

Toxic Substances and Waste

Indicator Names

- *Toxic Release Inventory Sites, Count in Watershed (WS)*
- *Toxic Release and Exposure Potential in Watershed (WS)*

Indicator Category | **Stressor**

Subcategory | *Hazardous Waste & Wastewater*

Available in RPS Tool files for all lower 48 states

Indicator Description

Background

The US Environmental Protection Agency (EPA) maintains the *Toxics Release Inventory (TRI)* to track the management of certain toxic substances that may pose a significant threat to human health and the environment.¹ Facilities that report to TRI are typically larger and involved in manufacturing, metal mining, power generation, chemical manufacturing, and waste treatment.¹

To help users explore data on releases of toxic substances from industrial and federal facilities, EPA developed the *Risk-Screening Environmental Indicators (RSEI)* model using TRI information.² For each facility in the TRI, the RSEI model calculates scores that reflect the potential for toxic substance release and human exposure from the magnitude of toxic releases in air emissions and wastewater discharge, the size of potentially exposed populations, and the estimated chemical dose at points of human exposure.²

What the Indicators Measure

These indicators measure the following characteristics of a HUC12 subwatershed:*

- **Toxic Release Inventory Sites, Count in Watershed (WS)** – the number of TRI sites in the HUC12.
- **Toxic Release and Exposure Potential in Watershed (WS)** – the sum of RSEI scores reported between 2015 and 2019 for TRI facilities in the HUC12 (Figure 1). Higher values correspond to greater potential for toxic substance release and exposure relative to other HUC12s.

Relevance to Water Quality Restoration and Protection

TRI facilities are regulated to reduce risk of toxic exposure, and their presence alone does not mean hazardous substances are harming a population or the environment.³ However, allowable discharges of toxic substances may be permitted, and accidental toxic releases can occur. Living near TRI and other hazardous waste facilities has been associated with human health effects, such as increased cancer rates, asthma hospitalizations, and stroke mortality.⁴

Minorities, low-income populations, and other overburdened communities may face a higher risk for toxic

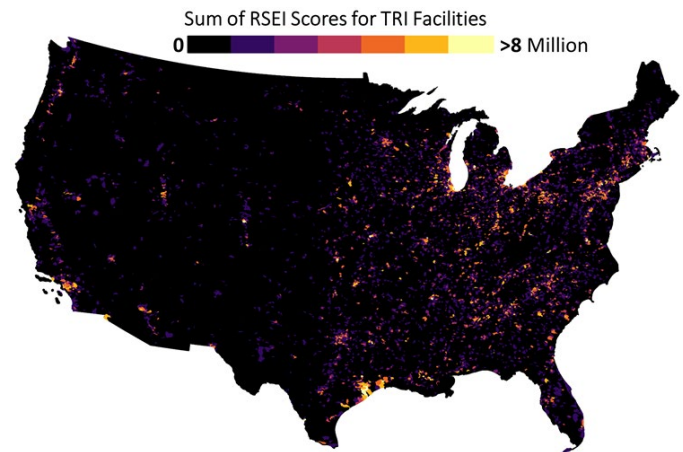


Figure 1. Map of **Toxic Release and Exposure Potential in Watershed** for HUC12s across the contiguous US.

substance exposure compared to other groups. For instance, a study of the distribution of TRI facilities in Charleston, South Carolina, found that TRI facilities tend to be concentrated in areas with higher poverty, unemployment, and non-white populations and lower education levels.⁵ A national study of toxic substance accidents found that surrounding communities tended to have a high proportion of African-American populations.⁶ Such inequities in toxic exposure may contribute to disparities in the health of disadvantaged communities.^{7,8}

These indicators can be used to evaluate the relative potential for exposure to toxic substances and waste within a group of HUC12s. They can be used with additional indicators of pollutant exposure and demographics (income, race, education, etc.) to identify HUC12s with populations that may face a greater pollution burden and associated health impacts. Such HUC12s may be considered priorities for follow-up restoration or protection efforts

Processing Method

TRI site counts for HUC12s were derived from information in the EPA Facility Registry Service (FRS). The FRS is EPA's centralized database that identifies facilities, sites, or places subject to environmental regulations or otherwise of environmental interest.

A map layer depicting the location of TRI facilities as of December 2020 was obtained from the FRS and overlaid

*HUC12s are subwatershed delineations in the [National Watershed Boundary Dataset](#). HUC12s are referenced by their 12-digit Hydrologic Unit Code.

with HUC12 boundaries to determine the number of TRI sites per HUC12. Facilities reported as Inactive or Closed were not included in HUC12 counts. Facilities in the dataset with matching latitude-longitude coordinates were assumed to be duplicates and only counted once.

HUC12 values of toxic release and exposure potential were derived from 2015-2019 RSEI scores reported by EPA for TRI facilities. RSEI scores for all facilities nationwide were downloaded in December 2020 from the [EasyRSEI database dashboard](#). Each RSEI score was assigned to a HUC12 using the corresponding facility ID and the TRI map layer used to determine TRI facility counts, as described above. The RSEI scores were then summed to quantify the total toxic release and exposure potential in each HUC12.

An example map displaying the RSEI scores for TRI facilities is provided in Figure 2.

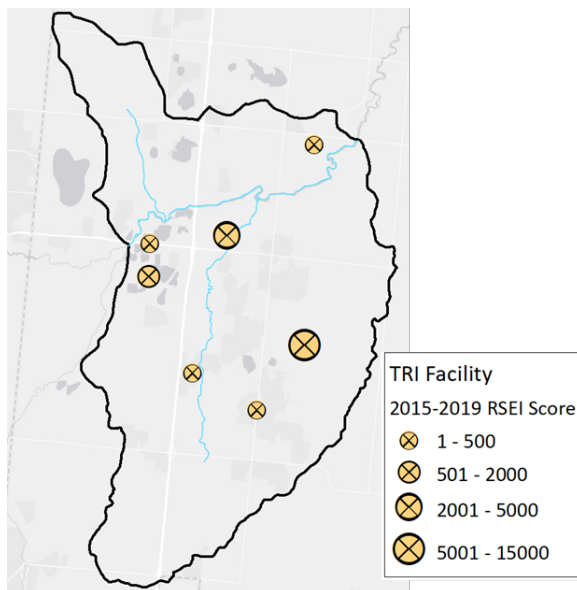


Figure 2. Map of Risk-Screening Environmental Indicators (RSEI) scores for Toxic Release Inventory (TRI) sites in an example HUC12.

Limitations

- TRI site counts are provided to help users understand and interpret the potential for toxic release and exposure in a HUC12. High site counts do not mean that toxic releases are occurring and/or harming a population.
- The RSEI scores used to quantify toxic release and exposure potential are based on a model that has been evaluated and refined by EPA researchers over several years. However, all models are subject to error and uncertainty. Refer to the [EPA RSEI](#) website for more information on the limitations of the RSEI model.

Links to Access Data and Additional Information

HUC12 indicator data can be accessed within the EPA Restoration and Protection Screening (RPS) Tool, in downloadable data files, or as a web service. Visit the [EPA RPS](#) website for links to access the RPS Tool, HUC12 indicator database, and web service.

The TRI facility map layer used to calculate these indicators can be accessed from the [EPA Facility Registry Service Geospatial Data Download](#) website. The RSEI model results used to estimate toxic release and exposure potential can be accessed from the [EPA EasyRSEI Dashboard](#).

References

- ¹EPA. 2021. [What is the Toxics Release Inventory](#). Accessed October 29, 2021.
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- ⁴Brender, J., et al. 2011. [Residential proximity to environmental hazards and adverse health outcomes](#). *American Journal of Public Health*. 101(1): S37-S52.
- ⁵Wilson, S., et al. 2012. [Assessment of the distribution of toxic release inventory facilities in metropolitan Charleston: an environmental justice case study](#). *American Journal of Public Health*. 102(10): 1974-1980.
- ⁶Elliott, M. 2004. [Environmental justice: frequency and severity of US chemical industry accidents and the socioeconomic status of surrounding communities](#). *Journal of Epidemiology & Community Health*. 58(1): 24-30.
- ⁷Luo, J., et al. 2011. [Environmental Carcinogen Releases and Lung Cancer Mortality in Rural-Urban Areas of the United States](#). *The Journal of Rural Health*. 27(4), 342-349.
- ⁸Kershaw, S., et al. 2013. [Identifying inequitable exposure to toxic air pollution in racialized and low-income neighbourhoods to support pollution prevention](#). *Geospatial health*. 7(2): 265-278.