Ethylene Oxide in Georgia

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Georgia EPD - Air Protection Branch

EPA Region 4 Fall Air Directors' Meeting
Gulfport, Mississippi
October 17, 2019
OUTLINE

- Background
- NATA Modeling
- Sterigenics Modeling
- Becton Dickinson Modeling
- Modeling at Other Facilities
- Monitoring
ETHYLENE OXIDE

- Ethylene oxide is a flammable, colorless gas used to make other chemicals that are used in making a range of products, including antifreeze, textiles, plastics, detergents, and adhesives.

- Also, ethylene oxide is used to sterilize medical equipment (e.g., kits and catheters) that cannot be sterilized by other methods (e.g., steam and irradiation).
HEALTH RISKS

- Studies show that breathing air containing elevated ethylene oxide levels over many years increases the risk of some types of cancers:
  - White blood cell cancers
    - non-Hodgkin’s lymphoma, myeloma, and lymphocytic leukemia
  - Breast cancer in females
The National Air Toxics Assessment (NATA) is EPA's ongoing review of air toxics in the U.S.

- NATA estimates the cancer risks from breathing outdoor sources of air toxics over many years at the census tract level.
- NATA combines results from dispersion models (local impacts) and photochemical grid models (regional impacts).

EPA developed NATA as a screening tool to help state, local, and tribal air agencies identify which pollutants, emission sources, and places they may wish to study further.

Released to the public on August 22, 2018

- Based on 2014 National Emissions Inventory (NEI) and 2014 Toxics Release Inventory (TRI)
The Integrated Risk Information System (IRIS) value for ethylene oxide was updated in December 2016:

- Inhalation Unit Risk (IUR) = 0.003 per μg/m³

Elevated risk due to the mutagenic mode of action through early-life exposures:

- Modified IUR for EtO = 0.005 per μg/m³
“ACCEPTABLE” CONCENTRATIONS

- EPA’s NATA used (100/1,000,000) individual risk for the purpose of determining “acceptable risk” (AR) in their national assessment:
  - EPA’s AR Exposure Concentration
    = Cancer Risk/Modified IUR
    = (100/1,000,000)/(0.005/μg/m³) = 0.02 μg/m³

- According to the GA EPD’s *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions*, the annual Acceptable Ambient Concentration (AAC) for ethylene oxide uses (1/1,000,000) individual risk and is calculated as:
  - GA EPD’s Annual AAC = Cancer Risk/IUR
    = (1/1,000,000)/(0.003/μg/m³) = 0.00033 μg/m³
# RISK IN ATLANTA

<table>
<thead>
<tr>
<th>EPA Region</th>
<th>EPA Region 4</th>
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<tbody>
<tr>
<td>State</td>
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<tr>
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<tr>
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<tr>
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<tr>
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<tr>
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<td>Secondary Risk</td>
<td>25.40</td>
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<tr>
<td>Background Risk</td>
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<td>25.40</td>
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<td>Background Risk</td>
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RISK IN COVINGTON

- EPA Region: EPA Region 4
- State: GA
- County: Newton County
- STCOFIFS: 13217
- Tract ID: 13217100300
- Population (2010): 8377
- Area (m2): 34949619
- Total Risk: 214
- Point Risk: 172.17
- Nonpoint Risk: 1.33
- Onroad Risk: 4.00
- Nonroad Risk: 0.77
- Fire Risk: 0.88
- Biogenic Risk: 6.24
- Secondary Risk: 25.49
- Background Risk: 3.18
# EMISSION SUMMARY (lbs/year)

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<tr>
<th>YEAR</th>
<th>STERIGENICS</th>
<th>BD - COVINGTON</th>
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<td>1987</td>
<td>89,010.0</td>
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<td>2018</td>
<td></td>
<td>656.3</td>
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<td>2019</td>
<td>206.1</td>
<td>657.4</td>
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<td>2020</td>
<td>37.6</td>
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*Proposed emissions are preliminary and subject to change*
## EMISSION SUMMARY (lbs/year)

### Sterigenics

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<tr>
<th>Emissions</th>
<th>Current (lbs/year)</th>
<th>Proposed* (lbs/year)</th>
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<td>17.7</td>
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<tr>
<td>Fugitives</td>
<td>188.4</td>
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<tr>
<td>Total</td>
<td>206.1</td>
<td>37.6</td>
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</table>

*Proposed emissions are preliminary and subject to change

### Becton Dickinson - Covington

<table>
<thead>
<tr>
<th>Emissions</th>
<th>Current (lbs/year)</th>
<th>Proposed* (lbs/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point</td>
<td>101.7</td>
<td>101.7</td>
</tr>
<tr>
<td>Fugitives</td>
<td>555.7</td>
<td>5.0</td>
</tr>
<tr>
<td>Total</td>
<td>657.4</td>
<td>106.7</td>
</tr>
</tbody>
</table>

*Proposed emissions are preliminary and subject to change
GA EPD MODELING

- Contacted facilities to get updated emission rates, stack parameters, and building dimensions
- Followed procedures in GA EPD’s *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions*
  - No receptors inside property boundary
  - AERMOD dispersion model (v18081)
  - 5 years of hourly meteorological data (2014 - 2018)
  - Annual average concentration at each receptor
- Final modeling reports submitted to APB Branch Chief on June 7, 2019
STERIGENICS (SMYRNA, GA)
STERIGENICS PERMIT APPLICATION

Additional Capture/Control Equipment:
1) Route Ceilcote emissions to AAT Scrubber and eliminate Ceilcote stack.
2) Route AAT scrubber to an 80 foot stack. Eliminate AAT stack.
3) Installation of capture and control system for indoor air in processed areas and route to an 80 foot stack.
4) Build a dedicated room for processed spices and duct to existing AAT scrubber.

Process Flow Diagram
(Changes noted in blue)
Current Scenario


Concentrations

- 0.02 µg/m³
- 0.00033 µg/m³

Chapel Hill
Chadsworth Townhomes
R1 0.020 µg/m³
R2 0.015 µg/m³
R3 0.017 µg/m³
R4 0.009 µg/m³
Sterigenics
BECTON
DICKINSON
(COVINGTON, GA)
OTHER FACILITIES TO BE EVALUATED

▪ Becton Dickinson – Madison
  ▪ Requested permit revision and modeling

▪ Sterilization Services of Georgia – Atlanta
  ▪ Currently reviewing permit revision and modeling

▪ Stepan – Winder
  ▪ Requested modeling input files

▪ Kendall Patient Recovery – Augusta
  ▪ Currently performing modeling

▪ AnewMed – Tucker
  ▪ Facility is in the process of permanently closing down

▪ Innovative Chemical Technologies - Cartersville
  ▪ Requested air permit application and modeling
ETHYLENE OXIDE MONITORING
WILLOWBROOK EtO (μg/m³)

GA EPD MONITORING APPROACH

- Long-term monitoring study (~ 6 months)
- Collect samples once every 6 days over 24 hours in 4 quadrants within ¼-mile of Sterigenics and Becton Dickinson fencelines each sample day
- Once a month – sample one location side-by-side
- Once a month – compare ¼-mile concentrations vs. ½-mile or 1-mile concentrations
- Sample at South DeKalb on each sample day
- Sample at General Coffee twice a month
- Sample at near-road I-285 monitor
- Using EPA’s contract laboratory for analysis
GA EPD MONITORING SITES

- Cobb County
- South DeKalb
- Newton
- General Coffee
Looking at upwind and downwind in the primary and secondary air directions. Comparing concentrations at ¼-mile, ½-mile, and 1-mile at each location.
GA EPD MONITORING EQUIPMENT

South DeKalb NATTs Sampler

Passive sampler for study

Sampler at General Coffee
GA EPD MONITORING - STATUS UPDATE

- Monitoring Plan and QAPP approved by EPA
- Sampling at ¼-mile began late September at both facilities
  - Waiting on results
- Will locate at ½-mile and 1-mile distances to compare to ¼-mile distance
- Results (26 – 30 data points each week) will be posted on EPD’s website after validated
  - https://epd.georgia.gov/ethylene-oxide-information
CONTACT INFORMATION

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