

Air Toxics at School

Technical Notes

PERI's Air Toxics at School estimates the comparative individual chronic health risk from industrial toxic air pollution at each K-12 and higher education institution in the United States. The air pollution analyzed comes from large fixed sources, such as factories, petroleum depots, metal mining, and toxic storage and disposal facilities -- not from mobile sources, roads, ports, airports, agriculture, fracking, forest fires or other sources that can be major contributors to health risk from air pollution.

School Data

Names, locations, and demographic data of schools in the US were taken from 3 databases maintained by the National Center for Education Statistics (US Department of Education):

- Private School Universe Survey (PSS) 2021-2022 data for private schools (the latest available)
- Common Core of Data (CCD) 2022-2023 school year data for public schools including locations from the EDGE Geodata project
- Integrated Postsecondary Education Data System (IPEDS) 2022-2023 school year data for postsecondary schools including locations from the EDGE Geodata project

The latitude/longitude for each school was matched to the US EPA pollution data described below to estimate comparative toxic air pollution outdoors at the school site.

Toxic Air Pollution Data: TRI and RSEI

The Toxics Release Inventory (TRI), compiled by the U.S. Environmental Protection Agency (EPA) in accordance with the Emergency Planning and Community Right-to-Know Act of 1986, annually reports the weight (in pounds) of each of approximately 600 toxic chemicals released into the environment by major industrial facilities in the United States. Facility names are linked to EPA's Envirofacts Toxic Release Inventory display for that facility.

Our analysis uses 2022 releases of toxic chemicals into air nationwide. We combine fugitive and stack releases. We also include post-incineration releases.

The EPA Office of Pollution Prevention and Toxics processes the raw TRI reports to create the [Risk Screening Environmental Indicators](#) (U.S. EPA RSEI version 2.3.12). RSEI provides an integrated assessment of the human health risks posed by toxic releases, incorporating:

- *fate and transport*, or how the chemical spreads from the point of release to the surrounding area;
- *toxicity*, or how dangerous the chemical is on a per-pound basis

Each release begins at a smokestack, leaking valve, open canister, or other source within the facility or at the stack of an off-site incineration facility. For incinerator releases, the model estimates the fraction of the chemical that escapes incineration. Using the AERMOD fate-and-transport model, EPA combines data on local wind patterns, temperature, and topography with information on the smokestack height and the exit velocity of released gasses and information about each chemical (molecular weight and rate of decay in sunlight and air) to estimate the concentrations of releases in each 810 m by 810 m grid cell within 50 km around every releasing facility. These grid-cell concentration estimates are the basis of the Air Toxics at School reporting.

The Corporate Toxics Information Project of the Political Economy Research Institute at UMass Amherst updates the TRI data so that they represent the most current available about the reporting year, in case companies revise earlier TRI reporting. In the case of downward revisions of the mass released, RSEI scores are adjusted on the assumption of a linear relation between pounds released and that release's RSEI score. Upward revisions or new reports are noted but do not engender adjustments of the RSEI score.

EPA matches each chemical to a toxicity weight that expresses the relative toxicity of the chemical per pound or per unit of concentration. Although all TRI chemicals are hazardous, their toxicities vary

greatly. At the extremes, just one pound of dioxin is equivalent, in terms of inhalation toxicity, to 20 billion pounds of the chemical chlorodifluoromethane (HCFC-22). The enormous variation in toxicity limits the usefulness of comparisons on the basis of the simple mass (pounds) of chemicals released. By multiplying the quantity of each toxic release by its toxicity weight, EPA can compare the toxic significance of releases of different chemicals.

The EPA's toxicity-weighting system is based on peer-reviewed toxicity databases including the EPA's Integrated Risk Information System (IRIS), the EPA's Office of Pesticide Programs (OPP) Reference Dose Tracking Reports, the U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry (ATSDR), the California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard and Assessment (OEHHA), and the EPA's Health Effects Assessment Tables (HEAST). For some of the chemicals listed in the TRI, no consensus has been reached regarding the appropriate toxicity weight, and these chemicals, (constituting 1 percent of the mass of 2018 TRI releases) are excluded from the analysis. [Further details on the toxicity weights are available from the EPA.](#)

Chemical names are linked to New Jersey Right-To-Know Hazardous Substance Fact Sheets on chemical health effects. Although focused on workplace exposure, the Fact Sheets are useful because they cover the Toxic Release Inventory chemicals and provide plain-language descriptions of the chemicals and associated health risks.

PERI's Air Toxics at School project reports toxicity-weighted concentrations to characterize individual chronic human health risk from industrial toxic air pollutants at the school location.

Parent Companies

The Air Toxics at School application presents a parent company for each polluting facility. Using information on company ownership of facilities from the TRI reports, company websites, and news reports, we matched each facility to its parent company. Parent companies are updated according to information on mergers, acquisitions, and corporate name changes (through mid 2024), under the principle that when one company acquires another, it takes responsibility for that company's past pollution. We also combined U.S. subsidiaries with a common foreign parent company. Parent company names are linked to PERI's 2022 Toxic 100 Air Polluters application, which shows a detailed display of all the TRI-reporting facilities owned by the company, all TRI chemicals released, and environmental justice indicators for toxic air pollution from the company's facilities.

Note on ranking and percentiles

Air Toxics at School uses a percentile system in which 1% indicates the schools with the highest RSEI toxicity-weighted concentrations indicating the greatest potential exposure to air toxins from these sources. Its ranking system used to be a "dense ranking" system in previous versions where each successive rank number increased by 1; Air Toxics at School has switched to a "standard competition ranking" system where each rank number is 1 plus the number of schools that have higher RSEI toxicity-weighted concentrations.