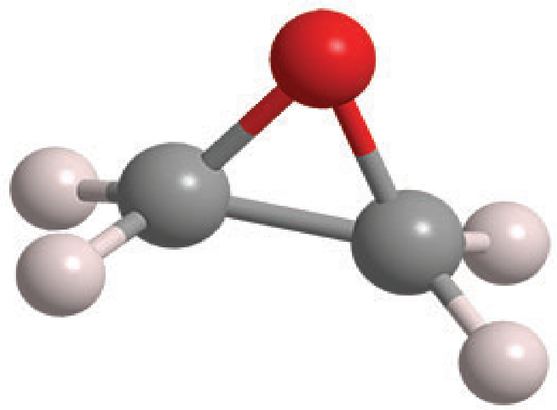
What is Ethylene Oxide?

Ethylene Oxide (EtO) is a versatile compound used to make countless everyday products:

- adhesives
- paints
- detergents
- cleaners
- textiles
- vehicle antifreezes
- noise/vibration reduction products
- roofing materials
- personal care products
- wood and water treatment

- EtO has been used in the Kanawha Valley since the 1920s. It was produced at facilities in West Virginia at one time but is now shipped into the state via railcar.
- EtO is also used to sterilize medical equipment and personal protection equipment.
- It is estimated that more than 50 percent of all medical devices are sterilized with EtO.



National Air Toxics Assessment (NATA)

- Used to estimate health risks from toxic air pollutants.
- Broad overview of air emissions across the country (screening tool).
- Designed to identify pollutants, emissions sources, and/or localized area for further study.
- EPA calculates air toxics concentrations and long-term health risks for identified areas called “census tracts.”
- EPA’s 2018 assessment, which used 2014 data, identified 106 census tracts in the U.S. with an estimated cancer risk greater than EPA’s threshold of 100 in 1 million.

  This means that if 1 million people were exposed to elevated levels of the same pollutant, 24 hours a day, 7 days a week, 365 days a year for 70 years, there is a possibility that 100 people would develop cancer at some point in their lifetime.

- The primary risk in many of these census tracts is driven by EtO emissions.
- In West Virginia, the EPA identified four census tracts in the Institute and South Charleston areas with a total cancer risk greater than 100 in 1 million.

Comparing Assessments

Care should be taken when comparing assessments for different years. A change in emissions, pollutant concentrations, or risks may be due to method improvements, real changes in emissions or sources, or both.

Screening Tools Should Not Be Used

- To pinpoint specific risk values in small areas such as a census tract,
- To characterize or compare risks at local levels (such as between neighborhoods),
- To characterize or compare risks between states,
- To examine trends from one assessment year to another,
- As the sole basis for risk reduction plans or regulations,
- To control specific sources or pollutants, or
- To quantify benefits of reduced air toxics emissions.

Why did the EtO impacts change from previous years?

- Newer studies show that EtO is a more potent carcinogen than scientists previously thought. The EPA updated their cancer risk calculations to reflect these new data.
- The 2014 NATA shows more areas with elevated risks driven by EtO emissions than the 2011 assessment.
- This does not mean there is more emissions of EtO. Even if emissions in an area are the same – or possibly if they are lower – the new cancer value often results in a higher risk estimate.

Institute, WV - Modeled Ethylene Oxide Risk
2017 Emissions - 2019 Meteorology
Union Carbide Corporation

Saint Albans

14

15

10

13

Tyler C

Landers

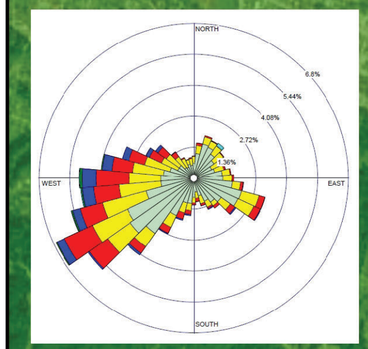
Finney Branch

Shawnee Sports Complex

I64

Big Spring Fork

Creek



N
W
E
S

0 0.5 1 2 Miles

EtO Risk in 1 million

- 0 - 100
- 100 - 200
- 200 - 400
- 400 - 600
- 600
- Max Risk (HEM)
- Max Risk (AERMOD)
- Monitoring Sites

Institute, WV - Modeled Ethylene Oxide Risk
WVDAQ 2020 Emissions - 2019 Meteorology
Union Carbide Corporation plus IFF

Saint Albans

15

14

13

10

Finney Branch

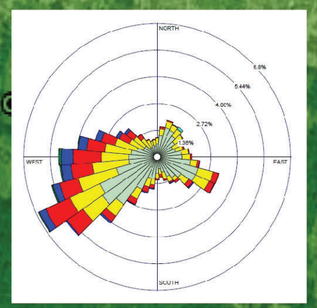
Big Spring Fork

Shawnee Sports Complex

I64

Tyler Cre

Landers Cr



N

W

E

S

0 0.5 1 2 Miles

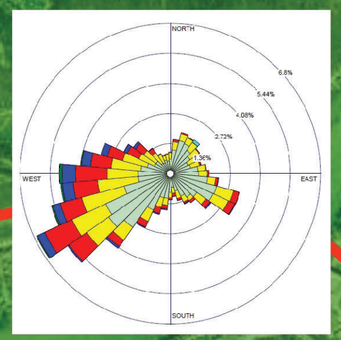
eographics, CNES/Ai
Garmin, (c) OpenSt
community

EtO Risk in 1 million

- 0 - 100
- 100 - 200
- 200 - 400
- 400 - 600
- 600
- Max Risk (HEM)
- Max Risk (AERMOD)
- Monitoring Sites

South Charleston, WV - Modeled Ethylene Oxide Risk
2017 Emissions - 2019 Meteorology
Union Carbide Corporation plus Covestro

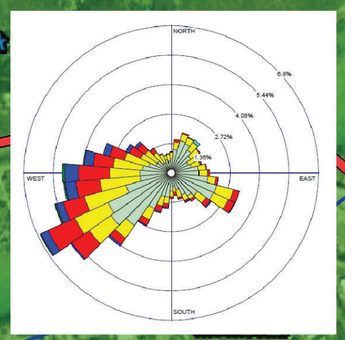
Sugar Creek
Woodward Branch
Pfieffer Branch
Falls Branch
4
3
0
Blaine Island
South Charleston
I64
Sunset Memorial Park
Little Creek Golf Course
N
W
E
S
0 0.5 1 2 Miles



EtO Risk in 1 million

- 0 - 100
- 100 - 200
- 200 - 400
- 400 - 600
- 600
- Max Risk (HEM)
- Max Risk (AERMOD)
- Monitoring Sites

South Charleston, WV - Modeled Ethylene Oxide Risk
WVDAQ 2020 Emissions - 2019 Meteorology
Union Carbide Corporation plus Covestro



Sugar Creek
Woodward Branch
Pfeiffer Branch
Falls Branch
4
3
0
U60W
Blaine Island
U60
South Charleston
I64
Park
Little Creek Golf Course
N
W
S
0 0.5 1 2 Miles
raphics, CNES/A
and the GIS User Community, Esri, HERE, Garmin, (c) OpenS
community
Joplin Branch

EtO Risk in a million

- 0 - 100
- 100 - 200
- 200 - 400
- 400 - 600
- 600
- Max Risk (HEM)
- Max Risk (AERMOD)
- Monitoring Sites

WVDEP Ethylene Oxide Sampling Results

	First Round Results January 25-26, 2022		Second Round Results February 15-16, 2022		Third Round Results March 2022		Fourth Round Results April 2022	
Sample Location	**Results (ppbv)***	**Predominant Wind Direction**	**Results (ppbv)***	**Predominant Wind Direction**	**Results (ppbv)***	**Predominant Wind Direction**	**Results (ppbv)***	**Predominant Wind Direction**
Guthrie Background Site **	0.0361	Not Available	0.0884	Not Available				
#0 South Charleston	Non-Detect	From Northwest	VOID	Intake regulator not working				
#3 North Charleston	0.0165	From Northwest	0.0227	From Northeast				
#4 North Charleston	0.0121	From Northwest	0.088	From Northeast				
#10 Institute	0.0821	From West/Northwest	0.0996	From Northeast and Southeast				
#13 Institute	0.0375	From West/Northwest	0.204	From Northeast and Southeast				
#14 Institute	0.0376	From West/Northwest	0.0958	From Northeast and Southeast				
#15 Institute	0.0505	From West/Northwest	1.3	From Northeast and Southeast				

* Concentrations measured in parts per billion by volume (ppbv)

** Background site: This is an area with no known sources of Ethylene Oxide

Method Detect Level (MDL) for the sampling = 0.0261 ppbv

MDL is the minimum concentration of a substance that can be measured and reported with 99% confidence that the concentration is greater than zero.

What is DEP doing?

- Immediately contacted the State Department of Health and Human Resources' (DHHR) Bureau for Public Health (BPH) for a review of the cancer registry for the areas identified by the EPA. BPH has not found elevated levels of the cancers associated with EtO in these areas.
- Gathered updated emissions data (2017) and site-specific weather data because the EPA's assessment used 2014 emissions data and weather data from Yeager Airport.
- Performed significantly more detailed, site-specific emissions modeling than previously done by the EPA. Modeling is using a mathematical simulation to predict the way pollutants behave in the atmosphere under different emission rates, weather, and development scenarios.
- Requested the EPA to expedite their review of regulations that govern EtO sources across the country.
- Issued a press release in 2019 outlining the new findings related to EtO.
- Created an EtO webpage and online mailing list to keep the public informed and provide updates.
- Hosted meetings with state and local elected officials and the public in the fall of 2021.
- Has and will continue to participate in monthly Community Advisory Panels (CAPs) for the South Charleston and Institute areas. To learn more, contact Mary Green at *mgreen@magc.info.*
- Has and will continue to provide updates on EtO and other environmental topics via virtual town hall meetings with the agency's Environmental Advocate. These meetings are open to all citizens.
- Continuing to enforce existing state and federal regulations, through permits, including those relating to EtO emissions.
- Sampling study in progess.