

ID # 39-57
Reg R13-1772H
Company CAMC
Facility General Initials SM

CLASS I ADMINISTRATIVE UPDATE
R13-1772G & R30-03900057-2012

Charleston Area Medical Center
General Division
Charleston, Kanawha County, West Virginia

Prepared for:
Charleston Area Medical Center, Inc.
3200 MacCorkle Avenue, SE
Charleston, West Virginia 25304

Prepared by:
Triad Engineering, Inc.
10541 Teays Valley Road
Scott Depot, West Virginia 25560

February 2014

Entire Document
NON-CONFIDENTIAL

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Permit Application

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WEST VIRGINIA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

**APPLICATION FOR NSR PERMIT
AND
TITLE V PERMIT REVISION
(OPTIONAL)**

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

- ☐ CONSTRUCTION ☐ MODIFICATION ☐ RELOCATION
☒ CLASS I ADMINISTRATIVE UPDATE ☐ TEMPORARY
☐ CLASS II ADMINISTRATIVE UPDATE ☐ AFTER-THE-FACT

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

- ☐ ADMINISTRATIVE AMENDMENT ☒ MINOR MODIFICATION
☐ SIGNIFICANT MODIFICATION

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION
INFORMATION AS ATTACHMENT S TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options
(Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant (as registered with the WV Secretary of State's Office):
Charleston Area Medical Center

2. Federal Employer ID No. (FEIN):
5-5-05-2-6-1-5-0

3. Name of facility (if different from above):
Charleston Area Medical Center, General Division

4. The applicant is the:
☐ OWNER ☐ OPERATOR ☒ BOTH

5A. Applicant's mailing address:

**3200 MacCorkle Avenue, SE
Charleston, West Virginia 25304**

5B. Facility's present physical address:

**501 Morris Street
Charleston, West Virginia 25301**

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☒ YES ☐ NO
- If YES, provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A**.
 - If NO, provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A**.

7. If applicant is a subsidiary corporation, please provide the name of parent corporation:

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site*? ☒ YES ☐ NO
- If YES, please explain: **The applicant owns the proposed site.**
 - If NO, you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.):

Installation of an air pollution control (APC) Packed Tower System at the incinerator.

10. North American Industry
Classification System
(NAICS) code for the facility:

62211

11A. DAQ Plant ID No. (for existing facilities only):
039-00057

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers
associated with this process (for existing facilities only):
**R13-1772G
R30-03900057-2012**

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- For **Construction** or **Relocation permits**, please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

From Interstate 64, exit at Leon Sullivan Way (Exit 100) toward Washington Street (US Route 60). From Leon Sullivan Way, turn left onto Washington Street (US Route 60, East). Turn left onto Sentz Street. Drive approximately 450 feet and incinerator building is on the right.

12.B. New site address (if applicable):

Not Applicable

12C. Nearest city or town:

Charleston

12D. County:

Kanawha

12.E. UTM Northing (KM): **4244.56**

12F. UTM Easting (KM): **445.19**

12G. UTM Zone: **17**

13. Briefly describe the proposed change(s) at the facility:

Install new APC equipment to increase removal efficiencies of HCl and bring the incinerator into compliance with requirements in the NSPS Standard 40 CFR 60, Subpart Ce, amended on October 6, 2009.

14A. Provide the date of anticipated installation or change: **12/23/2013**

- If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /

14B. Date of anticipated **Start-Up** if a permit is granted:

06/30/2014

14C. Provide a **Schedule** of the planned **Installation of/Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:

Hours Per Day **24**

Days Per Week **7**

Weeks Per Year **52**

16. Is demolition or physical renovation at an existing facility involved? ☐ **YES** ☒ **NO**

17. **Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (*if known*). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (*if known*). Provide this information as **Attachment D**.

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan**, e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to **Plot Plan Guidance**).

- Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F**.

23. Provide a **Process Description** as **Attachment G**.

- Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide Material Safety Data Sheets (MSDS) for all materials processed, used or produced as Attachment H . – For chemical processes, provide a MSDS for each compound emitted to the air.																	
25. Fill out the Emission Units Table and provide it as Attachment I .																	
26. Fill out the Emission Points Data Summary Sheet (Table 1 and Table 2) and provide it as Attachment J .																	
27. Fill out the Fugitive Emissions Data Summary Sheet and provide it as Attachment K .																	
28. Check all applicable Emissions Unit Data Sheets listed below: <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Bulk Liquid Transfer Operations</td> <td><input type="checkbox"/> Haul Road Emissions</td> <td><input type="checkbox"/> Quarry</td> </tr> <tr> <td><input type="checkbox"/> Chemical Processes</td> <td><input type="checkbox"/> Hot Mix Asphalt Plant</td> <td><input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities</td> </tr> <tr> <td><input type="checkbox"/> Concrete Batch Plant</td> <td><input type="checkbox"/> Incinerator</td> <td><input type="checkbox"/> Storage Tanks</td> </tr> <tr> <td><input type="checkbox"/> Grey Iron and Steel Foundry</td> <td><input type="checkbox"/> Indirect Heat Exchanger</td> <td></td> </tr> <tr> <td><input type="checkbox"/> General Emission Unit, specify</td> <td></td> <td></td> </tr> </table>			<input type="checkbox"/> Bulk Liquid Transfer Operations	<input type="checkbox"/> Haul Road Emissions	<input type="checkbox"/> Quarry	<input type="checkbox"/> Chemical Processes	<input type="checkbox"/> Hot Mix Asphalt Plant	<input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities	<input type="checkbox"/> Concrete Batch Plant	<input type="checkbox"/> Incinerator	<input type="checkbox"/> Storage Tanks	<input type="checkbox"/> Grey Iron and Steel Foundry	<input type="checkbox"/> Indirect Heat Exchanger		<input type="checkbox"/> General Emission Unit, specify		
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<input type="checkbox"/> General Emission Unit, specify																	
Fill out and provide the Emissions Unit Data Sheet(s) as Attachment L – Not Applicable																	
29. Check all applicable Air Pollution Control Device Sheets listed below: <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Absorption Systems</td> <td><input type="checkbox"/> Baghouse</td> <td><input type="checkbox"/> Flare</td> </tr> <tr> <td><input type="checkbox"/> Adsorption Systems</td> <td><input type="checkbox"/> Condenser</td> <td><input type="checkbox"/> Mechanical Collector</td> </tr> <tr> <td><input type="checkbox"/> Afterburner</td> <td><input type="checkbox"/> Electrostatic Precipitator</td> <td><input checked="" type="checkbox"/> Wet Collecting System</td> </tr> <tr> <td colspan="3"><input type="checkbox"/> Other Collectors, specify</td> </tr> </table>			<input type="checkbox"/> Absorption Systems	<input type="checkbox"/> Baghouse	<input type="checkbox"/> Flare	<input type="checkbox"/> Adsorption Systems	<input type="checkbox"/> Condenser	<input type="checkbox"/> Mechanical Collector	<input type="checkbox"/> Afterburner	<input type="checkbox"/> Electrostatic Precipitator	<input checked="" type="checkbox"/> Wet Collecting System	<input type="checkbox"/> Other Collectors, specify					
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<input type="checkbox"/> Other Collectors, specify																	
Fill out and provide the Air Pollution Control Device Sheet(s) as Attachment M .																	
30. Provide all Supporting Emissions Calculations as Attachment N , or attach the calculations directly to the forms listed in Items 28 through 31.																	
31. Monitoring, Recordkeeping, Reporting and Testing Plans. Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as Attachment O . ➤ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.																	
32. Public Notice. At the time that the application is submitted, place a Class I Legal Advertisement in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and Example Legal Advertisement for details). Please submit the Affidavit of Publication as Attachment P immediately upon receipt.																	
33. Business Confidentiality Claims. Does this application include confidential information (per 45CSR31)? <div style="text-align: center;"> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO </div> ➤ If YES, identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's " Precautionary Notice – Claims of Confidentiality " guidance found in the General Instructions as Attachment Q .																	

Section III. Certification of Information

34. Authority/Delegation of Authority. Only required when someone other than the responsible official signs the application. Check applicable Authority Form below: <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Authority of Corporation or Other Business Entity</td> <td><input type="checkbox"/> Authority of Partnership</td> </tr> <tr> <td><input type="checkbox"/> Authority of Governmental Agency</td> <td><input type="checkbox"/> Authority of Limited Partnership</td> </tr> </table>		<input type="checkbox"/> Authority of Corporation or Other Business Entity	<input type="checkbox"/> Authority of Partnership	<input type="checkbox"/> Authority of Governmental Agency	<input type="checkbox"/> Authority of Limited Partnership
<input type="checkbox"/> Authority of Corporation or Other Business Entity	<input type="checkbox"/> Authority of Partnership				
<input type="checkbox"/> Authority of Governmental Agency	<input type="checkbox"/> Authority of Limited Partnership				
Submit completed and signed Authority Form as Attachment R .					
All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.					

35A. Certification of Information. To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative**, hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry. I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE _____

(Please use blue ink)

DATE: _____

(Please use blue ink)

35B. Printed name of signee: **Dr. Glenn Crotty, Jr., MD**

35C. Title: **Executive VP & COO**

35D. E-mail: **Glenn.Crotty@camc.org**

35E. Phone: **304.388.7647**

35F. FAX: **304.388.7696**

36A. Printed name of contact person (if different from above): **Sandi Morgan**

36B. Title: **Safety Office Secretary**

36C. E-mail: **Sandi.Morgan@camc.org**

36D. Phone: **304.388.8208**

36E. FAX: **304.388.8891**

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Attachment A: Business Certificate | <input checked="" type="checkbox"/> Attachment K: Fugitive Emissions Data Summary Sheet |
| <input checked="" type="checkbox"/> Attachment B: Map(s) | <input type="checkbox"/> Attachment L: Emissions Unit Data Sheet(s) |
| <input checked="" type="checkbox"/> Attachment C: Installation and Start Up Schedule | <input checked="" type="checkbox"/> Attachment M: Air Pollution Control Device Sheet(s) |
| <input checked="" type="checkbox"/> Attachment D: Regulatory Discussion | <input checked="" type="checkbox"/> Attachment N: Supporting Emissions Calculations |
| <input checked="" type="checkbox"/> Attachment E: Plot Plan | <input checked="" type="checkbox"/> Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans |
| <input checked="" type="checkbox"/> Attachment F: Detailed Process Flow Diagram(s) | <input type="checkbox"/> Attachment P: Public Notice |
| <input checked="" type="checkbox"/> Attachment G: Process Description | <input type="checkbox"/> Attachment Q: Business Confidential Claims |
| <input checked="" type="checkbox"/> Attachment H: Material Safety Data Sheets (MSDS) | <input type="checkbox"/> Attachment R: Authority Forms |
| <input checked="" type="checkbox"/> Attachment I: Emission Units Table | <input checked="" type="checkbox"/> Attachment S: Title V Permit Revision Information |
| <input checked="" type="checkbox"/> Attachment J: Emission Points Data Summary Sheet | <input type="checkbox"/> Application Fee |

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- ☐ Forward 1 copy of the application to the Title V Permitting Group and:
- ☐ For Title V Administrative Amendments:
- ☐ NSR permit writer should notify Title V permit writer of draft permit,
- ☐ For Title V Minor Modifications:
- ☐ Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,
- ☐ NSR permit writer should notify Title V permit writer of draft permit.
- ☐ For Title V Significant Modifications processed in parallel with NSR Permit revision:
- ☐ NSR permit writer should notify a Title V permit writer of draft permit,
- ☐ Public notice should reference both 45CSR13 and Title V permits,
- ☐ EPA has 45 day review period of a draft permit.

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

Attachment A

Business Certificate

**WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION
CERTIFICATE**

ISSUED TO:
CHARLESTON AREA MEDICAL CENTER INC
DBA CHARLESTON AREA MEDICAL CENTER
PO BOX 1547
CHARLESTON, WV 25326-1547

BUSINESS REGISTRATION ACCOUNT NUMBER: 1035-7157

This certificate is issued on: 08/11/2010

*This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with Chapter 11, Article 12, of the West Virginia Code*

*The person or organization identified on this certificate is registered
to conduct business in the State of West Virginia at the location above.*

This certificate is not transferrable and must be displayed at the location for which issued.

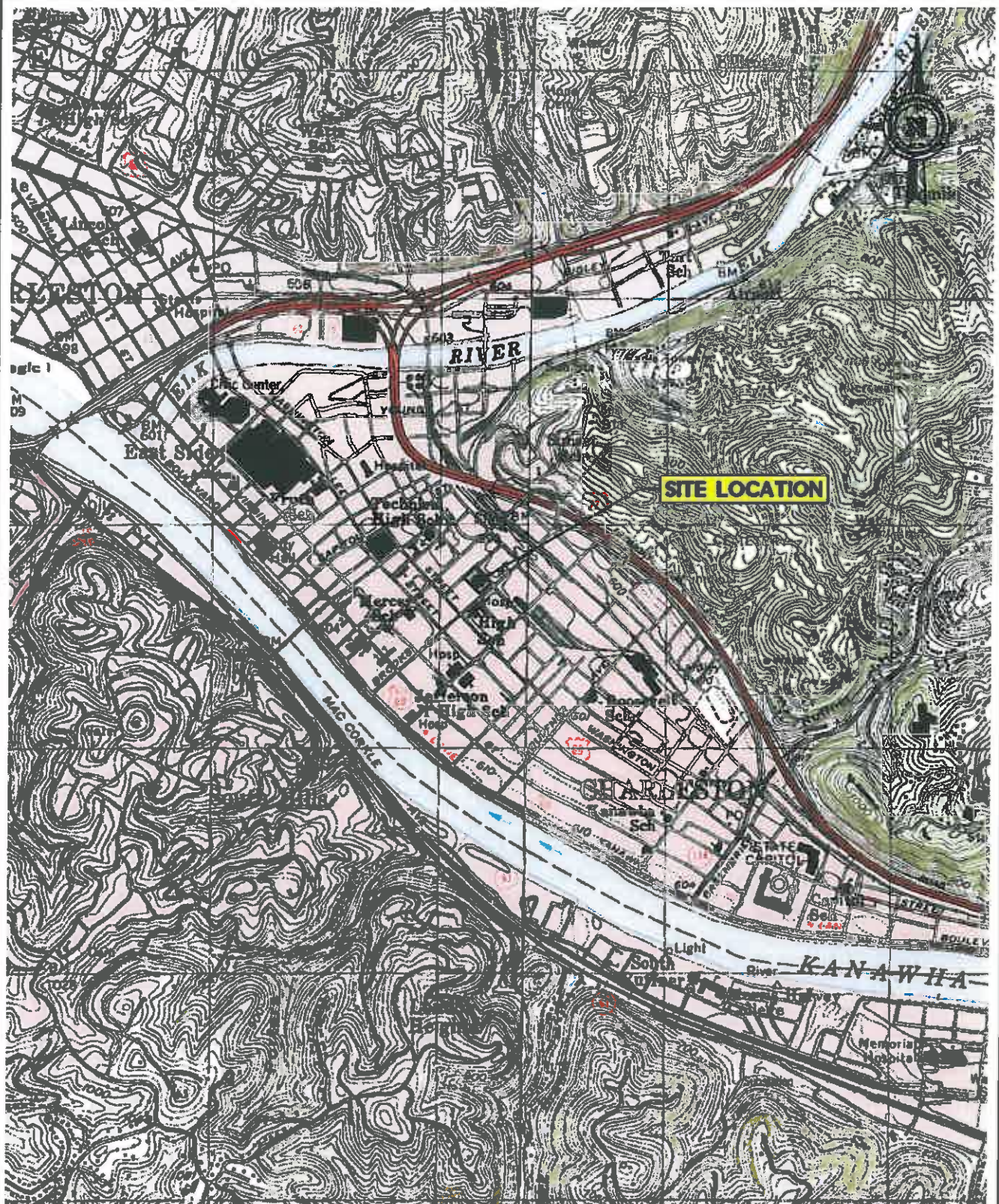
This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them.
CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of this certificate displayed at every job site within West Virginia.

Attachment B

Area Map



Plotted by: lcombs
 y:\sw_sa_04\2013_0_104-13-0019 camc 2013 regulatory compliance assistance\cadd\13-0019 site loc.dwg

CADD FILE: 13-0019 Site Loc.dwg	
DRAWN BY: SJF	CHECKED BY: SC
DATE: 1/27/2014	SCALE: 1" = 2000'

CHARLESTON AREA MEDICAL CENTER GENERAL DIVISION - CLASS I ADMINISTRATIVE UPDATE CHARLESTON, KANAWHA COUNTY, WV AREA MAP	
PROJECT No.: 04-13-0019	FIGURE No.: B

TRIAD
 TRIAD ENGINEERING, INC.
www.triadeng.com

4980 TEAYS VALLEY ROAD
 SCOTT DEPOT, WV 25560

Attachment C

Installation and Start Up Schedule

Attachment C

Install and Start Up Schedule

Construction began on December 23, 2013 to prepare the area that the packed tower type, air pollution control (APC) system will be installed. Installation of the APC is scheduled on January 27, 2014. Equipment startup, shakedown, and performance testing is scheduled for March 24, 2014. Additionally, compliance testing/final compliance will begin on June 30, 2014.

Attachment D

Regulatory Discussion

Attachment D
Regulatory Discussion

- 45CSR02** To prevent and control particulate air pollution control from combustion of indirect heat exchangers.
- 45CSR04** This facility has no history of odor complaints/violations.
- 45CSR06** Open burning prohibited.
- 45CSR10** Regulation applies to all boilers.
- 45CSR11** This regulation will apply if and when the chief declares an emergency.
- 45CSR13** This subject facility operates under current air permit R13-1772G.
- 45CSR20** The stacks at this facility are than 213 feet.
- 45CSR24** Regulation applies to HMIWI emission limits.
- 45CSR27** Use of toxic air pollutants (TAPs) at the hospital is currently regulated under the existing permit R13-1772G.
- 45CSR29** The facility currently submits, and will continue to submit, an annual emission inventory in a timely manner as requested by WVDEP, DAQ.
- 45CSR30** Although the subject facility's annual total potential to emit (TPE) does not exceed the 100 ton per year major source definition threshold, there is an operating infectious medical waste incinerator onsite; therefore, the facility maintains, and operates according to Title V Permit R30-039-00057-2012.
- 40CFR Part 60, subpart Ce** Per the manufacturer (Monroe), the new APC device meets the USEPA New Source Performance Standard Emission Level Requirements, as amended on October 6, 2009.

Attachment E

Plot Plan

Plotted by: lcoms
y:\sw_sa_042013\0_104-13-0019 camc 2013 regulatory compliance assistance\cadd\13-0019 site.dwg



CADD FILE:	
13-0019 Site.dwg	
DRAWN BY:	CHECKED BY:
SJF	SC
DATE:	SCALE:
1/27/2014	1" = 100'

CHARLESTON AREA MEDICAL CENTER
GENERAL DIVISION - CLASS I ADMINISTRATIVE UPDATE
CHARLESTON, KANAWHA COUNTY, WV
PLOT PLAN

PROJECT No.: 04-13-0019

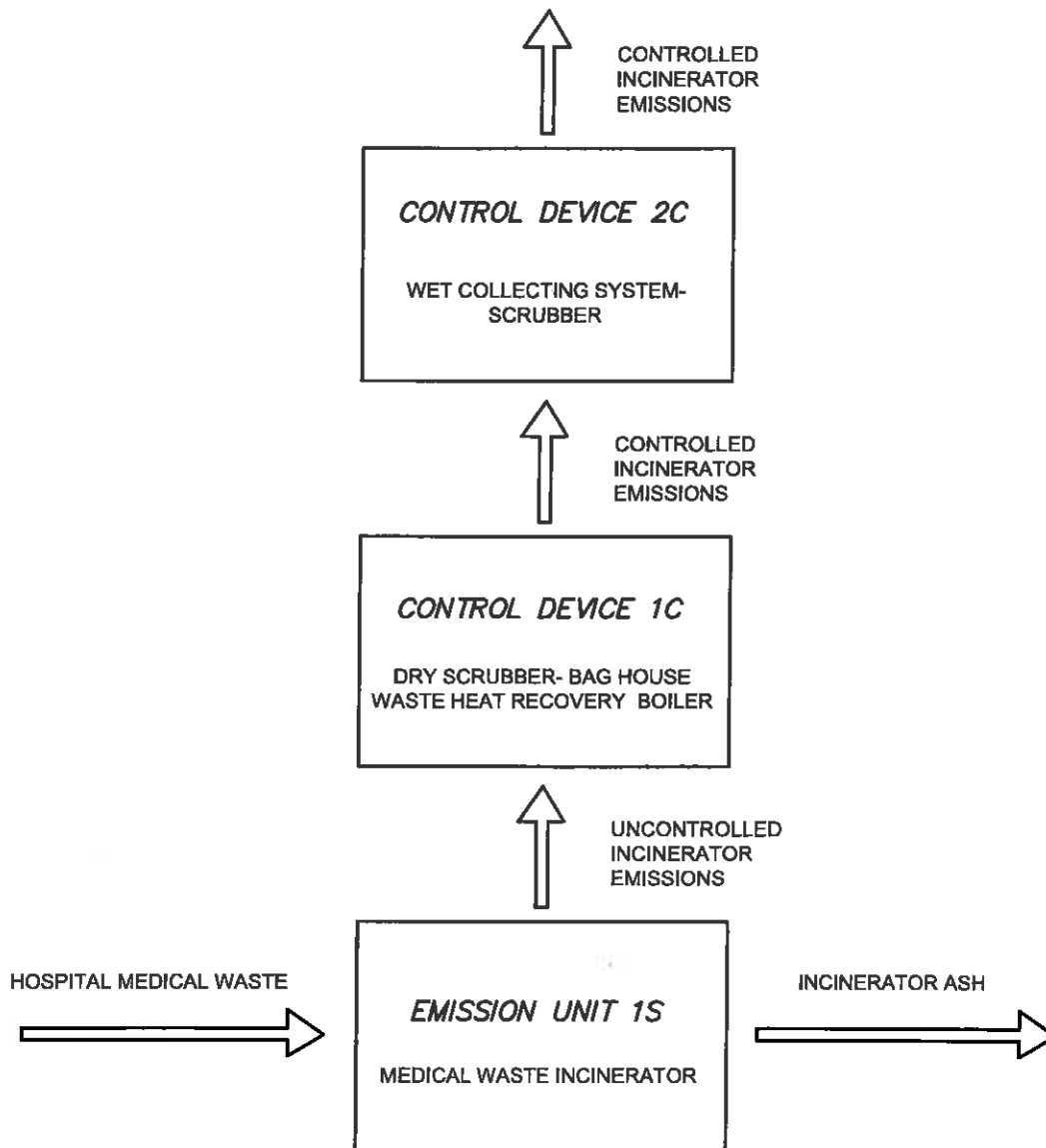
FIGURE No.: E

TRIAD
TRIAD ENGINEERING, INC.
www.triadeng.com

4980 TEAYS VALLEY ROAD
SCOTT DEPOT, WV 25560

Attachment F

Process Flow Diagram



Plotted by: lcombs
y:\aw_sa_04\2013\0_104-13-0019 camc 2013 regulatory compliance assistance\cadd\13-0019 fig f.dwg

CADD FILE: 13-0019 FIG F.dwg	
DRAWN BY: CLC	CHECKED BY: SC
DATE: 1/27/2014	SCALE: 1" = 10'

CHARLESTON AREA MEDICAL CENTER
GENERAL DIVISION - CLASS I ADMINISTRATIVE UPDATE
CHARLESTON, KANAWHA COUNTY, WV
PROCESS FLOW CHART

PROJECT No.: 04-13-0019

FIGURE No.: F

TRIAD
TRIAD ENGINEERING, INC.
www.triadeng.com

4980 TEAYS VALLEY ROAD
SCOTT DEPOT, WV 25560

Attachment G

Process Description

Attachment G

Process Description

This Permit Modification outlines Charleston Area Medical Center – General Division's need to install air pollution control (APC) equipment to meet requirements outlined in the New Source Performance Standard 40 CFR 60, Subpart Ce, as amended October 6, 2009. The new APC equipment is to be a counter-flow type packed tower unit, or wet scrubber, using controlled sodium hydroxide solution injection for maximum removal efficiencies of hydrogen chloride (HCl) and other acid gases from flue gases discharged from the existing dry-injection fabric filter (DIFF) system. The scrubber is to be equipped with a spray type quench chamber at its inlet for cooling gases from the DIFF from about 270 F to about 150 F. The scrubber tower is to be equipped with glass-filled polypropylene packing followed by a polypropylene mist eliminator pad. Water is to be continually recirculated counter-flow to the gas flow by a recirculating pump.

The scrubber is to be equipped with a control panel, and all controls, instrumentation, alarms, and other devices for the scrubber are to be fully and automatically controlled via a PLC system in conjunction and coordination with operations of the incinerator and DIFF. All key scrubber operating parameters, including recirculating water flow rates, inlet and outlet gas temperatures, differential pressure drop, and scrubber water pH, are to be monitored at all times and recorded via a centralized Data Acquisition System (DAS).

A new induced draft fan is to be provided to handle the added flue gas pressure drop across the scrubber unit.

Attachment H

Material Safety Data Sheets



Health	3
Fire	0
Reactivity	2
Personal Protection	J

Material Safety Data Sheet

Sodium hydroxide, Pellets, Reagent ACS MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium hydroxide, Pellets, Reagent ACS

Catalog Codes: SLS4090

CAS#: 1310-73-2

RTECS: WB4900000

TSCA: TSCA 8(b) inventory: Sodium hydroxide

CI#: Not available.

Synonym: Caustic Soda

Chemical Name: Sodium Hydroxide

Chemical Formula: NaOH

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium hydroxide	1310-73-2	100

Toxicological Data on Ingredients: Sodium hydroxide LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. **MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance is toxic to lungs. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: of metals

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:

sodium hydroxide + zinc metal dust causes ignition of the latter. Under proper conditions of temperature, pressure and state of division, it can ignite or react violently with acetaldehyde, allyl alcohol, allyl chloride, benzene-1,4-diol, chlorine trifluoride, 1,2 dichlorethylene, nitroethane, nitromethane, nitroparaffins, nitropropane, cinnamaldehyde, 2,2-dichloro-3,3-dimethylbutane. Sodium hydroxide in contact with water may generate enough heat to ignite adjacent combustible materials. Phosphorous boiled with NaOH yields mixed phosphines which may ignite spontaneously in air. sodium hydroxide and cinnamaldehyde + heat may cause ignition. Reaction with certain metals releases flammable and explosive hydrogen gas.

Special Remarks on Explosion Hazards:

Sodium hydroxide reacts to form explosive products with ammonia + silver nitrate. Benzene extract of allyl benzenesulfonate prepared from allyl alcohol, and benzene sulfonyl chloride in presence of aqueous sodium hydroxide, under vacuum distillation, residue darkened and exploded. Sodium Hydroxide + impure tetrahydrofuran, which can contain peroxides, can

cause serious explosions. Dry mixtures of sodium hydroxide and sodium tetrahydroborate liberate hydrogen explosively at 230-270 deg. C. Sodium Hydroxide reacts with sodium salt of trichlorophenol + methyl alcohol + trichlorobenzene + heat to cause an explosion.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

Large Spill:

Corrosive solid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep container dry. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, metals, acids, alkalis, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

CEIL: 2 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Odorless.

Taste: Not available.

Molecular Weight: 40 g/mole

Color: White.

pH (1% soln/water): 13.5 [Basic.]

Boiling Point: 1388°C (2530.4°F)

Melting Point: 323°C (613.4°F)

Critical Temperature: Not available.

Specific Gravity: 2.13 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:

Highly reactive with metals. Reactive with oxidizing agents, reducing agents, acids, alkalis, moisture.

Corrosivity: Not available.

Special Remarks on Reactivity:

Hygroscopic. Much heat is evolved when solid material is dissolved in water. Therefore cold water and caution must be used for this process. Sodium hydroxide solution and octanol + diborane during a work-up of a reaction mixture of oxime and diborane in tetrahydrofuran is very exothermic, a mild explosion being noted on one occasion. Reactive with water, acids, acid chlorides, strong bases, strong oxidizing agents, strong reducing agents, flammable liquids, organic halogens, metals (i.e aluminum, tin, zinc), nitromethane, glacial acetic acid, acetic anhydride, acrolein, chlorohydrin, chlorosulfonic acid, ethylene cyanohydrin, glyoxal, hydrochloric acid, sulfuric acid, hydrosulfuric acid, nitric acid, oleum, propiolactone, acrylonitrile, phosphorus pentoxide, chloroethanol, chloroform-methanol, tetrahydroborate, cyanogen azide, 1,2,4,5 tetrachlorobenzene, cinnamaldehyde. Reacts with formaldehyde hydroxide to yield formic acid, and hydrogen.

Special Remarks on Corrosivity: Very caustic to aluminum and other metals in presence of moisture.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Causes damage to the following organs: lungs.

Other Toxic Effects on Humans:

Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion.

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose: LDL [Rabbit] - Route: Oral; Dose: 500 mg/kg

Special Remarks on Chronic Effects on Humans: May affect genetic material (mutagenic). Investigation as a mutagen (cytogenetic analysis), but no data available.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May be harmful if absorbed through skin. Causes severe skin irritation and burns. May cause deep penetrating ulcers of the skin. Eyes: Causes severe eye irritation and burns. May cause chemical conjunctivitis and corneal damage. Inhalation: Harmful if inhaled. Causes severe irritation of the respiratory tract and mucous membranes with coughing, burns, breathing difficulty, and possible coma. Irritation may lead the chemical pneumonitis and pulmonary edema. Causes chemical burns to the respiratory tract and mucous membranes. Ingestion: May be fatal if swallowed. May cause severe and permanent damage to the digestive tract. Causes severe gastrointestinal tract irritation and burns. May cause perforation of the digestive tract. Causes severe pain, nausea, vomiting, diarrhea, and shock. May cause corrosion and permanent destruction of the esophagus and digestive tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Sodium hydroxide, solid UNNA: 1823 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Illinois toxic substances disclosure to employee act: Sodium hydroxide Illinois chemical safety act: Sodium hydroxide New York release reporting list: Sodium hydroxide Rhode Island RTK hazardous substances: Sodium hydroxide Pennsylvania RTK: Sodium hydroxide Minnesota: Sodium hydroxide Massachusetts RTK: Sodium hydroxide New Jersey: Sodium hydroxide Louisiana spill reporting: Sodium hydroxide California Director's List of Hazardous Substances: Sodium hydroxide TSCA 8(b) inventory: Sodium hydroxide CERCLA: Hazardous substances.: Sodium hydroxide: 1000 lbs. (453.6 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS E: Corrosive solid.

DSCL (EEC):

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:

Gloves. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 06:32 PM

Last Updated: 05/21/2013 12:00 PM

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Attachment I

Emission Units Table

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices
that will be part of this permit application review, regardless of permitting status)

Emission Unit ID ¹	Emission Point ID ²	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type ³ and Date of Change	Control Device ⁴
1S	1S	Medical Waste Incinerator Manufacturer: Consumat Systems, Inc. Model Number: C5-550-2	Constructed: 11/17/1995	1,000 lbs/hr 1,700,000 lbs/yr	NA	NA
NA	NA	Dry Scrubber - Bag House Manufacturer: Comsumat Systems, Inc. Model Number: DS-2180 Waste Heat Recovery Boiler Maximum Design Heat Input: 9.7 mmBtu/hr Manufacturer: Donlee Technologies, Inc. Model Number: HRH-1250-2 Pass Serial Number: 453-372W 310687 Rated at: 8,396 mmBtu/hr	Constructed: 11/17/1995	6,300 ft/min (@ 400°F & 14.5 psia)	NA	1C
NA	NA	Wet Collecting System - Scrubber Manufacturer: Monroe Environmental Corporation Model Number: VPB-070/13-5855-1	2014	7,000 ACFM @ 270°F (4,500 SCFM)	New January 2014	2C

¹ For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S,... or other appropriate designation.

² For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.

³ New, modification, removal

⁴ For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

Attachment J

Emission Points Data Summary Sheet

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 (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 condition: s, Solid, Liquid or Gas/Vapor or)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
1S	Vertical	1S	Incinerator	1C 2C	Baghouse Packed Tower	C	8760	CO NOx PM SO ₂ VOC HCl Pb Hg Cd CO ₂ CH ₄ N ₂ O CO ₂ e	0.44 2.60 0.30 1.20 0.05 0.622 9.8x10 ⁻⁴ 4.6x10 ⁻³ 4.9x10 ⁻⁴ 136.3 0.002 0.0002 136.5	1.31 7.80 0.90 3.60 0.16 1.87 2.9x10 ⁻³ 1.41x10 ⁻² 1.5x10 ⁻³ 597 0.01 0.001 598	0.44 2.60 0.30 1.20 0.05 0.622 9.8x10 ⁻⁴ 4.6x10 ⁻³ 4.9x10 ⁻⁴ 136.3 0.002 0.0002 136.5	1.31 7.80 0.90 3.60 0.16 1.87 2.9x10 ⁻³ 1.41x10 ⁻² 1.5x10 ⁻³ 597 0.01 0.001 598	Gas Gas Solid Gas Gas Gas Solid Solid Solid Gas Gas Gas Gas	O O O O O O O O O EE EE EE EE	11 PPMv 140 PPMv 9.0 PPMv 6.6 PPMvd

Max emissions were provided from the emission guidelines as amended on October 6, 2009 and included in the Title V Permit as the emissions of regulated air pollutants to the atmosphere from the medical waste incinerator they shall not exceed.

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 (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/week).

³ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, 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/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, use units of ppmv (See 45CSR10).

Attachment J

Table 2: Release Parameter Data

[illegible]

¹ Give at operating conditions. Include inerts.

² Release height of emissions above ground level.

Attachment K

Fugitive Emissions Data Summary Sheet

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process 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).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY		All Regulated Pollutants - Chemical Name/CAS # ¹	Maximum Potential Uncontrolled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
			lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads							
Unpaved Haul Roads							
Storage Pile Emissions							
Loading/Unloading Operations							
Wastewater Treatment Evaporation & Operations							
Equipment Leaks			Does not apply		Does not apply		
General Clean-up VOC Emissions							
Other							

¹ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.

² Give 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).

³ Give 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).

⁴ 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).

Attachment L

Emissions Unit Data Sheet

Attachment L
Emissions Unit Data Sheet

There are no changes being performed on the incinerator. This Class I Administrative Update consists of the installation of an additional APC, information regarding the APC is provided in Attachment M. Therefore, the emissions unit data sheet is not required and this attachment is not applicable.

Attachment M

Air Pollution Control Device Sheet

Attachment M
Air Pollution Control Device Sheet
(WET COLLECTING SYSTEM-SCRUBBER)

Control Device ID No. (must match Emission Units Table): 2C

Equipment Information

1. Manufacturer: Monroe Environmental Corporation Model No. VPB-070 / 13-5855-1	2. Method: <table style="display: inline-table; vertical-align: top; margin-left: 10px;"> <tr> <td><input checked="" type="checkbox"/> Packed Bed</td> <td><input type="checkbox"/> Venturi</td> </tr> <tr> <td><input type="checkbox"/> Spray Tower</td> <td><input type="checkbox"/> Cyclone</td> </tr> <tr> <td><input type="checkbox"/> Mechanical</td> <td><input type="checkbox"/> Orifice</td> </tr> <tr> <td colspan="2"><input type="checkbox"/> Other, specify</td> </tr> </table>	<input checked="" type="checkbox"/> Packed Bed	<input type="checkbox"/> Venturi	<input type="checkbox"/> Spray Tower	<input type="checkbox"/> Cyclone	<input type="checkbox"/> Mechanical	<input type="checkbox"/> Orifice	<input type="checkbox"/> Other, specify	
<input checked="" type="checkbox"/> Packed Bed	<input type="checkbox"/> Venturi								
<input type="checkbox"/> Spray Tower	<input type="checkbox"/> Cyclone								
<input type="checkbox"/> Mechanical	<input type="checkbox"/> Orifice								
<input type="checkbox"/> Other, specify									
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.									
4. Provide a scale diagram of the scrubber showing internal construction. Please include packing type and size, spray configurations, baffle plates, and mist eliminators.									
5. What type of liquid entrainment eliminators or system will be used? Submit a schematic diagram showing thickness, mesh, and material of construction.									
6. Describe the scrubber's construction material: • Scrubber Shell: FRP • Packing Media: glass-filled polypropylene • Mist Eliminator Pad: polypropylene mesh									
7. What will be the power requirements of the collector? <div style="display: flex; justify-content: space-between;"> Fan ID Fan: 30 HP Inlet scrubbing liquid pump: 7.5 HP </div>									
8. What type of fan(s) will be used? Type of fan blade: HP (See Appendix 2) Number of blades: 8 Diameter of blade: 30 in. Also supply a fan curve for each fan to be used.									
9. Estimated gas pressure drop at maximum flow rate: 15 inches H ₂ O									

Scrubbing Liquor Characteristics

10. Scrubbing Liquor <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 60%;">Composition</th> <th style="width: 40%;">Weight %</th> </tr> </thead> <tbody> <tr> <td>1 NaOH</td> <td>25</td> </tr> <tr> <td>2 Water</td> <td>75</td> </tr> <tr> <td>3</td> <td></td> </tr> <tr> <td>4</td> <td></td> </tr> </tbody> </table>	Composition	Weight %	1 NaOH	25	2 Water	75	3		4		11. Scrubbing liquor losses (evaporation, etc.): 0.29 gal/1000 ACF gas
Composition	Weight %										
1 NaOH	25										
2 Water	75										
3											
4											
	12. Liquor pressure to scrubber: 32 PSIA										
	13. Pressure drop through scrubber: 15 in. H ₂ O										
14. Source of liquor (explain): Recirculated liquor with automatic fresh water make-up; NaOH added as needed to maintain 7.0 pH	15. Liquor flow rates to scrubber: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Design maximum: 120 gal/min </div> <div style="display: flex; justify-content: space-between;"> Average expected: 60 gal/min </div>										
16. Describe system to be used to supply liquor to collector: See Appendix Item 1.f. - Process & Instrumentation Schematic Drawing No. 5855-01-1. Scrubbing liquor recirculated with automatic fresh water make-up added due to evaporation and blowdown; pH probe in scrubber basin activates NaOH pump as needed to maintain pH of 7.0.											
17. Give the expected solids content of the liquor: Total Dissolved Solid (TDS) in blowdown to be approximately 2.6%; TDS to be almost totally NaCl salt											

18. If the liquor is to be recirculated, describe any treatment performed:
No treatment for recirculated liquid other than maintaining neutral pH (7.0)

19. Data for Venturi Scrubber:

Throat Dimensions:
(Specify Units)

Throat Velocity: ft/sec

20. Data for Packed Towers:

Type of Packing: Glass-filled Polypropylene
Superficial Gas Velocity through Bed:
Approximately 400 FPM

Gas Stream Characteristics

21. Gas flow into the collector:

7,000 [per min] ACF @ 270 °F and 8-in
w.g. [negative] PSIA

22. Gas stream temperature:

Inlet: After Quench: 150 °F
Outlet: 140 °F

23. Gas flow rate:

Design Maximum: 7,000 ACFM
Average Expected: 6,400 ACFM

24. Particulate Grain Loading in grains/scf:

Inlet:
Outlet:

25. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN		OUT		Guaranteed Minimum Collection Efficiency
	lb/hr	grains/acf	lb/hr	grains/acf	
A See Supplemental Data					
B					
C					
D					
E					

26. Type of pollutant(s) controlled:

☐ SO_x

☐ Odor

☐ Particulate (type):

☒ Other: Hydrogen Chloride (HCl)

27. By what method were the uncontrolled emissions calculated?

☐ Material Balance

☒ Stack Test

☐ Pilot Test

☐ Other:

28. Dimensions of stack:

Height

55 ft.

Diameter

1.67 ft

29. Supply an equilibrium curve and/or solubility data (at various temperatures) for the proposed system.

30. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 100 percent of design rating of collector.

Particulate Distribution

31. Complete the table:	Particle Size Distribution at Inlet to Collector	Fraction Efficiency of Collector
Particulate Size Range (microns)	Weight % for Size Range	Weight % for Size Range
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

32. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):
 Quench chamber section provided at packed tower inlet to cool gases from 270 F to 150 F via water spray nozzles; outlet of packed tower equipped with mist eliminator pad of polyester mesh for removal of entrained water droplets

33. Describe the collection material disposal system:

34. Have you included **Wet Collecting (Scrubber) Control Device** in the Emissions Points Data Summary Sheet?

35. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:

In addition to parameters currently monitored for existing DIFF system, the following are to be monitored and recorded for packed tower system: 1. Recirculated water flow rate; 2. Scrubber water pH; 3. Differential pressure across scrubber; 4. Inlet gas temperature; 5. Outlet gas temperature

RECORDKEEPING:

All listed monitoring parameters are to be recorded.

REPORTING:

All listed monitoring parameters are to be reported as required under the HMIWI Regulations and Title V Permit

TESTING:

All regulated pollutants under the HMIWI Regulations [40 CFR 60 & 62] are to be tested to demonstrate initial compliance, and PM, HCl and CO are to be tested annual as required.

MONITORING:

Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING:

Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING:

Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING:

Please describe any proposed emissions testing for this process equipment on air pollution control device.

36. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

NA

37. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

Guaranteed control efficiency for HCl removal is 98%

38. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

See O&M Manual in Appendix

APPENDIX

WVDEP NSR FORM ATTACHMENT M

Air Pollution Control Device Sheet (Wet Collecting System – Scrubber)

- 1. Drawings & Schematics**
 - a. Scrubber General Assembly**
 - b. Scrubber & Stack Assembly**
 - c. Duct Layout-Plan View**
 - d. Duct Layout-Elevation View**
 - e. FRP Duct Elevation**
 - f. Process & Instrumentation Schematic**
- 2. Induced Draft (ID) Fan Data Sheet & Curves**
- 3. HCl & NaOH Equilibrium & Solubility Data & Curves**
- 4. Operating & Maintenance Instructions**

1. DRAWINGS & SCHEMATICS

- a. Scrubber General Assembly**
- b. Scrubber & Stack Assembly**
- c. Duct Layout-Plan View**
- d. Duct Layout-Elevation View**
- e. FRP Duct Elevation**
- f. Process & Instrumentation Schematic**

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west virginia department of environmental protection

2. INDUCED DRAFT (ID) FAN DATA SHEET & CURVES



The
New York Blower
Company

Date: 8/27/2013
File: 2013-06975
Sequence: 1
Revision: A

Control: 1
Chg Order: 1
Processor: JRF

Customer: **MONROE ENVIRONMENTAL**

Purchase Order: 18743-5855
Tagging:

Office Reference: 041013-04

FAN INFORMATION

Quantity: 1
Product Line: FRP Fume Exhauster
Size: 302
Class/Wheel Type: NA / HP
Rotation: CCW
Arrangement: 9E
Discharge: TAU
Motor Position: L
Motor By: NYB
Mounting By: NYB

Bearing Mfg. & Model:
BRG 2-7 PU3K39 LINKBELT FIXED (or equal)
Part number: A9100118
BRG 2-7 PEU3K39 LINKBLT EXPAN (or equal)
Part number: A9100123

Total fan wt. With accessories: 1442 lbs

DRIVE INFORMATION

QTY	DESCRIPTION	PART NUMBER
1	Motor Sheave	2B5V86 A9901617
1	Motor Bushing	B X 1 7/8 A9900805
1	Fan Sheave	2B5V62 A9901610
1	Fan Bushing	B X 2 7/16 A9900809
2	Belt	5VX750 A9902023
	Belt Centers:	25.7 in

SF: 1.46
Belt Tens: 7.78 lb to defl blt 0.4 in

FAN PERFORMANCE DATA

Capacity	CFM	SP	RPM	BHP	TEMP	DENS	ALT	MAX SS
STANDARD	6350	19.4	2436	31.9	70	0.075	0	3100
OPERATING	6350	15	2436	24.7	145	0.058	700	3100
FUTURE TEST								

SALES MEMO INFORMATION

QTY	DESCRIPTION	Drawing#
1	CCW TAU SIZE 30 FRP FUME EXHAUSTER HP ARR-9E POS-L 70.0% WIDTH	2013-06975-001-02A *
1	30 HP 1800 RPM 3-60-230/460, TE PREMIUM EFFICIENCY FRAME: 286T, INVERTER-DUTY, F1	
	CAST IRON BALL BEARING BALDOR; A9502110BAL	
1	MOTOR MOUNTING CHARGE	
1	V-BELT DRIVE: CONSTANT, SERVICE FACTOR = 1.30	
1	DRAIN: HOUSING, THREADED, FRP WITH PVC PLUG	
1	FLANGE DRILLING: INLET FLANGE	
1	FLANGE DRILLING: OUTLET FLANGE	
1	FLANGED INLET: FRP	2013-06975-001-03

QTY	DESCRIPTION	Drawing#
1	INSPECTION PORT	
1	WHEEL: NARROW-WIDTH CONSTRUCTION	
1	GUARD: BELT, ARRANGEMENT 9, STEEL	
1	GUARD: SHAFT AND BEARING, STEEL	
1	UNITARY BASE: WITH SPRING ISOLATION	2013-06975-001-05A *
1	UNITARY BASE ISOLATION	2013-06975-001-06A *
1	CERTIFIED DOCUMENTS: NON-COMPOSITE DRAWINGS, PDF FORMAT	
1	FLANGED OUTLET - STANDARD	2013-06975-001-07
1	FAN INSTALLATION AND MAINTENANCE MANUAL REFERENCE NUMBER.	IM180.PDF
Additional Notes		

REV. A: CHANGED MOTOR POSITION

Performance Curve

Date: 29-Jul-13
Performance
Options:
70.0% Width Wheel

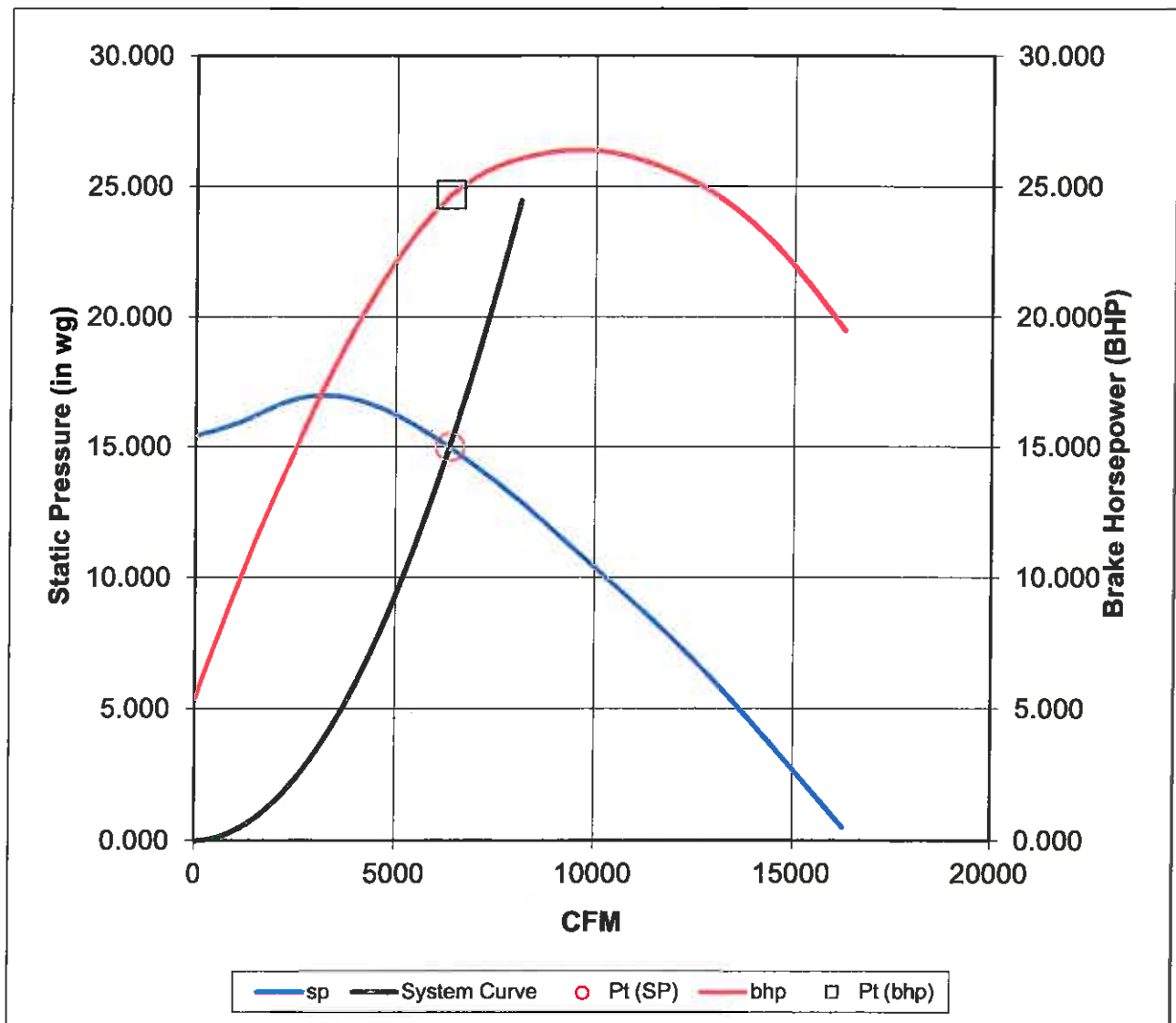
29-Jul-13

File: 2013-06975-001
Cust. No.: 18743-5855
Customer: MONROE ENVIRONMENTAL
810 West Front Street
Product Line: FRP Fume Exhauster
Size: 302
Capacity: Operating
CFM: 6,350
SP: 15
RPM: 2436
BHP: 24.7
Density: 0.058
Max Safe Speed: 3100

JRF

nyb

Temperature: 145
Altitude: 700



3. HCl & NaOH EQUILIBRIUM & SOLUBILITY DATA & CURVES

Scrubbing Hydrogen Chloride Gas using Caustic Soda

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for Monroe Environmental (quenched combustion exhaust gas)

Air Flow	6,350 acfm	Chlorides in Blowdown	2.5% (as NaCl)
Inlet HCl Concentration	26 ppm _v	Bicarbonates in Blowdown	0.0% (as NaHCO ₃)
Inlet CO ₂ Concentration	10,000 ppm _v	TDS in Blowdown	2.5%
Liquid Recirculation Rate	60 gpm	HTU _{HCl}	0.76 ft
Blowdown Rate	0.1 gpm	NTU _{HCl}	7.00
Temperature	150 °F	Outlet HCl Concentration	0.024 ppm _v
Atmospheric Pressure	29.14 in.Hg	HCl Gas Removal	99.9%
Static Pressure	0.0 in.WC	Pressure Gradient	0.06 in.WC/ft
pH in Sump	7.0	Packing Pressure Drop	0.4 in.WC
Make-up NaOH Conc.	25%	Packing Volume	127 ft ³
Tower Diameter	4.5 ft	Liquid Holdup	1.6%
Packing Height	8.0 ft	Liquid Residence Time	15 sec
Safety Factor	1.50	NaOH Usage	0.9 lb/h
Packing Type	Q-PAC		0.3 gal/h

Gas Flow Rate	5,373 scfm	Cross-Section Area	15.9 ft ²
=	13.9 lbmol/min	Gas Molecular Weight	26.2 lb/lbmol
HCl Removed	0.0004 lbmol/min	Gas Density	0.058 lb/ft ³
	0.16 mol/min	Liquid Density	8.47 lb/gal
	0.79 lb/h	Superficial Gas Velocity	399 ft/min
Blowdown	6 gal/h	Gas Loading	1,378 lb/h-ft ²
	0.4 L/min	Liquid Loading	1,918 lb/h-ft ²
[Cl ⁻]	0.4 mol/L	HTU _{CO₂}	10.0 ft
x _{1,CO₂}	2.72E-06 mol/mol	[H ⁺]	1.00E-07 mol/L
CO ₂ Removed	0.00 mol/min	T	338.7 K
[CO ₂]+[HCO ₃ ⁻]+[CO ₃ ⁼]	9.04E-04 mol/L	P _T	0.97 atm
[CO ₂]	1.51E-04 mol/L	K _w	1.44E-13 mol ² /L ²
[HCO ₃ ⁻]	7.53E-04 mol/L	CO ₂ K ₁	4.98E-07 mol/L
[CO ₃ ⁼]	5.69E-07 mol/L	CO ₂ K ₂	7.56E-11 mol/L
[Na ⁺]	4.33E-01 equiv/L		
NaCl	2.49%	NTU calculation	HCl CO₂
NaHCO ₃	0.006%	H (atm/mole fraction)	0.0000 3,583
Na ₂ CO ₃	0.0000%	y ₁ (ppm _v)	26 10,000
free NaOH	0.00001%	y ₂ (ppm _v)	0.02 10,000
Total Dissolved Solids	2.50%	Removal Efficiency	99.909% 0.00%
NaCl Saturation Index	-2.3	y ₁ [*] (ppm _v)	0 10,000
NaHCO ₃ Saturation Index	-3.4	y ₂ [*] (ppm _v)	0 9,983
Na ₂ CO ₃ Saturation Index	-7.8	ln(y ₁ -y ₁ [*])	3.3 -159.71
Sodium in Blowdown	8.31E-03 lb/min	(y-y ₁ [*]) _{lm} (ppm _v)	3.7 0.1
Make-up NaOH Density	1.274 g/mL	Expected NTU	7.00 0.53
Blowdown Density	1.02 g/mL	Calculated NTU	7.00 ✓ 0.53 ✓
Caustic reacting with HCl	99.8% of total	Discrepancy (×10 ³)	0.00000 0.00000
Alkali Exhaustion per Pass	49%		

Adiabatic Saturation of Noncondensable Gas with Water

(reference states: H = 0 for dry gas and liquid water at 0°C)

Adiabatic Saturation of Noncondensable Gas with Water																
(reference states: H = 0 for dry gas and liquid water at 0°C)																
P_{in} :	0.974 atm	740 torr	0 kPa-g	0 mbar	0 in.WC	0.0 psig	14.307 psia	$H_{sat}-H_{in}-H_{w,sat}=$		0.00 cal/mol _{bg}						
T_{in} :	65.6 °C	339 K	150 °F	ΔH_v :		10,062 cal/mol	$P^*_{H_2O}$:	0.253 atm	H_{in} :	4,389 cal/mol _{bg}						
T_{sat} :	65.6 °C	339 K	150 °F	ΔH_v :		10,062	$H_{w,sat}$:	0 cal/mol _{bg}	$P^*_{H_2O}$:	0.253 atm						
T_{out} :	65.6 °C	339 K	150 °F	ΔH_v :		10,062 cal/mol	$P^*_{H_2O}$:	0.253 atm	H_{out} :	4,389 cal/mol _{bg}						
T_{water} :	21.1 °C	294 K	70 °F	Evapn:		0.000 mol _{H2O} /mol _{bg}	0.000 m³/h	0.00 gpm	H_{water} :	0 cal/mol _{bg}						
V_{in} :	8,469 Nm³/h	10,787 Am³/h	5,371 scfm	6,350 acfm		m_{bg} 2.8E+05 mol _{bg} /h		6,267.50 Nm³/h (dry)	3,975 dscfm	322,250 scfh						
V_{sat} :	8,469 Nm³/h	10,787 Am³/h	5,371 scfm	6,350 acfm		$=$ 8.1E+03 kg _{DG} /h										
V_{out} :	8,469 Nm³/h	10,787 Am³/h	5,371 scfm	6,350 acfm		$m \times H_{in}$ 1.2E+09 cal/h		$=$ 4.87E+06 Btu/h	$=$ 1,427 kW							
$\rho_{G,in}$	0.92 kg/m³	0.057 lb/ft³		Y_{in} :		0.35 mol _{H2O} /mol _{NCG}	0.2174 g _{H2O} /g _{NCG}	r, h_{in} :	100.0%							
$\rho_{G,sat}$	0.92 kg/m³	0.057 lb/ft³		Y_{sat} :		0.35 mol _{H2O} /mol _{NCG}	0.217 g _{H2O} /g _{NCG}	ΔP :	0.0 mbar	0.0						
$\rho_{G,out}$	0.92 kg/m³	0.057 lb/ft³		Y_{out} :		0.35 mol _{H2O} /mol _{NCG}	0.217 g _{H2O} /g _{NCG}	P_{out} :	0.974 atm							
Gas	MW (g/mol)	Y_{in} (v/v)	Y_{in} (g/mol)	$Y_{in} C_p$ satn (cal/mol-°C)	$y_{in} H$ (cal/mol)	m_{in} (mol/h)	m_{in} (kg/h)	Y_{sat} (v/v)	$Y_{sat} MW$ (g/mol)	$Y_{sat} H$ (cal/mol)	m_{out} (mol/h)	m_{out} (kg/h)	Y_{out} (v/v)	$Y_{out} MW$ (g/mol)	$y_{out} H$ (cal/mol)	
H ₂	2.0	0.00%	0.00	0.00	0	0	0.0	0.00%	0.00	0	0	0	0.00%	0.00	0	
CH ₄	16.0	0.00%	0.00	0.00	0	0	0.0	0.00%	0.00	0	0	0	0.00%	0.00	0	
CO	28.0	0.00%	0.00	0.00	0	0	0	0.00%	0.00	0	0	0	0.00%	0.00	0	
CO ₂	44.0	1.00%	0.44	0.10	6	85	3,778	1.00%	0.44	6	85	3,778	1.00%	0.44	6	
Cl ₂	70.9	0.00%	0.00	0.00	0	0	0	0.00%	0.00	0	0	0	0.00%	0.00	0	
H ₂ S	34.1	0.00%	0.00	0.00	0	0	0	0.00%	0.00	0	0	0	0.00%	0.00	0	
HF	20.0	0.00%	0.00	0.00	0	0	0	0.00%	0.00	0	0	0	0.00%	0.00	0	
NH ₃	17.0	0.00%	0.00	0.00	0	0	0	0.00%	0.00	0	0	0	0.00%	0.00	0	
NO	30.0	0.00%	0.00	0.00	0	0	0	0.00%	0.00	0	0	0	0.00%	0.00	0	
NO ₂	46.0	0.00%	0.00	0.00	0	0	0	0.00%	0.00	0	0	0	0.00%	0.00	0	
SO ₂	64.1	0.00%	0.00	0.00	0	0	0	0.00%	0.00	0	0	0	0.00%	0.00	0	
N ₂	28.0	57.78%	16.19	3.95	258	4,894	218,325	57.78%	16.19	258	4,894	218,325	57.78%	16.19	258	
Ar	39.9	0.69%	0.27	0.03	2	58	2,600	0.69%	0.27	2	58	2,600	0.69%	0.27	2	
O ₂	32.0	14.53%	4.65	0.98	60	1,231	54,913	14.53%	4.65	60	1,231	54,913	14.53%	4.65	60	
H ₂ O	18.0	26.00%	4.68	2.19	2,922	2,201.7	98,227	26.00%	4.68	2,922	2,202	98,227	26.00%	4.68	2,922	
Σ		100.00%	26.24	7.25	3,248	8,469.2	377,844	100.00%	26.24	3,248	8,469	377,844	100.0%	26.24	3,248	
dry gas		74.00%	29.12	5.06	6,267	279,617	8,143	74.00%	29.12	326	6,267	279,617	74.0%	29.12	3,248	

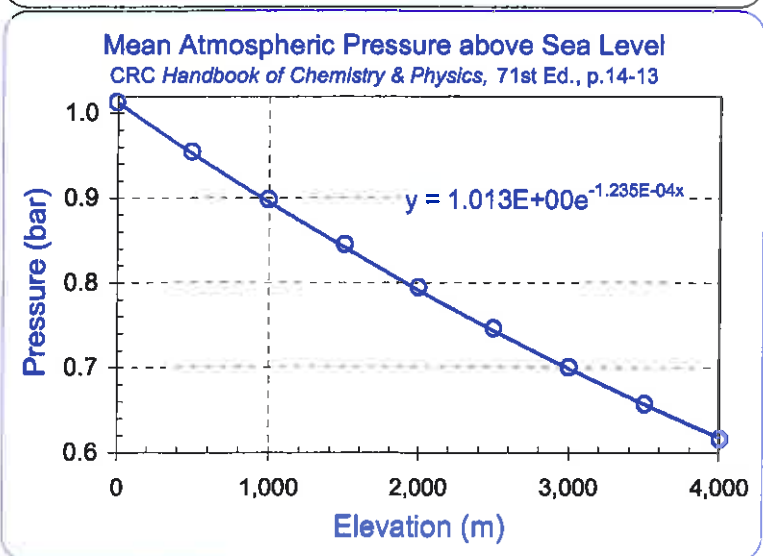
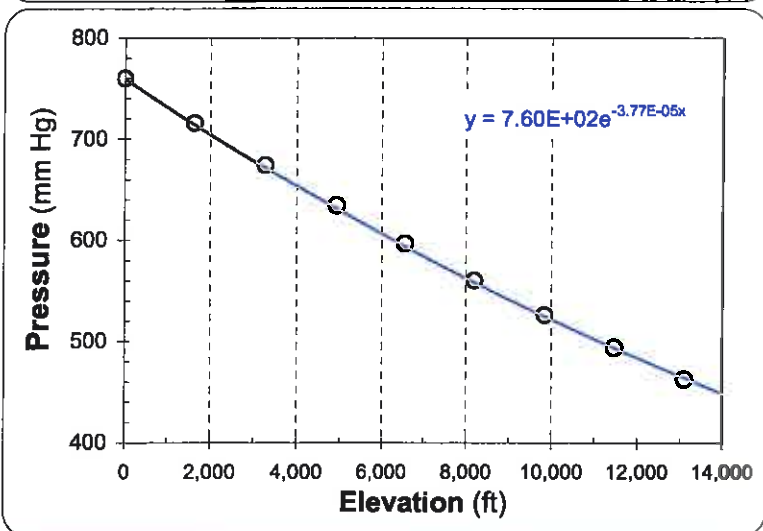
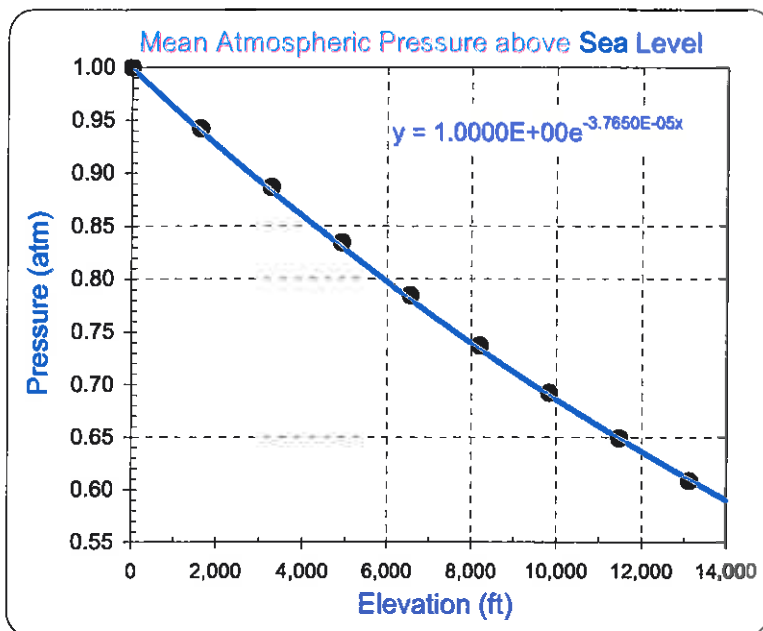
Mean Atmospheric Pressure above Sea Level (CRC Handbook of Chemistry & Physics, 71th Ed., p. 14-13)

Elevation		Atmospheric Pressure			
(m)	(ft)	(atm)	(bar)	(torr)	(in.Hg)
0	0	1.00	1.013	760	29.92
500	1,641	0.94	0.955	716	28.19
1,000	3,281	0.89	0.899	674	26.54
1,500	4,922	0.83	0.846	634	24.97
2,000	6,562	0.78	0.795	596	23.48
2,500	8,203	0.74	0.747	560	22.06
3,000	9,843	0.69	0.701	526	20.71
3,500	11,484	0.65	0.658	493	19.42
4,000	13,124	0.61	0.617	462	18.21
4,500	14,765	0.57	0.578	433	17.05

213	700	0.974	0.987	740	29.14
------------	-----	-------	-------	-----	-------

= 98.689 kPa

Boiling Point of Water: 99.3 °C
= 210.7 °F



Equilibrium Concentration of HCl gas over Hydrochloric Acid Solutions

(at 1.0 atm, from Perry's Handbook, 6th Ed., Table 3-11)

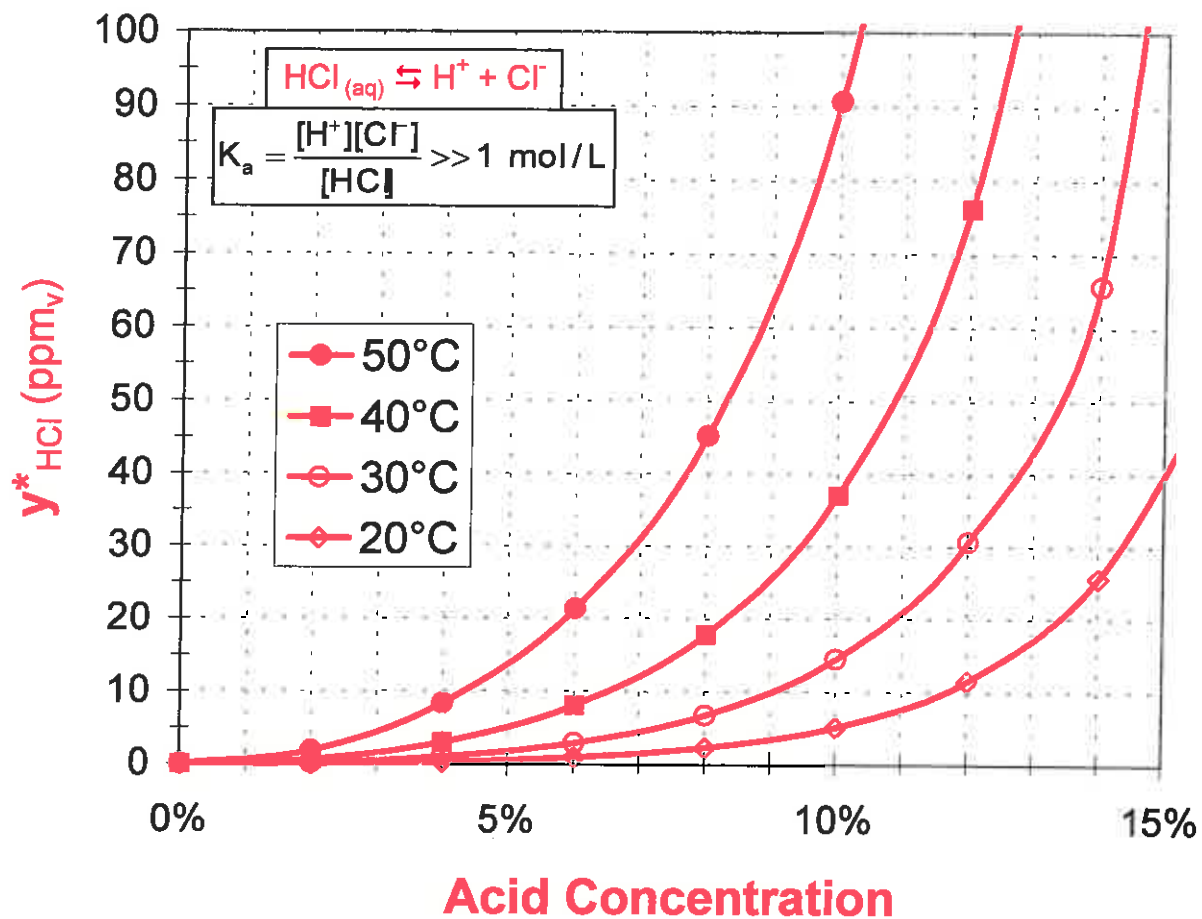


TABLE 3-10 Partial Pressures of Water over Aqueous Solutions of HCl*

log₁₀ pmm = $A - B/T$, which, however, agrees only approximately with the table. The table is more nearly correct. Partial pressure of H₂O, mmHg, °C

% HCl	A	B	0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	60°	70°	80°	90°	100°	110°
6	8.99156	2282	4.18	6.04	8.45	10.7	15.9	21.8	29.1	39.4	50.6	66.2	86.0	139	220	333	492	715	960
10	8.99864	2295	3.84	5.52	7.70	11.7	14.6	20.0	26.8	35.5	47.0	61.5	80.0	130	204	310	463	677	892
14	8.97075	2300	3.39	4.91	6.95	9.65	13.1	18.0	24.1	31.9	42.1	55.3	72.0	116	185	273	425	625	873
18	8.98014	2323	2.87	4.21	5.92	8.26	11.3	15.4	20.6	27.5	36.4	47.9	62.5	102	162	248	374	550	782
20	8.97877	2334	2.62	3.83	5.40	7.50	10.3	14.1	19.0	25.1	33.3	43.6	57.0	93.5	150	230	345	510	729
22	9.02708	2363	2.33	3.40	4.82	6.75	9.30	12.6	17.1	22.8	30.2	39.8	52.0	85.6	138	211	317	467	670
24	8.96022	2356	2.05	3.04	4.31	6.03	8.30	11.4	15.4	20.4	27.1	35.7	46.7	77.0	124	194	290	426	611
26	9.01511	2395	1.76	2.60	3.71	5.21	7.21	9.95	13.5	18.0	24.0	31.7	41.5	69.0	112	173	261	387	555
28	8.97611	2390	1.50	2.24	3.21	4.54	6.32	8.75	11.8	15.8	21.1	27.9	36.5	60.7	99.0	154	234	349	499
30	9.00117	2422	1.26	1.90	2.73	3.88	5.41	7.52	10.2	13.7	18.4	24.3	32.0	53.5	87.5	136	207	310	444
32	9.03317	2453	1.04	1.57	2.27	3.25	4.55	6.37	8.70	11.7	15.7	21.0	27.7	46.5	76.5	120	184	275	396
34	9.07193	2487	0.85	1.29	1.87	2.70	3.81	5.35	7.32	9.95	13.5	18.1	24.0	40.5	66.5	104	161	243	355
36	9.11815	2526	0.68	1.03	1.50	2.19	3.10	4.41	6.08	8.33	11.4	15.4	20.4	34.8	57.0	90.0	140	212	318
38	9.20783	2579	0.53	0.81	1.20	1.75	2.51	3.60	5.03	6.92	9.52	13.0	17.4	29.0	49.1	77.5	120	182	266
40	9.33923	2647	0.41	0.63	0.94	1.37	2.00	2.88	4.09	5.68	7.85	10.7	14.5	25.0	42.1	67.3	105	158	230
42	9.44953	2709	0.31	0.48	0.72	1.06	1.56	2.30	3.28	4.60	6.45	8.90	12.1	21.2	35.8	57.2	89.2	135	195

* Accuracy, ca. 2 percent for solutions of 15 to 30 percent HCl between 0 and 100°; for solutions of > 30 percent HCl the accuracy is ca. 5 percent at the lower temperatures and ca. 15 percent at the higher temperatures. Below 15 percent HCl, the accuracy is ca. 5 percent at the lower temperatures and higher strengths to ca. 15 to 20 percent at the lower strengths and perhaps 15 to 20 percent at the higher temperatures and lower strengths.

TABLE 3-11 Partial Pressures of HCl over Aqueous Solutions of HCl*

$\log_{10} p \text{ mm} = A - B/T$, which, however, agrees only approximately with the table. The table is more nearly correct.

%HCl	A	B	0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	60°	70°	80°	90°	100°	110°
2	11.8037	4736	.....	.....	0.0000117	0.0000323	0.0000044	0.0000084	0.000151	0.000275	0.00047	0.00083	0.00140	0.00380	0.0100	0.0245	0.058	0.132	0.280
4	11.6400	4471	0.000036	0.000036	0.000069	0.000131	0.00024	0.00044	0.00077	0.00134	0.0023	0.00385	0.0064	0.0165	0.0405	0.095	0.21	0.46	0.93
6	11.2144	4202	0.000125	0.000125	0.000234	0.000425	0.00076	0.00131	0.00225	0.0038	0.0062	0.0102	0.0163	0.040	0.094	0.206	0.44	0.92	1.78
8	11.0406	4042	0.000323	0.000323	0.000583	0.00104	0.00178	0.0031	0.00515	0.0085	0.0136	0.022	0.0344	0.081	0.183	0.39	0.82	1.64	3.10
10	10.9531	3908	0.00075	0.00075	0.00134	0.00232	0.00395	0.0067	0.0111	0.0178	0.0282	0.045	0.069	0.157	0.35	0.73	1.48	2.9	5.4
12	10.7990	3765	0.00175	0.00175	0.00305	0.0052	0.0088	0.0145	0.0234	0.037	0.058	0.091	0.136	0.305	0.66	1.34	2.65	5.1	9.3
14	10.6954	3636	0.00415	0.00415	0.0071	0.0118	0.0196	0.0316	0.050	0.078	0.121	0.185	0.275	0.60	1.25	2.50	4.8	9.0	16.0
16	10.6281	3516	0.0095	0.0095	0.016	0.0265	0.0428	0.0685	0.106	0.163	0.247	0.375	0.55	1.17	2.40	4.66	8.8	16.1	28
18	10.4957	3376	0.0225	0.0225	0.037	0.060	0.095	0.148	0.228	0.345	0.515	0.77	1.11	2.3	4.55	8.6	15.7	28	48
20	10.3633	3245	0.052	0.052	0.084	0.132	0.205	0.32	0.48	0.72	1.06	1.55	2.21	4.4	8.5	15.6	28.1	49	83
22	10.3172	3125	0.119	0.119	0.187	0.294	0.45	0.68	1.02	1.50	2.18	3.14	4.42	8.6	16.3	29.3	52	90	146
24	10.2185	2995	0.277	0.277	0.43	0.66	1.00	1.49	2.17	3.14	4.5	6.4	8.9	16.9	31.0	54.5	94	157	253
26	10.1303	2870	0.41	0.64	0.98	1.47	2.17	3.20	4.56	6.50	9.2	12.7	17.5	32.5	58.5	100	169	276	436
28	10.1115	2752	1.0	1.52	2.27	3.36	4.90	7.05	9.90	13.8	19.1	26.4	35.7	64	112	188	309	493	760
30	9.8763	2599	2.4	3.57	5.23	7.60	10.6	15.1	21.0	28.6	39.4	53	71	124	208	340	542	845	
32	9.7523	2457	5.7	8.3	11.8	16.8	23.5	32.5	44.5	60.0	81	107	141	238	390	623	970		
34	9.6061	2316	13.1	18.8	26.4	36.8	50.5	68.5	92	122	161	211	273	450	720				
36	9.5262	2229	29.0	41.0	56.4	78	105.5	142	188	246	322	416	535	860					
38	9.4670	2094	63.0	87.0	117	158	210	277	360	463	598	758	955						
40	9.2156	1939	130	176	233	307	399	515	627	830									
42	8.9925	1800	253	332	430	560	709	900											
44	8.8621	1681	510	655	840														
46	.....	.....	.....	.....	.....									

* Accuracy, ca. 2 percent for solutions of 15 to 30 percent HCl between 0 and 100°; for solutions of > 30 percent HCl the accuracy is ca. 5 percent at the lower temperatures and ca. 15 percent at the higher temperatures. Below 15 percent HCl, the accuracy is ca. 5 percent at the lower temperatures and higher strengths to ca. 15 to 20 percent at the lower strengths and perhaps 15 to 20 percent at the higher temperatures and lower strengths.

4. OPERATING & MAINTENANCE INSTRUCTIONS



810 West Front Street, Monroe, MI 48161 | (800) 992-7707 | <http://www.mon-env.com>

Vertical Packed Tower Scrubber

Installation, Operation and Maintenance Instruction



7,000 CFM

Monroe Serial #

13-5855-1

Monroe Job #

5855

P.O. #

CAP587350/CAP616587/CA

P616584

Ship To:

Capital Deliveries

3000 Mac Corkle Avenue

CHARLESTON, WV 25304

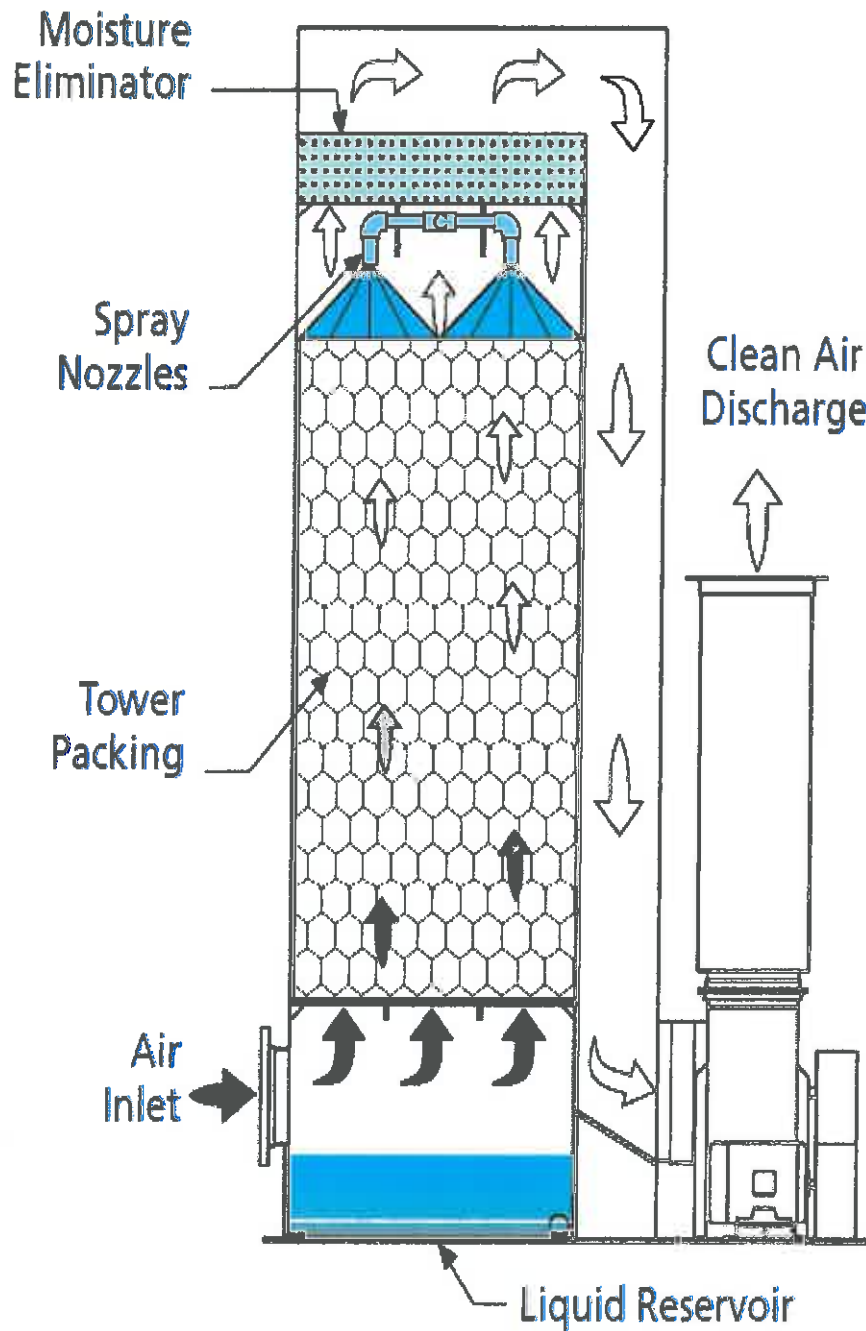
USA



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~ Please check the PDF manual on CD included on the back cover ~



The Flow Configuration May Not Reflect the Actual Unit



SECTION 1

GENERAL INFORMATION

This manual contains recommended procedures for installation, operation and maintenance for the Monroe Environmental Corp (MEC) Vertical Packed Tower Scrubber. It is important that these instructions be followed to ensure that your packed tower scrubber performs properly and continues to operate with sustained performance with minimal maintenance.

The MEC Vertical Packed Tower Scrubber is designed to efficiently remove or reduce water-soluble contaminants from the airflow. The contaminated air is introduced to the bottom of a packed tower. The packing is random placed plastic media that is intended to provide a very large effective surface area per unit volume for mass transfer. Water flows down the packed bed in opposite direction to ascending air. The design utilizes a tower with random placed packing and a mist eliminator.

Packing

Water irrigated packing is provided which produces a large surface area for air/water contact. The packing is hollow octagonal packing made from injection-molded plastics formed into a unique network of ribs, struts and drip rods. The packing is placed into the packing section in the tower. The packing depth is determined by job specific application; refer to assembly drawings in this manual.

Mist Eliminator

The mist eliminator located near the top of the scrubbing tower is designed to remove water from the air stream. It may consist of a chevron type mist eliminator or a mist pad. The chevron mist eliminator consists of numerous plates, set at an angle to the direction of air flow and removes moisture by direct impingement of moisture on the plates. Mist pad consists of layers or coils of knitted wired mesh held together by support grids on the top and bottom. See the contract drawing bill of material for type of mist eliminator supplied.



SECTION 2

DELIVERY INSPECTION

As soon as the unit is received, inspect for any evidence of damage in transit.

This inspection should be more than a visual once-over of the exterior. The interior sections of all units should be examined for breakage.

All damage claims should be made known at once to both the **Transportation Company and Monroe Environmental**. If any damages are noted a copy of your inspection documentation needs to be signed, dated and attached to the freight receipt. For minor damage, the notation can be written directly on the freight receipt. If an attachment is made to the freight receipt, note directly on the freight receipt that an attachment is included. Be sure to keep a copy of all documents given to the freight company. The unit was shipped as fully assembled as possible. Some components may be installed while others are shipped loose. Please refer to the shipping form. Care should be used when unloading and installing the scrubber. Lifting lugs are provided on each section of the clarifier for handling and lifting. Spreader bars should be used to prevent deformation of the clarifier.



SPECIAL UNLOADING INSTRUCTIONS

CAUTION:

Be sure all lifting equipment is suitable for loads being lifted including dynamic effects. Be certain there is sufficient overhead and lateral clearance from all power lines or other interferences.

CAUTION:

Do not stand in such a position as to get injured if lifting equipment fails or Scrubbing Tower is dropped.

The main scrubbing tower is being shipped in one piece and will be shipped in the horizontal position. Raising the scrubbing tower from the horizontal position on the truck to the vertical position is very critical. A special removable lifting device has been included which is to be inserted into the scrubbing tower through the mist pad access opening near the top of the tower. The half round portion must be in the up position when the scrubbing tower is lying horizontal. A clevis can be attached to the center lifting lug and the tower can be lifted and rotated into the vertical position using this device. A nylon sling will be required at the opposite end to lift the tower slightly in order to clear the truck. Once the tower has cleared the truck and the truck removed, the end supported by the nylon sling may be lowered and the tower then fully lifted by the special lifting device. The tower may be moved to final location using this lifting device. Use care not to induce additional dynamic loading by moving across rough ground or allowing the tower to swing.

Preparations should be made in advance so the Scrubber Tower can be set in place during the same lift as when the tower is rotated into the vertical position. Anchor bolts should be in place and correctly oriented as shown on the arrangement drawing. Shims may be required and should be available at time of the lift. We recommend full shims, 4"x4"x 1/8" thick and 1/16" thick, 304 stainless steel with 1" diameter center hole or 1" diameter center hole slotted to one edge to allow insertion without lifting the tower feet above anchor bolts. Shims and anchor bolts are not supplied by MEC unless specifically specified.



SECTION 3

INSTALLATION GUIDELINES

Installation and Mounting of Vertical Packed Tower Scrubber Assembly

Scrubber base should be mounted on a flat level surface. Anchor bolts for the tower base are required and should be stainless steel if corrosive chemicals are present in the vicinity of the scrubber tower. In some cases it may be necessary that the scrubber be laterally stabilized near the top of the tower. One method is to use steel angle connected to a building column or wall and connect to scrubber at the top flange. Stainless steel shims may be required to be installed under the anchor pads for proper leveling. Monroe Environmental usually does not furnish anchor bolts and shims unless specifically noted on the drawings. Each tower section is match marked to ease assembly of the upper half. Either a rubber gasket or PTFE joint sealant tape is furnished to seal between the tower sections. PTFE sealant is used only when the chemicals in the solution require an inert sealant. When PTFE joint sealant is used, apply two rows of sealant; one row inside the bolt circle and one row outside of the bolt circle. Overlap the mating ends and an "x" crossing to assure complete sealing. See additional instruction in manufacturer's information in Appendix B.

Nozzle and Piping

A liquid pipe and nozzle assembly is installed in the scrubber. Make sure there are no loose flanges or other loose pipe connections. All piping is leak tested in our shop but may be damaged or loosened during shipment.

Packing

The Monroe Environmental Vertical Packed Tower Scrubber is shipped without packing material installed. Once the tower section is installed, locate the access door below the mist pad access door and add packing into the tower. After the initial operation period, check packing level and add additional packing if required to compensate for settling. Refer to the general arrangement drawing in section of this IOM manual for proper packing height.

Connecting Inlet and Outlet Ductwork

Installing inlet & outlet ductwork requires some care to prevent misalignment and strain during assembly and subsequent operation. Inspect flanges to be sure they are flat and smooth so that an air and watertight seal can be maintained. A gasket or sealing compound must be used on the inlet & outlet connections to the scrubber. All connecting duct work must be supported to prevent undue stresses on the scrubber or fan.

DO NOT use the fan to support the ductwork.



Drain Connections

The drain connections are located per assembly drawing. The MEC Vertical Packed Tower Scrubber is equipped with a gravity drain and an overflow drain. The gravity drain must have a ball valve (supplied by others) tied into main drain. Either the overflow port or the internal drain trap port must be connected to an open drain in order to prevent packed tower scrubber failure. An excess of water in the scrubber can cause the unit to leak or possibly fail.

Fresh Water Supply & Scrubbing Liquid Sample

Connect 1/2" NPT fresh water supply piping to the fresh water inlet solenoid valve located on the packed tower sump basin top enclosure. If sampling ports for the scrubbing liquid have been specified and furnished; they can be piped to a location dictated by the plant and local codes for industrial waste. Fresh water supply and scrubbing liquid sample locations are shown on the general arrangement drawings in section 10 of this manual.

Emergency Water Supply

Connect clean fresh water to 1" FNPT connection on inlet throat. This supply is required to cool incoming air flow to prevent damage to FRP scrubber tower and polymer internals. If the scrubber tower is for cleaning ambient temperature air, no emergency water connection will be included.

Stack Installation

CAUTION:

All materials of the stack are electrically conductive. Be careful not to allow stack or guy cables to come into contact with any power lines when lifting or moving into position.

CAUTION:

Lift stack with adequately sized equipment and properly trained personnel to prevent injury to personnel or equipment.

The stack is shipped in three pieces. See drawings 5855-01-A-02-0 and 5855-01-D-03-0 for installation.

SECTION 4

START-UP

Before Starting Unit

1. Make certain unit is **properly assembled** and all nuts, bolts, and piping are secured.
2. Be certain all equipment is firmly anchored.
3. Check to see that all moving components are properly aligned.
4. Check to make sure all utilities are connected and properly grounded.
5. Check for proper water level in tank. A level switch must be energized for operation.
6. Make sure valve at recirculation pump inlet is open.
7. Make sure emergency water supply is connected and all block valves are open and solenoid valve is operable.
8. Place all guards on unit.
9. Check for proper mist eliminator pad placement and nozzle position.
10. Verify that the stack is properly grounded.

Sequence of Operation

Sequence of operation will be dictated by customer and the electrical configuration.
Please refer to drawing number: **5855-1-E-06-1** in section 10.

Operational Check

1. Check for proper pump and fan rotation per manufacturer's instructions. "Bumping" the motor to check rotation is not recommended for checking pump rotation. For pumps, use a phase sequence –motor rotation checker to prevent spinning the impeller off the shaft.
2. Unit should run without excessive noises from pump or fan.
3. Verify air inlet temperature is below 150 °F after water quench.
4. Check for proper airflow rate with a pitot tube or hot wire anemometer.

CAUTION:

Excessive airflow will cause scrubbing solutions to be discharged at fan outlet.

5. Check fan motor amperage and record for future troubleshooting purposes.
6. Check to see that pump is working properly. Take amperage reading on pump motor and record for future troubleshooting. Record operating pressure, and dead head pressure and compare readings to pump curve. Dead head pressure will indicate which pump curve is applicable. The operating pressure converted to head will give operating gpm per pump curve. To convert from operating psi to feet of head, divided by (.433xs.g.) For water use s.g.(specific gravity)=1
Example:



Pressure reading 82 psi. specific gravity of solution =1.02

$82 \text{ psi} / .433(1.02) = 185.7 \text{ ft of head.}$

7. The unit should operate unattended except for periodic inspections and maintenance.



SECTION 5

GENERAL MAINTENANCE

The MEC Vertical Packed Tower Scrubber is designed for continuous operating conditions and will maintain its performance provided that periodic maintenance procedures are followed.

After a period of time depending on the amount of dirt/dust, the mist eliminator pad will need replacement. A dirty condition is indicated by a high pressure drop across the mist eliminator or a noticeable reduction in the air flow into the tower.

CAUTION:

Before any maintenance is performed on the MEC Packed Tower Scrubber, shut down and lockout all energy sources according to your company's lockout procedure for safety. Close all valves and lockout according to your company's safety procedures.

CAUTION:

Never enter scrubbing tower alone.

CAUTION:

Check oxygen level before entering scrubber vessel.

CAUTION:

Scrubbing tower is a confined space and all safety procedures pertaining to confined space entry must be followed.

Motor Lubrication

Lubricate motors in accordance with motor manufacturer's O&M manual in section 9. Do not attempt to grease motors without removing vent plugs. If bearing grease seals are broken by excessive pressure, the motor can be severely damaged. Do not over grease.

Clean Packed Tower

Periodically, it may be necessary to clean the packed tower to maintain performance. The frequency of cleaning depends upon the operation. Complete cleaning may require removal of packing. Access doors are provided on the unit for inspection. These doors should be opened and the following items checked.



CAUTION:

Prior to opening the packed tower, adjust pH to approximately 7 and operate scrubber for at least 15 minutes. Shut down and lock out all energy sources and influent water sources before performing any maintenance.

CAUTION:

Never enter scrubbing tower alone.

CAUTION:

Check oxygen level before entering scrubber vessel.

CAUTION:

Scrubbing tower is a confined space and all safety procedures pertaining to confined space entry must be followed.

- A. Check spray nozzle operation with only the pump on and using neutral or clean water. Spray nozzles should produce a full cone spray. If any nozzle is plugged, the pump should be shut down, piping and nozzle removed, and the nozzle cleaned.
- B. Check the bottom face of the packing for a build-up of solids. If a surface build-up has occurred, this may be removed by spraying with high-pressure water or by manual cleaning. If the fouling of the packing appears to be more than just bottom face fouling, either chemical cleaning for replacement might be required.
- C. Check the face of the mist eliminator pad for a build-up of solids. If a surface build-up has occurred, pull the mist eliminator pad and clean or replace.
- D. If packed tower has an emergency fresh water connection for cooling incoming air stream, verify solenoid valve is functioning properly and quench nozzle is clean and providing good spray pattern.
- E. Monroe Environmental highly recommends reviewing the attached auxiliary equipment manufacturer's documents in section 9 for recommended maintenance for all auxiliary equipment and instrumentation.



SECTION 6

PREVENTIVE MAINTENANCE

The Monroe Vertical Packed Tower Scrubber is designed for continuous operating conditions and will maintain its performance provided that periodic preventive maintenance procedures are followed. Preventive maintenance is important for assuring the proper operation of scrubber system. Preventive maintenance procedure should include periodic equipment inspection, worn parts replacement, components prone to plugging cleaning, spare parts inventory maintenance, and recording of all maintenance performed on scrubber unit.

The dirty condition is indicated by a high pressure drop across the tower or a noticeable reduction in the air flow into the Packed Tower Scrubber.

CAUTION:

Before any maintenance is performed on the MEC Vertical Packed Tower Scrubber, shut down Tower and lockout all energy sources according to the lock out procedure for safety.

CAUTION:

Prior to opening the packed tower, adjust pH to approximately 7 and operate scrubber for at least 15 minutes.

CAUTION:

Never enter scrubbing tower alone.

CAUTION:

Check oxygen level before entering scrubber vessel.

CAUTION:

Scrubbing tower is a confined space and all safety procedures pertaining to confined space entry must be followed.

INSPECTION SCHEDULE

DESCRIPTION	INSPECT	INTERVAL
Fan: Wheel Blades	Check for proper balance, clean	6 Mo.
Fan Motor	Lubricate / Clean cooling fins	6 Mo.
Pump Motor	Lubricate / Clean cooling fins	6 Mo.
Packing / Mist pad Gauge	Check pressure drop	3 Mo.
Packing	Check for Fouling	3 Mo.
Mist Pad	Check for Plugging / Build-up	3 Mo.
Tower	Check for build-up	3 Mo.
Emergency Water Cooling	Check nozzle for buildup and check solenoid valve for proper operation	3Mo.
-Differential pressure switch -Scrubbing liquor flow meters -Pump pressure gauges -Fan ammeters	Observe for normal function	Once every work shift
-Ductwork -Induced draft fans handling clean -Dry gases	Check for build-up	1 Mo.

SECTION 7

TROUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE	REMEDY
Vibration (See fan manufacturer's information in Appendix B)	Loose bolts on fan housing	Tighten bolts
	Loose hold down bolt on fan or motor.	Tighten bolts & add lock washers
	Fan wheel dirty and out of balance	Clean wheel
	Fan wheel rubbing on fan housing	Inspect, loosen bolts & adjust fan inlet cone
	Fan may be out of balance	Dynamically balance fan rotating parts
Low Air Flow	Dirty or fouled packing	Clean or Replace
	Packing support tray blocked or plugged	Remove blockage or Clean
	Mist eliminator plugged or build up	Clean or Replace
	Buildup of salt like crystals in tower and piping	Check scrubbing solution at sample valve. Check operation of blow down valve
	Fan rotation reversed	Correct fan rotation
Low Amperes on Fan Motor	Plugged ductwork or closed valve Fan rotation reversed	Clear obstruction or open valve. Correct fan rotation

SECTION 7
TROUBLE SHOOTING CHART (Continued)

PROBLEM	POSSIBLE CAUSE	REMEDY
High Amperes on fan motor	Ductwork resistance low	Check for broken / missing packing or missing mist eliminator pads
	Fan damper opened too much	Adjust damper
	Fan or motor bearing worn	Replace bearings or lubricate
Removal efficiency not being met	Initial concentration too high	Reduce inlet concentration levels
	Dirty or fouled packing	Clean or replace
	Air flow below system design	Check fan
	Pump not at design GPM	Check pump
Foaming	Build-up of contaminants	Drain tank and refill
	Improper chemicals added	Check composition
Air Temperature too high >150 °F	Solenoid valve on emergency fresh water inlet has failed or is plugged.	Clean or replace solenoid valve
	Quench nozzle is plugged or fouled.	Clean or replace nozzle

SECTION 7

TROUBLE SHOOTING CHART (Continued)

PROBLEM	POSSIBLE CAUSE	REMEDY
-Reduced flow -Uneven distribution of the liquid	Nozzle plugged	-Replace nozzle -Clean nozzle
Pump leaking	Worn pump packing or seals	Replace
-Pump pressure high -Flow low	Nozzle closed	Clean or replace nozzle
	Valve closed	Open valves
-Pump pressure low -Flow low	Impeller wear	Replace
	Nozzle worn	Replace
	Pump inlet blocked	Remove blockage
Flow low	Obstruction in piping	Check pipes, strainer and impeller



MONROE
ENVIRONMENTAL

Liquid Clarification & Air/Gas Cleaning Systems

810 West Front Street, Monroe, MI 48161
Phone: 800.992.7707 Fax: 734.242.5275

FAILURE REPORT

FR No. _____ (to be assigned by
Engineering)

Reference Feedback Number _____ if applicable
(to be assigned by Sales)

Customer _____

Address _____

Contact(s) _____

Phone _____

Fax _____

E-mail _____

Date _____ Page 1 of _____

Job Number _____

Equip. Description _____

Equip. Serial No. _____

Equip. Location _____

Part Number _____

Number attached
pages _____

Name of preparer: _____

FAILURE DATA

Time On

Machine: _____

Root Cause/Failure Mode: _____

Failure Effect: _____

Environmental Observances (ambient, roof, outside, etc.): _____

Immediate Corrective Action: _____

Remove and Replace Time: _____

Description of failure: _____

FOR INTERNAL USE:

Permanent Corrective Action: _____

Responsible Department: _____

Date: _____

Failure Class: ☐ minor ☐ major ☐ hazardous

Warranty: yes/no

Attachment N

Supporting Emissions Calculations

CAMC General Division

Class / Administrative Update

Attachment N - Supporting Calculations

MAXIMUM FACILITY EMISSIONS

Equipment	Combustion Material	Power Rating	EF Units	Criteria Pollutant				
				CO	NO _x	PM ₁₀	SO _x	VOCs
Permitted Boilers ^{1,2}	Natural Gas	<100MMBtu/hr	lb/MMscf	84	100	7.6	0.6	5.5
	#2 Fuel Oil	<100MMBtu/hr	lb/10 ³ gal	5	20	2	72	0.34
Permitted Generators ³ (Generator #4)	Diesel Fuel	<600 hp	lb/hp-hr	6.68E-03	0.031	2.20E-03	2.05E-03	2.47E-03
			lb/MMBtu	0.95	4.41	0.31	0.29	0.35
			lb/gal	0.13	0.62	0.04	0.04	0.05
Permitted Generators ⁴ (Generators #1 & #3)	Diesel Fuel	>600 hp	lb/hp-hr	5.50E-03	0.024	7.00E-04	4.05E-03	7.05E-04
			lb/MMBtu	0.85	3.2	0.1	0.505	0.09
			lb/gal	0.119	0.448	0.014	0.0707	0.0126
Permitted Generators ⁵ (Generator #2)	Diesel Fuel	500 kW	g/hp-hr	2.60E-01	5.02	2.30E-02	NA	3.00E-02
			lb/hp-hr	5.73E-04	1.11E-02	5.07E-05	4.05E-03	6.61E-05
			lb/gal	0.01489	0.28741	0.00132	0.10504	0.00172
Permitted Generators ⁶ (Generator #5)	Diesel Fuel	750 kW	g/hp-hr	2.40E-01	5.32	2.20E-02	NA	3.00E-02
			lb/hp-hr	5.29E-04	1.17E-02	4.85E-05	1.21E-05	6.61E-05
			lb/gal	0.01374	0.30458	0.00126	0.00032	0.00172

Definitions:

CO carbon monoxide
 EF emission factor
 Current gram
 gal gallon
 hp horsepower
 hr hour
 lb pound
 MMBtu million British thermal units
 MMscf million standard cubic feet
 NO_x nitrogen oxides
 Current particulate matter
 SO_x sulfur oxides
 VOCs volatile organic compounds

Notes:

- 1 - EFs for natural gas combustion in small boilers, from AP-42, Chapter 1, Section 4, Tables 1.4-1 and 1.4-2.
- 2 - EFs for #2 fuel oil combustion in small boilers, from AP-42, Chapter 1, Section 3, Tables 1.3-1, 1.3-2, and 1.3-3. Sulfur content is 0.5%, based on Perry's Chemical Engineer's Handbook.
- 3 - EFs for diesel fuel combustion in small generators, from AP-42, Chapter 3, Section 3, Table 3.3-1.
- 4 - EFs for diesel fuel combustion in large generators, from AP-42, Chapter 3, Section 4, Table 3.4-1.
- 5 - EFs for diesel fuel combustion in Generator #2 were supplied by the manufacturer.
- 6 - EFs for diesel fuel combustion in Generator #5 were supplied by the manufacturer.

CAMC General Division
Class / Administrative Update
Attachment N - Supporting Calculations

MAXIMUM FACILITY EMISSIONS

STACK	EQUIPMENT	FUEL	RATING	FUEL CONSUMPTION (MMscf/hr)	HOURS (per year)	EMISSIONS (pph)				EMISSIONS (tpy)			
						CO	NO _x	PM ₁₀	SO ₂	CO	NO _x	PM ₁₀	VOC
BS1													
	Boiler #1	NG	10.46	0.0105	8760	0.88	1.05	0.08	0.01	0.06	3.85	4.58	0.35
	Boiler #2	NG	10.46	0.0105	8760	0.88	1.05	0.08	0.01	0.06	3.85	4.58	0.35
	Boiler #3	NG	15.00	0.0150	8760	1.26	1.50	0.11	0.01	0.08	5.52	6.57	0.50
	Boiler #4	NG	15.00	0.0150	8760	1.26	1.50	0.11	0.01	0.08	5.52	6.57	0.50
						2.52	3.00	0.23	0.02	0.17	11.04	13.14	1.00
BS2													
	Boiler #1	Fuel Oil	10.46	0.0747	6850	0.37	1.49	0.15	5.38	0.03	1.28	5.12	0.51
	Boiler #2	Fuel Oil	10.46	0.0747	6850	0.37	1.49	0.15	5.38	0.03	1.28	5.12	0.51
	Boiler #3	Fuel Oil	15.00	0.1071	6850	0.54	2.14	0.21	7.71	0.04	1.83	7.34	0.73
	Boiler #4	Fuel Oil	15.00	0.1071	6850	0.54	2.14	0.21	7.71	0.04	1.83	7.34	0.73
						1.07	4.29	0.43	15.43	0.07	3.67	14.68	1.47
BS3													
	Boiler #1	Comb.	10.46	0.0747	6850	NA	NA	NA	NA	NA	2.12	6.12	0.59
	Boiler #2	Comb.	10.46	0.0747	6850	NA	NA	NA	NA	NA	2.12	6.12	0.59
	Boiler #3	Comb.	15.00	0.1071	6850	NA	NA	NA	NA	NA	3.04	8.77	0.84
	Boiler #4	Comb.	15.00	0.1071	6850	NA	NA	NA	NA	NA	3.04	8.77	0.84
						NA	NA	NA	NA	NA	6.08	17.54	1.69
Current Permit Limits (R13-1772G)													
					BS1	0.89	1.50	0.15	5.38	0.10	3.87	6.12	0.59
					BS2	0.89	1.50	0.15	5.38	0.10	3.87	6.12	0.59
					BS3	2.52	4.30	0.44	15.42	0.18	11.04	17.54	1.70
IMIWI													
	Med. Waste Inc.	Waste	NA	NA	NA	0.44	2.60	0.30	1.20	0.05	1.31	7.80	0.90
Current Permit Limits (R13-1772G & R30-03900057-2012)													
					IMIWI	0.44	2.60	0.30	1.20	0.05	1.31	7.80	0.90

CAMC General Division
 Class I Administrative Update
 Attachment N - Supporting Calculations

MAXIMUM FACILITY EMISSIONS

STACK	EQUIPMENT	FUEL	RATING	FUEL CONSUMPTION	HOURS (per year)	(KW)			EMISSIONS (pph)			EMISSIONS (tpy)				
						(Hp)			CO	NO _x	PM ₁₀	VOC	CO	NO _x	PM ₁₀	VOC
GS1	Generator #1	Fuel Oil	750	1005.8	1100				5.53	24.14	0.70	4.07	0.71	13.28	0.39	2.24
GS2	Generator #2	Fuel Oil	500	670.5	1100				0.38	7.42	0.03	2.71	0.04	4.08	0.02	1.49
GS3	Generator #3	Fuel Oil	750	1005.8	1100				5.53	24.14	0.70	4.07	0.71	13.28	0.39	2.24
GS4	Generator #4	Fuel Oil	100	134.1	1100				0.90	4.16	0.30	0.27	0.33	2.29	0.16	0.15
GS5	Generator #5	Fuel Oil	750	1005.8	1100				0.53	11.80	0.05	0.01	0.07	6.49	0.03	0.01
Current Permit Limits (R13-1772G)																
EOSS	Sterilizer #1	NA	NA	NA	NA				--	--	--	--	--	--	--	--
	Sterilizer #2	NA	NA	NA	NA				--	--	--	--	--	--	--	--
Current Permit Limits (R13-1772G)																
EOSS									--	--	--	--	--	--	--	--
TOTAL FACILITY EMISSIONS																
									17.64	81.56	2.84	38.52	2.80	27.19	4.78	2.70

CAMC General Division
 Class I Administrative Update
 Attachment N - Supporting Calculations

GREENHOUSE GAS FACILITY EMISSIONS

STACK	EQUIPMENT	FUEL	FUEL LHV	FUEL CONSUMPTION	FUEL CONSUMPTION (gal/yr)	HOURS (per year)	EMISSIONS (pph)				EMISSIONS (tpy)			
							CO ₂	CH ₄	N ₂ O	CO ₂ e	CO ₂	CH ₄	N ₂ O	CO ₂ e
(BTU/ft ³)														
(ft ³ /yr)														
BS1	Boiler #1	NG	1,029	91,980,000	91.98	8760	1.26E+03	2.38E-02	2.38E-03	1.26E+03	5.54E+03	1.04E-01	1.04E-02	5.55E+03
BS2	Boiler #2	NG	1,029	91,980,000	91.98	8760	1.26E+03	2.38E-02	2.38E-03	1.26E+03	5.54E+03	1.04E-01	1.04E-02	5.55E+03
BS3	Boiler #3	NG	1,029	131,400,000	131.40	8760	1.81E+03	3.40E-02	3.40E-03	1.81E+03	7.91E+03	1.49E-01	1.49E-02	7.92E+03
	Boiler #4	NG	1,029	131,400,000	131.40	8760	1.81E+03	3.40E-02	3.40E-03	1.81E+03	7.91E+03	1.49E-01	1.49E-02	7.92E+03
Total BS3							3.61E+03	6.81E-02	6.81E-03	3.62E+03	1.58E+04	2.98E-01	2.98E-02	1.58E+04
(gal/yr)														
BS1	Boiler #1	Fuel Oil	NA	224,000	NA	6850	7.31E+02	3.00E-02	6.00E-03	5.74E+02	2.51E+03	1.03E-01	2.05E-02	2.52E+03
BS2	Boiler #2	Fuel Oil	NA	654,000	NA	6850	2.14E+03	8.76E-02	1.75E-02	1.68E+03	7.31E+03	3.00E-01	6.00E-02	7.34E+03
BS3	Boiler #3	Fuel Oil	NA	938,000	NA	6850	3.06E+03	1.26E-01	2.51E-02	2.40E+03	1.05E+04	4.30E-01	8.60E-02	1.05E+04
	Boiler #4	Fuel Oil	NA	938,000	NA	6850	3.06E+03	1.26E-01	2.51E-02	2.40E+03	1.05E+04	4.30E-01	8.60E-02	1.05E+04
Total BS3							6.13E+03	2.51E-01	5.02E-02	4.80E+03	2.10E+04	8.60E-01	1.72E-01	2.10E+04
BS1							2.00E+03	5.38E-02	8.38E-03	1.83E+03	8.04E+03	2.07E-01	3.10E-02	8.07E+03
BS2							3.40E+03	1.11E-01	1.99E-02	2.94E+03	1.28E+04	4.04E-01	7.04E-02	1.29E+04
BS3							9.74E+03	3.19E-01	5.70E-02	8.42E+03	3.68E+04	1.16E+00	2.02E-01	3.68E+04
(mmBTU/hr)														
IMIWI	Med. Waste Incinerator	Waste	NA	6.0	NA	8760	1.36E+02	2.57E-03	2.57E-04	1.36E+02	5.97E+02	1.12E-02	1.12E-03	5.98E+02
	IMIWI							1.36E+02	2.57E-03	2.57E-04	1.36E+02	5.97E+02	1.12E-02	1.12E-03	5.98E+02
(KW)														
(gal/yr)														
GS1	Generator #1	Fuel Oil	750	173,250	NA	1100	3.52E+03	1.44E-01	2.89E-02	4.44E+02	1.94E+03	7.95E-02	1.59E-02	1.95E+03
GS2	Generator #2	Fuel Oil	500	117,810	NA	1100	2.40E+03	9.82E-02	1.96E-02	3.02E+02	1.32E+03	5.40E-02	1.08E-02	1.32E+03
GS3	Generator #3	Fuel Oil	750	173,250	NA	1100	3.52E+03	1.44E-01	2.89E-02	4.44E+02	1.94E+03	7.95E-02	1.59E-02	1.95E+03
GS4	Generator #4	Fuel Oil	100	24,420	NA	1100	4.97E+02	2.04E-02	4.07E-03	6.26E+01	2.73E+02	1.12E-02	2.24E-03	2.74E+02
GS5	Generator #5	Fuel Oil	750	173,250	NA	1100	3.52E+03	1.44E-01	2.89E-02	4.44E+02	1.94E+03	7.95E-02	1.59E-02	1.95E+03
GS1							5.54E+00	2.41E+01	7.10E-01	4.07E+00	3.05E+00	1.33E+01	3.90E-01	2.24E+00
GS2							2.40E+03	9.82E-02	1.96E-02	3.02E+02	1.32E+03	5.40E-02	1.08E-02	1.32E+03
GS3							5.54E+00	2.41E+01	7.10E-01	4.07E+00	3.05E+00	1.33E+01	3.90E-01	2.24E+00
GS4							9.00E-01	4.16E+00	3.00E-01	2.80E-01	5.00E-01	2.29E+00	1.70E-01	1.60E-01
GS5							3.52E+03	1.44E-01	2.89E-02	4.44E+02	1.94E+03	7.95E-02	1.59E-02	1.95E+03
TOTAL FACILITY GREENHOUSE EMISSIONS														
							2.12E+04	5.32E+01	1.85E+00	1.41E+04	6.15E+04	3.08E+01	1.28E+00	6.17E+04

Attachment O

Monitoring/Recordkeeping/Reporting/Testing Plans

Attachment O

Monitoring, Recordkeeping, Reporting, and Testing Plan

- Monitoring** The following will be monitored for the packed tower system: recirculated water flow rate; scrubber water pH; differential pressure across scrubber; inlet gas temperatures; and outlet gas temperature.
- Recordkeeping** The monitoring parameters listed above will be recorded. These records will be maintained onsite for a period of at least five years and will be made available to the chief or his designee upon request.
- Reporting** All listed monitoring parameters will be reported as required under the HMIWI Regulations and Title V Permit.
- Testing** All regulated pollutants under the HMIWI Regulations (40CFR60 and 62) will be tested to demonstrate initial compliance. Particulate matter, hydrogen chloride, and carbon monoxide will be tested annually as required.

Attachment P

Public Notice

Attachment P

Public Notice

A Class I legal advertisement is not required for a Class I Administrative Update. Therefore, a public notice is not required and this attachment is not applicable.

Attachment Q

Business Confidential Claims

Attachment Q

Business Confidential Claims

This Class I Administrative Update does not contain any
information considered to be "Confidential Business
Information" per 45CSR31.

Attachment R

Authority Forms

Attachment R

Authority Forms

This Class I Administrative Update has been signed by the appropriate "Responsible Official." Therefore, no authority forms are required and this attachment is not applicable.

Attachment S

Title V Permit Revision Information

Attachment S
Title V Permit Revision Information

1. New Applicable Requirements Summary	
Mark all applicable requirements associated with the changes involved with this permit revision:	
<input type="checkbox"/> SIP	<input type="checkbox"/> FIP
<input type="checkbox"/> Minor source NSR (45CSR13)	<input type="checkbox"/> PSD (45CSR14)
<input type="checkbox"/> NESHAP (45CSR15)	<input type="checkbox"/> Nonattainment NSR (45CSR19)
<input checked="" type="checkbox"/> Section 111 NSPS (Subpart(s) <u>Ce</u>)	<input type="checkbox"/> Section 112(d) MACT standards (Subpart(s) _____)
<input type="checkbox"/> Section 112(g) Case-by-case MACT	<input type="checkbox"/> 112(r) RMP
<input type="checkbox"/> Section 112(i) Early reduction of HAP	<input type="checkbox"/> Consumer/commercial prod. reqts., section 183(e)
<input type="checkbox"/> Section 129 Standards/Reqts.	<input type="checkbox"/> Stratospheric ozone (Title VI)
<input type="checkbox"/> Tank vessel reqt., section 183(f)	<input type="checkbox"/> Emissions cap 45CSR§30-2.6.1
<input type="checkbox"/> NAAQS, increments or visibility (temp. sources)	<input type="checkbox"/> 45CSR27 State enforceable only rule
<input type="checkbox"/> 45CSR4 State enforceable only rule	<input type="checkbox"/> Acid Rain (Title IV, 45CSR33)
<input type="checkbox"/> Emissions Trading and Banking (45CSR28)	<input type="checkbox"/> Compliance Assurance Monitoring (40CFR64) ⁽¹⁾
<input type="checkbox"/> NO _x Budget Trading Program Non-EGUs (45CSR1)	<input type="checkbox"/> NO _x Budget Trading Program EGUs (45CSR26)
<p>⁽¹⁾ If this box is checked, please include Compliance Assurance Monitoring (CAM) Form(s) for each Pollutants Specific Emission Unit (PSEU) (See Attachment H to Title V Application). If this box is not checked, please explain why Compliance Assurance Monitoring is not applicable:</p> <p style="padding-left: 40px;">40CFR64 – A CAM Plan is not required because the facility is subject to 40CFR60, Subpart Ec.</p>	

2. Non Applicability Determinations
<p>List all requirements, which the source has determined not applicable to this permit revision and for which a permit shield is requested. The listing shall also include the rule citation and a rationale for the determination.</p> <p>Not Applicable</p>
<input type="checkbox"/> Permit Shield Requested <i>(not applicable to Minor Modifications)</i>

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

3. Suggested Title V Draft Permit Language

Are there any changes involved with this Title V Permit revision outside of the scope of the NSR Permit revision? ☐ Yes ☒ No If Yes, describe the changes below.

Also, please provide **Suggested Title V Draft Permit language** for the proposed Title V Permit revision (including all applicable requirements associated with the permit revision and any associated monitoring /recordkeeping/ reporting requirements), OR attach a marked up pages of current Title V Permit. Please include appropriate citations (Permit or Consent Order number, condition number and/or rule citation (e.g. 45CSR§7-4.1)) for those requirements being added / revised.

This Title V Permit revision is to incorporate the addition of an APC system to bring the incinerator system into compliance with requirements in West Virginia Air Quality Legislative Rule 45CSR18-7, Section 7.1 through 7.9 and with the New Source Performance Standard 40CFR60, Subpart Ce. Please refer to Attachment M for all monitoring/recordkeeping/reporting/testing requirements.

4. Active NSR Permits/Permit Determinations/Consent Orders Associated With This Permit Revision

Permit or Consent Order Number	Date of Issuance	Permit/Consent Order Condition Number
R13-1772G	07/14/2011	

5. Inactive NSR Permits/Obsolete Permit or Consent Orders Conditions Associated With This Revision

Permit or Consent Order Number	Date of Issuance	Permit/Consent Order Condition Number
Not Applicable		

6. Change in Potential Emissions

Pollutant	Change in Potential Emissions (+ or -), TPY
Hydrogen Chloride (HCl)	Decrease emissions by 14.5 PPMvd

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

7. Certification For Use Of Minor Modification Procedures (Required Only for Minor Modification Requests)

Note: This certification must be signed by a responsible official. Applications without a signed certification will be returned as incomplete. The criteria for allowing the use of Minor Modification Procedures are as follows:

- i. Proposed changes do not violate any applicable requirement;
- ii. Proposed changes do not involve significant changes to existing monitoring, reporting, or recordkeeping requirements in the permit;
- iii. Proposed changes do not require or change a case-by-case determination of an emission limitation or other standard, or a source-specific determination for temporary sources of ambient air quality impacts, or a visibility increment analysis;
- iv. Proposed changes do not seek to establish or change a permit term or condition for which there is no underlying applicable requirement and which permit or condition has been used to avoid an applicable requirement to which the source would otherwise be subject (synthetic minor). Such terms and conditions include, but are not limited to a federally enforceable emissions cap used to avoid classification as a modification under any provision of Title I or any alternative emissions limit approved pursuant to regulations promulgated under § 112(j)(5) of the Clean Air Act;
- v. Proposed changes do not involve preconstruction review under Title I of the Clean Air Act or 45CSR14 and 45CSR19;
- vi. Proposed changes are not required under any rule of the Director to be processed as a significant modification;

Notwithstanding subparagraph 45CSR§30-6.5.a.1.A. (items i through vi above), minor permit modification procedures may be used for permit modifications involving the use of economic incentives, marketable permits, emissions trading, and other similar approaches, to the extent that such minor permit modification procedures are explicitly provided for in rules of the Director which are approved by the U.S. EPA as a part of the State Implementation Plan under the Clean Air Act, or which may be otherwise provided for in the Title V operating permit issued under 45CSR30.

Pursuant to 45CSR§30-6.5.a.2.C., the proposed modification contained herein meets the criteria for use of Minor permit modification procedures as set forth in Section 45CSR§30-6.5.a.1.A. The use of Minor permit modification procedures are hereby requested for processing of this application.

(Signed):


(Please use blue ink)

Date:

02 / 04 / 2004
(Please use blue ink)

Named (typed):

Title:

Note: Please check if the following included (if applicable):



Compliance Assurance Monitoring Form(s)



Suggested Title V Draft Permit Language

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.