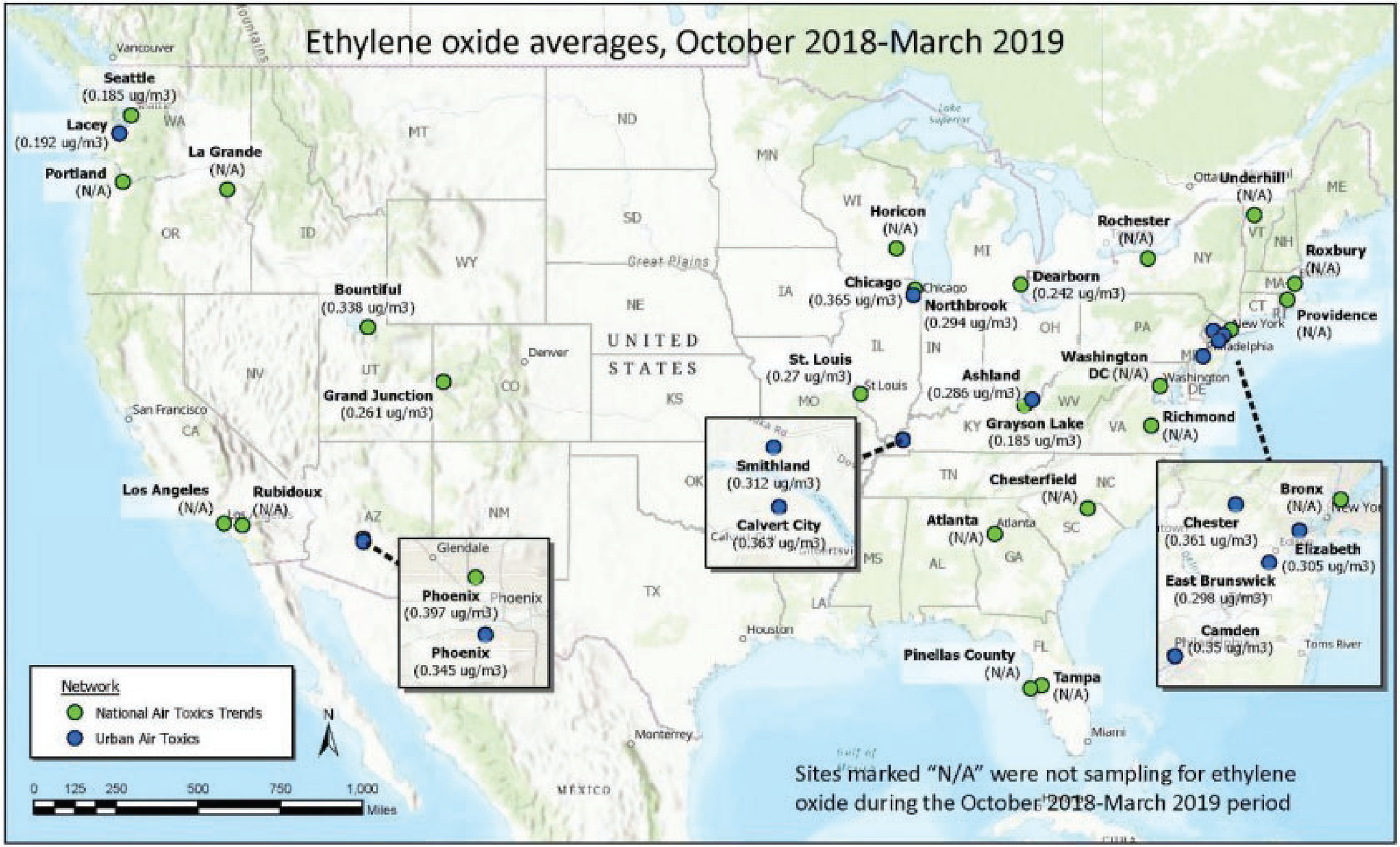
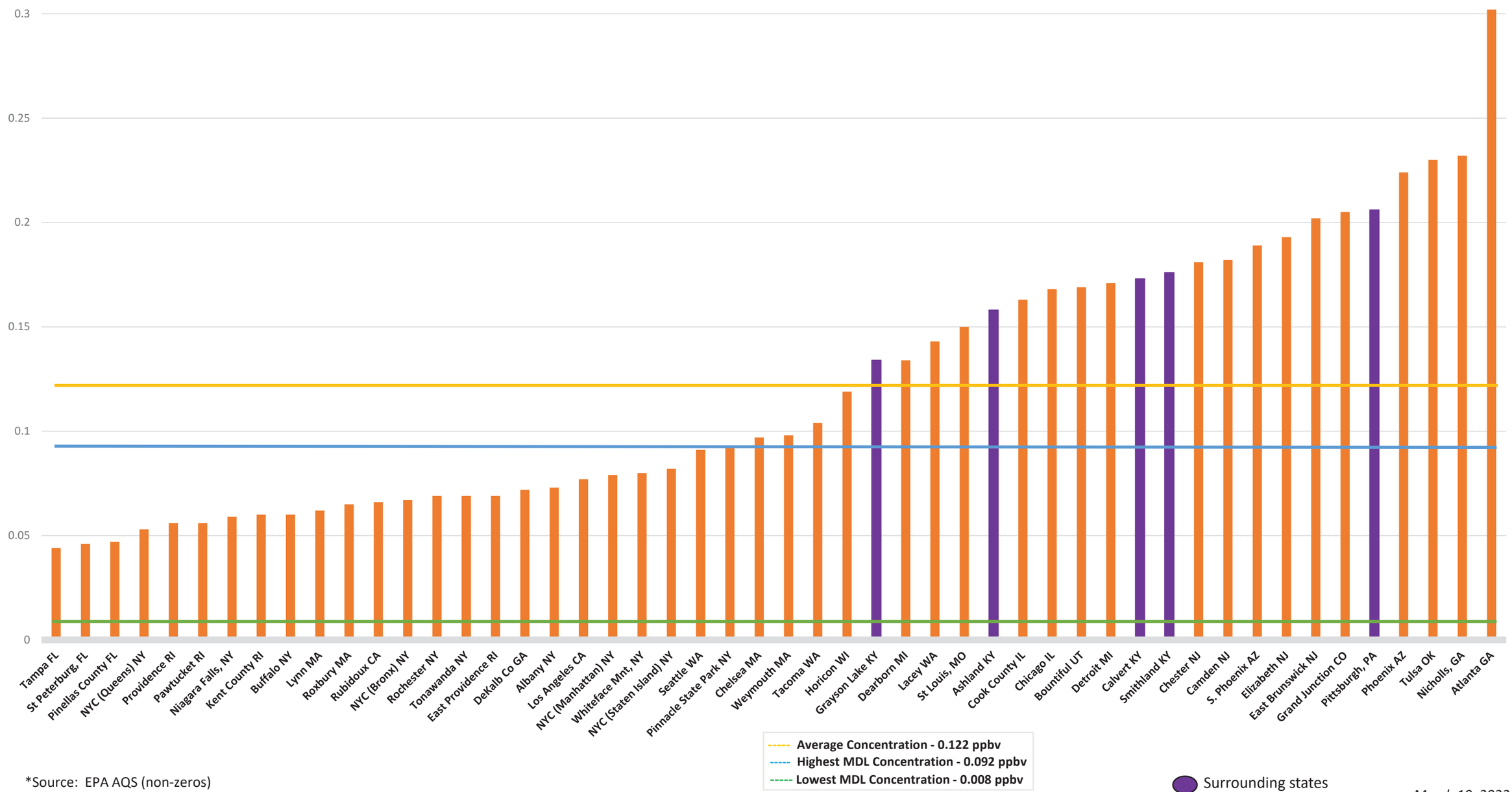
National Air Toxics Trends and Urban Air Toxics Monitoring Sites



https://www.epa.gov/sites/default/files/2019-11/documents/map_of_natts_uatmp.pdf

National Air Toxics Trends Stations (NATTS) and non-NATTS Sites

EtO Average Concentration (ppbv)



*Source: EPA AQS (non-zeros)
Number of samples for each site range from 6 to 437 (2018-November 2021)

March 10, 2022

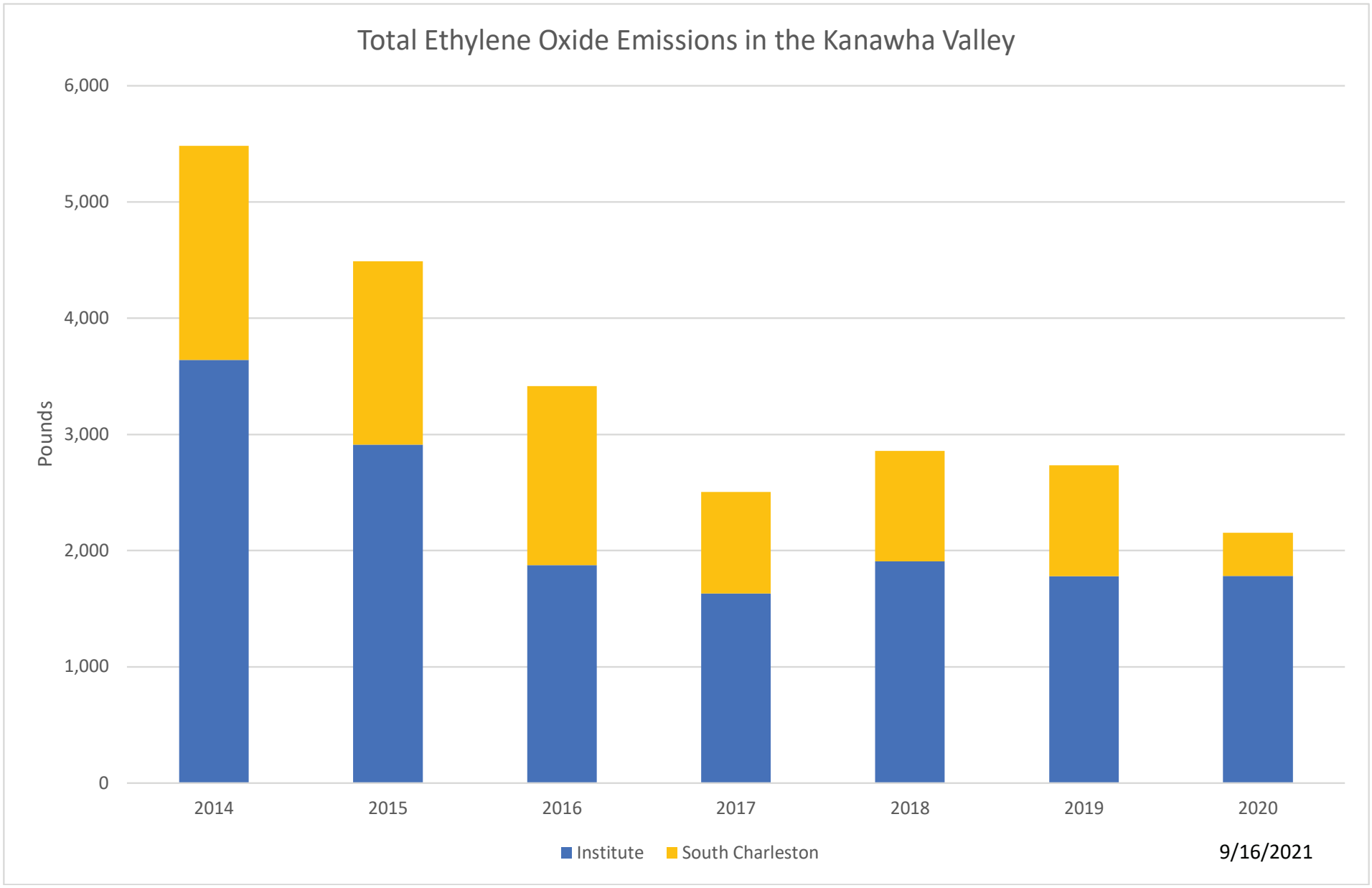
Metropolitan areas in the United States where there is at least one census tract in which EtO is the risk driver

Source: 2014 NATA and information from the EPA

Note: Two of the metropolitan areas — Allentown-Bethlehem-Easton in Pennsylvania and Philadelphia-Camden-Wilmington in Pennsylvania, New Jersey and Delaware — overlap, so only 16 areas are identifiable on the map.

https://www.epa.gov/sites/default/files/2020-03/documents/epaoig_20200331-20-n-0128_0.pdf

Total EtO Emissions in the Kanawha Valley



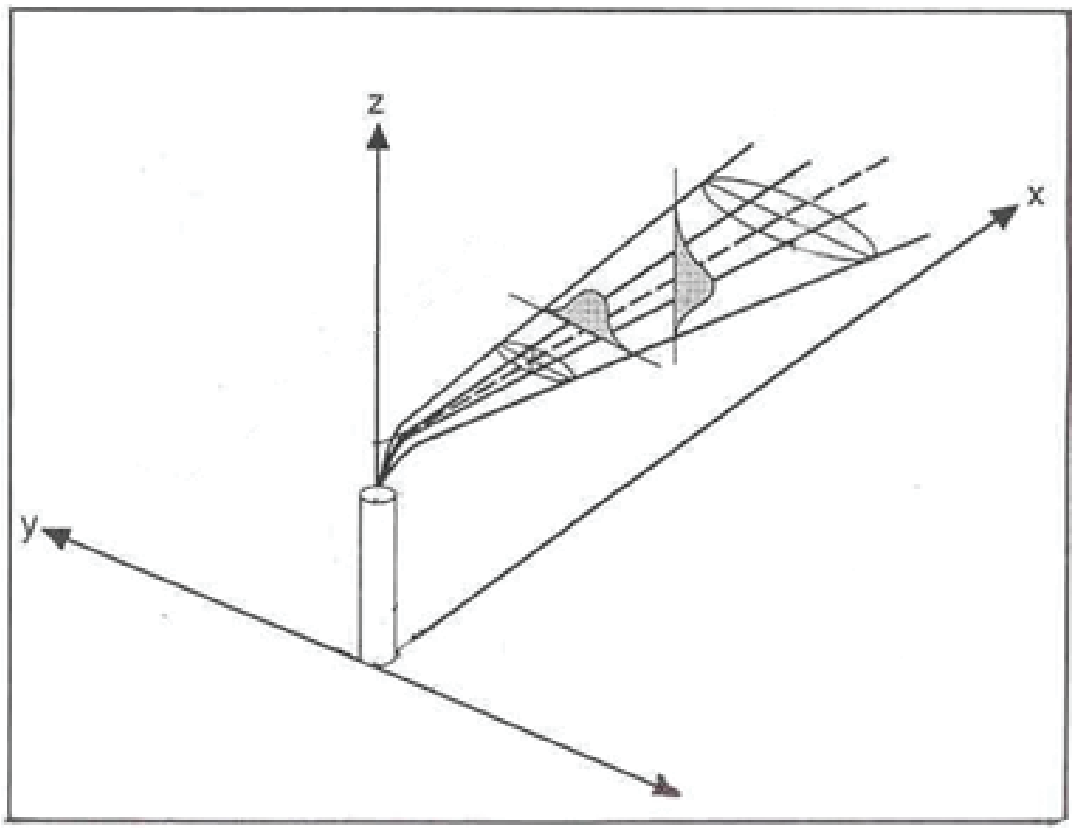
		2014 SLEIS EtO Emissions (lbs/yr)	2015 SLEIS EtO Emissions (lbs/yr)	2016 SLEIS EtO Emissions (lbs/yr)	2017 SLEIS EtO Emissions (lbs/yr)	2018* SLEIS EtO Emissions (lbs/yr)	2019 SLEIS EtO Emissions (lbs/yr)	2020 SLEIS EtO Emissions (lbs/yr)
Union Carbide	South Charleston	1,656	1,397	1,385	709	776	756	209
Covestro	South Charleston	185	183	156	165	175	195	160
Union Carbide	Institute	3,641	2,911	1,876	1,631	1,764	900	952
Specialty Products	Institute	N/A	N/A	N/A	N/A	143	881	831
	Totals	5,482	4,491	3,417	2,505	2,858	2,732	2,152

* Specialty Products was split from Union Carbide Institute November 26, 2018

Air Modeling Group

Air quality dispersion modeling is a tool used to predict the pollutant concentrations in the ambient atmosphere resulting from the release of air pollutants. Models incorporate the influences of physical processes through mathematical equations derived from fundamental scientific principles and are useful to study the consequences of new or modified sources of air pollution. The equations account for the movement of pollutants by wind and dispersion of pollutants by mixing with ambient air. Pre-construction permitting under the Clean Air Act often requires the use of models to estimate the air quality impact from proposed new and modified sources.

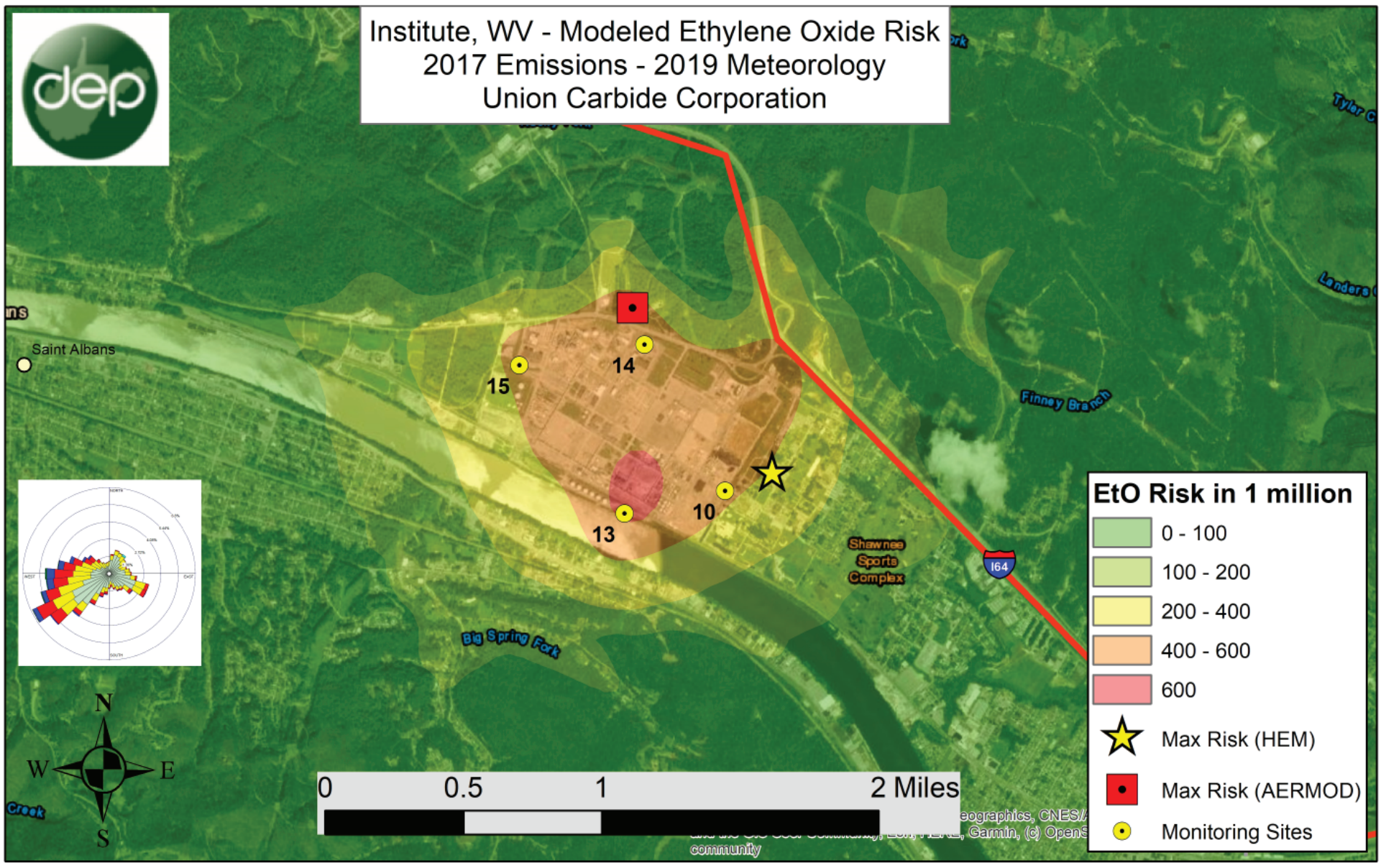
Most dispersion models have been based on the Gaussian (or normal) distribution where the concentration profile through the plume has the shape of the normal bell curve in both the vertical and horizontal direction. Newer models use a non-Gaussian distribution in the vertical direction. The concentration is highest at the plume centerline and decreases with distance from the centerline.

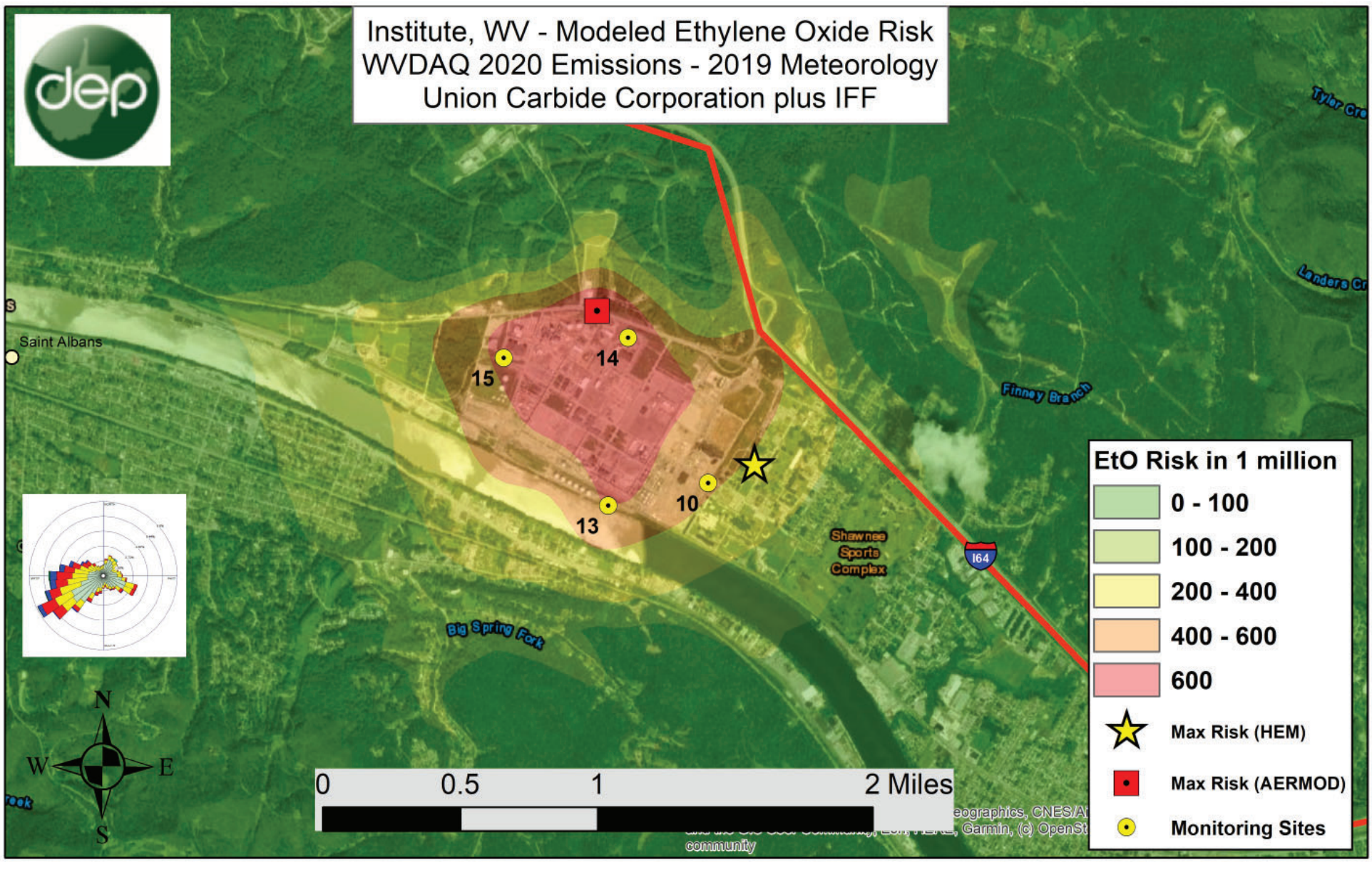


Air dispersion models require input data in four main categories: meteorological conditions, source/emission parameters, land use/terrain information and receptor information. Specific requirements vary by source type and the model used. Input data can include:

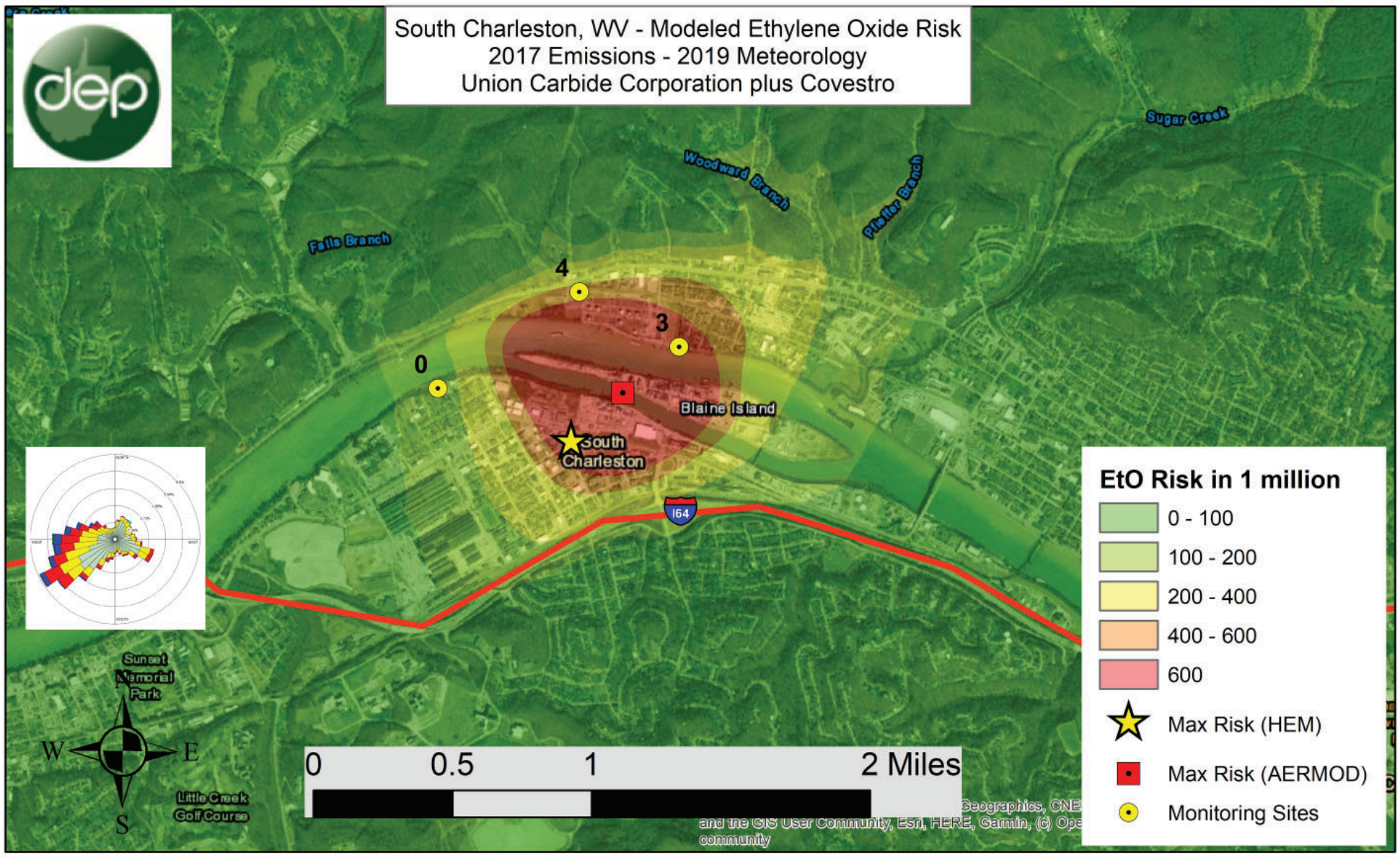
- **Meteorological Data** - Meteorological data is used by the model to simulate transport and dispersion and include wind speed, wind direction, ambient temperature, mixing height, and atmospheric stability. Data are recorded hourly and are typically obtained from National Weather Service (NWS) stations or from on-site collection stations. Five years of NWS data or one year of on-site data are typically used as input to a model.
- **Source/Emission Parameters** - Source/emission parameters define how the emissions are released into the atmosphere and include stack gas temperature, stack gas velocity, height and diameter of state, and emission rates of pollutants.
- **Land Use/Terrain Information** - Land use and terrain elevations are necessary to help predict ambient concentrations of pollutants. Land use surrounding a source of emissions influences the atmospheric turbulence while surrounding elevated terrain heights can increase pollutant concentrations.
- **Receptors** - Receptors are locations where the model computes concentration estimates. Receptors are typically located using a grid system with enough locations to identify maximum impacts. Also, locations of particular interest are often included as receptors.

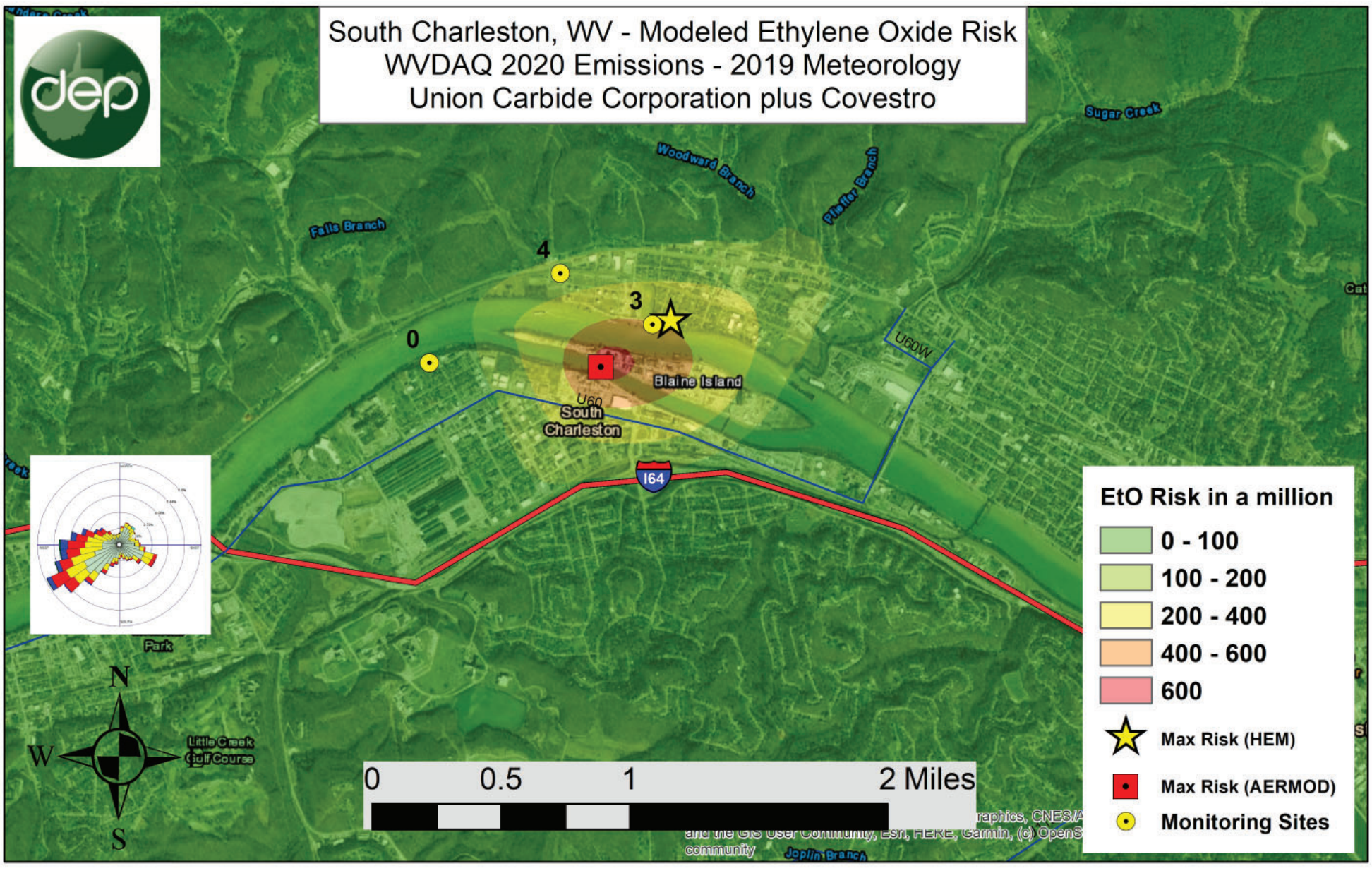
Institute Area





South Charleston Area





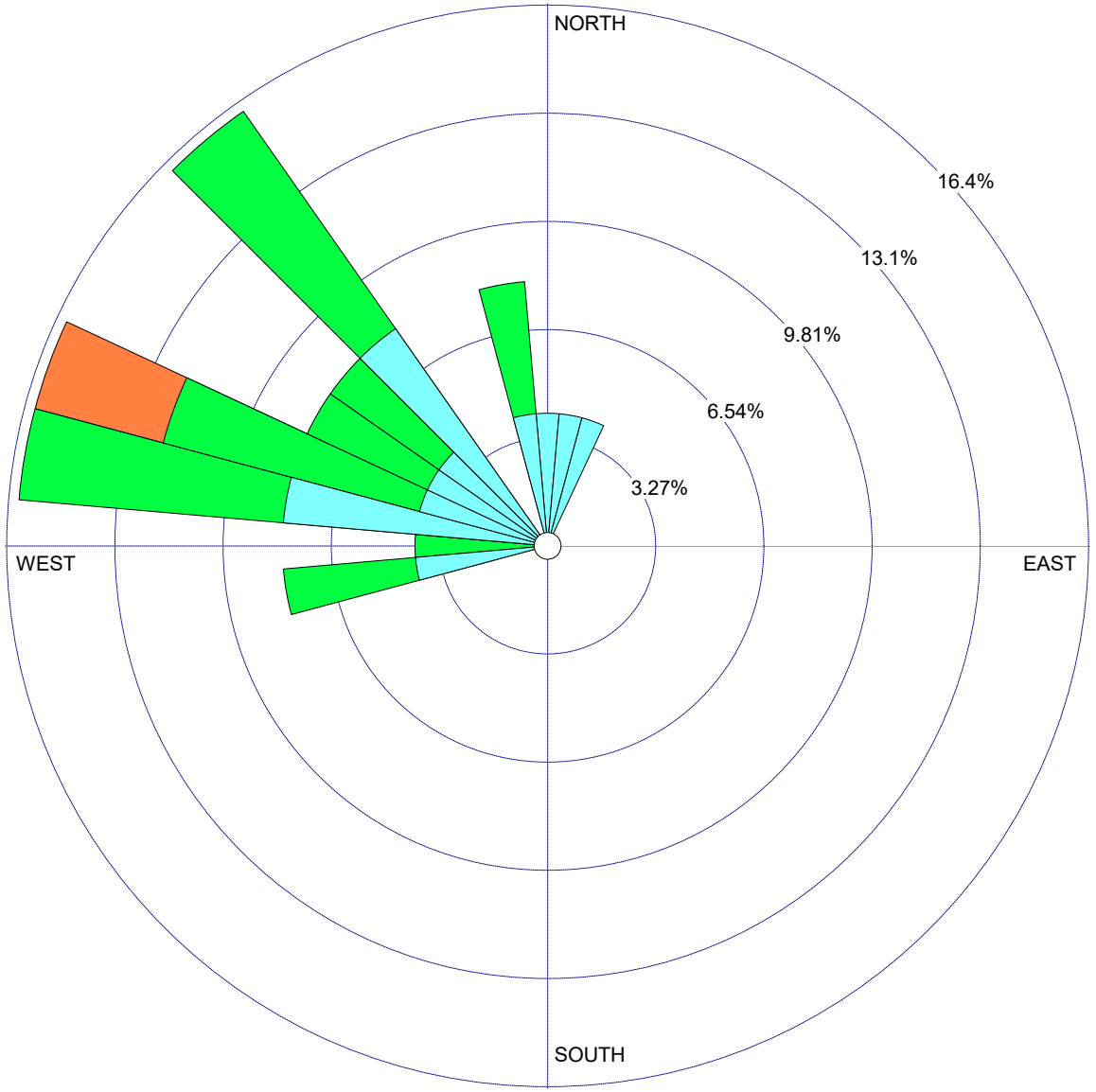
WIND ROSE PLOT:

Institute
Altivia Met Tower

DISPLAY:

Wind Speed
Direction (blowing from)

COMMENTS:



DATA PERIOD:

Start Date: 1/25/2022 - 11:00
End Date: 1/26/2022 - 11:00

TOTAL COUNT:	CALM WINDS:
25 hrs.	**4.00%**

AVG. WIND SPEED:

2.07 mph

COMPANY NAME:

MODELER:

DATE:

2/22/2022

PROJECT NO.:

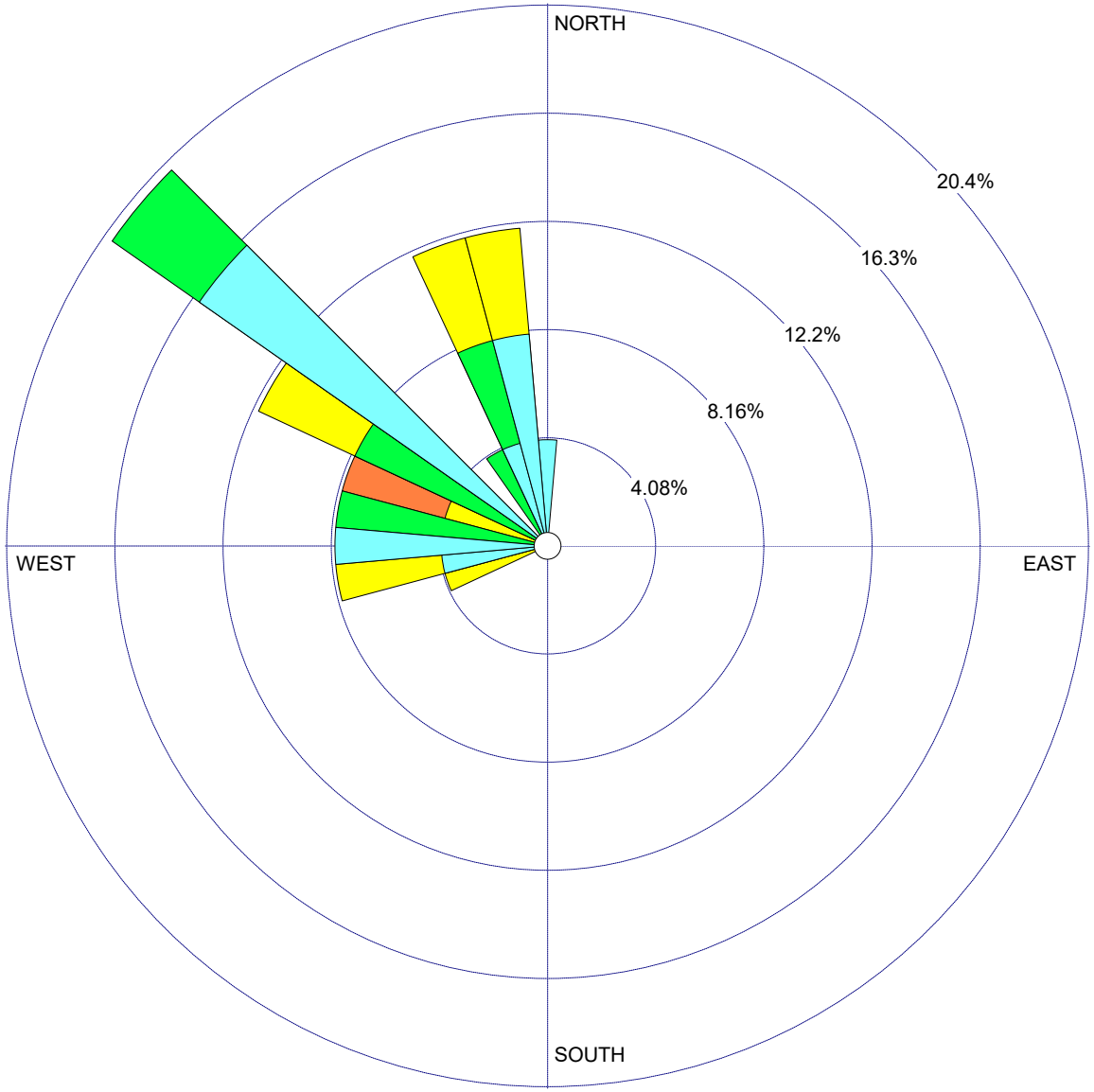
WIND ROSE PLOT:

South Charleston
UCC/Dow Met Tower

DISPLAY:

Wind Speed
Direction (blowing from)

COMMENTS:



DATA PERIOD:

Start Date: 1/25/2022 - 13:00
End Date: 1/26/2022 - 13:00

TOTAL COUNT:	CALM WINDS:
25 hrs.	**0.00%**

AVG. WIND SPEED:

2.49 mph

COMPANY NAME:

MODELER:

DATE:

2/22/2022

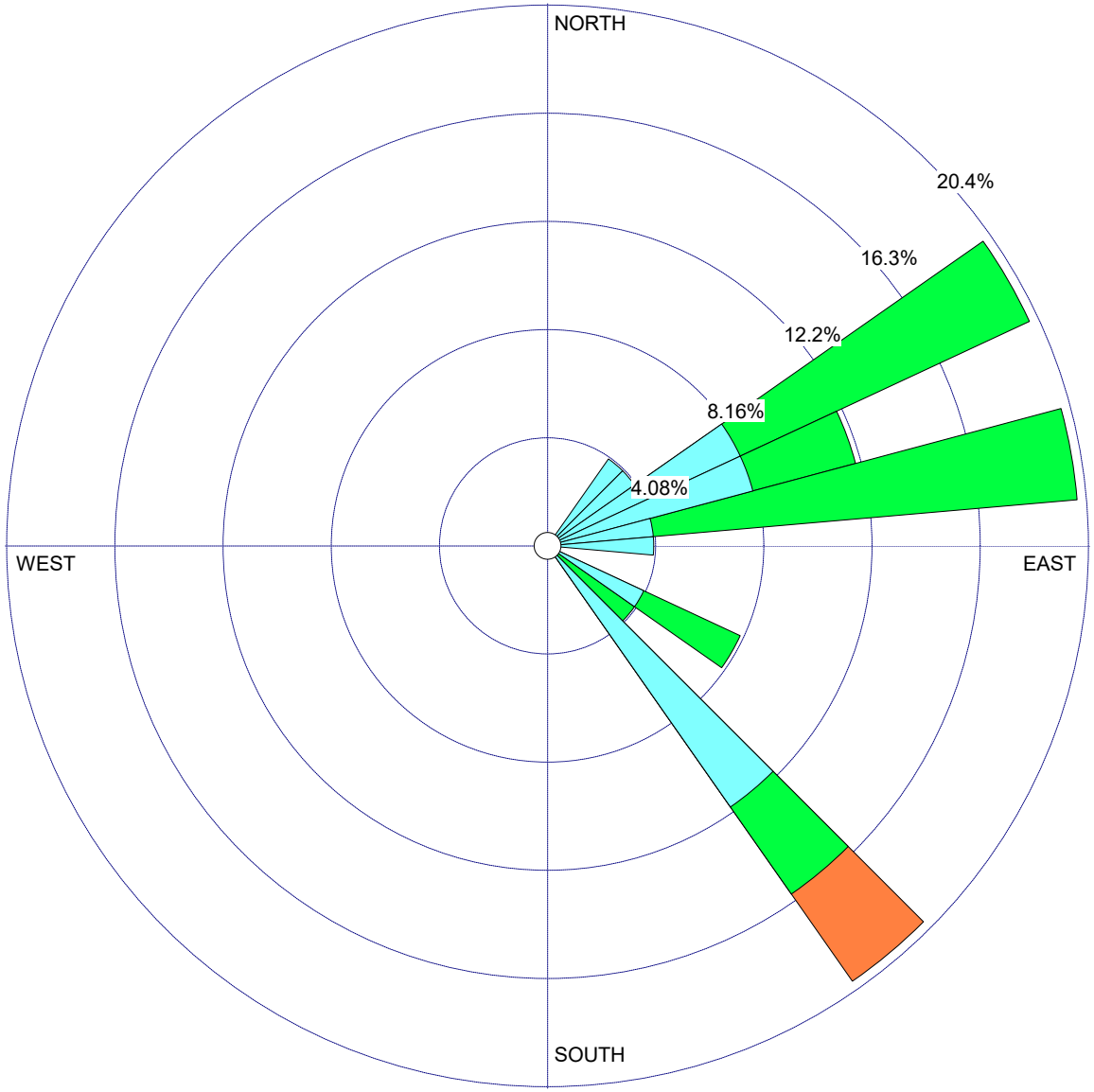
PROJECT NO.:

WIND ROSE PLOT:

Institute
Altivia Met Tower

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 2/15/2022 - 11:00
End Date: 2/16/2022 - 11:00

TOTAL COUNT:	CALM WINDS:
24 hrs.	**0.00%**

AVG. WIND SPEED:

2.22 mph

COMPANY NAME:

MODELER:

DATE:

2/22/2022

PROJECT NO.:

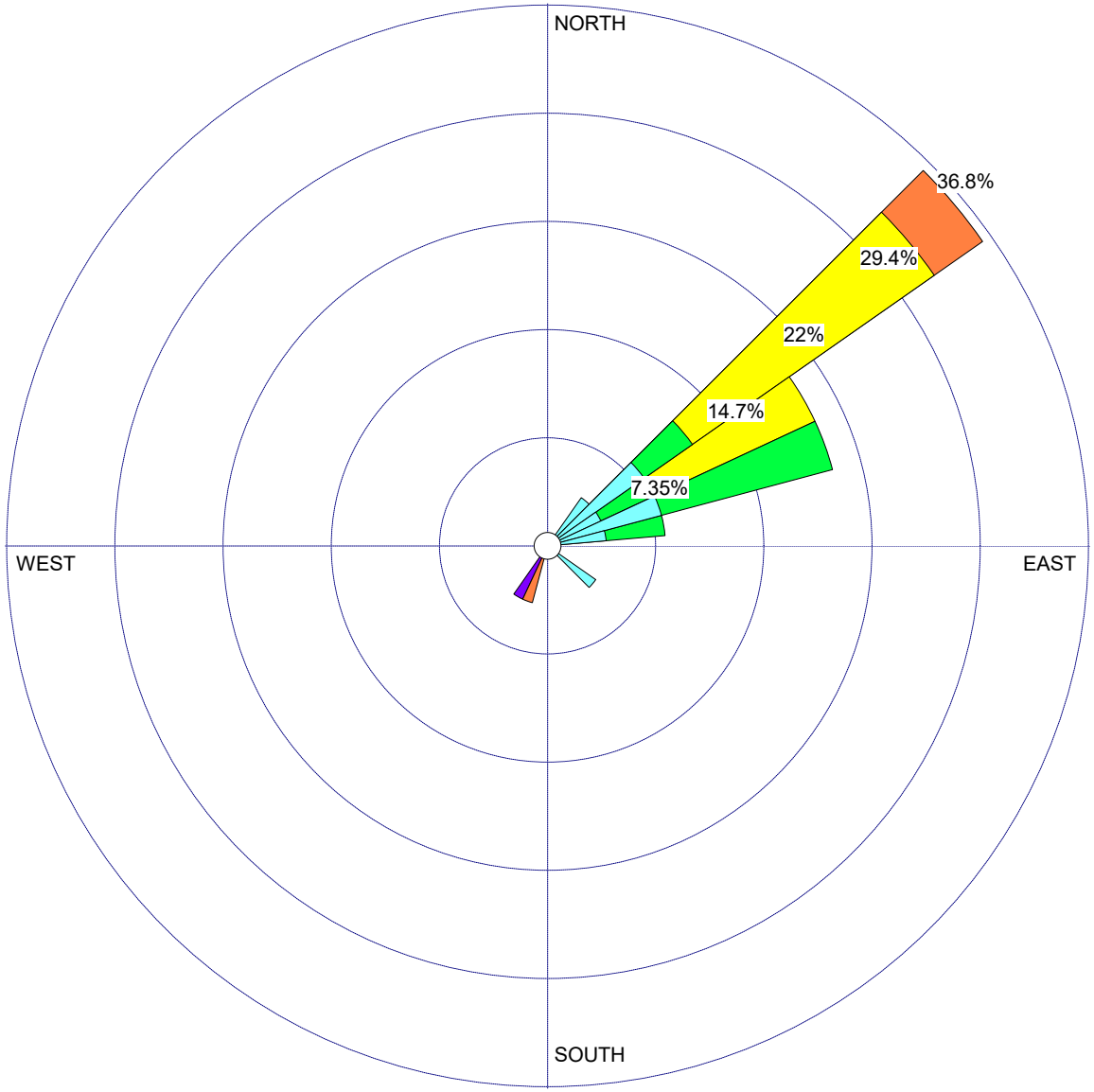
WIND ROSE PLOT:

South Charleston
UCC/Dow Met Tower

DISPLAY:

Wind Speed
Direction (blowing from)

COMMENTS:



WIND SPEED
(mph)

- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 0.00%

DATA PERIOD:

Start Date: 2/15/2022 - 13:00
End Date: 2/16/2022 - 13:00

TOTAL COUNT:	CALM WINDS:
25 hrs.	**0.00%**

AVG. WIND SPEED:

3.63 mph

COMPANY NAME:

MODELER:

DATE:

2/22/2022

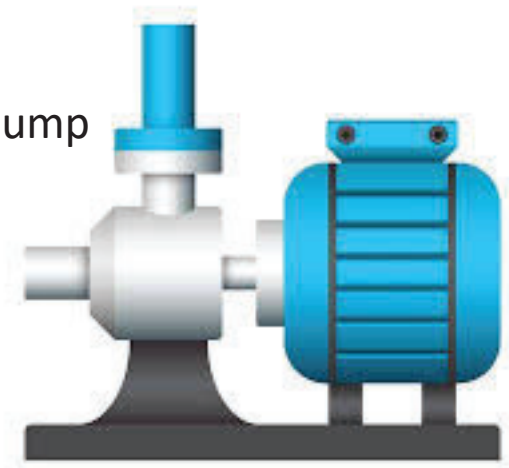
PROJECT NO.:

The requirements among the regulations vary, but all Leak Detection and Repair programs or LDAR, consist of six basic elements.

- Identifying Components
- Leak Definition
- Monitoring Components
- Repairing Leaks
- Recordkeeping
- Reporting

Valves & Connectors

Pump



Agitator

PRVs
Pressure Relief Valves

WVDEP-Division of Air Quality
Compliance and Enforcement

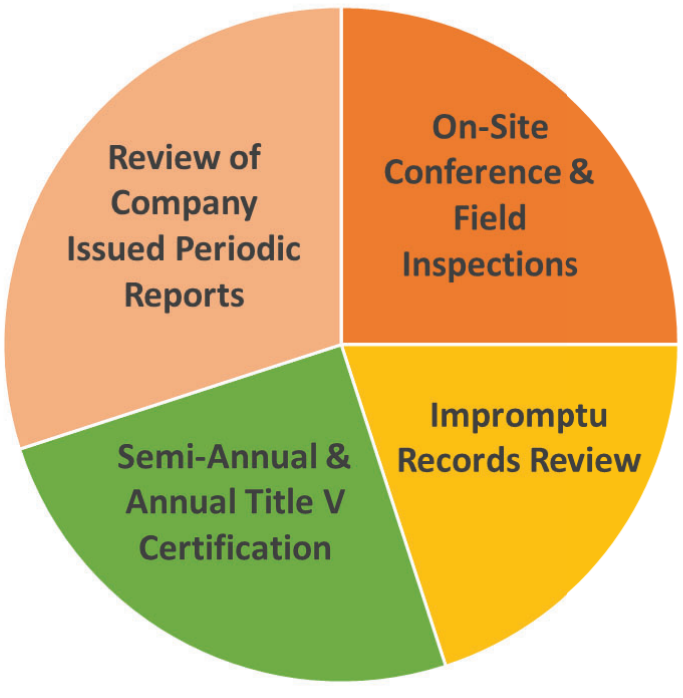
What We Do

The Compliance and Enforcement Section is responsible for conducting inspections and investigations of air pollution sources in West Virginia, addressing citizen complaints involving alleged air pollution violations, implementing the federal Title IV "acid rain" requirements for all of the West Virginia coal-fired electric generating units and inspecting asbestos demolition and renovation projects in West Virginia. The sources involved are subject to a wide range of regulations, including EPA delegated programs, the EPA-approved SIP, and state-only regulations. Most of the EPA-delegated programs are recently promulgated rules governing the emissions of hazardous air pollutants utilizing maximum achievable control technology (MACT) standards, or are subject to federal new source performance standards (NSPS).

The Compliance and Enforcement Section is comprised of four areas, including chemical operations, materials handling, combustion, and asbestos. Each area also has its own compliance and enforcement criteria.

In order to achieve it’s objective, the section conducts periodic facility inspections. When a noncompliance issue is observed and documented, a Notice of Violation is issued to the facility. Depending on the gravity of the situation, a Cease and Desist Order may also be issued. In some situations a Consent Order may be entered into with the facility allowing the facility to continue operating while correcting the noncompliance issue in accordance with a compliance schedule incorporated into the Consent Order.

Site Inspection Elements



WVDEP-Division of Air Quality
Compliance and Enforcement

Regulatory milestones to control Ethylene Oxide (EtO) emissions:

1970	Federal Clean Air Act
	State air permitting
1990	Federal Clean Air Act Amendments
1990	West Virginia Rule 27 - Toxic Air Pollutants (regulated EtO specifically for the first time, based on July 1987 *Kanawha Valley Toxics Screening Study Final Report)*
1992-1997	West Virginia Rule 27 Toxic Air Pollutants Consent Orders
mid-1990s	Federal (Title V air permits)
1999	Federal Polyether Polyols National Emission Standard for Hazardous Air Pollutants
2014	Updated Federal Polyether National Emission Standard for Hazardous Air Pollutants
2017	Compliance deadline to updated Federal Polyether Polyols regulation (“Release of HAPs to atmosphere from Pressure Reducing Valve (PRV) not allowed”)