open the attached document. It was scanned and sent to you using a Xerox WorkCentre.

Sent by: u759257@DOW.COM [JPFedczak@dow.com] Number of Images: 13 Attachment File Type: PDF

Device Name: P54063
Device Location: Bldg. 307/128

Sent from Xerox PCSF

Union Carbide Corporation
A Subsidiary of The Dow Chemical Company
P.O. Box 8004
437 MacCorkle Avenue, SW
South Charleston, WV 25303
USA

Certified Mail – Return Receipt Requested
7010 2780 0001 8879 2970

September 28, 2016

Mr. Ed Andrews
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

RE: Application Status: Incomplete, Union Carbide Corporation – South Charleston
Permit Application No. R13-3308, Plant ID No. 039-00003

Dear Mr. Andrews:

The following has been prepared per your recent data and information request related to the construction permit application for a groundwater remediation project at Union Carbide Corporation. Each of your questions is listed along with the response and additional information.

1. The revised emission estimates provided on September 9, 2016 lacks justification. The emission estimate needs to be made based on the best available information. The use of someone's experience is not acceptable. Each point/process step where there is potential for organics from the groundwater to be entrained into the air needs to be evaluated as a potential source of air emissions. This justification should explain why UCC is changing its approach in estimating emissions from the estimated made in the April 11, 2016 submittal.

Groundwater sampling has been ongoing at the Middle Island Main Source area since 12/16/2002. Concentrations from 2012 were used in the development of the design basis for the Groundwater Collection System because this year included a full data set for volatile organic compounds and was determined to be representative of the groundwater plume. For Phase 1, the area was divided into 3 groundwater capture zones based on groundwater modeling conducted using the MODFLOW-NWT code in conjunction with the Groundwater Vista pre- and post-processing software. The average concentration for each capture zone was determined based on the groundwater analytical data applicable to that capture zone. The predicted groundwater influent flowrate is anticipated to be 30 gpm total from the 3 capture zones; however, this value was scaled up for design purposes to 100 gpm. (Thus, the mass basis of contaminants more than doubled based on this contingency factor for the flowrate). The process train is meant to treat the VOCs in aqueous form; however, there are high iron concentrations in the groundwater. Iron can negatively affect the wetland performance; as a result, a cascade aerator is included to oxidize the iron, which is then precipitated and settled out in the clarifier. A vacuum truck will be used to dispose of the precipitated iron oxide. A maximum of 470 scfm of atmospheric air will be introduced into the aerator and as a side effect, a portion of the VOCs

will volatilize during this process. The emission estimates submitted in April 2016 with the original permit application conservatively assumed 99.99% of the VOCs would volatilize.

Subsequent to that submittal, the design has progressed and equipment vendors have been selected. The cascade aerator vendor has indicated a range of 20 to 40% of benzene would volatilize based on their equipment design. To be conservative, revised emission estimates were based on 40% volatilization of benzene through the cascade aerator, with volatilization rates for other VOCs being scaled based on each chemical's Henry's Law constant in relation to benzene's Henry's Law constant.

As noted above, prior to detailed design and availability of vendor information, we had conservatively estimated emissions at nearly 100% volatilization along with the scaled up groundwater flowrate of 100 gpm. Per your subsequent request on 09/20/16, we have prepared an emissions scenario that evaluates emissions using the modeled rate of groundwater flow from the capture zones with 99.99% volatilization to demonstrate that total uncontrolled emissions are below 40 TPY (See Enclosure 1). The model predicted a flowrate of approximately 30 gpm; however, 50 gpm was utilized in this emissions scenario to be conservative. At this flow rate and assuming 99.99% volatilization, total uncontrolled VOC emissions are 33 TPY. It should be noted that this estimate does not appropriately estimate emissions under operating conditions, as the goal of the treatment system is to treat VOCs in the aqueous form.

2. The concentrations of the constituents in Table N-3 submitted on May 11, 2016 are higher than on Page N-3 of the September 9, 2016 submittal. There is no explanation in the recent submittal for the decrease in the concentration of constituents and none of the submittal provided to the DAQ for this project include any sampling results of the contaminated groundwater. Please explain why the initial load of the constituents has decreased from the loading provided on April 11, 2016.

This is a significant figure issue due to the difference in units (mg/L vs. µg/L); however, we have reverted to what was originally provided to be conservative. See attached revision dated 09/20/16 (Enclosure 2).

3. Your revised application notes that the remediation material's average total volatile organic hazardous air pollutant (VOHAP) concentration will be less than 500 parts per million by weight (ppmw), which is based on current data. Please provide this data that the VOHAP concentration indicates that the concentration will be less than 500 ppmw.

Refer to attachment N (page N-3 of Enclosure 2) and the groundwater concentrations. If the VOHAP concentrations are summed, the value is 284,270 µg/L on a mass basis. Converting this to ppm results in a value of 284.27 ppm.

The following summarizes the additional information you requested during the conference call on 09/20/2016:

- ***Pressure of the incoming groundwater-*** *The maximum incoming groundwater pressure is 65 psi; cascade aerator pressure is 3/8 inches of water*
- ***Oil/Water Separator Details-*** *The Oil/Water Separator itself is 1,000 gallons and is used for removal of any non-aqueous phase liquid (NAPL or free product) that may be entrained in extracted groundwater. The collected NAPL will be drummed, sampled and removed per normal waste management procedures. The drumming of NAPL will be a manual process as there is not expected to be a significant amount. The drums are not vented.*

Lastly, see Enclosure 3 for revised page N-1 of Attachment N and page 1 of 2 of Attachment J of the application which reflects a slight increase of annual VOC emissions from 1.25 tons per year to 1.26 tons per year due to rounding.

Should you have any questions on this submittal or need additional information, please contact Jay Fedczak at (304) 747-1354.

Regards,

Jon Putnam
WVO Responsible Care Leader

CC: Jerome Cibrik/Union Carbide Corporation

Enclosure 1

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Revised 09/26/16

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1,3-Dichlorobenzene	VOC	0.04	0.19	0.00	0.01
1,4-Dichlorobenzene	VOC/HAP	0.04	0.19	0.00	0.01
2-Butanone	VOC	0.44	1.95	0.02	0.10
Acetone	NRC	1.11	4.87	0.06	0.24
Benzene	VOC/HAP/TAP	6.07	26.58	0.30	1.33
Chlorobenzene	VOC/HAP	0.04	0.19	0.00	0.01
cis-1,2-Dichloroethylene	VOC	0.04	0.19	0.00	0.01
Ethylbenzene	VOC/HAP	0.09	0.38	0.00	0.02
Naphthalene	VOC/HAP	0.03	0.13	0.00	0.01
Styrene	VOC/HAP	0.05	0.23	0.00	0.01
Toluene	VOC/HAP	0.48	2.10	0.02	0.11
Xylenes, Total	VOC/HAP	0.23	1.00	0.01	0.05
Total HAP		**7.09**	**31.04**	**0.35**	**1.55**
Total VOC		**7.63**	**33.41**	**0.38**	**1.67**

1 - CatOx provides a VOC/HAP control efficiency of 95%

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South Charleston Facility, Middle Island Groundwater Containment System, South Charleston, WV

Revised 09/26/16

Total Maximum Water Flow = 50 gpm
189.25 lpm

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1,2-Dichloroethane	1.78	0.04
1,3-Dichlorobenzene	1.78	0.04
1,4-Dichlorobenzene	1.78	0.04
2-Butanone	17.77	0.44
Acetone	44.43	1.11
Benzene	242.69	6.07
Chlorobenzene	1.78	0.04
cis-1,2-Dichloroethylene	1.78	0.04
Ethylbenzene	3.44	0.09
Naphthalene	1.16	0.03
Styrene	2.07	0.05
Toluene	19.18	0.48
Xylenes, Total	9.15	0.23
	Total air emissions	**8.74**

Notes:

Air Emission Rate (lb/hr) = pollutant GW conc. (mg/l) * % that vaporizes (99.99%) * water flow (lpm) * g/1000 mg * lb/454 g * 60 min/hr

*Loading estimate are based on analytical groundwater data representative of the containment area.

Green shading = 4 Max contributors: Benzene, Acetone, 2-butanone, toluene

Andrews, Edward S

From: Ward, Beth A
Sent: Wednesday, September 14, 2016 2:28 PM
To: Andrews, Edward S
Subject: UNION CARBIDE CORPORATION PERMIT APPLICATION FEE

This is the receipt for payment received from:

UNION CARBIDE CORPORATION, SOUTH CHARLESTON, CHECK NUMBER 2200351061, CHECK DATE 08/31/2016, $2,500.00
R13-3308 ID# 039-00003

OASIS CR 1700028577

THANK YOU!

Beth Ward
WV DEPARTMENT OF ENVIRONMENTAL PROTECTION
BTO FISCAL
601 57TH STREET SE
CHARLESTON, WV 25304
(304) 926-0499 EXT 1846
beth.a.ward@wv.gov

Andrews, Edward S

From: Chalmers, ray <chalmers.ray@epa.gov>
Sent: Wednesday, June 29, 2016 10:12 AM
To: Chakrabarty, Renu M
Cc: Andrews, Edward S; McKeone, Beverly D; Durham, William F; Campbell, Dave; pizarro, luis; Weissbart, Erich; Mastro, Donna; Maldonado, Zelma
Subject: RE: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

Hi Renu,

In response to your message below, EPA Region III's Air Protection Division concurs with WV's determination that DOW/UCC 's proposed groundwater remediation project at its South Charleston, WV facility does not have a RCRA permit or order, and is therefore subject to the Site Remediation NESHAP (40 CFR 63, Subpart GGGGG).

You reported that Dow/UCC has claimed that its proposed groundwater remediation project at its South Charleston, WV facility would be exempt from the Site Remediation NESHAP under the provision in that NESHAP found at §63.7881(b)(3) which states:

"Your site remediation is not subject to this subpart if the site remediation will be performed under a Resource Conservation and Recovery Act (RCRA) corrective action conducted at a treatment, storage and disposal facility (TSDF) that is either required by your permit issued by either the U.S. Environmental Protection Agency (EPA) or a State program authorized by the EPA under RCRA section 3006; required by orders authorized under RCRA; or required by orders authorized under RCRA section 7003."

You said that WV had requested that DOW/UCC provide documentation to support its claim that its proposed project would qualify for the exemption, and that in response DOW/UCC had provided WV with 1999 letters of commitment pertaining to a "Facility Lead Agreement." You noted that you had spoken with Mr. Erich Weissbart of EPA Region III's RCRA section, who had indicated that the 1999 letters of commitment were voluntary (non-binding) which would mean that they do not meet the level of an order or permit.

Given that the 1999 letters of commitment pertaining to a "Facility Lead Agreement" are not a "permit issued by either the U.S. Environmental Protection Agency (EPA) or a State program authorized by the EPA under RCRA section 3006;" are not "orders authorized under RCRA;" and are not "orders authorized under RCRA section 7003," EPA Region III's Air Division agrees that the 1999 letters of commitment do not qualify DOW/UCC's proposed groundwater remediation project at its South Charleston, WV facility for the exemption from the Site Remediation NESHAP that is provided for by the NESHAP provision at §63.7881(b)(3).

Also, please note that EPA has proposed to eliminate the exemption from the Site Remediation NESHAP that is provided for by the NESHAP provision at §63.7881(b)(3). See 81 FR 29821 (May 13, 2016). On June 24, 2016, EPA extended the comment period on this proposal to July 27, 2016. See 81 FR 41282 (June 24, 2016).

Ray Chalmers
EPA Region III
215-814-2061

From: Chakrabarty, Renu M [mailto:Renu.M.Chakrabarty@wv.gov]
Sent: Friday, June 10, 2016 11:22 AM
To: Chalmers, ray <chalmers.ray@epa.gov>
Cc: Andrews, Edward S <Edward.S.Andrews@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; Durham, William F <William.F.Durham@wv.gov>
Subject: FW: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

Per our discussion this morning, we have made an applicability determination that a facility's proposed groundwater remediation project does not have a RCRA permit or order, and is therefore subject to the Site Remediation NESHAP (40 CFR 63, Subpart GGGGG). The attached 1999 letters of commitment were provided by the company when documentation of a RCRA permit or order was requested. The e-mail below provides some background on a discussion with Mr. Erich Weissbart of EPA Region III's RCRA section. Mr. Weissbart indicated that the 1999 letters of commitment were voluntary (non-binding) which would mean that they do not meet the level of an order or permit.

The Site Remediation NESHAP contains a number of exemptions, including §63.7881(b)(3) which states

> Your site remediation is not subject to this subpart if the site remediation will be performed under a Resource Conservation and Recovery Act (RCRA) corrective action conducted at a treatment, storage and disposal facility (TSDF) that is either required by your permit issued by either the U.S. Environmental Protection Agency (EPA) or a State program authorized by the EPA under RCRA section 3006; required by orders authorized under RCRA; or required by orders authorized under RCRA section 7003.

If you could please provide any guidance on determining whether the attached 1999 letters of commitment meet the Site Remediation NESHAP exemption for an order or permit at §63.7881(b)(3), it would be very much appreciated.

Please feel free to contact us if any additional information is needed.

Thank you,
Renu

Renu M. Chakrabarty, P.E.
Air Toxics Coordinator
Division of Air Quality
WV Department of Environmental Protection
601 57th Street, SE
Charleston, WV 25304

Tel: (304) 926-0499, ext. 1246
Fax: (304) 926-0479
e-mail: Renu.M.Chakrabarty@wv.gov

From: Chakrabarty, Renu M
Sent: Thursday, May 19, 2016 2:49 PM
To: weissbart.erich@epa.gov
Subject: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

Mr. Weissbart,

Thank you for taking the time to discuss the status and standing of the 1999 letters of commitment (attached) which are voluntary (non-binding) agreements with EPA Region III on what DOW/Union Carbide Corporation is doing for RCRA remediation. It was interesting to learn that the company's approach has been to discuss remediation plans with EPA Region III and then proceed to implement measures even before final written EPA approval.

The EPA Region III Corrective Action website for Dow/UCC's South Charleston facility that lists the status of the actions under this agreement (https://www3.epa.gov/reg3wcmd/ca/wv/webpages/wvd005005483.html).

Regarding the proposed new Middle Island groundwater remediation well, EPA Region III and the company have recently discussed the approach, including using biofiltration and vegetated contact beds with Mr. Jerome Cibrik of DOW, and both parties understand this method of remediation is being pursued. The information we have received in an air permit application indicates that approximately 89% of the hazardous air pollutant (HAP) emissions to air will be controlled.

You noted that EPA Region III will likely officially select and finalize remediation plans in 2017, and at that point the WVDEP will incorporate the plans into a permit (since WVDEP is now the RCRA corrective action authority). Ms. Tracy Jeffries of WVDEP's Office of Environmental Remediation has been the contact for those activities.

From an air quality perspective, the Site Remediation NESHAP (40 CFR 63, Subpart GGGGG) exempts sources that are subject to a corrective action order or permit issued by either EPA or WVDEP. That is, the company must follow the order or permit terms and conditions, but would not be subject to the federal NESHAP requirements as well. In the absence of an order or permit, the company would have to follow the NESHAP GGGGG requirements, which in this case would likely require 95% control of hazardous air pollutant (HAP) emissions to air (a little higher than that proposed under the voluntary agreement).

Thank you for providing some context to the 1999 letter of commitment to EPA Region III provided to our office by the company.

Renu

Renu M. Chakrabarty, P.E.
Air Toxics Coordinator
Division of Air Quality
WV Department of Environmental Protection
601 57th Street, SE
Charleston, WV 25304

Tel: (304) 926-0499, ext. 1246
Fax: (304) 926-0479
e-mail: Renu.M.Chakrabarty@wv.gov

Andrews, Edward S

From: Chakrabarty, Renu M
Sent: Friday, June 24, 2016 1:57 PM
To: Chalmers, ray; Weissbart, Erich
Cc: Campbell, Dave; Maldonado, Zelma; Jeffries, Tracy A; Andrews, Edward S; McKeone, Beverly D; Hirtz, Paula; Mastro, Donna; Keatley, Robert L; Adkins, Jesse D; Durham, William F
Subject: RE: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

Yes, the facility had an air permit originally issued back in 2010 for groundwater remediation with air emissions controlled by both an 2 incinerators, a regenerative thermal oxidizer and a packed bed caustic scrubber. This permit has been modified a couple of times since; the current, controlled potential to emit for air emissions in the most recent permit is for 0.84 tpy 1,1, 2-trichloroethane, 0.65 tpy vinylidene chloride, 6.67 tpy ethylene dichloride, 1.70 tpy trichloroethene, 3.33 tpy hydrochloric acid, and 1.61 tpy other organic HAPs for a total of 14.79 tpy total maximum HAPs based on controlled air emissions. I do not know how much has actually been remediated, but can check with our Office of Environmental Remediation folks. In reviewing the air permit files, it appears that the company indicated that they were operating under a RCRA corrective action program; the engineering evaluation states the company indicated they met the exemption criteria that the site remediation will be performed under RCRA corrective action and is required by a permit.

A separate groundwater remediation effort proposed to be controlled by biofiltration and vegetated contact beds is what triggered this set of questions regarding applicability. The company again indicated they were operating under a RCRA permit. However, when a copy of the permit was requested, the facility lead agreement was provided, which led to questions about Site Remediation MACT applicability and exemptions.

Thanks,
Renu

From: Chalmers, ray [mailto:chalmers.ray@epa.gov]
Sent: Thursday, June 23, 2016 10:08 AM
To: Weissbart, Erich <Weissbart.Erich@epa.gov>; Chakrabarty, Renu M <Renu.M.Chakrabarty@wv.gov>
Cc: Campbell, Dave <campbell.dave@epa.gov>; Maldonado, Zelma <Maldonado.Zelma@epa.gov>; Jeffries, Tracy A <Tracy.A.Jeffries@wv.gov>; Andrews, Edward S <Edward.S.Andrews@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; Hirtz, Paula <Hirtz.Paula@epa.gov>; Mastro, Donna <Mastro.Donna@epa.gov>
Subject: RE: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

Erich,

Thanks! I did misunderstand Renu – I thought she was saying that DOW/Union Carbide had reported that its WV plant was already annually processing remediation waste containing 50 tons of benzene, not that this was a plan for a future remediation action.

If we should finalize our proposed removal of the Site Remediation NESHAP's exemption of sources that are subject to CERCLA actions or RCRA orders or permits, it appears that his new remediation project would make the DOW/Union Carbide plant in WV fully subject to the Site Remediation NESHAP, whether or not its past "Facility Lead Agreement" with EPA might have qualified as a RCRA Permit or Order, as DOW/Union Carbide contends.

Given your clarification that the plant will only be annually processing remediation waste containing 50 tons of benzene in the future, it remains the case that the plant might currently be processing remediation waste containing

less than 1 Mg of HAP, as Paula Hirtz reported based on the data she has received, and might have been doing so in the past.

If so, the plant would currently qualify and may in the past have qualified for the Site Remediation NESHAP's alternative exemption from all but recordkeeping requirements for sources that process remediation material containing less than 1 Mg of HAP.

Accordingly, to help clarify the current and past status of the DOW/Union Carbide plant with respect to the requirements of the Site Remediation NESHAP, further investigation by WV of whether or not DOW/Union Carbide's plant in WV is currently and has in the past been processing remediation material containing less than 1 Mg of HAP still seems appropriate.

Ray

From: Weissbart, Erich
Sent: Thursday, June 23, 2016 7:54 AM
To: Chalmers, ray <chalmers.ray@epa.gov>; Chakrabarty, Renu M <Renu.M.Chakrabarty@wv.gov>
Cc: Campbell, Dave <campbell.dave@epa.gov>; Maldonado, Zelma <Maldonado.Zelma@epa.gov>; Jeffries, Tracy A <Tracy.A.Jeffries@wv.gov>; Andrews, Edward S <Edward.S.Andrews@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; Hirtz, Paula <Hirtz.Paula@epa.gov>; Mastro, Donna <Mastro.Donna@epa.gov>
Subject: RE: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

Ray,
I think you misunderstood Renu:

Paula Hirtz, the EPA HQ lead for the Site Remediation NESHAP (phone #919-541-2618), said that the national level data that she has available, which was obtained from individual source reports for 2013, shows that the DOW/Union Carbide plant in WV was at or close to the 1 Mg limit in 2013, as **compared to WV's report that the plant is annually processing water containing at least 50 tons of benzene**. An error in either the reported data or in the data records appears to exist, unless there has been a major change in remediation activity at the plant since 2013.

They are not processing 50 tons of benzene yet; that is the proposal for the newest remediation system which is not yet online.

Erich Weissbart, P.G.
Land and Chemicals Division
USEPA Region III
701 Mapes Road
Fort Meade, MD 20755
(410) 305-2779
weissbart.erich@epa.gov

From: Chalmers, ray
Sent: Tuesday, June 21, 2016 5:03 PM
To: Chakrabarty, Renu M <Renu.M.Chakrabarty@wv.gov>
Cc: Campbell, Dave <campbell.dave@epa.gov>; Maldonado, Zelma <Maldonado.Zelma@epa.gov>; Jeffries, Tracy A <Tracy.A.Jeffries@wv.gov>; Andrews, Edward S <Edward.S.Andrews@wv.gov>; McKeone, Beverly D

<Beverly.D.Mckeone@wv.gov>; Weissbart, Erich <Weissbart.Erich@epa.gov>; Hirtz, Paula <Hirtz.Paula@epa.gov>; Mastro, Donna <Mastro.Donna@epa.gov>
Subject: RE: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

Hi Renu,

EPA's RCRA program does discuss "Facility Lead Agreements" to a considerable extent on EPA's website, in addition to the specific information which you quote, and I hope you find all of this information helpful. If I learn of any other available information regarding such agreements, I will forward it to you.

With respect to the question of whether or not the DOW/Union Carbide plant in WV might be eligible for the alternative exemption from all but record keeping requirements that the Site Facility NESHAP allows for sources that annually process remediation material containing 1 Mg (about 1.1 ton) or less of HAP, further investigation of whether or not the plant might qualify appears warranted, given the major discrepancy that exists in the data that EPA and WV have been relying on pertaining to the amount of HAP in the remediation material processed by the plant.

Paula Hirtz, the EPA HQ lead for the Site Remediation NESHAP (phone #919-541-2618), said that the national level data that she has available, which was obtained from individual source reports for 2013, shows that the DOW/Union Carbide plant in WV was at or close to the 1 Mg limit in 2013, as compared to WV's report that the plant is annually processing water containing at least 50 tons of benzene. An error in either the reported data or in the data records appears to exist, unless there has been a major change in remediation activity at the plant since 2013.

Paula said that she would be happy to speak with you should you have any questions. You may want to contact her to discuss the exemption in the NESHAP for sources that annually process remediation material containing 1 Mg HAP (about 1.1 ton) or less of HAP, and regarding the data that she has on the amount of HAP in the remediation material that the DOW/Union Carbide plant in WV processed in 2013.

Ray

From: Chakrabarty, Renu M [mailto:Renu.M.Chakrabarty@wv.gov]
Sent: Tuesday, June 21, 2016 11:33 AM
To: Chalmers, ray <chalmers.ray@epa.gov>
Cc: Campbell, Dave <campbell.dave@epa.gov>; Maldonado, Zelma <Maldonado.Zelma@epa.gov>; Jeffries, Tracy A <Tracy.A.Jeffries@wv.gov>; Andrews, Edward S <Edward.S.Andrews@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; Weissbart, Erich <Weissbart.Erich@epa.gov>; Hirtz, Paula <Hirtz.Paula@epa.gov>; Mastro, Donna <Mastro.Donna@epa.gov>
Subject: RE: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

Ray,

I am surprised that EPA has never has the question of whether a "facility lead agreement" meets the level of RCRA permit or order come up before with respect to the applicability exemption in the Site Remediation MACT.

As you suggested when we first spoke, the RCRA folks themselves would know best whether a "facility lead agreement" is equivalent to a RCRA permit or order. So far, it seems that the "facility lead agreement" was designed as an alternative to traditional RCRA orders and permits, with the tradeoffs being more flexibility and speed for the company to start remediation, with less structure, detail, and enforceability than in the traditional regulatory sense. I did find an EPA description of the facility lead program that corroborated Mr. Weissbart's explanation that the agreements were non-binding (see below).

Innovative Facility Lead Program Results in Quicker Cleanups

Region 3 has streamlined its corrective action process by developing a "**Facility-Lead**" program as an alternative to conventional corrective action permits and orders. This innovative program encourages RCRA Corrective Action facilities to take the lead in addressing corrective action using a generic agreement. The Agreement requires each facility to develop a site specific workplan for site characterization and appropriate clean up measures. The Agreement also requires a plan for public participation and a reporting schedule.

Facilities which receive an invitation from EPA and the State have 30 days to submit a Letter of Commitment. Facilities commit to start the investigation or cleanup within 90 days. The result is an expedited administrative process and quicker initiation of actual fieldwork. While the agreement is non-enforceable, if the facility does not make reasonable progress, EPA may issue an order or permit to require the facility to comply with its corrective action obligations. Similarly, if at any time the facility chooses, they may withdraw from the program and implement Corrective Action under a traditional corrective action mechanism.

SOURCE: https://www3.epa.gov/reg3wcmd/ca/pgm_reforms.htm

Thank you for checking with the Site Remediation MACT writer. If there are any provisions in the rule whereby the facility may be subject to the rule, but perhaps exempted from certain parts of it, that would certainly be useful to know. The groundwater remediation is for at water that contains at least 50 tons of benzene as year (in addition to other HAPs). Therefore, the 1 megagram provision of 63.7881(c)(1) which would only require recordkeeping does not seem to apply. Additionally, there are other remediation operations already underway at this site.

Any additional information you may be able to find would certainly be appreciated.

Thank you,
Renu

From: Chalmers, ray [mailto:chalmers.ray@epa.gov]
Sent: Friday, June 17, 2016 3:37 PM
To: Chakrabarty, Renu M <Renu.M.Chakrabarty@wv.gov>
Cc: Campbell, Dave <campbell.dave@epa.gov>; Maldonado, Zelma <Maldonado.Zelma@epa.gov>; Jeffries, Tracy A <Tracy.A.Jeffries@wv.gov>; Andrews, Edward S <Edward.S.Andrews@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; Weissbart, Erich <Weissbart.Erich@epa.gov>; Hirtz, Paula <Hirtz.Paula@epa.gov>; Mastro, Donna <Mastro.Donna@epa.gov>
Subject: RE: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

Hi Renu,

I believe that the call you propose regarding DOW/Union Carbide's argument that the Site Remediation NESHAP provides an exemption for sources that are subject to CERCLA actions or RCRA permits or orders, and that the Company's plant in S. Charleston, WV should therefore be considered exempt because in 1999 the Company had entered into a "Facility Lead Agreement" regarding addressing contamination at that plant, might not be the best approach to resolving this matter. Such a call might result only in the conclusion that further review by EPA Air and RCRA HQ program offices, and by EPA Regional Counsel and OGC Air and RCRA attorneys, was required, given that the issue involves both Air and RCRA program considerations and legal concerns. Completing such a review would likely require considerable time. Based on a recent discussion regarding this matter that I've had with Paula Hirtz, the HQ lead for the Site Remediation NESHAP, a more expeditious route to resolution of the exemption issue appears possible.

In my discussion with Paula she was only able to comment, regarding DOW/Union Carbide's argument, that the Site Remediation NESHAP's cited exemption for sources that are subject to CERCLA actions or RCRA permits or orders does not mention "Facility Lead Agreements" and that we have proposed to remove the exemption in any case. She noted that the OGC attorney she was working with on Site Remediation matters might be able to comment further, and that she would check and get back to me if this was the case.

However, of particular interest, Paula went on to point out that HQ had estimated that even if the exemption from the Site Remediation NESHAP for plants that are subject to CERCLA actions or RCRA permits or orders is removed there will be many sources that have been exempt under that provision that will still remain exempt from all except certain recordkeeping requirements, because these sources would fall under another Site Remediation NESHAP provision that exempts sources that have listed HAP in their remediation material that is below specified levels.

She noted that this second provision is found in the Site Remediation NESHAP at 63.7881(c)(1). It states, in part, that:

"(c) Your site remediation activities are not subject to the requirements of this subpart, except for the recordkeeping requirements in this paragraph, provided that you meet the requirements specified in paragraphs (c)(1) through (c)(3) of this section.

(1) You determine that the total quantity of the HAP listed in Table 1 to this subpart that is contained in the remediation material excavated, extracted, pumped, or otherwise removed during all of the site remediations conducted at your facility is less than 1 megagram (Mg) annually. This exemption applies the 1 Mg limit on a facility-wide, annual basis, and there is no restriction to the number of site remediations that can be conducted during this period...."

Paula said that based on national database information she has available for 2013 it appears that in that year the DOW/Union Carbide plant in WV may have met the requirements of this second Site Remediation exemption from all except certain recordkeeping requirements.

Accordingly, if the plant has been below that level since prior to the 2006 compliance date of the Site Remediation NESHAP the plant would have been exempt from all except recordkeeping requirements since that time. It might also have kept the specified records as part of documenting its ongoing remediation activities.

Given that EPA has proposed to remove the exemption from the Site Remediation NESHAP for sources which are subject to CERCLA actions or RCRA permits or orders, it now seems more effective and appropriate to focus on whether or not the DOW/Union Carbide Plant currently falls under and has previously fallen under this other exemption from all but certain recordkeeping requirements.

WV could consider asking DOW/Union Carbide to address this issue. Also, Paula noted that sources are required to provide ongoing reports regarding their source remediation activities to States with delegated RCRA programs. She noted that the summary data she had was from these reports. She further noted that WV might be able to find in the reports that DOW/Union Carbide should have been submitting information that WV could use to calculate

whether or not DOW/Union Carbide's WV plant is meeting and has in the past met the criteria for exemption from the Site Remediation NESHAP for all but recordkeeping activities.

Paula also said that the comment period on the proposed removal of the site remediation NESHAP exemption for sources subject to CERCLA actions or RCRA permits or orders remains open. She further noted that a notice extending the comment period had been signed and that the notice would be published in the Federal Register soon. Accordingly, if WV or DOW/Union Carbide wish to request changes or clarifications, now is their opportunity to do so.

Ray

From: Chakrabarty, Renu M [mailto:Renu.M.Chakrabarty@wv.gov]
Sent: Wednesday, June 15, 2016 9:08 AM
To: Chalmers, ray <chalmers.ray@epa.gov>
Cc: Campbell, Dave <campbell.dave@epa.gov>; Maldonado, Zelma <Maldonado.Zelma@epa.gov>; Jeffries, Tracy A <Tracy.A.Jeffries@wv.gov>; Andrews, Edward S <Edward.S.Andrews@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; Weissbart, Erich <Weissbart.Erich@epa.gov>
Subject: RE: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

Ray,

I think it would be useful to have a conference call with Mr. Weissbart, and our state Office of Environmental Remediation contact, Ms. Tracy Jeffries, so that we can all get on the same page as far as what the 1999 letters of commitment represent, and specifically, whether they meet the Site Remediation NESHAP criteria for a permit or order.

Thanks,
Renu

From: Chakrabarty, Renu M
Sent: Tuesday, June 14, 2016 2:28 PM
To: Chalmers, ray <chalmers.ray@epa.gov>
Cc: Campbell, Dave <campbell.dave@epa.gov>; Maldonado, Zelma <Maldonado.Zelma@epa.gov>
Subject: RE: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls

OK – thanks. We have been checking with the RCRA folks in our other programs, and have not found a RCRA permit or order so far. My understanding is that EPA Region III is the lead on this project since the state was not delegated as the corrective action authority back in 1999. As noted in the e-mail correspondence chain below, Mr. Weissbart of EPA Region III did not indicate there was a EPA RCRA permit or order for this site either.

Thanks,
Renu

Andrews, Edward S

From: Andrews, Edward S
Sent: Monday, June 06, 2016 10:20 AM
To: McKeone, Beverly D
Subject: RE: Subpart GGGGGG exclusion for UCC South Charleston/Tech Center/PTO

Why should I be requesting such information? I am reviewing a permit application for groundwater remediation project. He has provide a letter that does not be the criteria of an RCRA order. Thus, the project is subject to Subpart GGGGGG. If DOW/UCC has used this letter to avoid Subpart GGGGGG for other projects, that is not my duty to investigate those projects after-the-fact.

I feel that I should not grant an extension and evaluate this application as it and make a decision whether it does or does not comply with Subpart GGGGGG.

Ed

From: McKeone, Beverly D
Sent: Monday, June 06, 2016 10:11 AM
To: Andrews, Edward S <Edward.S.Andrews@wv.gov>
Cc: Chakrabarty, Renu M <Renu.M.Chakrabarty@wv.gov>
Subject: RE: Subpart GGGGGG exclusion for UCC South Charleston/Tech Center/PTO

Ed,

I am not aware of any either. You can ask Jay for specific permits he claimed that DOW claimed an exemption under this agreement or try to find such a thing in our files. I assume that Renu would have shared such information already if she had it.

Bev

From: Andrews, Edward S
Sent: Monday, June 06, 2016 9:37 AM
To: McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; Chakrabarty, Renu M <Renu.M.Chakrabarty@wv.gov>
Cc: Keatley, Robert L <Robert.L.Keatley@wv.gov>; Bauerle, Dan C <Dan.C.Bauerle@wv.gov>; Adkins, Jesse D <Jesse.D.Adkins@wv.gov>
Subject: Subpart GGGGGG exclusion for UCC South Charleston/Tech Center/PTO

Bev: This is the first time that I have hear of other remediation activities that UCC has used the Dec 15, 1999 LEAD Agreement letter to be exclude from Subpart GGGGGG. I would not have a problem extending my deadline for developing a compliance plan for the groundwater remediation project. However, I don't agree with an extension to make a case that this LEAD agreement letter is an order, which is what UCC is asking doing. We already gave UCC additional 30 days to provide an RCRA order. Renu and I both agree that this letter does not constitute as an RCRA order and therefor remediation activities needs to comply with the requirements of Subpart GGGGGG (See attached e-mails).

I feel if we grant an extension for R13-3308, then Enforcement needs either investigate and determine if any of these other remediation activities are subject to Subpart GGGGGG or pursue action against UCC for failing to comply with Subpart GGGGGG.

I would suggest 15 days only for a comply plan for Subpart GGGGGG & NESHAP Fee just like I request for on May 20, 2016 or move forward to deny the application on the bases that it does not meet the requirements of Subpart GGGGGG. Let me know what you want to do?

Andrews, Edward S

From: McKeone, Beverly D
Sent: Monday, June 06, 2016 10:07 AM
To: Andrews, Edward S; Chakrabarty, Renu M
Cc: Keatley, Robert L; Bauerle, Dan C; Adkins, Jesse D
Subject: RE: Subpart GGGGGG exclusion for UCC South Charleston/Tech Center/PTO

What are everyone's thoughts? Do we need to get together to discuss?

Bev

From: Andrews, Edward S
Sent: Monday, June 06, 2016 9:37 AM
To: McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; Chakrabarty, Renu M <Renu.M.Chakrabarty@wv.gov>
Cc: Keatley, Robert L <Robert.L.Keatley@wv.gov>; Bauerle, Dan C <Dan.C.Bauerle@wv.gov>; Adkins, Jesse D <Jesse.D.Adkins@wv.gov>
Subject: Subpart GGGGGG exclusion for UCC South Charleston/Tech Center/PTO

Bev: This is the first time that I have hear of other remediation activities that UCC has used the Dec 15, 1999 LEAD Agreement letter to be exclude from Subpart GGGGGG. I would not have a problem extending my deadline for developing a compliance plan for the groundwater remediation project. However, I don't agree with an extension to make a case that this LEAD agreement letter is an order, which is what UCC is asking doing. We already gave UCC additional 30 days to provide an RCRA order. Renu and I both agree that this letter does not constitute as an RCRA order and therefor remediation activities needs to comply with the requirements of Subpart GGGGGG (See attached e-mails).

I feel if we grant an extension for R13-3308, then Enforcement needs either investigate and determine if any of these other remediation activities are subject to Subpart GGGGGG or pursue action against UCC for failing to comply with Subpart GGGGGG.

I would suggest 15 days only for a comply plan for Subpart GGGGGG & NESHAP Fee just like I request for on May 20, 2016 or move forward to deny the application on the bases that it does not meet the requirements of Subpart GGGGGG. Let me know what you want to do?

Thanks,
Ed

From: Fedczak, James (JP) [mailto:JPFedczak@dow.com]
Sent: Friday, June 03, 2016 3:32 PM
To: Andrews, Edward S <Edward.S.Andrews@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>
Cc: Putnam, Jon (J) <JPutnam@dow.com>; Callahan, Shannon <SCallahan@dow.com>; Cibrik, Jerome (JE) <cibrikje@dow.com>; Sizemore, Freddie (FA) <sizemofa2@dow.com>
Subject: RE: WV DAQ Permit Application Incomplete for Company Name and Location

Ed/Bev,

Union Carbide Corporation requests a 15-day extension in order to formulate a response, as this determination is inconsistent with previous site remediation permits at the same facility for which the DAQ allowed the exemption to 40 C.F.R. Part 63, Subpart GGGGG (Site Remediation MACT). Thank you for your consideration.

Andrews, Edward S

From: Fedczak, James (JP) <JPFedczak@dow.com>
Sent: Friday, June 03, 2016 3:32 PM
To: Andrews, Edward S; McKeone, Beverly D
Cc: Putnam, Jon (J); Callahan, Shannon; Cibrik, Jerome (JE); Sizemore, Freddie (FA)
Subject: RE: WV DAQ Permit Application Incomplete for Company Name and Location

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Jay

Jay Fedczak, P.E.
EH&S Environmental Specialist
Union Carbide Corporation
A Wholly Owned Subsidiary of The Dow Chemical Company
South Charleston, WV 25303
O: 304-747-1354, Email: JPFedczak@dow.com

From: Andrews, Edward S [mailto:Edward.S.Andrews@wv.gov]
Sent: Friday, May 20, 2016 10:34 AM
To: Putnam, Jon (J)
Cc: McKeone, Beverly D; Fedczak, James (JP)
Subject: WV DAQ Permit Application Incomplete for Company Name and Location

RE: Application Status: Incomplete
Union Carbine Corporation – South Charleston
Permit Application No. R13-3308
Plant ID No. 039-00003

Mr. Putnam:

Your application for a construction permit for a groundwater remediation project was received by this Division on April 11, 2006 and assigned to the writer for review. Upon review of the additional items provided May 15, 2016 & May 19, 2016, it has been determined that the application as submitted is incomplete based on the following items:

1. The December 15, 1999 Facility Lead Agreement does not meet the criteria of an "order" under the Resource Conservation and Recovery Act (RCRA). Thus, the exclusion in 40 CFR 63.7881 does not apply to your facility. Please see the attached e-mails regarding the DAQ's discussions with U.S. EPA Region III regarding your Lead Agreement. Therefore, Subpart GGGGG to Part 63 is applicable to this

project. Please present additional information indicating how your proposed project will meet the applicable emission standards of Subpart GGGGG.

2. 45 CSR 22 NESHAP Fee of $2,500 for being subject to Subpart GGGGG to Part 63.

Please address the above deficiencies in writing within fifteen (15) days of the receipt of this email. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Edward Andrews at (304) 926-0499 ext.1214 or reply to this email.

Sincerely,

Edward S. Andrews, P.E.
Engineer
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
304.926.0499 ext. 1214

Andrews, Edward S

From: Andrews, Edward S
Sent: Friday, May 20, 2016 10:34 AM
To: Putnam, Jon (J)
Cc: McKeone, Beverly D; 'Fedczak, James (JP)'
Subject: WV DAQ Permit Application Incomplete for Company Name and Location
Attachments: RE: Dow (AKA Union Carbide SC) Permit R13-3308

RE: Application Status: Incomplete
Union Carbine Corporation – South Charleston
Permit Application No. R13-3308
Plant ID No. 039-00003

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Andrews, Edward S

From: Fedczak, James (JP) <JPFedczak@dow.com>
Sent: Monday, May 16, 2016 2:49 PM
To: Andrews, Edward S
Cc: McKeone, Beverly D; Putnam, Jon (J)
Subject: RE: WV DAQ Permit Application Incomplete for Union Carbine Corporation - South Charleston Facility
Attachments: ETI_Biofilter_Overview_FINAL.PDF; Facility_Lead_Agreement-Dec 1999.pdf; Response to Agency questions 051616.docx; Attachment F-PFD_27April2016.pdf; Attachment N3 Tables-MI_GCS_Groundwater Calcs.pdf

Ed,

Thank you for your questions. Please see the attached documents in response to your request and please let me know if you need anything else in order to deem this application complete or if you have any further questions.

Jay

Jay Fedczak, P.E.
EH&S Environmental Specialist
Union Carbide Corporation
A Wholly Owned Subsidiary of The Dow Chemical Company
South Charleston, WV 25303
O: 304-747-1354, Email: JPFedczak@dow.com

From: Andrews, Edward S [mailto:Edward.S.Andrews@wv.gov]
Sent: Monday, April 18, 2016 9:47 AM
To: Putnam, Jon (J)
Cc: McKeone, Beverly D; Fedczak, James (JP)
Subject: WV DAQ Permit Application Incomplete for Union Carbine Corporation - South Charleston Facility

RE: Application Status: Incomplete
Union Carbine Corporation
Permit Application No. R13-3308 Plant ID No. 039-00003

Mr. Putnam:

Your application for a construction permit for a groundwater remediation project was received by this Division on April 11, 2016 and assigned to the writer for review. Upon initial review of said application, it has been determined that the application as submitted is incomplete based on the following items:

1. **Original affidavit for Class I legal advertisement not submitted.**

2. **Please provide a copy of the corrective action order or permit issued by the EPA or WVDEP requiring such remediation be conducted under the Resource Conservation and Recovery Act (RCRA).**

3. **Please reevaluate the potential air emissions, including fugitive sources emissions (i.e. drains, sumps, trenches, any source where air may be entrained with contained groundwater), before and after controls (bio filter). The DAQ would suggest using process simulator that can predicted air emissions associated with water treatment operations be used to estimate the emissions or other acceptable prediction means other than assuming 100% of the organic contaminates are released from the groundwater prior to treatment by the vegetated contact beds. These estimates needs to include all supporting documentation including analytical results from sampling of extraction well and target levels after treatment.**

4. **Please provide design information of the bio filter, explanation of its operation, and projected life expectance.**

5. **Please explain in detail how the minimum operating temperature of the bio filter is linked to the 90% control efficiency for organic compounds.**

6. **Please explain in detail why there are no VOC/HAP emissions downstream of the siphon tank as illustrated in Attachment F – Process Flow Diagram.**

7. **Please identify if any by-products are going to be generated by the bio filter and/or the vegetated contact beds.**

Please address the above deficiencies in writing within fifteen (15) days of the receipt of this email. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

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Charleston, WV 25304
304.926.0499 ext. 1214

Andrews, Edward S

From: Fedczak, James (JP) <JPFedczak@dow.com>
Sent: Wednesday, April 20, 2016 10:36 AM
To: Andrews, Edward S; Putnam, Jon (J)
Cc: McKeone, Beverly D
Subject: RE: WV DAQ Permit Application Incomplete for Union Carbine Corporation - South Charleston Facility

Ed,

UCC respectfully requests a 15-day extension in order to address all of the items listed in the incomplete letter below, for a total of 30 days. Please respond with confirmation of the acceptance of this request. Thanks!

Jay

Jay Fedczak, P.E.
EH&S Environmental Specialist
Union Carbide Corporation
A Wholly Owned Subsidiary of The Dow Chemical Company
South Charleston, WV 25303
O: 304-747-1354, Email: JPFedczak@dow.com

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Proven performance and low lifecycle costs for VOC & Odor Control

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For the control of VOCs, HAPs and odor-causing compounds, Envirogen offers a state-of-the-art portfolio of biological treatment systems – including biofilters, biotrickling filters and combinations of the two technologies – in both standardized and custom designs. Envirogen can provide solutions for a broad range of contaminants and flow rates – from 120 to over 100,000 cfm. Envirogen biofilters are the result of more than three decades of experience in managing industrial and municipal emissions, featuring advanced engineering concepts that can be tailored to provide a low lifecycle cost solution in your facility.

Effective and Sustainable

Envirogen biofilters are ideally suited for contaminants that are low molecular weight, polar and readily biodegradable. They are particularly effective for low loading applications at high flow volumes. Removal ratios in excess of 95% for water soluble compounds and 90% for BTEX and similar compounds are readily achievable. Envirogen biofilters are extremely effective in treating odors caused by hydrogen sulfide (H_2S) and other reduced sulfur compounds. Greater than 99% H_2S removal and 90% odor removal are common. As stand-alone systems or in combination with other emissions control technologies, Envirogen biofilters offer an inherently sustainable solution with ease of operation and very low operating costs.

Seven Things **YOU WANT TO KNOW** About Envirogen Biofilters

1 **Cost effective:**
Very low operating costs.

2 **Reliable:**
Proven, technology in over 120 installations.

3 **Simple operation:**
Minimal maintenance.

4 **High removal efficiencies:**
Useful for broad range of contaminants. Can be effectively combined with other technologies to reduce costs and improve performance.

5 **Broad range of configurations:**
For different influent air & loading rates
- Modular
- Built-in-Place
- Biotrickling Filter (Biotower)
- Biotrickling/Biofilter combination

6 **Long-life filter media:**
- Guarantees up to 10 years depending on the application.
- Media matched to project.

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Biotrickling Filters (BT Series)

Envirogen Biotrickling Filters are vertically-oriented biofilters filled with an inorganic media featuring 100% water recirculation. The filters' unique design can address high concentration of H_2S odors in areas where space is at a premium – offering a shorter retention time and higher throughput than a conventional biofilter. They can also treat high concentrations of VOCs and be chemically augmented when needed. The recirculation water maintained in the tower allows for optimal control of pH, nutrient levels and biofilm thickness. In some applications, an intermittent, single-pass irrigation system can be supplied, eliminating the need for a recirculation pump.

Integrated Biotrickling/Biofilter Systems (BTF Series)

The result of 20 years of research, design and operating experience, Envirogen's Integrated Biotrickling/Biofilter Systems are some of the most technically advanced solutions for low- to moderate-flow applications available. These systems combine the high performance of a biotrickling filter in removing H_2S, with the VOC and reduced sulfur compound efficiencies of a biofilter in a single, pre-fabricated fiberglass system that offers ease of installation and a small system footprint. One of the design advantages of the Integrated Biotrickling/Biofilter System is that it can be configured to offer multiple zones of treatment – for efficient and cost-effective management of complex air streams.

Built-in-Place Biofilters (BIP Series)

Envirogen Built-in-Place Biofilters are custom designed solutions for mid- to high-air flow VOC and odor control applications. Installations are based on standardized multibay designs and system components to lower installed costs for air flows ranging from 2,000 to 72,000 cfm. They can be configured with both biofilter and biotrickling designs for multi-zonal treatment. Envirogen Built-in-Place Biofilters are intended for centralized treatment solutions and are ideal for emissions control in industrial manufacturing applications.

The Envirogen Biofilter Portfolio

Line	Models	Media (ft^3)	CFM	EBRT/seconds (default)
Biofilter (H-Series)	8	120-680	120-2720	10-60 (30)
Biofilter (I-Series)	13	450-3900	224-8350	30-120 (75)
Biofilter box (P&B Series)	14	448-4176	450-1670	15-60 (30)
Biotower (BT)	30	120-3500	200-14000	10-30 (15)
BT/BF Box (BTF Series)	11	550-4500	800-9000	30-55 (40)
Built-in-Place	24	2000-48000	2000-72000	20-60 (30)

The Envirogen Sustainable Emissions Control Offering

For a broad range of industrial emissions applications, the Envirogen Sustainable Emissions Control offering features the use of both biological and enhanced adsorption treatment technologies to control contaminants covered under the Clean Air Act and state and local air quality regulatory programs. Used alone or together, the two-technology approach allows Envirogen to treat organic and inorganic, polar and non-polar emission constituents at varying concentrations and air flow rates.

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Biofilter Applications

- Asphalt Manufacture
- Chemical Processing
- Coatings Manufacture
- Composting
- Food Processing
- Fragrance Manufacture
- Landfill Gas/Leachate Extraction
- Petroleum & Refining
- Pulp & Paper Manufacture
- Rendering
- Wastewater Collection & Pumping
- Wastewater Treatment
- Wood Products

For more information on Sustainable Emissions Control or our biofilter portfolio, visit www.envirogen.com.

Corporate Office
Two Kingwood Place
700 Rockmead Dr., Suite 105
Kingwood, TX 77339
Tel: 877.312.8950
www.envirogen.com

ETI 2001 052014

Attachment F - Process Flow Diagram

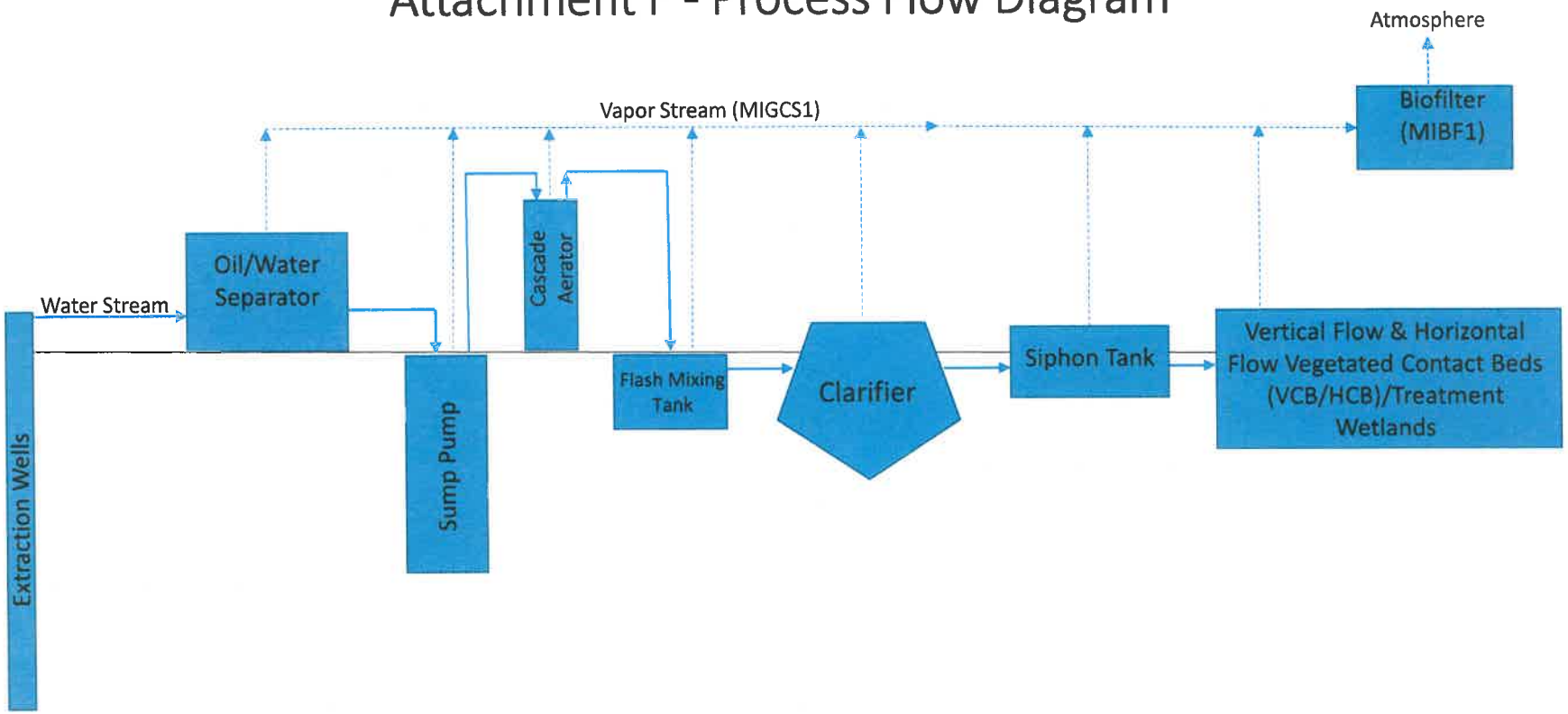

Table N-3
Summary of Pollutant Groundwater Concentrations
South Charleston Facility, Middle Island Groundwater Containment System, South Charleston, WV

Capture Zone/Loc - #	Adjusted Flow Rate, SUM = 100 GPM	Adjusted Flow Rate, 12% in-flow from River*	Flow Rate (GPD)
0	45.8	40.3	58,080
2	38.9	34.2	49,280
3	15.3	13.4	19,360
Total	**100.0**		**126,720**

Notes:
Flowrate anticipated to be around 30 gallons per minute; however, it was scaled up to a design flowrate of 100 gallons per minute, which includes 12% in-flow from the river

Constituent	Unit	Capture Zone 0 - Optimized Average Concentration	Capture Zone 2 - Optimized Average Concentration	Capture Zone 3 - Optimized Average Concentration	Weighted Conc. in Groudwater (mg/L)
1,2-Dichloroethane	UG/L	2,250	1,329	1,500.0	1.8
1,3-Dichlorobenzene	UG/L	2,250	1,329	1,500.0	1.8
1,4-Dichlorobenzene	UG/L	2,250	1,329	1,500.0	1.8
2-Butanone	UG/L	22,503	13,286	15,000.0	17.8
Acetone	UG/L	56,256	33,214	37,500.0	44.4
Benzene	UG/L	315,786	162,072	226,500.0	242.7
Chlorobenzene	UG/L	2,251	1,329	1,500.0	1.8
cis-1,2-Dichloroethylene	UG/L	2,250	1,329	1,500.0	1.8
Ethylbenzene	UG/L	3,325	4,255	1,680.0	3.4
Naphthalene	UG/L	1,233	1,170	920.8	1.2
Styrene	UG/L	2,250	1,329	3,415.0	2.1
Toluene	UG/L	21,925	14,976	21,650.0	19.2
Xylenes, Total	UG/L	11,251.6	7,324	7,500.0	9.2

Notes:
Weighted Concentration (mg/l) = (Zone 0 Average Concentration (ug/l) * zone 0 flow (gpd) + Zone 2 Average Concentration (ug/l) * zone 2 flow (gpd) + Zone 3 Average Concentration (ug/l) * zone 3 flow (gpd)) / total flow (gpd) / 1000 ug/mg
Green shading = 4 Max contributors: Benzene, Acetone, 2-butanone, toluene

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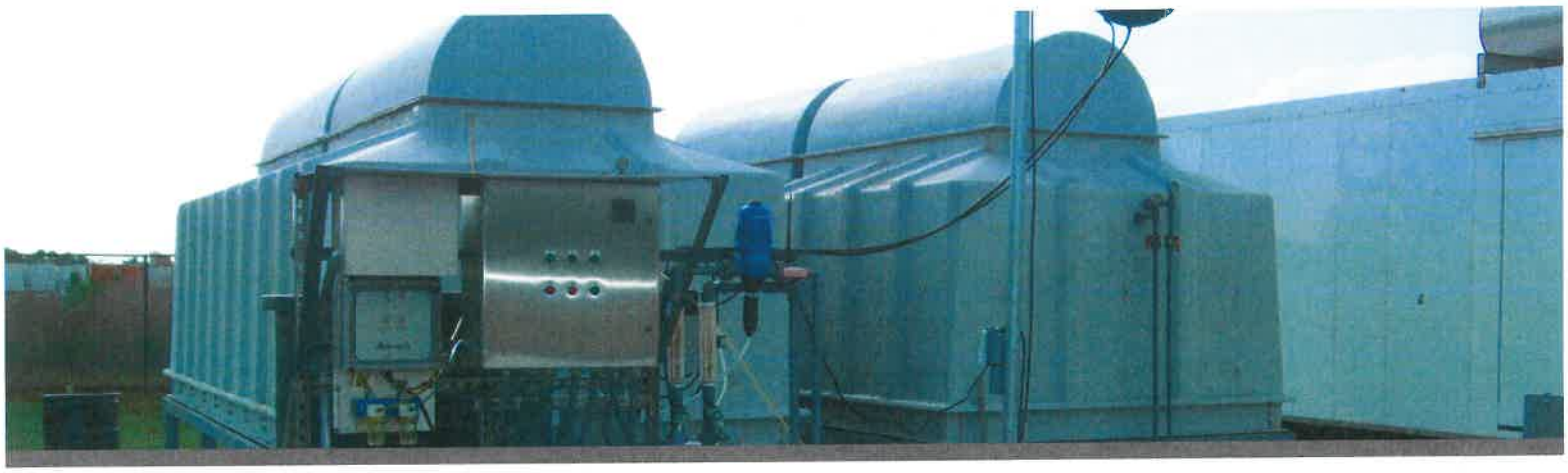

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For more information on Sustainable Emissions Control or our biofilter portfolio, visit www.envirogen.com.

Corporate Office
Two Kingwood Place
700 Rockmead Dr., Suite 105
Kingwood, TX 77339
Tel: 877.312.8950
www.envirogen.com

ETI 2001 052014

Adkins, Sandra K

From: Adkins, Sandra K
Sent: Wednesday, April 13, 2016 1:32 PM
To: 'jputnam@dow.com'; 'Fedczak, James (JP)'
Cc: McKeone, Beverly D; Andrews, Edward S
Subject: WV DAQ Permit Application Status for Union Carbide Corporation; South Charleston

RE: Application Status
Union Carbide Corporation
South Charleston
Plant ID No. 039-00003
Application No. R13-3308

Mr. Putnam,

Your application for a construction permit for the South Charleston location was received by this Division on April 11, 2016, and was assigned to Ed Andrews. The following items were not included in the initial application submittal:

Original affidavit for Class I legal advertisement not submitted.

Emission calculations not included – emission factors, references, source identification numbers, etc.
Testing of influent to be treated as basis for emission calculations was not included.

These items are necessary for the assigned permit writer to continue the 30-day completeness review.

Within 30 days, you should receive a letter from Ed stating the status of the permit application and, if complete, given an estimated time frame for the agency's final action on the permit.

Any determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit decision.

Should you have any questions, please contact the assigned engineer, Ed Andrews, at 304-926-0499, extension 1214.

Jay

Jay Fedczak, P.E.
EH&S Environmental Specialist
Union Carbide Corporation
A Wholly Owned Subsidiary of The Dow Chemical Company
South Charleston, WV 25303
O: 304-747-1354, Email: JPFedczak@dow.com

From: Andrews, Edward S [mailto:Edward.S.Andrews@wv.gov]
Sent: Friday, May 20, 2016 10:34 AM
To: Putnam, Jon (J)
Cc: McKeone, Beverly D; Fedczak, James (JP)
Subject: WV DAQ Permit Application Incomplete for Company Name and Location

RE: Application Status: Incomplete
Union Carbine Corporation – South Charleston
Permit Application No. R13-3308
Plant ID No. 039-00003

Mr. Putnam:

Your application for a construction permit for a groundwater remediation project was received by this Division on April 11, 2006 and assigned to the writer for review. Upon review of the additional items provided May 15, 2016 & May 19, 2016, it has been determined that the application as submitted is incomplete based on the following items:

1. The December 15, 1999 Facility Lead Agreement does not meet the criteria of an "order" under the Resource Conservation and Recovery Act (RCRA). Thus, the exclusion in 40 CFR 63.7881 does not apply to your facility. Please see the attached e-mails regarding the DAQ's discussions with U.S. EPA Region III regarding your Lead Agreement. Therefore, Subpart GGGGG to Part 63 is applicable to this project. Please present additional information indicating how your proposed project will meet the applicable emission standards of Subpart GGGGG.

2. 45 CSR 22 NESHAP Fee of $2,500 for being subject to Subpart GGGGG to Part 63.

Please address the above deficiencies in writing within fifteen (15) days of the receipt of this email. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Edward Andrews at (304) 926-0499 ext.1214 or reply to this email.

Sincerely,

Edward S. Andrews, P.E.
Engineer

Table N-3
Summary of Pollutant Groundwater Concentrations
South Charleston Facility, Middle Island Groundwater Containment System, South Charleston, WV

Capture Zone/Loc - #	Adjusted Flow Rate, SUM = 100 GPM	Adjusted Flow Rate, 12% in-flow from River*	Flow Rate (GPD)
0	45.8	40.3	58,080
2	38.9	34.2	49,280
3	15.3	13.4	19,360
Total	**100.0**		**126,720**

Notes:
Flowrate anticipated to be around 30 gallons per minute; however, it was scaled up to a design flowrate of 100 gallons per minute, which includes 12% in-flow from the river

Constituent	Unit	Capture Zone 0 - Optimized	Capture Zone 2 - Optimized	Capture Zone 3 - Optimized	Weighted Conc. in Groudwater (mg/L)
		Average Concentration	Average Concentration	Average Concentration	
1,2-Dichloroethane	UG/L	2,250	1,329	1,500.0	1.8
1,3-Dichlorobenzene	UG/L	2,250	1,329	1,500.0	1.8
1,4-Dichlorobenzene	UG/L	2,250	1,329	1,500.0	1.8
2-Butanone	UG/L	22,503	13,286	15,000.0	17.8
Acetone	UG/L	56,256	33,214	37,500.0	44.4
Benzene	UG/L	315,786	162,072	226,500.0	242.7
Chlorobenzene	UG/L	2,251	1,329	1,500.0	1.8
cis-1,2-Dichloroethylene	UG/L	2,250	1,329	1,500.0	1.8
Ethylbenzene	UG/L	3,325	4,255	1,680.0	3.4
Naphthalene	UG/L	1,233	1,170	920.8	1.2
Styrene	UG/L	2,250	1,329	3,415.0	2.1
Toluene	UG/L	21,925	14,976	21,650.0	19.2
Xylenes, Total	UG/L	11,251.6	7,324	7,500.0	9.2

Notes:
Weighted Concentration (mg/l) = (Zone 0 Average Concentration (ug/l) * zone 0 flow (gpd) + Zone 2 Average Concentration (ug/l) * zone 2 flow (gpd) + Zone 3 Average Concentration (ug/l) * zone 3 flow (gpd)) / total flow (gpd) / 1000 ug/mg
Green shading = 4 Max contributors: Benzene, Acetone, 2-butanone, toluene

West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
304.926.0499 ext. 1214

Andrews, Edward S

From: Andrews, Edward S
Sent: Friday, May 20, 2016 10:34 AM
To: Putnam, Jon (J)
Cc: McKeone, Beverly D; 'Fedczak, James (JP)'
Subject: WV DAQ Permit Application Incomplete for Company Name and Location
Attachments: RE: Dow (AKA Union Carbide SC) Permit R13-3308

RE: Application Status: Incomplete
Union Carbine Corporation – South Charleston
Permit Application No. R13-3308
Plant ID No. 039-00003

Mr. Putnam:

Your application for a construction permit for a groundwater remediation project was received by this Division on April 11, 2006 and assigned to the writer for review. Upon review of the additional items provided May 15, 2016 & May 19, 2016, it has been determined that the application as submitted is incomplete based on the following items:

1. The December 15, 1999 Facility Lead Agreement does not meet the criteria of an "order" under the Resource Conservation and Recovery Act (RCRA). Thus, the exclusion in 40 CFR 63.7881 does not apply to your facility. Please see the attached e-mails regarding the DAQ's discussions with U.S. EPA Region III regarding your Lead Agreement. Therefore, Subpart GGGGG to Part 63 is applicable to this project. Please present additional information indicating how your proposed project will meet the applicable emission standards of Subpart GGGGG.

2. 45 CSR 22 NESHAP Fee of $2,500 for being subject to Subpart GGGGG to Part 63.

Please address the above deficiencies in writing within fifteen (15) days of the receipt of this email. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Edward Andrews at (304) 926-0499 ext.1214 or reply to this email.

Sincerely,

Edward S. Andrews, P.E.
Engineer
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
304.926.0499 ext. 1214

Andrews, Edward S

From: Chakrabarty, Renu M
Sent: Thursday, May 19, 2016 2:49 PM
To: weissbart.erich@epa.gov
Subject: Dow/UCC South Charleston, WV site - proposed Middle Island groundwater remediation well and air emissions controls
Attachments: Facility_Lead_Agreement-Dec 1999.pdf

Mr. Weissbart,

Thank you for taking the time to discuss the status and standing of the 1999 letters of commitment (attached) which are voluntary (non-binding) agreements with EPA Region III on what DOW/Union Carbide Corporation is doing for RCRA remediation. It was interesting to learn that the company's approach has been to discuss remediation plans with EPA Region III and then proceed to implement measures even before final written EPA approval.

The EPA Region III Corrective Action website for Dow/UCC's South Charleston facility that lists the status of the actions under this agreement (https://www3.epa.gov/reg3wcmd/ca/wv/webpages/wvd005005483.html).

Regarding the proposed new Middle Island groundwater remediation well, EPA Region III and the company have recently discussed the approach, including using biofiltration and vegetated contact beds with Mr. Jerome Cibrik of DOW, and both parties understand this method of remediation is being pursued. The information we have received in an air permit application indicates that approximately 89% of the hazardous air pollutant (HAP) emissions to air will be controlled.

You noted that EPA Region III will likely officially select and finalize remediation plans in 2017, and at that point the WVDEP will incorporate the plans into a permit (since WVDEP is now the RCRA corrective action authority). Ms. Tracy Jeffries of WVDEP's Office of Environmental Remediation has been the contact for those activities.

From an air quality perspective, the Site Remediation NESHAP (40 CFR 63, Subpart GGGGG) exempts sources that are subject to a corrective action order or permit issued by either EPA or WVDEP. That is, the company must follow the order or permit terms and conditions, but would not be subject to the federal NESHAP requirements as well. In the absence of an order or permit, the company would have to follow the NESHAP GGGGG requirements, which in this case would likely require 95% control of hazardous air pollutant (HAP) emissions to air (a little higher than that proposed under the voluntary agreement).

Thank you for providing some context to the 1999 letter of commitment to EPA Region III provided to our office by the company.
Renu

Renu M. Chakrabarty, P.E.
Air Toxics Coordinator
Division of Air Quality
WV Department of Environmental Protection
601 57th Street, SE
Charleston, WV 25304

Tel: (304) 926-0499, ext. 1246
Fax: (304) 926-0479
e-mail: Renu.M.Chakrabarty@wv.gov

Andrews, Edward S

From: Chakrabarty, Renu M
Sent: Thursday, May 19, 2016 3:06 PM
To: Andrews, Edward S
Subject: RE: Dow (AKA Union Carbide SC) Permit R13-3308

You are very very welcome.

From: Andrews, Edward S
Sent: Thursday, May 19, 2016 3:05 PM
To: Chakrabarty, Renu M <Renu.M.Chakrabarty@wv.gov>
Subject: RE: Dow (AKA Union Carbide SC) Permit R13-3308

Thank-you very, very much.
Ed

From: Chakrabarty, Renu M
Sent: Thursday, May 19, 2016 2:59 PM
To: Andrews, Edward S <Edward.S.Andrews@wv.gov>
Cc: McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; Boehm, Richard A <Richard.A.Boehm@wv.gov>; Keatley, Robert L <Robert.L.Keatley@wv.gov>
Subject: RE: Dow (AKA Union Carbide SC) Permit R13-3308

Based on a discussion with Mr. Erich Weissbart of EPA Region III, who is the Project Manager for the Dow/UCC sites in WV, the 1999 letters of commitment are voluntary (non-binding) agreements on what the company will do for RCRA remediation. Since they are not an order or a permit, they do not exempt the proposed new Middle Island groundwater remediation well from the Site Remediation NESHAP (40 CFR 63, Subpart GGGGG).

See the attached e-mail to him regarding details from our conversation. If additional information surfaces, I will pass it along.

Thanks,
Renu

From: Andrews, Edward S
Sent: Wednesday, May 18, 2016 2:57 PM
To: Chakrabarty, Renu M <Renu.M.Chakrabarty@wv.gov>
Cc: McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>
Subject: Dow (AKA Union Carbide SC) Permit R13-3308

It appears Region III accepted the agreement with a few exceptions. Jay offer any explanation how this agreement fits in with the proposed groundwater remediation.

However, this agreements covers several sites but is fairly complex. I don't believe it meets the criteria of an order or permit requirement remediation. This agreement is nearly 17 years old and lacks site specific details.

Please let me know what you think if this meets the definition of an order under the MACT standard.

Thanks,

Union Carbide Corporation
A Subsidiary of The Dow Chemical Company
P.O. Box 8004
437 MacCorkle Avenue, SW
South Charleston, WV 25303
USA

CERTIFIED MAIL – Return Receipt Requested
7014 1820 0001 2806 6945

May 16, 2016

RECEIVED
MAY 19 2016
WV DEP / DIV OF AIR QUALITY

Mr. Ed Andrews, Permit Engineer
WV Department of Environmental Protection
Division of Air Quality
601 57th Street SE
Charleston, WV 25304

Dear Mr. Legg,

Subject: Union Carbide Corporation – South Charleston Operations
Facility ID# 039-00003
45CSR13 Construction Permit Request
Middle Island Site Remediation Permit R13-3308
Legal Ad Affidavit

Enclosed, you will find the original Class I Legal Advertisement with regard to permit number R13-3308.

Should you require any additional information, please contact me at (304) 747-1354 or via e-mail (JPFedczak@dow.com).

Sincerely,

Jay Fedczak
EH&S Environmental Specialist

Enclosure

Entire Document
NON-CONFIDENTIAL

CHARLESTON NEWSPAPERS
P.O. Box 2993
Charleston, West Virginia 25330
Billing 348-4898
Classified 348-4848
1-800-WVA-NEWS

LEGAL ADVERTISING INVOICE

INVOICE DATE	04/13/16
ACCOUNT NBR	071907102
SALES REP ID	0998
INVOICE NBR	990127001

M

BILLED TO

UNION CARBIDE CORP
P.O.BOX 8361
SOUTH CHARLESTON WV 25303 USA

RECEIVED
MAY 19 2016
WV DEP / DIV OF AIR QUALITY

Please return this portion with your payment. AMOUNT PAID: _____

Make checks payable to: Charleston Newspapers

CHARLESTON NEWSPAPERS
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Charleston, West Virginia 25330
Billing 348-4898
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1-800-WVA-NEWS
FEIN 55-0676079

INVOICE DATE	04/13/16
ACCOUNT NBR	071907102
SALES REP ID	0998
INVOICE NBR	990127001

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ISSUE DATE	AD TYPE	PUB	DESCRIPTION REFERENCE NBR PURCHASE ORDER #	AD NUMBER	AD SIZE TOTAL RUN	RATE	GROSS AMOUNT	NET AMOUNT
04/11	LEG	GZ	Middle Island Notice 990127001	0626556	1X0525 5.25	9.10	47.78	47.78
			TOTAL INVOICE AMOUNT					47.78

State of West Virginia, **AFFIDAVIT OF PUBLICATION**

I, Lisa Hampwater of

OFFICIAL SEAL
NOTARY PUBLIC
STATE OF WEST VIRGINIA
MARY C. SMITH
871 SOUTH WASHINGTON ST.
ST. ALBANS, WV 25177
My commission expires June 16, 2019

) and during the dates listed below:
04/11/16-04/11/16

AIR QUALITY PERMIT NOTICE

Notice of Application

Notice is given that Union Carbide Corporation has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Construction Permit to install and operate a new groundwater containment system located at 437 MacCorkle Avenue SW, South Charleston, in Kanawha County, West Virginia. The latitude and longitude coordinates are: 38.36852, -81.68654

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be: volatile organic compounds - 6.68 tons per year; hazardous air pollutants - 6.21 tons per year.

Startup of operation is planned to begin in late 2016. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the 11th day of April, 2016.

By:
Union Carbide Corporation
Jon Putnam
WVO Responsible Care Leader
P.O. Box 8361
South Charleston, WV 25303
(626556)

Notary Public of Kanawha County, West Virginia

Andrews, Edward S

From: Andrews, Edward S
Sent: Monday, April 18, 2016 9:47 AM
To: 'jputnam@dow.com'
Cc: McKeone, Beverly D; 'jpfedczak@dow.com'
Subject: WV DAQ Permit Application Incomplete for Union Carbine Corporation - South Charleston Facility

RE: Application Status: Incomplete
Union Carbine Corporation
Permit Application No. R13-3308 Plant ID No. 039-00003

Mr. Putnam:

Your application for a construction permit for a groundwater remediation project was received by this Division on April 11, 2016 and assigned to the writer for review. Upon initial review of said application, it has been determined that the application as submitted is incomplete based on the following items:

1. **Original affidavit for Class I legal advertisement not submitted.**

2. **Please provide a copy of the corrective action order or permit issued by the EPA or WVDEP requiring such remediation be conducted under the Resource Conservation and Recovery Act (RCRA).**

3. **Please reevaluate the potential air emissions, including fugitive sources emissions (i.e. drains, sumps, trenches, any source where air may be entrained with contained groundwater), before and after controls (bio filter). The DAQ would suggest using process simulator that can predicted air emissions associated with water treatment operations be used to estimate the emissions or other acceptable prediction means other than assuming 100% of the organic contaminates are released from the groundwater prior to treatment by the vegetated contact beds. These estimates needs to include all supporting documentation including analytical results from sampling of extraction well and target levels after treatment.**

4. **Please provide design information of the bio filter, explanation of its operation, and projected life expectance.**

5. **Please explain in detail how the minimum operating temperature of the bio filter is linked to the 90% control efficiency for organic compounds.**

6. **Please explain in detail why there are no VOC/HAP emissions downstream of the siphon tank as illustrated in Attachment F – Process Flow Diagram.**

7. **Please identify if any by-products are going to be generated by the bio filter and/or the vegetated contact beds.**

Please address the above deficiencies in writing within fifteen (15) days of the receipt of this email. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Edward Andrews at (304) 926-0499 ext. 1214 or reply to this email.

Sincerely,

Edward S. Andrews, P.E.
Engineer
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
304.926.0499 ext. 1214

1. **Original affidavit for Class I legal advertisement not submitted.**

The Class I Legal Ad will be submitted under a separate cover However, a scanned copy is included as well.

2. **Please provide a copy of the corrective action order or permit issued by the EPA or WVDEP requiring such remediation be conducted under the Resource Conservation and Recovery Act (RCRA).**

The attached Facility Lead Agreement pertains to the site as a whole and specifies the facility will be investigated and remediated in accordance with the Federal Resource Conservation and Recovery Act (RCRA) Corrective Action Program.

3. **Please reevaluate the potential air emissions, including fugitive sources emissions (i.e. drains, sumps, trenches, any source where air may be entrained with contained groundwater), before and after controls (bio filter). The DAQ would suggest using process simulator that can predicted air emissions associated with water treatment operations be used to estimate the emissions or other acceptable prediction means other than assuming 100% of the organic contaminates are released from the groundwater prior to treatment by the vegetated contact beds. These estimates needs to include all supporting documentation including analytical results from sampling of extraction well and target levels after treatment.**

Emissions were initially modeled using WATER9; however, results from the program indicated emissions higher than the total amount of VOCs present in the groundwater. It appears this is because the equipment choices in WATER9 did not match up to the GCS process train. As a result, emissions were conservatively estimated using the assumption that 99.99% of the VOCs volatilized to air. As noted, the entire process is closed and air emissions are routed to the biofilter. Note the vegetated contact beds will also be routed to the biofilter. The previously submitted process flow diagram (PFD) contained an error (see attached for updated PFD).

Emissions are based on multiple rounds of groundwater sampling conducted over a number of years. The attached table (N3) summarizes the average concentration based on groundwater sampling data for each capture zone. A weighted average concentration of the compound was developed based on the groundwater data for each capture zone and the respective flow rate for that capture zone. Total influent flow rate is estimated to be approximately 30 gallons per minute; however, the flow rates were conservatively scaled up to a design flow rate of 100 gallons per minute.

4. **Please provide design information of the bio filter, explanation of its operation, and projected life expectance.**

Biofiltration is both physical chemistry and biological. The first step is the phase transfer of the VOC's from the vapor phase to the aqueous/biomass. This transfer is dependent on Henry's law, and water solubility of the compounds (equilibrium

equation). The biological process involves the use of the aqueous phase VOCs as food. The microorganisms enzymatically convert the carbon compounds into biomass and grow or maintain themselves. By reducing the concentration of the compound in the aqueous phase, more adsorption of contaminate compounds from the vapor phase into the aqueous phase occurs. See attached information from a biofilter vendor for general design and operation.

The media has a 7-10 year expectancy and can be replaced.

5. **Please explain in detail how the minimum operating temperature of the bio filter is linked to the 90% control efficiency for organic compounds.**

The minimum operating temperature is linked to activity of the microorganisms and the physical processes noted above. The temperature must be maintained above this setpoint to maintain health of the "bugs" responsible for removal of the contaminants. A lower temperature may result in the decline of the microbe population; resulting in a decrease in efficiency of removal. As noted in question 7, heat is one of the byproducts of the process, which also works to maintain the biofilter operating temperature.

6. **Please explain in detail why there are no VOC/HAP emissions downstream of the siphon tank as illustrated in Attachment F – Process Flow Diagram.**

This was drawn incorrectly on the Process Flow Diagram. Emissions from the vegetated contact beds will also be routed to the control device (biofilter). See revised PFD.

7. **Please identify if any by-products are going to be generated by the bio filter and/or the vegetated contact beds.**

Biomass and heat

SC File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

RECEIVED
JAN - 3
J.J. DLUGOS III
J.J. DLUGOS III

December 15, 1999

Mr. Jerome Cibrick
Remedial Program Manager
Union Carbide PTO
P.O. Box 8361
South Charleston, West Virginia 25303

Mr. Mike Agee
Mike Agee
Plant Manager
Union Carbide Corporation
437 MacCorkle, SW
South Charleston, West Virginia 25303

Mr. J.J. Dlugos, III
Site Manager
Union Carbide Corporation Technical Center
P.O. Box 8361
South Charleston, West Virginia 25303

(1) ~~Jerome — DO WE NEED TO DISCUSS THIS?~~ 2 see e-mail dated 1/6/00

(2) Jay Dlugos / File

1/5/00

RE: October 26, 1999 Letters of Commitment

Gentlemen:

The United States Environmental Protection Agency ("EPA") received your October 26, 1999 Letters of Commitment for Union Carbide's Technical Center, South Charleston Plant and PTO Facility. We would first like to thank you for being one of the first in Region III to commit to address corrective action under this new Facility Lead Program. We believe that your commitment to this program will benefit all parties in meeting EPA's corrective action goals in a streamlined and expeditious manner.

Your response included a number of revisions, additions and clarifications to the Facility Lead Agreement. A majority of these comments are acceptable to EPA but there are a few which EPA cannot accept. Our comments are addressed below:

1.	Section IA. (page 1)	Acceptable to EPA.
2.	Section II.A.1. (page 1)	This comment was only included in the Commitment Letter for the Tech Center. This comment is acceptable.
3.	Section II.B.1. (page 2)	Acceptable to EPA.

4.	Section II.B.1.b. (page 2)	Acceptable to EPA.
5.	Section II.B.2.b. (page 3)	EPA is not asking you to include CLP quality data. Follow the protocol that is specified in the Agreement.
6.	Section II.B.2.c. (page 3)	EPA requirs third party validation. If UCC would like to demonstrate it has the capability of performing data validation that is equivalent to a third party review, this demonstration must be included in the QAPP, and would require approval from EPA.
7.	Section II.B.5. (page 3)	The OSWER Directive is relevant to RCRA sites. UCC stated that they will be advising the local community of anticipated future uses of the facility as per the Community Relations Plan. UCC's proposal is consistent with what EPA intended under this Section.
8.	Section II.C. (page 4)	Acceptable to EPA.
9.	Section V.A. (page 6)	Acceptable to EPA.
10.	Section V.D. (page 7)	Acceptable to EPA.
11	Section VI.G. (page 8)	EPA does not traditionally require any duplication of effort under permits or orders. It is EPA's practice to use any past data which is of acceptable quality. Delete the parenthetical "or did not disapprove after having sufficient opportunity to do so". This language is not acceptable to EPA.
12.	Section VIII. (page 8)	Not acceptable to EPA.

This letter, with the above-mentioned changes and modifications to EPA's Facility Lead Agreement and your facilities respective Letter of Commitment shall constitute our Agreement. In addition, EPA agrees with UCC that the June 30, 1999 meeting satisfied the requirement to meet with EPA. We will be anticipating your Workplans for all three facilities to be submitted by January 26, 2000. Thanks again for accepting the goals and expectations of EPA Region III's Facility Lead Agreement.

Sincerely,

Robert E. Greaves, Chief
General Operations Branch

cc: G.S. Atwall, WV DEP

bcc: H.M. Agee 82/3
J. A. Amos 82/5
J.E. Cibrik 2000/3407
S. W. Drake, 2000
J.R. Erickson Danbury E3253
J. A. Fey 701/251
R. W. Jones 2000/4302
P. F. Normand Taft 631/212
P. D. Sherman 740/2320
F.A. Sizemore 701/326
M. E. Tapp Parsec II/215
H. C. Ward Danbury K4441

UNION CARBIDE

UNION CARBIDE CORPORATION
P.O. BOX 8361, SOUTH CHARLESTON, WV 25303

October 26, 1999

Certified Mail
Return Receipt Requested

Mr. Robert E. Greaves, Chief
General Operations Branch
U.S. Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

Dear Mr. Greaves:

RE: Letter of Commitment For Facility Lead Corrective Action
Union Carbide Corporation – Technical Center
South Charleston, West Virginia
EPA ID Number: WVD060682291

I am writing on behalf of Union Carbide Corporation (UCC) in response to EPA's request, as set forth in your September 23, 1999, letter, that UCC document its decision to participate in Region III's Facility Lead Program with a Letter of Commitment.

EPA's Facility Lead Agreement:

Please accept this letter as UCC's Letter of Commitment acknowledging our understanding and acceptance of the goals and expectations described in EPA's Facility Lead Agreement (copy attached), subject to the following revisions, additions, and clarifications.

Section I.A (page 1): UCC agrees to investigate and, if necessary, remediate releases of hazardous waste and/or hazardous waste constituents to those releases from:

(i) "solid waste management units" ("SWMUs") as EPA proposed to define that term in 1990, or

Section I.A (page 1) (continued):

(ii) at other non-SWMU areas provided that EPA has made and appropriately documented its site-specific determination, after due consideration of UCC comments, that actions at such areas are necessary to protect human health and the environment.

Section II.A.1 (page 1): UCC submitted a RCRA Facility Investigation (RFI) workplan (for the high priority SWMUs) to EPA on March 31, 1999. UCC believes that a number of items required in this section are already addressed in this workplan. UCC recommends that this workplan be incorporated into this Agreement. Additional workplans, schedules, etc., will be developed as needed.

Section II.B.1 (page 2): It is UCC's understanding that site characterization will focus primarily on Solid Waste Management Units and Areas of Concern identified at the facility (see comment on Section I.A).

Section II.B.1.b (page 2): The use of groundwater modeling shall be allowed in supplementing actual monitoring data, when delineating the extent of any contamination.

Section II.B.2.b (page 3): We want to clarify that "Equivalent to that followed by EPA" does not include CERCLA sites (i.e., CLP quality data). UCC does not anticipate the need to generate CLP quality data as part of this program. The quality assurance/quality control program and qualifications of the laboratory we use will be provided to EPA.

Section II.B.2.c (page 3): UCC proposes that validation by its trained technical staff and certification by management provides sufficient assurance that data is valid. Therefore, the need for third party validation is unnecessary and unproductive. Proper quality assurance and quality control will be incorporated into all workplans as required by Section II.B.2.

Section II.B.5 (page 3): EPA's May 25, 1995 OSWER Directive No. 9355.7-04 is intended to guide land use decision-making at CERCLA National Priority List (NPL) sites, not at well-capitalized, active manufacturing facilities operating pursuant to a RCRA permit. The OSWER guidance noted that EPA would be addressing future land use issues as they relate to RCRA facility cleanups in future guidance or rulemakings. To our knowledge, no such guidance or rulemaking has been issued. As a result, we do not plan to propose a schedule to submit the land use information outlined in the OSWER guidance. However, we will be advising the local community of UCC's reasonably anticipated future uses of the Facility in the course of implementing our Community Relations Plan, to be prepared in accordance with this Agreement. Given the long history of chemical use at the Facility, plus the industrial zoning of the Facility, we would not anticipate that anything other than a non-residential land use scenario would ever be applicable to the Facility.

Formal consideration of a community's desired future property uses would be warranted if the facility was a CERCLA NPL site. NPL sites typically are abandoned properties owned by bankrupt individuals or bankrupt/dissolved/defunct corporations and, as a result, are usually in dire need of responsible caretaking and land use planning. On the other hand, future land use decisions regarding property owned and actively operated by a well-capitalized corporation, such as UCC, are best left to such an owner/operator, provided the owner/operator actively communicates its cleanup plans to the community and duly considers its input.

Section II.C (page 4): It is our understanding that the Environmental Indicators may be achieved through sampling, measurements, modeling, and other techniques approved by EPA.

Section V.A (page 6): At the end of this sentence insert "...pursuant to this Agreement."

Section V.D (page 7): Strike from the end of this section "...or to hazardous waste management and/or disposal at the Facility." Waste management at the Facility is already covered by existing regulations and extends beyond activities carried out per this Agreement.

Section VI.G (page 8): Add to the end of this section: "During the term of this agreement, should EPA require that UCC apply for a corrective action permit, EPA agrees that (1) it will not require that UCC repeat any work previously completed under this Agreement which EPA already approved (or did not disapprove after having sufficient opportunity to do so), and (2) that it will agree to incorporate and duly consider as part of UCC's permit application any information in EPA's files regarding work already approved, or completed and not disapproved after sufficient opportunity to do so, under this Agreement.

Section VIII (page 8): Add at the end "...except for claims or causes of action arising solely from or on account of acts or omissions of EPA."

<u>EPA Meeting</u>:

It is UCC's understanding that the meeting on June 30, 1999, satisfied the requirement for a meeting with EPA, as required in Section II.F.1.a. If EPA still desires a meeting, please let us know.

Facility Project Coordinator:

The following person will serve as the Facility Project Coordinator for corrective action work at the referenced Union Carbide facility. He can be reached as follows:

Jerome Cibrik, P.G.
Remediation Program Manager
Union Carbide Corporation
P.O. Box 8361
South Charleston, WV 25303

Please call Mr. Cibrik at 304-747-7788 if you have any questions regarding this Letter of Commitment. In the event that Mr. Cibrik is unavailable, please contact Freddie Sizemore at 304-747-3713.

Sincerely,

J. J. Dlugos, III
Site Manager

FAS/ld 1264/cc-4588
Attachment

cc: Mr. Denis M. Zielinski, EPA Region III
Mr. G.S. Atwal, WV DEP
Mr. Ken Ellison, WVDEP

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Certified Mail
Return Receipt Requested

SEP 23 1999

Maryjo Hendricks
Site Manager
Union Carbide Corporation Technical Center
P.O. Box 8361
South Charleston, West Virginia 25303

Dear Ms. Hendricks:

On behalf of the United States Environmental Protection Agency ("EPA"), I would like to thank Union Carbide for meeting on June 30, 1999 to discuss investigating and remediating the Union Carbide Technical Center in South Charleston, West Virginia in accordance with the federal Resource Conservation and Recovery Act ("RCRA") Corrective Action Program. During the meeting, the Region discussed conducting corrective action at your site using a Facility Lead Agreement (Agreement).

EPA requests that Union Carbide document its decision to participate in the Region's Facility Lead Program by responding with a Letter of Commitment acknowledging its understanding and acceptance of the goals and expectations described in the enclosed Facility Lead Agreement. We believe the Region's Facility Lead Program will offer benefits to all parties and provides a means to achieve these critical corrective action goals in a streamlined and expeditious manner. We would appreciate receiving Union Carbide's Letter of Commitment within thirty days of your receipt of this letter. EPA will treat receipt of your signed Letter of Commitment as initiation of corrective action and a commitment by Union Carbide to perform the requirements set forth in the enclosed Agreement.

EPA looks forward to working with you to achieve the goals of the Corrective Action Program. If you have any questions regarding this letter, please contact me at 215-814-3423 or Denis M. Zielinski of my staff at 215-814-3431.

Sincerely,

Robert E. Greaves, Chief
General Operations Branch

Attachment

cc: G.S. Atwall, WV DEP

FACILITY LEAD CORRECTIVE ACTION AGREEMENT

I. CORRECTIVE ACTION GOALS

By agreeing to participate in the Facility Lead Corrective Action Program with EPA, the Facility commits to:

A. Determine the extent and sources of all releases of hazardous wastes or hazardous waste constituents at or from the Facility using quality data;

B. Evaluate and meet EPA's Environmental Indicators (see "Environmental Indicator Forms" on EPA Region III's website at www.epa.gov/reg3wcmd/corrective_action.htm);

C. Perform interim measures at the Facility to prevent or mitigate unacceptable threats to human health and the environment by: 1) controlling human exposures, and 2) controlling migration of any groundwater contamination at or from the Facility from releases of hazardous wastes or hazardous constituents;

D. Conduct effective public involvement; and

E. Communicate regularly to EPA, the State, and the community on corrective action progress at the Facility.

EPA agrees to provide an appropriate level of oversight to assist the Facility to meet these goals.

II. WORK TO BE PERFORMED

The Facility agrees to demonstrate achievement of the goals listed in Section I by performing the work (as appropriate) described below. These goals may be achieved through a combination of sampling activities, previous work, and documentation of valid historical data.

A. Develop a Workplan

1. Within ninety (90) calendar days of the date of its Commitment Letter, the Facility agrees to submit a Workplan to EPA. The Workplan is subject to approval by EPA and shall include a strategy and schedule to implement pertinent tasks identified in this Agreement, which include, but are not limited to, the following:

a. Site characterization (Section II.B)
b. Quality Assurance and Sampling Plan (Section II.B and D)
c. Evaluation of Environmental Indicator goals (Section II.C)
d. Ongoing or planned Interim Measures (Section II.D)
e. Community Relations Plan (Section II.E)
f. Reports to EPA (Section II.F and IV)
g. Selection of a land use scenario (Section II.B)

2. The Facility may also add other tasks to the Workplan.

B. Determine the extent and sources of releases of hazardous wastes or hazardous constituents at or from the Facility using quality data.

1. Site Characterization - The Facility will determine the nature and extent of all releases of hazardous wastes and hazardous constituents at or from the Facility. The characterization will include investigative tasks such as sampling, analyses, data validation and data interpretation and will be conducted in a manner consistent with the provisions of Region III's guidance for a "RCRA Facility Investigation" and "Risk-Based Screening"as well as additional EPA guidance (see "RCRA Facility Investigation" document, "Risk-Based Screening" document and additional "Guidance Documents" on EPA Region III's website at www.epa.gov/reg3wcmd/corrective_action. htm); At a minimum, the Facility shall perform the following:

a. Soil - Identify maximum concentrations and determine the extent of any releases of hazardous wastes and hazardous constituents to soil. Sampling shall continue until concentrations in soil approach Region III's Risk-Based Concentration (RBC) Table using an appropriate land use scenario approved by EPA (see "Risk-Based Concentration Tables" on EPA Region III's website at www.epa.gov/reg3hwmd/risk/riskmenu. htm). In addition, evaluate the potential of hazardous wastes and hazardous constituents in soil to affect other media through cross media transfer (e.g., screening against Soil Screening Levels "SSLs" for groundwater).

b. Groundwater - Determine maximum concentrations of hazardous wastes and hazardous constituents in groundwater and, to the extent practicable, the source of the groundwater contamination. The horizontal and vertical extent of any releases to groundwater shall be delineated until concentrations of hazardous wastes and hazardous constituents in groundwater approach maximum contaminant levels ("MCLs"), or, where no MCLs have been promulgated, Region III's Risk-Based Concentration (RBC) Table using the tap water column, independent of whether the aquifer is currently utilized as a source of potable water.

c. Surface Water and Sediment - Where contaminated groundwater potentially discharges to a surface water body, determine the maximum concentrations of hazardous wastes and hazardous constituents in surface water and sediment, and assess the extent of impact of hazardous wastes and hazardous constituents to the surface water body and sediments to levels considering the state-designated use of the surface water body and the potential exposure to human and/or ecological receptors.

d. Air - Where there is the potential for indoor or outdoor air to be contaminated by particulates or vapors through cross-media transfer, determine the maximum concentrations through appropriate methods (e.g., sampling, modeling).

2. Data Quality - The Facility agrees to perform site screening and site characterization through the use of high quality field data collection protocols and appropriate EPA laboratory methods specified in 2.a and 2.b below such that the analytical results accurately represent site characteristics (see "Quality Assurance/Quality Control" document on EPA Region III's website at www.epa.gov/reg3wcmd/corrective_action.htm). The data collected must support decisions regarding the applicability and effectiveness of interim measures' and/or final remedial decisions. In addition the Facility shall:

a. Ensure that all laboratories used by the Facility for analyses perform such analyses according to the EPA methods included in "Test Methods for Evaluating Solid Waste" (SW-846, November 1986) or other methods deemed satisfactory to EPA;

b. Ensure that all laboratories used by the Facility for analyses participate in a quality assurance/quality control program equivalent to that which is followed by EPA; and

c. Ensure that data is reliable by having it data undergo 3rd party data validation.

3. Exposure Assessment - The Facility agrees to identify all potential exposure pathways.

4. Site Screening - The Facility agrees to use the Screening process specified in the Risk-Based Screening document located on EPA Region III's website.

5. Future Land Use - If conditions suggest that a future non-residential land use scenario is applicable to any portion of the Facility, the Facility shall include a schedule in the Workplan for submitting land use information as specified in the OSWER Directive No. 9355.7-04 "Land Use in the CERCLA Remedy Selection Process" and will solicit public input (as specified in the Facility Workplan in Section II.A) on this issue.

C. Evaluate and meet EPA's Environmental Indicators.

1. The Facility agrees to assess current exposures and evaluate potential contaminated groundwater migration pathways as priority activities of the site investigation.

2. The Facility agrees to implement Interim Measures as soon as possible to achieve the Environmental Indicator goals.

D. Perform Interim Measures at the Facility to prevent or mitigate threats to human health and/or the environment.

1. The Facility agrees to implement Interim Measures:

a. When it is necessary to protect human health and/or the environment.

b. To meet the Environmental Indicator goals of eliminating current human exposure to and controlling groundwater contamination from releases of hazardous wastes or hazardous constituents to the extent practicable.

Interim Measures implemented shall be consistent with the long term cleanup objectives at the Facility.

2. The Facility will conduct appropriate monitoring and/or confirmatory sampling of Interim Measures to assess their effectiveness. The quantity, quality, and frequency of the monitoring will be dependent upon the Interim Measures selected.

E. Conduct effective public involvement.

1. The Facility agrees to:

a. Develop a Community Relations Plan which will describe how it will conduct public involvement activities to inform the local community, the State and any other interested parties of activities throughout the corrective action process. EPA guidance for conducting effective public involvement in the RCRA program can be found in the RCRA Public Involvement Manual, EPA530-R-93-006, September 1993.

b. Provide EPA with a fact sheet summarizing the status of the work to date for inclusion on EPA Region III's web page within sixty (60) calendar days of the Letter of Commitment. At a minimum, this fact sheet shall be updated semi-annually.

F. Communicate regularly to EPA, the State, and the community on corrective action progress at the Facility.

1. The Facility agrees to submit:

a. A Letter of Commitment which shall include a proposed time-frame for a meeting with EPA to discuss the known current conditions and to outline the work necessary to meet EPA's Environmental Indicator objectives. The letter will also identify a Facility Project Coordinator, who will be responsible for the implementation of the corrective action activities and serve as the Facility's point of contact.

b. An Environmental Indicators report to EPA and the State when the Facility has collected sufficient data, and taken action as necessary, to control current human exposures to contamination and the migration of any groundwater contamination.

c. A Site Investigation report to EPA and the State when the Facility has identified the nature and extent of all releases of hazardous wastes and/or hazardous constituents at or from the Facility.

d. Annual Progress Reports to EPA and the State summarizing the work performed (including new interim measures), public involvement activities, proposed schedule changes, and a summary of anticipated activities to be conducted over the next year. The first Annual Progress Report shall be submitted to EPA and the State one year from the date of the Letter of Commitment.

e. In addition to the written reports identified above, the Facility may choose to present information to EPA in the form of oral presentations and request EPA comment on technical issues or proposed actions.

III. FINAL REMEDIES - COMPLETING CORRECTIVE ACTION

Eliminating human exposure to hazardous wastes and hazardous constituents and controlling migration of contaminated groundwater are short-term corrective action objectives. Interim Measure activities implemented to achieve these short-term objectives are based on reasonably expected human exposures under current land and groundwater use conditions. The RCRA Corrective Action Program's overall mission is to protect human health and the environment. To achieve this goal, final remedies must be based on potential future land and groundwater uses and ecological receptors.

A. At the completion of site characterization activities, EPA will evaluate the need to issue a Corrective Action Permit or Order to the Facility.

B. Under certain circumstances' implementation of Interim Measures may achieve the final remedial goals. In that case, EPA will public notice a tentative determination and solicit comment prior to making a final Agency determination regarding final corrective action remedies at the Facility.

IV. CERTIFICATION

Reports specified in Section II. F.1.b, Section II.F.1.c and Section II.F.1.d, when submitted to EPA and the State, shall be certified by a "responsible corporate officer[1]." The Facility agrees to provide the certification in the following form:

> I certify that the information contained in this Report is true, accurate, and complete.
>
> As to [the/those identified portion(s)] of this [type of submission] for which I cannot personally verify [its/their] accuracy, I certify that this Report and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.
>
> Name: Title: Signature :

V. SAMPLING AND DATA/DOCUMENT AVAILABILITY AND PRESERVATION

A. The Facility shall submit to EPA the results of all sampling and/or tests or other data generated by, or on behalf of, Facility.

B. At the request of EPA, the Facility shall provide or allow EPA or its authorized representatives to take split or duplicate samples of all samples collected by Facility pursuant to this Agreement. The Facility agrees not to limit access to the property or otherwise affect EPA's authority to collect samples pursuant to applicable law, including, but not limited to, RCRA and CERCLA.

C. The Facility may assert a business confidentiality claim covering all or part of any information submitted to EPA pursuant to this Agreement in the manner described in 40 C.F.R. § 2.203(b). The Facility shall not assert any confidentiality claim with regard to any physical, sampling, monitoring, or analytical data.

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[1] A "responsible corporate officer" means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or (b) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. A person is a "duly authorized representative" only if: (1) the authorization is made in writing by a person described above; and (2) the authorization specifies either an individual or position having responsibility for overall operation of the regulated facility or activity (a duly authorized representative may thus be either a named individual or any individual occupying a named position).

D. Commencing on the date the Letter of Commitment is submitted to EPA, the Facility agrees that it shall preserve and make available to EPA for inspection and copying, all data, records and documents in its possession or in the possession of its divisions, officers, directors, employees, agents, contractors, successors, and assigns which relate in any way to this Agreement or to hazardous waste management and/or disposal at the Facility.

VI. RESERVATION OF RIGHTS

A. EPA reserves all of its statutory and regulatory powers, authorities, rights, and remedies, both legal and equitable, which may pertain to the Facility's activities. This Agreement shall not be construed as a covenant not to sue, release, waiver, or limitation of any rights, remedies, powers, and/or authorities, civil or criminal, which EPA has under RCRA, CERCLA, or any other statutory, regulatory, or common law authority of the United States.

B. EPA reserves the right to disapprove work performed by the Facility pursuant to this Agreement and to request or direct that Facility perform additional tasks.

C. EPA reserves the right to require or to perform any portion of the work consented to herein or any additional site characterization, feasibility study, and remedial work as it deems necessary to protect human health and/or the environment. EPA may exercise its authority under CERCLA to undertake response actions at any time. EPA reserves its right to seek reimbursement from the Facility for costs incurred by the United States. Notwithstanding compliance with the terms of this Agreement, the Facility is not released from liability, if any, for the costs of any response actions taken or authorized by EPA.

D. If EPA determines that activities undertaken pursuant to this Agreement have caused or may cause a release of hazardous waste or hazardous constituent(s), or a threat to human health and/or the environment, or that the Facility is not capable of undertaking the work agreed upon, EPA may order the Facility to stop further implementation of activities undertaken pursuant to this Agreement for such period of time as EPA determines may be needed to abate any such release or threat and/or to undertake any action which EPA determines is necessary to abate such release or threat.

E. EPA and the Facility acknowledge and agree that EPA's approval of any Statements of Work (SOWs) or any workplan submitted pursuant to this Agreement does not constitute a warranty or representation that the SOWs or workplans will achieve the required cleanup or performance standards. Compliance by the Facility with the terms of this Agreement shall not relieve it of its obligations to comply with RCRA or any other applicable local, state, or federal laws and regulations.

F. Notwithstanding any other provision herein, no action or decision by EPA pursuant to this Agreement, including without limitation, decisions of the Regional Administrator, the Director of the Waste and Chemicals Management Division, or any authorized representative of EPA, shall constitute final agency action giving rise to any right of judicial review prior to EPA's initiation of a judicial action to enforce this Agreement, including an action for penalties or an action to compel the Facility's compliance with its terms and conditions.

G. Notwithstanding any other terms or conditions in this Agreement, EPA may decide to issue a Corrective Action Permit or Order to the Facility at any time.

H. Indemnification: The Facility agrees to indemnify and save and hold harmless the United States government, its agencies, departments, agents, and employees, from any and all claims or causes of action arising from or on account of acts or omissions of the Facility or its officers, employees, agents, independent contractors, receivers, trustees, and assigns in carrying out activities required by this Agreement. This indemnification shall not be construed in any way as affecting or limiting the rights or obligations of the Facility or the United States under their various contracts. The Facility shall not be responsible for indemnifying the EPA for claims or causes of action solely from or on account of acts or omissions of EPA.

VII. OTHER APPLICABLE LAWS

All actions shall be undertaken in accordance with the requirements of all applicable local, state, and federal laws and regulations. The Facility shall obtain or require its authorized representatives to obtain all permits and approvals necessary under such laws and regulations.

VIII. NOTICE OF NON-LIABILITY OF EPA

EPA shall not be deemed a party to any contract involving the Facility and relating to activities at the Facility and shall not be liable for any claim or cause of action arising from or on account of any act, or the omission of the Facility, its officers, employees, contractors, receivers, trustees, agents or assigns, in carrying out the activities required by this Agreement.

IX. EFFECTIVE DATE

The effective date of this Agreement is the date of the Letter of Commitment submitted by the Facility to EPA.