

# Use of Ambient Air Monitoring Data in Health Consultations by the Agency for Toxic Substances and Disease Registry (ATSDR) and State/Local Health Agencies

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# Topics

- What is ATSDR?
- Our health consultation process
- Working with air data
- Air project examples



# ATSDR's mission and goals

- Mission: to protect communities from harmful health effects related to exposure to natural and human-made hazardous substances
- ATSDR's goals are to:
  - Evaluate human health risks from toxic sites and recommend timely, responsive public health actions
  - Determine the relationship between exposure to toxic substances and disease
  - Develop and provide reliable, understandable information for affected communities and tribes and for other stakeholders
  - Build and enhance effective partnerships with federal agencies, states, localities, tribes, academic institutions, community members, and other stakeholders

# ATSDR's mandate

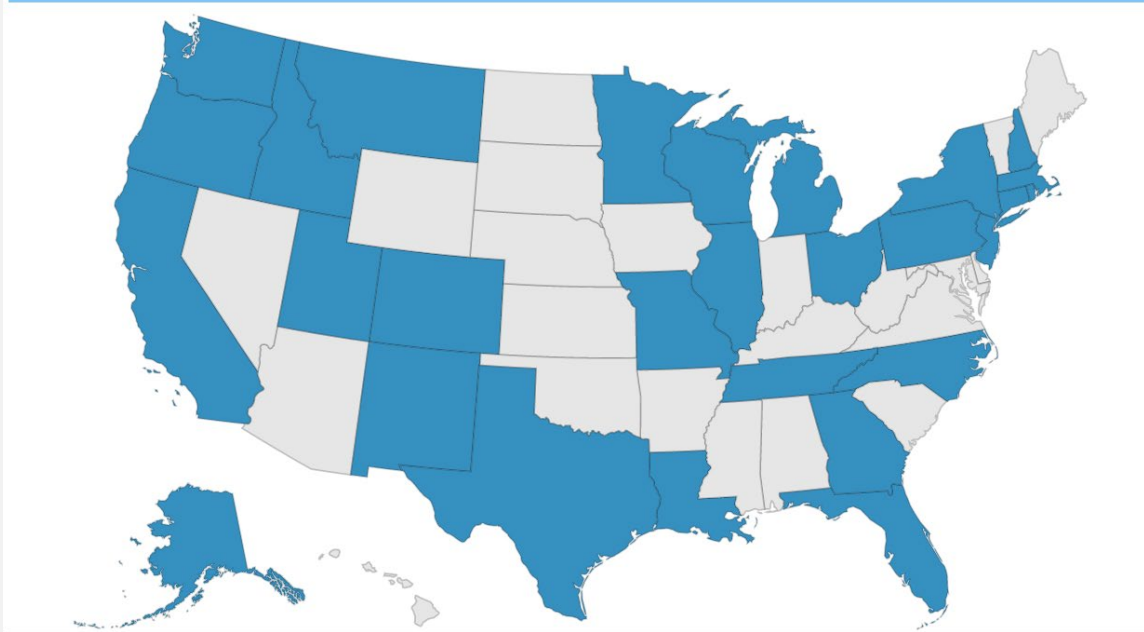
- Congress established ATSDR in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as the Superfund law
- CERCLA requires ATSDR to assess the presence and nature of health hazards to communities living near Superfund sites, help prevent or reduce harmful exposures, and expand the knowledge base about the health effects that result from exposure to hazardous substances
- The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to manage hazardous waste facilities. In 1984, amendments to RCRA authorized ATSDR to conduct public health assessment activities at these sites when requested by EPA, states, tribes, or individuals

# Petitioning ATSDR

- A petition is a written request asking ATSDR to investigate specific environmental health concerns in a community
- Who can submit a petition?
  - Community members, including residents, community groups, attorneys, medical providers, and regional or national activists
  - Elected officials at the local, state, or national level
  - Tribes

# ATSDR's Cooperative Agreement Program

28 Funded States



Twenty-eight states use Cooperative Agreement Program funding to build their ability to evaluate and respond to environmental public health issues. This program is called ATSDR's Partnership to Promote Localized Efforts to Reduce Environmental Exposure (APPLETREE).

# ATSDR public health assessment (PHA) and health consultation (HC) process

- ATSDR conducts PHAs and HCs to respond to a health question or concern about a potential environmental hazard
- The objective is to determine if exposure to a hazardous substance has or could occur, whether it is harmful, and if the exposure should be stopped or reduced
- Health-protective recommendations are made to prevent harmful exposures or to collect information to fill data gaps

# PHA process basic components



## Triggers

- Petition
- National Priorities Listing
- Other Agency Request

## Data and Information

- Sampling Data
- Exposure Data
- Health Effects Data
- Community Data

## Scientific Evaluations

- Exposure Pathways (Exposure Units\*)
- Screening
- EPCs and Exposure Calculations
- In-Depth Toxicological Effects

## Products

- Public Health Assessment
- Health Consultation
- Letter Health Consultation
- Exposure Investigation-Health Consultation
- Health Advisory
- Technical Assist

## Outcomes

- Follow-Up Health Actions
- Technical Assistance to Other Agencies

\*Based on site-specific information, health assessors may define an exposure unit (if appropriate) before or after the screening analysis. Health assessors will use professional judgement to determine when to define exposure units; however, they must define them before determining EPCs.



# Screening air data

- We compare maximum concentrations or appropriate time-weighted averages with ATSDR health-based comparison values (CVs) as a first step to identify contaminants that require further evaluation
- Chronic cancer risk CV
  - ATSDR cancer risk evaluation guides (CREG), derived from EPA's inhalation unit risk (IUR)
- Non-cancer CVs
  - chronic (1 year or longer) exposure: ATSDR chronic minimal risk level ( $MRL_c$ ) or EPA reference concentration (RfC)
  - intermediate (14-365 days) exposure:  $MRL_i$
  - acute (1-14 days) exposure:  $MRL_a$

# Identifying exposure point concentrations (EPCs)

- The EPC is the 95 percent upper confidence limit (95% UCL) on the mean concentration. This is the representative level to which people are exposed for acute, intermediate, or chronic durations.
- Health assessors compare the EPC to inhalation CVs. If exceeded, we conduct a health effects evaluation by comparing site-specific EPCs (based on exposure factor adjustments for central tendency exposure (CTE) and reasonable maximum exposure (RME) scenarios) to health guidelines.
- If a carcinogen exceeds its CV, we calculate lifetime excess cancer risk using the site-specific adjusted chronic EPC (i.e., reasonable maximum exposure, 33 years, and, if appropriate, age-dependent adjustment factors (ADAFs)) and the EPA IUR.

# How ATSDR evaluates criteria pollutants

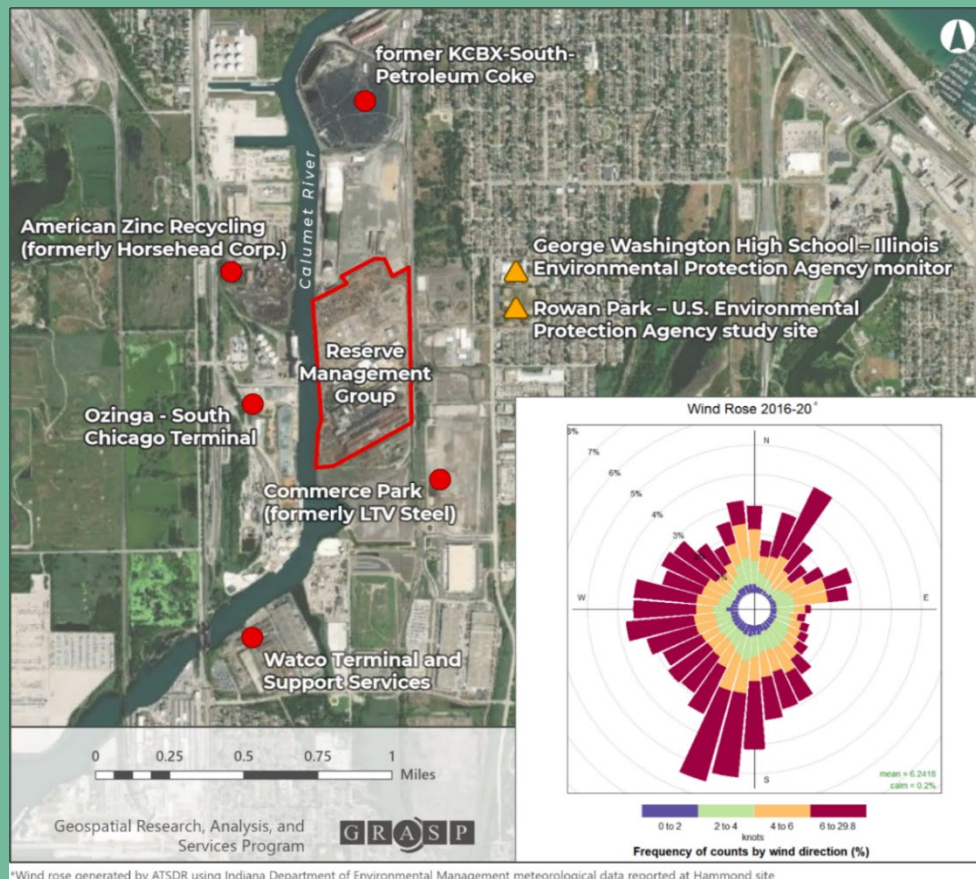
- ATSDR does not have CVs for lead, ozone, nitrogen dioxide, and carbon monoxide. We apply EPA's National Ambient Air Quality Standard (NAAQS).
- For sulfur dioxide, we screen on EPA's 1-hr NAAQS (75 ppb) and our acute MRL (10 ppb).
- For particulate matter (PM) we screen on World Health Organization's Air Quality Guidelines (AQGs). For in-depth analysis, i.e., to determine whether there is a health hazard, we calculate the frequency (percent of days) in each of EPA's Air Quality Index (AQI) categories and consider other factors such as the sensitivity of exposed individuals, dataset size, and spatial and meteorological factors.

**Table 1. ATSDR PM Screening Values**

| World Health Organization Particulate Matter Air Quality Guidelines (AQGs)* |  |          |
|---|--|----------|
| PM Air Pollutant Metric   | WHO  | ATSDR CV |
| PM <sub>10</sub>  | 45 µg/m <sup>3</sup> (24-hour) <sup>a</sup><br>15 µg/m <sup>3</sup> (annual) | NA       |
| PM <sub>2.5</sub>   | 15 µg/m <sup>3</sup> (24-hour) <sup>a</sup><br>5 µg/m <sup>3</sup> (annual)  | NA       |

# Example #1: Reserve Management Group (RMG), Chicago, IL

- Federal officials from IL petitioned ATSDR to investigate whether facilities at RMG are releasing contaminants into outdoor air and potentially harming people's health
- Community members were concerned that another recycler, General Iron, intended to relocate its operations to RMG



\*Wind rose generated by ATSDR using Indiana Department of Environmental Management meteorological data reported at Hammond site

# RMG: what ATSDR evaluated



ATSDR photo of Washington High School air monitoring station

ATSDR evaluated community-based air monitoring data to identify possible exposure to contaminants from past and current recycling activities at RMG and other industrial and commercial sources within 1 mile of the site

- 1969 to 2020, particulate matter (PM) and metals air monitoring data collected at Washington High School
- 2015 continuous metals data collected at Rowan Park

# RMG findings: conclusion 1

- Based on recent air monitoring data (2016-2020), breathing particles smaller than 10 microns ( $PM_{10}$ ) and particles smaller than 2.5 microns ( $PM_{2.5}$ ) could cause symptoms to be worse in highly sensitive people with pre-existing lung and heart conditions
- On approximately 10 percent of days, when the AQI is in the moderate category, exposure risk is greater for people with pre-existing health conditions who live downwind from RMG and other industrial and commercial sites
- People without pre-existing lung and heart health conditions living near the RMG facility, are not expected to be harmed by breathing the particulate matter in the air

## RMG findings: conclusion 2

- People living downwind of RMG (now or in the past) are not likely to develop health problems from breathing metals in the air, based on recent air monitoring (2016-2020) and historic data (1982-2015)
  - The metals we looked at include arsenic, cadmium, chromium, lead, manganese, and nickel
  - People are not likely to experience an increased risk of cancer or other health problems from breathing the metals

# RMG: ATSDR recommendations

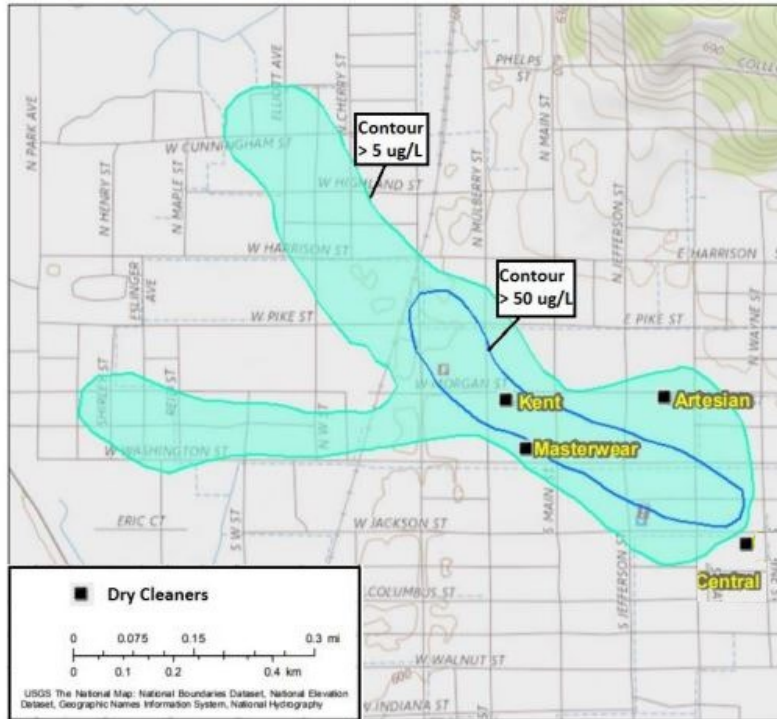
1. To protect their health, highly sensitive persons with pre-existing conditions should
  - Access the EPA AirNow air quality website every day at [www.airnow.gov](http://www.airnow.gov) to determine the current quality of outdoor air
  - Avoid strenuous outdoor work or play for long periods on days when the air quality index is in the moderate category
2. EPA, the Illinois EPA, and the City of Chicago are encouraged to identify opportunities to reduce local PM and metals releases. ATSDR recommends additional air monitoring for PM and metals.



## RMG: ATSDR recommendations (continued)

3. ATSDR recommends that regulators assess the VOCs and hexavalent chromium released from local industries and consider air monitoring for these contaminants
4. ATSDR recommends regulatory agencies conduct surface soil sampling in areas downwind of RMG
5. ATSDR will provide federal and local health partners with resources to address community stress related to concerns about environmental contamination (see our Community Stress Resource Center site: [www.atsdr.cdc.gov/stress/index.html](http://www.atsdr.cdc.gov/stress/index.html))

**Figure 3. Approximate Outline of Tetrachloroethylene Groundwater Plume and Dry Cleaner Locations**



1. Data source: Environmental Protection Agency (EPA). Draft Remedial Investigation Report – Pike and Mulberry Streets PCE Plume Site. June 2017

## Example #2: Pike & Mulberry Streets site, Martinsville, IN

- The city discovered in 2002 that one of its drinking water wells was contaminated with tetrachloroethylene (PCE) and trichloroethylene (TCE) from an industrial dry-cleaning facility.
- EPA added the site to its National Priority List (NPL) in 2013. ATSDR was required to investigate whether exposures to PCE and TCE could be harming people's health.
- PCE and TCE were migrating into indoor air through the process of vapor intrusion.

# Pike and Mulberry: ATSDR methods

- We compiled indoor air data collected by EPA. The EPC was the highest concentrations for each contaminant at sampled properties. We found 23 residences and 11 commercial properties with indoor concentrations of PCE and/or TCE higher than health screening levels.
- We evaluated non-cancer risk by comparing EPCs to health guidelines in PCE and TCE studies, as documented in ATSDR toxicological profiles.
- To calculate residential cancer risk, we multiplied the EPC by the IUR for PCE and three organ-specific IURs with early-life adjustments for TCE to predict the number of excess cancer cases per million people over a lifetime of exposure.

# Pike and Mulberry: ATSDR findings

- We evaluated PCE based on an occupational epidemiology study which found a lowest observable adverse effects level (LOAEL) of 11,544  $\mu\text{g}/\text{m}^3$ . The highest air EPC (239  $\mu\text{g}/\text{m}^3$ ) was two orders of magnitude lower than the LOAEL. ATSDR does not expect that health effects would occur at this level.
- We evaluated TCE based on a rat study that found fetal heart defects at a human equivalent concentration (HEC) LOAEL of 21  $\mu\text{g}/\text{m}^3$ . One home in Martinsville had an EPC of 16  $\mu\text{g}/\text{m}^3$ , approaching the level that could result in harmful effects to the fetus if a pregnant women were exposed.
- The sum of PCE and TCE lifetime excess cancer risks at the home with the highest exposures was 38 per million. ATSDR does not consider this a concern for cancer.

# Pike and Mulberry: conclusion and recommendations

- **Conclusion:** for some homes and businesses, people's health may be harmed by breathing TCE that has evaporated into their indoor air from the Pike and Mulberry Streets NPL site
- **Recommendations:**
  - EPA install vapor mitigation systems in homes and businesses where vapor intrusion could harm people's health
  - EPA again offer air sampling to untested homes and businesses that are above or near the groundwater plume
  - EPA develop a long-term monitoring plan to check for vapor intrusion in properties that have high levels of solvents in soil vapor and future potential for vapors to migrate indoors

# Questions?

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