8195 Industrial Blvd.
Covington, GA 30014

bd.com

BD

13 December 2019

Eric Cornwell
Georgia Department of Natural Resources
Environmental Protection Division
Air Protection Branch
4244 International Parkway, Suite 120
Atlanta, Georgia 30354-3908

Dear Mr. Cornwell:

RE: SIP Permit Application
BD Madison
Air Quality Permit 3841-211-0021-S-0-04-0

Enclosed is a SIP application for our 1211 Mary Magnan Blvd., Madison, Georgia location. The application describes the additional voluntary emission controls we plan to install to reduce fugitive emissions of Ethylene Oxide. These emissions are not regulated by Subpart O (40 CFR 63.360).

Please note that Attachment E of the permit application, a "potential to emit" (PTE) spreadsheet, contains information which BD has designated as "Trade Secrets" under the Georgia Open Records Act, O.C.G.A. § 50-18-70, *et seq*. This information is protected from disclosure to the public. In support of the designation, BD is providing an affidavit and a redacted version of the permit application, which is marked as required.

If you have any questions or comments regarding this information, please contact me at (770) 652-2049.

Sincerely,

John LaMontagne
Process Technology Engineer
Urology and Critical Care Division
Becton, Dickinson and Company

cc: K. Hays, GA EPD
R. Pasdon
With Air Dispersion Modeling files. (USB Flash Drive)

Certified: 70062150000389632596

ATTACHMENT E CONTAINS CONFIDENTIAL TRADE SECRET INFORMATION
NOT SUBJECT TO DISCLOSURE PURSUANT TO OCGA § 50-18-72(34)

State of Georgia
Department of Natural Resources
Environmental Protection Division
Air Protection Branch

Stationary Source Permitting Program
4244 International Parkway, Suite 120
Atlanta, Georgia 30354
404/363-7000
Fax: 404/363-7100

SIP AIR PERMIT APPLICATION

EPD Use Only

Date Received: ____________ Application No. ____________

FORM 1.00: GENERAL INFORMATION

1. Facility Information

Facility Name: BD Madison
AIRS No. (if known): 211 - 00021
Facility Location: Street: 1211 Mary Magnan Blvd
City: Madison Georgia Zip: 30650 County: Morgan
Is this facility a "small business" as defined in the instructions? Yes: ☐ No: ☒

2. Facility Coordinates

Latitude: 33° 33' 52" NORTH Longitude: 83° 28' 29" WEST
UTM Coordinates: 270256 EAST 3716455 NORTH ZONE ______

3. Facility Owner

Name of Owner: Becton, Dickinson and Company
Owner Address Street: 1 Becton Drive
City: Franklin Lakes State: NJ Zip: 07417

4. Permitting Contact and Mailing Address

Contact Person: John LaMontagne Title: Process Technology Engineer
Telephone No.: 770 784 6186 Ext. ______ Fax No.: 770 788 5519
Email Address: john.lamontagne@BD.com
Mailing Address: Same as: Facility Location: ☐ Owner Address: ☐ Other: ☒
If Other: Street Address: 8195 Industrial Blvd.
City: Covington State: GA Zip: 30014

5. Authorized Official

Name: Ron Pasdon Title: Sr.Operations Mgr. Covington
Address of Official Street: 8195 Industrial Blvd.
City: Covington State: GA Zip: 30014

This application is submitted in accordance with the provisions of the Georgia Rules for Air Quality Control and, to the best of my knowledge, is complete and correct.

Signature: R Pasdon Date: 13 Dec 2019

6. **Reason for Application: (Check all that apply)**

- ☐ New Facility (to be constructed)
- ☒ Existing Facility (initial or modification application)
- ☒ Permit to Construct
- ☒ Permit to Operate
- ☐ Change of Location
- ☐ Permit to Modify Existing Equipment: Affected Permit No.: ____

☐ Revision of Data Submitted in an Earlier Application

Application No.: ____

Date of Original Submittal: ____

7. **Permitting Exemption Activities (for permitted facilities only):**

Have any exempt modifications based on emission level per Georgia Rule 391-3-1-.03(6)(i)(3) been performed at the facility that have not been previously incorporated in a permit?

☒ **No** ☐ **Yes, please fill out the SIP Exemption Attachment** (See Instructions for the attachment download)

8. **Has assistance been provided to you for any part of this application?**

☐ **No** ☐ **Yes, SBAP** ☒ **Yes, a consultant has been employed or will be employed.**

If yes, please provide the following information:

Name of Consulting Company: Trinity Consultants

Name of Contact: Justin Fickas

Telephone No.: 678 441-9977 Fax No.: ____

Email Address: ____

Mailing Address: Street: 3495 Piedmont Rd

City: Atlanta State: GA Zip: 30305

Describe the Consultant's Involvement:

Air Dispersion Modeling

9. **Submitted Application Forms:** Select only the necessary forms for the facility application that will be submitted.

No. of Forms	Form
1	2.00 Emission Unit List
	2.01 Boilers and Fuel Burning Equipment
	2.02 Storage Tank Physical Data
	2.03 Printing Operations
	2.04 Surface Coating Operations
	2.05 Waste Incinerators (solid/liquid waste destruction)
	2.06 Manufacturing and Operational Data
1	3.00 Air Pollution Control Devices (APCD)
	3.01 Scrubbers
	3.02 Baghouses & Other Filter Collectors
	3.03 Electrostatic Precipitators
1	4.00 Emissions Data
1	5.00 Monitoring Information
	6.00 Fugitive Emission Sources
1	7.00 Air Modeling Information

10. **Construction or Modification Date**

Estimated Start Date: Construction estimated to start in February 2020

11. **If confidential information is being submitted in this application, were the guidelines followed in the "Procedures for Requesting that Submitted Information be treated as Confidential"?**

☐ No ☒ Yes

12. New Facility Emissions Summary

Criteria Pollutant	New Facility	
	Potential (tpy)	Actual (tpy)
Carbon monoxide (CO)		
Nitrogen oxides (NOx)		
Particulate Matter (PM) (filterable only)		
PM <10 microns (PM10)		
PM <2.5 microns (PM2.5)		
Sulfur dioxide (SO_2)		
Volatile Organic Compounds (VOC)		
Greenhouse Gases (GHGs) (in CO2e)		
Total Hazardous Air Pollutants (HAPs)		
Individual HAPs Listed Below:		

13. Existing Facility Emissions Summary

Criteria Pollutant	Current Facility		After Modification	
	Potential (tpy)	Actual (tpy)	Potential (tpy)	Actual (tpy)
Carbon monoxide (CO)	19.89	2.81	19.89	2.81
Nitrogen oxides (NOx)	36.23	4.60	36.23	4.60
Particulate Matter (PM) (filterable only)	1.94	0.27	1.94	0.27
PM <10 microns (PM10)	1.94	0.27	1.94	0.27
PM <2.5 microns (PM2.5)	1.94	0.27	1.94	0.27
Sulfur dioxide (SO_2)	3.02	0.50	3.02	0.50
Volatile Organic Compounds (VOC)	3.1	0.56	2.6	0.37
Greenhouse Gases (GHGs) (in CO2e)	23,748	3,542	23,748	3,542
Total Hazardous Air Pollutants (HAPs)	0.87*	0.25*	0.39*	0.06*
Individual HAPs Listed Below:				
Ethylene Oxide	0.5*	0.2*	0.024*	0.009*

*Historical estimating methods were employed for the preparation of this information. BD's environmental consultants are currently collecting EtO data from inside and outside the Covington and Madison plants. When these studies are completed, BD reserves the right to revise the EtO emissions estimates contained in this application based upon that newly obtained information.

14. 4-Digit Facility Identification Code:

SIC Code: 3841 SIC Description: Surgical & Medical Instruments & Apparatus

NAICS Code: 339112 NAICS Description: Surgical and Medical Instrument Manufacturing

15. Description of general production process and operation for which a permit is being requested. If necessary, attach additional sheets to give an adequate description. Include layout drawings, as necessary, to describe each process. References should be made to source codes used in the application.

This application is for the addition of Emission Controls for currently non-captured emissions of Ethylene Oxide (EO) at an existing medical device sterilization facility. The existing regulated process which includes the Sterilization Chamber Exhaust Vent, Chamber Vent, and Aeration Exhaust are not being modified. Information for these systems has been included in previous permit applications and will not be repeated here. This application is specific to additional emission controls being installed to capture and treat emissions not captured by current control equipment. No increase in the usage of EO will result from this proposed fugitive emission control project. The new controls will be comprised of two Local Exhaust Ventilation Systems:

System One (SYS1) will capture potential emissions from the seven Sterilization Vessel Rooms (VRM1, VRM2, VRM3, VRM4, VRM5, VRM6, VRM7), the Vessel to Aeration Transfer Corridors (UCO1, UCO2), and the EO Dispensing Rooms (DRM1, DRM2). Reference Attachment C.

System Two (SYS2) will capture potential emissions from the Work in Progress Area (WIP1) where product is stored after Sterilization and prior to shipment. Reference Attachment D.

The captured emissions will be treated using Advanced Air Technologies Model DR490 "Dry Bed Scrubbers" designed to achieve an estimated 99% destruction efficiency.

16. Additional information provided in attachments as listed below:

Attachment A - Floor Plan

Attachment B - Plot Plan with proposed new stack locations

Attachment C - System 1 Flow Diagram

Attachment D - System 2 Flow Diagram

Attachment E - Mass Balance Calculations.

Attachment F - Monitoring Recommendations

Attachment G - Advanced Air Technologies DR-490 Equipment Information

Attachment H - Air Dispersion Modeling

17. Additional Information: Unless previously submitted, include the following two items:

☒ Plot plan/map of facility location or date of previous submittal: Attachment B

☒ Flow Diagram or date of previous submittal: Attachment C & D

18. Other Environmental Permitting Needs:

Will this facility/modification trigger the need for environmental permits/approvals (other than air) such as Hazardous Waste Generation, Solid Waste Handling, Water withdrawal, water discharge, SWPPP, mining, landfill, etc.?

☒ **No** ☐ **Yes, please list below:**

19. List requested permit limits including synthetic minor (SM) limits.

Proposed Permit Conditions

Permittee shall initially test performance of System1 (SYS1) and System2 (SYS2) to confirm ethylene oxide removal efficiency of at least 99% on a concentration basis within 60 days of commissioning of each system and within 60 days following any replacement of dry bed media.

> Removal efficiency across each system (SYS1 and SYS2) shall be demonstrated on a concentration reduction basis using simultaneous samples of inlet and outlet gases by Summa Canisters using EPA Method TO-15 with analysis by GC/MS in the Selective Ion Monitoring (SIM) acquisition mode. During sampling of the inlet and outlet concentrations across each system, the outlet stack airflows will be measured using EPA Methods 1, 2, and 4 for determination of volumetric flow rate and moisture content, and calculation of mass emission rate of ethylene oxide.

Permittee shall sample the outlet from System1 (SYS1) and System2 (SYS2) once each month by Summa Canisters using EPA Method TO-15 with analysis by GC/MS in the Selective Ion Monitoring (SIM) acquisition mode to determine concentration of ethylene oxide in the exhaust airflow stream.
Permittee shall track monthly concentration data versus baseline conditions and, in consultation with the dry bed manufacturer, determine when media replacement is warranted to maintain at least 99% removal efficiency.

20. Effective March 1, 2019, permit application fees will be assessed. The fee amount varies based on type of permit application. Application acknowledgement emails will be sent to the current registered fee contact in the GECO system. If fee contacts have changed, please list that below:

Fee Contact name: n/a
Fee Contact email address: n/a
Fee Contact phone number: n/a

Fee invoices will be created through the GECO system shortly after the application is received. It is the applicant's responsibility to access the facility GECO account, generate the fee invoice, and submit payment within 10 days after notification.

Facility Name: BD Madison **Date of Application:** 12 December 2019

FORM 2.00 – EMISSION UNIT LIST

Emission Unit ID	Name	Manufacturer and Model Number	Description
VRM1	Vessel Room 1	N/A	Dedicated Room for Sterilization Chamber 1
VRM2	Vessel Room 2	N/A	Dedicated Room for Sterilization Chamber 2
VRM3	Vessel Room 3	N/A	Dedicated Room for Sterilization Chamber 3
VRM4	Vessel Room 4	N/A	Dedicated Room for Sterilization Chamber 4
VRM5	Vessel Room 5	N/A	Dedicated Room for Sterilization Chamber 5
VRM6	Vessel Room 6	N/A	Dedicated Room for Sterilization Chamber 6
VRM7	Vessel Room 7	N/A	Dedicated Room for Sterilization Chamber 7
WIP1	Work in Progress	N/A	Common area where sterilized product is stored prior to shipment
UCO1	Vessel to Aeration Transfer 1	N/A	Common corridor between Vessel Rooms 1-5 and Aeration Cells
UCO2	Vessel to Aeration Transfer 2	N/A	Corridor between Vessel Room 7 and Aeration Cell 7
DRM1	EO Dispensing 1	N/A	Dedicated Room for Dispensing EO from supply drums to Vessels #1- #6
DRM2	EO Dispensing 2	N/A	Dedicated Room for Dispensing EO from supply drums to Vessel #7
WIP1	Work in Progress	N/A	Common area where sterilized product is stored prior to shipment

Facility Name: BD Madison **Date of Application:** 12 December 2019

Form 3.00 – AIR POLLUTION CONTROL DEVICES - PART A: GENERAL EQUIPMENT INFORMATION

APCD Unit ID	Emission Unit ID	APCD Type (Baghouse, ESP, Scrubber etc)	Date Installed	Make & Model Number (Attach Mfg. Specifications & Literature)	Unit Modified from Mfg Specifications?	Gas Temp. °F		Inlet Gas Flow Rate (acfm)
						Inlet	Outlet	
SYS1	VRM1	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	2,116-10,580
SYS1	VRM2	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	2,116-10,580
SYS1	VRM3	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	4,232-10,580
SYS1	VRM4	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	4,232-10,580
SYS1	VRM5	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	4,232-10,580
SYS1	VRM6	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	4,232-10,580
SYS1	VRM7	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	1,580-2,645
SYS1	UCO1	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	3,147
SYS1	UCO2	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	3,147
SYS1	DRM1	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	2,116-8,464
SYS1	DRM2	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	212-1,058
SYS2	WIP1	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	67,709

Facility Name: BD Madison **Date of Application:** 12 December 2019

Form 3.00 – AIR POLLUTION CONTROL DEVICES – PART B: EMISSION INFORMATION

APCD Unit ID	Pollutants Controlled	Percent Control Efficiency		Inlet Stream To APCD		Exit Stream From APCD		Pressure Drop Across Unit (Inches of water)
		Design	Actual	lb/hr	Method of Determination	lb/hr	Method of Determination	
SYS1	Ethylene Oxide	99%	TBD	0.013	Mass Balance	0.00013	Mass Balance	7
SYS2	Ethylene Oxide	99%	TBD	0.40	Mass Balance	0.0040*	Mass Balance	7
							*This value was calculated using the facility's maximum sterilization production rate at 8,760 hours per year (i.e., the PTE).	

Facility Name: BD Madison **Date of Application:** 12 December 2019

FORM 4.00 – EMISSION INFORMATION

Emission Unit ID	Air Pollution Control Device ID	Stack ID	Pollutant Emitted	Emission Rates				
				Hourly Actual Emissions (lb/hr)	Hourly Potential Emissions (lb/hr)	Actual Annual Emission (tpy)	Potential Annual Emission (tpy)	Method of Determination
VRM1	SYS1	STK1	Ethylene Oxide	0.000013	0.000013	0.00006	0.00006	Process Knowledge & Engineering Judgement
VRM2	SYS1	STK1	Ethylene Oxide	0.000013	0.000013	0.00006	0.00006	Process Knowledge & Engineering Judgement
VRM3	SYS1	STK1	Ethylene Oxide	0.000013	0.000013	0.00006	0.00006	Process Knowledge & Engineering Judgement
VRM4	SYS1	STK1	Ethylene Oxide	0.000013	0.000013	0.00006	0.00006	Process Knowledge & Engineering Judgement
VRM5	SYS1	STK1	Ethylene Oxide	0.000013	0.000013	0.00006	0.00006	Process Knowledge & Engineering Judgement
VRM6	SYS1	STK1	Ethylene Oxide	0.000013	0.000013	0.00006	0.00006	Process Knowledge & Engineering Judgement
VRM7	SYS1	STK1	Ethylene Oxide	0.000013	0.000013	0.00006	0.00006	Process Knowledge & Engineering Judgement
UCO1	SYS1	STK1	Ethylene Oxide	0.00000037	0.0000097	.000016	0.000043	Mass Balance
UCO2	SYS1	STK1	Ethylene Oxide	0.00000037	0.0000097	.000016	0.000043	Mass Balance
DMR1	SYS1	STK1	Ethylene Oxide	0.000013	0.000013	0.00006	0.00006	Process Knowledge & Engineering Judgement
DMR2	SYS1	STK1	Ethylene Oxide	0.000013	0.000013	0.00006	0.00006	Process Knowledge & Engineering Judgement
WIP1	SYS2	STK2	Ethylene Oxide	0.0015	0.0040	0.0065	0.018	Mass Balance

Facility Name: BD Madison **Date of Application:** 12 December 2019

FORM 5.00 MONITORING INFORMATION

Emission Unit ID/ APCD ID	Emission Unit/APCD Name	Monitored Parameter		Monitoring Frequency
		Parameter	Units	
VRM1/SYS 1	Vessel Room1/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
VRM2/SYS 1	Vessel Room2/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
VRM3/SYS 1	Vessel Room3/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
VRM4/SYS 1	Vessel Room4/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
VRM5/SYS 1	Vessel Room5/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
VRM6/SYS 1	Vessel Room6/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
VRM7/SYS 1	Vessel Room7/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
UCO1/SYS 1	Vessel to Aeration Transfer/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
UCO2/SYS 1	Vessel to Aeration Transfer/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
DMR1/SYS 1	EO Dispensing/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
DMR2/SYS 1	EO Dispensing/System1	EO Concentration at outlet of SYS1	ppm	Reference Attachment F
WIP1/SYS2	Work in Progress/System2	EO Concentration at outlet of SYS2	ppm	Reference Attachment F

Comments:
Monitoring detail described in attachment F

Facility Name: BD Madison **Date of Application:** 12 December 2019

FORM 7.00 – AIR MODELING INFORMATION: Stack Data

Stack ID	Emission Unit ID(s)	Stack Information			Dimensions of largest Structure Near Stack		Exit Gas Conditions at Maximum Emission Rate			
		Height Above Grade (ft)	Inside Diameter (ft)	Exhaust Direction	Height (ft)	Longest Side (ft)	Velocity (ft/sec)	Temperature (°F)	Flow Rate (acfm)	
									Average	Maximum
STK1	VRM1, VRM2, VRM3, VRM4, VRM5, VRM6, VRM7, UCO1, UCO2, DMR1, DMR2,	100	3.83	To the Sky	20	50	52	70	24,546	38,087
STK2	WIP1	100	5.17	To the Sky	20	50	50.8	70	67,709	67,709

NOTE: If emissions are not vented through a stack, describe point of discharge below and, if necessary, include an attachment. List the attachment in Form 1.00 *General Information*, Item 16.

n/a

Facility Name: BD Madison **Date of Application:** 12 December 2019

FORM 7.00 AIR MODELING INFORMATION: Chemicals Data

Chemical	Potential Emission Rate (lb/hr)	Toxicity	Reference	MSDS Attached
Ethylene Oxide CAS#: 71-25-8	0.0055	PEL: 1ppm STEL: 5 ppm See Att H for Outside Exposures	OSHA 1910 See Att H for Outside Exposures Reference	☐
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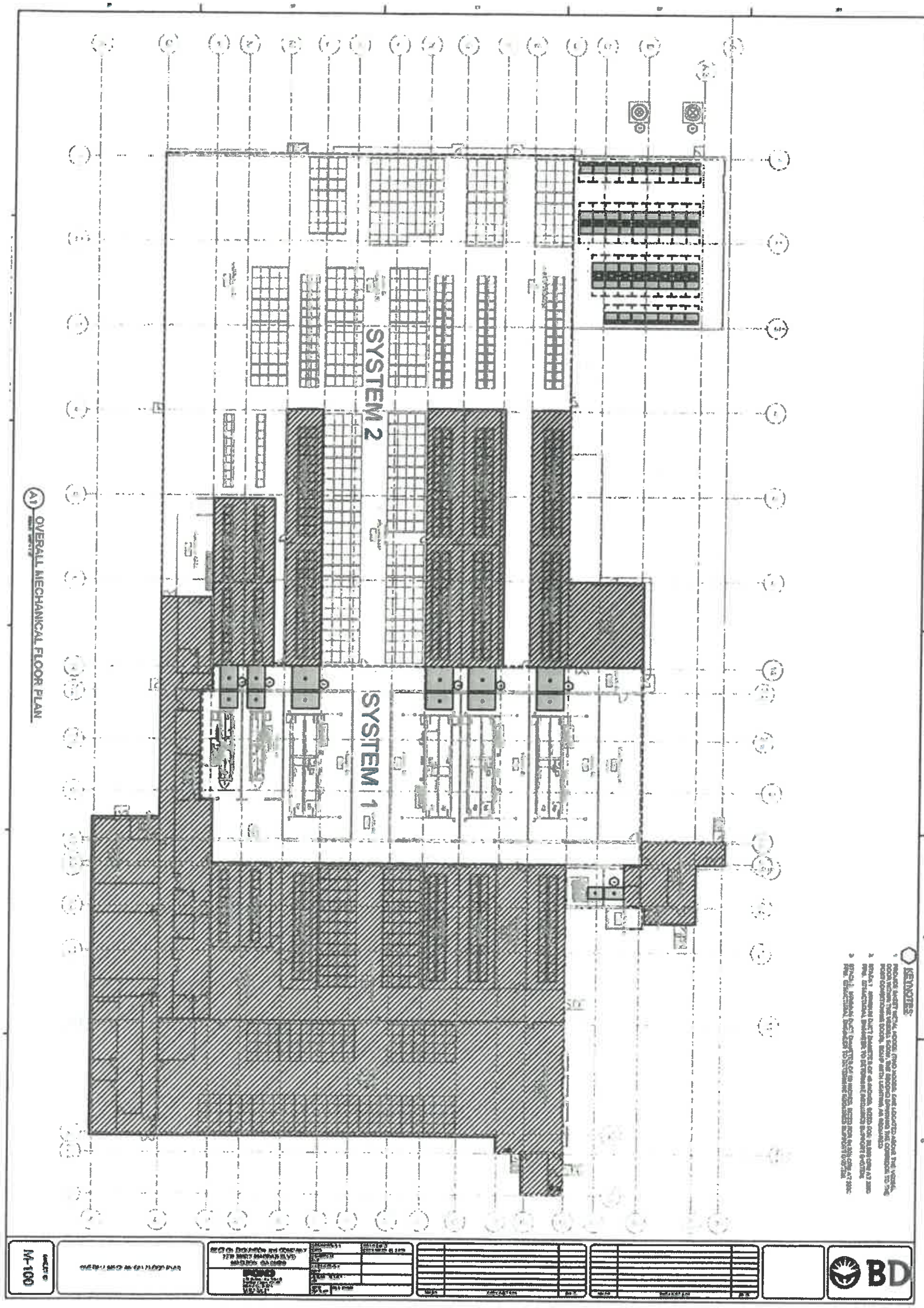
ATTACHMENT A

BD Madison SIP Application



ATTACHMENT B

BD Madison SIP Application

ATTACHMENT B

BD Madison SIP Application

Attachment C

BD Madison SIP Application

General Description

The intent of the mechanical systems design upgrade is to capture unregulated, fugitive Ethylene Oxide (EO) emissions inside the facility and reduce the potential for releases of these emissions to atmosphere. An effective means of containing emissions is to capture EO at the source. The capture and treatment systems will utilize pressure differential strategies. Using negatively pressurized spaces, extraction will direct air from the lowest EO concentrations to the highest concentrations in the building and then send this exhaust air through an EO destruction process. Existing exhaust fans (WIP1) will be replaced with a dedicated EO capture and destruction systems. Further, the shipping area will be enclosed. The new systems are designed to reduce captured emissions by 99% at the outlet.

System 1 Description/Flow Diagram

System One (SYS1) will capture potential emissions from the seven Sterilization Vessel Rooms (VRM1, VRM2, VRM3, VRM4, VRM5, VRM6, VRM7), the Vessel to Aeration Transfer Corridors (UCO1, UCO2), and the EO Dispensing Room (DRM1, DMR2). All SYS1 exhaust will be manifolded into a Dry Bed System with variable speed exhaust fan with a maximum capacity of 38,087 cfm. The system will maintain negative pressure, with respect to outside, in the Vessel Rooms, Vessel to Aeration Transfer Corridors, Drum Dispensing rooms and use local ventilation exhaust to capture and destruct EO.

Normal Mode:

Vessel Rooms VRM1-VRM2 will exhaust 2,116 cfm each, Vessel Rooms VRM3-VRM5 will exhaust 4,232 cfm each, Vessel Room VRM7 will exhaust 1,058 cfm. DMR1 will exhaust 2,116 cfm, DMR2 will exhaust 212 cfm. UC01, UCO2 hoods will be off. Total cfm = 24,546. The Vessel rooms, DMR1, DMR2, and UCO1, UCO2 can increase cfm, to a total of 38,087 cfm, if monitoring equipment detects elevated EO levels.

Chamber Unloading Mode:

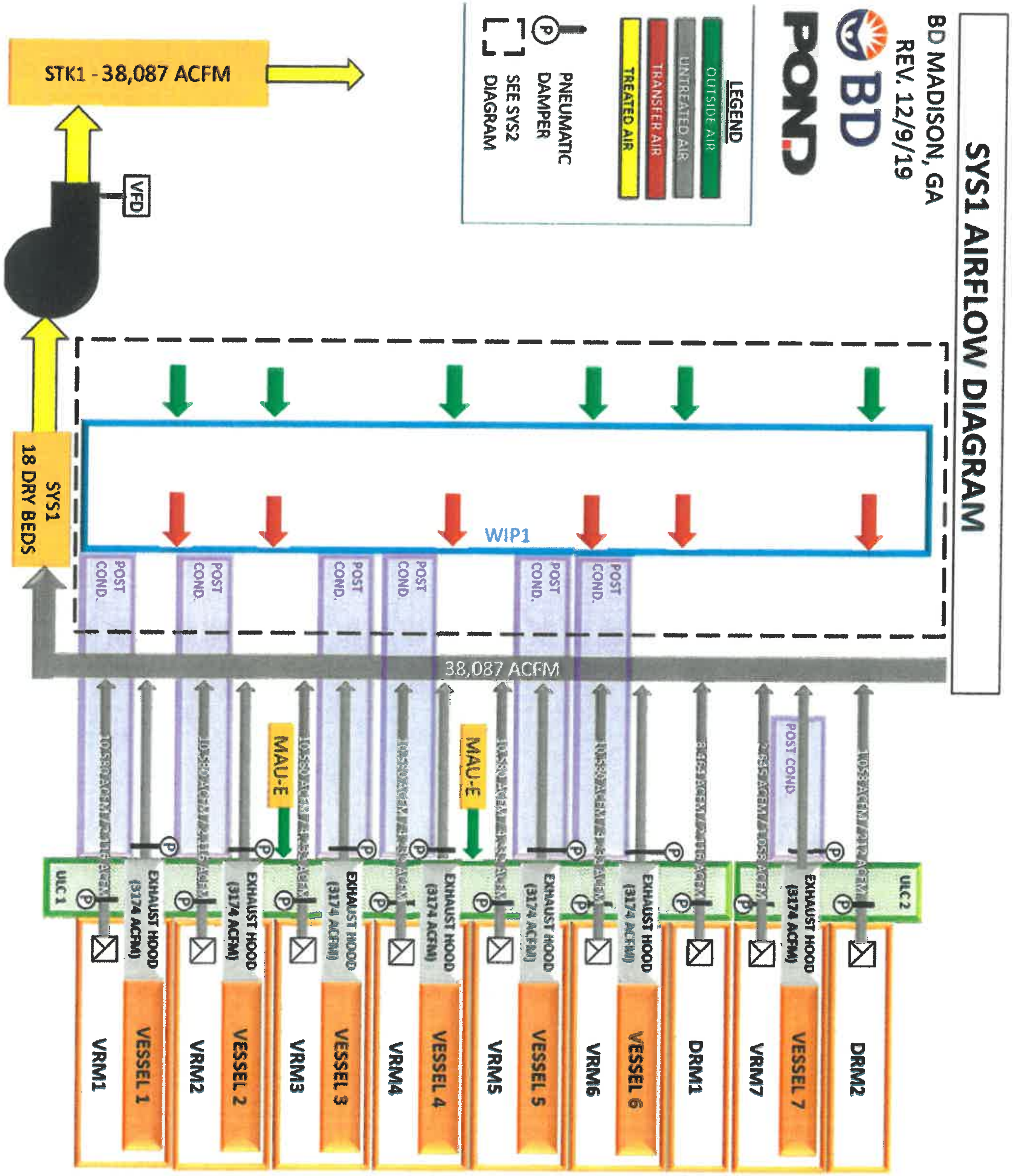
When a chamber is being unloaded the room exhaust will ramp to High Flow 2,645-10,580 cfm (all other vessel rooms will be at Low Flow (1,058-4,232 cfm) the corresponding UCO1 or UCO2 hood will go to 3,174 cfm exhaust (all other hoods will be off). DMR1, DMR2 will remain at 212/2,116 cfm. Total cfm = 20,843-29,836 cfm. The other Vessel rooms can increase cfm, to a total of 38,087 cfm, if monitoring equipment detects elevated EO levels.

Emergency Mode:

SYS1 will also incorporate a safety feature that will serve to shut down the system in the case of a major EO leak (≥25% of LEL or 7,500ppm). The AAT Dry Beds are designed for a maximum limit of 10,000 ppm and can ignite if overfed leading to potential fire or explosion. An EO sensor will be located in the SYS1 inlet duct and will activate a shutdown sequence based on an internal setpoint. EO emissions will not be captured in this emergency situation. This event will also trigger a sterilization process shutdown. It should be noted that BD has not experienced levels of this magnitude in its twenty-year history and this safety system is being included only to prevent a personnel injury in the event of a catastrophic failure.

Attachment C

BD Madison SIP Application

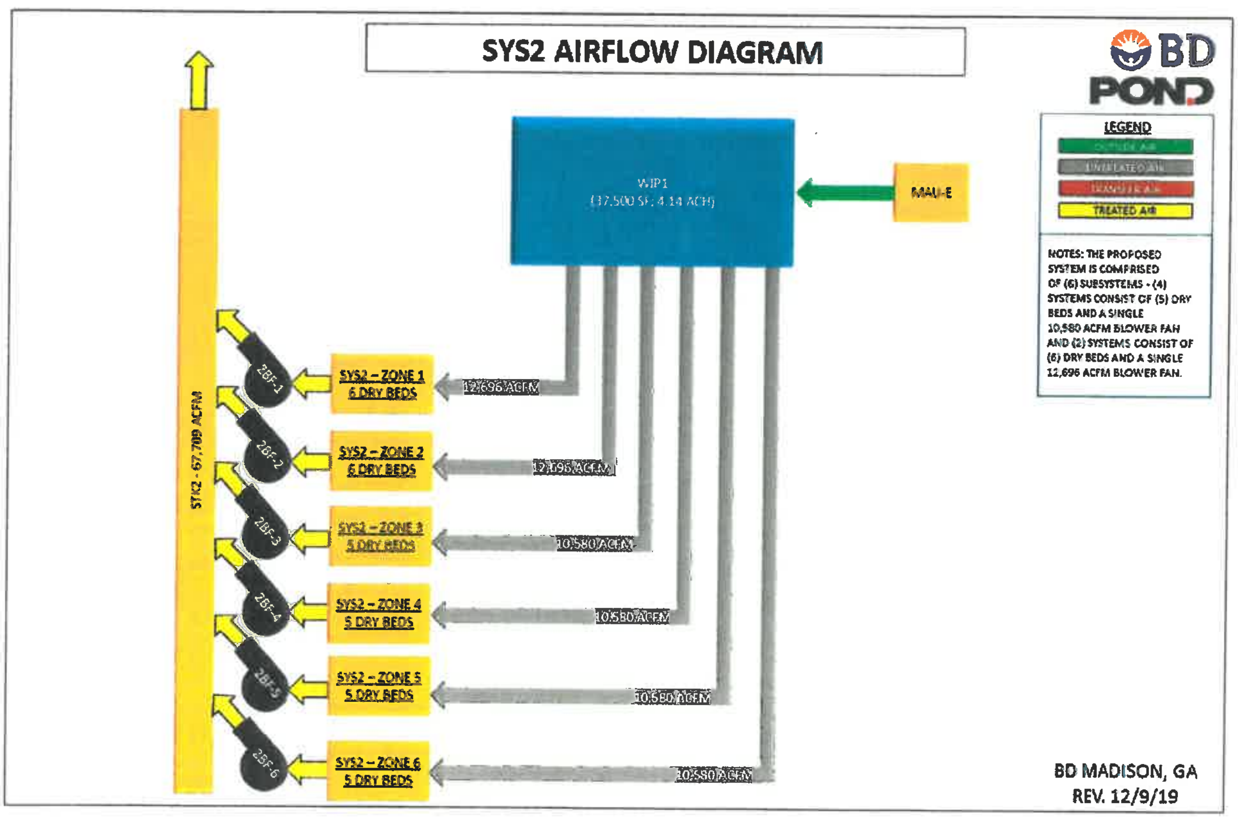


Attachment D

BD Madison SIP Application

System 2 Description/Flow Diagram

System Two (SYS2) will capture potential emissions from the Work in Progress Area (WIP1) where product is stored after Sterilization and prior to shipment. All SYS2 exhaust will be manifolded into a Dry Bed System with multiple variable speed exhaust fans for a maximum capacity of 67,700 cfm. The exhaust fans will be routed to a common Stack (STK2). The system will maintain negative pressure, with respect to outside, in the WIP1 area. The area pressure will be monitored with pressure sensors and fans will modulated to maintain a negative pressure in the space. Administrative controls will be implemented to ensure building integrity is preserved, doorways are managed, and air flows/pressures are maintained per design. The administrative controls will consist of written Operating Procedures and Preventative Maintenance procedures/checklists. The controls will also include pressure sensing devices and system monitoring that will notify plant personnel if the systems are not functioning properly. The shipping area will be enclosed to aid in containment of emissions.



ATTACHMENT E

Becton, Dickinson and Company

Mass Balance Calculations for SIP Application (PTE)[6]

Facility: Madison, GA

	Cycle Info	Cycle Info	Total		
Input data:					
Ethylene oxide usage	[redacted]			lb/yr	Info for two cycles is shown as they have alternat absorption and k factors; Total usage based on Mass Balance
Sterilizer removal efficency[1]	99.9%	99.9%			Based on partial pressure calculation estimate
RTO efficiency, aeration	99.700%	99.700%			Based on 2018 Performance Testing (Previously submitted to EPD)
RTO efficiency, vessels	99.999%	99.999%			Based on 2018 Performance Testing (Previously submitted to EPD)
Product transfer time, sterilizer to aeration	5	5		min	
Aeration time	16	16		hr	
Aeration Unload time	10	10		min	
System 1 removal efficiency	99%	99%			Assume 99% Based on vendor literature
System 2 removal efficiency	99%	99%			Assume 99% Based on vendor literature
System 2 Safety Factor	4.00	4.00			Safety factor included to account for variation in future products and product density which may impact EO residuals.
Assumptions:					
Product absorption[2]	[redacted]				
EO degassing rate constant, k[3]	[redacted]			lb/hr	
Miscellaneous fugitive loss[4]	100			lb	captured in system 1
Calculations:					
Sterilizer:					
EO into sterilizers	[redacted]			lb	Total usage based on Mass Balance minus miscellaneous fugitive loss
EO absorbed by product	2,159.6	585.0	2,745	lb	
EO in sterilizer not absorbed by product	[redacted]			lb	
EO exhausted to RTO from vac/air wash	[redacted]			lb	
EO exhausted to RTO from vent	537.7	64.4	602	lb	
Sterilizer exhaust to RTO	[redacted]			lb	
Sterilizer exhaust removed by RTO	[redacted]			lb	
Sterilizer exhaust to atmosphere after RTO	5.4	[illegible]	6.0	lb	
Transfer:					EO will off-gas from products during aeration per equation: $C = C_o e^{-kt}$, where C = Final EO concentration, C_o = EO concentration at time 0, k = EO degassing rate constant, and t = degassing time in hrs.
EO offgas during product transfer to aeration	0.51%	0.99%			
EO offgas during product transfer to aeration	11.0	5.8	16.8	lb	This will be captured by system one
Aeration:					
EO remaining in product entering aeration	2,148.6	579.2	2,727.8	lb	
Offgas during aeration	62.6%	85.1%	1.5		
Offgas during unloading	0.01	0.02	0.03		
EO offgas during aeration	1,345.5	493.2	1,838.7	lb	
To RTO during aeration	1,345.5	493.2	1,838.7	lb	
To RTO during aeration unload	8.2	1.7	9.9	lb	
Total aeration to RTO	1,353.7	494.9	1,848.6	lb	
Aeration removed by RTO	1,349.7	493.4	1,843.1	lb	
Aeration exhaust to atmosphere after RTO	4.1	1.5	5.5	lb	
System1:					
Into System 1	111.0	5.8	116.8	lb	
Removed by System 1	109.9	5.7	115.7	lb	
System 1 exhaust to atmosphere	1.1	0.06	1.2		
System2:					
Into System 2	3,179.4	337.3	3,516.6	lb	Includes System 2 Safety Factor
Removed by System 2	3,147.6	333.9	3,481.5	lb	
System 2 exhaust to atmosphere	31.8	3.4	35.2		
Exhausted before Modification:					
EO exhausted to atmosphere from RTO	9.4	2.1	11.6	lb	
EO Exhausted to atmosphere by system 1	111.0	5.8	116.8	lb	
EO Exhausted by to atmosphere System 2	794.8	84.3	879.2	lb	Does not Include Safety Factor[5]
Total EO exhausted to atmosphere	915.3	92.2	1,007.4	lb	Before Modifications
	[illegible]	0.05	0.5	Tons	
Exhausted after Modification:					
EO exhausted to atmosphere from RTO	9.4	2.1	11.6	lb	
EO Exhausted to atmosphere by system 1	1.1	0.06	1.2	lb	
EO Exhausted by to atmosphere System 2	31.8	3.4	35.2	lb	Does include Safety Factor
Total EO exhausted to atmosphere	42.3	5.6	47.9	lb	
	0.021	0.0028	0.024	Tons	After Modifications

Note 1	This estimates how much EO is removed during post exposure vacuum washes but does not include what is in the product at the time it transfers to Aeration.
Note 2	Estimates the amount of EO in the product when it starts the transfer to aeration.
Note 3	An estimate based on Product EO Residue Testing performed by BD laboratory personnel.
Note 4	An estimate of potential EO emissions from pump/valve packaging, flange losses, EO supply drum changes, and non-routine losses.
Note 5	The Safety Factor is only included in the After Modification calculations as this insures the new system is designed to account for variation in future products and product density.
Note 6	Historical estimating methods were employed for the preparation of this Mass Balance. BD's environmental consultants are currently collecting EtO data from inside and outside the Covington and Madison plants. When these studies are completed, BD reserves the right to revise the EtO emissions estimates contained in this application based upon that newly obtained information.

ATTACHMENT E

Becton, Dickinson and Company

Mass Balance Calculations for SIP Application (Actual)[6]

Facility: Madison, GA

	Cycle Info	Cycle Info	Total	Unit	Notes
Input data:					
Ethylene oxide usage	[redacted]			lb/yr	Info for two cycles is shown as they have alternat absorption and k factors
Sterilizer removal efficency[1]	99.9%	99.9%			Total usage based on Mass Balance (CY2018)
RTO efficiency, aeration	99.700%	99.700%			Based on partial pressure calculation estimate
RTO efficiency, vessels	99.999%	99.999%			Based on 2018 Performance Testing (Previously submitted to EPD)
Product transfer time, sterilizer to aeration	5	5		min	Based on 2018 Performance Testing (Previously submitted to EPD)
Aeration time	16	16		hr	
Aeration Unload time	10	10		min	
System 1 removal efficiency	99%	99%			Assume 99% Based on vendor literature
System 2 removal efficiency	99%	99%			Assume 99% Based on vendor literature
System 2 Safety Factor	4.00	4.00			Safety factor included to account for variation in future products and product density which may impact EO residuals.
Assumptions:					
Product absorption[2]	[redacted]				
EO degassing rate constant, k[3]	[redacted]			lb/hr	
Miscellaneous fugitive loss[4]	100	0		lb	captured in system 1
Calculations:					
Sterilizer:					
EO into sterilizers	[redacted]			lb	Total usage based on Mass Balance minus miscellaneous fugitive loss
EO absorbed by product	795.4	231.9	1,027	lb	
EO in sterilizer not absorbed by product	[redacted]			lb	
EO exhausted to RTO from vac/air wash				lb	
EO exhausted to RTO from vent	198.1	25.5	224	lb	
Sterilizer exhaust to RTO	[redacted]			lb	
Sterilizer exhaust removed by RTO				lb	
Sterilizer exhaust to atmosphere after RTO	2.0	0.3	2.2	lb	
Transfer:					EO will off-gas from products during aeration per equation: $C = C_o e^{-kt}$, where C = Final EO concentration, C_o = EO concentration at time 0, k = EO degassing rate constant, and t = degassing time in hrs.
EO offgas during product transfer to aeration	0.51%	0.99%			This will be captured by system one
EO offgas during product transfer to aeration	4.1	2.3	6.4	lb	
Aeration:					
EO remaining in product entering aeration	791.3	229.6	1,021.0	lb	
Offgas during aeration	62.6%	85.1%	1.5		
Offgas during unloading	0.01	0.02	0.03		
EO offgas during aeration	495.6	195.5	691.1	lb	
To RTO during aeration	495.6	195.5	691.1	lb	
To RTO during aeration unload	3.0	0.7	3.7	lb	
Total aeration to RTO	498.6	196.2	694.8	lb	
Aeration removed by RTO	497.1	195.6	692.7	lb	
Aeration exhaust to atmosphere after RTO	[illegible]	[illegible]	2.1	lb	
System1:					
Into System 1	104.1	2.3	106.4	lb	
Removed by System 1	103.0	2.3	105.3	lb	
System 1 exhaust to atmosphere	1.0	0.0	1.1		
System2:					
Into System 2	1,171.0	133.7	1,304.7	lb	Includes System 2 Safety Factor
Removed by System 2	1,159.3	132.4	1,291.7	lb	
System 2 exhaust to atmosphere	11.7	1.3	[illegible]		
Exhausted before Modification:					
EO exhausted to atmosphere from RTO	3.5	0.8	4.3	lb	
EO Exhausted to atmosphere by system 1	104.1	2.3	106.4	lb	
EO Exhausted by to atmosphere System 2	292.7	33.4	326.2	lb	Does not include Safety Factor[5]
Total EO exhausted to atmosphere	400.3	36.6	436.9	lb	Before Modifications
	0.2	0.02	0.2	Tons	
Exhausted after Modification:					
EO exhausted to atmosphere from RTO	3.5	0.8	4.3	lb	
EO Exhausted to atmosphere by system 1	1.0	0.02	1.1	lb	
EO Exhausted by to atmosphere System 2	11.7	1.3	13.0	lb	Does Include Safety Factor
Total EO exhausted to atmosphere	16.2	2.2	18.4	lb	
	0.008	0.0011	0.009	Tons	After Modifications

Note 1	This estimates how much EO is removed during post exposure vacuum washes but does not include what is in the product at the time it transfers to Aeration.
Note 2	Estimates the amount of EO in the product when it starts the transfer to aeration.
Note 3	An estimate based on Product EO Residue Testing performed by BD laboratory personnel.
Note 4	An estimate of potential EO emissions from pump/valve packaging, flange losses, EO supply drum changes, and non-routine losses.
Note 5	The Safety Factor is only included in the After Modification calculations as this insures the new system is designed to account for variation in future products and product density.
Note 6	Historical estimating methods were employed for the preparation of this Mass Balance. BD's environmental consultants are currently collecting EtO data from inside and outside the Covington and Madison plants. When these studies are completed, BD reserves the right to revise the EtO emissions estimates contained in this application based upon that newly obtained information.

Attachment F

BD Madison SIP Application

BD has not identified an US EPA- or GA EPD-approved stack test method that will measure the concentrations of unregulated, fugitive emissions of ethylene oxide (EO), which are expected to be less than 0.2 ppm, that will enter the dry systems' inlets or the resulting, reduced concentrations of EO at the dry bed systems' outlets or the combined stacks.[1] For these reasons, BD proposes to demonstrate the control efficiency of the dry bed systems using the following sample collection and analysis methods, which are based EPA Method TO-15.

Based upon available information, BD anticipates that the ethylene oxide (EO) concentrations at the inlet and outlet of the proposed systems will be relatively low (i.e., typically less than 0.2 ppmv) and essentially not reliably detected by standard EPA stack testing methods (e.g., EPA Method No. 18). To overcome this limitation, the approach described below employs a gas sampling technique capable of achieving lower detection limits.

When the inlet and outlet concentrations are close to the limits of detection of the analytical equipment it becomes mathematically impossible to prove the specified destruction efficiency. We are currently investigating monitoring technologies and methods that would allow practical measurement of the relatively low levels of EO expected at the outlet of the proposed emission systems with the intent to be able to confirm a 99% reduction or an equivalent emission standard. BD welcomes any alternate sample/analysis methods may be that GA EPD may recommend.

BD proposes that the initial compliance tests and subsequent monthly monitoring of System1 and System2 as follows:

Initial Compliance Testing:

- Demonstrate 99% ethylene oxide removal efficiency of the dry bed systems across each control System using simultaneous samples of inlet and outlet gases by Summa Canisters using EPA Method TO-15 with analysis by GC/MS in the Selective Ion Monitoring (SIM) acquisition mode.
- During this sampling of the inlet and outlet concentrations across each system, the outlet stack airflows will be measured using EPA Methods 1, 2, and 4 for determination of volumetric flow rate and moisture content.

[1] Advanced Air Technologies, Inc. (AAT), the manufacturer of the dry bed systems, has claimed that that emissions "of EtO will be 99% or = 1 ppmv, whichever is less stringent, when operated per AAT operations manual and other parameters of project design." BD has based its calculations of the removal of unregulated, fugitive EO emissions on AAT's manufacturer's claims. To its knowledge, BD's installation of the AAT dry bed systems to control EO in the concentrations found in the unregulated, fugitive emissions of the substance at the Covington plant is the first such installation anywhere. BD, nonetheless, believes that the dry bed systems will reduce the unregulated, fugitive emissions of EO by 99%.

- Using the above-measured airflow and concentration data, the mass emission rate from each System will be calculated and reported.

- These data will be used to establish baseline conditions against which subsequent monitoring data (collected as described below) will be considered in determining when media replacement should be initiated.

This compliance testing regime will be repeated after completion of any future media replacement.

Routine Monitoring:

- Sample the outlet from each dry bed system on a monthly basis by Summa Canisters using EPA Method TO-15 with analysis by GC/MS in the Selective Ion Monitoring (SIM) acquisition mode and determine concentration of ethylene oxide in the exhaust airflow stream.

- Monthly concentration data will be tracked and compared with baseline data.

- Trending of the monthly concentration data versus baseline will be used in consultation with the dry bed manufacturer to determine when media replacement is warranted to maintain at least 99% removal efficiency.

The abatement method is chemisorption (adsorption accompanied by chemical reaction) by means of Advanced Air Technology dry beds containing sulfonated polymer of styrene. Once the chemisorption process has occurred, the amount of EO is reduced by at least 99%. See table below:

ISO 9001 : 2008 Certified

ADVANCED AIR TECHNOLOGIES, INC.

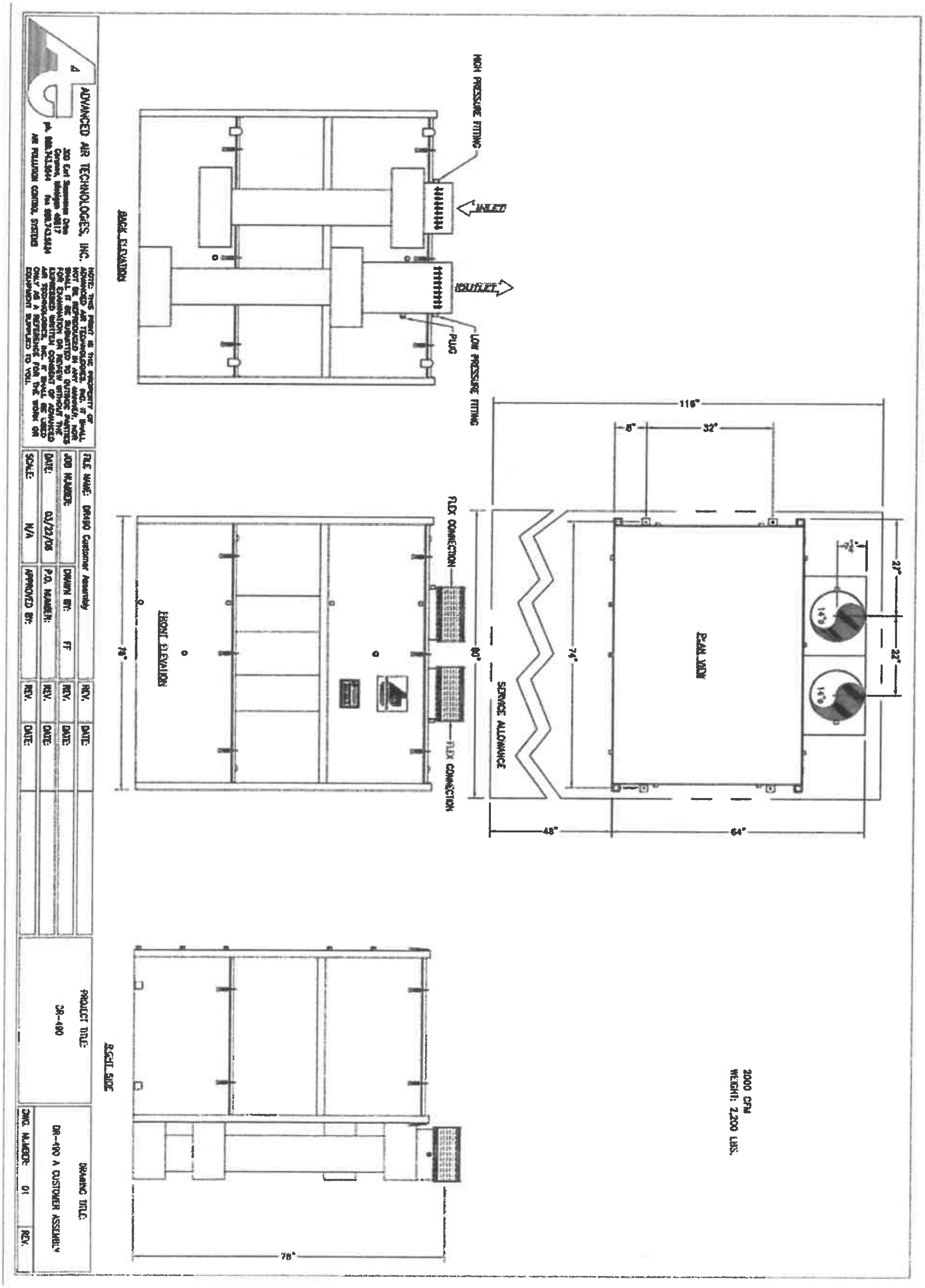
www.advairtech.com

300 Earl Sleeseman Drive
Corunna, MI 48817
(Michigan - USA)

Phone: 989-743-5544
Fax: 989-743-5624
Toll Free: 800-295-6583

AAT, INC. DR-490 ETHYLENE OXIDE ABATOR
REMOVAL EFFICIENCY DECAY
(BASED ON 2000 SCFM AIR FLOW RATE)

lb. EtO Treated/lb. Reactant	lb. EtO Previously Treated	EtO % Removal Efficiency
0	0	99.995
0.05	45	99.97
0.10	90	99.95
0.15	135	99.92
0.20	180	99.9
0.25	225	99.5
0.30	270	99
0.35	315	98
0.40	360	97
0.45	405	95
0.50	450	85
0.52	468	0


ADVANCED AIR TECHNOLOGIES, INC.
BACK ELEVATION
HIGH PRESSURE FITTING
INLET
OUTLET
LOW PRESSURE FITTING
PLUG
FRONT ELEVATION
FLEX CONNECTION
SERVICE ALLOWANCE
PLAN VIEW
RIGHT SIDE
2000 CFM
WEIGHT: 2,200 LBS.
PRODUCT TITLE:
DR-490
DRAWING TITLE:
DR-490 A CUSTOMER ASSEMBLY
DATE: 03/23/06
SCALE: N/A
DRAWN BY: FF

Attachment H
BD Madison SIP Application

ETHYLENE OXIDE EMISSIONS IMPACT ASSESSMENT

BD Bard > Madison Facility

Prepared By:

TRINITY CONSULTANTS

December 2019

Project 191101.0280

Trinity Consultants

Environmental solutions delivered uncommonly well

1. ETHYLENE OXIDE EMISSIONS IMPACT ASSESSMENT

EPD regulates the emissions of toxic air pollutants (TAPs) through a program approved under the provisions of GRAQC Rule 391-3-1-.02(2)(a)3(ii). A TAP is defined as any substance that may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard. Procedures governing the EPD's review of toxic air pollutant emissions as part of air permit reviews are contained in EPD's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions* (the *Guideline*).[1]

This assessment included dispersion modeling for ethylene oxide (EtO) from the facility.

1.1. MODELING ASSESSMENT

Modeling conducted was done with the AERMOD (v19191) dispersion model. Meteorological data utilized for the modeling assessment was obtained from the Georgia EPD website, consistent with the meteorological data recommended for use for the location of the subject facility (Morgan County).[2] Meteorological data utilized was processed using AERMET (v18081), AERSURFACE (v13016), and AERMINUTE (v15272) with the adjusted surface friction velocity option (ADJ_U*). Five consecutive years of meteorological data (2014-2018) were utilized in the modeling assessment, with surface meteorological data from the Athens Ben Epps airport and upper air data from Falcon Field in Peachtree City, Georgia. This assessment was performed in accordance with the *Guideline*.

1.1.1. Source Parameters

Ethylene oxide emissions were modeled as point sources from three specific facility stack locations. For point sources, AERMOD requires the stack height (m), inside stack exit diameter (m), temperature (K), and exit gas velocity (m/s) to be specified. Table 1-1 provides a summary of the location and stack parameters used in the dispersion model for the point sources. The modeled emission rates reflect the current DRE for the RTO (incinerator) at the Madison facility, and assume a 99% reduction of all fugitive emissions of EtO from the facility, which reflects the performance of the dry bed filters proposed in the permit application for which this modeling was performed.

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[1] *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions.* Georgia Department of Natural Resources, Environmental Protection Division, Air Protection Branch, Revised, May 2017.

[2] https://epd.georgia.gov/air-protection-branch-technical-guidance-0/air-quality-modeling/georgia-aermet-meteorological-data

Table 1-1. Point Source Parameters

Source	Easting (meter)	Northing (meter)	Modeled Emissions (lb/yr)	Modeled Emissions (lb/hr)	Modeled Emissions (g/s)	Stack Height (ft)	Stack Height (m)	Stack Temperature (F)	Stack Temperature (K)	Exit Velocity (ft/s)	Exit Velocity (m/s)	Flow (cfm)	Stack Diameter (in)	Stack Diameter (m)
RTO	270,841.52	3,716,316.63	11.6	1.32E-03	1.67E-04	50	15.24	250	394.26	42.6	12.98	32,150	48	1.219
System 1	270,878.40	3,716,269.30	1.2	1.37E-04	1.73E-05	100	30.48	70	294.26	36.9	11.24	25,546	46	1.167
System 2	270,881.85	3,716,272.66	35.2	4.02E-03	5.07E-04	100	30.48	70	294.26	53.1	16.18	66,800	62	1.575

1.1.2. Land Use Classification

Classification of land use in the immediate area surrounding a facility is important in determining the appropriate dispersion coefficients to select for a particular modeling application. The selection of either rural or urban dispersion coefficients for a specific application should follow one of two procedures. These include a land use classification procedure or a population-based procedure to determine whether the area is primarily urban or rural.[3]

Of the two methods, the land use procedure is considered more definitive. The land use within the total area circumscribed by a 3-kilometer (km) radius circle around the facility was classified using the land use typing scheme proposed by Auer. If land use types I1 (Heavy Industrial), I2 (Light Industrial), C1 (Commercial), R2 (Residential; Small Lot Single Family & Duplex), and R3 (Residential; Multi-Family) account for 50% or more of the circumscribed area, urban dispersion coefficients should be used; otherwise, rural dispersion coefficients are appropriate.

AERSURFACE (v13016) was used for the extraction of the land-use values in the domain. The results of the land use analysis evaluation were as follows.

Each USGS NLCD92 land use class was compared to the most appropriate Auer land use category to quantify the total urban and rural area. Table 1-2 summarizes the results of this land use analysis. As approximately 98.2% of the area can be classified as rural, rural dispersion coefficients were used. The AERSURFACE files are enclosed in Appendix A.

[3] 40 CFR Part 51, Appendix W, the Guideline on Air Quality Models (January 2017) – Section 7.2.1.1(b)(i)

Table 1-2. Summary of Land Use Analysis

USGS NLCD92		Auer Scheme		Rural/ Urban	Land Area
Land Class	Land Class Description	Land Use Type	Land Use Description		
11	Open Water	A5	Water Surfaces/Rivers/Lakes	Rural	0.7%
12	Perennial Ice/Snow	A5	Water Surfaces/Rivers/Lakes	Rural	0.0%
21	Low Intensity Residential	R1	Common Residential	Rural	2.9%
22	High Intensity Residential	R2 and R3	Compact Residential (Single Family, Multi-Family & Duplex)	Urban	0.3%
23	Commercial/Industrial/ Transportation	I1, I2, and C1	Heavy and Light-Moderate Industrial & Commercial	Urban	1.5%
31	Bare Rock/Sand/Clay	A3	Undeveloped	Rural	0.2%
32	Quarries/Strip Mines/Gravel	A4	Undeveloped Rural	Rural	0.3%
33	Transitional	A3	Undeveloped/Uncultivated	Rural	2.0%
41	Deciduous Forest	A4	Undeveloped Rural	Rural	22.8%
42	Evergreen Forest	A4	Undeveloped Rural	Rural	22.3%
43	Mixed Forest	A4	Undeveloped Rural	Rural	12.3%
51	Shrubland	A3	Undeveloped/Uncultivated	Rural	0.0%
61	Orchards/Vineyard/Other	A2	Agricultural Rural	Rural	0.0%
71	Grasslands/Herbaceous	A3	Undeveloped/Uncultivated	Rural	0.0%
81	Pasture/Hay	A2	Agricultural Rural	Rural	24.2%
82	Row Crops	A2	Agricultural Rural	Rural	8.9%
83	Small Grains	A2	Agricultural Rural	Rural	0.0%
84	Fallow	A2	Agricultural Rural	Rural	0.0%
85	Urban/Recreational Grasses	A1	Metropolitan Natural	Rural	1.4%
91	Woody Wetlands	A4	Undeveloped Rural	Rural	0.3%
92	Emergent Herbaceous Wetlands	A4	Undeveloped Rural	Rural	0.0%

1.1.3. Building Downwash

The effects of building downwash for each of the stack emission points were evaluated in terms of the proximity of the stack to nearby structures. The purpose of this evaluation is to determine if stack discharges might become caught in the turbulent wakes of these structures leading to downwash of the plumes. Wind blowing around a building creates zones of turbulence that are greater than if the building were absent.

For these modeling analyses, the direction-specific building dimensions used as input to the AERMOD model were calculated using the U.S. EPA's BPIP PRIME, version 04274. BPIP PRIME is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents.[4]

For the BPIP analysis, the structure elevations (buildings and stacks) were estimating using the AERMAP processor (v18081). Terrain elevations from the USGS 1-arc second NED were used for AERMAP processing. In all modeling analysis data files, the location of emission points and structures were represented in the UTM coordinate system, zone 17, NAD 83.

EPA has promulgated stack height regulations that restrict the use of stack heights in excess of "Good Engineering Practice" (GEP) in air dispersion modeling analyses. Under these regulations, that portion of a stack in excess of the GEP height is generally not creditable when modeling to determine source impacts. This essentially prevents the use of excessively tall stacks to reduce ground-level pollutant concentrations.

This equation is limited to stacks located within five times the lesser dimension (5L) of a building structure. Stacks located at a distance greater than 5L from a building structure are not subject to the wake effects of the structure. The wind direction-specific downwash dimensions and the dominant downwash structures used in this analysis are determined using BPIP. In general, the lowest GEP stack height for any source is 65 meters by default.[5] The BPIP evaluation indicates that none of the facility emission unit stacks exceed GEP stack height.

Input and output files from the BPIP downwash analysis are provided in the electronic files included in Appendix A.

1.1.4. Receptor Grid Coordinate System

Modeled concentrations were calculated at ground-level receptors placed along the facility fenceline and on a variable Cartesian receptor grid. Fenceline receptors were spaced no more than 25 meters apart. Beyond the fenceline, receptors were placed with 100 meters spacing on a Cartesian grid extending outward from the facility. An approximately 10 km by 10 km modeling domain with a receptor spacing of 100 meters was created.

Also, six residential receptors, as identified from review of aerial imagery and data reviewed regarding land use classification information (industrial/commercial) from available online information, were also placed within the receptor grid system to provide predicted modeled impacts at nearby residential areas.[6]

Receptor elevations and hill heights required by AERMOD were determined using the AERMAP terrain preprocessor (v18081). Terrain elevations from the USGS 1-arc second NED were used for AERMAP processing. In all modeling analysis data files, the location of receptors were represented in the UTM coordinate system, zone 17, NAD 83.

1.1.5. Modeling Results

Using the source parameters specified in Table 1-1, and additional model setup as described above, AERMOD was executed for each of the five years of meteorological data to determine the maximum predicted modeled 1-

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[4] U.S. EPA, Office of Air Quality Planning and Standards, Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised), Research Triangle Park, North Carolina, EPA 450/4-80-023R, June 1985.

[5] 40 CFR 51.100(ii)

[6] https://qpublic.schneidercorp.com/

hr, 24-hr, and annual concentrations of ethylene oxide at each receptor location. Table 1-3 below summarizes the MGLC for each averaging period. Hourly concentrations were adjusted to a 15-min averaging period based on the *Guideline* (15-min MGLC = 1-hr MGLC * 1.32).

Table 1-3. Maximum Predicted Modeled Impacts

Year	Max Annual Concentration (µg/m³)	Annual AAC (µg/m³)	Max 24-hr Concentration (µg/m³)	24-hr AAC (µg/m³)	Max Hourly Concentration (µg/m³)	Max 15-min Concentration (µg/m³)	15-minute AAC (µg/m³)
2014	1.92E-03		1.94E-02		0.37	0.48	
2015	2.25E-03		2.42E-02		0.55	0.72	
2016	2.17E-03	3.3E-04	1.87E-02	1.43	0.45	0.59	900
2017	1.52E-03		3.22E-02		0.77	1.01	
2018	2.31E-03		2.02E-02		0.21	0.28	

While maximum predicted modeled impacts exceed the annual AAC, the locations where the annual AAC are exceeded are limited to locations in close proximity to the facility. No modeled impacts exceed the 100 in a million cancer risk level for the annual averaging period. Values for comparison to Georgia EPD derived AAC values have been provided above.

Analyses were also conducted to evaluate predicted modeled impacts for the annual averaging period at six residential receptors identified. Table 1-3 below summarizes the annual average maximum predicted modeled impacts at the six residential receptor locations identified as part of this assessment.

Table 1-4. Maximum Predicted Modeled Impacts at EPD Identified Residential Receptors

Residential Area	Easting (meter)	Northing (meter)	Max Annual Concentration (µg/m³)	Averaging Period	Annual AAC (µg/m³)	Ratio of Result to AAC
R1	270,899.4	3,717,756.1	9.00E-05	Annual	3.3E-04	0.27
R2	271,433.0	3,717,474.5	1.30E-04	Annual	3.3E-04	0.39
R3	271,875.7	3,717,411.6	1.70E-04	Annual	3.3E-04	0.52
R4	272,423.9	3,717,211.9	2.10E-04	Annual	3.3E-04	0.64
R5	272,813.0	3,716,885.3	1.40E-04	Annual	3.3E-04	0.42
R6	273,487.2	3,715,958.2	9.00E-05	Annual	3.3E-04	0.27

All air dispersion modeling files are included in Appendix A.

APPENDIX A. ELECTRONIC TOXICS MODELING FILES