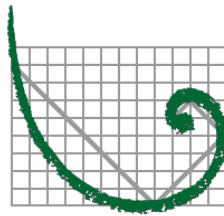




# Alcon Research, Ltd

## Rule 13 Application for Permit Modification Alcon – Advanced Optic Device Center North

Lesage, West Virginia



**ERM**

Prepared By:

**ENVIRONMENTAL RESOURCES MANAGEMENT, Inc.  
Hurricane, West Virginia**

October 2016

Alcon Laboratories, Inc.  
2 Vision Lane, Lesage, WV 25537  
T: 304.733.1556  
www.alcon.com



October 12, 2016

Mr. William F. Durham, Director  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304

Subject: Rule 13 Permit Application for Permit Modification  
Alcon Research, Ltd  
Alcon – Advanced Optic Device Center (AODC) North

Dear Director Durham:

Alcon Research, Ltd (Alcon) is pleased to submit the enclosed Rule 13 Application for Permit Modification for Alcon's Advanced Optic Device Center located near Lesage, Cabell County, West Virginia. An original hard copy and two electronic copies, included on CD, are enclosed with this submittal. A check for the application fee of \$4,500 is enclosed with this submittal.

A public notice for the proposed modification will be published in *The Herald Dispatch* at this time of the submittal. An original Affidavit of Publication and copy of the public notice will be forwarded to the permit engineer upon receipt from the publisher.

If you should have any questions, please contact me at (304) 733 - 1482.

Best Regards,

A handwritten signature in black ink that reads "Robbie Loudon". The signature is written in a cursive, flowing style.

Robbie Loudon  
Health, Safety & Environmental Specialist

## INTRODUCTION

Alcon Research, Ltd. (Alcon) submits this Reg. 13 Application for Permit Modification to the WVDEP's Division of Air Quality for the Advanced Optic Device Center (AODC) North Plant located in Cabell County, West Virginia. This application addresses the operational changes at the facility associated with the installation of an additional ethylene oxide sterilizer, a natural gas boiler, and a diesel emergency firewater pump.

## FACILITY DESCRIPTION

With this application for a Reg. 13 Permit Modification, the applicant seeks the authority to construct the following emission source:

- One (1) Ethylene Oxide Sterilizer Chamber.

Also with the application, the applicant seeks to update the permit with the following after-the-fact emission sources:

- One (1) Natural Gas Fired Boiler rated at 7.0 MMBtu/hr; and
- One Diesel Emergency Firewater Pump rated with a power rating between 79 and 110 hp.

A process flow diagram is included in this application in Attachment D.

## REGULATORY DISCUSSION

This section outlines the State air quality regulations that could be reasonably expected to apply to the AODC North facility and makes an applicability determination for each regulation based on activities conducted at the site and the emissions of regulated air pollutants. This review is presented to supplement and/or add clarification to the information provided in the Reg. 13 Modification application forms.

The West Virginia State Regulations address applicable state (i.e. State Implementation Plan) rules as well as federal regulations, including Title I Prevention of Significant Deterioration Nonattainment New Source Review preconstruction permitting, Title V, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants. The regulatory requirements in reference to AODC North are described in detail in the following section.

## WEST VIRGINIA STATE AIR REGULATIONS

### *45 CSR 02 – To Prevent and Control Particulate Air Pollution From Combustion of Fuel in Indirect Heat Exchangers*

The boiler to be installed is considered an indirect heat exchanger that combusts natural gas. The boiler unit is less than 10 MMBtu/hr. Such units are exempt from the requirements in the rule aside from discretionary testing requirements.

The diesel firewater engine is not considered an indirect heat exchanger and is therefore not subject to the opacity requirements of this rule.

### *45 CSR 04 – To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor*

Operations conducted at the AODC North Plant are subject to this requirement. Based on the nature of the processes, the presence of objectionable odors is unlikely.

### *45 CSR 06 – Control of Air Pollution from the Combustion of Refuse*

There is no combustion of refuse at the AODC Plant. Therefore the facility is not subject to the conditions of this regulatory requirement.

### *45 CSR 10 – To Prevent and Control Air Pollution From the Emission of Sulfur Oxides*

Sulfur oxide emissions from the emergency firewater pump diesel engine are subject to the facility's 2,000 ppm<sub>v</sub> sulfur dioxide concentration limitation but are exempt from most other requirements in the rule aside from discretionary testing requirements. Compliance with the allowable sulfur dioxide concentration limitations is based on a block (3) hour averaging time.

The boiler is an indirect heat exchanger that combusts natural gas, but is exempt since the heat capacity is less than 10 MMBtu/hr.

### *45 CSR 13 – Permits for Construction, Modification, Relocation, And Operation of Stationary Sources of Air Pollutants*

This Reg. 13 Application for Modification is being submitted for the operational activities associated with the ethylene oxide sterilizer chamber, natural gas fired boiler, and emergency engine.

### *45 CSR 14 / 45 CSR 19 – Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration / Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contributed to Non-attainment*

The AODC North Plant is not a major stationary source and the current changes proposed in this permit application do not change this facility's status. Additionally, the plant is located in Cabell County which is an EPA attainment area for all regulated pollutants. Under both of these conditions, the AODC North Plant is not subject to the conditions of 45 CSR 19 and 45 CSR 14.

*45 CSR 16 - Standards of Performance for New Stationary Sources (NSPS)*

45CSR 16 applies to all registrants with affected facilities that are subject to any of the NSPS requirements, described in more detail in the Federal Regulations section.

*45 CSR 30 – Requirements for Operating Permits*

45 CSR 30 applies to the requirements of the federal Title V operating permit program (40 CFR 70). The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAPs, and 100 tpy of all other regulated pollutants.

The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility. The facility is not a major source with respect to the Title V operating permit program.

*45 CSR 34 – National Emission Standards for Hazardous Air Pollutants (NESHAP)*

45 CSR 34 applies to all registrants that are subject to any of the NESHAP requirements, described in more detail in the Federal Regulations section.

## **FEDERAL REGULATIONS**

*40 CFR 60, Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines)*

Subpart IIII established standards and compliance schedules for the control of Particulate Matter (PM), Nitrogen Oxides (NO<sub>x</sub>), and Carbon Monoxide (CO) emissions from affected facilities that commence construction, modification, or reconstruction after July 11, 2005.

The Clarke JU4H-UF58 diesel-fired fire water pump included with this Reg. 13 Permit Modification is subject to the requirements of this Rule. The pump is a compression ignition internal combustion engine that was manufactured in 2009. This engine operates within a specified operating range between 79 bhp at 1470 rpm and 110 bhp at 1760 rpm. The base model engine was manufactured

by John Deere Corporation conforming to 40 CFR 60 engine requirements, as stated by the manufacturer. Emission factors were provided with a warranty by John Deere for the outer limits of the engine's operational range. Emissions of 0.19 g/hp-hr NMHC, 5.88 g/hp-hr NO<sub>x</sub>, 1.88 g/hp-hr CO, 0.48 g/hp-hr Total PM are provided for the operational limit of 79 bhp at 1470 rpm. Furthermore, emissions of 0.16 g/hp-hr NMHC, 6.07 g/hp-hr NO<sub>x</sub>, 0.87 g/hp-hr CO, 0.30 g/hp-hr Total PM were provided for the 110 bhp at 1760 rpm operational limit. As a part of the emissions analysis in Attachment N, the most conservative emissions for each operational limit were used as part of the potential total emissions analysis.

This is a noncertified engine constructed in 2009, a year before the mandate for engine manufacturers to certify fire water pumps with maximum power ratings between 100 and 175 bhp, as illustrated in 40 CFR 60 Table 3 and 40 CFR 60.4211(c). This engine is subject to the diesel fuel requirements as a part of 40 CFR 60.4207 and subject to the compliance requirements of 40 CFR 80.510(b). Furthermore, in accordance with 40 CFR 60, Subpart IIII this engine is subject to the emission standards in Table 4 for engines with maximum engine power between 100 and 175 horsepower for the year of 2009.

Although not required for engines manufactured in 2009, John Deere has provided certification for this engine that it meets the emission standards required by Subpart IIII. This manufacturer guarantee is provided with this submittal and included as supporting documentation to Attachment L for the diesel-fired fire water pump. Based upon this manufacturer's data indicating compliance with the 40 CFR 60 Subpart IIII emission standards outlined in Table 4, initial performance testing is not required for this engine.

#### *40 CFR 63, Subpart O (Ethylene Oxide Emissions Standards for Sterilization Facilities)*

With an emission rate greater than 1 ton per year the proposed ethylene oxide sterilizer, is subject to the requirements of 40 CFR 63, Subpart O. Applicable regulatory requirements include emission controls greater or equal 99% control efficiency. Alcon Research, Ltd. is subject to initial performance compliance testing within 180 days of the compliance date for the specific source. For the ethylene oxide sterilizer included within this submittal, the compliance date would be 180 days from unit startup. Details on the requirements of this analysis are presented in 40 CFR 63.363(c). Continuous compliance will be demonstrated by monitoring the temperature of the abator, as outlined by requirement 4.1.g. of the R13-2820C Permit.

Alcon requests a change to the compliance requirements of 40CFR63.363 and R13-2820B condition 4.1.1.h, which states, "The catalyst bed in the abator shall be replaced with new catalyst material once every five (5) years, beginning five

(5) years after the initial compliance test as required in 4.3.1 of this permit". In order to link the performance of the abator catalyst material to site-specific conditions, Alcon proposes to conduct an annual engineering evaluation, including testing of the catalyst material, to determine if the catalyst material requires changing. Alcon would retain the results of these engineering evaluations as a recordkeeping requirement of the issued R13 Permit.

*40 CFR 63, Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)*

This permit update involves the operation of a diesel powered reciprocating internal combustion engine. This engine was manufactured after July 1, 2008 and therefore will comply with 40 CFR 63 Subpart ZZZZ by complying with 40 CFR 60 Subpart IIII.



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION  
**DIVISION OF AIR QUALITY**

601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
(304) 926-0475  
[www.dep.wv.gov/daq](http://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):<br>Alcon Research, Ltd.   |  | 2. Federal Employer ID No. (FEIN):<br>75-2824405   |  |
| 3. Name of facility (if different from above):<br>Alcon – Advanced Optic Device Center (AODC) North   |  | 4. The applicant is the:<br><input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH        |  |
| 5A. Applicant's mailing address:<br>6065 Kyle Lane<br>Huntington, WV 25702  |  | 5B. Facility's present physical address:<br>2 Vision Lane<br>Lesage, WV 25537  |  |
| 6. <b>West Virginia Business Registration.</b> Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO<br>– If <b>YES</b> , provide a copy of the <b>Certificate of Incorporation/Organization/Limited Partnership</b> (one page) including any name change amendments or other Business Registration Certificate as <b>Attachment A</b> .<br>– If <b>NO</b> , provide a copy of the <b>Certificate of Authority/Authority of L.L.C./Registration</b> (one page) including any name change amendments or other Business Certificate as <b>Attachment A</b> . |  |  |  |
| 7. If applicant is a subsidiary corporation, please provide the name of parent corporation: Novartis International, AG  |  |  |  |
| 8. Does the applicant own, lease, have an option to buy or otherwise have control of the <i>proposed site</i> ? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO<br>– If <b>YES</b> , please explain:    Alcon owns the site.<br>– If <b>NO</b> , you are not eligible for a permit for this source.   |  |  |  |
| 9. Type of plant or facility (stationary source) to be <b>constructed, modified, relocated, administratively updated</b> or <b>temporarily permitted</b> (e.g., coal preparation plant, primary crusher, etc.): Alcon operates an Advanced Optic Device Center in Lesage, WV. This submittal is made for the operation of an ethylene oxidizer Sterilizer, a natural gas boiler, and an emergency firewater pump.   |  | 10. North American Industry Classification System (NAICS) code for the facility:<br><br>339113   |  |
| 11A. DAQ Plant ID No. (for existing facilities only):<br>011 – 00201  |  | 11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):<br>R13-2820B |  |



*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 I-64, Take exit 18 towards US-60/WV-2, Turn Right at Merritts Creek Connector/WV-193. Travel 3.2 miles to Ohio River Rd/WV-2 and turn right. Travel 8 miles and turn left at Vision Lane.

|  |  |                        |
|--|--|------------------------|
| 12.B. New site address (if applicable):<br>2 Vision Lane<br>Lesage, WV 25537 | 12C. Nearest city or town:<br>Lesage, WV | 12D. County:<br>Cabell |
|--|--|------------------------|

|                                   |                               |                   |
|-----------------------------------|-------------------------------|-------------------|
| 12.E. UTM Northing (KM): 4,270.07 | 12F. UTM Easting (KM): 388.03 | 12G. UTM Zone: 17 |
|-----------------------------------|-------------------------------|-------------------|

13. Briefly describe the proposed change(s) at the facility:  
Installation of third ethylene oxide sterilizer, a natural gas boiler, and a firewater pump.

|  |   |
|--|---|
| 14A. Provide the date of anticipated installation or change: 01/01/2017<br>– If this is an <b>After-The-Fact</b> permit application, provide the date upon which the proposed change did happen:        /        / | 14B. Date of anticipated Start-Up if a permit is granted:<br>01/01/2017 |
|--|---|

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](http://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:

- |   |   |  |
|---|---|--|
| <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 checked="" type="checkbox"/> Indirect Heat Exchanger |  |
| <input checked="" type="checkbox"/> General Emission Unit, specify: Sterilizer Chamber, Fire water pump |   |  |

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L**.

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

- |   |   |  |
|---|---|--|
| <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 type="checkbox"/> Wet Collecting System |

Other Collectors, specify: Catalytic Oxidation Abatement Device

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)?

YES     NO

➤ 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:

- |  |   |
|--|---|
| <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  DATE: 11 OCT 2016  
(Please use blue ink) (Please use blue ink)

|  |                          |  |
|--|--------------------------|--|
| 35B. Printed name of signee: Michelle Dixon                                  |                          | 35C. Title: Plant Manager                            |
| 35D. E-mail:   | 36E. Phone:              | 36F. FAX:  |
| 36A. Printed name of contact person (if different from above): Robbie Louden |                          | 36B. Title: Heath, Safety & Environmental Specialist |
| 36C. E-mail: Robbie.louden@alcon.com   | 36D. Phone: 304-733-1482 | 36E. FAX:  |

**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 checked="" 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 checked="" 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 type="checkbox"/> Attachment S: Title V Permit Revision Information                         |
| <input checked="" type="checkbox"/> Attachment J: Emission Points Data Summary Sheet | <input checked="" 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.**

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 \_\_\_\_\_ DATE: \_\_\_\_\_  
(Please use blue ink) (Please use blue ink)

|  |                          |  |
|--|--------------------------|--|
| 35B. Printed name of signee: Michelle Dixon                                  |                          | 35C. Title: Plant Manager                            |
| 35D. E-mail:   | 36E. Phone:              | 36F. FAX:  |
| 36A. Printed name of contact person (if different from above): Robbie Louden |                          | 36B. Title: Heath, Safety & Environmental Specialist |
| 36C. E-mail: Robbie.louden@alcon.com   | 36D. Phone: 304-733-1482 | 36E. FAX:  |

**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            |
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| <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 type="checkbox"/> Attachment S: Title V Permit Revision Information                         |
| <input checked="" type="checkbox"/> Attachment J: Emission Points Data Summary Sheet | <input checked="" 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.*

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# **Attachment A**



# State of West Virginia



## Certificate

*I, Betty Ireland, Secretary of State of the State of West Virginia, hereby certify that*

**ALCON RESEARCH, LTD.**

**Control Number: 99207**

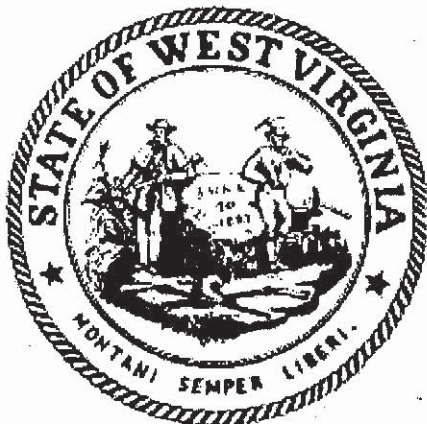
a corporation formed under the laws of Delaware

has filed its "Application for Certificate of Authority" to transact business in West Virginia as required by the provisions of the West Virginia Code. I hereby declare the organization to be registered as a foreign corporation from its effective date of January 11, 2008

Therefore, I issue this

### **CERTIFICATE OF AUTHORITY**

to the corporation authorizing it to transact business in West Virginia



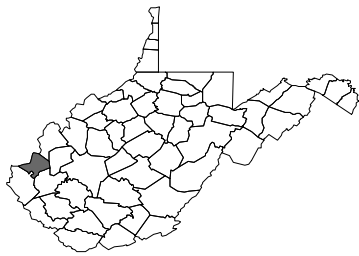
*Given under my hand and the  
Great Seal of the State of  
West Virginia on this day of  
January 11, 2008*

*Betty Ireland*

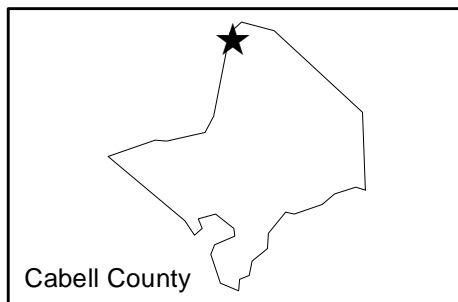
Secretary of State

# **Attachment B**

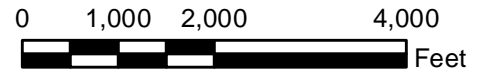




West Virginia



Cabell County



LAT. 38.57200 LON. -82.28500  
 CABELL COUNTY  
 WEST VIRGINIA



USGS 1:24K 7.5' Quadrangle:  
 Athalia, OH

### SITE LOCATION MAP

**Alcon – Advanced Optic Device Center (AODC) North**

Alcon Research Ltd.  
 Cabell County, West Virginia

GIS Review: MC

CHK'D: MC

0356130



Drawn By:  
 SRV-7/7/16

**Environmental Resources Management**

ATTACHMENT B

J:\GIS\Projects\SiteLocation\Map\Alcon Research Ltd - MXD\AttachmentB-Site\_Location\_Map.mxd - 7/7/2016\SRV

# **Attachment C**

## **Attachment C**

### **Schedule of Installation**

The ethylene oxide sterilizer unit will commence construction upon issuance of the updated permit. The natural gas boiler and diesel fire water pump included with this application are after-the-fact emission units and are included for completeness in the issued permit.

# **Attachment D**

## **Attachment D**

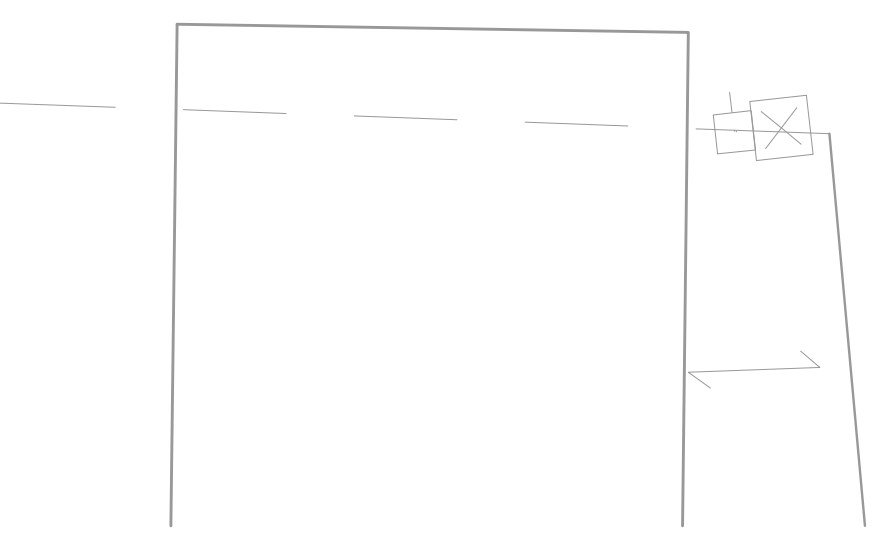
### **Regulatory Discussion**

A state and federal regulatory discussion is included with the introduction to this permit application.

# **Attachment E**

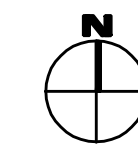
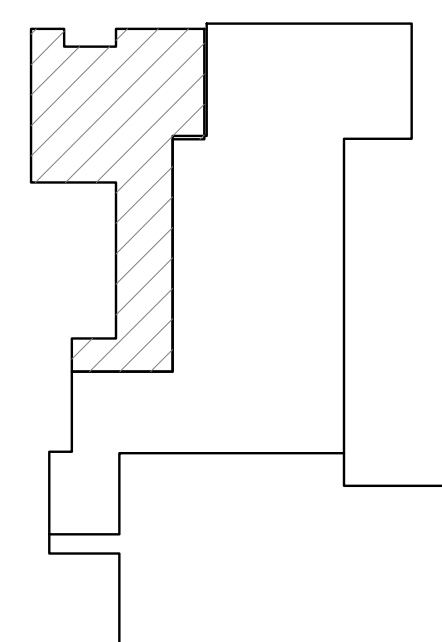


Alcon Research Ltd. Advanced Optic Device Center - North Plant  
Lat - 38.57200; Long - -82.28500  
Elevation - 565 ft



general notes

key plan



| no. | by | description | date |
|-----|----|-------------|------|
|     |    |             |      |
|     |    |             |      |
|     |    |             |      |
|     |    |             |      |

T-CN1  
T-CN2

T-TP1

T-TM1

drawing name

GRUNDSKEEPING  
PLAN

T-PCB

| project title   | date        | T-DA |
|-----------------|-------------|------|
|                 |             |      |
| scale           |             |      |
| reference files | drawn by    |      |
|                 |             |      |
|                 | project no. | T-PN |
|                 |             |      |
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T-PH

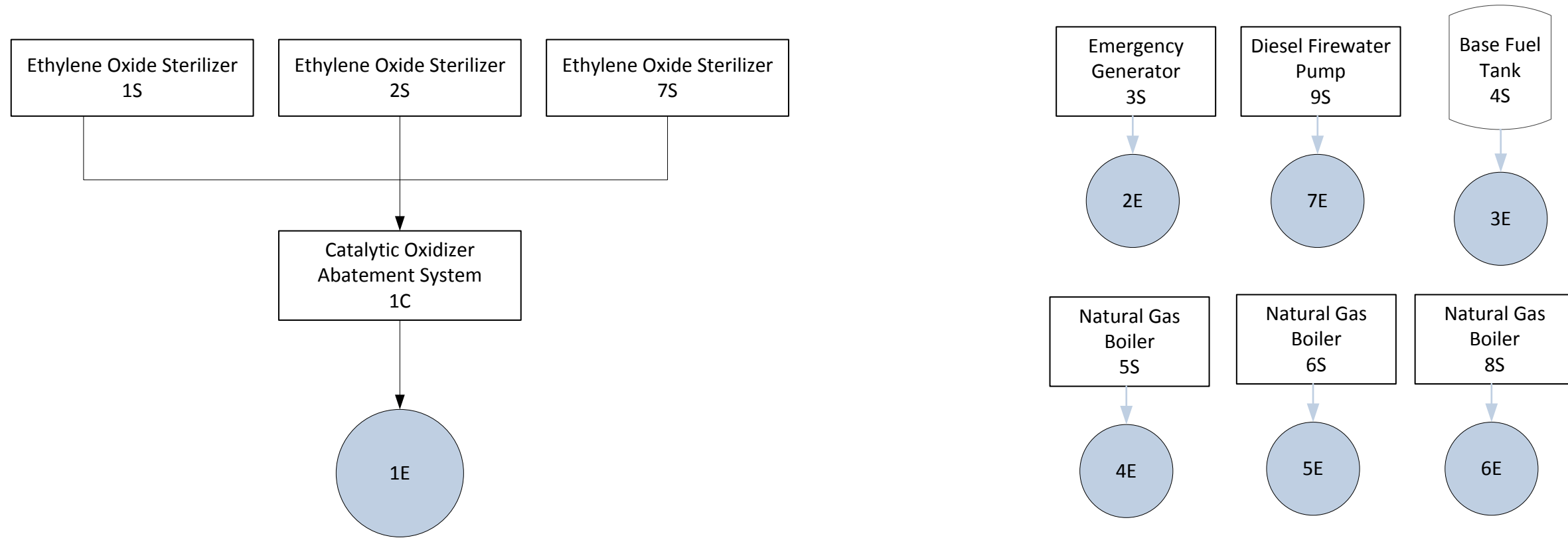
floor/  
section drawing no.

# **Attachment F**



**Coordinates**  
**Latitude:** 38.57200  
**Longitude:** -82.28500  
**Elevation:** 570 ft.  
**Drawn:** 07/11/2016

**Attachment F**  
**Process Flow Diagram**  
**Alcon Optical Device Center - North**



# **Attachment G**

## **Attachment G**

### **Process Description**

The Advanced Optical Device Center North, owned by Alcon Research, Ltd. (Alcon) manufactures ophthalmic products; primarily intraocular lenses and surgical delivery system accessories. Alcon seeks the authority to add an ethylene oxidizer sterilization chamber, a diesel-fired emergency fire water engine, and a natural gas-fired boiler to the facility.

The proposed ethylene oxide sterilization chamber (7S) will be exhausted to the existing catalytic oxidizer abatement device (1C). The catalytic oxidizer abatement device is a current control for the existing ethylene oxide sterilization chamber (1S and 2S) and has the capacity for two (2) additional sterilization chambers. Each sterilization chamber uses no more than sixteen (16) pounds per production cycle of Ethylene Oxide during normal production runs. No more than twenty-five (25) pounds per production cycle of Ethylene Oxide shall be used during special test or development cycles. Each sterilization chamber is capable of performing two (2) cycles per day.

The Ethylene Oxide (100% by weight) is repackaged by Balchem ARC Specialty Products and an SDS is included as Attachment H. At the completion of the ethylene oxide dwell phase of the PLC controlled sterilization cycle, the ethylene oxide is exhausted by vacuum to the catalytic oxidizer abatement system, followed by six (6) washes (three (3) nitrogen and three (3) air) purges. During these purges, the Ethylene Oxide gas is exhausted by vacuum out of the sterilization chamber to the LESNI catalytic Abatement Device. The LESNI Catalytic Abatement Device (1C) is greater than 99.9% efficient for destruction of ethylene oxide.


A process flow diagram is included as Attachment F.

# **Attachment H**

## SAFETY DATA SHEET

|                            |             |     |              |
|----------------------------|-------------|-----|--------------|
| Effective Date: 05-09-2014 | Revision: D | ARC | Language: EN |
|----------------------------|-------------|-----|--------------|

| 1. IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND OF THE SUPPLIER |  |
|---|--|
| 1.1. GHS product identifier.                                      | Ethylene Oxide   |
| Other means of identification.                                    | Oxirane  |
| 1.2. Recommended use and restrictions on use.                     | Recommended: Chemical intermediate for production of anti-freeze, polyester resins, non-ionic surfactants and specialty solvents; sterilizing agent for controlling microorganisms in health care applications; fumigant for controlling insect infestation in whole and ground spices and cosmetics; sterilization of musical wind instruments.<br><br>Advised Against: Consumer use. |
| 1.3. Supplier's details.  | Name: ARC Specialty Products<br>c/o Balchem Corporation<br>Address: 52 Sunrise Park Road<br>New Hampton, NY 10958<br>USA<br>Phone number: +1 845-326-5611<br>Fax number: +1 845-326-5706<br>Internet: <a href="http://www.arcspecialtyproducts.com">www.arcspecialtyproducts.com</a><br>Email: <a href="mailto:sds@balchem.com">sds@balchem.com</a>                                    |
| 1.4. Emergency phone number.                                      | <b>EMERGENCY TELEPHONE</b><br>(24 hrs. / 7 days per week)<br><br>In US: CHEMTREC (800) 424-9300<br>Outside US & Canada: CHEMTREC (703) 527-3887  |

| 2. HAZARDS IDENTIFICATION   |   |
|---|---|
| 2.1. GHS classification of the substance or mixture and any national or regional information. | Flammable Gas 1<br>Pressurized Gas (Liquefied Gas)<br>Carcinogen Category 1B<br>Mutagen Category 1B<br>Acute Toxicity Category 3 (Inhalation); Category 4 (oral)<br>Eye Irritant Category 2A<br>Specific Target Organ Toxicity – Single Exposure 3<br>Skin Irritant 2   |
| 2.2. GHS label elements, including precautionary statements.                                  | Product Label Name: ETHYLENE OXIDE<br>Signal Word: DANGER<br><br><b>Hazard statement:</b><br>H220: Extremely flammable gas.<br>H280: Contains gas under pressure; may explode if heated<br>H302: Harmful if swallowed<br>H315: Causes skin irritation<br>H319: Causes serious eye irritation<br>H331: Toxic if inhaled<br>H335: May cause respiratory irritation<br>H340: May cause genetic defects |

## SAFETY DATA SHEET

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|  |  |
|--|--|
|  | <p>H350: May cause cancer</p> <p><b>Precautionary statement:</b></p> <p>P201: Obtain special instructions before use.</p> <p>P202: Do not handle until all safety precautions have been read and understood.</p> <p>P210: Keep away from heat/sparks/open flames/hot surfaces. — No smoking.</p> <p>P261: Avoid breathing gas/vapours.</p> <p>P264: Wash hands thoroughly after handling.</p> <p>P270: Do not eat, drink or smoke when using this product.</p> <p>P271: Use only outdoors or in a well-ventilated area.</p> <p>P280: Wear protective gloves/protective clothing/ eye protection/face protection.</p> <p>P281: Use personal protective equipment as required.</p> <p>P301;P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.</p> <p>P330: Rinse mouth.</p> <p>P302;P352: IF ON SKIN: Wash with plenty of soap and water.</p> <p>P362: Take off contaminated clothing and wash before reuse.</p> <p>P332;P313: If skin irritation occurs: Get medical advice/attention.</p> <p>P304;P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.</p> <p>P305;P351;P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P337;P313: If eye irritation persists: Get medical advice/attention.</p> <p>P312: Call a POISON CENTER or doctor/physician if you feel unwell.</p> <p>P308;P313: IF exposed or concerned: Get medical advice/attention.</p> <p>P321: Specific treatment: See first aid section of SDS.</p> <p>P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.</p> <p>P381: Eliminate all ignition sources if safe to do so.</p> <p>P403;P233: Store in a well-ventilated</p> |
|--|--|

## SAFETY DATA SHEET

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|   |  |   |
|---|--|---|
|   | <p>P405:<br/>P410;P403:</p> <p>P501:</p> | <p>place. Keep container tightly closed.<br/>Store locked up.<br/>Protect from sunlight. Store in a well-ventilated place.<br/>Dispose of contents/container in accordance with local/regional/national/international regulation.</p> |
| 2.3. Other hazards which do not result in classification or are not covered by the GHS. | EUH006:                                  | Explosive with or without contact with air.   |

|   |   |                       |                 |
|---|---|-----------------------|-----------------|
| <b>3. COMPOSITION/INFORMATION ON INGREDIENTS</b>  |   |                       |                 |
| <b>3.1. Substance:</b>  |   |                       |                 |
| Chemical identity.  | Ethylene Oxide  |                       |                 |
| Common name, synonyms, etc.   | Oxirane, EO, EtO, Dihydroxirene, 1-2 Epoxyethane, Dimethylene Oxide, Oxane, Oxirane, Alpha/Beta-Oxidoethane, Oxacyclopropane                            |                       |                 |
| CAS number, EC number, etc.   | CAS#: 75-21-8; EC#: 200-849-9 (from EINECS)<br>Chemical Family: Epoxide<br>Formula: (CH <sub>2</sub> ) <sub>2</sub> O<br>Molecular Weight: 44.053 g/mol |                       |                 |
| Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance.   | Contains no other components or impurities which will influence the classification of the product.  |                       |                 |
| <b>3.2. Mixture:</b>  |   |                       |                 |
| The chemical identity and concentration or concentration ranges of all ingredients which are hazardous within the meaning of the GHS and are present above their cutoff levels. | <b>Chemical Identity:</b>   | <b>Concentration:</b> | <b>CAS No.:</b> |
|   | No applicable information found (i.e. material is not a mixture).   |                       |                 |

|   |   |
|---|---|
| <b>4. FIRST AID MEASURES</b>            |   |
| 4.1. Description of first aid measures. | <p><b>EYE CONTACT:</b> Immediately flush eyes, including the entire surface of the eyes and under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Obtain medical attention immediately. <b>NOTE: Never wear contact lenses when working with ethylene oxide.</b></p> <p><b>SKIN CONTACT:</b> Immediately flush skin thoroughly with water for at least 15 minutes while removing contaminated clothing and shoes. Obtain medical attention immediately. Treat for possible cryogenic injury, if needed by warming affected areas with tepid water (wrap with a blanket if lukewarm water is not available). Wash clothing before reuse and discard contaminated leather articles such as shoes and belts.</p> <p><b>INHALATION:</b> Remove exposed person to fresh air. If</p> |

## SAFETY DATA SHEET

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| Effective Date: 05-09-2014   | Revision: D   | ARC | Language: EN |
|  | <p>breathing has stopped, give artificial respiration then have qualified personnel administer oxygen, if needed. Get immediate medical attention.</p> <p><u>INGESTION:</u> If patient is conscious give plenty of water (minimum of two glasses) but <b>DO NOT INDUCE VOMITING</b>. This material is corrosive. Keep head lower than hips to avoid aspiration, should vomiting occur. Get medical attention immediately.</p> <p><u>MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:</u><br/>Preexisting skin, eye and respiratory disorders; lung, blood, nervous system and peripheral nerve disorders.</p> |     |              |
| 4.2. Most important symptoms/effects.  | <p><u>SIGNS AND SYMPTOMS OF OVEREXPOSURE:</u><br/>Effects include skin, eye and respiratory tract irritation or burns. Central nervous system effects initially cause headache, dizziness and nausea and in extreme cases, unconsciousness and death. Peripheral nerve damage may result in muscular weakness, giddiness, irrational behavior and loss of sensation in the extremities. Dulling of the sense of smell may occur.</p>  |     |              |
| 4.3. Indication of immediate medical attention and special treatment needed, if necessary. | <p><u>NOTE TO PHYSICIANS:</u> Respiratory symptoms include nausea, vomiting and irritation of the nose and throat. Pulmonary edema may occur. Respiratory effects may be delayed. Consider oxygen administration. If a chemical burn is present, decontaminate skin and treat as any thermal burn. No specific antidote is known, however consider gastric lavage and administration of a charcoal slurry.</p>  |     |              |
| <b>5. FIREFIGHTING MEASURES</b>  |   |     |              |
| 5.1. Suitable (and unsuitable) extinguishing media.  | <p><u>EXTINGUISHING MEDIA:</u> Carbon dioxide, dry chemical or water spray for small fires. Water spray, polymer or alcohol resistant foams for large fires. Dilution of liquid ethylene oxide with 22 volumes of water should render it non-flammable. Dilution with 100 parts water to one part of ethylene oxide vapor may be required to control build up of flammable vapors in closed systems. Water spray can be used to reduce flame intensity, cool fire-exposed containers and dilute spills to render non-flammable.</p>   |     |              |
| 5.2. Specific hazards arising from the chemical.   | <p><u>EMERGENCY OVERVIEW:</u> Colorless liquid or heavier-than-air gas with a sweet, ether-like odor. Extremely flammable liquefied gas which burns in the absence of oxygen and can explode when exposed to elevated temperatures. Toxic when inhaled. Causes severe skin and eye irritation or burns and respiratory tract irritation; effects may be delayed. Harmful if swallowed or absorbed through the skin. Contact with liquid may cause frostbite.</p> <p><u>Statement of Hazards:</u> DANGER! Extremely flammable</p>  |     |              |



## SAFETY DATA SHEET

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|  |   |
|--|---|
|  | <p>liquid and gas under pressure. May form explosive mixtures with air. Highly Reactive. Harmful or fatal if inhaled and may cause delayed lung injury, respiratory system and nervous system damage. Inhalation may cause dizziness or drowsiness. Liquid contact may cause frostbite. May cause allergic skin reaction. Harmful if swallowed. May cause adverse blood effects, liver and kidney damage based on animal data. Cancer and reproductive hazard.</p> <p>HAZARD RATINGS: (0 = minimum; 4 = maximum)</p> <p><u>HMIS Rating:</u> Health = 3<br/>Flammability = 4<br/>Reactivity = 3<br/>Personal Protection Code = X<br/>(Consult your supervisor or standard operating procedures for special handling directions.)</p> <p><u>NFPA Rating:</u> Health = 3<br/>Flammability = 4<br/>Reactivity = 3</p> <p><u>UNUSUAL FIRE AND EXPLOSION HAZARDS:</u><br/>Ethylene oxide is dangerously explosive under fire conditions; it is flammable over an extremely large range of concentrations in air and burns in the absence of oxygen. Liquid ethylene oxide is lighter than water (floats) and vapors are heavier than air and may travel along ground long distances to sources of ignition, and then flash back. Avoid storage at warm temperatures [around 100 °F (38 °C)] in order to prevent polymerization. Do not store at temperatures above 125 °F (52 °C) under any circumstances. Containers are fitted with metallic plugs which melt and release contents when temperature increases to a range of 157-170 °F (69-77 °C). Vapors are extremely flammable and are readily ignited by static charge, sparks and flames at concentrations above 2.6%.</p> |
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## SAFETY DATA SHEET

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|--|--|
| <p>5.3. Special protective equipment and precautions for firefighters.</p> | <p><b>SPECIAL FIRE-FIGHTING PROCEDURES:</b> Wear NIOSH-approved self-contained breathing apparatus (SCBA) operated in the pressure-demand mode and full chemical-resistant protective clothing. Evacuate all personnel from danger area and keep upwind. Immediately cool containers with water spray from maximum safe distance. Stop flow of gas, if without risk, while continuously cooling containers with water. Do not extinguish flames unless flow is stopped, since explosive re-ignition can occur. Remove containers from fire area, if without risk. Refer to the most current edition of the "North American Emergency Response Guidebook" for isolation and evacuation distances.</p> |
|--|--|

|  |  |
|--|--|
| <b>6. ACCIDENTAL RELEASE MEASURES</b>  |  |
| <p>6.1. Personal precautions, protective equipment and emergency procedures.</p> | <p><b>PRECAUTIONS:</b> Treat any ethylene oxide leak as an emergency. All cleanup personnel must wear full protective equipment. Evacuate all personnel from the area except those directly engaged in stopping the leak or in cleaning up.</p>  |
| <p>6.2. Environmental precautions.</p>   | <p><b>ENVIRONMENTAL:</b> Dike runoff water, if possible, to prevent contaminated water from entering sewers, ditches, streams and ponds. It is mandatory to call the National Response Center (800-424-8802) if 10 pounds (4.54 kg) or more is spilled or released to the environment.</p> |
| <p>6.3. Methods and materials for containment and cleaning up.</p>               | <p><b>SPILL CLEANUP:</b> Eliminate all ignition sources if this can be done safely. Ethylene oxide/air mixtures ignite readily and may detonate. Use water fog or spray to disperse vapors. Flood spill with water spray to dilute and render non-flammable.</p>                           |

|   |  |
|---|--|
| <b>7. HANDLING AND STORAGE</b>  |  |
| <p>7.1. Precautions for safe handling.</p>                                | <p><b>HANDLING AND STORAGE PRECAUTIONS:</b> Wear all recommended protective clothing and devices when handling this material. Have established handling and emergency response procedures in place prior to use. Ground and bond shipping container, transfer line, and receiving container. Protect containers from physical damage and regularly inspect them for cracks, leaks or faulty valves.</p>  |
| <p>7.2. Conditions for safe storage, including any incompatibilities.</p> | <p><b>STORAGE SEGREGATION:</b> Store ethylene oxide in a cool, dry, well-ventilated area away from incompatible chemicals and sources of ignition. Store cylinders and drums upright; secure containers tightly; do not drag or slide; and move in a carefully supervised manner with a suitable hand truck. <b>DO NOT STORE IN DIRECT SUNLIGHT.</b></p> <p><b>SHIPPING AND STORAGE CONTAINERS:</b> (See 49 CFR 173.323) Ethylene oxide is shipped and stored in UN 1A1 specification drums and DOT specification drums and cylinders. Nitrogen must be charged into the container after filling with ethylene oxide, bringing the</p> |

## SAFETY DATA SHEET

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|  |  |
|--|--|
|  | <p>total container pressure up to 50 psig. Before returning container to supplier, pressurize container with nitrogen to 50 psig total pressure; close valves and replace valve plugs tightly in outlets. <b>Check container valves and plugs for leaks prior to shipment.</b> In addition, please refer to the most current edition of NFPA Publication 55, 'Compressed Gases and Cryogenic Fluids Code.'</p> <p><b>INCOMPATIBILITIES:</b> Ethylene oxide is very reactive. Runaway exothermic polymerization reactions can result from contamination with amines, ammonia, water, acids, bases, metal chlorides, metal oxides, metallic potassium, mercaptans, alcohols, oxidizers and many other organic and inorganic materials.</p> |
|--|--|

| 8. EXPOSURE CONTROLS/PERSONAL PROTECTION |  |                                |                                 |                                 |
|--|--|--------------------------------|---------------------------------|---------------------------------|
| 8.1. Control parameters.                 | Exposure Limits  |                                |                                 |                                 |
|  | SOURCE   | TWA (8-hr)                     | STEL (15-min)                   | OTHER                           |
|  | OSHA   | 1 ppm                          | 5 ppm (9 mg/m <sup>3</sup> )    | 0.5 ppm action level (8-hr TWA) |
|  | ACGIH  | 1 ppm (1.8 mg/m <sup>3</sup> ) | No applicable information found | 800 ppm IDLH                    |
| 8.2. Appropriate engineering controls.   | <p><b>ENGINEERING CONTROLS:</b> Ethylene oxide, a major fire hazard, can burn in the absence of oxygen. All electrical devices used in areas processing or handling ethylene oxide must be engineered and designed to the applicable local electrical/fire codes. Safeguards can include designing electrical devices as explosion-proof and/or intrinsically safe. When considering engineering controls, users of ethylene oxide should consult the current edition of NFPA 55 (Compressed Gases and Cryogenic Fluids Code, Section 14: Storage, Handling and Use of Ethylene Oxide for Sterilization and Fumigation). Sterilization facilities should consult NIOSH Publication NO. 2007-164 (Alert: Preventing Worker Injuries and Deaths from Explosions in Industrial Ethylene Oxide Sterilization Facilities).</p> <p><b>VENTILATION:</b> Install and operate general and local exhaust ventilation systems powerful enough to maintain airborne levels of ethylene oxide below the OSHA PEL in the worker's breathing area. Ventilation systems must be of maximum explosion-proof design. Emission controls must be in compliance with Federal, State and local regulations.</p> <p><b>SAFETY SHOWERS:</b> Have eyewash stations, emergency deluge showers, and washing facilities available in all work areas.</p> |                                |                                 |                                 |

## SAFETY DATA SHEET

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|   |   |
|---|---|
|   | <p><b>OTHER PROTECTION:</b> Design all engineering systems to be explosion-proof in any area where this gas may be present. Container and system must be electrically grounded/bonded before unloading. Practice good personal hygiene; always wash thoroughly after using this material. Do not eat, drink or smoke in work area.</p>  |
| 8.3. Individual protection measures, such as personal protective equipment. | <p><b>RESPIRATORY PROTECTION:</b> Refer to OSHA respirator regulations cited at 29 CFR 1910.134 and 29 CFR 1910.1047. Wear a NIOSH-approved full facepiece respirator for routine use situations where atmosphere is at or above OSHA's Action Level. Do not exceed the maximum use conditions of the respirator. For emergency or non-routine uses where concentrations are unknown, wear an SCBA with a full facepiece operated in the pressure-demand or positive pressure mode.</p> <p><b>EYE PROTECTION:</b> Always wear chemical safety glasses. If splashing may occur, wear a full face shield as a supplementary protective measure over safety glasses. <b>NEVER WEAR CONTACT LENSES</b> when working with ethylene oxide.</p> <p><b>SKIN PROTECTION:</b> Wear impervious gloves (see <a href="http://www.ethyleneoxide.com">www.ethyleneoxide.com</a> for permeation data); boots; aprons; head cover; and clean impervious body-covering clothing to prevent any possibility of skin contact. Launder contaminated clothing and discard contaminated leather shoes, belts, etc.</p> |

|   |  |
|---|--|
| <b>9. PHYSICAL AND CHEMICAL PROPERTIES</b>                  |  |
| 9.1. Information on basic physical and chemical properties. |  |
| Appearance (physical state, color, etc.).                   | Colorless liquid or gas  |
| Corrosivity   | Not Corrosive  |
| Odor.   | Sweet ether-like   |
| Odor threshold.   | 261 ppm – detectable<br>500 to 700 ppm - recognizable                      |
| pH.   | 7, neutral (100 g/L in water)  |
| Melting point/freezing point.                               | -169 °F (-112 °C)  |
| Initial boiling point and boiling range.                    | 50.7 °F (10.4 °C)  |
| Flash point.  | Tag Closed Cup: < 0 °F (< -18 °C)  |
| Evaporation rate.   | 100% volatile by volume  |
| Flammability (solid, gas).                                  | Flammable  |
| Upper/lower flammability or explosive limits.               | Upper flammable limit: 100% vol/vol<br>Lower flammable limit: 2.6% vol/vol |
| Vapor pressure.   | 1095 mmHg @ 20 °C  |
| Vapor density.  | 1.5 (Air = 1)  |
| Relative density.   | 0.875 at 20 °C   |
| Solubility (ies).   | 100% in water  |
| Partition coefficient: n-octanol/water.                     | -0.3   |
| Autoignition temperature.                                   | 833 °F (445 °C); Burns in the absence of air                               |
| Decomposition temperature.                                  | ~932 °F (~773 °K)  |
| Viscosity.  | 0.255 centipoise at 80 °F  |

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| Oxidizing properties.   |   | Not an oxidizer |              |
| <b>10. STABILITY AND REACTIVITY</b>   |   |                 |              |
| 10.1. Reactivity.   | Not reactive under normal conditions. Under abnormal conditions (for example external heating, contamination), thermal decomposition and runaway polymerization can occur and may lead to explosion.  |                 |              |
| 10.2. Chemical stability.   | <u>STABILITY</u> : Material is stable for extended periods in closed, airtight, pressurized containers at room temperature, under normal storage and handling conditions. Vapors may explode when exposed to common ignition sources. In the presence of catalysts, polymerization and decomposition of liquid may occur and is accelerated at temperatures above 800 °F (426 °C).  |                 |              |
| 10.3. Possibility of hazardous reactions.   | <u>HAZARDOUS POLYMERIZATION</u> : Dangerous exothermic polymerization reaction can occur when ethylene oxide is contaminated or when heated.  |                 |              |
| 10.4. Conditions to avoid (e.g., static discharge, shock or vibration).                           | <u>CONDITIONS TO AVOID</u> : Avoid storage at warm temperatures [around 100 °F (38 °C)] in order to prevent polymerization. Do not store at temperatures above 125 °F (52 °C) under any circumstances. Avoid contact of ethylene oxide with incompatible chemicals to avoid highly exothermic polymerization reaction. Prevent exposure to all sources of ignition such as heat, flame, lighted tobacco products or electrical or mechanical sparks.  |                 |              |
| 10.5. Incompatible materials.   | See section 7.2   |                 |              |
| 10.6. Hazardous decomposition products.   | <u>HAZARDOUS DECOMPOSITION PRODUCTS</u> : Ethylene oxide undergoes thermal decomposition to form carbon dioxide and carbon monoxide gases.  |                 |              |
| <b>11. TOXICOLOGICAL INFORMATION</b>  |   |                 |              |
| 11.1. Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact); | <u>PRIMARY ROUTES OF EXPOSURE</u> : Inhalation; eye contact; skin contact/absorption.   |                 |              |
| 11.2. Symptoms related to the physical, chemical and toxicological characteristics;               | <p><b>ACUTE HEALTH EFFECTS:</b></p> <p><u>INHALATION</u>: Inhaling concentrated vapor may cause serious health effects, possibly death. Inhalation may progressively cause mucous membrane and respiratory irritation, headache, vomiting, cyanosis, drowsiness, weakness, loss of coordination, CNS depression, lachrymation, nasal discharge and salivation, gasping, and labored breathing. Delayed effects may include nausea, diarrhea, edema of the lungs, paralysis, convulsions and possibly death. NOTE: Ethylene oxide has a high odor threshold (&gt; 250 ppm) and the sense of smell does not provide adequate protection against its toxic effects.</p> <p><u>EYE CONTACT</u>: Liquid ethylene oxide is severely irritating and corrosive to the eyes and contact can cause swelling of the conjunctiva and irreversible corneal injury.</p> |                 |              |

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|  | <p>Contact with liquid ethylene oxide can cause frostbite. Vapors may cause eye irritation, tearing, redness and swelling of the conjunctiva.</p> <p><b>SKIN CONTACT:</b> Prolonged contact with liquid ethylene oxide can cause a local erythema, edema, and formation of blisters. Response is more severe on damp skin. There may be a latency period of several hours prior to the onset of symptoms. Ethylene oxide may be absorbed by the skin, and sustained contact may produce adverse effects such as headache, dizziness, nausea and vomiting. Ethylene oxide is a skin sensitizer and some individuals may suffer an allergic skin reaction. Skin contact may also cause allergic contact dermatitis in some exposed individuals. Liquid ethylene oxide evaporates rapidly and may chill the skin causing frostbite.</p> <p><b>INGESTION:</b> This relatively unlikely route of exposure is expected to cause severe irritation and burns of the mouth and throat, abdominal pain, nausea, vomiting, collapse and coma. Aspiration may occur during swallowing or vomiting, resulting in lung damage.</p>   |     |              |
| 11.3. Delayed and immediate effects and also chronic effects from short- and long-term exposure; | <p><b>CHRONIC HEALTH EFFECTS:</b></p> <p><b>SKIN CONTACT:</b> Long term effects are unknown but are expected to be similar to acute effects of skin exposure.</p> <p><b>EYE CONTACT:</b> Some cases of cataract formation have been reported.</p> <p><b>INHALATION:</b> Respiratory irritation which can result in permanent lung injury, chromosomal aberrations and peripheral neurotoxic effects with a numbing of the sense of smell. Cognitive and CNS impairment may result from long term exposures.</p> <p><b>INGESTION:</b> May cause anemia, gastrointestinal irritation, effects on liver, kidneys, and adrenal glands.</p> <p><b>CARCINOGENICITY:</b><br/> <b>OSHA</b> classifies ethylene oxide as a cancer/reproductive hazard and considers that, at excessive levels, ethylene oxide may present reproductive, mutagenic, genotoxic, neurologic and skin sensitization hazards.<br/> <b>ACGIH</b> classifies ethylene oxide as "A2" - suspected human carcinogen.<br/> <b>NTP</b> classifies ethylene oxide as a known human carcinogen.<br/> <b>IARC</b> classifies ethylene oxide in Group I (carcinogenic to humans).<br/> <b>NIOSH</b> classifies ethylene oxide as a potential human carcinogen.</p> |     |              |

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| <p>11.4. Numerical measures of toxicity (such as acute toxicity estimates).</p> | <p><u>TOXICOLOGICAL - ACUTE INHALATION:</u><br/> <math>LC_{50}</math> (1 hr. exposure)<br/>         5748 ppm (male rat)<br/>         4439 ppm (female rat)<br/>         5029 ppm (rat - combined sexes)<br/>         Various mammalian species exposed to lethal concentrations of ethylene oxide had symptoms of mucous membrane irritation, central nervous system depression, lacrimation, nasal discharge, salivation, nausea, vomiting, diarrhea, respiratory irritation, loss of coordination and convulsions.</p> <p><u>TOXICOLOGICAL - CHRONIC INHALATION:</u><br/>         Symptoms of chronic exposure are similar to those observed in acute studies, including lung, kidney and liver damage and testicular tubule degeneration in some species. Studies demonstrated neuromuscular effects as the most sensitive indicator of ethylene oxide overexposure.</p> <p><u>TOXICOLOGICAL - ACUTE DERMAL:</u> No dermal <math>LD_{50}</math> information is available on this product. It is expected to be corrosive to rabbit skin.</p> <p><u>TOXICOLOGICAL - CHRONIC DERMAL:</u> No chronic dermal toxicity data are available on this product.</p> <p><u>TOXICOLOGICAL - EYE:</u> No eye irritation animal data are available on this product; however, it is expected to be extremely irritating to rabbit eyes.</p> <p><u>TOXICOLOGICAL - ACUTE INGESTION:</u> The acute oral <math>LD_{50}</math> for this product is: 330 mg/kg, rat.</p> <p><u>TOXICOLOGICAL - CHRONIC INGESTION:</u> The effects of chronic ingestion of this product are unknown.</p> <p><u>CARCINOGENICITY:</u> A recent assessment of available epidemiology studies related to ethylene oxide concluded that the evidence indicates that ethylene oxide does not cause heart disease, an excess of cancers overall, or brain, stomach or pancreatic cancers which were seen in some animal and isolated human studies. The findings with respect to leukemia and non-Hodgkin's lymphoma are less definitive. While the majority of the evidence does not indicate that ethylene oxide causes these cancers, there are some suggestive trends. A longer follow-up of ethylene oxide was completed in 2004 to better clarify these relationships. NIOSH reported no overall elevated risk for any type of cancer or other diseases as compared to the general population, however, among those workers with very high ethylene oxide exposure (combination of exposure level and years worked); there was evidence of an elevated risk for blood</p> |
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|  | <p>cancers among men and breast cancer among women. Two inhalation studies with rats demonstrated carcinogenic responses consisting of increased incidences of mononuclear cell leukemia, peritoneal mesotheliomas, and primary brain tumors. In 2-year inhalation studies with mice there was evidence of carcinogenic activity as indicated by dose-related incidences of benign or malignant neoplasms of the uterus, mammary gland, and hematopoietic system (lymphoma).</p> <p><b>MUTAGENICITY:</b> While ethylene oxide has demonstrated, in epidemiological studies with exposed workers, an increased incidence of chromosomal aberrations and sister chromatid exchanges, the relevance of such effects to human health hazard evaluation is currently uncertain. In rodent studies, dose related exposure to ethylene oxide induces increases in numbers of adducts in DNA and hemoglobin. Laboratory studies with mice have shown that acute exposure to ethylene oxide at 300 ppm and above caused testicular injury as evidenced by concentration-related increased embryonic deaths following mating of exposed males to non-exposed females (Dominant-Lethal Test).</p> <p><b>NEUROTOXICITY:</b> Effects are similar to those of acute (short term) exposure, namely, headaches, nausea, diarrhea, lethargy and irrational behavior. Muscle weakness, loss of sensation in the extremities and a reduction in the sense of smell and/or taste may also result. Studies on workers indicate that CNS and cognitive impairment may result from chronic exposures to ethylene oxide.</p> <p><b>REPRODUCTIVE EFFECTS:</b> Some limited epidemiological data suggests that women exposed to ethylene oxide have a greater incidence of miscarriage. A one-generation reproduction study in rats showed decreased numbers of pups at 100 ppm but not at 33 ppm. In a two-generation reproduction study involving exposure of rats to ethylene oxide vapor for 6 hrs/day, 5 days/week, there was parental toxicity at 33 ppm and 100 ppm. Post implantation losses with reduction in litter size and offspring body weight were found at 33 ppm and 100 ppm. The no-observable effect concentration for adult toxicity, offspring effect and reproductive effect was 10 ppm.</p> <p><b>TERATOLOGY:</b> Inhalation development toxicity studies with rats exposed to ethylene oxide vapor at concentrations of 50 ppm, 125 ppm and 225 ppm showed that maternal toxicity occurred at 125 and 225 ppm. Fetotoxicity, evidenced by reduced fetal body weight, occurred at all concentrations. At 225 ppm and</p> |
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|  | <p>to a lesser extent at 125 ppm an increased incidence of skeletal variants was found. There was no evidence of embryotoxicity or malformations.</p> <p><b>TARGET ORGANS:</b> Overexposure to this product may affect the skin, eyes, respiratory system, liver, kidneys, brain, blood, reproductive system and central nervous system.</p> |
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| <b>12. ECOLOGICAL INFORMATION</b>                             |  |
| 12.1. Ecotoxicity (aquatic and terrestrial, where available). | <p><b>AQUATIC TOXICITY:</b><br/>Acute 96-hr. LC<sub>50</sub> data:<br/>57-84 mg/L, fathead minnow (<i>Pimephales promelas</i>)<br/>90 mg/L, goldfish (<i>Carassius auratus</i>)<br/>137-300 mg/L, water flea (<i>Daphnia magna</i>)<br/>Material is slightly toxic to marine invertebrates.<br/>48 hr. LC<sub>50</sub> in brine shrimp: 490 mg/L</p>   |
| 12.2. Persistence and degradability.                          | <p><b>CHEMICAL FATE INFORMATION:</b><br/>BOD<sub>5</sub>: 0.35 p/p.<br/>BOD<sub>10</sub>: 1.1 p/p.<br/>BOD<sub>20</sub>: 1.3 p/p.</p>  |
| 12.3. Bioaccumulative potential.                              | <p>Log octanol/water partition coefficient (log Kow) is low. Partitioning from water to oil is low. Bioconcentration is not expected to occur due to high water solubility and a low log Kow. Ethylene oxide hydrolyzes to ethylene glycol. Biodegradation of ethylene oxide occurs at a moderate rate after acclimation (3-20% degradation after 5 days; 70% after 20 days). Biodegradation is expected in a wastewater treatment plant. Ethylene oxide has an estimated half life in the atmosphere of 105 days. EO does not readily absorb into sediments or soils and does not persist in soils; if absorbed, soil organisms will over time convert EO to glycols eliminating any persistence in the soil.</p> |
| 12.4. Mobility in soil.                                       | EO does not readily absorb into sediments or soils.  |
| 12.5. Results of PBT and vPvB                                 | No applicable information found.   |
| 12.6. Other adverse effects.                                  | No applicable information found.   |

|   |   |
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| <b>13. DISPOSAL CONSIDERATIONS</b>  |   |
| 13.1. Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging. | <p><b>WASTE MANAGEMENT/DISPOSAL:</b> When disposed, ethylene oxide is a RCRA hazardous waste with waste code U115 (Commercial chemical product - listed for toxicity and ignitability). Waste ethylene oxide may be incinerated in an approved hazardous waste incinerator or can be biologically treated in an approved facility. <b>DO NOT INCINERATE ANY ETHYLENE OXIDE CONTAINERS.</b> Ethylene oxide is banned from land disposal. Dispose of waste materials in accordance with all applicable Federal, State and local laws and regulations.</p> |

|                                  |                |
|----------------------------------|----------------|
| <b>14. TRANSPORT INFORMATION</b> |                |
| 14.1. UN number.                 | UN 1040        |
| 14.2. UN proper shipping name.   | Ethylene Oxide |

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| 14.3. Transport hazard class (es).  | <p><u>DOT</u><br/>Primary: 2.3 (Poison Gas);<br/>Secondary: 2.1 (Flammable Gas)<br/>Poison-Inhalation Hazard Zone D<br/>Reportable Quantity 10 lb (4.54 kg)</p> <p><u>IMO</u><br/>Primary: 2.3 (Toxic Gas);<br/>Secondary: 2.1 (Flammable Gas)</p> <p><u>TDG (from or within Canada)</u><br/>Primary: 2.3 (Toxic Gas);<br/>Secondary: 2.1 (Flammable Gas)</p> <p>Shipments of residual amounts of ethylene oxide are considered hazardous material. All facilities shipping or receiving ethylene oxide are subject to registration as a shipper of hazardous material (49 CFR 107, Subpart G). All facilities handling ethylene oxide must also maintain a written security plan (49 CFR 172.00 – 804, 49 CFR 172.704)</p> |     |              |
| 14.4. Packing group, if applicable.   | Not applicable  |     |              |
| 14.5. Marine pollutant (Yes/No).  | No  |     |              |
| 14.6. Special precautions which a user needs to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises. | See Section 7.2   |     |              |
| 14.7. Transportation in bulk according to Annex II of MARPOL 73/78 and the IBC Code.  | Product is not supplied in bulk   |     |              |

## 15. REGULATORY INFORMATION

15.1. Safety, health and environmental regulations specific for the product in question.

|                    |         |   |
|--------------------|---------|---|
| <b>US Federal:</b> | CERCLA: | Section 103: Reportable Quantity – 10 lb (40 CFR 302.4)   |
|                    | CWA:    | Release into a waterway may require reporting to the National Response Center @ 800-424-8802 (40 CFR 116.4).  |
|                    | FIFRA   | <p>If this chemical is a pesticide product registered by the United States Environmental Protection Agency, it is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets (SDS), and for workplace labels of non-pesticide chemicals. The hazard information required on the pesticide label is reproduced below. The pesticide label also includes other important information, including directions for use.</p> <p><u>EPA Registration No. 36736-2 and EPA Registration No. 36736-8</u><br/><b>DANGER!</b> Causes eye and skin burns. Harmful if inhaled. May cause nervous system damage. Cancer hazard and reproductive hazard. May be fatal if inhaled in high concentrations. May cause irritation of the respiratory tract. May cause immediate or delayed skin irritation or blisters. May cause allergic skin reaction. Do not breathe vapor.<br/>Highly flammable liquid and gas under pressure.</p> |
|                    | RCRA:   | If discarded in purchased form, this product is a listed and characteristic hazardous waste. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal whether a material containing the product or derived from the product should be classified  |

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|                            |   | as a hazardous waste (40 CFR 261.20-24).  |              |
|                            | RMP:  | Listed under the EPA Chemical Accidental Prevention Provisions (Risk Management Plan: 40 CFR 68.130) as a Toxic with a 10000 lb Threshold Quantity  |              |
|                            | SARA TITLE III:   | Section 302 Extremely Hazardous Substances – Listed; 1000 lb Threshold Planning Quantity (40 CFR 355 Appendix A)<br>Section 304 – Listed 10 lb Reportable Quantity (40 CFR 302.4)<br>Section 311/312 Hazard Categories – Acute, Chronic, Fire, Reactive, Sudden Release (40 CFR 370.66)<br>Section 313 Toxic Chemicals – Listed (40 CFR 372.65) |              |
|                            | TSCA:   | On TSCA inventory.  |              |
|                            | Other EPA   | EPA list of Hazardous Air Contaminants: Listed<br>EPA Organic Hazardous Air Pollutant (HAP) list (40 CFR 61.01): Listed<br>EPA list of Pesticide Chemicals (40 CFR 180.151): Listed<br>EPA NESHAPS (40 CFR 63.360)<br>VOC Rule: 100% VOC  |              |
|                            | FDA/USDA:   | Not applicable.   |              |
|                            | OSHA:   | This product is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.<br>Ethylene Oxide Standard 29 CFR 1910.1047  |              |
|                            | Other OSHA:   | Listed under the Process Safety Management standard (29 CFR 1910.119) with 5000 lb Threshold Quantity.  |              |
| <b>US State:</b>           | California Proposition 65: Listed; cancer hazard; reproductive hazard<br>California Director's List: Listed<br>Florida Hazardous Substance List: Listed<br>Massachusetts Extraordinarily Hazardous Substance List: Listed<br>Minnesota Hazardous Substance List: Listed<br>New Jersey Hazardous Substance List: Listed sn 0882<br>(Special Hazardous Substance; Environmental Hazardous Substance)<br>Pennsylvania Right-to-know List: Listed |   |              |
| <b>Canadian:</b>           | DSL:  | Listed as Oxirane (published 5 April 1994)  |              |
|                            | WHMIS:  | Ingredient Disclosure List: Listed 0.1%, item 725 (1310)<br>Classification: A; B1; D1A; D2A; D2B; F<br>This MSDS complies with the Canadian Controlled Product Regulations.   |              |
| <b>EU:</b>                 | CLP:  | This product is not sold into the European Union.   |              |
|                            | EINECS:   |   |              |
|                            | REACH:  |   |              |
|                            | Safety Data Sheets:   |   |              |

## 16. OTHER INFORMATION INCLUDING INFORMATION ON PREPARATION AND REVISION

|                            |   |   |
|----------------------------|---|---|
| <b>Last Revision Date:</b> | See top of each page under 'Effective Date' |   |
| <b>Reason for Issue:</b>   | Rev A supersedes Rev. 22 Jul 2009           | Reformatted per OSHA GHS. Added part 10.1. Changed 11.4 Acute Ingestion LD50 from 72 to 330 mg/kg (no evidence located to support 72; web review, including IPCS. 2003. Ethylene Oxide. Geneva, World Health Organization, International Program on Chemical Safety, Concise International Chemical Assessment Document 54, p 1-57. <a href="http://www.inchem.org/documents/cicads/cicads/cicad54.htm">http://www.inchem.org/documents/cicads/cicads/cicad54.htm</a> . |
|                            | B   | Correct flash point temperature from 18°C to -18°C  |
|                            | C   | Remove Canutec phone contact information  |
|                            | D   | Added Corrosivity to section 9 physical and chemical properties to support 29 CFR 1910.119(d)(1)  |
| <b>Risk Phrases Used:</b>  | See Section 2.                              |   |

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| <b>Hazard Ratings:</b> | See Section 5.2 |
|------------------------|-----------------|

| <b>THE FOLLOWING ABBREVIATIONS MAY BE USED IN THIS DOCUMENT:</b> |  |
|--|--|
| ACGIH  | American Council of Governmental Industrial Hygienists   |
| AICS   | Australian Inventory of Chemical Substances  |
| BOD 5, 10, 20  | Biochemical Oxygen Demand, 5, 10 or 20 day   |
| CAS  | Chemical Abstract Service  |
| CERCLA   | Comprehensive Environmental Response, Compensation and Liability Act   |
| CFR  | Code of Federal Regulations  |
| CLP  | Classification, Labeling and Packaging   |
| CNS  | Central nervous system   |
| CWA  | Clean Water Act  |
| D.O.T. or DOT  | Department of Transportation   |
| DSL  | Domestic Substance List (Canada)   |
| EC <sub>50</sub>   | Effective concentration which induces a response halfway between the baseline and maximum.   |
| EC   | European Community   |
| ECL  | Existing Chemicals List (Korea)  |
| EINECS   | European Inventory of Existing Commercial Substances   |
| EPA  | Environmental Protection Agency  |
| EU   | European Union   |
| FDA  | Food and Drug Administration   |
| FIFRA  | Federal Insecticide, Fungicide and Rodenticide Act   |
| GHS  | Globally Harmonized System   |
| HAP  | Hazardous Air Pollutant  |
| HMIS   | Hazardous Materials Information System   |
| IARC   | International Agency for Research on Cancer  |
| IBC  | International Bulk Chemical Code   |
| IDL  | Ingredient disclosure list   |
| IDLH   | Immediately Dangerous to Life and Health   |
| IMO  | International Maritime Organization  |
| K <sub>St</sub>  | Deflagration Index   |
| LC <sub>50</sub>   | Median lethal concentration for 50% mortality of subject species by the inhalation route   |
| LD <sub>50</sub>   | Median lethal dose for 50% mortality of subject species by the oral or dermal route  |
| LD <sub>Lo</sub>   | Median lethal dose low; the lowest dose of a substance introduced by any route other than inhalation reported to have caused death in humans or animals. |
| LEL / LFL  | Lower Explosive Limit / Lower Flammable Limit  |
| MARPOL   | International Convention for the Prevention of Pollution from Ships  |
| MSHA   | Mine Safety Health Administration  |
| NESHAPS  | National Emission Standards for Hazardous Air Pollutants   |
| NFPA   | National Fire Protection Association   |
| NIOSH  | National Institute of Occupational Safety and Health   |
| NTP  | National Toxicology Program  |
| OSHA   | Occupational Safety and Health Administration  |
| PBT  | Persistent Bioaccumulative Toxic   |
| PEL  | Permissible Exposure Limit (default 8 hour day, 40 hour week TWA)  |
| p/p  | Parts per part   |
| Ppm  | Parts per million  |
| p.s.i.g. or psig   | Pounds per square inch (gauge pressure)  |
| PSM  | Process Safety Management  |
| PVC  | Polyvinyl chloride   |
| RCRA   | Resource Conservation and Recovery Act   |
| REACH  | Registration, Evaluation, Authorization and Restriction of Chemical Substances   |

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| REL              | Recommended Exposure Limit (default 10 hour day, 40 hour week TWA)  |
| RMP              | Risk Management Plan  |
| SARA             | Superfund Amendment and Reauthorization Act of 1990   |
| SCBA             | Self-contained breathing apparatus  |
| STEL             | Short Term Exposure Limit (default 15 minute TWA)   |
| TD <sub>Lo</sub> | Lowest dose to which humans or animals have been exposed and reported to produce a toxic effect other than cancer |
| TDG              | Transportation of Dangerous Goods   |
| TLV              | Threshold limit value   |
| TSCA             | Toxic Substance Control Act   |
| TWA              | Time Weighted Average   |
| UFL              | Upper Flammable Limit   |
| USDA             | United States Department of Agriculture   |
| VOC              | Volatile organic chemical   |
| vPvB             | Very Persistent, Very Bioaccumulative   |
| WHMIS            | Workplace Hazardous Material Information System Regulations   |

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

# **Attachment I**

## 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 <sup>1</sup> | Emission Point ID <sup>2</sup> | Emission Unit Description | Year Installed/<br>Modified | Design Capacity | Type <sup>3</sup> and Date of Change | Control Device <sup>4</sup> |
|-------------------------------|--------------------------------|---------------------------|-----------------------------|-----------------|--------------------------------------|-----------------------------|
| 1S                            | 1E                             | Ethylene Oxide Sterilizer | 2011                        | 2 cycle/day     | Existing                             | 1C                          |
| 2S                            | 1E                             | Ethylene Oxide Sterilizer | 2011                        | 2 cycle/day     | Existing                             | 1C                          |
| 3S                            | 2E                             | Emergency Generator 1     | 2010                        | 250 KW          | Existing                             | N/A                         |
| 4S                            | 3E                             | Base Fuel Tank            | 2010                        | 400 gal.        | Existing                             | N/A                         |
| 5S                            | 4E                             | Natural Gas Boiler        | 2010                        | 7 MMBtu/hr      | Existing                             | N/A                         |
| 6S                            | 5E                             | Natural Gas Boiler        | 2010                        | 7 MMBtu/hr      | Existing                             | N/A                         |
| 7S                            | 1E                             | Ethylene Oxide Sterilizer | 2017                        | 2 cycle/day     | New                                  | 1C                          |
| 8S                            | 6E                             | Natural Gas Fired Boiler  | 2012                        | 7 MMBtu/hr      | New                                  | N/A                         |
| 9S                            | 7E                             | Diesel Firewater Pump     | 2010                        | 79-110 hp       | New                                  | N/A                         |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |
|                               |                                |                           |                             |                 |                                      |                             |

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

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

<sup>3</sup> New, modification, removal

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

# **Attachment J**



**Attachment J  
EMISSION POINTS DATA SUMMARY SHEET**

| Table 1: Emissions Data  |                                  |  |                   |   |             |  |             |  |  |   |  |   |  |   |   |
|--|----------------------------------|--|-------------------|---|-------------|--|-------------|--|--|---|--|---|--|---|---|
| Emission Point ID No.<br>(Must match Emission Units Table & Plot Plan) | Emission Point Type <sup>1</sup> | Emission Unit Vented Through This Point<br>(Must match Emission Units Table & Plot Plan) |                   | Air Pollution Control Device<br>(Must match Emission Units Table & Plot Plan) |             | Vent Time for Emission Unit<br>(chemical processes only) |             | All Regulated Pollutants - Chemical Name/CAS <sup>3</sup><br><br>(Speciate VOCs & HAPS)  | Maximum Potential Uncontrolled Emissions <sup>4</sup>                      |   | Maximum Potential Controlled Emissions <sup>5</sup>                        |   | Emission Form or Phase<br><br>(At exit conditions, Solid, Liquid or Gas/Vapor) | Est. Method Used <sup>6</sup>                     | Emission Concentration <sup>7</sup><br>(ppmv or mg/m <sup>4</sup> ) |
|  |                                  | ID No.   | Source            | ID No.  | Device Type | Short Term <sup>2</sup>                                  | Max (hr/yr) |  | lb/hr  | ton/yr  | lb/hr  | ton/yr  |  |   |   |
| 1E   | Upward Vertical Stack            | 1E   | Ethylene Oxidizer | NA  | NA          | C  | 8760        | EO   | 16.0   | 5.8   | 0.14   | 0.05  | Gas  | Manufacturer Emissions Warranty                   | < 1 ppm   |
| 6E   | Upward Vertical Stack            | 6E   | Boiler            | NA  | NA          | C  | 8760        | Total VOCs<br>NO <sub>x</sub><br>CO<br>PM <sub>Condensable</sub><br>PM <sub>Filterable</sub><br>SO <sub>x</sub><br>Total HAPs<br>CO <sub>2</sub><br>CO <sub>2e</sub> | 0.04<br>0.65<br>0.54<br>0.04<br>0.01<br><0.01<br><0.01<br>778.78<br>782.40 | 0.16<br>2.84<br>2.38<br>0.16<br>0.05<br>0.02<br><0.01<br>3,407<br>3,427 | 0.04<br>0.65<br>0.54<br>0.04<br>0.04<br><0.01<br><0.01<br>778.78<br>782.40 | 0.16<br>2.84<br>2.38<br>0.16<br>0.05<br>0.02<br><0.01<br>3,407<br>3,427 | Gas  | AP-42, Subpart C                                  | N/A   |
| 7E   | Upward Vertical Stack            | 7E   | Diesel Engine     | NA  | NA          | C  | 500         | Total VOCs<br>NO <sub>x</sub><br>CO<br>PM <sub>10</sub><br>PM <sub>2.5</sub><br>SO <sub>x</sub><br>Total HAPs<br>CO <sub>2</sub><br>CO <sub>2e</sub>                 | 0.04<br>1.47<br>0.21<br>0.07<br>0.07<br>0.23<br><0.01<br>271.79<br>271.79  | 0.01<br>0.37<br>0.05<br>0.02<br>0.02<br>0.06<br><0.01<br>67.95<br>67.95 | 0.05<br>1.48<br>0.47<br>0.05<br>0.02<br>0.39<br><0.01<br>271.79<br>271.79  | 0.01<br>0.37<br>0.05<br>0.02<br>0.06<br><0.01<br>67.95<br>67.95         | Gas  | AP-42, Subpart C, Manufacturer Emissions Warranty | N/A   |

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.

<sup>1</sup> Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

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

<sup>3</sup> List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS<sub>2</sub>, VOCs, H<sub>2</sub>S, Inorganics, Lead, Organics, O<sub>3</sub>, NO, NO<sub>2</sub>, SO<sub>2</sub>, SO<sub>3</sub>, all applicable Greenhouse Gases (including CO<sub>2</sub> and methane), etc. **DO NOT LIST** H<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>, O<sub>2</sub>, and Noble Gases.

<sup>4</sup> 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).

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

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

7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m<sup>3</sup>) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO<sub>2</sub>, use units of ppmv (See 45CSR10).

## Attachment J EMISSION POINTS DATA SUMMARY SHEET

| Table 2: Release Parameter Data                                   |                      |            |   |                |  |  |                      |         |
|---|----------------------|------------|---|----------------|--|--|----------------------|---------|
| Emission Point ID No.<br><i>(Must match Emission Units Table)</i> | Inner Diameter (ft.) | Exit Gas   |   |                | Emission Point Elevation (ft)                        |  | UTM Coordinates (km) |         |
|   |                      | Temp. (°F) | Volumetric Flow <sup>1</sup> (acfm)<br><i>at operating conditions</i> | Velocity (fps) | Ground Level<br><i>(Height above mean sea level)</i> | Stack Height <sup>2</sup><br><i>(Release height of emissions above ground level)</i> | Northing             | Easting |
| 1E  | 1                    | 167.0      | 1,765   | 37             | 573  | 24   | 4270.16              | 388.00  |
| 6E  | 0.5                  | 853        |   |                | 573  | 8  | 4270.16              | 388.00  |
| 7E  | 0.5                  | 853        |   |                | 573  | 2  | 4270.16              | 388.00  |
|   |                      |            |   |                |  |  |                      |         |
|   |                      |            |   |                |  |  |                      |         |
|   |                      |            |   |                |  |  |                      |         |
|   |                      |            |   |                |  |  |                      |         |
|   |                      |            |   |                |  |  |                      |         |
|   |                      |            |   |                |  |  |                      |         |
|   |                      |            |   |                |  |  |                      |         |

<sup>1</sup> Give at operating conditions. Include inerts.

<sup>2</sup> Release height of emissions above ground level.

# **Attachment K**

## 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?

Yes       No

If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.

2.) Will there be Storage Piles?

Yes       No

If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.

3.) Will there be Liquid Loading/Unloading Operations?

Yes       No

If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.

4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?

Yes       No

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.)?

Yes       No

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?

Yes       No

If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.

7.) Will there be any other activities that generate fugitive emissions?

Yes       No

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."

# **Attachment L**

**Attachment L**  
**EMISSIONS UNIT DATA SHEET**  
**GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): **9S**

|  |
|--|
| <p>1. Name or type and model of proposed affected source:</p> <p><b>79-100 hp variable drive Diesel Engine</b></p>   |
| <p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p> |
| <p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p><b>NA</b></p>  |
| <p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p><b>NA</b></p>   |
| <p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p><b>NA</b></p>  |

\* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

**NA**

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

**Diesel fuel**

(c) Theoretical combustion air requirement (ACF/unit of fuel):

**NA** @ **NA** °F and **NA** psia.

(d) Percent excess air: **NA**

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

**NA**

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

**NA**

(g) Proposed maximum design heat input: **NA** × 10<sup>6</sup> BTU/hr.

7. Projected operating schedule: **500 hrs/year**

|           |           |           |           |            |           |
|-----------|-----------|-----------|-----------|------------|-----------|
| Hours/Day | <b>NA</b> | Days/Week | <b>NA</b> | Weeks/Year | <b>NA</b> |
|-----------|-----------|-----------|-----------|------------|-----------|

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

| @                      | NA | °F and                | Ambient   | psia       |
|------------------------|----|-----------------------|-----------|------------|
| a. NO <sub>x</sub>     |    | <b>1.47</b> lb/hr     | <b>NA</b> | grains/ACF |
| b. SO <sub>2</sub>     |    | <b>0.16</b> lb/hr     | <b>NA</b> | grains/ACF |
| c. CO                  |    | <b>0.21</b> lb/hr     | <b>NA</b> | grains/ACF |
| d. PM <sub>10</sub>    |    | <b>0.07</b> lb/hr     | <b>NA</b> | grains/ACF |
| e. Hydrocarbons        |    | <b>0.04</b> lb/hr     | <b>NA</b> | grains/ACF |
| f. VOCs                |    | <b>0.04</b> lb/hr     | <b>NA</b> | grains/ACF |
| g. Pb                  |    | <b>NA</b> lb/hr       | <b>NA</b> | grains/ACF |
| h. Specify other(s)    |    |                       |           |            |
| Total HAPs             |    | <b>&lt;0.01</b> lb/hr | <b>NA</b> | grains/ACF |
| Total CO <sub>2e</sub> |    | <b>86.07</b> lb/hr    | <b>NA</b> | grains/ACF |
|                        |    | lb/hr                 |           | grains/ACF |
|                        |    | lb/hr                 |           | grains/ACF |

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.



9. 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**  
**See Attachment O.**

**RECORDKEEPING**  
**See Attachment O.**

**REPORTING**  
**See Attachment O.**

**TESTING**  
**See Attachment O.**

**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 OPERATION/AIR POLLUTION CONTROL DEVICE.

**RECORDKEEPING.** PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

**REPORTING.** PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

**TESTING.** PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

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

**NA**

# CLARKE

FIRE PUMP ENGINES

MODELS

JU4H-UF10  
JU4H-UF12

JU4H-UF20  
JU4H-UF22  
JU4H-UF30

JU4H-UF12  
JU4H-UF18  
JU4H-UF30

JU4H-UF12  
JU4H-UF40  
JU4H-UF42

JU4H-UF58  
JU4H-UF50  
JU4H-UF52

## FM-UL-CUL APPROVED RATINGS BHP/KW

| Model | RATED SPEED |      |      |      |      |     |     |    |
|-------|-------------|------|------|------|------|-----|-----|----|
|       | 1470        | 1760 | 2100 | 2350 | 2600 |     |     |    |
| UF10  | 41          | 31   | 51   | 38   | 55   | 41  |     |    |
| UF12  |             |      |      | 55   | 41   | 59  | 44  |    |
| UF20  | 69          | 45   | 67   | 50   | 72   | 54  |     |    |
| UF22  |             |      |      | 72   | 54   | 75  | 56  |    |
| UF30  | 54          | 48   | 79   | 59   | 85   | 63  |     |    |
| UF32  |             |      |      | 85   | 63   | 85  | 63  |    |
| UF18  | 63          | 47   | 73   | 54   |      |     |     |    |
| UF10  |             | 73   | 54   | 88   | 66   | 98  | 73  |    |
| UF12  |             |      |      |      | 98   | 73  | 99  | 74 |
| UF10  |             | 94   | 70   | 105  | 78   | 106 | 79  |    |
| UF42  |             |      |      |      | 106  | 79  | 106 | 79 |
| UF58  | 79          | 59   | 110  | 82   |      |     |     |    |
| UF50  |             | 110  | 82   | 130  | 97   | 127 | 86  |    |
| UF52  |             |      |      |      | 127  | 86  | 127 | 86 |

All engine models and ratings are USA EPA emissions compliant per NSPS (40 CFR Part 60 Sub Part III)

## SPECIFICATIONS

| Model                      | JU4H MODELS                           |         |              |                           |         |            |
|----------------------------|---------------------------------------|---------|--------------|---------------------------|---------|------------|
|                            | UF10/12                               | UF20/22 | UF30/32      | UF18/H0/H2                | UF40/42 | UF50/52/52 |
| Number of Cylinders        | 4                                     |         |              |                           |         |            |
| Aspiration                 | NA                                    |         |              | T                         |         |            |
| Rotation*                  | Clockwise (CW)                        |         |              |                           |         |            |
| Weight - lb (kg)           | 910 (413)                             |         |              | 835 (424)                 |         |            |
| Compression Ratio          | 17.0:1                                |         |              | 17.0:1                    |         |            |
| Displacement - cu. in. (l) | 275 (4.5)                             |         |              |                           |         |            |
| Engine Type                | 4 Stroke Cycle - In-line Construction |         |              |                           |         |            |
| Bore & Stroke - in. (mm)   | 4.19 x 5.00 (108 x 127)               |         |              |                           |         |            |
| Installation Drawing       | D - 534 - US                          |         | D - 545 - UK |                           |         |            |
| Wiring Diagram             | C07676 (DC Engine Wiring)             |         |              | C07651 (AC Heater Wiring) |         |            |
| Engine Series              | John Deere 4045 Series                |         |              |                           |         |            |

Abbreviations: CW - Clockwise NA - Naturally Aspirated T - Turbocharged

\*Rotation viewed from Heat Exchanger / Front of engine • Engine intended for indoor use or inside weatherproof enclosure only

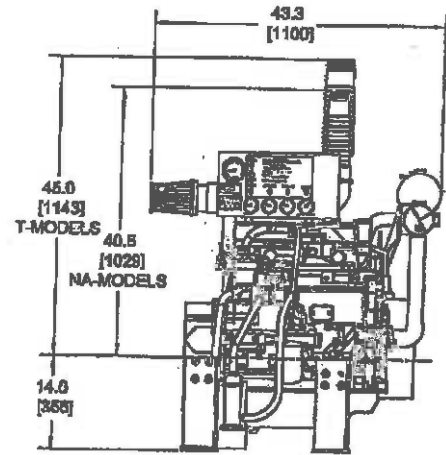
### † ENGINE RATINGS BASELINES

- Engines are rated at standard SAE conditions of 29.61 in. (7621 mm) Hg barometer and 77°F (25°C) inlet air temperature (approximates 300 ft. (91.4 m) above sea level) by the testing laboratory (see SAE Standard J 1349).
- A deduction of 3 percent from engine horsepower rating at standard SAE conditions shall be made for diesel engines for each 1000 ft. (305 m) altitude above 300 ft. (91.4 m).
- A deduction of 1 percent from engine horsepower rating as corrected to standard SAE conditions shall be made for diesel engines for every 10°F (5.6°C) above 77°F (25°C) ambient temperature.

- Note: Engines are not to be used for continuous duty. Engines are to be used only for stationary emergency standby fire pump service. According to NFPA 25 engines are to be tested 30 minutes per week at no pump flow and full pump flow once per year.

### CERTIFIED POWER AT ANY SPEED

- Although FM-UL Certified BHP ratings are shown at specific speeds, Clarke engines can be applied at any intermediate speed. To determine the intermediate certified power, make a linear interpolation from the Clarke FM-UL certified power curve. Contact Clarke or your Pump OEM representative to obtain details.



JU4H-UF50  
OVERALL WIDTH  
29.0  
(735)



Engine Make - John Deere  
Model # - JU4H-UF58  
Serial # - PE4045T773367

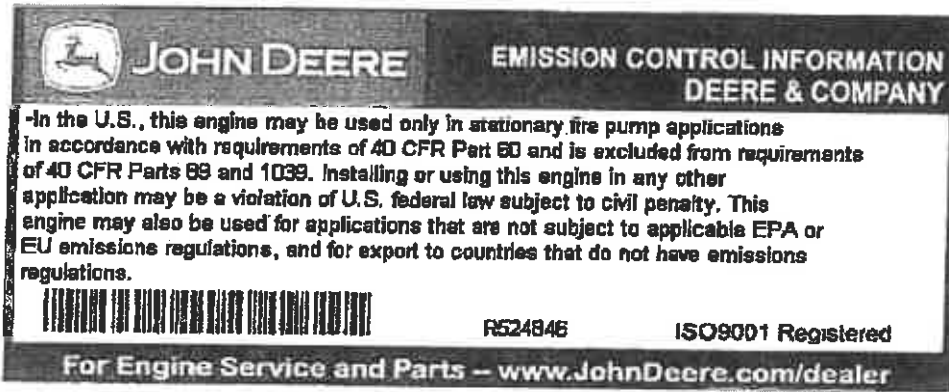


John Deere Power Systems  
 3801 W. Ridgeway Ave., PO Box 5100  
 Waterloo, Iowa USA 50704-5100

31 October 2007

**Subject: Fire Pump Ratings-- Conformance to EPA 40 CFR Part 60 (NSPS requirements)**

All John Deere stationary fire pump engines conform to the requirements of 40 CFR Part 60. All such engines include an emission label, stating the engine conforms to the requirements of 40 CFR Part 60. An example of the emission label is show below.



This label applies to all of the following engine models, sold to Clarke Fire Protection, for use in stationary fire pump applications:

| John Deere Engine Model |
|-------------------------|
| 4045DF120               |
| 4045DF130               |
| 4045TF252               |
| 4045TF254               |
| 4045TF220               |
| 5008TF252               |
| 5008TF254               |
| 6008HF252               |
| 6008HF254               |
| 6008HF120               |
| 6008TF220               |
| 5001AF001               |
| 6001HF001               |
| 6123AF001               |
| 6123HF070               |

All engines conforming to 40 CFR Part 60 (identified by emission label, as shown above) are covered under the emissions warranty of 40 CFR Part 89.

Sincerely,

Kyle J. Tingle  
 Regional Sales Manager, JDPS

**JU4H-UF58**  
**Stationary Fire Pump Engine Driver**  
**EMISSION DATA**  
**EPA 40 CFR Part 60**

**4 Cylinders**  
**Four Cycle**  
**Lean Burn**  
**Turbocharged**

| 500 PPM SULFUR #2 DIESEL FUEL |                    |                          |               |      |      |                                 |            |                              |
|-------------------------------|--------------------|--------------------------|---------------|------|------|---------------------------------|------------|------------------------------|
| RPM                           | BHP <sup>(1)</sup> | FUEL<br>GAL/HR<br>(L/HR) | GRAMS / HP-HR |      |      |                                 | EXHAUST    |                              |
|                               |                    |                          | NMHC          | NOx  | CO   | PM <sub>10</sub> <sup>(4)</sup> | °F (°C)    | CFM<br>(m <sup>3</sup> /min) |
| 1470                          | 79                 | 3.2 (12.1)               | 0.19          | 5.88 | 1.88 | 0.46                            | 1135 (613) | 431 (12)                     |
| 1760                          | 110                | 3.8 (14.4)               | 0.16          | 6.07 | 0.67 | 0.30                            | 1108 (598) | 564 (16)                     |

**Notes:**

- 1) 4045TF220 Base Engine Model manufactured by John Deere Corporation.  
 For John Deere Emissions Conformance to EPA 40 CFR Part 60 see Page 2 of 2.
- 2) The Emission Warranty for this engine is provided directly to the owner  
 by John Deere Corporation. A copy of the John Deere Emission Warranty can  
 be found in the Clarke Operation and Maintenance Manual.
- 3) Engines are rated at standard conditions of 29.51in. (752.1 mm) Hg barometer  
 and 77°F (25° C) inlet air temperature. (SAE J1349)
- 4) PM is a measure of total particulate matter, including PM<sub>10</sub>.

**CLARKE**

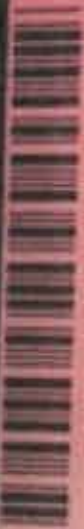
FIRE PROTECTION PRODUCTS  
 3433 EAST KEMPER ROAD  
 CINCINNATI, OH 45241



**JOHN DEERE**

**IMPORTANT ENGINE INFORMATION  
DEERE & COMPANY**

In the U.S., this engine may be used only in stationary fire pump applications in accordance with requirements of 40 CFR Part 60 and is excluded from requirements of 40 CFR Parts 89 and 1039. Installing or using this engine in any other application may be a violation of U.S. federal law subject to civil penalty. This engine may also be used for applications that are not subject to applicable EPA or EU emissions regulations, and for export to countries that do not have emissions regulations.



RS24846

1S09001 Registered

For Engine Service and Parts — [www.JohnDeere.com/dealer](http://www.JohnDeere.com/dealer)

**Attachment L**  
**EMISSIONS UNIT DATA SHEET**  
**GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): **8S**

1. Name or type and model of proposed affected source:

**7.0 MMBtu/hr Natural Gas Boiler**

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

**NA**

4. Name(s) and maximum amount of proposed material(s) produced per hour:

**NA**

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

**NA**

\* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

|   |           |           |           |            |           |
|---|-----------|-----------|-----------|------------|-----------|
| 6. Combustion Data (if applicable):   |           |           |           |            |           |
| (a) Type and amount in appropriate units of fuel(s) to be burned:   |           |           |           |            |           |
| <b>Natural Gas – 56.78 MMscf/yr</b>   |           |           |           |            |           |
| (b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:                      |           |           |           |            |           |
| <b>NA</b>   |           |           |           |            |           |
| (c) Theoretical combustion air requirement (ACF/unit of fuel):  |           |           |           |            |           |
| <b>NA</b>   | @         | <b>NA</b> | °F and    | <b>NA</b>  | psia.     |
| (d) Percent excess air: <b>NA</b>   |           |           |           |            |           |
| (e) Type and BTU/hr of burners and all other firing equipment planned to be used:   |           |           |           |            |           |
| <b>NA</b>   |           |           |           |            |           |
| (f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired: |           |           |           |            |           |
| <b>NA</b>   |           |           |           |            |           |
| (g) Proposed maximum design heat input: <b>7.0</b> × 10 <sup>6</sup> BTU/hr.  |           |           |           |            |           |
| 7. Projected operating schedule: <b>8,760 hrs/year</b>  |           |           |           |            |           |
| Hours/Day   | <b>NA</b> | Days/Week | <b>NA</b> | Weeks/Year | <b>NA</b> |

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

| @                      | NA | °F and                | Ambient   | psia       |
|------------------------|----|-----------------------|-----------|------------|
| a. NO <sub>x</sub>     |    | <b>0.65</b> lb/hr     | <b>NA</b> | grains/ACF |
| b. SO <sub>2</sub>     |    | <b>0.004</b> lb/hr    | <b>NA</b> | grains/ACF |
| c. CO                  |    | <b>0.54</b> lb/hr     | <b>NA</b> | grains/ACF |
| d. PM <sub>10</sub>    |    | <b>0.01</b> lb/hr     | <b>NA</b> | grains/ACF |
| e. Hydrocarbons        |    | <b>0.05</b> lb/hr     | <b>NA</b> | grains/ACF |
| f. VOCs                |    | <b>0.04</b> lb/hr     | <b>NA</b> | grains/ACF |
| g. Pb                  |    | <b>NA</b> lb/hr       | <b>NA</b> | grains/ACF |
| h. Specify other(s)    |    |                       |           |            |
| Total HAPs             |    | <b>&lt;0.01</b> lb/hr | <b>NA</b> | grains/ACF |
| Total CO <sub>2e</sub> |    | <b>3,426.91</b> lb/hr | <b>NA</b> | grains/ACF |
|                        |    | lb/hr                 |           | grains/ACF |
|                        |    | lb/hr                 |           | grains/ACF |

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.  
 (2) Complete the Emission Points Data Sheet.



9. 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**  
**See Attachment O.**

**RECORDKEEPING**  
**See Attachment O.**

**REPORTING**  
**See Attachment O.**

**TESTING**  
**See Attachment O.**

**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 OPERATION/AIR POLLUTION CONTROL DEVICE.

**RECORDKEEPING.** PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

**REPORTING.** PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

**TESTING.** PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

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

**NA**

**Attachment L  
EMISSIONS UNIT DATA SHEET  
GENERAL**

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): **7S**

|  |
|--|
| <p>1. Name or type and model of proposed affected source:</p> <p><b>Ethylene Oxide Sterilizer</b></p>  |
| <p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p> |
| <p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p><b>Ethylene Oxide – 16 pounds per cycle; 2 cycles per day – normal production<br/>Ethylene Oxide – 25 pounds per cycle; 2 cycles per day – special test cycles</b></p>                           |
| <p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p><b>NA</b></p>   |
| <p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p><b>NA</b></p>  |

\* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

**NA**

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

**NA**

(c) Theoretical combustion air requirement (ACF/unit of fuel):

**NA** @ **NA** °F and **NA** psia.

(d) Percent excess air: **NA**

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

**NA**

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

**NA**

(g) Proposed maximum design heat input: **NA** × 10<sup>6</sup> BTU/hr.

7. Projected operating schedule: **8,760 hrs/year**

|           |           |           |           |            |           |
|-----------|-----------|-----------|-----------|------------|-----------|
| Hours/Day | <b>NA</b> | Days/Week | <b>NA</b> | Weeks/Year | <b>NA</b> |
|-----------|-----------|-----------|-----------|------------|-----------|

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

| @                      | NA   | °F and | Ambient | psia       |
|------------------------|------|--------|---------|------------|
| a. NO <sub>x</sub>     | NA   | lb/hr  | NA      | grains/ACF |
| b. SO <sub>2</sub>     | NA   | lb/hr  | NA      | grains/ACF |
| c. CO                  | NA   | lb/hr  | NA      | grains/ACF |
| d. PM <sub>10</sub>    | NA   | lb/hr  | NA      | grains/ACF |
| e. Hydrocarbons        | 0.14 | lb/hr  | NA      | grains/ACF |
| f. VOCs                | 0.14 | lb/hr  | NA      | grains/ACF |
| g. Pb                  | NA   | lb/hr  | NA      | grains/ACF |
| h. Specify other(s)    |      |        |         |            |
| Total HAPs             | 0.14 | lb/hr  | NA      | grains/ACF |
| Total CO <sub>2e</sub> | NA   | lb/hr  | NA      | grains/ACF |
|                        |      | lb/hr  |         | grains/ACF |
|                        |      | lb/hr  |         | grains/ACF |

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. 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**  
**See Attachment O.**

**RECORDKEEPING**  
**See Attachment O.**

**REPORTING**  
**See Attachment O.**

**TESTING**  
**See Attachment O.**

**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 OPERATION/AIR POLLUTION CONTROL DEVICE.

**RECORDKEEPING.** PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

**REPORTING.** PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

**TESTING.** PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

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

**NA**

# **Attachment M**

**Attachment M**  
**Air Pollution Control Device Sheet**  
(Other Collectors)

Control Device ID No. (must match Emission Units Table): 1C

**Equipment Information**

|  |  |
|--|--|
| 1. Manufacturer: Lesni<br>Model No. CAP 2500   | 2. Control Device Name: ETO Catalytic Abator<br>Type: LESNI – CAP 2500 |
| 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. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.  |  |
| 5. Provide a scale diagram of the control device showing internal construction. Attached PID Drawing   |  |
| 6. Submit a schematic and diagram with dimensions and flow rates. Attached Layout Drawing  |  |
| 7. Guaranteed minimum collection efficiency for each pollutant collected: > 99% purification efficiency  |  |
| 8. Attached efficiency curve and/or other efficiency information.  |  |
| 9. Design inlet volume: 1500 SCFM  | 10. Capacity: 1500 SCFM  |
| 11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.<br><br>Gas Flow – Differential and flow switches will control.   |  |
| 12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.<br>Fully automated plant and system to control safety, efficiency, and plant performance. |  |
| 13. Description of method of handling the collected material(s) for reuse or disposal.<br><br>Does not routinely generate any byproducts/material for disposal.  |  |

**Gas Stream Characteristics**

|                                       |                              |  |  |
|---------------------------------------|------------------------------|--|--|
| 14. Are halogenated organics present? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |  |
| Are particulates present?             | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |  |
| Are metals present?                   | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |  |
| 15. Inlet Emission stream parameters: | <b>Maximum</b>               | <b>Typical</b>                         |  |
| Pressure (mmHg):                      | Atmospheric                  | Atmospheric                            |  |
| Heat Content (BTU/scf):               | Low                          | Low                                    |  |
| Oxygen Content (%):                   | 21%                          | 21%                                    |  |
| Moisture Content (%):                 | 100%                         | 100%                                   |  |
| Relative Humidity (%):                | 100%                         | 100%                                   |  |

|  |   |                                      |                      |                             |
|--|---|--------------------------------------|----------------------|-----------------------------|
| 16. Type of pollutant(s) controlled: <input type="checkbox"/> SO <sub>x</sub> <input type="checkbox"/> Odor<br><input type="checkbox"/> Particulate (type): <input checked="" type="checkbox"/> Other – Ethylene Oxide |   |                                      |                      |                             |
| 17. Inlet gas velocity: 90 ft/sec  | 18. Pollutant specific gravity: 1.83 kg/cubic meter                       |                                      |                      |                             |
| 19. Gas flow into the collector:<br>1000-1500 CFM @ 113 °F and 0.030 PSIA  | 20. Gas stream temperature:<br>Inlet: 113 °F<br>Outlet: 167 °F            |                                      |                      |                             |
| 21. Gas flow rate:<br>Design Maximum: 1500 ACFM<br>Average Expected: 1500 ACFM   | 22. Particulate Grain Loading in grains/scf:<br>Inlet: N/A<br>Outlet: N/A |                                      |                      |                             |
| 23. Emission rate of each pollutant (specify) into and out of collector:   |   |                                      |                      |                             |
| <b>Pollutant</b>   | <b>IN Pollutant</b>   | <b>Emission Capture Efficiency %</b> | <b>OUT Pollutant</b> | <b>Control Efficiency %</b> |
|  | <b>lb/hr</b>  | <b>grains/acf</b>                    | <b>lb/hr</b>         | <b>grains/acf</b>           |
| A – Ethylene Oxide   | 48  |                                      | 0.14                 |                             |
| B  |   |                                      |                      |                             |
| C  |   |                                      |                      |                             |
| D  |   |                                      |                      |                             |
| E  |   |                                      |                      |                             |
| 24. Dimensions of stack: Height 24 ft. Diameter 1 ft.  |   |                                      |                      |                             |
| 25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector. Attached   |   |                                      |                      |                             |

**Particulate Distribution**

|   |   |   |
|---|---|---|
| 26. Complete the table:                 | <b>Particle Size Distribution at Inlet to Collector</b> | <b>Fraction Efficiency of Collector</b> |
| <b>Particulate Size Range (microns)</b> | <b>Weight % for Size Range</b>                          | <b>Weight % for Size Range</b>          |
| 0 – 2                                   | NA  |   |
| 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                                    |   |   |



27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

In the first step, a water balancer is used to dampen the peaks and expected variations in the incoming quantity of EO from the vacuum pumps. When the concentrations are high, the balancer serves as an absorber. When the concentrations are low, a controlled stripping of EO will commence, providing a constant and continuous VOC load to the catalytic abator in a safe and efficient manner.

The second step of the plant is the catalytic abator itself, where the EO is converted into CO<sub>2</sub> and H<sub>2</sub>O at a low temperature by the catalyst.

28. Describe the collection material disposal system:

All interconnecting duct work is stainless steel and is sized to handle the air flow and velocity efficiently.

29. Have you included **Other Collectores Control Device** in the Emissions Points Data Summary Sheet? Yes

**30. 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:  
See Attachment O

RECORDKEEPING:  
See Attachment O

REPORTING:  
See Attachment O

TESTING:  
See Attachment O

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.

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

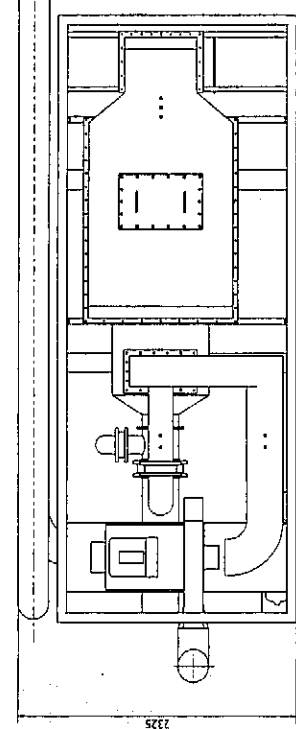
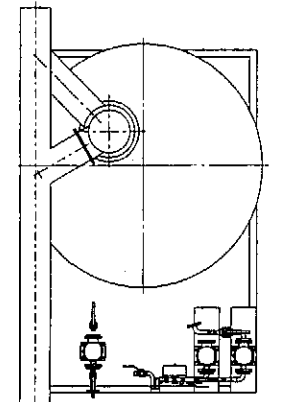
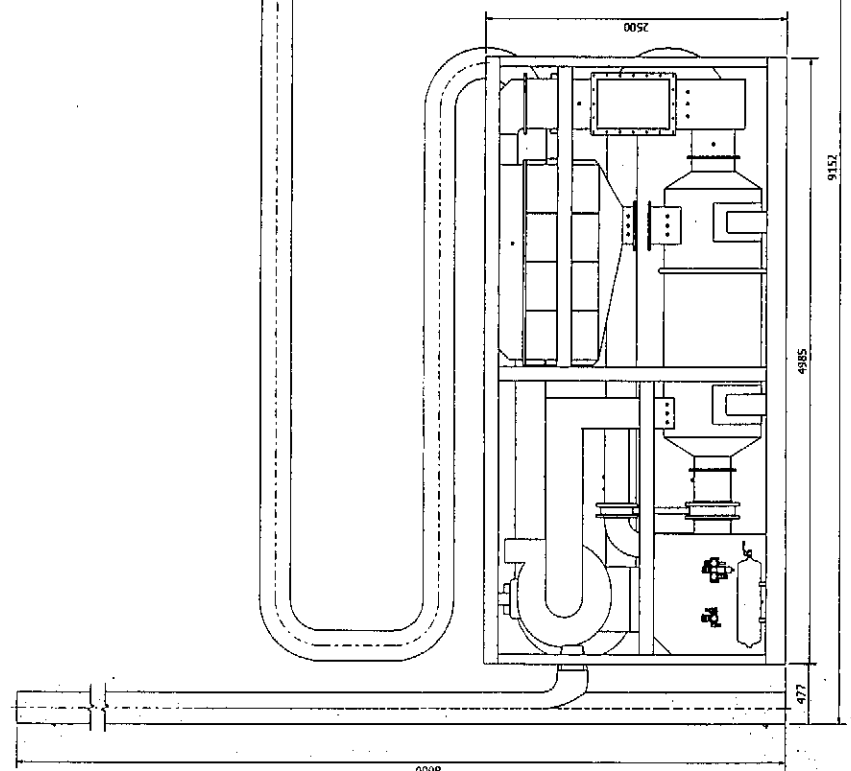
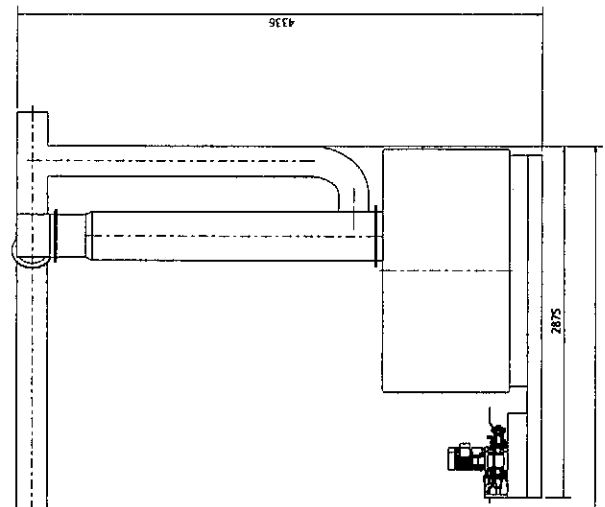
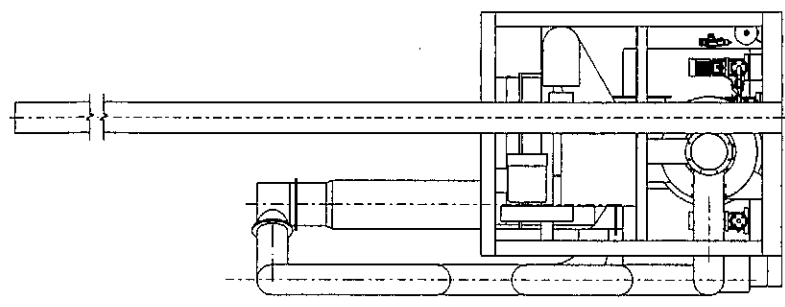
Ethylene Oxide >99%

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

Ethylene Oxide >99%

33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty. LESNI will provide Operating and Maintenance manuals with all necessary procedures/safe operation of the plant.

LESNI recommends an annual preventative service by a LESNI Technician.

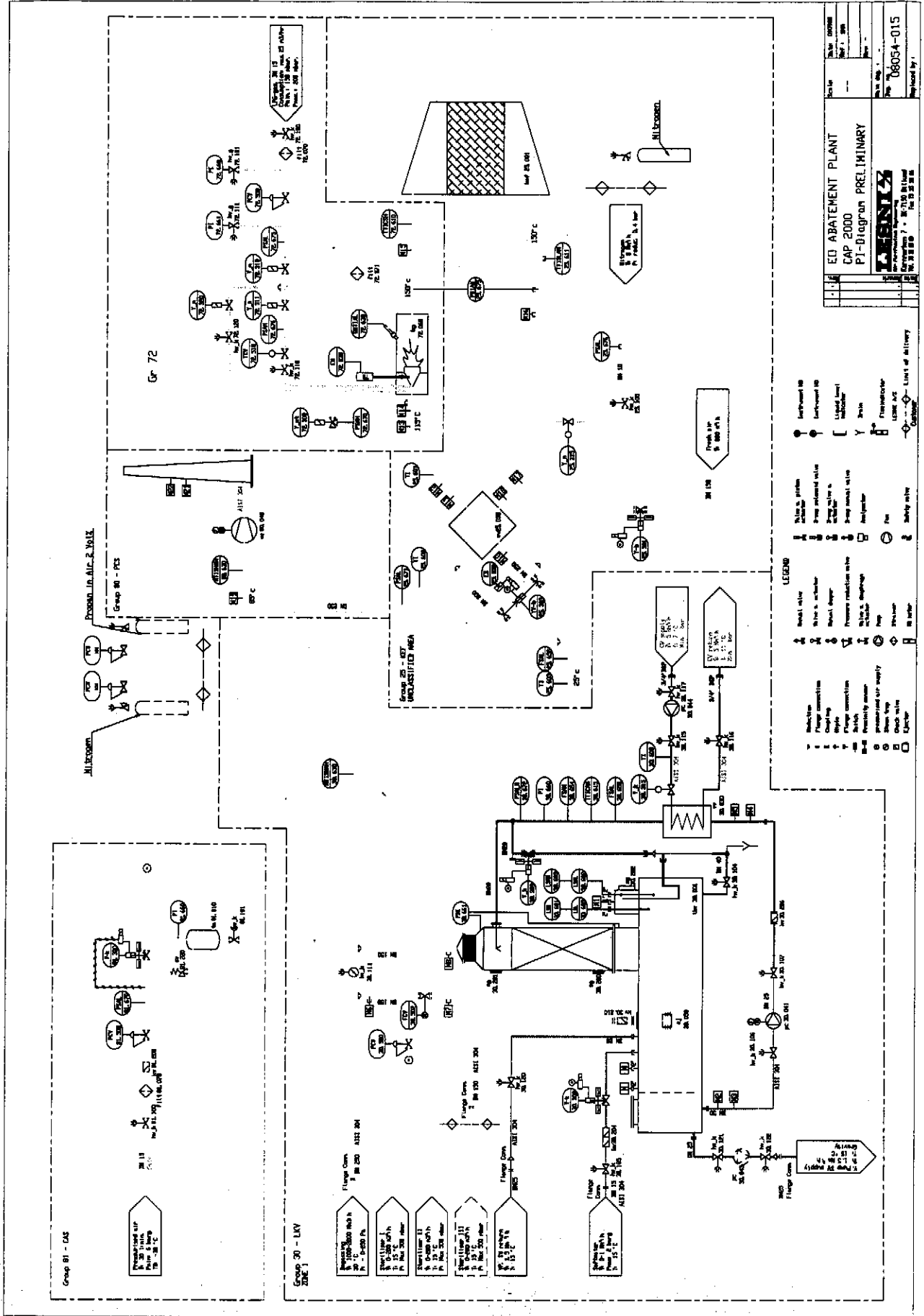


|          |           |                  |          |           |                  |
|----------|-----------|------------------|----------|-----------|------------------|
| Rev. No. | Rev. Date | Rev. Description | Rev. No. | Rev. Date | Rev. Description |
| 01       | 10-2009   | Initial          |          |           |                  |

Project: **EO Abatement Plant**  
 Drawing No: **08054-001-002**  
 Title: **Layout**  
 Scale: **AS IS**  
 Date: **10-27-09**  
 Rev: **01**  
 Weight: **56029.10 kg**

**LESNI**  
 LESTER ASSOCIATES  
 10000 16th Avenue S.W.  
 Surrey, BC V4N 1V7  
 Tel: 604-593-5000  
 Fax: 604-593-5006  
 www.lesni.com

The drawing must not be shown or handed over to a 3rd party without written acceptance from LESNI AG.



|  |           |                                |
|--|-----------|--------------------------------|
| ED ABATEMENT PLANT<br>CAP 2000<br>PI-Diagram PRELIMINARY |           | Date: 09/08/01<br>Scale: 1/100 |
| <b>LEGNITZ</b>   |           |                                |
| 66-11111-1<br>10000000000<br>7-1<br>10000000000          |           |                                |
| Doc No.:   | 06054-015 | Prepared by:                   |

LEGEND

|  |                           |  |                |
|--|---------------------------|--|----------------|
|  | Single flow               |  | Pump           |
|  | Split flow                |  | Tank           |
|  | Flange connection         |  | Heat Exchanger |
|  | Isolation                 |  | Temperature    |
|  | Lock                      |  | Pressure       |
|  | Pressure reduction in the |  | Flowmeter      |
|  | supply                    |  | Level          |
|  | Check valve               |  | Safety valve   |
|  | Electric                  |  | Safety         |

**Design DATA & Utility requirements**

Type of plant: EO Catalytic Abatement Plant  
Airflow to plant from degassing – max. 2000 m<sup>3</sup>/h

**Design conditions:**

Load of Pollutant Ethylene Oxide  
No of sterilises 2 to 4  
Cycles per Chamber per day, max.: 2 cycles/ chamber/ day  
EO for each cycle – 15.1 lbs/cycle (13.5 lbs/cycle)  
Due to start with 2 chambers: 60.5 lbs/day in 2010 (30 lbs/hr max)  
Add 3<sup>rd</sup> chamber in 2012: up to 90.6 lb/day in 2012  
Add 4<sup>th</sup> chamber in 2017: max. lbs 120.8 in 2017

**Total quantity – design: lbs/day 120.8 (kg 55/day)**  
Efficiency - emission less than: < 1ppm ~ 1.8 mg/m<sup>3</sup>

– **Step 1: interface with sterilisation process**

Balancer: LKV 450  
Sump tank balancing volume 3.0 m<sup>3</sup>

**1-Connection to vacuum pumps gas vent:**

Gas flow from vac. pump – each max. approx. 125 m<sup>3</sup>/h  
(Getinge to confirm)  
Connection, for 4 sterilisers, 2 now, 2 in future

**LESNI WILL Provide 2 X Nozzles flanged as DN 100**  
Each nozzle to take the manifold vent from 2 sterilisers.

**2-Connection for degassing cells: Fugitive air**

Degassing airflow from degassing cells and aeration rooms  
Total: 2000 m<sup>3</sup>/h

**Connection at LESNI skid= DN 300 (12")**

**3-Vacuum Pumps, liquid ring seal make-up Water:**

Flow rate re-circulated approx. 2.5 m<sup>3</sup>/h  
(to be confirmed by GETINGE allowing for 4 chambers)!!  
Temperature °C 5 - 30  
Pressure set-up bar g 2  
**2 x Connections at the skid– in/out: DN 25 Flanged**

– Step 2: internal interface with LESNI balancer

|   |                             |
|---|-----------------------------|
| Catalytic Abator                        | KEF 2000-2500               |
| Airflow from aeration & vac pumps range | 1000-2500 m <sup>3</sup> /h |
| – Connection – in:                      | part of Lesni plant N/R     |
| – Connection – out to stack             | DN 300 part of LESNI SCOPE  |

**Utility connections and services:**

**a) Pressurised Air supply:**

|                    |        |        |                 |
|--------------------|--------|--------|-----------------|
| Pressure           | max.   | bar    | 7               |
|                    | min.   | bar    | 6.0             |
| Consumption        | (max.) | l:min. | 30              |
| Battery contents   |        | l      | 100             |
| Dew point          |        | °C     | - 15            |
| <b>Connection:</b> |        |        | <b>1/2" BSP</b> |

**b) Fresh Water supply to balancer:**

Quality: drinking Quality is sufficient (city water)

|                                 |                             |
|---------------------------------|-----------------------------|
| Volume flow:                    | up to 3.0 m <sup>3</sup> /h |
| Consumption – Process dependent | negligible                  |
| Pressure on inlet – max.        | 2 Barg                      |
| Temperature – inlet             | °C 5 – 25                   |
| <b>Connection:</b>              | <b>1/2" BSP</b>             |

**c) Chilled water:**

|  |    |                           |
|--|----|---------------------------|
| – Supply to heat exchanger (sump cooler) | °C | 7                         |
| – Return from heat exchanger             | °C | 15                        |
| – Liquid coolant flow                    |    | max. 10 m <sup>3</sup> /h |
| – <b>Connection:</b>                     |    | <b>2 x 3/4" BSP</b>       |

**d) Nitrogen supply:**

|                    |        |                    |                 |
|--------------------|--------|--------------------|-----------------|
| Pressure           | max.   | mbar               | 400             |
| Consumption        | (max.) | Nm <sup>3</sup> :h | 8               |
| <b>Connection:</b> |        |                    | <b>1/2" BSP</b> |

**e) Calibration GAS, IR Monitor****Zero point:**

- Synthetic Air (or clean ambient) or Nitrogen

**Range:**

- Propane (C<sub>3</sub> H<sub>8</sub>) in air.: vol. % 1.94 = 24.8 % LEL
- or Methane (C H<sub>4</sub>) in air.: vol. % 2,5 = 27,8 % LEL

supply: 10 litre cylinder or equivalent.

**f) Abatement Plant Power supply:**

|                          |           |             |
|--------------------------|-----------|-------------|
| Voltage                  | V         | 3 x 480+N   |
| Frequency                | Hz        | 60          |
| <b>Power – connected</b> | <b>kW</b> | <b>≈ 18</b> |
| <b>Amps-</b>             |           | <b>50 A</b> |

Note: Consumption max. (Estimated) kW 10

**Connection needed to main electric panel on the skid;**

**Plus Ethernet cable and power cable from lesni electric panel to Operator Panel in control room.**

**g) Natural Gas supply to burner:**

Gas type Natural

|   |                                   |     |
|---|-----------------------------------|-----|
| Pressure – inlet max.   | mbar                              | 200 |
| min.  | mbar                              | 150 |
| - Pressure – running  | mbar                              | 100 |
| - Consumption during start up max.  | 10 m <sup>3</sup> /h (~kWh/h 100) |     |
| - Supply connection for 20 m <sup>3</sup> /h burner at 150mbar if CH <sub>4</sub> |                                   |     |

**CONNECTION & supply: 20 m<sup>3</sup>/h**  
**Pressure: 150 mbar**  
**Dimension: DN 25**

**h) Stack monitoring:**

|                              |                    |                                      |
|------------------------------|--------------------|--------------------------------------|
| Exhaust volume               | Nm <sup>3</sup> :h | max. 2500                            |
| Exhaust temperature - normal | °C                 | 75                                   |
| - Exhaust temperature – min. | °C                 | 65                                   |
| - Exhaust temperature – max. | °C                 | 85 (without secondary heat recovery) |

**ALCON TO ADVISE ON SIZE AND LOCATION OF THE MONITORING POINTS FOR EXTERNAL INSPECTION.**

## Alcon Project - Huntington, WV

Emission Pollutant - Ethylene oxide from sterilisation of medical devices

Air extracts- vents from vacuum pumps- post evacuation and fugitive air from degassing cells.

| Degassing cells-continuous                             | Volume m3<br>APPROX.   | Number of air changes @ 20 times<br>x 20 changes/hr @ 55 C | Amount of bleed to abatement<br>approx. 50% bleed       |
|--|------------------------|--|---|
| degas cell 1 ( 24 ft x 8 ft x 9 ft)                    | 1728 ft3               | 34560 ft3/h  | 17280 ft3/h   |
| degas cell 2 ( 24 ft x 8 ft x 9 ft)                    | 1728 ft3               | 34560 ft3/h  | 17280 ft3/h   |
| degas cell 3 ( 24 ft x 8 ft x 9 ft)                    | 1728 ft3               | 34560 ft3/h  | 17280 ft3/h   |
| degas cell 4 ( 24 ft x 8 ft x 9 ft)                    | 1728 ft3               | 34560 ft3/h  | 17280 ft3/h   |
| degas cell 5 ( 24 ft x 8 ft x 9 ft)                    | 1728 ft3               | 34560 ft3/h  | 17280 ft3/h   |
| <b>TOTAL</b>   |                        |  | <b>86400 ft3/h - equal to 1440 cfm<br/>(~2448 m3/h)</b> |
| <b>Vacuum pumps - Intermittent</b>                     |                        |  |   |
|  | peak flow m3/h         | No   | Total m3/hr   |
| steriliser 1   | 75                     | 1  | 0-75  |
| steriliser 2   | 75                     | 1  | 0-75  |
| steriliser 3   | 75                     | 1  | 0-75  |
| steriliser 4   | 75                     | 1  | 0-75  |
| <b>Total vac pumps</b>                                 |                        |  | <b>0-300m3/h</b>  |
| <b>Total air volume</b>                                | <b>Degassing cells</b> |  | 1440 cfm (2448 m3/h)                                    |
|  | <b>VACUUM PUMPS</b>    |  | 176 cfm (300 m3/h)                                      |
|  | <b>Total</b>           |  | 1624 cfm ( 2760 m3/h)                                   |
| <b>DESIGN FOR ABATOR</b>                               |                        |  | <b>max. 3000 m3/h</b>                                   |
| <b>Ethylene Oxide mass Loading</b>                     |                        |  |   |
|  | lbs/cycle max.         | Cyc/day max.   | Total (lbs/day)   |
| steriliser 1   | 15.1 lbs/cycle         | 2  | 30.20   |
| steriliser 2   | 15.1 lbs/cycle         | 2  | 30.20   |
| steriliser 3   | 15.1 lbs/cycle         | 2  | 30.20   |
| steriliser 4   | 15.1 lbs/cycle         | 2  | 30.20   |
| <b>total EO/cycle &amp; day</b>                        |                        |  | <b>121</b>  |
| Inlet peak concentration:<br>(total mass/V.P gas flow) | 50726 ppm              |  |   |
| Outlet concentration                                   | 1 ppm                  |  |   |



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Date: 7<sup>th</sup> November 2009  
Our case: 08054  
**Our order: 1951/SHM**

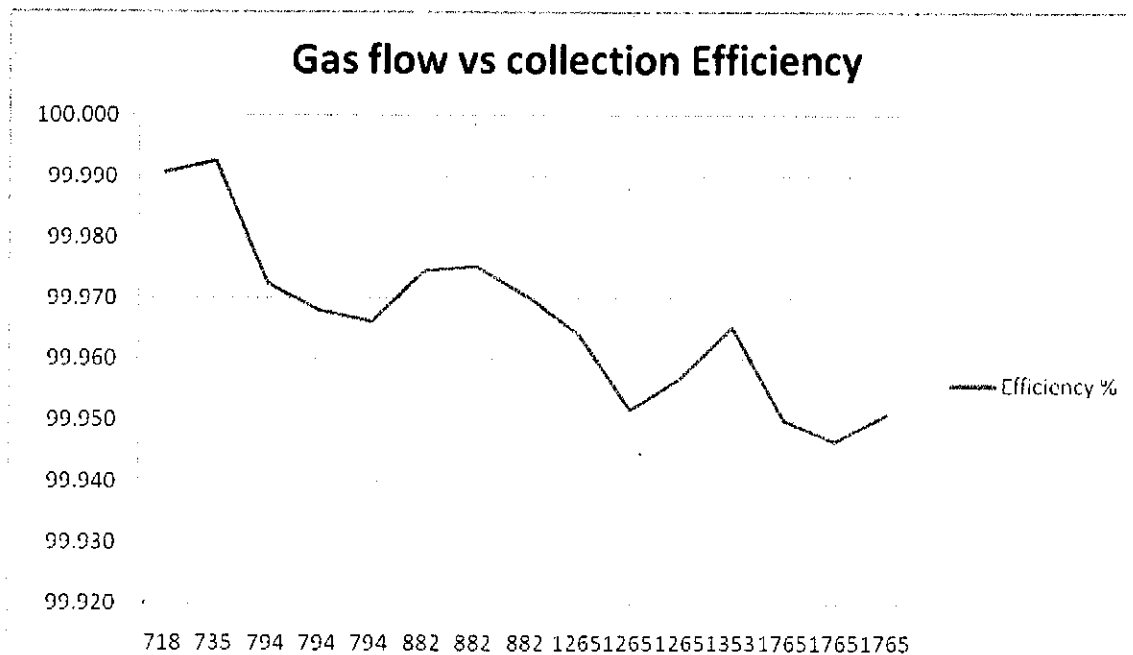
**Efficiency Curve of catalytic abator**

To whom it may concern,

We are pleased to submit the collection efficiency curve as requested and take this opportunity to make the following clarification.

The gas flow from the vacuum pump varies between 0-600 m<sup>3</sup>/h (0-350 acfm) depending on the number of vacuum pumps discharging at any time; but the fugitive extract air flow from the degassing cells varies depending on the number of cells in operation between 1200-2400 m<sup>3</sup>/h (700-1411 cfm). Thus the air flow to the catalytic abator could vary between 700 cfm and 1765 only.

However collection efficiency depends on the VARIABLE EO concentration in the final exhaust from process to the catalytic abator.



# **Attachment N**

## Sterilizer Emission Calculations

### Sterilizer Specifications:

No. of Cycles per Day                    2  
Control Efficiency                        99.1%

### Uncontrolled Emission Rates:

| Uncontrolled Emissions | lb/cycle | lb/hr | lb/day | tpy |
|------------------------|----------|-------|--------|-----|
| Chamber 7S             | 16       | 16    | 32     | 5.8 |

### Controlled Emission Rates:

| Controlled Emissions | lb/cycle | lb/hr | lb/day | tpy  |
|----------------------|----------|-------|--------|------|
| Chamber 7S           | 0.14     | 0.14  | 0.29   | 0.05 |

### Notes:

1. For each sterilization chamber, emissions represent 100% Ethylene Oxide running two cycles per day. Emissions occur at the end of each cycle
2. One Cycle takes an hour to complete

**Natural Gas Boiler Combustion Emissions**

**Equipment Specifications:**

|   |      |
|---|------|
| Boiler Rating (MMBtu/hr)                | 7.0  |
| Operational Hours                       | 8760 |
| Natural Gas Heating Value (MMBtu/MMscf) | 1080 |

**Emission Factors:**

| Emission Factor<br>(lb/10 <sup>6</sup> scf) | Greenhouse Gases |         |                          |  | PM<br>(Cond) | PM<br>(Filter) | VOC | Small Boiler <100 |                         | SO <sub>2</sub> |
|---|------------------|---------|--------------------------|--|--------------|----------------|-----|-------------------|-------------------------|-----------------|
|   | CO <sub>2</sub>  | Methane | N <sub>2</sub> O<br>(UG) | N <sub>2</sub> O<br>(Low NO <sub>x</sub> ) |              |                |     | CO                | NO <sub>x</sub><br>(UG) |                 |
|   | 120,000          | 2.3     | 2.2                      | 0.64                                       | 5.7          | 1.9            | 5.5 | 84                | 100                     | 0.6             |

**Greenhouse Gas Emissions:**

| Emission Point ID | Emission Unit ID | Emission Unit Name            | Control Device ID | Max<br>(MMBtu/hr) | Greenhouse Gas Emissions |              |                 |             |                  |             |                             |                 |
|-------------------|------------------|-------------------------------|-------------------|-------------------|--------------------------|--------------|-----------------|-------------|------------------|-------------|-----------------------------|-----------------|
|                   |                  |                               |                   |                   | CO <sub>2</sub>          |              | CH <sub>4</sub> |             | N <sub>2</sub> O |             | CO <sub>2</sub> Equivalence |                 |
|                   |                  |                               |                   |                   | pph                      | tpy          | pph             | tpy         | pph              | tpy         | pph                         | tpy             |
| 8S                | 6E               | Natural Gas Fired Boiler (6S) | NA                | 7.0               | 778                      | 3,407        | 0.01            | 0.07        | 0.01             | 0.06        | 782.40                      | 3,426.91        |
| <b>Totals:</b>    |                  |                               |                   |                   | <b>777.78</b>            | <b>3,407</b> | <b>0.01</b>     | <b>0.07</b> | <b>0.01</b>      | <b>0.06</b> | <b>782.40</b>               | <b>3,426.91</b> |

**VOCs & Criteria Pollutant Emissions:**

| Emission Point ID | Emission Unit ID | Emission Unit Name            | Control Device ID | Max<br>(MMBtu/hr) | Criteria Pollutant Emissions |             |             |             |                 |             |                |             |               |             |             |             |
|-------------------|------------------|-------------------------------|-------------------|-------------------|------------------------------|-------------|-------------|-------------|-----------------|-------------|----------------|-------------|---------------|-------------|-------------|-------------|
|                   |                  |                               |                   |                   | NO <sub>x</sub>              |             | CO          |             | SO <sub>2</sub> |             | PM Condensable |             | PM Filterable |             | VOC         |             |
|                   |                  |                               |                   |                   | pph                          | tpy         | pph         | tpy         | pph             | tpy         | pph            | tpy         | pph           | tpy         | pph         | tpy         |
| 8S                | 6E               | Natural Gas Fired Boiler (6S) | NA                | 7.0               | 0.65                         | 2.84        | 0.54        | 2.38        | 0.004           | 0.02        | 0.04           | 0.16        | 0.01          | 0.05        | 0.04        | 0.16        |
| <b>Totals:</b>    |                  |                               |                   |                   | <b>0.65</b>                  | <b>2.84</b> | <b>0.54</b> | <b>2.38</b> | <b>0.004</b>    | <b>0.02</b> | <b>0.04</b>    | <b>0.16</b> | <b>0.01</b>   | <b>0.05</b> | <b>0.04</b> | <b>0.16</b> |

**Organic Compounds:**

| Pollutant                                   | Emission Factor          | Emission Rates |       |
|---|--------------------------|----------------|-------|
|   | (lb/10 <sup>6</sup> scf) | (lb/h)         | (tpy) |
| 2-Methylnaphthalene <sup>1</sup>            | 0.000024                 | <0.01          | <0.01 |
| 3-Methylchloranthrene <sup>1</sup>          | 0.000018                 | <0.01          | <0.01 |
| 7,12-Dimethylbenz(a)anthracene <sup>1</sup> | 0.000016                 | <0.01          | <0.01 |
| Acenaphthene <sup>2</sup>                   | 0.000018                 | <0.01          | <0.01 |
| Acenaphthylene <sup>2</sup>                 | 0.000018                 | <0.01          | <0.01 |
| Anthracene <sup>1</sup>                     | 0.000024                 | <0.01          | <0.01 |
| Benz(a)anthracene <sup>2</sup>              | 0.000018                 | <0.01          | <0.01 |
| Benzene <sup>1</sup>                        | 0.0021                   | <0.01          | <0.01 |
| Benzo(a)pyrene <sup>1</sup>                 | 0.000012                 | <0.01          | <0.01 |
| Benzo(b)fluoranthene <sup>2</sup>           | 0.000018                 | <0.01          | <0.01 |
| Benzo(g,h,i)perylene <sup>2</sup>           | 0.000012                 | <0.01          | <0.01 |
| Benzo(k)fluoranthene <sup>2</sup>           | 0.000018                 | <0.01          | <0.01 |
| Butane                                      | 2.1                      | <0.01          | <0.01 |
| Chrysene <sup>2</sup>                       | 0.000018                 | <0.01          | <0.01 |
| Dibenz(a,h)anthracene <sup>1</sup>          | 0.000012                 | <0.01          | <0.01 |
| Dichlorobenzene <sup>1</sup>                | 0.0012                   | <0.01          | <0.01 |
| Ethane                                      | 3.1                      | <0.01          | <0.01 |
| Fluoranthene <sup>2</sup>                   | 0.000003                 | <0.01          | <0.01 |
| Fluorene <sup>2</sup>                       | 0.000028                 | <0.01          | <0.01 |
| Formaldehyde <sup>1</sup>                   | 0.075                    | <0.01          | <0.01 |
| Hexane <sup>1</sup>                         | 1.8                      | <0.01          | <0.01 |
| Indeno(1,2,3-cd)pyrene <sup>2</sup>         | 0.000018                 | <0.01          | <0.01 |
| Naphthalene <sup>1,2</sup>                  | 0.0061                   | <0.01          | <0.01 |
| Pentane                                     | 2.6                      | <0.01          | <0.01 |
| Phenanthrene <sup>2</sup>                   | 0.000017                 | <0.01          | <0.01 |
| Propane                                     | 1.6                      | <0.01          | <0.01 |
| Pyrene <sup>2</sup>                         | 0.000005                 | <0.01          | <0.01 |
| Toluene <sup>1</sup>                        | 0.0034                   | <0.01          | <0.01 |

**Metals:**

| Pollutant              | Emission Factor          | Emission Rates |       |
|------------------------|--------------------------|----------------|-------|
|                        | (lb/10 <sup>6</sup> scf) | (lb/h)         | (tpy) |
| Arsenic <sup>1</sup>   | 0.0002                   | <0.01          | <0.01 |
| Barium                 | 0.0044                   | <0.01          | <0.01 |
| Beryllium <sup>1</sup> | 0.000012                 | <0.01          | <0.01 |
| Cadmium <sup>1</sup>   | 0.0011                   | <0.01          | <0.01 |
| Chromium <sup>1</sup>  | 0.0014                   | <0.01          | <0.01 |
| Cobalt <sup>1</sup>    | 0.000084                 | <0.01          | <0.01 |
| Copper                 | 0.00085                  | <0.01          | <0.01 |
| Lead                   | 0.0005                   | <0.01          | <0.01 |
| Manganese <sup>1</sup> | 0.00038                  | <0.01          | <0.01 |
| Mercury <sup>1</sup>   | 0.00026                  | <0.01          | <0.01 |
| Molybdenum             | 0.0011                   | <0.01          | <0.01 |
| Nickel <sup>1</sup>    | 0.0021                   | <0.01          | <0.01 |
| Selenium <sup>1</sup>  | 0.000025                 | <0.01          | <0.01 |
| Vanadium               | 0.0023                   | <0.01          | <0.01 |
| Zinc                   | 0.029                    | <0.01          | <0.01 |

**Hazardous Air Pollutants:**

| Pollutant  | Emission Rates |       |
|------------|----------------|-------|
|            | (lb/h)         | (tpy) |
| Total HAPs | <0.01          | <0.01 |
| Total PAHs | <0.01          | <0.01 |

**Notes:**

1. Identified as Hazardous Air Pollutant by Section 112(b) of Clean Air Act
2. Identified as Polycyclic Aromatic Hydrocarbons

### Firewater Pump Emissions

#### Emission Factors & Boiler Specifications:

| SO <sub>x</sub> | CH <sub>4</sub> | N <sub>2</sub> O | CO <sub>2</sub> |
|-----------------|-----------------|------------------|-----------------|
| (lb/hp-hr)      | (lb/MMBtu)      | kg CO2/mmbtu     | kg CO2/mmbtu    |
| 0.00205         | 0.29            | 0.003            | 0.0006          |
|                 |                 |                  | 73.96           |

#### Assumptions (AP-42):

|                               |       |
|-------------------------------|-------|
| BSFC (Btu/hp-hr)              | 7000  |
| Diesel Density (lb/gal)       | 7.1   |
| Diesel Heating Value (Btu/lb) | 19300 |
| Diesel Carbon Content (%)     | 87%   |

| John Deere Emissions Data |                       |                       | Additional Data and Conversions based on Engine Usage and Fuel Considerations |                               |                       |        |
|---------------------------|-----------------------|-----------------------|---|-------------------------------|-----------------------|--------|
| Certified Power (bhp)     | Operating Scenario 1: | Operating Scenario 2: | Hours of Operation  | Annual Vol. of Fuel Combusted | Diesel Carbon Content |        |
|                           | 79                    | 110                   | 500   | 1,900                         | gal                   | 2.80   |
|                           |                       |                       | hr  |                               |                       | kg/gal |
| Emission Rates            | g/(hp-hr)             | g/(hp-hr)             | Fuel Consumption  |                               |                       |        |
| NO <sub>x</sub>           | 6.07                  | 6.07                  | 3.8   | gal/hr                        |                       |        |
| HC                        | 0.16                  | 0.16                  |   |                               |                       |        |
| PM                        | 0.3                   | 0.3                   |   |                               |                       |        |
| CO                        | 0.87                  | 0.87                  |   |                               |                       |        |

#### Greenhouse Gas Emissions (bhp)

| Emission Point ID | Emission Unit Name    | Emission Unit ID | Maximum Rating (hp) | Greenhouse Gas Emissions |              |                 |                 |                  |                 |                             |              |
|-------------------|-----------------------|------------------|---------------------|--------------------------|--------------|-----------------|-----------------|------------------|-----------------|-----------------------------|--------------|
|                   |                       |                  |                     | CO <sub>2</sub>          |              | CH <sub>4</sub> |                 | N <sub>2</sub> O |                 | CO <sub>2</sub> Equivalence |              |
|                   |                       |                  |                     | pph                      | tpy          | pph             | tpy             | pph              | tpy             | pph                         | tpy          |
| 9S                | Diesel Firewater Pump | 7E               | 110.0               | 86.07                    | 21.52        | <0.01           | <0.01           | <0.01            | <0.01           | 86.07                       | 21.52        |
| <b>Totals:</b>    |                       |                  |                     | <b>86.07</b>             | <b>21.52</b> | <b>&lt;0.01</b> | <b>&lt;0.01</b> | <b>&lt;0.01</b>  | <b>&lt;0.01</b> | <b>86.07</b>                | <b>21.52</b> |

#### VOCs & Criteria Pollutant Emissions:

| Engine ID  | Emission Unit Name    | Emission Unit ID | Operating Scenario    | Power Rating (hp) | Emission Rates  |             |             |             |                 |             |                  |             |                   |             |             |             |
|--|-----------------------|------------------|-----------------------|-------------------|-----------------|-------------|-------------|-------------|-----------------|-------------|------------------|-------------|-------------------|-------------|-------------|-------------|
|  |                       |                  |                       |                   | NO <sub>x</sub> |             | CO          |             | SO <sub>x</sub> |             | PM <sub>10</sub> |             | PM <sub>2.5</sub> |             | VOC         |             |
|  |                       |                  |                       |                   | (lb/hr)         | (tpy)       | (lb/hr)     | (tpy)       | (lb/hr)         | (tpy)       | (lb/hr)          | (tpy)       | (lb/hr)           | (tpy)       | (lb/hr)     | (tpy)       |
| 9S   | Diesel Firewater Pump | 7E               | Operating Scenario 1: | 79                | 1.06            | 0.26        | 0.15        | 0.04        | 0.16            | 0.04        | 0.05             | 0.01        | 0.05              | 0.01        | 0.03        | 0.01        |
|  |                       |                  | Operating Scenario 2: | 110               | 1.47            | 0.37        | 0.21        | 0.05        | 0.23            | 0.06        | 0.07             | 0.02        | 0.07              | 0.02        | 0.04        | 0.01        |
| <b>Totals (Based off of Highest Operating Scenario):</b> |                       |                  |                       |                   | <b>1.47</b>     | <b>0.37</b> | <b>0.21</b> | <b>0.05</b> | <b>0.23</b>     | <b>0.06</b> | <b>0.07</b>      | <b>0.02</b> | <b>0.07</b>       | <b>0.02</b> | <b>0.04</b> | <b>0.01</b> |

#### Organic Compounds (110 bhp):

| Pollutant                           | Fuel Input (lb/MMBtu) | Emission Rates |       |
|-------------------------------------|-----------------------|----------------|-------|
|                                     |                       | (lb/h)         | (tpy) |
| Benzene <sup>1</sup>                | 0.000933              | <0.01          | <0.01 |
| Toluene <sup>2</sup>                | 0.009409              | <0.01          | <0.01 |
| Xylenes <sup>2</sup>                | 0.000285              | <0.01          | <0.01 |
| Propylene <sup>2</sup>              | 0.00258               | <0.01          | <0.01 |
| 1,3 Butadiene <sup>1</sup>          | 0.000391              | <0.01          | <0.01 |
| Formaldehyde <sup>1</sup>           | 0.00118               | <0.01          | <0.01 |
| Acrolein <sup>1</sup>               | 0.000925              | <0.01          | <0.01 |
| Naphthalene <sup>1,2</sup>          | 0.000848              | <0.01          | <0.01 |
| Acenaphthylene <sup>2</sup>         | 5.06E-06              | <0.01          | <0.01 |
| Acenaphthene <sup>2</sup>           | 1.42E-06              | <0.01          | <0.01 |
| Fluorene <sup>2</sup>               | 0.000292              | <0.01          | <0.01 |
| Phenanthrene <sup>2</sup>           | 0.000294              | <0.01          | <0.01 |
| Anthracene <sup>2</sup>             | 1.87E-06              | <0.01          | <0.01 |
| Fluoranthene <sup>2</sup>           | 7.61E-06              | <0.01          | <0.01 |
| Pyrene <sup>2</sup>                 | 4.78E-06              | <0.01          | <0.01 |
| Benzo(a)anthracene <sup>2</sup>     | 1.68E-06              | <0.01          | <0.01 |
| Chrysene <sup>2</sup>               | 3.53E-07              | <0.01          | <0.01 |
| Benzo(b)fluoranthene <sup>2</sup>   | 9.91E-08              | <0.01          | <0.01 |
| Benzo(k)fluoranthene <sup>2</sup>   | 1.55E-07              | <0.01          | <0.01 |
| Benzo(a)pyrene <sup>2</sup>         | 1.88E-07              | <0.01          | <0.01 |
| Indeno(1,2,3-cd)pyrene <sup>2</sup> | 3.75E-07              | <0.01          | <0.01 |
| Dibenz(a,h)anthracene <sup>2</sup>  | 5.83E-07              | <0.01          | <0.01 |
| Benzo(g,h,i)perylene <sup>2</sup>   | 4.89E-07              | <0.01          | <0.01 |

#### Hazardous Air Pollutants:

| Pollutant  | Emission Rates |       |
|------------|----------------|-------|
|            | (lb/h)         | (tpy) |
| Total PAHs | <0.01          | <0.01 |
| Total HAPs | <0.01          | <0.01 |

#### Notes:

- Identified as Hazardous Air Pollutant
- Identified as Polycyclic Aromatic Hydrocarbon
- This engine operates between 79 hp at 1470 RPM and 110 hp at 1760 RPM. Two emissions scenarios are given for VOC and Criteria Pollutant Emissions in order to provide the most conservative scenario for each specific pollutant. Remaining Emissions are Calculated at 110 bhp.
- Listed Assumptions are from AP-42, Chapter 3.3 (revised October 1996)
- Emission Factors for NO<sub>x</sub>, PM<sub>10</sub>, and CO emissions were utilized from the Engine's EPA Certification 6068HFC28A
- Emission Factor for VOCs were based upon AP-42, Chapter 3.3 (revised October 1996)
- Assumes Maximum Operation of 500 hours per Year in line with Permit Requirements
- PM<sub>10</sub> = Total PM
- CO<sub>2</sub> Emissions Calculated using Equation C-4 in 40 CFR 98 Subpart C designated for Tier III Engines with Liquid Fuel
- CH<sub>4</sub> and N<sub>2</sub>O Emissions Calculated using Equation C-8 in 40 CFR 98 Subpart C.
- Carbon Content Estimated using AP-42 Assumptions for Diesel Fuel
- Hazardous Air Pollutant Rates based upon AP-42, Chapter 3.3 (revised October 1996)

**Alcon North Plant Permit Application Modification Emissions Summary**

**Alcon North Plant Emission Rates - Initial Permit Levels:**

| Engine ID                      | Emission Point ID | Emissions       |       |         |       |                 |       |                  |       |                   |       |         |        |                |       |      |
|--------------------------------|-------------------|-----------------|-------|---------|-------|-----------------|-------|------------------|-------|-------------------|-------|---------|--------|----------------|-------|------|
|                                |                   | NO <sub>x</sub> |       | CO      |       | SO <sub>x</sub> |       | PM <sub>10</sub> |       | PM <sub>2.5</sub> |       | VOC     |        | Ethylene Oxide |       |      |
|                                |                   | (lb/hr)         | (tpy) | (lb/hr) | (tpy) | (lb/hr)         | (tpy) | (lb/hr)          | (tpy) | (lb/hr)           | (tpy) | (lb/hr) | (tpy)  | (lb/hr)        | (tpy) |      |
| Ethylene Oxide Sterilizer (1S) | 1E                | --              | --    | --      | --    | --              | --    | --               | --    | --                | --    | --      | 0.14   | 0.05           | 0.14  | 0.05 |
| Ethylene Oxide Sterilizer (2S) | 1E                | --              | --    | --      | --    | --              | --    | --               | --    | --                | --    | --      | 0.14   | 0.05           | 0.14  | 0.05 |
| Emergency Generator (3S)       | 2E                | 2.62            | 0.66  | 0.32    | 0.08  | 0.82            | 0.21  | 0.07             | 0.02  | 0.07              | 0.02  | 0.02    | 0.18   | 0.05           | --    | --   |
| Tank (4S)                      | 3E                | --              | --    | --      | --    | --              | --    | --               | --    | --                | --    | --      | <0.001 | <0.001         | --    | --   |
| Natural Gas Fired Boiler (5S)  | 4E                | --              | --    | --      | --    | --              | --    | --               | --    | --                | --    | --      | --     | --             | --    | --   |
| Natural Gas Fired Boiler (6S)  | 5E                | --              | --    | --      | --    | --              | --    | --               | --    | --                | --    | --      | --     | --             | --    | --   |
| <b>Total Emissions</b>         |                   | 2.62            | 0.66  | 0.32    | 0.08  | 0.82            | 0.21  | 0.07             | 0.02  | 0.07              | 0.02  | 0.02    | 0.46   | 0.15           | 0.28  | 0.10 |

**Modified Alcon North Plant Emission Rates:**

**Greenhouse Gas Emissions:**

| Engine ID                      | Emission Point ID | Emissions       |          |                 |       |                  |       |           |          |
|--------------------------------|-------------------|-----------------|----------|-----------------|-------|------------------|-------|-----------|----------|
|                                |                   | CO <sub>2</sub> |          | CH <sub>4</sub> |       | N <sub>2</sub> O |       | Total GHG |          |
|                                |                   | (lb/hr)         | (tpy)    | (lb/hr)         | (tpy) | (lb/hr)          | (tpy) | (lb/hr)   | (tpy)    |
| Ethylene Oxide Sterilizer (7S) | 1E                | --              | --       | --              | --    | --               | --    | --        | --       |
| Natural Gas Fired Boiler (8S)  | 6E                | 777.78          | 3406.67  | 0.01            | 0.07  | 0.01             | 0.06  | 782.40    | 3426.91  |
| Diesel Firewater Pump (9S)     | 7E                | 86.07           | 21.52    | <0.01           | <0.01 | <0.01            | <0.01 | 86.07     | 21.52    |
| <b>Total Emissions</b>         |                   | 863.84          | 3,428.18 | 0.01            | 0.07  | 0.01             | 0.06  | 868.47    | 3,448.43 |

**VOCs & Criteria Pollutants:**

| Engine ID                      | Emission Point ID | Emissions       |       |         |       |                 |       |                  |       |                   |       |         |       |
|--------------------------------|-------------------|-----------------|-------|---------|-------|-----------------|-------|------------------|-------|-------------------|-------|---------|-------|
|                                |                   | NO <sub>x</sub> |       | CO      |       | SO <sub>x</sub> |       | PM <sub>10</sub> |       | PM <sub>2.5</sub> |       | VOC     |       |
|                                |                   | (lb/hr)         | (tpy) | (lb/hr) | (tpy) | (lb/hr)         | (tpy) | (lb/hr)          | (tpy) | (lb/hr)           | (tpy) | (lb/hr) | (tpy) |
| Ethylene Oxide Sterilizer (7S) | 1E                | --              | --    | --      | --    | --              | --    | --               | --    | --                | --    | 0.14    | 0.05  |
| Natural Gas Fired Boiler (8S)  | 6E                | 0.65            | 2.84  | 0.54    | 2.38  | 0.004           | 0.02  | 0.01             | 0.05  | 0.01              | 0.05  | 0.04    | 0.16  |
| Diesel Firewater Pump (9S)     | 7E                | 1.47            | 0.37  | 0.21    | 0.05  | 0.23            | 0.06  | 0.07             | 0.07  | 0.02              | 0.02  | 0.04    | 0.01  |
| <b>Total Emissions</b>         |                   | 2.12            | 3.21  | 0.76    | 2.44  | 0.23            | 0.07  | 0.09             | 0.07  | 0.09              | 0.07  | 0.21    | 0.22  |

**Organic Compounds:**

| Pollutant  | Ethylene Oxide Sterilizer (7S) |       | Natural Gas Fired Boiler (8S) |       | Diesel Firewater Pump (9S) |       |
|--|--------------------------------|-------|-------------------------------|-------|----------------------------|-------|
|  | (lb/hr)                        | (tpy) | (lb/hr)                       | (tpy) | (lb/hr)                    | (tpy) |
| 1,3-Butadiene <sup>1</sup>                           | --                             | --    | --                            | --    | <0.01                      | <0.01 |
| 2-Methylnaphthalene <sup>1</sup>                     | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| 3-Methylchloranthrene <sup>1</sup>                   | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| 7,12-Dimethylbenz[ <i>a</i> ]anthracene <sup>1</sup> | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Acenaphthene <sup>2</sup>                            | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Acenaphthylene <sup>2</sup>                          | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Acrolein <sup>1</sup>                                | --                             | --    | --                            | --    | <0.01                      | <0.01 |
| Anthracene <sup>2</sup>                              | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzo[ <i>a</i> ]anthracene <sup>2</sup>             | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzene <sup>1</sup>                                 | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzo[ <i>a</i> ]pyrene <sup>2</sup>                 | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzo[ <i>b</i> ]fluoranthene <sup>2</sup>           | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzo[ <i>g,h,i</i> ]perylene <sup>1</sup>           | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzo[ <i>k</i> ]fluoranthene <sup>2</sup>           | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Butane   | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Chrysene <sup>2</sup>                                | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Dibenz[ <i>a,h</i> ]anthracene <sup>2</sup>          | --                             | --    | --                            | --    | <0.01                      | <0.01 |
| Dibenz[ <i>a,h</i> ]anthracene <sup>1,2</sup>        | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Dichlorobenzene <sup>1</sup>                         | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Ethane   | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Ethylene Oxide                                       | 0.14                           | 0.05  | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Fluoranthene <sup>2</sup>                            | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Fluorene <sup>2</sup>                                | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Formaldehyde <sup>1</sup>                            | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Hexane   | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Indeno[1,2,3- <i>cd</i> ]pyrene <sup>1,2</sup>       | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Naphthalene <sup>1,2</sup>                           | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Pentane  | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Phenanthrene <sup>2</sup>                            | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Propane  | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Propylene  | --                             | --    | --                            | --    | <0.01                      | <0.01 |
| Pyrene <sup>2</sup>                                  | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Toluene <sup>1</sup>                                 | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Xylenes <sup>1</sup>                                 | --                             | --    | --                            | --    | <0.01                      | <0.01 |

**Organic Compounds:**

| Pollutant              | Emission Rates |       |
|------------------------|----------------|-------|
|                        | (lb/h)         | (tpy) |
| Arsenic <sup>1</sup>   | <0.01          | <0.01 |
| Barium                 | <0.01          | <0.01 |
| Beryllium <sup>1</sup> | <0.01          | <0.01 |
| Cadmium <sup>1</sup>   | <0.01          | <0.01 |
| Chromium <sup>1</sup>  | <0.01          | <0.01 |
| Cobalt <sup>1</sup>    | <0.01          | <0.01 |
| Copper                 | <0.01          | <0.01 |
| Lead                   | <0.01          | <0.01 |
| Manganese <sup>1</sup> | <0.01          | <0.01 |
| Mercury <sup>1</sup>   | <0.01          | <0.01 |
| Molybdenum             | <0.01          | <0.01 |
| Nickel <sup>1</sup>    | <0.01          | <0.01 |
| Selenium <sup>1</sup>  | <0.01          | <0.01 |
| Vanadium               | <0.01          | <0.01 |
| Zinc                   | <0.01          | <0.01 |

**Hazardous Air Pollutants:**

| Pollutant  | Emission Rates |       |
|------------|----------------|-------|
|            | (lb/h)         | (tpy) |
| Total PAHs | <0.01          | <0.01 |
| Total HAPs | 0.15           | 0.05  |

**Total Change in Emission Rates:**

**Greenhouse Gas Emissions:**

| Engine ID                      | Emission Point ID | Emissions       |                 |                 |             |                  |             |               |                 |
|--------------------------------|-------------------|-----------------|-----------------|-----------------|-------------|------------------|-------------|---------------|-----------------|
|                                |                   | CO <sub>2</sub> |                 | CH <sub>4</sub> |             | N <sub>2</sub> O |             | Total GHG     |                 |
|                                |                   | (lb/hr)         | (tpy)           | (lb/hr)         | (tpy)       | (lb/hr)          | (tpy)       | (lb/hr)       | (tpy)           |
| Ethylene Oxide Sterilizer (7S) | 1E                | --              | --              | --              | --          | --               | --          | --            | --              |
| Natural Gas Fired Boiler (8S)  | 6E                | 777.78          | 3,406.67        | 0.01            | 0.07        | 0.01             | 0.06        | 782.40        | 3,426.91        |
| Diesel Firewater Pump (9S)     | 7E                | 86.07           | 21.52           | <0.01           | <0.01       | <0.01            | <0.01       | 86.07         | 21.52           |
| <b>Total Emissions</b>         |                   | <b>863.84</b>   | <b>3,428.18</b> | <b>0.01</b>     | <b>0.07</b> | <b>0.01</b>      | <b>0.06</b> | <b>868.47</b> | <b>3,448.43</b> |

**VOCs & Criteria Pollutants:**

| Engine ID                      | Emission Point ID | Emissions       |             |             |             |                 |             |                  |             |                   |             |             |             |
|--------------------------------|-------------------|-----------------|-------------|-------------|-------------|-----------------|-------------|------------------|-------------|-------------------|-------------|-------------|-------------|
|                                |                   | NO <sub>x</sub> |             | CO          |             | SO <sub>x</sub> |             | PM <sub>10</sub> |             | PM <sub>2.5</sub> |             | VOC         |             |
|                                |                   | (lb/hr)         | (tpy)       | (lb/hr)     | (tpy)       | (lb/hr)         | (tpy)       | (lb/hr)          | (tpy)       | (lb/hr)           | (tpy)       | (lb/hr)     | (tpy)       |
| Ethylene Oxide Sterilizer (7S) | 1E                | --              | --          | --          | --          | --              | --          | --               | --          | --                | --          | 0.14        | 0.05        |
| Natural Gas Fired Boiler (8S)  | 6E                | 0.65            | 2.84        | 0.54        | 2.38        | 0.00            | 0.02        | 0.01             | 0.05        | 0.01              | 0.05        | 0.04        | 0.16        |
| Diesel Firewater Pump (9S)     | 7E                | 1.47            | 0.37        | 0.21        | 0.05        | 0.23            | 0.06        | 0.07             | 0.02        | 0.07              | 0.02        | 0.04        | 0.01        |
| <b>Total Emissions</b>         |                   | <b>2.12</b>     | <b>3.21</b> | <b>0.76</b> | <b>2.44</b> | <b>0.23</b>     | <b>0.07</b> | <b>0.09</b>      | <b>0.07</b> | <b>0.09</b>       | <b>0.07</b> | <b>0.21</b> | <b>0.22</b> |

**Organic Compounds:**

| Pollutant                                   | Ethylene Oxide Sterilizer (7S) |       | Natural Gas Fired Boiler (8S) |       | Diesel Firewater Pump (9S) |       |
|---|--------------------------------|-------|-------------------------------|-------|----------------------------|-------|
|   | (lb/hr)                        | (tpy) | (lb/hr)                       | (tpy) | (lb/hr)                    | (tpy) |
| 1,3 Butadiene <sup>1</sup>                  | --                             | --    | --                            | --    | <0.01                      | <0.01 |
| 2-Methylnaphthalene <sup>1</sup>            | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| 3-Methylchloranthrene <sup>1</sup>          | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| 7,12-Dimethylbenz(a)anthracene <sup>2</sup> | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Acenaphthene <sup>2</sup>                   | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Acenaphthylene <sup>2</sup>                 | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Acrolein <sup>1</sup>                       | --                             | --    | --                            | --    | <0.01                      | <0.01 |
| Anthracene <sup>2</sup>                     | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzo(a)anthracene <sup>2</sup>             | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzenes <sup>1</sup>                       | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzo(a)pyrene <sup>2</sup>                 | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzo(b)fluoranthene <sup>2</sup>           | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzo(g,h,i)perylene <sup>2</sup>           | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Benzo(k)fluoranthene <sup>2</sup>           | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Butane <sup>1</sup>                         | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Chrysene <sup>2</sup>                       | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Dibenz(a,h)anthracene <sup>2</sup>          | --                             | --    | --                            | --    | <0.01                      | <0.01 |
| Dibenz(a,h)anthracene <sup>1,2</sup>        | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Dichlorobenzene <sup>1</sup>                | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Ethane <sup>1</sup>                         | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Ethylene Oxide                              | 0.14                           | 0.05  | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Fluoranthene <sup>2</sup>                   | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Fluorene <sup>2</sup>                       | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Formaldehyde <sup>1</sup>                   | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Hexane <sup>1</sup>                         | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Indeno(1,2,3-cd)pyrene <sup>1,2</sup>       | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Naphthalene <sup>1,2</sup>                  | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Pentane <sup>1</sup>                        | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Phenanthrene <sup>2</sup>                   | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Propane <sup>1</sup>                        | --                             | --    | <0.01                         | <0.01 | --                         | --    |
| Propylene <sup>1</sup>                      | --                             | --    | --                            | --    | <0.01                      | <0.01 |
| Pyrene <sup>2</sup>                         | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Toluene <sup>1</sup>                        | --                             | --    | <0.01                         | <0.01 | <0.01                      | <0.01 |
| Xylenes <sup>1</sup>                        | --                             | --    | --                            | --    | <0.01                      | <0.01 |

**Organic Compounds:**

| Pollutant               | Emission Rates |       |
|-------------------------|----------------|-------|
|                         | (lb/hr)        | (tpy) |
| Arsenic <sup>1</sup>    | <0.01          | <0.01 |
| Barium <sup>1</sup>     | <0.01          | <0.01 |
| Beryllium <sup>1</sup>  | <0.01          | <0.01 |
| Cadmium <sup>1</sup>    | <0.01          | <0.01 |
| Chromium <sup>1</sup>   | <0.01          | <0.01 |
| Cobalt <sup>1</sup>     | <0.01          | <0.01 |
| Copper <sup>1</sup>     | <0.01          | <0.01 |
| Lead <sup>1</sup>       | <0.01          | <0.01 |
| Manganese <sup>1</sup>  | <0.01          | <0.01 |
| Mercury <sup>1</sup>    | <0.01          | <0.01 |
| Molybdenum <sup>1</sup> | <0.01          | <0.01 |
| Nickel <sup>1</sup>     | <0.01          | <0.01 |
| Selenium <sup>1</sup>   | <0.01          | <0.01 |
| Vanadium <sup>1</sup>   | <0.01          | <0.01 |
| Zinc <sup>1</sup>       | <0.01          | <0.01 |

**Hazardous Air Pollutants:**

| Pollutant  | Emission Rates |       |
|------------|----------------|-------|
|            | (lb/hr)        | (tpy) |
| Total PAHs | <0.01          | <0.01 |
| Total HAPs | 0.15           | 0.05  |

# **Attachment O**



## **Attachment O**

### **Monitoring, Reporting, and Recordkeeping Plan**

Alcon will continue to monitor the oxidation temperature at the exhaust point from the LESNI Abatement Device (1C), as required by 4- CFR 63.364(c) and as described in 63.364(d). Alcon will replace the catalyst as required to maintain efficiency. Based on the third EO Sterilization Chamber, Alcon proposes to conduct an initial efficiency performance test required by 40 CFR 63.363.

# **Attachment P**

# AIR QUALITY PERMIT NOTICE

## Notice of Application

Notice is given that Alcon Research Ltd. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Permit Modification for an Ophthalmic Manufacturing Operation located on 2 Vision Lane, in Lesage, in Cabell County, West Virginia. The latitude and longitude coordinates are: 38.57207 and -82.28468. Startup of operations is scheduled to begin on January 1, 2017.

The applicant estimates the maximum increase in potential to discharge in the following regulated air pollutants on a facility-wide basis will be:

Nitrogen Oxides (NO<sub>x</sub>) = 3.21 tpy  
Carbon Monoxide (CO) = 2.44 tpy  
Particulate Matter (PM) = 0.07 tpy  
Volatile Organic Compounds (VOCs) = 0.22 tpy  
Sulfur Dioxide (SO<sub>2</sub>) = 0.07 tpy  
Hazardous Air Pollutants (HAPs) = 0.05 tpy  
Ethylene Oxide (EO) = 0.05 tpy  
Carbon Dioxide Equivalents (CO<sub>2</sub>e) = 3,448.43 tpy

Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57<sup>th</sup> Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this the XX<sup>th</sup> day of October, 2016.

By: Alcon Research Ltd.  
Michelle Dixon  
Plant Manager  
2 Vision Lane  
Lesage, WV 25537