

# Mapping emissions and proposed fence line monitoring requirements for synthetic chemical manufacturing and polymer and resin industries

TRI National Conference: Identifying environmental justice issues

Speaker: Lauren Padilla, VoLo Senior Environmental Data Scientist<sup>1</sup>

Co-authors: Libby Mohr<sup>1</sup>, Dan Peters<sup>1</sup>, Lexi Ambrogi<sup>1</sup>

<sup>1</sup>Environmental Defense Fund

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# EPA's proposal to reduce toxic air pollution from synthetic organic chemical manufacturing and polymers and resins industries

- Issued April 6, 2023
- Clean Air Act requires review of the National Emission Standards for Hazardous Air Pollutants (NESHAP) every 8 years
- Proposed revisions to six NESHAP a.k.a. air toxics rules
  - The Hazardous Organic NESHAP (HON) – 4 rules
  - Polymer and resin groups I & II – 2 rules
- Affected facilities produce one or more listed chemicals via processes that use or produce a listed organic HAP or produce certain polymers and resins
- Final rule deadline March 29, 2024

## Environmental justice impact

- EPA analysis found that people who are Black, and people living in poverty, have a disproportionate share of current elevated air toxics related cancer risks.
- EPA anticipates that, when implemented, the proposal will reduce disproportionate harm to communities in the neighborhoods surrounding HON facilities, often low-income communities and Black or Latino communities that have been historically overburdened by pollution.

## Fenceline monitoring work practice standard

- Key to the HON proposal's effectiveness is a new set of work practice standards requiring plants to conduct monitoring around the perimeter of a facility using, producing, storing, or emitting any of six priority air toxics
  - ethylene oxide, chloroprene, 1,3-butadiene, benzene, ethylene dichloride, and vinyl chloride
- and take corrective action should concentrations exceed set thresholds.
- EPA identified 128 facilities that it anticipates will be subject to the proposed fenceline monitoring requirements.

# How can we identify a more complete list of facilities for fenceline monitoring?

- Are there more facilities handling the priority chemicals than initially identified by EPA?
- What facilities are handling other high-risk and widely-emitted pollutants?



# Using TRI and TX data to identify facilities emitting EPA priority chemicals

- TRI facility-wide emissions from multiple years (2016-2020)
- Systematic identification of 28 more facilities than initially listed in EPA HON proposal



# Using TRI and TX data to identify additional high-risk pollutants and facilities for fence-line monitoring

- TRI-reported pollutants emitted by remaining facilities with greatest cancer and non-cancer toxicity-weighted total emissions
- Top TX STEERS state-level upset emissions (2018-2022)
- → 5 more pollutants, 200 high risk facilities including P&R II facilities



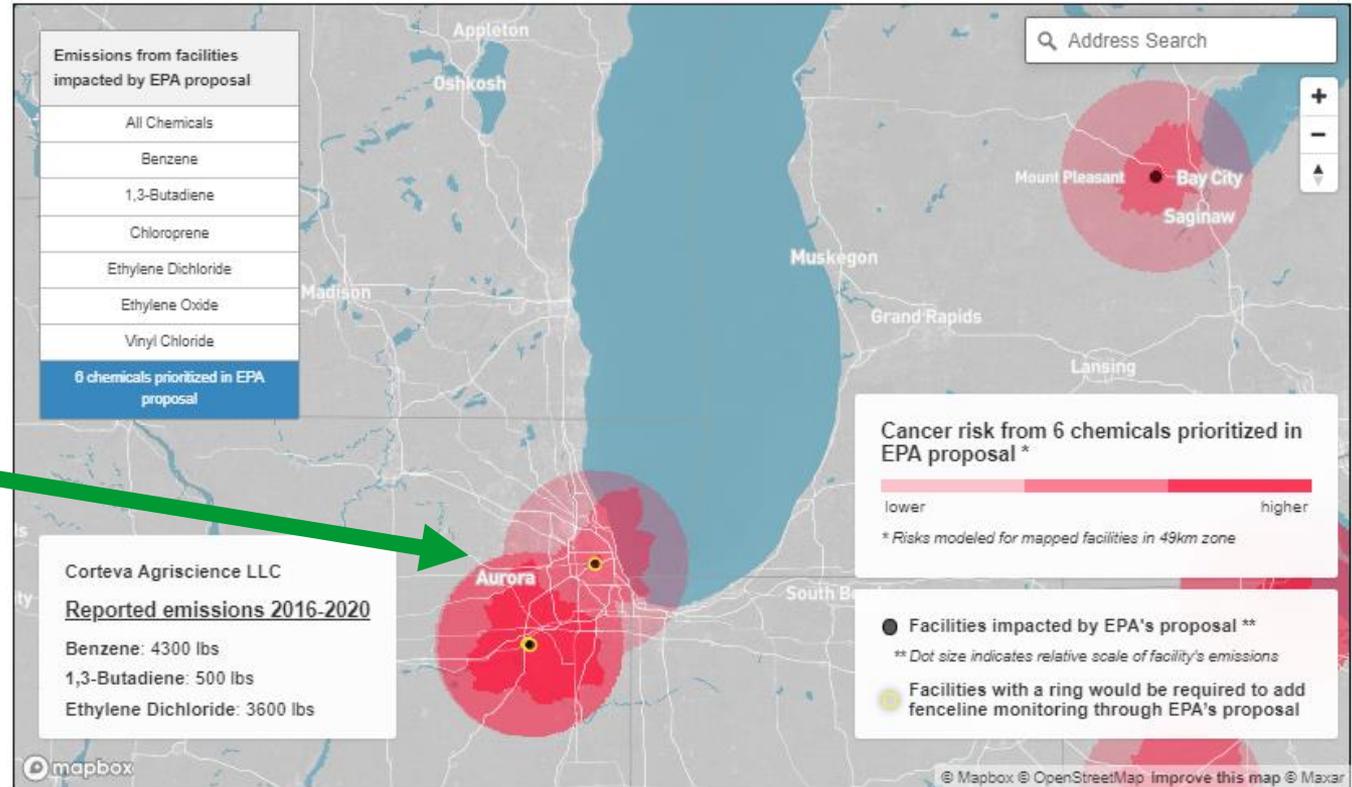
# Additional candidate pollutants for monitoring

\*(compared to proposed)

Pollutant	Additional facilities*	Total unique facilities	Rationale
EPA proposed (1,3-butadiene, benzene, chloroprene, 1,2-dichloroethane, ethylene oxide, vinyl chloride)	N/A	128	EPA identified priority for cancer risk
Proposed constituents, per robust TRI review	28	157	EPA priority carcinogens
Formaldehyde (including ethylene and propylene precursors)	48	184	Top 10 cancer, top 15 non-cancer health risk Top 10 precursor upset emissions (ethylene 4 <sup>th</sup> , propylene 7 <sup>th</sup> )
Methanol	59	197	Top 40 upset emissions
Toluene, Ethylbenzene, Xylenes	41	200	Top 40 upset emissions, remaining BTEX suite

Some HON facilities still not covered because not reporting to TRI or not sources of selected pollutants. NEI or other sources should be considered to evaluate these.

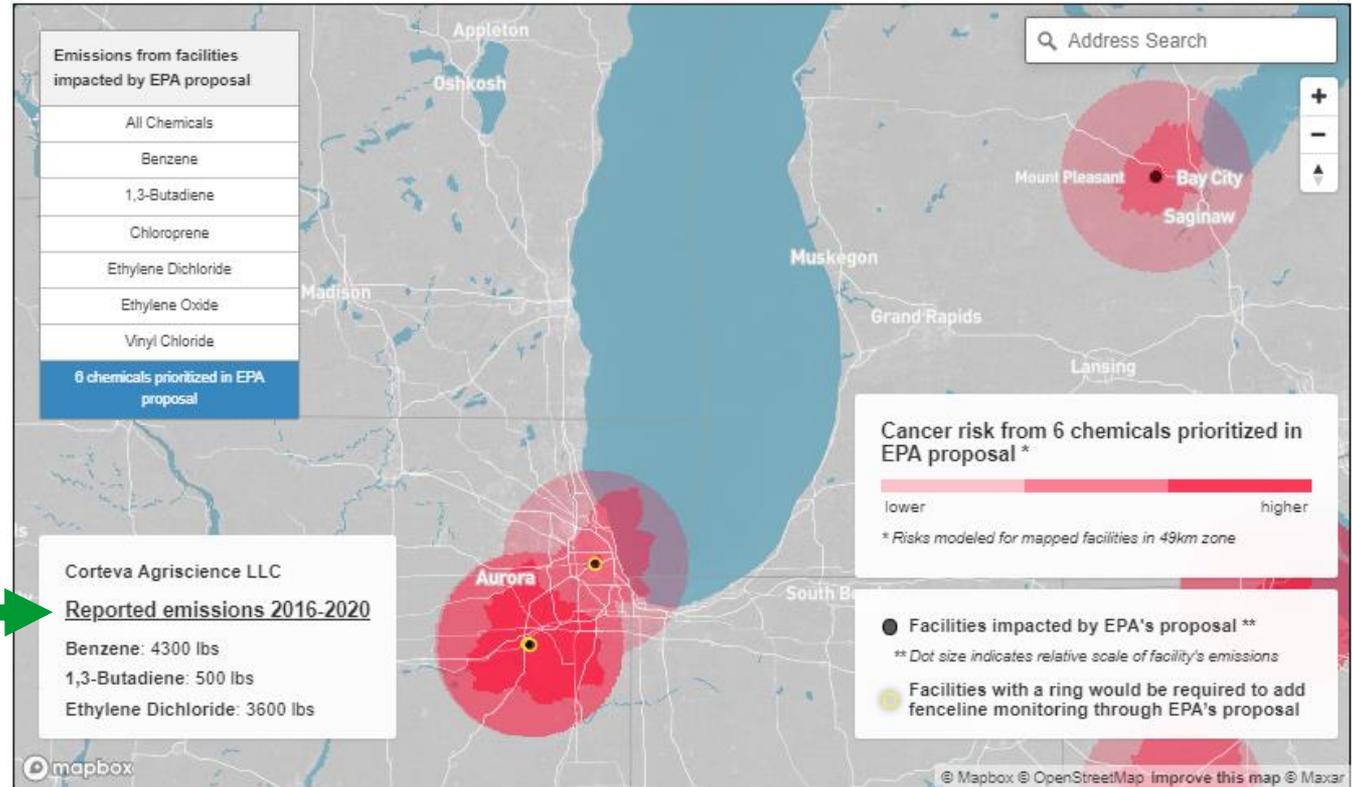
# Interactive public map



Facilities identified in the proposal that would likely require fenceline monitoring

<https://www.clearcollab.org/proposal-map/>

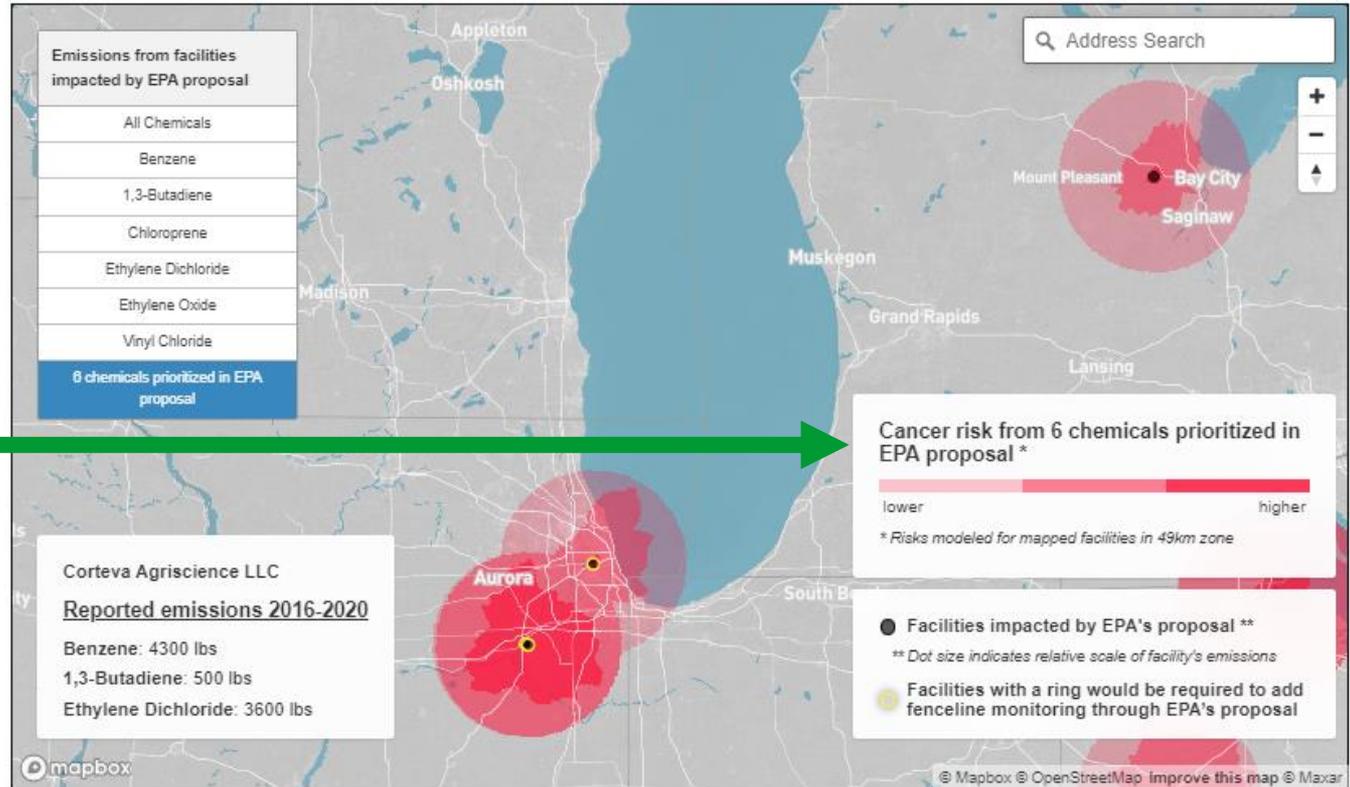
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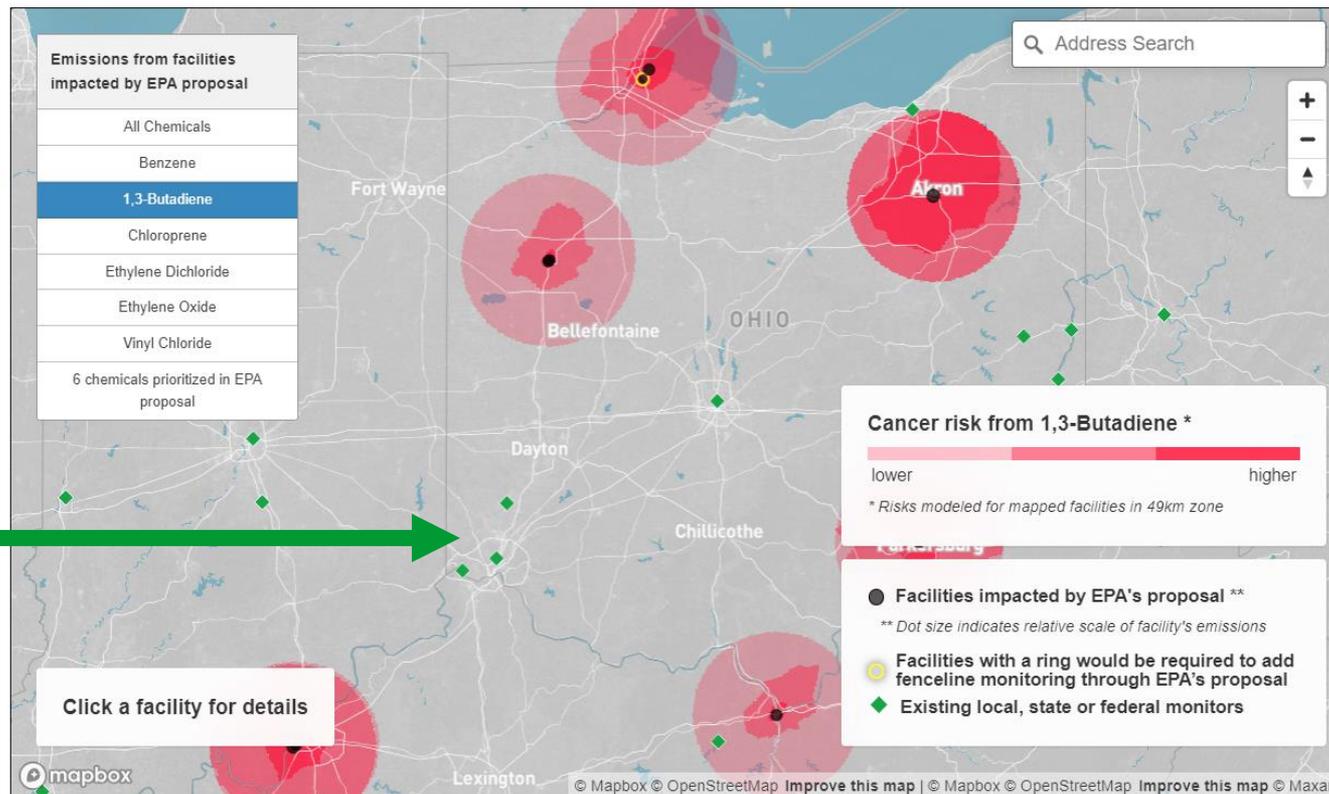
# Interactive public map

RSEI modeled cancer risk



<https://www.clearcollab.org/proposal-map/>

# Interactive public map



locations of existing air toxics monitors

<https://www.clearcollab.org/proposal-map/>

# Community awareness

- Shared with community organizations, and media across the country → increased awareness of toxic chemical releases and new health protections on the horizon
- Targeted to Texas/Louisiana zip codes with concentration of petrochemical facilities → 1.8 million people reached
- 15,000 map clicks and 4,800 public comments submitted to EPA calling for strongest possible version of final rules



Benzene. Butadiene. These cancer-causing chemicals are among the 6 a proposed @EPA rule would limit from facilities on the Gulf Coast, from Corpus to Lake Charles. This @CLEAR\_Collab map shows the facilities — and the communities — the rule would impact.

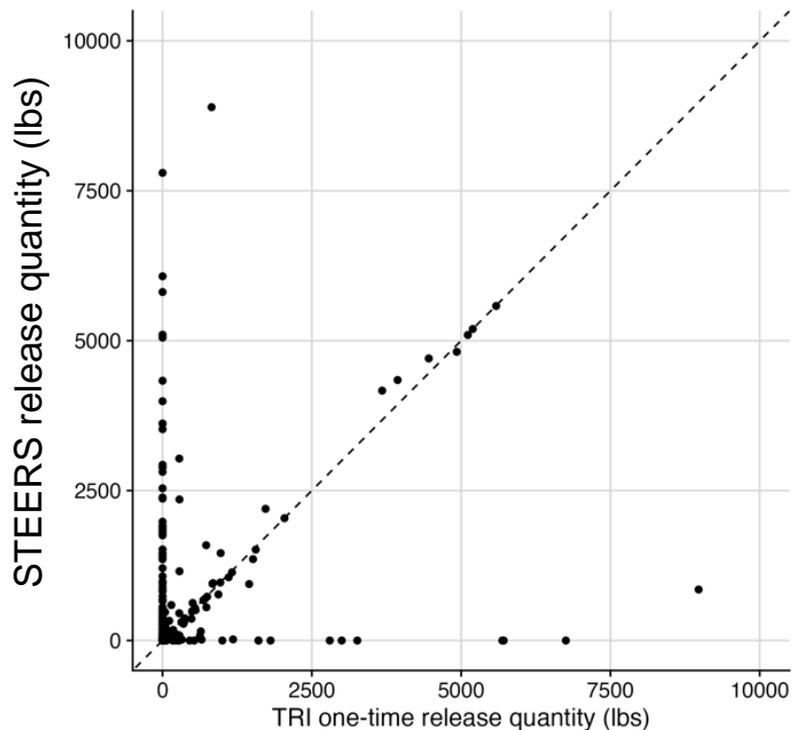


[clearcollab.org](http://clearcollab.org)

EPA petrochemical proposal map

EPA has proposed crucial protections against toxic air pollution from petrochemical facilities - see which 218 facilities are expected to be impacte...

## Lessons learned: One-time emissions



- Inconsistencies between state and national inventories, STEERs often not included in TRI one-time.
- Higher resolution data and reporting system like that in TX would be informative in other states.
- Reconciling differences would improve both datasets.

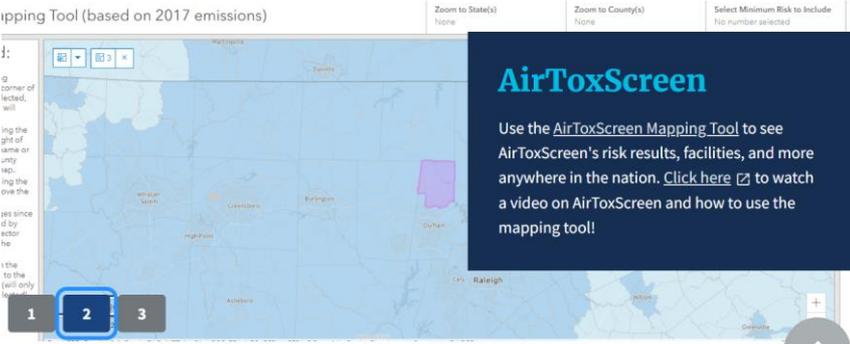
# Lessons learned: Bias in risk assessment

- How does modeled exposure based on TRI (Airtoxscreen + RSEI) compare to air toxics measurements in the Ambient Monitoring Archive?

## Air Toxics Screening Assessment

Mapping Tool (based on 2017 emissions)

Zoom to State(s) None Zoom to County(s) None Select Minimum Risk to Include No number selected



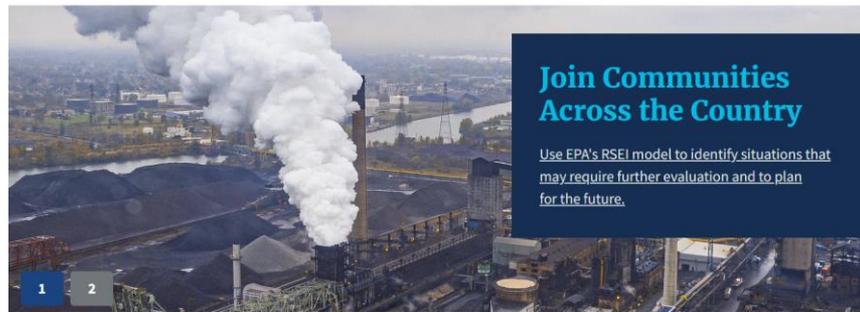
**AirToxScreen**

Use the [AirToxScreen Mapping Tool](#) to see AirToxScreen's risk results, facilities, and more anywhere in the nation. [Click here](#) to watch a video on AirToxScreen and how to use the mapping tool!

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## Risk-Screening Environmental Indicators (RSEI) Model



**Join Communities Across the Country**

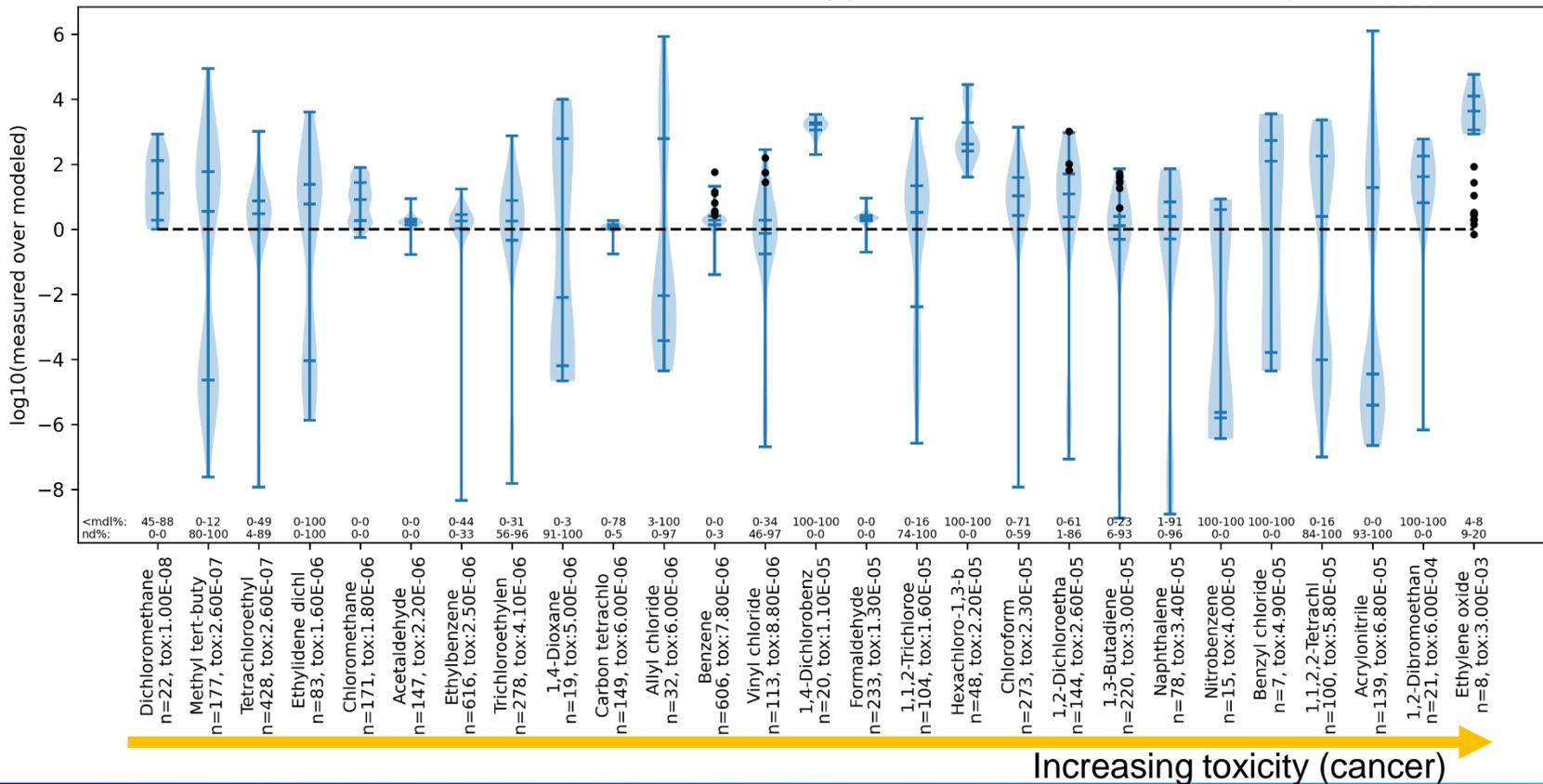
Use EPA's RSEI model to identify situations that may require further evaluation and to plan for the future.

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# Measured ↔ modeled concentration ratios

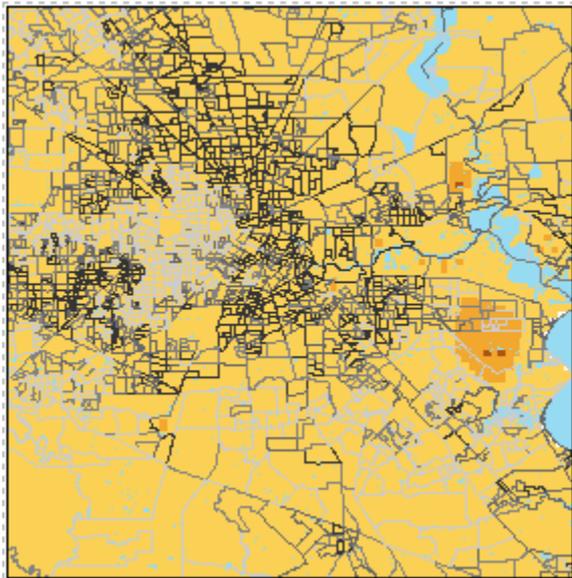
Bias factor by pollutant

● EPA comparisons at HON facilities  
EPA-HQ-OAR-2022-0730-0091 Tables 2-7



# Modeled risk and bias – equity implications

unadjusted



Excess lifetime cancer risk (25 chemicals)

- < 1 in 100,000
- < 1 in 10,000
- < 1 in 1,000
- < 1 in 100

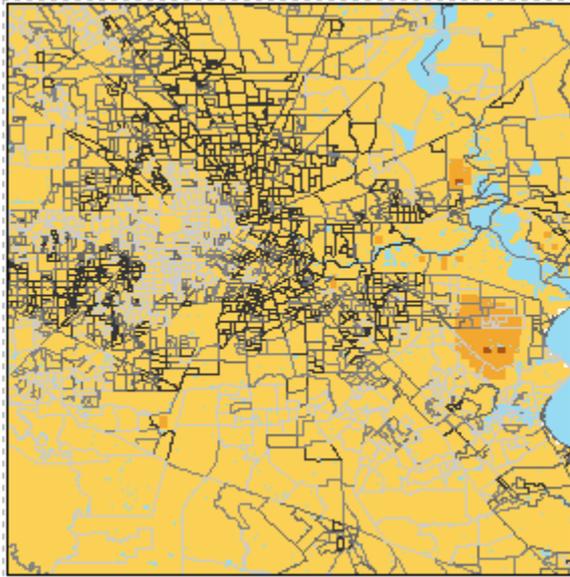
Percent low-income\*

- < 18% (q1)
- < 35% (q2)
- < 53% (q3)
- < 100% (q4)

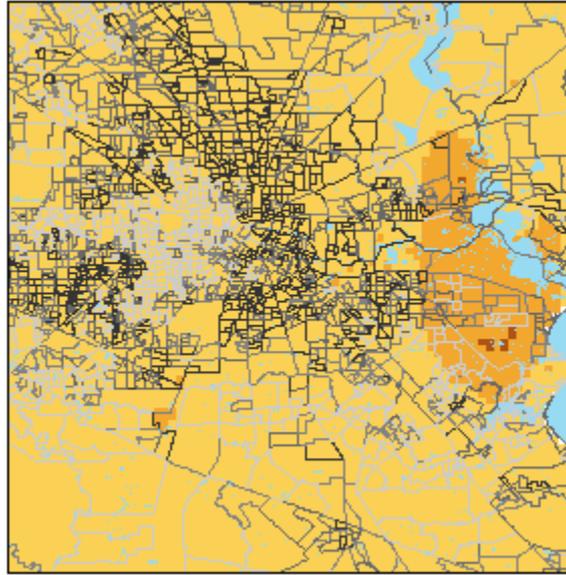
\*Percent of individuals whose ratio of household income to poverty level in the past 12 months was less than 2 (as a fraction of individuals for whom ratio was determined).  
i.e. in 2023 < \$29,160 for individuals, < \$60,000 family of 4  
<https://www.healthcare.gov/glossary/federal-poverty-level-fpl/>

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25<sup>th</sup> percentile bias adjusted



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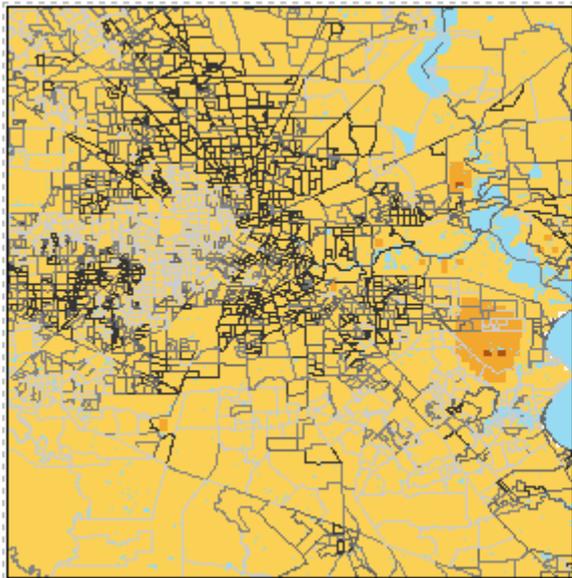
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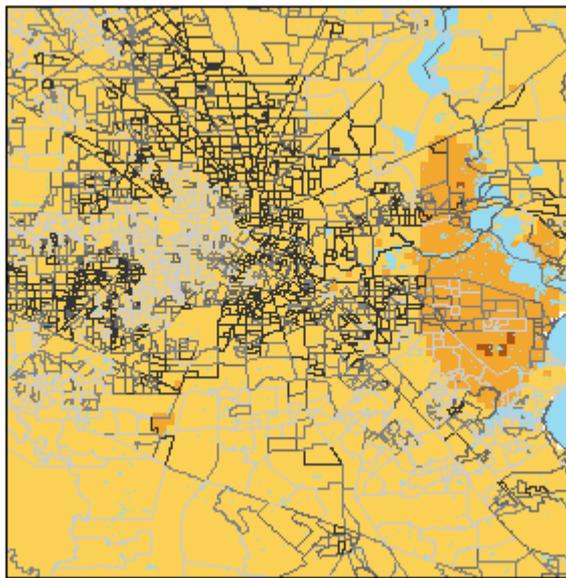
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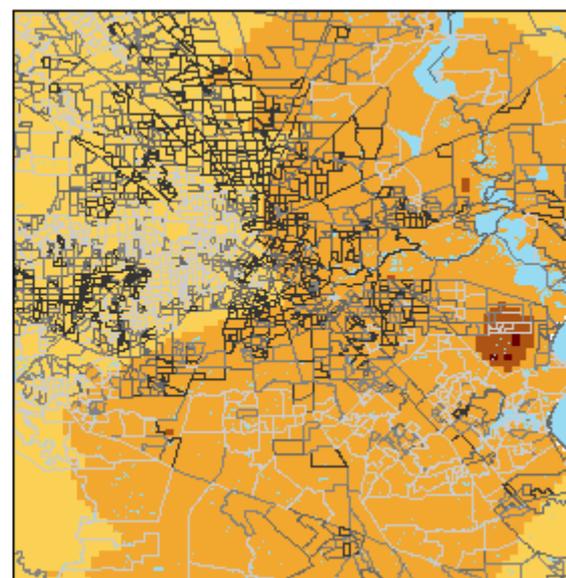
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25<sup>th</sup> percentile bias adjusted



median bias adjusted



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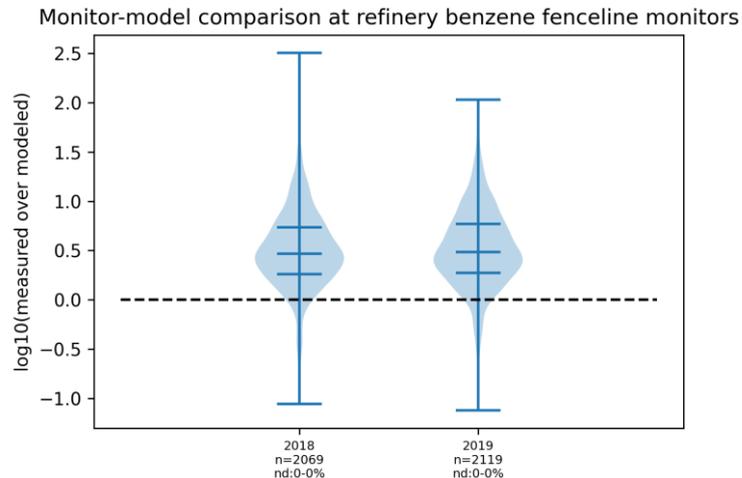
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## Concluding remarks

- TRI database enabled analysis of high-risk facilities and increased awareness of new rules.
- Inventory useful as a lower bound and relative metric for emissions.
- Screening-level model concentrations based on emission estimates largely underestimated measurements by orders of magnitude.
  - Even with large uncertainty factors applied to health effect metrics, not clear whether overall health risk estimate still conservative.

# Opportunities

- Reconciling differences in state and national accounting of one-time/upset emissions would improve inventories.
- Measurements from current and future fenceline monitoring programs could inform emission reporting to TRI and improve accuracy of inventory and related risk assessments.



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Conflict of Interest Disclosure

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## Contact

[lpadilla@edf.org](mailto:lpadilla@edf.org)