

# Public Health Response to Ethylene Oxide Emissions

**Michelle Colledge, MPH, PhD**  
**Environmental Health Scientist**

**Mark Johnson, PhD, DABT**  
**Regional Director, ATSDR-Region 5**

Town Hall Meeting on Ethylene Oxide  
October 2, 2019

# Agency for Toxic Substances and Disease Registry (ATSDR)

- ATSDR is a federal public health agency of the U.S. Department of Health and Human Services.
- Top priority is to protect people from harmful chemical exposures.
- Serves the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances.

# ATSDR

## ATSDR's work falls into three primary areas:

- Preventing and reducing community exposure to hazardous substances.
- Building the science base on toxic substances.
- Educating health care providers and the public about toxic chemicals.



# Ethylene Oxide Properties

- Highly volatile chemical-gas
- Colorless, tasteless vapor
- High odor-threshold
- Persistent in the air: 50-60 day half-life

National Library of Medicine- Toxnet. <https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/f?./temp/~uBboKN:7>

ATSDR. Medical Management Guidelines for Ethylene Oxide. <https://www.atsdr.cdc.gov/mmg/mmg.asp?id=730&tid=133>

# Health Effects Associated with EtO

## Exposure in the Scientific Literature

Studies of animals or workers exposed to very high levels of ethylene oxide report associations with the following health effects:

### Short-term (acute) Exposures:

- Neurological effects
- Nausea/vomiting
- Frostbite with direct skin contact

### Long-term (chronic) Exposures:

- Neurologic effects
- Reproductive effects
- Cancer: Lymphoid cancers such as non-Hodgkin lymphoma, myeloma, and lymphocytic leukemia; breast cancer in females

# Lake County Ethylene Oxide Evaluation

# 2014 National Air Toxic Assessment (NATA): Overview

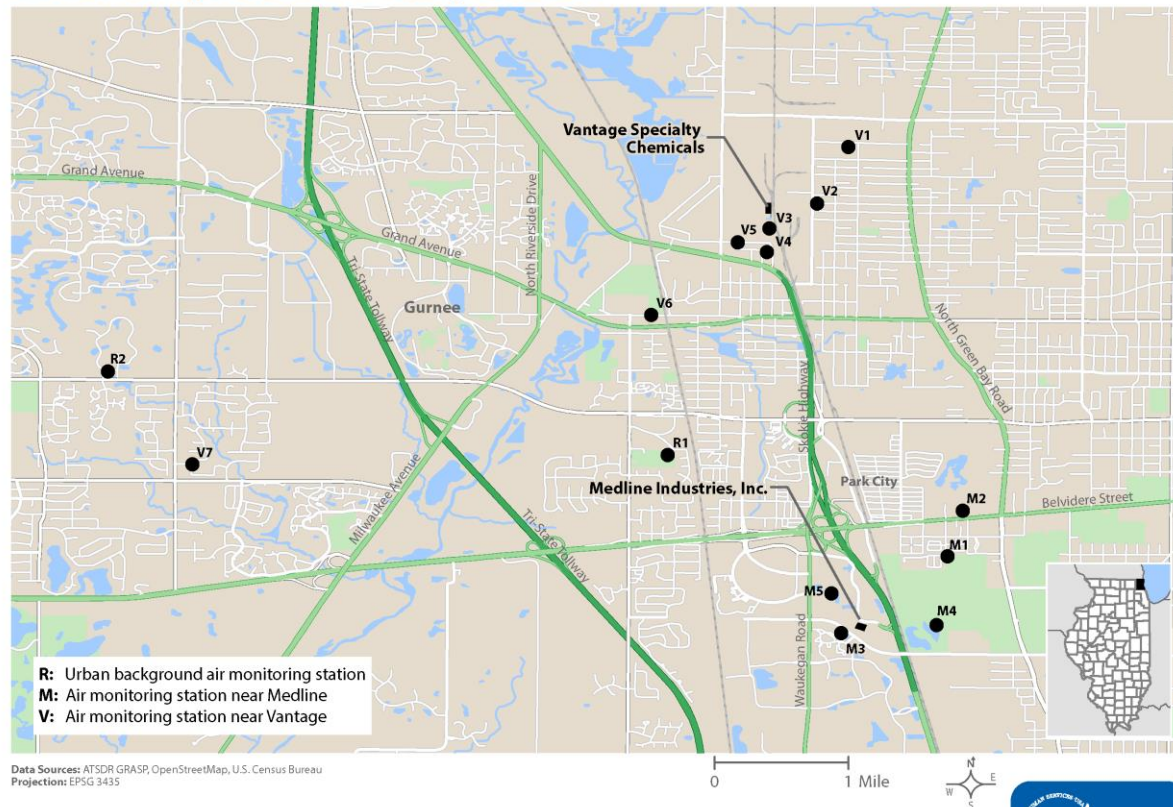
- The National Air Toxics Assessment (NATA) is EPA's ongoing review of air toxics in the United States.
- NATA is screening tool used by regulatory agencies to prioritize pollutants and emission sources that pose possible risks to public health.
- NATA maps display theoretical cancer and non-cancer risk over geographic areas (e.g., census tracts) across the country that environmental and health agencies use to identify areas of further study to understand population risk. It does not estimate any person's individual risk.
- NATA maps are **not** displays of cancer cases or rates of cancer, and are **not** a demonstration of a “cancer cluster.”

# Preliminary Data

- ATSDR has done a preliminary review of existing data.
- EtO samples were collected between June 6 and July 4, 2019 with SUMMA canisters at 10 sites by Lake County.
- Four additional locations were sited by Medline and Vantage.
- Though the data are useful for screening for the presence of EtO in ambient air, they cannot be used to generalize short- or long-term exposures.
- Additional sampling is warranted, and is being planned.



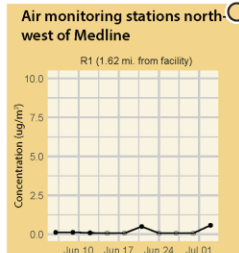
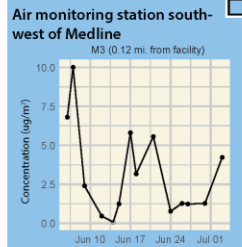
## Vantage and Medline - Lake County, IL Air Monitoring Stations and Facility Locations



Location of air monitoring stations in Lake County

## EtO concentration over time at air monitoring stations - Medline

# Time trends: EtO concentrations at locations near Medline

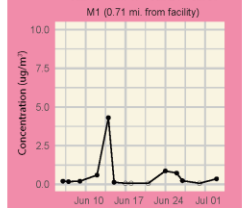
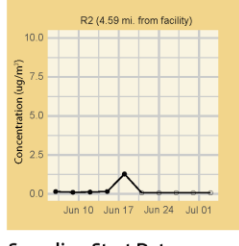
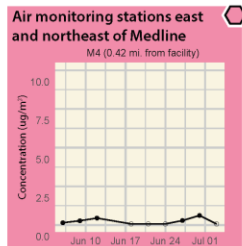


The line graphs here indicate ethylene oxide (EtO) concentration at the four<sup>1</sup> air monitoring stations around the Medline Industries, Inc. location, as well as two remote stations. These stations collected 24-hour air samples starting at 10:00 a.m. on the days listed in the chart to the left. The map shows the location of these air monitoring stations and of the Medline Industries, Inc. facility.

When multiple samples were collected at the same monitoring station on the same day, only the highest EtO concentration is shown on the line graph.

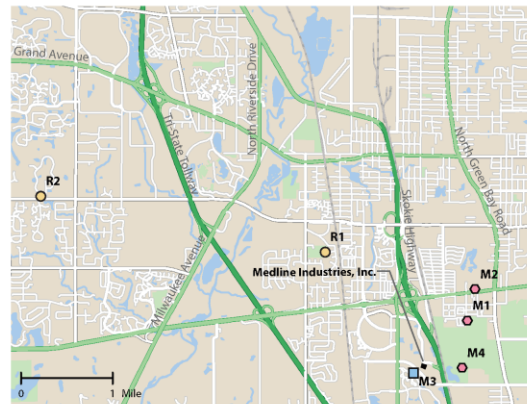
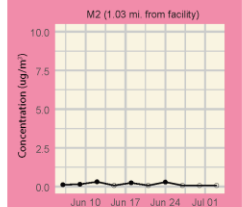
A solid circle indicates EtO was detected, and an empty circle indicates that the EtO was not detected (detection limit = 0.072 ug/m<sup>3</sup>).

<sup>1</sup>A fifth sampling site was excluded because it was only sampled on one day and therefore had insufficient data.



### Sampling Start Dates

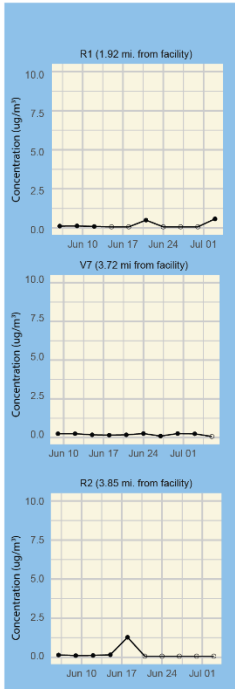
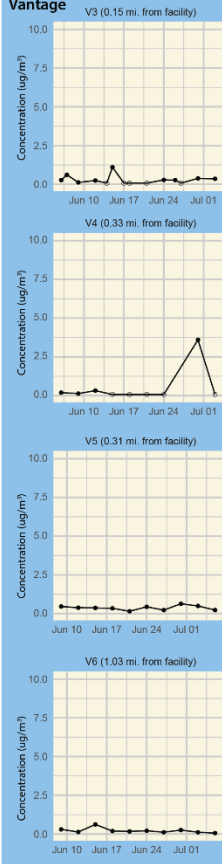
June	July
6	7
7	3
9	12
14	15
17	18
21	24
26	27
30	



# Time trends: EtO concentrations at locations near Vantage

## EtO concentration over time at air monitoring stations - Vantage

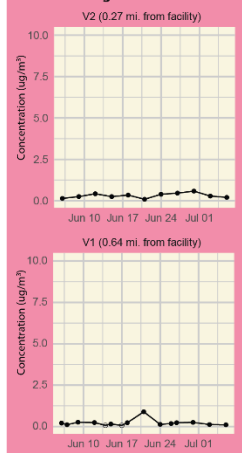
**Air monitoring stations southwest and south of Vantage**



**Sampling Start Dates**

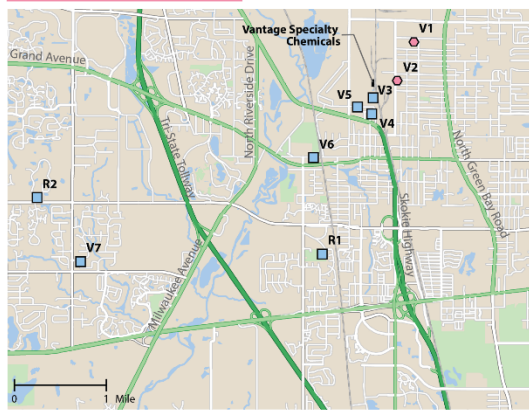
June	July
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**Air monitoring stations north-east of Vantage**



The line graphs here indicate ethylene oxide (EtO) concentration at the seven air monitoring stations around the Vantage Specialty Chemicals location, as well as two remote stations. These stations collected 24-hour air samples starting at 10:00 a.m. on the days listed in the chart at the lower left of this page. The map shows the location of these air monitoring stations and of the Vantage Specialty Chemicals facility.

When multiple samples were collected at the same station on the same day, only the highest EtO concentration is shown on the line graph. A solid circle indicates EtO was detected, and an empty circle indicates that EtO was not detected (detection limit = 0.072 ug/m³).



# Background levels of EtO

- ATSDR has reviewed historical and current measurements of EtO in ambient air at various locations without a known EtO source.
- Data review included a large number of air samples collected on East Coast states (Rhode Island, Massachusetts, New Hampshire); Central states (IL, MI, CO); and West Coast (California).
- The results showed that median EtO concentrations generally range from **0.1-0.3 ug/m<sup>3</sup>**.
- The sources of these “background levels” are not well understood, but EtO is man-made and may be detected long distances from where it is emitted.

# ATSDR's work in the Lake County, IL Community

- At this time, ATSDR is reviewing the initial EtO monitoring data collected in Lake County in June/early July to evaluate potential health risks.
- ATSDR will also be reviewing the 2<sup>nd</sup> phase of air monitoring data, which will begin in October.
- Data review will be summarized in a public health consultation document, with conclusions about potential health hazards and health-protective recommendations for further actions, as appropriate.

# Key points about the interpretation of initial Lake County EtO data

- Existing data show the presence of EtO over a snapshot in time, but more data are needed to characterize potential health risks to nearby residents off-site workers.
- Results of initial EtO air monitoring data at the Lake County locations are well below concentrations that cause immediate health effects in scientific studies.
- Short-term air sampling has limited value in understanding long-term exposures.
- Evaluation of long-term exposure is not based on individual daily measurements, but on **exposure data over months and years.**
- National EtO air monitoring data suggest the presence of background EtO concentrations present in ambient air, even in the absence of local EtO sources.

# Resources for Additional Information

- Lake County Health Department

<https://www.lakecountyil.gov/4158/Ethylene-Oxide-in-Lake-County>

- USEPA

<https://www.epa.gov/hazardous-air-pollutants-ethylene-oxide>

<https://www.epa.gov/il/sterigenics-willowbrook-facility-frequent-questions>

- Illinois EPA

<https://www2.illinois.gov/epa/topics/community-relations/sites/ethylene-oxide/Pages/default.aspx>

- ATSDR

<https://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=734&tid=133>

# Questions?

For more information, contact NCEH/ATSDR  
1-800-CDC-INFO (232-4636)

TTY: 1-888-232-6348      [www.atsdr.cdc.gov](http://www.atsdr.cdc.gov)      [www.cdc.gov](http://www.cdc.gov)

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