

## Health Evaluation of Ethylene Oxide Concentrations in Outdoor Air Near Medline Industries and Vantage Specialty Chemicals

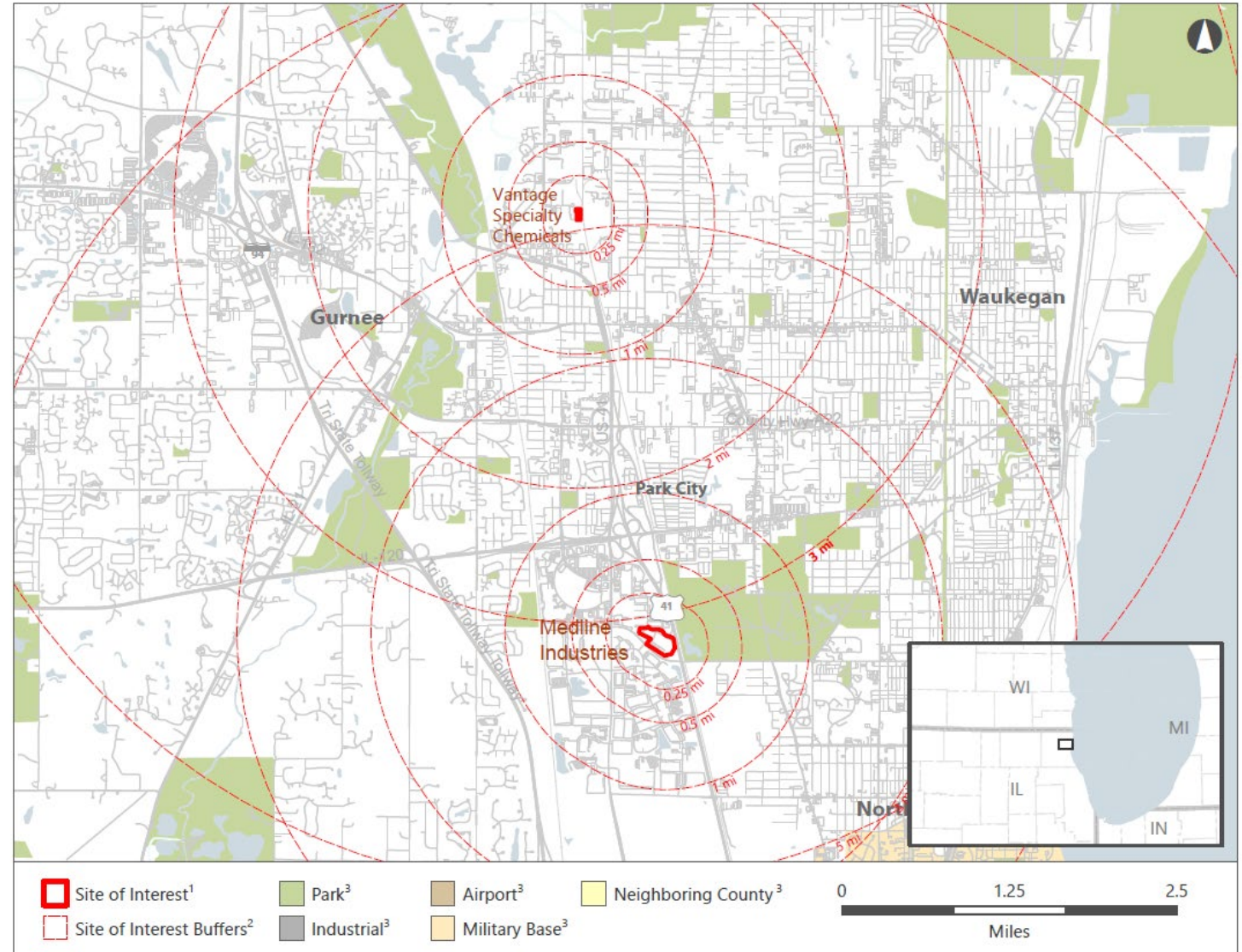
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June 26, 2024



# Presentation Outline

- Background Information
- What Did ATSDR Do?
- What Did ATSDR Find?
  - At Vantage
  - At Medline
- Recommendations and Next Steps
- Question and Answers

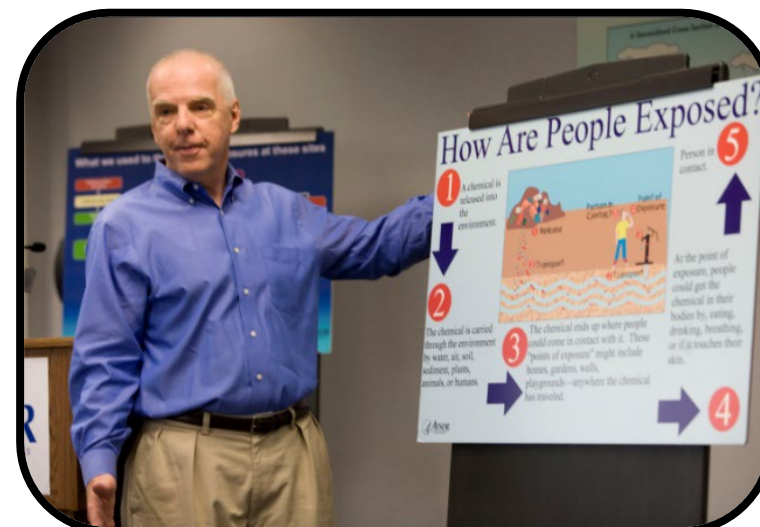


# Background Information

ATSDR, EtO, and Health Consultation

# Who is ATSDR?

- A federal non-regulatory public health agency within the U.S. Department of Health and Human Services (HHS). Located in Atlanta, GA with 10 Regional Offices, including Chicago, IL.
- ATSDR's health consultations evaluate environmental sampling data to make public health conclusions and recommendations.
- Engages communities, local, state, tribal governments, and other federal agencies when responding to environmental public health concerns.



# What is EtO?

- Ethylene oxide (EtO) is a gas used to produce other chemicals and as a sterilant.
- EtO is colorless, tasteless, and does not have a smell at the levels measured in communities.
- Breathing EtO in the air over many years may increase your risk for certain types of cancers including breast cancer and some lymphoid cancers (i.e., non-Hodgkin lymphoma, myeloma, and lymphocytic leukemia).

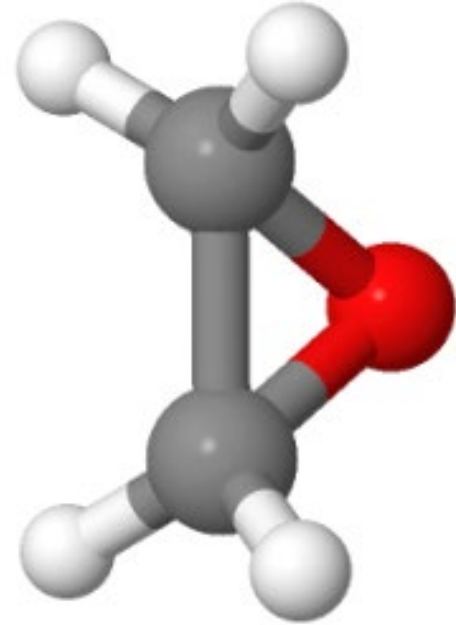


Image courtesy of NIH ChemIDPlus

# Background and Presentation Purpose

- On March 26, 2019, the Lake County Health Department and Community Health Center (LCHD) requested that the ATSDR assess whether EtO concentrations in outdoor air near Medline and Vantage pose a public health hazard in Lake County.
- ATSDR's health consultation report was released for public comment on June 21, 2024, evaluating EtO concentrations measured in outdoor air sampling near Medline and Vantage.
- The health consultation is available for public comment on ATSDR's website on the [Public Health Assessments and Health Consultations page for Illinois](#) until August 5, 2024. You can email public comments to [ATSDRRecordsCenter@cdc.gov](mailto:ATSDRRecordsCenter@cdc.gov).
- This presentation summarizes ATSDR's draft findings.

# Vantage Specialty Chemicals

- The facility has handled EtO since 1988.
- Vantage uses EtO to produce ingredients used in a variety of consumer products (shampoo, cosmetics, etc.).
- EtO may be released from the stack or from leaking components such as valves and seals (“fugitive” emissions).
- EtO air sampling near Vantage began after some additional emissions controls had been installed, but before their final permit was issued in December 2019.



Photo taken by ATSDR staff June 2024

# Vantage Timeline

- In April 2019, Vantage installed a dry bed absorber to reduce EtO emissions.
- In May 2019, Vantage began an enhanced leak detection and repair program.
- In November 2019, Vantage removed a cooling tower, likely a source of fugitive emissions.
- In December 2019, a new emissions permit was in place for Vantage.
- In 2020, Vantage started reporting stack emissions as measured by a continuous emissions monitoring system (CEMS). They also started reporting fugitive emissions.



# Medline Industries

- The facility has used EtO since 1994 to sterilize medical products.
- In March 2020, Medline installed new controls including:
  - Adding a permanent total enclosure (PTE) to prevent air containing EtO from escaping the building.
  - Adding dry bed absorbers to remove EtO from air captured using the PTE.
  - Adding a CEMS that measures and records how much EtO comes out of the stack each day.



Photo taken by ATSDR staff June 2024

# What did ATSDR do?

ATSDR's Public Health Assessment Process

# ATSDR Evaluated EtO Levels in Outdoor Air Sampling Data

1. LCHD EtO air sampling occurred three separate sampling phases from June 2019–May 2020
  - a. Five sampling locations near Vantage (V1–V5)
  - b. Five sampling locations near Medline (M1–M5)
  - c. Two background sampling locations in Lake County (R1 and R2)
2. Medline monthly EtO air sampling from March 2020–September 2023
  - a. Two fenceline sampling locations at Medline (F1 and F2)
  - b. Two community sampling locations near Medline (CF1 and C1/2)
3. Two background air monitoring stations in Cook County, Illinois that are part of the Illinois Ambient Air Quality Network measuring EtO concentrations in outdoor air every 6 days October 2018–June 2023

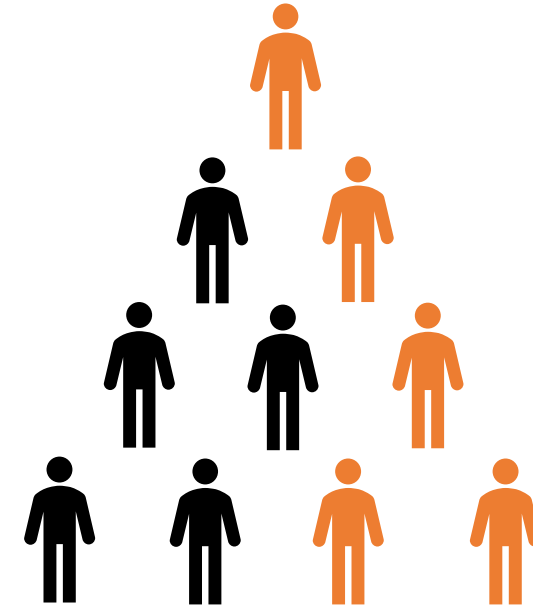
# ATSDR Addressed Challenges in Measuring EtO Using a Statistical Adjustment

- EtO concentrations were sampled using canisters.
- The amount of EtO may increase after the outdoor air sample is collected in some canisters.
- EtO concentrations in some canisters are higher than what is truly in the air.
- ATSDR used a statistical model to adjust EtO concentrations by controlling for factors that may cause EtO concentrations to be higher than what is in the air.



# Lifetime Risk of Being Diagnosed with Cancer in the U.S.

- Lifetime cancer risk is the chance a person has, over the course of their lifetime (from birth to death), of being diagnosed with cancer.
- The average lifetime risk in the U.S. can be measured because it is based on diagnosed cases of cancer.
- 1 out of every 2 men (or 5,000 in 10,000) men and 1 out of every 3 women (about 3,000 in 10,000) will be diagnosed with cancer in their lifetime.



# ATSDR Evaluation of Cancer: Calculated Lifetime Excess Cancer Risk

ATSDR's uses calculated lifetime, excess cancer risks to make public health decisions.

- They represent the excess cancer risk from EtO exposure, which is in addition to a person's lifetime risk of being diagnosed with cancer for other reasons.

We calculate these high-end risks for nearby workers and residents using health protective assumptions about

- the average level of EtO someone might breathe over many years,
- how long and how often someone may breathe the levels of EtO measured near Medline or Vantage, and
- the potential risks of breathing EtO, including for children.

These lifetime excess cancer risks

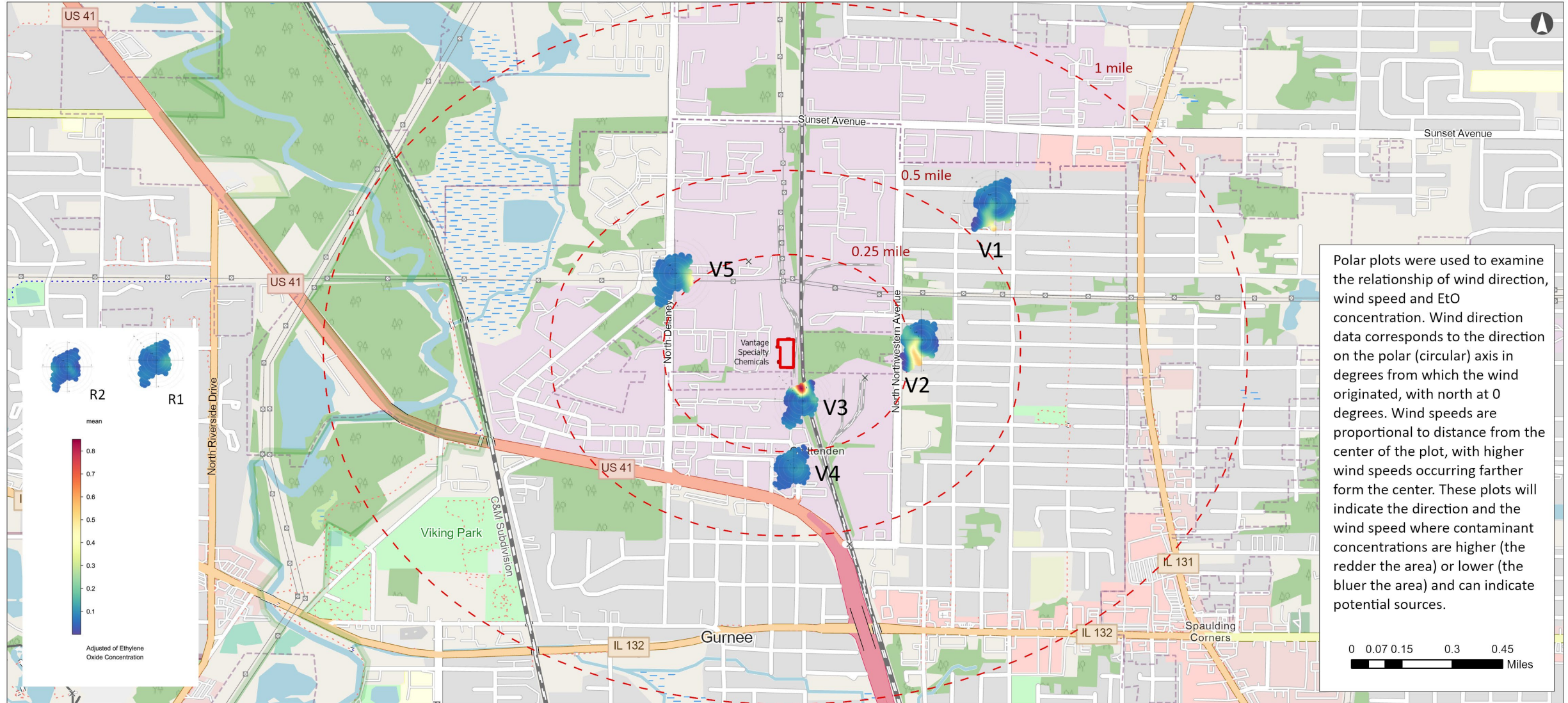
- do not represent the actual diagnosed cases of cancer in Lake County and
- cannot predict an individual's risk of developing cancer.

# What did ATSDR find at Vantage?

During and after installation of new emissions controls

# Vantage Specialty Chemicals, Lake County IL

## Polar Plots of Ethylene Oxide Concentration



Centers for Disease Control and Prevention  
 Agency for Toxic Substances  
 and Disease Registry



Geospatial Research, Analysis, and  
 Services Program



# ATSDR's Conclusions for People Living and Working Near Vantage

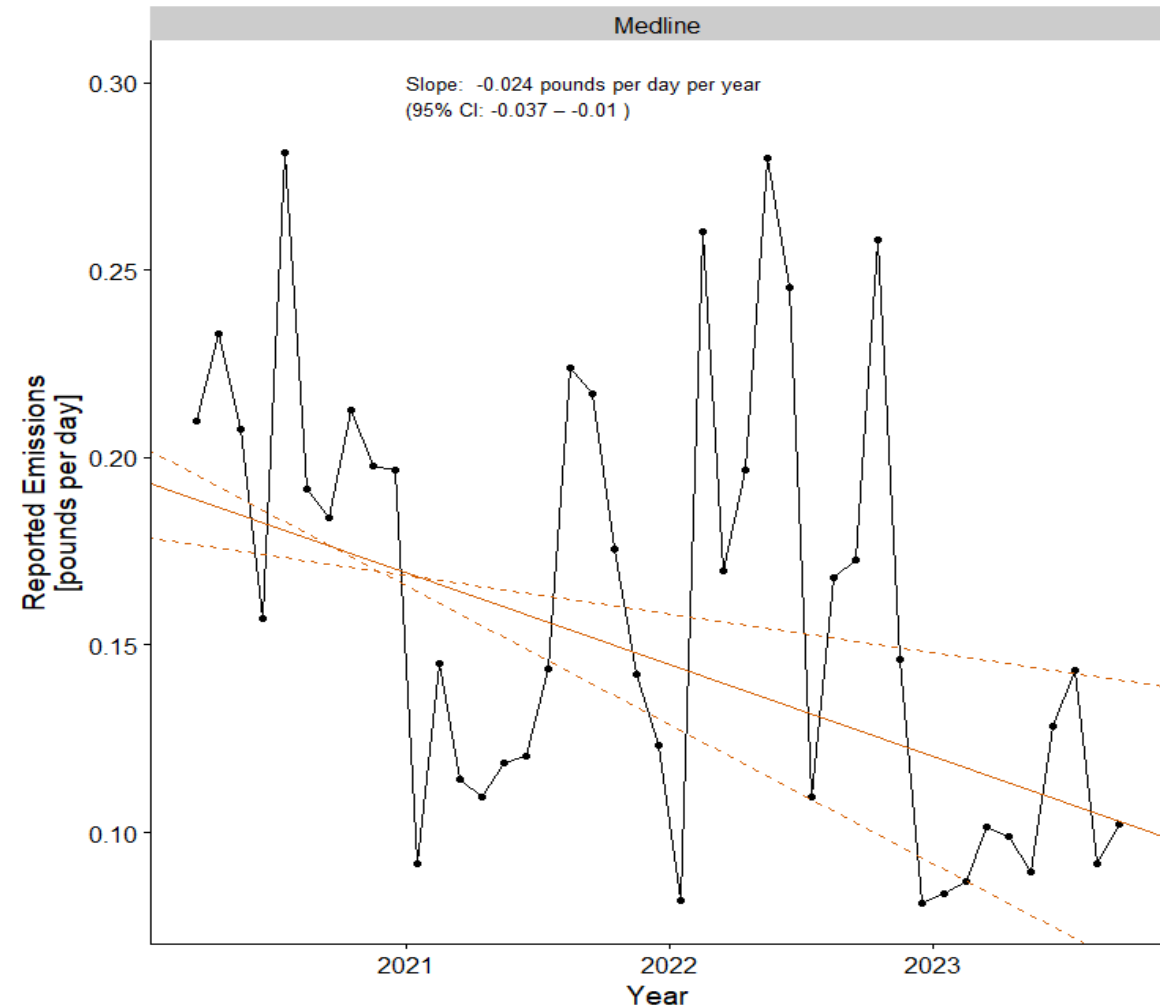
- This conclusion is based on the EtO sampling data near Vantage from June 2019 to 2020 when pollution controls may not have been fully operational.
- ATSDR found that breathing air with EtO for many years at levels measured near Vantage between June 2019 and May 2020 may result in a small increase in the risk of certain cancers for
  - residents living within 0.6 miles of Vantage and
  - people who work within ¼ mile north or east of the Vantage facility.

# What did ATSDR find at Medline?

After new emissions controls were installed in March 2020

# EtO Emissions from Medline Trended Downward 2020-2023

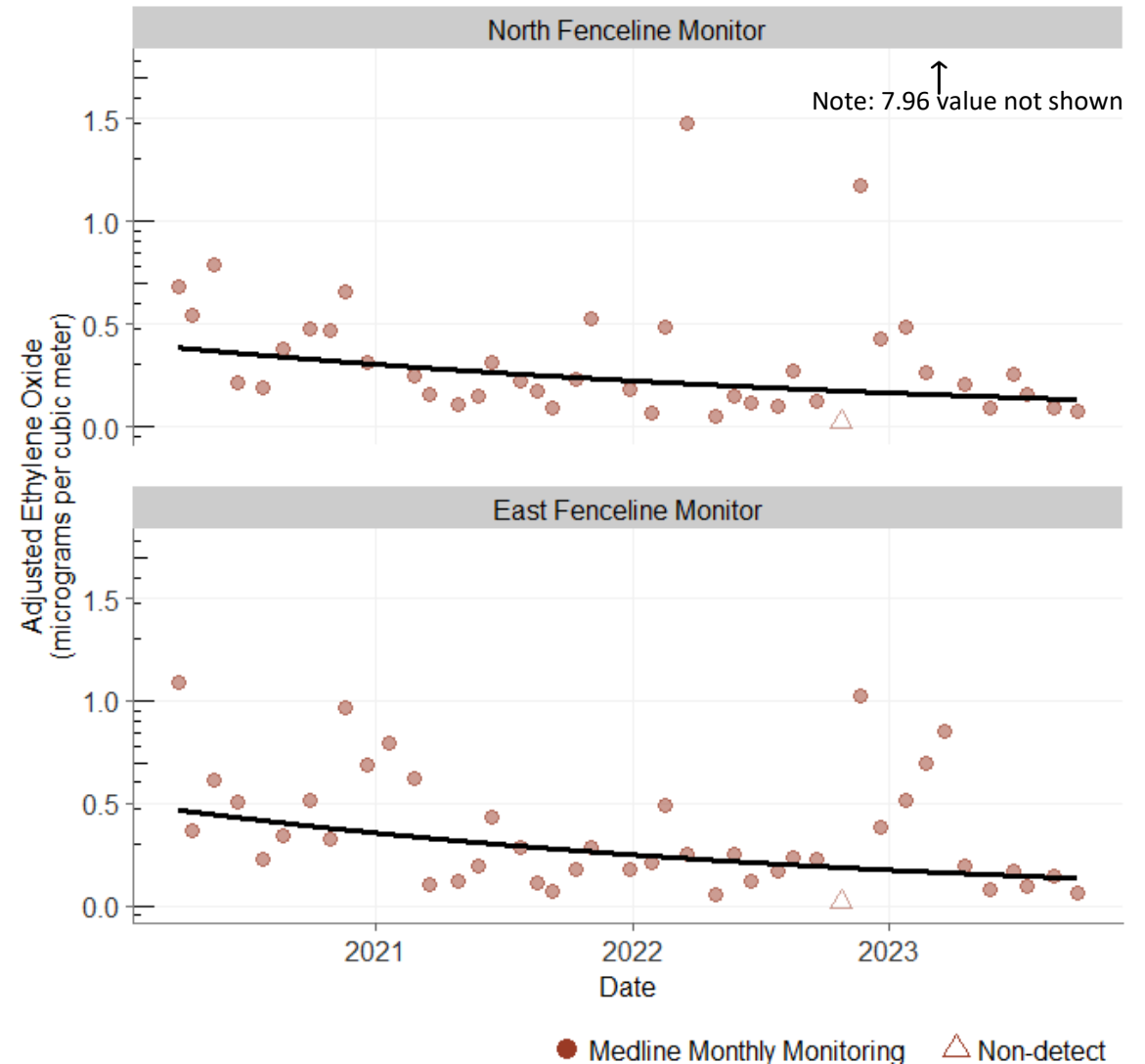
- EtO emissions as measured by the CEMS from 2020-2023 have trended downward over time at Medline



Thiel-Sen Line with 95% Confidence Interval.  
Note intercepts change due to bootstrapping of Thiel Sen Line

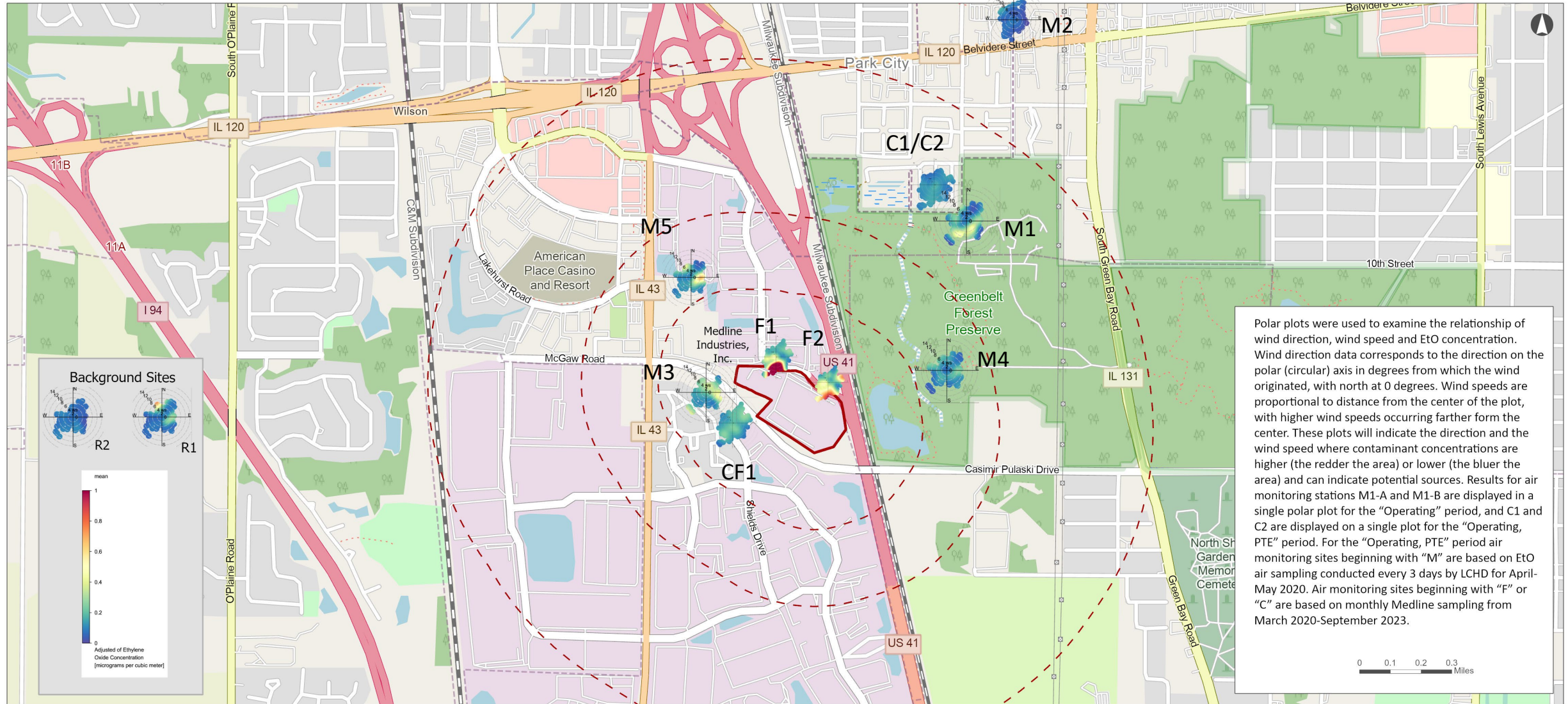
# EtO Concentrations at Fenceline Sampling Locations at Medline Also Trended Downwards March 2020- September 2023

- EtO concentrations at two fenceline locations were decreasing significantly, approximately 30% per year.
- The most recent 2023 EtO data suggest that EtO levels were low enough to not pose an elevated cancer risk to offsite workers who work near the plant.



# Medline Industries, Lake County IL

Polar plots of Ethylene Oxide Concentration During PTE Operation Period



# ATSDR Cannot Rule Out Medline Contribution to EtO Concentrations at the Closest Communities

- There were signs of facility influence at the two community locations based on statistical testing.
  - EtO concentrations were slightly higher at both sampling locations (CF1 and C1) than background EtO concentrations at Northbrook and Schiller Park in Cook County, IL.
  - EtO concentrations were higher at the closer community location (CF1) compared to the farther community (C1).
- Evidence of facility contribution to EtO concentrations in the community was not as strong as it was at the fenceline.
  - There was not a statistically significant downward trend in community EtO concentrations even though there was a downward trend in EtO emissions 2020-2023.
  - Medline's EtO emissions influence was not as evident in the polar plots as at the fenceline sampling location.

## ATSDR's Conclusion for Residents Near Medline (After March 2020)

- ATSDR cannot rule out the possibility that breathing EtO for many years at levels measured near the Medline plant between 2020 and 2023 may contribute to a small increase in lifetime risk of certain cancers for people living within 0.7 miles of Medline.
  - This does not mean residents will get cancer from EtO exposure; it means they may have a slightly increased chance from their baseline lifetime cancer risk from all causes.

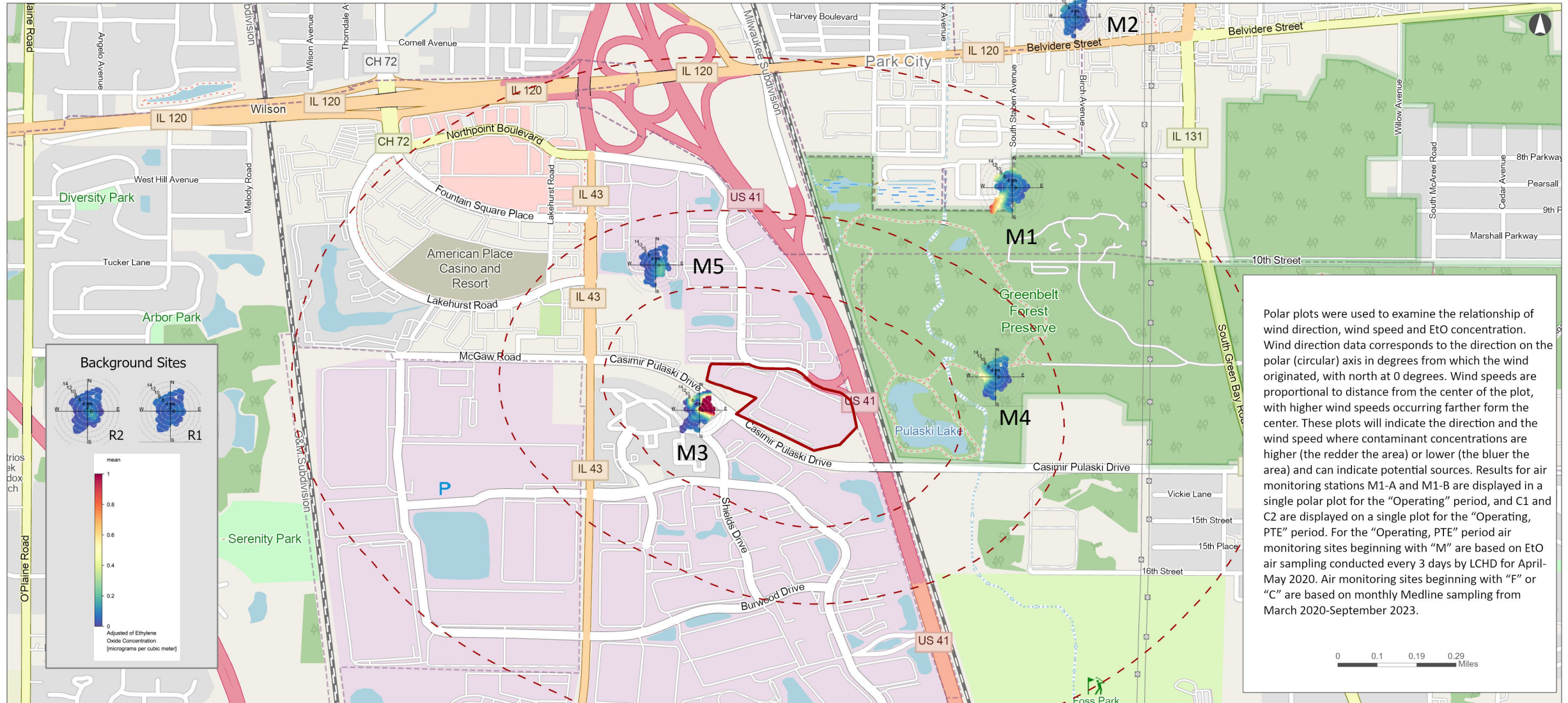
# What did ATSDR find at Medline?

Before new emissions controls were installed, sampling prior to December 2019



# Medline Industries, Lake County IL

Polar plots of Ethylene Oxide Concentration During Pre-Closure Operating Period



## **ATSDR's Conclusion for Residents Near Medline (Before December 2019)**

- Breathing EtO for many years prior to December 2019 could have increased the risk of certain types of cancers for people who lived within 0.6 miles of Medline.

**What did ATSDR find about background EtO?**

# Background EtO Concentrations in Illinois

Sampling Location	Average EtO Concentration ( $\mu\text{g}/\text{m}^3$ )
Willowbrook, IL	0.055
Northbrook (Cook County, IL)	0.070
Schiller Park (Cook County, IL)	0.077
R1 (Lake County, IL)	0.081
R2 (Lake County, IL)	0.071

- These concentrations were all statistically adjusted
- The potential sources of background EtO are not well understood

# ATSDR's Conclusion for Background EtO Air Sampling, June 2019– May 2020

- EtO concentrations measured in Lake County away from Medline and Vantage and near Medline when the facility was closed were similar to background levels observed across the United States.
- Lifetime excess cancer risk estimates from EtO exposure for people living or working in other parts of Lake County removed from Medline or Vantage is similar to EtO-related cancer risk for people living or working in other areas without a known EtO source.

**What does ATSDR recommend based on these findings?**

## ATSDR Recommendations for Other Agencies

- ATSDR recommends that Illinois EPA and the two facilities investigate potential sources of EtO emissions that may affect outdoor EtO air concentrations at the closest residential areas and adjacent businesses.
- ATSDR recommends that further air sampling is conducted at Vantage to better characterize long-term EtO exposure.
- ATSDR recommends that U.S. EPA continue to work to improve the analytical methods to accurately measure EtO at lower concentrations by lowering the EtO method detection limit and the impact of EtO canister effect.

# ATSDR Recommendations and Next Steps for Community Members

- ATSDR recommends community members keep up to date with regular checkups and recommended age-appropriate medical screening tests.
- ATSDR has resources for clinicians about environmental EtO exposure available on our [EtO website](#).
  - [ATSDR clinician brief: ethylene oxide](#)
  - [ATSDR clinician overview: ethylene oxide](#)
- If you have questions about this health consultation, contact us at 1-800-CDC-INFO and ask for information on the Medline and Vantage EtO health consultation in Lake County, Illinois or email [EtO@cdc.gov](mailto:EtO@cdc.gov) .
- If you'd like to submit a public comment, email [ATSDRRecordsCenter@cdc.gov](mailto:ATSDRRecordsCenter@cdc.gov).



# Questions?

For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

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