8195 Industrial Blvd.
Covington, GA 30014

bd.com

BD

14 February 2020

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 Global Distribution Center

Enclosed is a SIP application for our 14201 Lochridge Boulevard, Covington GA 30014 location. The application describes the emission controls to be installed at the Covington Global Distribution Center (GDC) to treat fugitive emissions of Ethylene Oxide from saleable product. Subpart O (40 CFR 63.360) does not regulate these emissions.

If you have any questions or comments regarding this information, please contact me at (770) 784-6186.

Sincerely,

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

cc: K. Hays, GA EPD
M. Thorburn

Certified: 70062150000389632794

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M. Thorburn

Certified: 70062150000389632749

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 Global Distribution Center
AIRS No. (if known):
Facility Location: Street: 14201 Lochridge Blvd
City: Covington Georgia Zip: 30014 County: Newton
Is this facility a "small business" as defined in the instructions? Yes: ☐ No: ☒

2. Facility Coordinates

Latitude: 33.606680 **NORTH** Longitude: -83.818700 **WEST**
UTM Coordinates: 238464 **EAST** 3722109 **NORTH** **ZONE** 17

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: Mark Thorburn Title: Sr. Director BD North America Distribution Ops.
Address of Official Street: 14201 Lochridge 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: [signature] Date: 2/14/20

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 May 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)	22.08	2.56	22.08	2.56
Nitrogen oxides (NOx)	45.92	6.97	45.92	6.97
Particulate Matter (PM) (filterable only)	2.24	0.28	2.24	0.28
PM <10 microns (PM10)	2.24	0.28	2.24	0.28
PM <2.5 microns (PM2.5)	2.24	0.28	2.24	0.28
Sulfur dioxide (SO_2)	4.67	0.92	4.67	0.92
Volatile Organic Compounds (VOC)	6.27	1.79	3.04	0.40
Greenhouse Gases (GHGs) (in CO2e)	24,144	2,158	24,144	2,158
Total Hazardous Air Pollutants (HAPs)	3.44	1.49	0.54	0.10
Ethylene Oxide	3.4*	1.46*	0.17*	0.07*

* These EO estimates are based on sampling inside the Global Distribution Center (GDC). BD's environmental consultants continue to collect EO data from inside and outside the GDC. BD reserves the right to revise the EO emissions estimates contained in this application based upon that newly obtained information.

The table includes emissions from current and future fuel burning equipment including emergency generators, fire pump, and comfort heating units.

14. 4-Digit Facility Identification Code:

SIC Code: 5047 SIC Description: Medical, Dental, and Hospital Equipment and Supplies

NAICS Code: 423450 NAICS Description: Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers

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 to control fugitive emissions of ethylene oxide (EO) at an existing medical device distribution center (DC). The DC receives both sterilized and non-sterilized medical product, typically in palletized form. Sterilized product consists of product sterilized using radiation and EO. The product is received at the facility, and then depending on customer preference, is shipped in palletized form or in smaller, custom order quantities.

This application is specific to emission controls being installed to capture and treat fugitive emissions from EO sterilized medical devices. The new controls will utilize a pressure cascade strategy to direct airflow from temperature controlled areas to non-temperature controlled areas where the air will be captured and treated by System One (SYS1). Reference Attachment C.

The captured emissions will be treated using Advanced Air Technologies Model DR490 "Dry Bed Scrubbers" designed to achieve an estimated 95% destruction efficiency (based on expected inlet concentration).

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 - EO Emissions Calculations.

Attachment E - Advanced Air Technologies DR-490 Equipment Information

Attachment F - Monitoring Recommendations

Attachment G - Air Dispersion Modeling

Attachment H - EO Emissions Control Equipment Design and Installation Schedule.

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

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) to confirm ethylene oxide removal efficiency on a concentration basis within 60 days of commissioning and within 60 days following any replacement of dry bed media.

Removal efficiency across each system (SYS1) 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 the 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) 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 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 Global Distribution Center **Date of Application:** 14 February 2020

FORM 2.00 – EMISSION UNIT LIST

Emission Unit ID	Name	Manufacturer and Model Number	Description
PSTR	Product Storage	N/A	Area for Storage of Medical Devices prior to distribution

Facility Name: BD Global Distribution Center **Date of Application:** 14 February 2020

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	PSTR	Dry Beds	TBD	Advanced Air Technologies, DR490	No	70	70	100,000

Facility Name: BD Global Distribution Center **Date of Application:** 14 February 2020

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	95	tbd	0.777	Estimate Based on Area Testing	0.039	Calculation based on expected APCD destruction efficiency	7

Facility Name: BD Global Distribution Center **Date of Application:** 14 February 2020

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
PSTR	SYS1	STK1	Ethylene Oxide	0.017	0.039	0.073	0.17	Process Knowledge & Engineering Judgement

Facility Name: BD Global Distribution Center **Date of Application:** 14 February 2020

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	PSTR	100	6	To the Sky	40	1064	58.9	70	100,000	100,000

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 Global Distribution Center **Date of Application:** 14 February 2020

FORM 7.00 AIR MODELING INFORMATION: Chemicals Data

Chemical	Potential Emission Rate (lb/hr)	Toxicity	Reference	MSDS Attached
Ethylene Oxide CAS#: 71-25-8	0.039	PEL: 1ppm STEL: 5 ppm See Att H for Outside Exposures	OSHA 1910 See Att H for Outside Exposures Reference	☐
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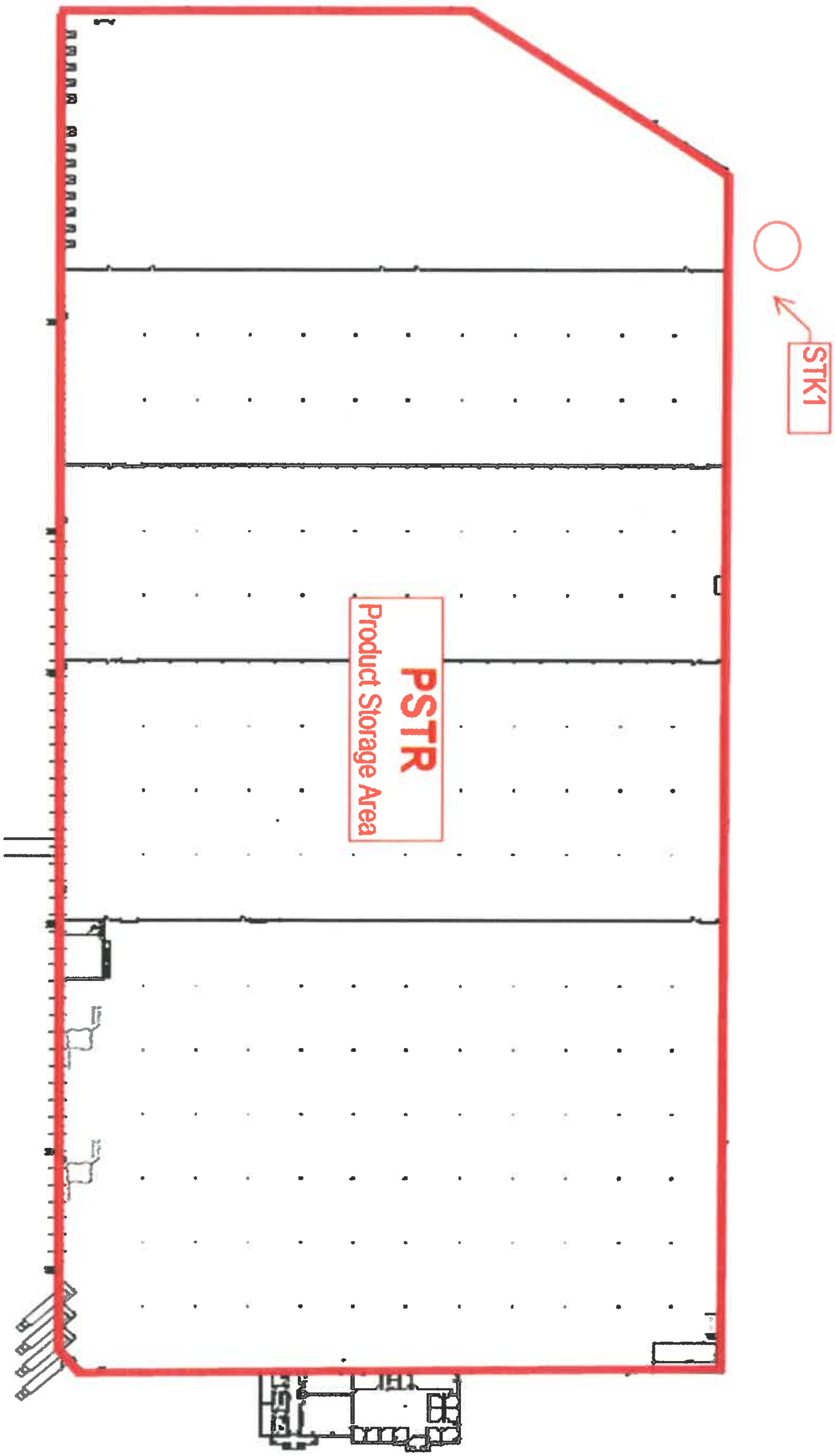
ATTACHMENT A

BD Global Distribution Center SIP Application



ATTACHMENT B

BD Global Distribution Center SIP Application


Google
Imagery ©2020 Google, Imagery ©2020 Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2020
1000 ft

Attachment C

BD Covington GDC SIP Application

General Description

The intent of the mechanical system upgrades is to capture and treat fugitive Ethylene Oxide (EtO) emissions from saleable product stored in the distribution center. Air inside the distribution center will be collected and treated by means of a dedicated EtO treatment system. The new EtO treatment system is expected to reduce EtO emissions, at expected inlet concentrations, by >95%.

System Description

The EtO treatment system will be comprised of a manifold of 50 dry beds, fan(s), HVAC controls, ducting and a 100 foot exhaust stack. The system is designed to capture and treat 100,000 cfm of air from the distribution center.

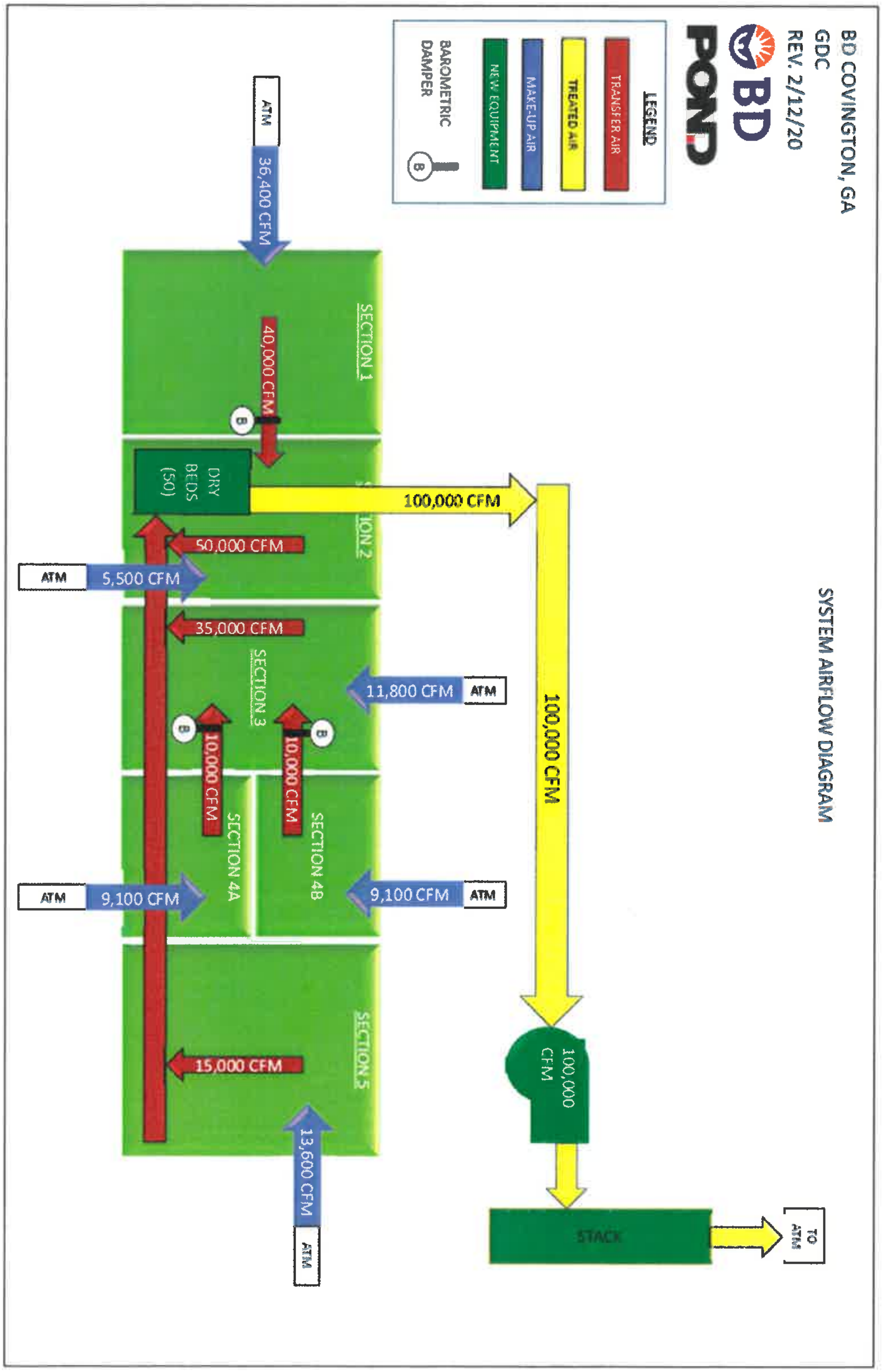
Air will enter the building through rooftop make-up air units or dedicated fresh air supply in various sections of the building. Each section of the building will be maintained negative pressure, with respect to outside the building. Air will be collected from all sections of the building and routed through the EtO treatment system and then discharged to atmosphere via a single 100 foot stack.

Destratification fans will be used inside the building to ensure homogeneity within the space. Existing exhaust fans and existing wall louvers used in the GDC facility will be disabled.

Attachment C

BD Global Distribution Center SIP Application

System Airflow Diagram



The tables below represent data obtained by Ramboll, Inc. (a consultant for BD) as part of an ongoing effort to calculate levels of Ethylene Oxide (EO) inside the Covington Global Distribution Center. The tables also indicate the relative utilization of the facility at the time the samples were taken. Based on this data an estimate of what the levels would be if the facility was at 100% capacity was determined. The data from November 22, 2019 represents the highest level of EO from all the data collected. This is used as the uncontrolled Potential to Emit (PTE) for the purpose of this permit application. The average of the actual data obtained is used to represent the "actual" data for this application.[4]

22-Nov-19

Section	lb/hr[1]	lb/yr	%full[2]	lb/yr @ 100%[3]
S1A	0.008	70.1	70.84	98.9
S1A	0.008	70.1	70.84	98.9
S1B	0.018	157.7	70.84	222.6
S2	0.118	1033.7	91.10	1134.7
S2	0.070	613.2	91.10	673.1
S2	0.115	1007.4	91.10	1105.8
S2	0.118	1033.7	91.10	1134.7
S3	0.188	1646.9	96.36	1709.1
S4E	0.006	52.6	98.28	53.5
S4W	0.004	35.0	98.28	35.7
S5	0.048	420.5	78.23	537.5
S5				
	Actual:	**6141**		**6804**
				Use for PTE

5-Dec-19

lb/hr[1]	lb/yr	%full[2]	lb/yr @ 100%[3]
0.004	35.0	71.00	49.4
0.003	26.3	71.00	37.0
0.017	148.9	71.00	209.7
0.070	613.2	90.56	677.1
0.042	367.9	90.56	406.3
0.068	595.7	90.56	657.8
0.070	613.2	90.56	677.1
0.153	1340.3	96.36	1390.9
0.010	87.6	98.18	89.2
0.007	61.3	98.18	62.5
0.128	1121.3	78.23	1433.3
0.034	297.8	78.23	380.7
	5309		**6071**

27-Dec-19

lb/hr[1]	lb/yr	%full[2]	lb/yr @ 100%[3]
0.004	35.0	68.62	51.1
0.004	35.0	68.62	51.1
0.011	96.4	68.62	140.4
0.033	289.1	82.92	348.6
0.032	280.3	82.92	338.1
0.032	280.3	82.92	338.1
0.033	289.1	82.92	348.6
0.070	613.2	81.40	753.3
0.008	70.1	99.44	70.5
0.007	61.3	99.44	61.7
0.080	700.8	76.72	913.5
	2751		**3415**

3-Jan-20

Section	lb/hr[1]	lb/yr	%full[2]	lb/yr @ 100%[3]
S1A	0.001	8.8	51.35	17.1
S1A	0.002	17.5	51.35	34.1
S1B	0.002	17.5	51.35	34.1
S2	0.023	201.5	69.14	291.4
S2	0.022	192.7	69.14	278.7
S2	0.022	192.7	69.14	278.7
S2	0.023	201.5	69.14	291.4
S3	0.028	245.3	69.04	355.3
S4E	0.004	35.0	99.05	35.4
S4W	0.003	26.3	99.05	26.5
S5	0.029	254.0	72.86	348.7
		1393		**1991**

9-Jan-20

lb/hr[1]	lb/yr	%full[2]	lb/yr @ 100%[3]
0.001	8.8	49.22	17.8
0.001	8.8	49.22	17.8
0.003	26.3	49.22	53.4
0.020	175.2	68.09	257.3
0.020	175.2	68.09	257.3
0.019	166.4	68.09	244.4
0.020	175.2	68.09	257.3
0.019	166.4	62.44	266.6
0.002	17.5	98.61	17.8
0.002	17.5	98.61	17.8
0.014	122.6	70.55	173.8
	1060		**1581**

16-Jan-20

lb/hr[1]	lb/yr	%full[2]	lb/yr @ 100%[3]
0.006	52.6	50.33	104.4
0.007	61.3	50.33	121.8
0.010	87.6	50.33	174.1
0.041	359.2	74.87	479.7
0.041	359.2	74.87	479.7
0.040	350.4	74.87	468.0
0.041	359.2	74.87	479.7
0.083	727.1	70.41	1032.6
0.004	35.0	98.05	35.7
0.003	26.3	98.05	26.8
0.026	227.8	69.30	328.7
	2646		**3731**

25-Jan-20

Section	lb/hr[1]	lb/yr	%full[2]	lb/yr @ 100%[3]
S1A	0.003	26.3	50.03	52.5
S1A	0.003	26.3	50.03	52.5
S1B	0.004	35.0	50.03	70.0
S2	0.015	131.4	78.06	168.3
S2	0.015	131.4	78.06	168.3
S2	0.015	131.4	78.06	168.3
S2	0.015	131.4	78.06	168.3
S3	0.052	455.5	77.57	587.2
S4E	0.002	17.5	98.84	17.7
S4W	0.003	26.3	98.84	26.6
S5	0.007	61.3	67.54	90.8
		1174		**1571**

		DRE%	After Controls
Avg. of Actual Data =	**2925** lbs.	95	**146** lbs.
Worst case of 100% utilization data =	**6804** lbs.	95	**340** lbs.

Note 1 The lb/hr column represents emissions of EO from roof mounted exhaust fans and was calculated based on actual EO concentration measured and fan flow rate data. Detailed calculations have been previously submitted and will not be repeated here.

Note 2 The % full column represents the utilization based on how many of the available pallet spaces were in use at the time EO samples were being taken.

Note 3 The lb/yr @ 100% column indicates the estimated EO emissions with 100% utilization of available spaces and was calculated using a ratio of actual EO levels and utilization.

Note 4 These EO estimates are based on sampling inside the Global Distribution Center (GDC). BD's environmental consultants continue to collect EO data from inside and outside the GDC. BD reserves the right to revise the EO emissions estimates contained in this application based upon that newly obtained information.

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:

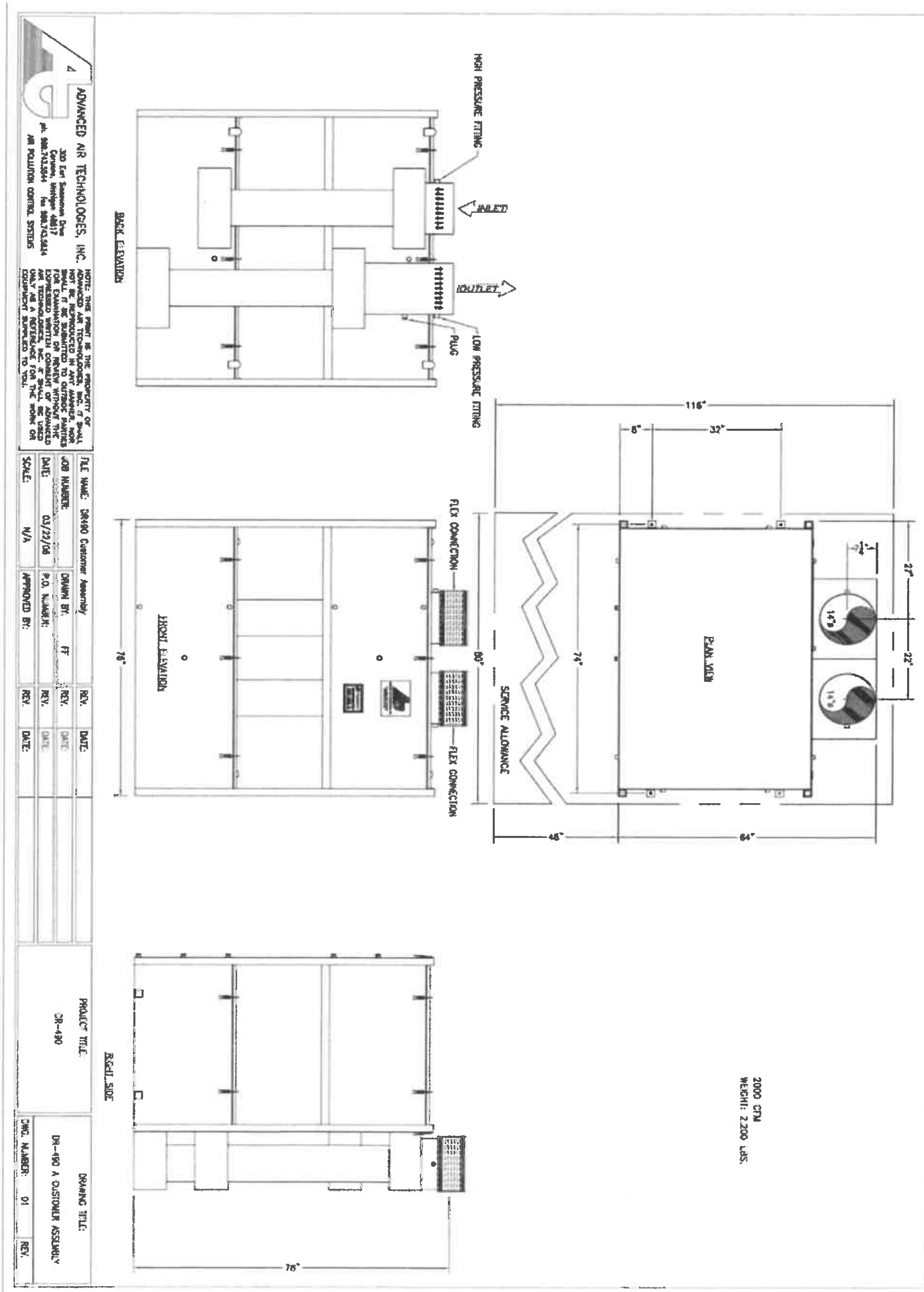
ISO 9001 : 2008 Certified
ADVANCED AIR TECHNOLOGIES, INC.
www.advairtech.com
300 Earl Sleeseman Drive
Corunna, MI 48817
(Michigan - USA)
Phone: 989-743-5544
Fax: 989-743-5624
Toll Free: 800-295-6583

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

ATTACHMENT E

BD Global Distribution Center SIP Application



Attachment F

BD Global Distribution Center 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 0.5 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, the specified destruction efficiency cannot be demonstrated by normal methods.

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 95% reduction or an equivalent emission standard. BD welcomes recommendations from GA EPD regarding any alternate sample/analysis methods.

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

Initial Compliance Testing:

- Demonstrate 95% 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.

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

---

[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. BD believes that the dry bed systems will reduce the unregulated, fugitive emissions of EO by 95%.

- 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.

<u>Routine Monitoring:</u>

- 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 95% removal efficiency.

Attachment G
BD Global Distribution Center SIP Application

ETHYLENE OXIDE EMISSIONS IMPACT ASSESSMENT

BD Bard > GDC Facility

Prepared By:

TRINITY CONSULTANTS

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Project 201101.0054

Trinity Consultants

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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 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.[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 Atlanta Hartsfield Jackson airport and upper air data from Falcon Field in Peachtree City, Georgia. This assessment was performed in accordance with the *Guideline*.

Due to the proximity of the Global Distribution Center (GDC) facility to the main Covington plant, both the GDC facility and the main Covington plant have been included within the same modeling run, for conservatism as part of this modeling assessment. Therefore, source parameters listed, and reported modeling results as indicated, are reflective of both facilities.

1.1.1. Source Parameters

Ethylene oxide emissions were modeled as point sources from four specific stack locations, one location at the GDC facility and three locations at the main Covington plant. 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 for the RTO (incinerator) at the main Covington plant, have been updated to account for the RTO emissions as per the most recent stack testing results from the facility at a Limit of Detection (LOD) of 0.02 ppm as directed by the Georgia EPD. Emissions from the GDC facility are per current emissions estimates for the site.

[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)
GDC	238,631.3	3,722,261.4	340.2	3.88E-02	4.89E-03	100	30.48	70	294.26	58.9	17.95	100,000	72	1.829
RTO	236,424.2	3,722,295.0	44	5.02E-03	6.33E-04	50	15.24	250	394.26	30.5	9.29	23,000	48	1.219
System 1	236,404.2	3,722,273.3	1.1	1.26E-04	1.59E-05	100	30.48	70	294.26	30.3	9.23	21,000	46	1.167
System 2	236,423.6	3,722,313.7	31.4	3.58E-03	4.52E-04	100	30.48	70	294.26	50.8	15.48	64,000	62	1.575

Note: GDC refers to the GDC facility stack, whereas the RTO, System 1, and System 2 stacks are associated with the main Covington plant.

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 GDC 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 95% of the area can be classified as rural, rural dispersion coefficients were used. The AERSURFACE files are enclosed in Appendix A.

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[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	1.2%
12	Perennial Ice/Snow	A5	Water Surfaces/Rivers/Lakes	Rural	0.0%
21	Low Intensity Residential	R1	Common Residential	Rural	6.2%
22	High Intensity Residential	R2 and R3	Compact Residential (Single Family, Multi-Family & Duplex)	Urban	0.7%
23	Commercial/Industrial/ Transportation	I1, I2, and C1	Heavy and Light-Moderate Industrial & Commercial	Urban	4.3%
31	Bare Rock/Sand/Clay	A3	Undeveloped	Rural	0.0%
32	Quarries/Strip Mines/Gravel	A4	Undeveloped Rural	Rural	0.0%
33	Transitional	A3	Undeveloped/Uncultivated	Rural	2.1%
41	Deciduous Forest	A4	Undeveloped Rural	Rural	27.5%
42	Evergreen Forest	A4	Undeveloped Rural	Rural	19.4%
43	Mixed Forest	A4	Undeveloped Rural	Rural	13.3%
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	10.2%
82	Row Crops	A2	Agricultural Rural	Rural	4.3%
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	2.2%
91	Woody Wetlands	A4	Undeveloped Rural	Rural	8.5%
92	Emergent Herbaceous Wetlands	A4	Undeveloped Rural	Rural	0.2%

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. However, for the GDC facility it was noted that the base elevation of the facility structures and stack were significantly different as reported by AERMAP, possibly due to terrain features north/northeast of the main facility structure. Therefore, the base elevations of the GDC facility structures and stack were reset to values consistent with topographical survey information specific to the site (e.g. 707 ft. for the stack, as opposed to 736 ft. as provided by AERMAP).

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 stacks included within the modeling analysis 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 GDC and main Covington plant 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] Since the receptor grid and modeling domain for the GDC facility encompass the area surrounding the main Covington plant, the five residential receptors, previously identified in a modeling memo prepared by the Georgia Environmental

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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/

Protection Division (EPD) in June 2019 for the main Covington plant, were also placed within the current combined model setup.[7]

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-hr, 24-hr, and annual concentrations of ethylene oxide at each receptor location. Table 1-3 and Table 1-4 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).[8]

Model results are first presented for the GDC facility, and then presented for combined impacts for both the GDC facility and main Covington plant.

Table 1-3. Maximum Predicted Modeled Impacts – GDC Facility

Year	Max Annual Concentration (μg/m^3)	Annual AAC (μg/m^3)	Max 24-hr Concentration (μg/m^3)	24-hr AAC (μg/m^3)	Max Hourly Concentration (μg/m^3)	Max 15-min Concentration (μg/m^3)	15-minute AAC (μg/m^3)
2014	1.43E-02	3.3E-04	1.95E-01	1.43	4.65	6.13	900
2015	1.33E-02		9.75E-02		0.41	0.54	
2016	1.19E-02		9.22E-02		0.35	0.46	
2017	1.15E-02		8.86E-02		0.51	0.67	
2018	1.36E-02		9.31E-02		0.64	0.85	

Table 1-4. Maximum Predicted Modeled Impacts – GDC Facility and Main Covington Plant Combined

Year	Max Annual Concentration (μg/m^3)	Annual AAC (μg/m^3)	Max 24-hr Concentration (μg/m^3)	24-hr AAC (μg/m^3)	Max Hourly Concentration (μg/m^3)	Max 15-min Concentration (μg/m^3)	15-minute AAC (μg/m^3)
2014	1.44E-02	3.3E-04	1.96E-01	1.43	4.65	6.13	900
2015	1.34E-02		9.76E-02		0.41	0.54	
2016	1.20E-02		9.22E-02		0.35	0.46	
2017	1.16E-02		8.86E-02		0.51	0.67	
2018	1.37E-02		9.31E-02		0.64	0.85	

Analyses were also conducted to evaluate predicted modeled impacts at each of six identified residential receptors for the GDC facility, and five previously identified residential receptors for the main Covington plant by the Georgia EPD. Table 1-3 and Table 1-6 below summarizes the annual average maximum predicted modeled impacts at the residential receptor locations identified.

[7] https://epd.georgia.gov/bd-becton-dickinson-and-company-covington

[8] AAC values considered are consistent with recent Georgia EPD memo publications regarding their consideration of averaging times and corresponding AAC values (https://epd.georgia.gov/stepan-company).

Table 1-5. Maximum Predicted Modeled Impacts at Identified Residential Receptors – GDC Facility

Residential Area	Easting (meter)	Northing (meter)	Max Annual Concentration (μg/m³)	Averaging Period	Annual AAC (μg/m³)	Ratio of Result to AAC
R1GDC	238,515.0	3,721,512.6	6.00E-04	Annual	3.3E-04	1.82
R2GDC	238,824.1	3,721,543.4	1.62E-03	Annual	3.3E-04	4.91
R3GDC	239,700.4	3,721,684.0	1.48E-03	Annual	3.3E-04	4.48
R4GDC	239,978.8	3,722,117.1	1.18E-03	Annual	3.3E-04	3.58
R5GDC	237,566.7	3,721,698.2	8.90E-04	Annual	3.3E-04	2.70
R6GDC	237,436.2	3,722,120.5	1.84E-03	Annual	3.3E-04	5.58
R1	236,932.5	3,722,361.2	1.30E-03	Annual	3.3E-04	3.94
R2	236,137.9	3,721,995.0	8.80E-04	Annual	3.3E-04	2.67
R3	236,163.0	3,721,885.6	8.20E-04	Annual	3.3E-04	2.48
R4	237,343.8	3,721,603.8	7.00E-04	Annual	3.3E-04	2.12
R5	235,611.0	3,722,319.2	7.20E-04	Annual	3.3E-04	2.18

Table 1-6. Maximum Predicted Modeled Impacts at Identified Residential Receptors – GDC Facility and Main Covington Plant Combined

Residential Area	Easting (meter)	Northing (meter)	Max Annual Concentration (μg/m³)	Averaging Period	Annual AAC (μg/m³)	Ratio of Result to AAC
R1GDC	238,515.0	3,721,512.6	7.00E-04	Annual	3.3E-04	2.12
R2GDC	238,824.1	3,721,543.4	1.71E-03	Annual	3.3E-04	5.18
R3GDC	239,700.4	3,721,684.0	1.57E-03	Annual	3.3E-04	4.76
R4GDC	239,978.8	3,722,117.1	1.27E-03	Annual	3.3E-04	3.85
R5GDC	237,566.7	3,721,698.2	1.07E-03	Annual	3.3E-04	3.24
R6GDC	237,436.2	3,722,120.5	2.04E-03	Annual	3.3E-04	6.18
R1	236,932.5	3,722,361.2	1.67E-03	Annual	3.3E-04	5.06
R2	236,137.9	3,721,995.0	1.16E-03	Annual	3.3E-04	3.52
R3	236,163.0	3,721,885.6	9.80E-04	Annual	3.3E-04	2.97
R4	237,343.8	3,721,603.8	1.02E-03	Annual	3.3E-04	3.09
R5	235,611.0	3,722,319.2	1.20E-03	Annual	3.3E-04	3.64

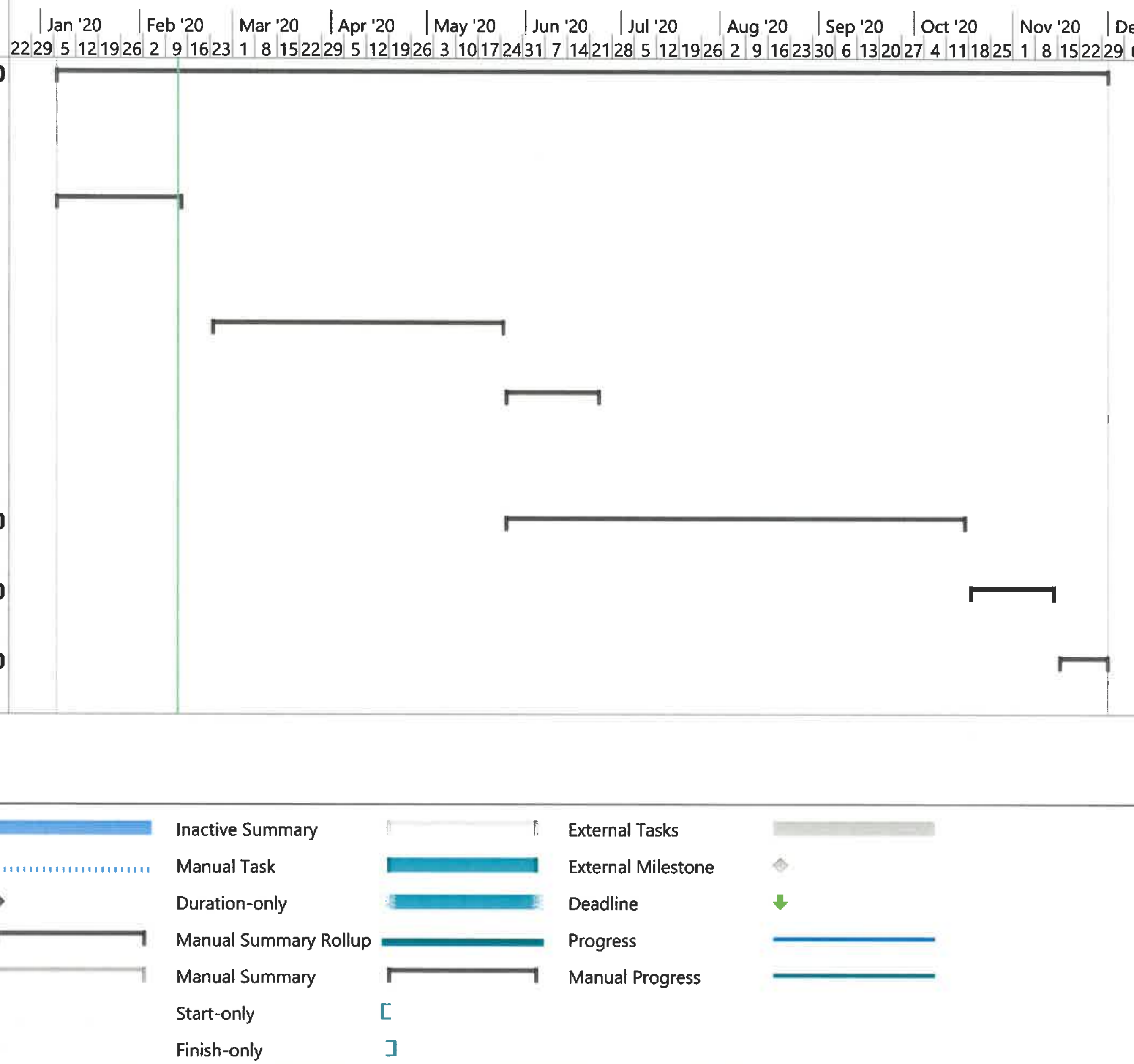
Predicated modeled impacts demonstrate that risk from ethylene oxide concentrations at identified residential receptors near both the GDC facility, and the main Covington plant, do not exceed 100-in-a-million for an individual if that person was exposed to that concentration continuously for a lifetime.

All air dispersion modeling files are included in Appendix A.

APPENDIX A. ELECTRONIC TOXICS MODELING FILES

Attachment H
BD Global Distribution Center SIP Application
Emission Control Project Schedule

ID	Task Name	Duration	Start	Finish
1	**GDC Emission Control Project**	**236 days**	**1/6/20**	**11/30/20**
2	**Air Permit Application**	**29 days**	**1/6/20**	**2/14/20**
5	**Detailed Engineeri**	**65 days**	**2/24/2(**	**5/25/20**
12	**Submit for Construction Permit**	**21 days**	**5/26/2(**	**6/24/20**
15	**Construction**	**104 days**	**5/26/2(**	**10/16/20**
19	**Commissioning**	**20 days**	**10/19/:**	**11/13/20**
21	**Performance Testi**	**11 days**	**11/16/:**	**11/30/20**



Project: GDC Exhaust Treatmen
Date: 2/10/20