

Toxic 100 Water Polluters Technical Notes

TRI and RSEI Data

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. Our analysis uses reporting year 2021 releases of toxic chemicals into surface water nationwide. We combine direct surface water releases and transfers to sewage treatment.

The EPA has developed [Risk Screening Environmental Indicators \(RSEI\)](#) to make the TRI reports more useful to the public. The EPA provides additional information to assess the potential chronic human health hazard posed by toxic releases. As a reliable characterization of the potential impact of water-borne industrial toxics, we use the US EPA RSEI Hazard, which consists of the oral toxicity weight (a measure of how dangerous the chemical is on a per-pound basis) times the pounds released or transferred. Our analysis uses version 2.3.11 of RSEI.

Please note that prior to RSEI version 2.3.8, US EPA calculated RSEI Hazard for transfers to sewage treatment plants (POTWs) on the basis of estimated post-treatment releases, modeling removal by the POTW. EPA's revised method calculates RSEI Hazard using pre-treatment quantities to avoid release-modeling assumptions about treatment efficiency. This switch from post-treatment to pre-treatment quantities for transfers gives transfers to POTWs greater weight in the Toxic 100 RSEI Hazard totals.

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. For example, the toxicity weight for ingesting the chemical zinc is about 3 while the toxicity weight for ingesting mercury is 10,000. It is roughly 3,000 times more potentially harmful to ingest mercury as it is to ingest an equal quantity of zinc. The chemicals reported in the Toxics Release Inventory vary by ten orders of magnitude in their oral toxicity weights (from 0.02 for sulfuric acid to 1,400,000,000 for dioxin). The enormous variation in toxicity limits the usefulness of comparisons on the basis of the simple mass (pounds) of chemicals released. By multiplying the mass 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 those of 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 are excluded from the analysis. In the TRI data for the year 2018, chemicals with toxicity weights account for more than 97% of the reported pounds for all water releases. Further details on the toxicity weights are available from the EPA at <https://www.epa.gov/rsei/rsei-toxicity-data-and-calculations>.

For many chemicals in the TRI, the US EPA Risk Reduction Engineering Laboratory estimates the removal efficiency, or how successfully sewage treatment removes toxic chemicals from wastes that are transferred for treatment based on the technology used and the type of influent. Toxic chemicals that are not removed are released into surface water with other effluents post-treatment. However, these removal efficiencies are used in EPA's "score" calculations, not their hazard calculations, as of the most recent version of RSEI.

The product of the toxicity weight and the quantity released, including both direct releases and pre-treatment transfers, is called the RSEI Hazard and represents potential chronic human health hazard from water releases of the toxic chemicals. The extent of population risk also depends on other determinants of exposure, including dilution and sedimentation in waterways, fish consumption from and recreation in contaminated waters, the location of drinking-water intakes, and the effectiveness of drinking-water treatment in achieving safe levels for regulated contaminants, and the number of persons affected.

The data cover toxic releases from point-source industrial facilities reporting to TRI. Agricultural pollution, boating and shipping, runoff from streets and roads, and other important sources of water pollution are not included in the analysis. The data are additionally limited to TRI listed toxic chemicals.

The Corporate Toxics Information Project (CTIP) of the Political Economy Research Institute (PERI) at UMass Amherst adjusts the TRI data so that they represent the most current available information about the reporting year, in case companies revise earlier TRI reporting. In the case of downward revisions of pounds released, RSEI Hazards are adjusted based on the linear relation between pounds released and that release's

RSEI Hazard. Upward revisions or new reports are noted but do not engender adjustments of the RSEI Hazard. No revisions were made to the data for this version of the Toxic 100 Water.

Parent Company Matching

Using information on company ownership of facilities from the TRI reports, company websites, the CrocTail database of SEC filings, and news reports, we matched each facility to its parent company. Each facility was assigned either one or two parents as follows:

If more than 50% of a facility was controlled by a single parent, that parent was assumed to have final control over the facility's operations, and was assigned full responsibility for the facility's pollution.

If two companies each controlled 50% of a facility (i.e. it was a 50/50 joint venture), then its pollution was divided between the two companies.

If a single company controlled 50% of a facility and no other single entity controlled the other 50%, that company was considered to be the parent of the facility.

If no parent controlled 50% of a facility, the facility was considered to be its own parent.

We update parent companies according to all available data on mergers, acquisitions, and corporate name changes, under the principle that when one company acquires another, it takes responsibility for that company's past pollution. We also combine some U.S. subsidiaries of common foreign companies together.

We aggregate the RSEI Hazard for water releases of toxics by the facilities owned by each parent company, and ranked companies on this basis. Facilities that were owned 50%/50% by two companies had half of their hazard assigned to each parent.

The Toxic 100 Water application also shows data from individual facilities owned by each parent company and from chemicals at each. For each parent company, the percentage of the company's total score that is from a single facility is displayed in the Toxic 100 Water list to identify companies whose overall chronic human health hazard is dominated by a single source. Parent company information is current as of mid-2023.

Large Company lists

The Toxic 100 Water Polluters list reports the top polluters among the companies that appeared on any of the following lists of large US and foreign-owned corporations:

- Forbes Global 2000 for 2023
- Forbes America's Largest Private Companies, 2022 ranking
- Fortune 500 for 2023 (1000 companies)
- Fortune Global 500 for 2022
- S&P 500 as of 7/5/2023
- Russell 1000 as of 7/5/2023

Pollution data for the entire universe of companies that report toxic water emissions to EPA can be accessed via the searchable database that accompanies the Toxic 100 list.

Toxic 100 Water Environmental Justice

For this version of the Toxic 100 Water our analysis uses a new method of calculating Environmental Justice (EJ) ratios.

The US EPA Risk Screening Environmental Indicators geographic microdata for water estimates downstream concentrations of chemicals released from TRI facilities into surface water for each stream reach (a length of stream with no confluences) up to 200 km downstream of the point of release. Using the NHD Plus V2 National Hydrography Dataset and the US Census, CTIP matched each polluted stream reach to the populations of all abutting Census block groups. Weighting the population (or sub-population by race/ethnicity or poverty status) of each abutting block group by the toxicity value of the chemical and the maximum concentration in all abutting stream reaches produces a score for each block group abutting the polluted surface water. The sum of these scores for a given chemical release over all affected block groups provides an aggregate score. Scores for minority and near-poor populations can be expressed as a share of the score for the whole population. This version of the EJ ratios uses US Census demographic data for 2015-2019 in order to match the data used for Toxic 100 Air.