Introduction to the 2018 TRI National Analysis

Industries and businesses in the United States (U.S.) use chemicals to make the products we depend on, such as pharmaceuticals, computers, paints, clothing, and automobiles. While the majority of chemicals included on the Toxics Release Inventory (TRI) chemical list are managed by industrial facilities in ways that minimize releases into the environment, releases still occur as part of their normal business operations. It is your right to know what TRI chemicals are being used in your community, and how they are managed including how much is released into the environment, and whether such quantities are increasing or decreasing over time.

TRI Reporting

Under the Emergency Planning and Community Right-to-Know Act (EPCRA) and the Pollution Prevention Act (PPA), facilities must report details about their pollution prevention and waste management activities, including releases, of TRI-listed chemicals for the prior calendar year to EPA by July 1 of each year.

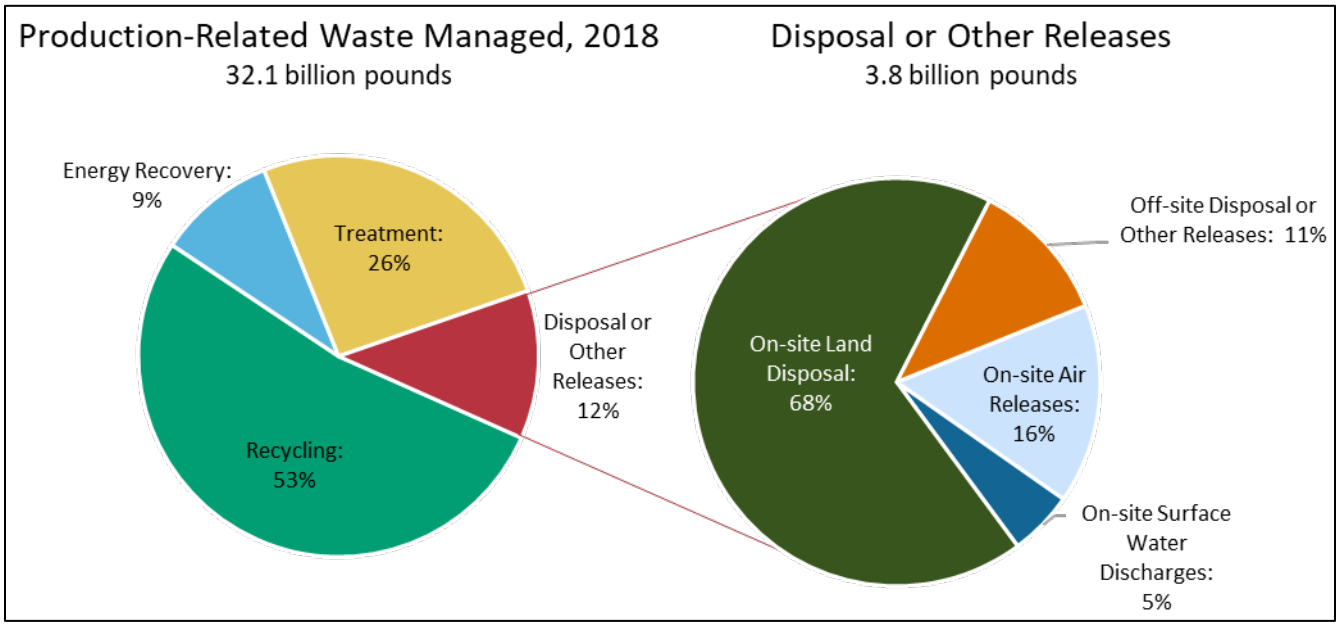
The TRI tracks the annual management of certain chemicals based on the information reported to EPA by facilities in U.S. industry sectors such as manufacturing, metal mining, electric utilities, and hazardous waste management. The data reported to TRI are compiled in a publicly available database maintained by EPA. For calendar year 2018, more than 21,000 facilities submitted TRI data to EPA.

Each year, EPA prepares and publishes the TRI National Analysis. In support of EPA's mission to protect human health and the environment, the TRI National Analysis summarizes recently submitted TRI data, explores data trends, and interprets the findings.

Watch a short video about the TRI Program and your right to know.

Overview of the 2018 TRI data

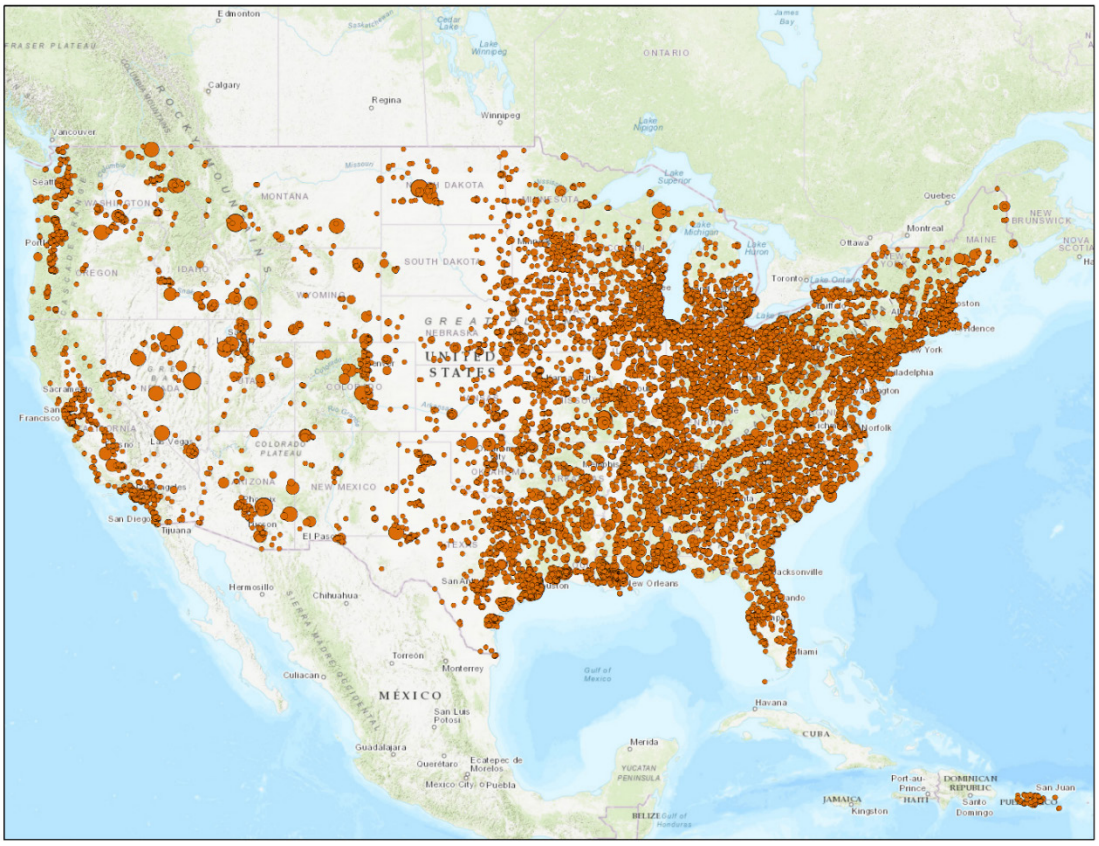
The pie charts below summarize the most recent TRI data on: 1) how production-related chemical wastes were managed in 2018; and 2) how the portion of wastes that were disposed of or otherwise released to the environment were handled.



Note: To avoid double counting, the Disposal or Other Releases pie on the right excludes quantities of TRI chemicals that are transferred off site from a TRI-reporting facility and subsequently released on site by a receiving facility that also reports to TRI.

- Facilities reported managing 32.12 billion pounds of TRI-listed chemicals as production-related waste. This is the quantity of TRI chemicals in waste that is recycled, combusted for energy recovery, treated, disposed of, or otherwise released into the environment. In other words, it encompasses the TRI chemicals in waste generated from the routine production processes and operations at the facilities.
    - Of this total, 88% was recycled, combusted for energy recovery, or treated. Only 12% was disposed of or otherwise released into the environment.
- For chemical wastes that were disposed of or otherwise released, facilities also reported where the wastes were released—into the air, water, or land (on site or off site). As shown in the pie chart on the right, most waste was disposed of to land, which includes landfills and underground injection, and other land disposal.
- To view these data in a table and for more information on why the "disposal or other releases" values differ between these two pie charts, see Quick Facts under TRI Data Considerations.

Where are TRI Facilities Located?



Click on any of the locations on the map to see facility information.

View Larger Map

TRI Data Considerations

As with any dataset, there are several factors to consider when reviewing results or using Toxics Release Inventory (TRI) data. Key factors associated with the data presented in the TRI National Analysis are summarized below; for more information see Factors to Consider When Using Toxics Release Inventory Data.

- **Covered sectors and chemicals.** TRI includes information reported by many industry sectors on the quantities of many chemicals that are released or otherwise managed as waste, but it does not contain such information on all chemicals manufactured, processed or otherwise used in the U.S., nor does it cover facilities in all industry sectors within the U.S. A list of the sectors covered by the TRI Program is available on the TRI webpage, as well as a current list of the chemicals reportable to the TRI Program. Facilities in covered sectors that manufacture, process, or use TRI-listed chemicals above threshold quantities must also employ at least ten full-time equivalent employees to be required to report to the TRI Program.
- **TRI trends**. The list of TRI chemicals has changed over the years; as a result, trend graphs in the TRI National Analysis include only those chemicals that were reportable for the entire time period presented so that the year-to-year data are comparable. Results which focus only on the year 2018 include all chemicals reportable for 2018. Thus, the results for 2018 analyses may differ slightly from results presented in trend analyses, which include 2018 and previous years.
- **Data quality.** Facilities determine the quantities of chemicals they report to TRI using best readily available data. Each year, EPA conducts an extensive data quality review that includes contacting facilities to review potential errors in reported information. This data quality review helps ensure that the National Analysis is based on accurate and useful information.
- **Risk.** The quantity of TRI chemicals released is not an indicator of health risks posed by the chemicals. Although TRI data generally cannot indicate the extent to which individuals may have been exposed to chemicals, TRI data can be used as a starting point to evaluate the potential for exposure and whether TRI chemical releases might pose risks to human health and the environment. In particular, note that:
    - The level of toxicity varies among the TRI-listed chemicals; data on quantities of the chemicals alone are inadequate to reach conclusions on health-related risks, and

- The presence of a chemical in the environment must be evaluated along with the potential and actual exposures and the route of exposures, the chemical's fate in the environment and other factors before any judgements can be made about potential risks associated with the chemical or from a release.

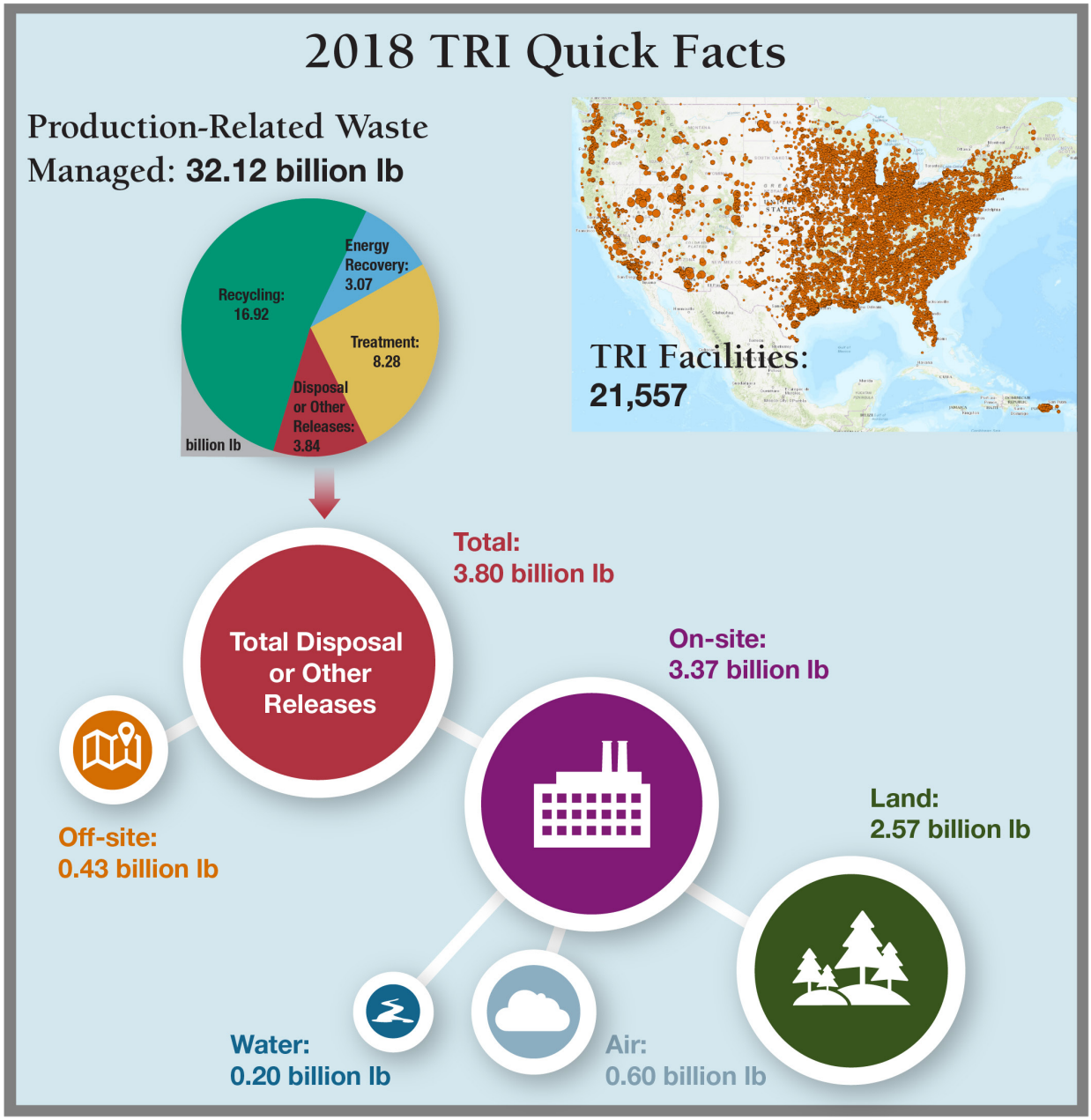
For more information on the use of TRI data in exposure and risk analyses, see Factors to Consider When Using Toxics Release Inventory Data and the Hazard and Potential Risk of TRI Chemicals in the Releases section.

- **Late submissions.** TRI reporting forms submitted to EPA after the July 1 reporting deadline may not be processed in time to be included in the National Analysis. While facilities can submit revisions after July 1, the TRI dataset used to develop the National Analysis was frozen in mid-November. Any revisions or late submissions received after this date will not be reflected in the National Analysis but will be incorporated into the TRI dataset during the spring data refresh and will be reflected in next year's National Analysis where 2018 data are referenced.
- **Double counting.** The National Analysis presents summaries of many quantitative data elements including releases to the environment, which occur on site and off site after wastes are transferred to other businesses for further waste management. When aggregating releases across facilities, such as national totals, EPA adjusts off-site releases to eliminate double counting of releases if the receiving facility also reports to TRI.

TRI Reporting is Required

Reporting to TRI is required by law for facilities that meet the reporting criteria under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA). EPA investigates cases of EPCRA non-compliance and may issue civil penalties, including monetary fines. Since the TRI Program's inception, EPA has filed more than 3,300 enforcement actions involving TRI. For more information, see the TRI Compliance and Enforcement webpage.

Quick Facts for 2018



The two metrics related to disposal or other releases are similar (3.84 and 3.80 billion pounds), but not the same. There are several reasons that these metrics differ slightly:

1. **Double counting.** Total disposal or other releases removes "double counting" that occurs when a facility that reports to the TRI Program transfers waste to another TRI-reporting facility. For example, when TRI Facility A transfers a chemical off site

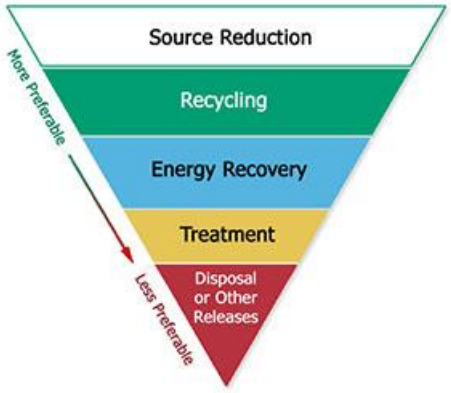
for disposal to Facility B, Facility A reports the chemical as transferred off site for disposal while Facility B reports the same chemical as disposed of on site. In processing the data, the TRI Program recognizes that this is the same quantity of the chemical and includes it only once in the total disposal or other releases metric. The production-related waste managed metric in TRI, however, considers all instances where the waste is managed (first as a quantity sent off site for disposal and next as a quantity disposed of on site), and reflects both the off-site transfer and the on-site disposal. Typically, double counting accounts for most of the difference between the two metrics.

2. **Non-production related waste.** Total disposal or other releases includes quantities of non-production-related waste that are released to the environment, but these quantities are not included in the releases metric that is part of the production-related waste total.
3. **Range Codes.** Facilities may use range codes for the quantities reported that make up the total disposal or other releases (e.g., fugitive air emissions, water discharges, and releases to a landfill) if the quantity released to the medium is less than 1,000 pounds and the chemical is not designated as a persistent, bioaccumulative toxic (PBT) chemical in TRI. The three reporting range codes are: A =1 to 10 pounds; B = 11 to 499 pounds; and C = 500 to 999 pounds. EPA calculations assume the approximate midpoint for each range (i.e., A = 5 pounds; B = 250 pounds; and C = 750 pounds). For the releases metric that is part of the production-related waste total, range codes cannot be used; a numerical estimate must be provided.

Pollution Prevention and Waste Management

Each year, the Toxics Release Inventory (TRI) collects information from more than 21,000 facilities on the quantities of TRI-listed chemicals they recycle, combust for energy recovery, treat for destruction, and dispose of or otherwise release both on and off site as part of their normal operations. These quantities, in total, are collectively referred to as the quantity of production-related waste managed.

Waste Management Hierarchy



Looking at production-related waste managed over time helps track progress made by industrial facilities in reducing the amount of chemical waste generated and in adopting waste management practices that are preferable to disposing of or otherwise releasing waste into the environment.

EPA encourages facilities to first eliminate the creation of chemical waste through source reduction activities. For wastes that are generated, the most preferred management method is recycling, followed by combusting for energy recovery, treatment, and, as a last resort, disposing of or otherwise releasing the chemical waste into the environment in an environmentally safe manner. This order of preference is established in the Pollution Prevention Act (PPA) of 1990 and illustrated by the waste management hierarchy graphic above. One goal of the PPA is that over time facilities will shift from disposal or other releases toward the more preferred techniques in the waste management hierarchy that do not result in releases to the environment.

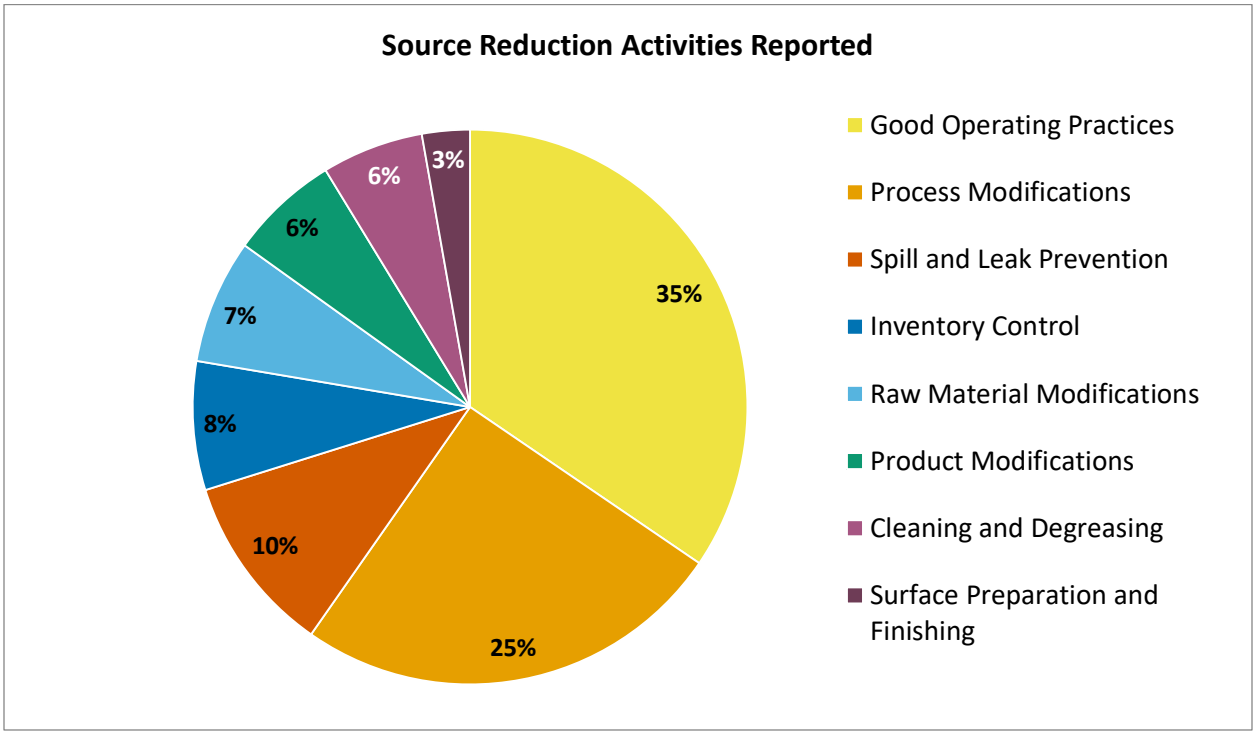
As with any dataset, there are several factors to consider when using the TRI data. Key factors associated with data used in the National Analysis are summarized in the Introduction. For more information see Factors to Consider When Using Toxics Release Inventory Data.

Also note that the list of TRI chemicals has changed over the years. For comparability, trend graphs include only those chemicals that were reportable for all years presented. Figures that focus only on the year 2018 include all chemicals reportable for 2018, therefore, values for a 2018-only analysis may differ slightly from results for 2018 in a trend analysis.

Source Reduction Activities Reported

Facilities are required to report to TRI new source reduction activities that they initiated or fully implemented during the year. Source reduction includes activities that eliminate or reduce the generation of chemical waste. Other waste management practices, such as recycling and treatment, refer to how chemical waste is managed after it is generated and are not considered source reduction activities. The source reduction information the TRI Program collects can help facilities learn from each other's best practices and potentially reduce their own chemical releases.

For more information, see the TRI Source Reduction Reporting Fact Sheet.



Note: Facilities report their source reduction activities by selecting codes that describe their activities. These codes fall into one of eight categories listed in the graph legend and are defined in the TRI Reporting Forms and Instructions.

- In 2018, a total of 3,120 new source reduction activities were implemented by 1,270 facilities (6% of all facilities that reported to TRI).
- Facilities select from 49 types of source reduction activities that fall under the 8 categories shown in the graph. The most commonly reported source reduction category is Good Operating Practices.

- For example, a printed circuit board manufacturing facility reported periodic maintenance of equipment that helps minimize overdosing ammonia into the process. [Click to view facility details in the Pollution Prevention (P2) tool]

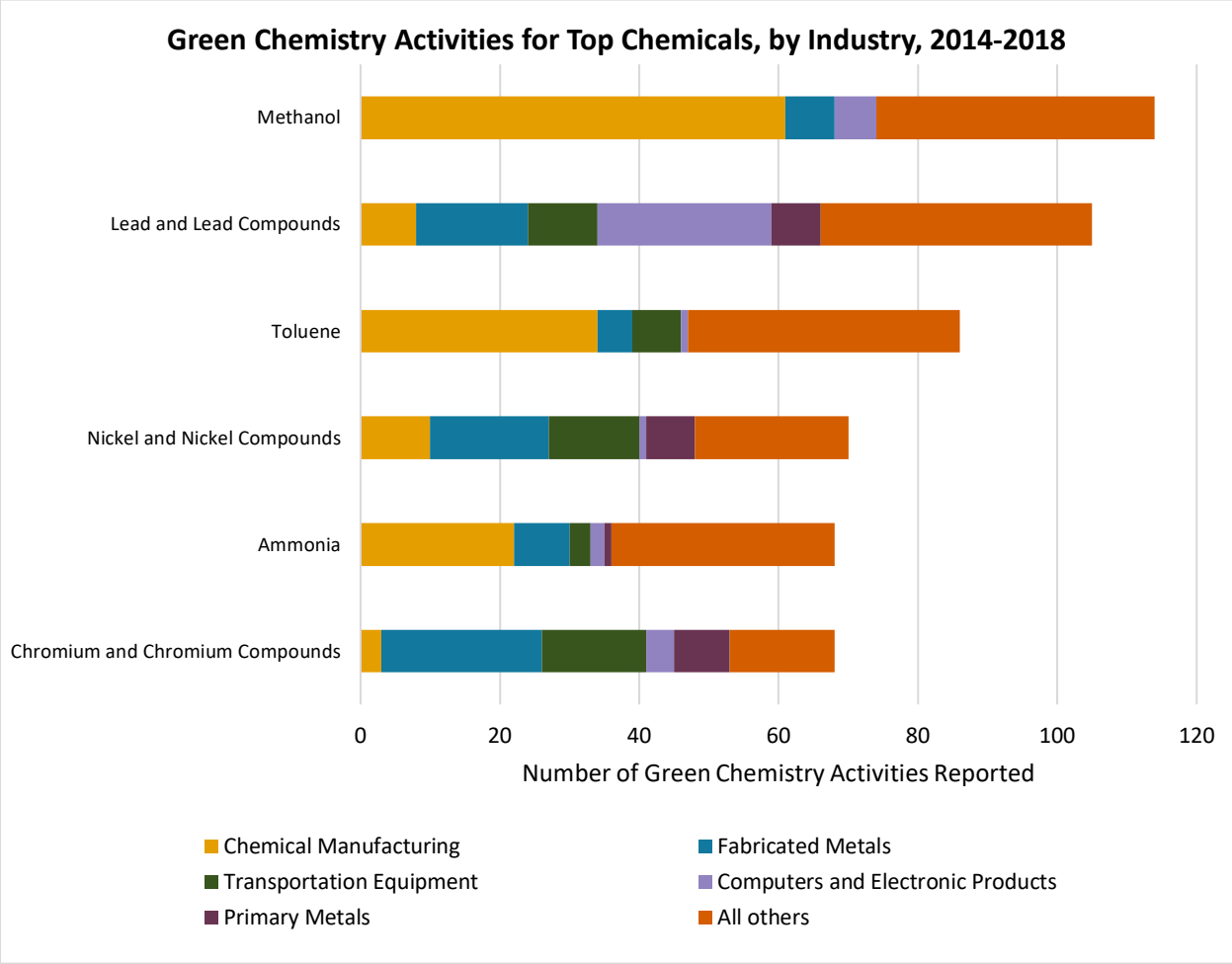
Additional Resources

- See the TRI P2 Data Overview Factsheet for more information on source reduction reporting in recent years.
- Note that facilities may have implemented source reduction activities in earlier years which are ongoing or completed projects. To see details of source reduction activities implemented for this year or in previous years, use the TRI Pollution Prevention (P2) Search Tool.

Green Chemistry Activities

Green chemistry is a discipline within the field of chemistry which seeks to prevent formation of pollution through the design and implementation of manufacturing syntheses that use safer reagents (e.g., green solvents) or feedstocks, use minimal energy, and produce the desired product in high yield without forming unwanted byproducts or wastes. In the pollution prevention hierarchy green chemistry is a means to achieve source reduction. Advancements in green chemistry allow industry to reduce or even prevent pollution at its source by, for example, designing manufacturing processes that use or produce fewer quantities of TRI chemicals, or no TRI chemicals at all.

Six of the source reduction codes are specific to green chemistry activities, although green chemistry practices may also fit under other codes. This figure shows the chemicals for which the highest number of green chemistry activities, based on the six green chemistry codes, were implemented over the last five years and the sectors that reported those activities.



- Since 2014, facilities have reported 1,496 green chemistry activities for 130 TRI chemicals and chemical categories.
    - Green chemistry activities were reported most frequently for methanol, lead and lead compounds, toluene, nickel and nickel compounds, ammonia, and chromium and chromium compounds.
    - The chemical manufacturing, fabricated metals, and transportation equipment sectors reported the highest number of green chemistry activities.
- Chemical manufacturers used green chemistry to reduce or eliminate their use of TRI solvent and reagent chemicals, such as methanol, toluene, and ammonia. For example:
    - Based on an employee recommendation, a paint and coating manufacturing facility reformulated a number of products to reduce its toluene usage. [Click to view facility details in the Pollution Prevention (P2) Tool]
- Fabricated metal producers applied green chemistry techniques to reduce their usage of metals including lead, nickel, and chromium. For example:
    - A metal forming and laser cutting facility used enhanced process monitoring and quality control to improve its resource utilization and reduce the scrap metal (containing nickel) generated. [Click to view facility details in the P2 Tool]
- Transportation equipment manufacturers used green chemistry to reduce or eliminate their usage of chromium, nickel, and lead. For example:
    - A motor vehicle electronics manufacturer replaced leaded product lines with non-leaded lines, reducing its amount of lead waste managed. [Click to view facility details in the P2 Tool]

Additional Resources

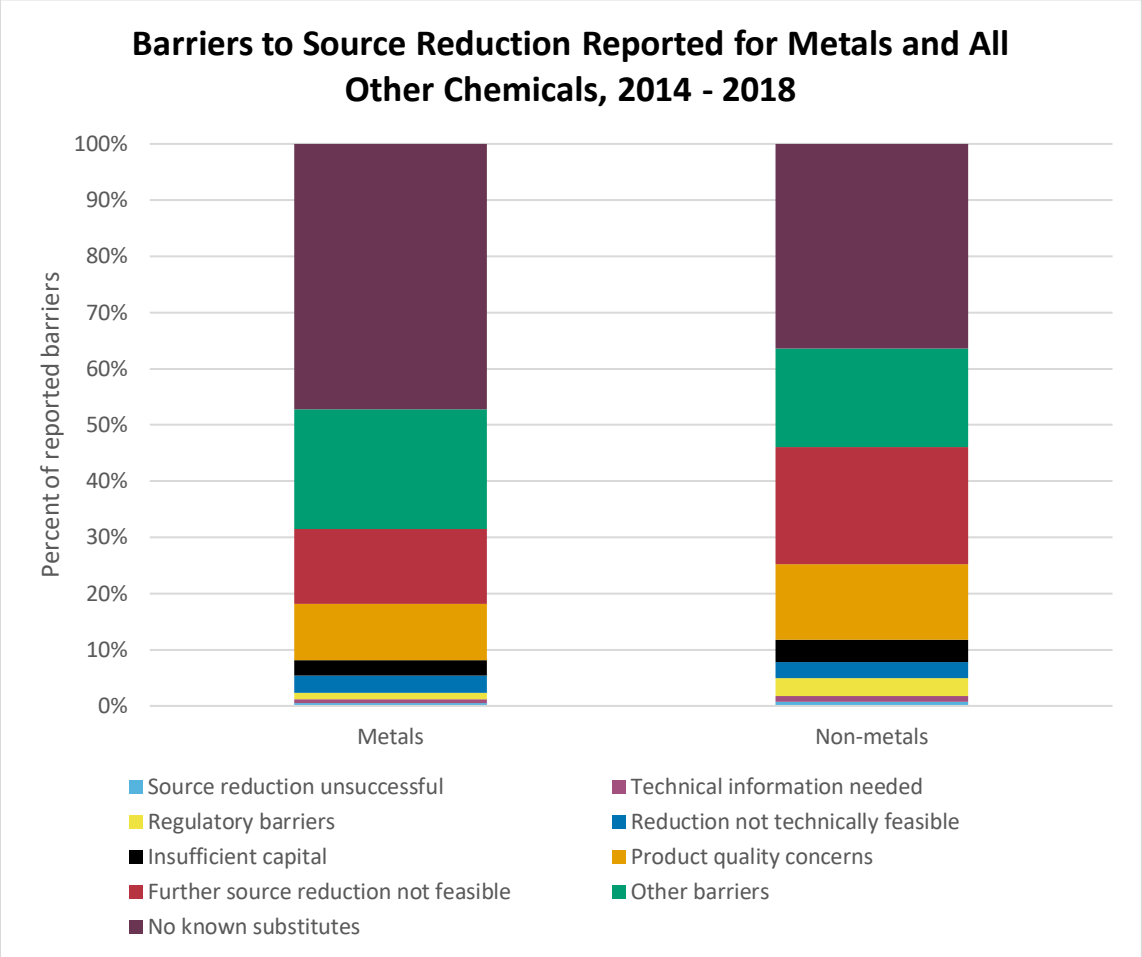
Source reduction activities such as green chemistry are the preferred way to reduce formation of chemical wastes. Find more information on green chemistry using these resources:

- EPA's TRI Pollution Prevention (P2) Qlik Dashboard to find green chemistry examples for a specific chemical and/or industry.
- EPA's Green Chemistry program for information about green chemistry and EPA's efforts to facilitate its adoption.
- EPA's Safer Choice program for information about consumer products with lower hazard.

- For more details on the types of green chemistry activities reported to TRI and trends in green chemistry reporting, see *The Utility of the Toxics Release Inventory (TRI) in Tracking Implementation and Environmental Impact of Industrial Green Chemistry Practices in the United States*. EXIT

Reported Barriers to Source Reduction

Facilities that did not implement new source reduction activities for a TRI chemical have the option to disclose any barriers that prevented them from implementing source reduction. Since 2014, TRI reporting forms include barrier codes, which enable reporting and analysis of obstacles that facilities may be experiencing. This figure shows the types of barriers that facilities reported for metals and for all other (non-metal) TRI chemicals.



Note: Facilities report barriers to source reduction by selecting from nine codes that describe possible barriers. These codes are defined in the TRI Reporting Forms and Instructions.

From 2014 to 2018:

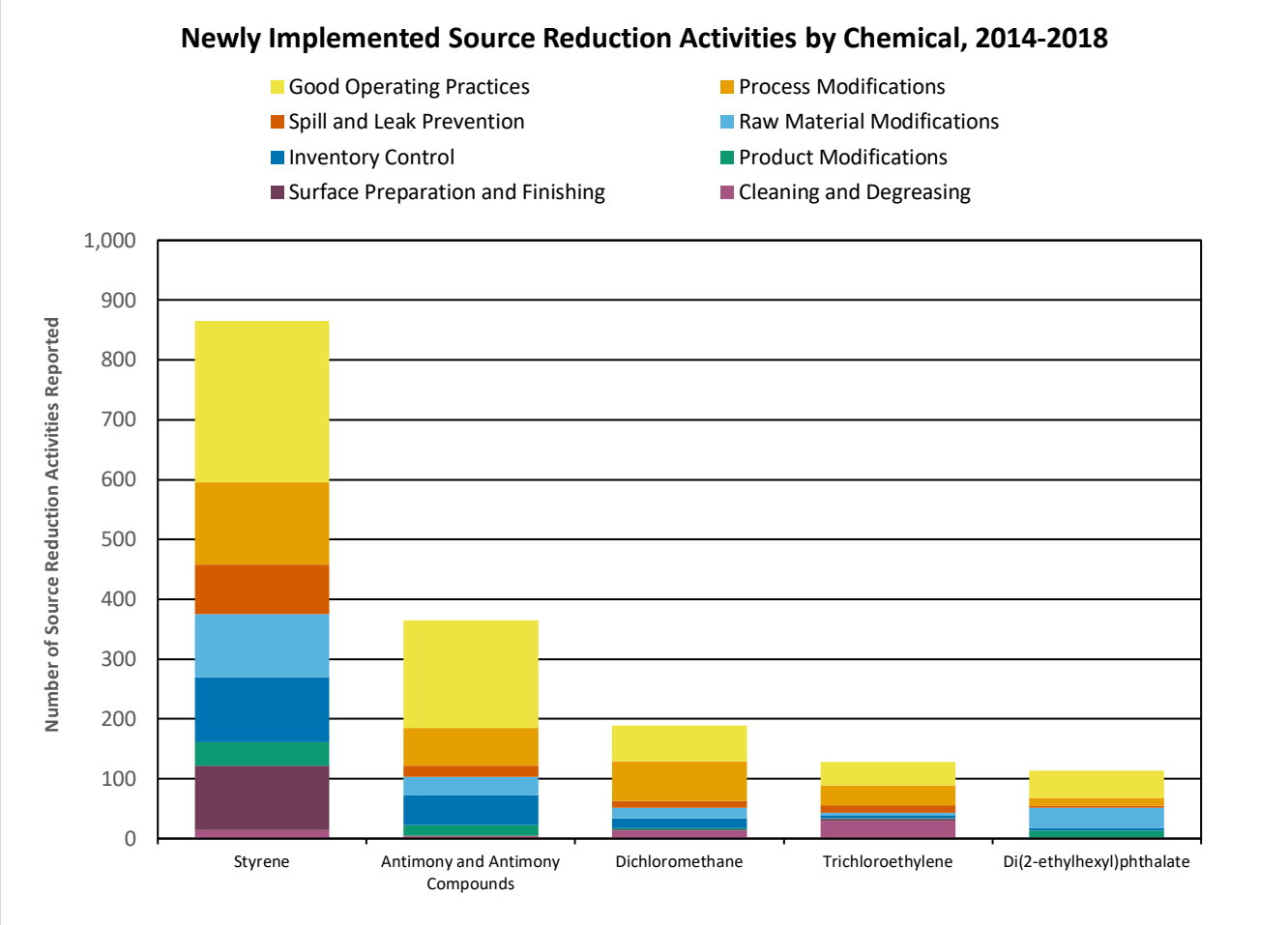
- Facilities reported barriers to source reduction for 333 chemicals and chemical categories. Analyzing the source reduction barriers reported to TRI helps identify where more research is needed, for example, to address technological challenges or promote development of viable alternatives. It may also allow for better communication between

those that have knowledge of source reduction practices and those that are seeking additional help.

- The most frequently reported barriers for both metals and non-metals were *no known substitutes or alternative technologies* and *further source reduction not feasible*. This excludes *other barriers*, a catch-all category available to facilities.
- While *no known substitutes* was the most frequently reported barrier for both metals and non-metals, it accounted for almost half (47%) of the barriers reported for metals but made up a smaller portion (37%) of barriers reported for non-metals.
- For the *no known substitutes* barrier for metals, many facilities reported the presence of the TRI metal in their raw materials (e.g., metal alloys) as the reason they did not implement source reduction activities. Examples include:
    - A sign manufacturer reported that the prime aluminum and magnesium they use in production contains trace amounts of lead as an undesirable impurity. [Click to view facility details in the Pollution Prevention (P2) Tool]
    - An iron and steel mill noted that manganese is used in steel production to comply with American Society for Testing and Materials (ASTM) standards, so they are unable to reduce their use of this chemical. [Click to view facility details in the P2 Tool]
- *Further source reduction not feasible* was another commonly reported barrier, especially for non-metals. Facilities select this barrier code when additional reductions do not appear feasible. For example:
    - A plastic product manufacturing facility implemented a recirculation system for bulk storage and an accurate metering system related to its styrene usage. Further reductions could be realized with the implementation of a robotic application process, but the facility reported insufficient capital to install such equipment. [Click to view facility details in the P2 Tool]
- You can view barriers reported for any TRI chemical by using the TRI P2 Search Tool.

Source Reduction Activities by Chemical

For the chemicals with the highest source reduction reporting rates over the last 5 years, this figure shows the number and types of activities implemented.



Note: 1) Limited to chemicals with at least 100 reports of source reduction activities from 2014-2018. 2) Facilities report their source reduction activities by selecting codes that describe their activities. These codes fall into one of eight categories listed in the graph and are defined in the TRI Reporting Forms and Instructions.

From 2014 to 2018:

- TRI facilities reported 28,951 source reduction activities for 267 chemicals and chemical categories.
- Chemicals with the highest source reduction reporting rates were: styrene, antimony and antimony compounds, dichloromethane (DCM, also known as methylene chloride), trichloroethylene, and di(2-ethylhexyl)phthalate.

- The type of source reduction activity implemented for these chemicals varied depending on their use in industrial operations and the chemical's characteristics. For example:
    - **Raw material modifications** is commonly reported as a source reduction activity to reduce waste of di(2-ethylhexyl)phthalate (DEHP), a plasticizer; styrene, a chemical used to make plastics such as polystyrene; and antimony compounds which are used in electronics, batteries, and as a component of fire retardants.
    - **Cleaning and degreasing**, including changing to aqueous cleaners, is implemented for industrial solvents such as trichloroethylene (TCE).
    - **Process modifications,** including optimizing reaction conditions and modifying equipment, layout, or piping, can help reduce the amount of solvents such as dichloromethane (DCM) needed for a process.

Facilities may also report additional details to TRI about their source reduction, recycling, or pollution control activities in an optional text field of the TRI reporting form.

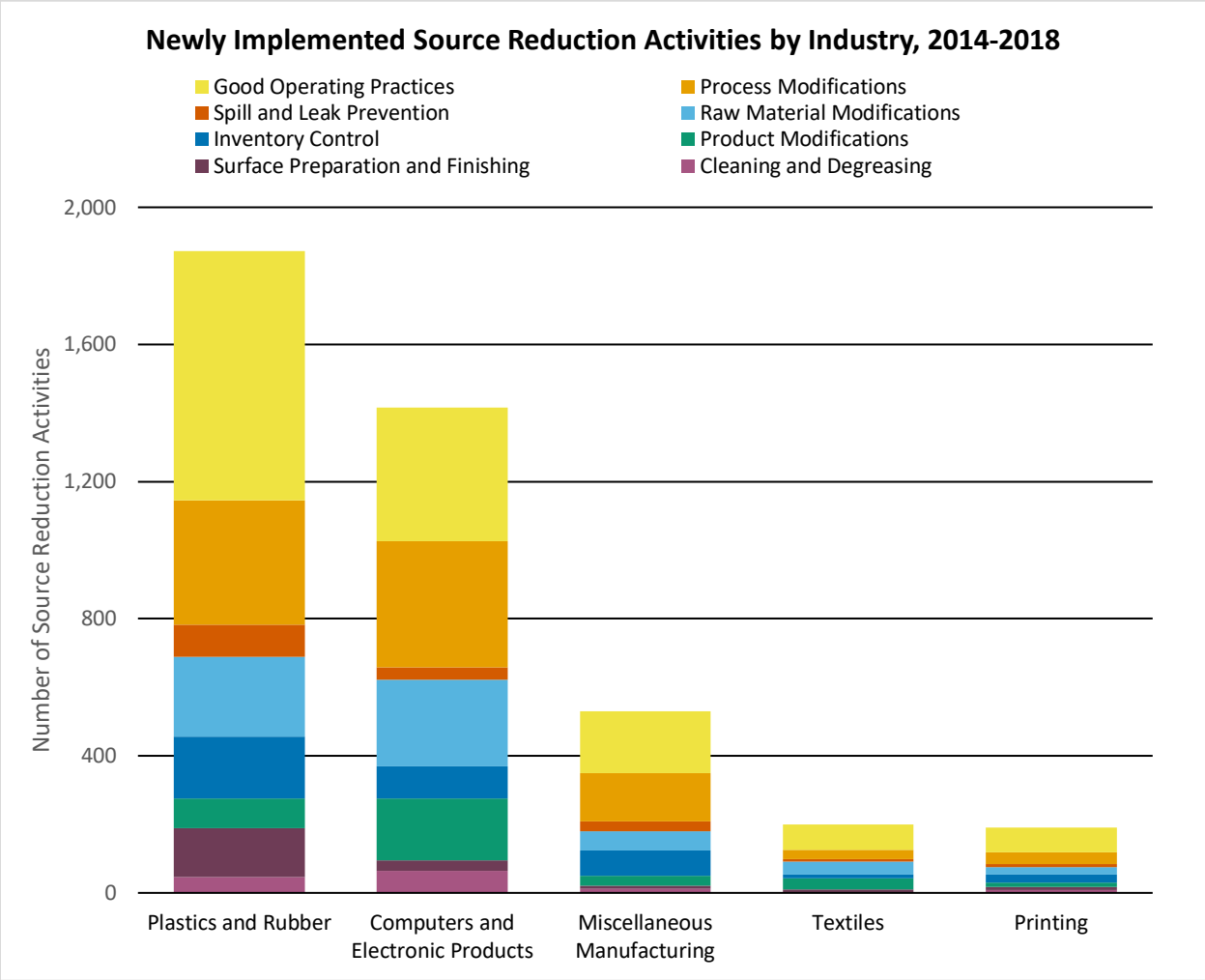
Examples of optional source reduction information for 2018:

- Styrene: A boat manufacturer optimized the efficient use of styrene by adding equipment to conduct some molding operations under closed conditions. [Click to view facility details in the Pollution Prevention (P2) Tool]
- Dichloromethane: A paint and coating manufacturer was able to reduce its releases of dichloromethane by implementing product reformulation identified through participative team management. [Click to view facility details in the P2 Tool]
- Trichloroethylene: A metal stamping facility purchased and installed a new vacuum vapor degreaser to reduce its trichloroethylene releases. [Click to view facility details in the P2 Tool]
- Di(2-ethylhexyl)phthalate: A resin compounding facility substituted DEHP with other plasticizer(s). [Click to view facility details in the P2 Tool]
- Antimony Compounds: An automobile parts manufacturer is moving away from PVC materials which use antimony trioxide as a fire retardant to thermoplastic polyolefin (TPO)-type materials to meet customer demands. The facility continues to test alternative fire retardants to use in its products. [Click to view facility details in the P2 Tool]

You can compare facilities' waste management methods and trends for any TRI chemical by using the TRI P2 Search Tool.

Source Reduction Activities by Industry

For the industries with the highest source reduction reporting rates over the last 5 years, this figure shows the number and types of activities these sectors implemented.



Note: Facilities report their source reduction activities by selecting codes that describe their activities. These codes fall into one of eight categories listed in the graph legend and are defined in the TRI Reporting Forms and Instructions.

From 2014 to 2018:

- The five industry sectors with the highest source reduction reporting rates were plastics and rubber, computers and electronic products, miscellaneous manufacturing (e.g., medical equipment), textiles, and printing.
- For most sectors, "Good operating practices" was the most frequently reported type of source reduction activity. Other commonly reported source reduction activities varied by

sector. For example, computers and electronic products manufacturers frequently reported modifications to their raw materials and products, often associated with the elimination of lead-based solder.

- Facilities may also report additional details to TRI about their source reduction or waste management activities, as shown in the following examples.

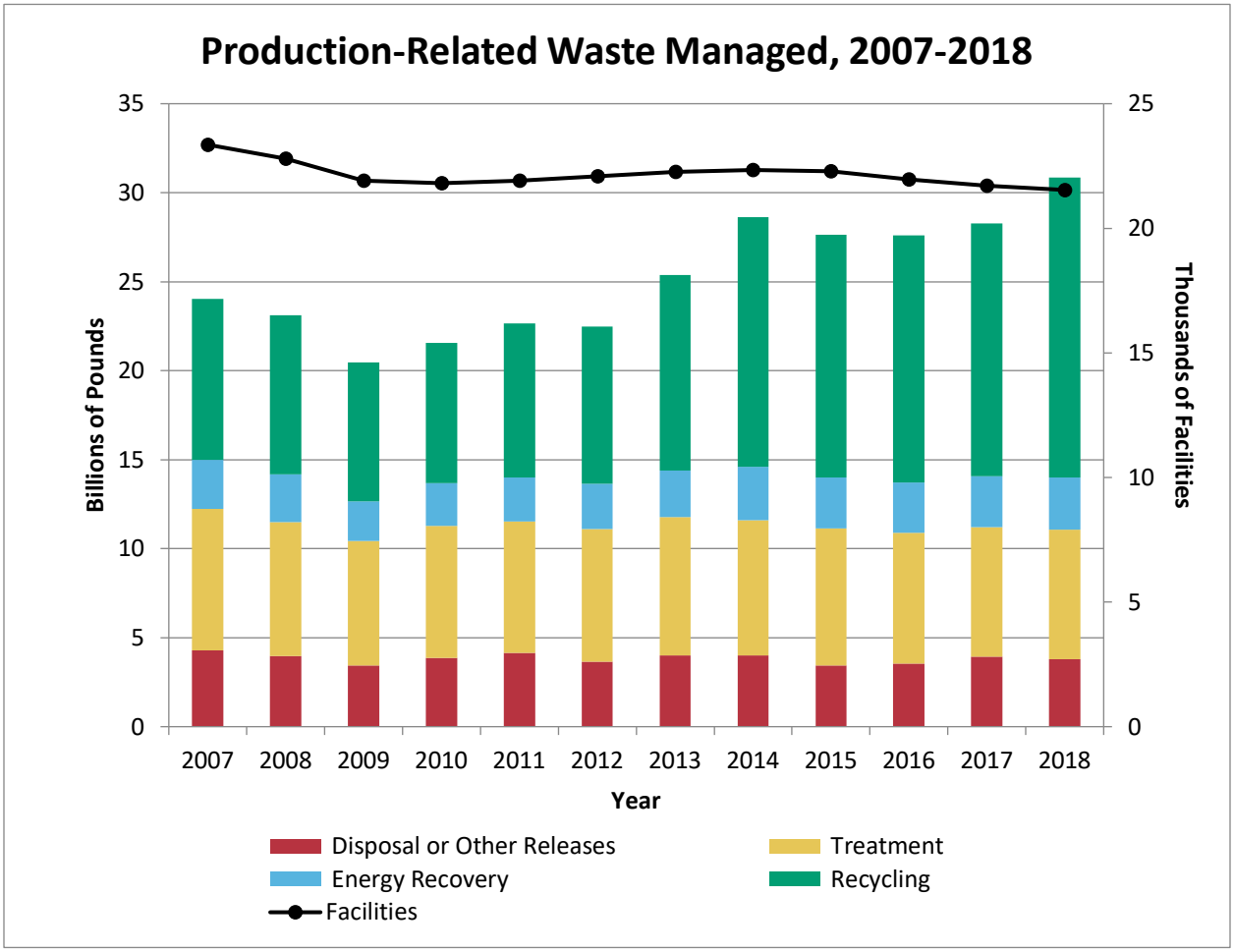
Examples of optional source reduction information for 2018:

- **Plastics and Rubber**: A plastics and resin manufacturing facility reformulated its liquid polyester resin to a zero-styrene alternative resin, and reformulated its sheet molding compounds resin to use raw materials with lower quantities of styrene. [Click to view facility details in the P2 Tool]
- **Computers and Electronic Products**: A printed circuit board manufacturing facility began offering alternative product finishes to customers in order to offset the use of lead finish in its product. The facility also changed product specifications to minimize the amount of rework required in production, further reducing unnecessary use of lead for metal coating. [Click to view facility details in the P2 Tool]
- **Miscellaneous Manufacturing**: A surgical and medical instrument manufacturing facility purchased raw materials shaped more similarly to final products to reduce its chromium-containing stainless steel scrap. [Click to view facility details in the P2 Tool]
- **Printing**: A gravure printer reduced toluene use through paint scrap tracking and paint reuse programs. [Click to view facility details in the P2 Tool]
- **Textiles**: A carpet and rug mill implemented raw material modifications and reduced its cobalt and copper compounds releases by using a different type of yarn. [Click to view facility details in the P2 Tool]

You can view all reported pollution prevention activities and compare facilities' waste management methods and trends for any TRI chemical by using the TRI P2 Search Tool.

Waste Management Trends

Facilities report to TRI the quantities of TRI-listed chemicals that they dispose of or otherwise release to the environment as a result of normal industrial operations. In addition, facilities report the quantities of these chemicals that they manage through preferred methods including recycling, combusting for energy recovery, and treating for destruction. This figure shows the trend in these quantities, collectively referred to as production-related waste managed.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

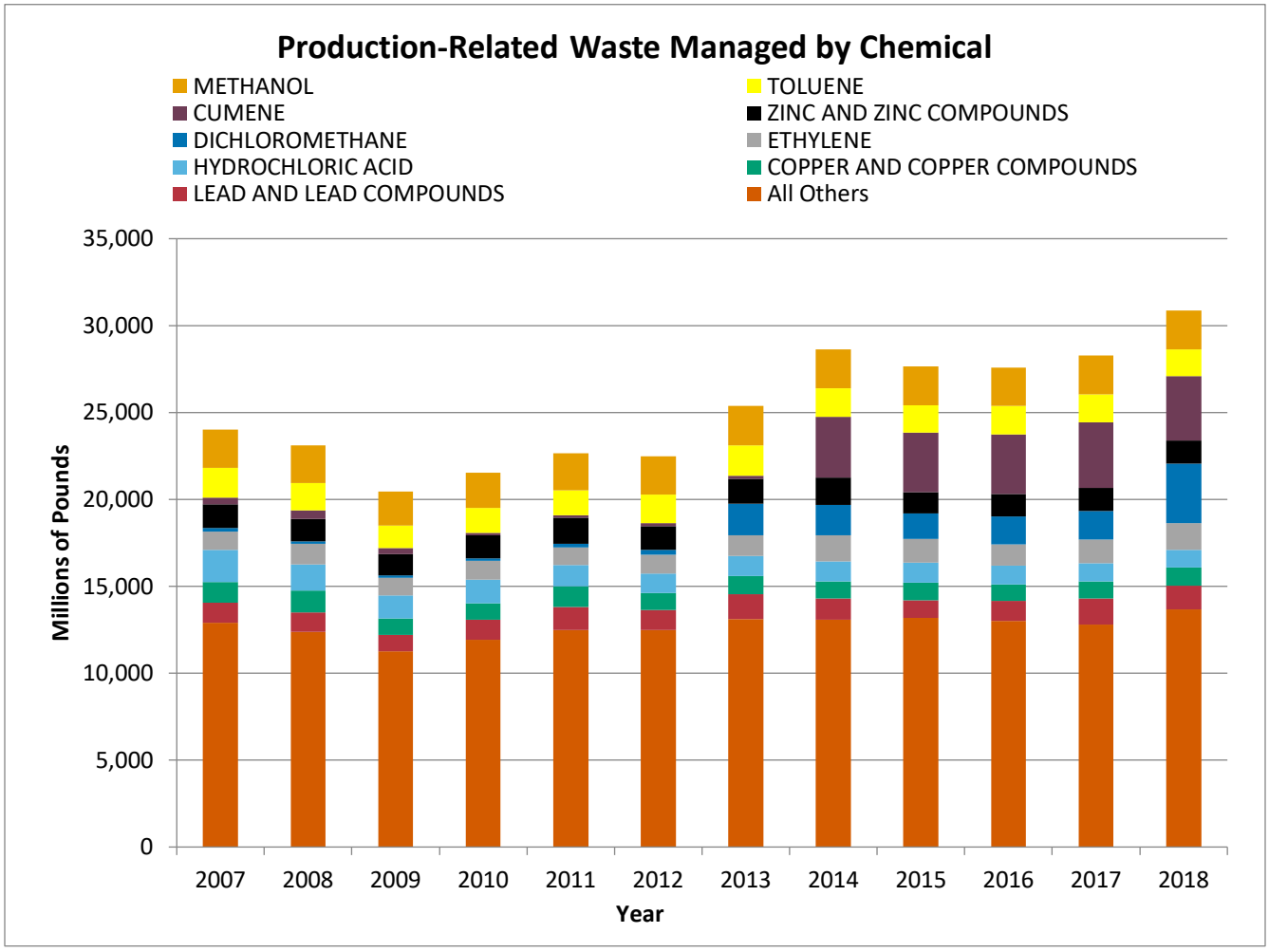
- Production-related waste managed decreased during the recession. Since 2009, production-related waste managed has generally been increasing as the U.S. economy has improved.
- Since 2007, production-related waste managed increased by 6.8 billion pounds (28%).

  - Disposal and other releases decreased by 466 million pounds (-11%).
  - Treatment decreased by 707 million pounds (-9%).
  - Energy recovery increased by 194 million pounds (7%).
  - Recycling increased by 7.8 billion pounds (86%), a trend largely driven by two plastics manufacturing facilities reporting billions of pounds of dichloromethane recycled and one petrochemical manufacturing facility reporting over 3.4 billion pounds of cumene recycled each year from 2014-2018.

- The number of facilities that report to TRI has declined by 8% since 2007. Reasons for this decrease include facility closures, outsourcing of operations to other countries, and facilities reducing their manufacture, processing, or other use of TRI-listed chemicals below the reporting thresholds.

Production-Related Waste Managed by Chemical

This figure shows the chemicals that were managed as waste in the greatest quantities from 2007 to 2018.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- Facilities reported production-related waste managed for 546 chemicals and chemical categories from 2007 to 2018. The nine chemicals for which facilities reported the most production-related waste managed, shown above, represent 50% of the total production-related waste reported.
- The reported quantities of most of the top chemicals contributing to production-related waste managed have remained relatively constant since 2007.

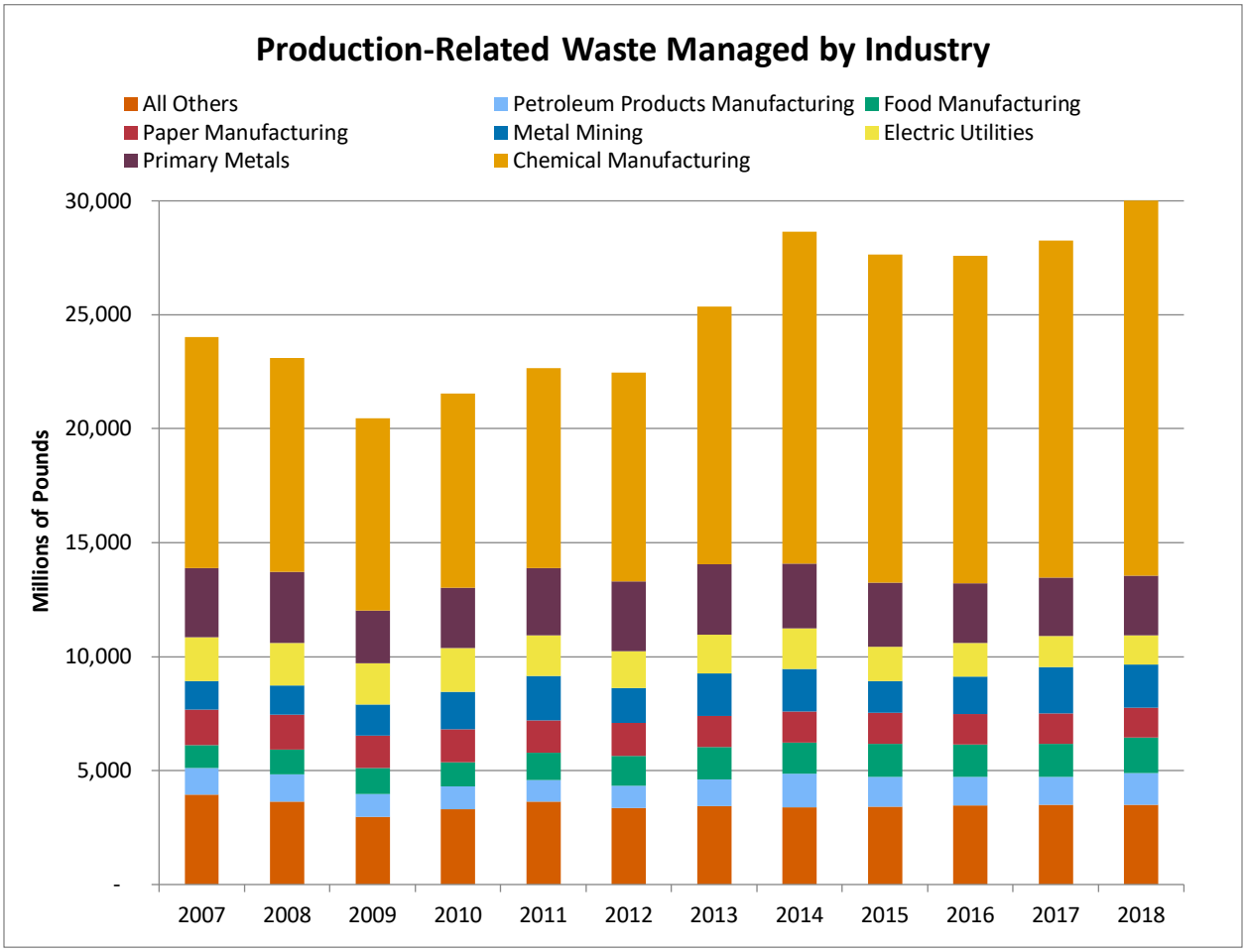
- Of the chemicals shown above, facilities reported increased quantities of waste managed for: dichloromethane, lead and lead compounds, cumene, and ethylene.
    - Production-related waste of lead and lead compounds increased by 21%.
    - Cumene waste managed increased eight-fold, mostly driven by one facility reporting over 3.4 billion pounds of cumene recycled annually during 2014-2018. [Click to view facility details in the Pollution Prevention (P2) Tool]

From 2017 to 2018:

- Facilities reported decreases in waste management quantities for these chemicals:
    - Lead and lead compounds decreased by 117 million pounds (-8%)
    - Toluene decreased by 70.0 million pounds (-4%)
    - Hydrochloric acid decreased by 42.2 million pounds (-4%)
    - Cumene decreased by 37.8 million pounds (-1%)
    - Zinc and zinc compounds decreased by 27.4 million pounds (-2%)
- Dichloromethane waste managed increased by 1.8 billion pounds (112%), mostly driven by one plastic manufacturing facility reporting 2.0 billion pounds of the chemical recycled in 2018 and no recycling of dichloromethane in prior years. [Click to view facility details in the Pollution Prevention (P2) Tool]

Production-Related Waste Managed by Industry

This figure shows the industry sectors that managed the most waste from 2007 to 2018.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- The percent contribution of each of the top sectors to production-related waste managed has remained relatively constant since 2007.
- Of the sectors shown in the graph, four increased their quantity of waste managed:
  - Chemical manufacturing increased by 7 billion pounds (71%)
  - Metal mining increased by 601 million pounds (47%)
  - Food manufacturing increased by 553 million pounds (55%)
  - Petroleum products manufacturing increased by 203 million pounds (17%)

- The quantity of waste generated in some industries fluctuates considerably from year to year, due to changes in production or other factors. For example, quantities of waste managed reported by metal mining facilities can change significantly based on differences in the composition of waste rock.

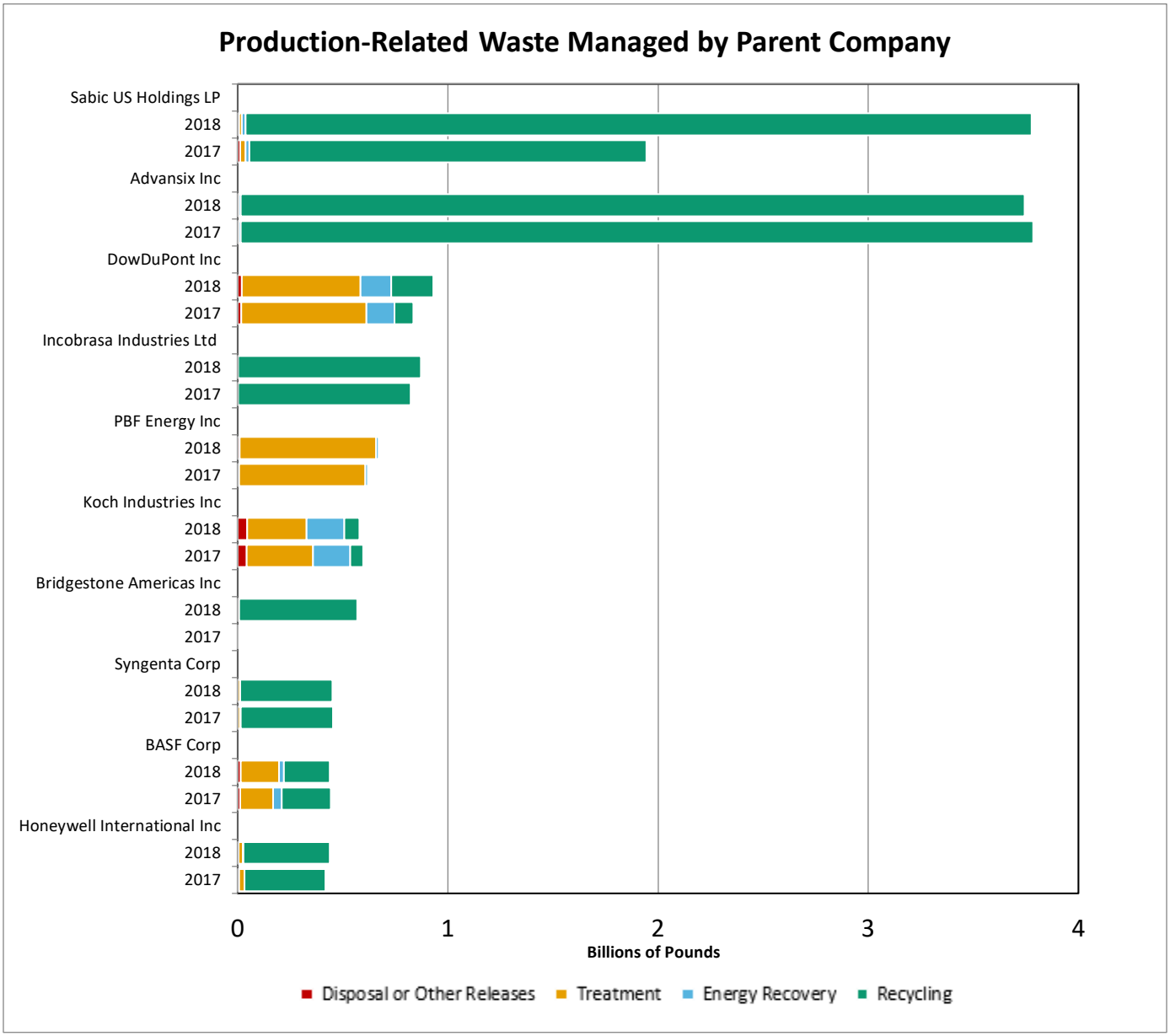
From 2017 to 2018:

- Industry sectors with the greatest reported changes in waste management quantities were:
    - Chemical manufacturing increased by 2.5 billion pounds (16%)
    - Petroleum products manufacturing increased by 175 million pounds (8%)

Waste Management by Parent Company

Facilities that report to the Toxics Release Inventory (TRI) provide information on their parent company. For TRI reporting purposes, the parent company is the highest-level company located in the United States. This figure shows the parent companies whose facilities reported the most production-related waste managed for 2018. Facilities outside of the manufacturing sector, such as electric utilities and coal and metal mines, are not included in this chart because those sectors' activities do not lend themselves to the same types or degree of source reduction opportunities as the activities at manufacturing facilities.

Note that almost all of these companies are largely managing their waste through EPA's preferred waste management methods–recycling, energy recovery, or treatment–rather than releasing it to the environment.



Notes: 1) This figure uses EPA's standardized parent name. 2) To view facility counts by parent in 2017 or 2018, mouse over the bar graph. 3) One facility, Incobrasa Industries Ltd, does not report a parent company but it is included in this figure because it has a comparable quantity of production-related waste managed. 4) For 2017, ten facilities submitted subsidiaries or variations of Bridgestone Americas, Inc. as their parent company and for 2018, these facilities were standardized under the Bridgestone Americas parent company.

These parent companies' TRI-reporting facilities operate in the following industry sectors:

- **Chemical manufacturing:** Advansix Inc, DowDuPont Inc, BASF Corp, Syngenta Corp, Honeywell International Inc, Sabic US Holdings LP
- **Soybean processing:** Incobrasa Industries Ltd
- **Multiple sectors**, e.g. pulp and paper, petroleum refining, and chemicals**:** Koch Industries Inc

- **Tires and rubber products:** Bridgestone Americas Inc
- **Petroleum refining:** PBF Energy Inc

Six of these top parent companies reported implementing new source reduction activities in 2018. Some of these companies reported additional (optional) descriptive information to TRI about their pollution prevention or waste management activities.

Examples of additional pollution prevention-related information for 2018:

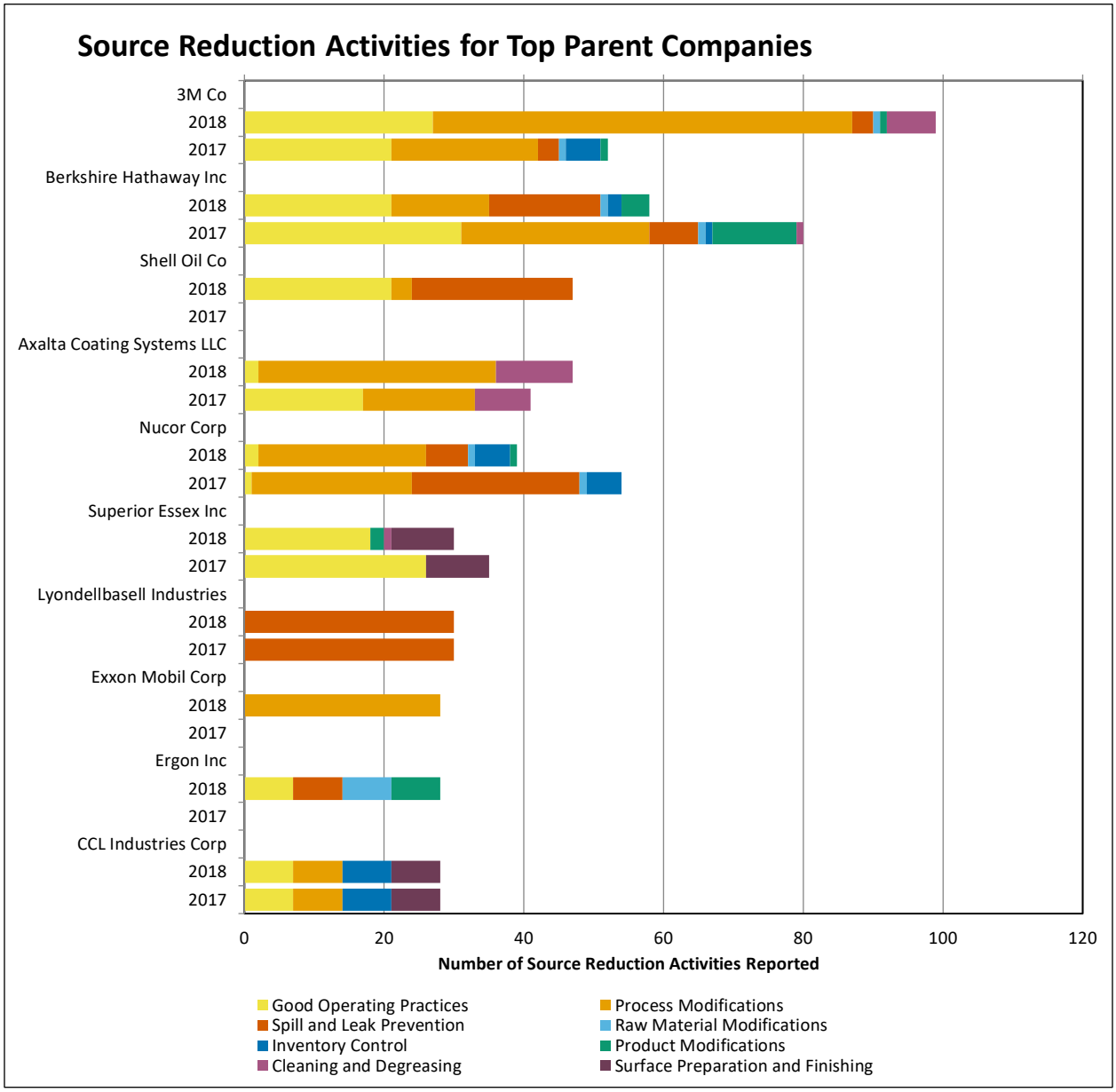
- A DowDuPont plastics and resin manufacturing facility replaced a process tank and connected the new tank to an air pollution control device to reduce releases of chemicals including acrylonitrile. [Click to view facility details in the Pollution Prevention (P2) Tool]
- A wood product manufacturing facility owned by Koch Industries upgraded a wastewater treatment system to reduce releases of ammonia in wastewater, and diverted a portion of the previously treated wastewater for energy recovery. [Click to view facility details in the P2 Tool]

To conduct a similar type of parent company comparison for a given sector, chemical, or geographic location, use the TRI P2 Search Tool.

Source Reduction Activities by Parent Company

This figure shows the parent companies whose facilities implemented the most source reduction activities during 2018. Facilities outside of the manufacturing sector, such as electric utilities and coal and metal mines, are not included in this chart because those sectors' activities do not lend themselves to the same source reduction opportunities as the activities at manufacturing facilities. For example, metal mining involves moving large volumes of earth from below ground or from a mining pit to the surface, to get to the target metal ore. This activity, which metal mines report as a release of TRI chemicals, is inherent in mining operations.

Facilities report their source reduction activities by selecting codes that describe their activities. These codes fall into one of eight categories listed in the graph legend and are defined in the TRI Reporting Forms and Instructions.



Notes: 1) This figure uses EPA's standardized parent company names. 2) The increases by Ergon, Inc are driven by the acquisition of two facilities whose source reduction activities for 2017 are under their former parent company. 3) For 2017, 13 facilities reported subsidiaries of Shell Oil Company as their parent companies; for 2018 the parent company for these facilities was standardized to Shell Oil Company. 4) To view facility counts by parent in 2017 or 2018, mouse over the bar graph.

These parent companies' facilities primarily operate in the following industries:

- **Chemical manufacturing**: 3M Co, Axalta Coating Systems, Lyondellbasell Industries
- **Multiple sectors**: Berkshire Hathaway Inc, Ergon Inc
- **Steel manufacturing**: Nucor Corp

- **Wire and cable manufacturing**: Superior Essex Inc
- **Metal containers**: CCL Industries Corp
- **Petroleum products manufacturing**: Shell Oil Co, Exxon Mobil Corp

Good operating practices, such as improving maintenance scheduling and installation of quality monitoring systems, are the most commonly reported types of source reduction activities for these parent companies. Spill and leak prevention and process modifications are also commonly reported.

Some of these parent companies submitted additional optional text on their TRI reporting forms describing their pollution prevention or waste management activities.

Examples of additional pollution prevention-related information for 2018:

- A Nucor facility began using a new primer paint coating containing less certain glycol ethers to reduce its releases of the chemical. [Click to view facility details in the Pollution Prevention (P2) Tool]
- A 3M facility implemented procedures to prevent spilling or leakage of boron trifluoride by improving maintenance and inspection requirements for its outdoor storage tanks. [Click to view facility details in the P2 Tool]

You can find P2 activities reported by a specific parent company and compare facilities' waste management methods and trends for any TRI chemical by using the TRI P2 Search Tool.

Releases of Chemicals

Releases or disposal of chemical waste into the environment occur in several ways. Facilities may release chemical waste into the air or water or dispose of it on land, per EPA regulatory requirements. Facilities may also ship (transfer) wastes that contain TRI chemicals to an off-site location for treatment or disposal. Release and disposal practices are subject to a variety of regulatory requirements designed to minimize potential exposure or harm to human health and the environment. To learn more about what EPA is doing to help limit the release of TRI chemicals into the environment, see the EPA laws and regulations webpage.

Evaluating releases of TRI-listed chemicals can help identify potential concerns and gain a better understanding of potential risks the releases may pose. This evaluation can also help identify priorities and opportunities for government and communities to work with industry to reduce chemical releases and potential associated risks. However, it is important to consider that the quantity of releases is not necessarily an indicator of health impacts posed by the chemicals. Human health risks resulting from exposure to TRI chemicals are determined by many factors, as discussed further in the Hazard and Potential Risk of TRI Chemicals section.

Many factors can affect trends in releases at facilities, including production rates, management practices, the composition of raw materials used, and the installation of control technologies.

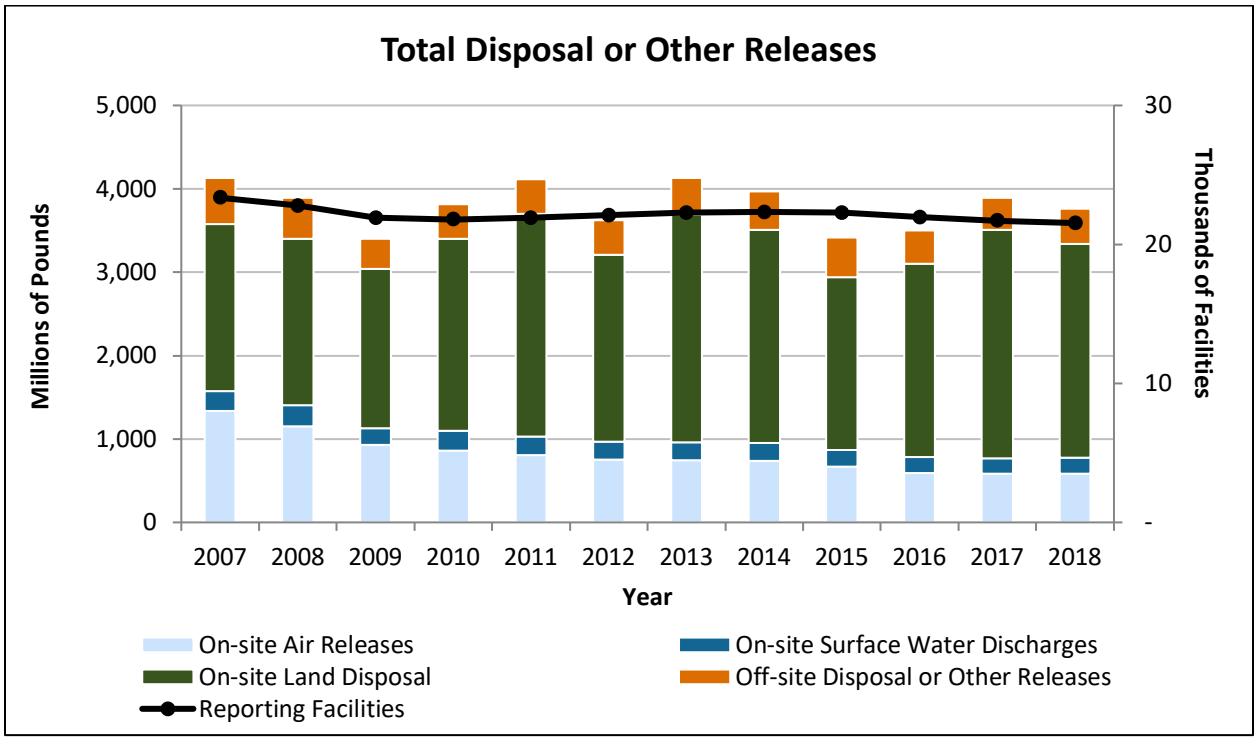
As with any dataset, there are several factors to consider when reading about or using the TRI data. Key factors associated with data presented are summarized in the Introduction. For more information see Factors to Consider When Using Toxics Release Inventory Data. Also note that the list of TRI chemicals has changed over the years. For comparability, trend graphs include only those chemicals that were reportable for all years presented. Figures and text that focus only on the year 2018 include all chemicals reportable for 2018, therefore, values for a 2018-only analysis may differ slightly from results for 2018 in a trend analysis.

Helpful Concepts

What is a release?

In the context of TRI, a "release" of a chemical generally refers to a chemical that is emitted to the air, discharged to water, or disposed of in some type of land disposal unit. The vast majority of TRI releases occur in the course of routine production operations at the facility.

The following graph shows the total disposal or other releases of TRI chemicals (also referred to as "total releases"), including on-site disposal to land, discharges to water, and releases to air, and off-site transfers for disposal or release.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

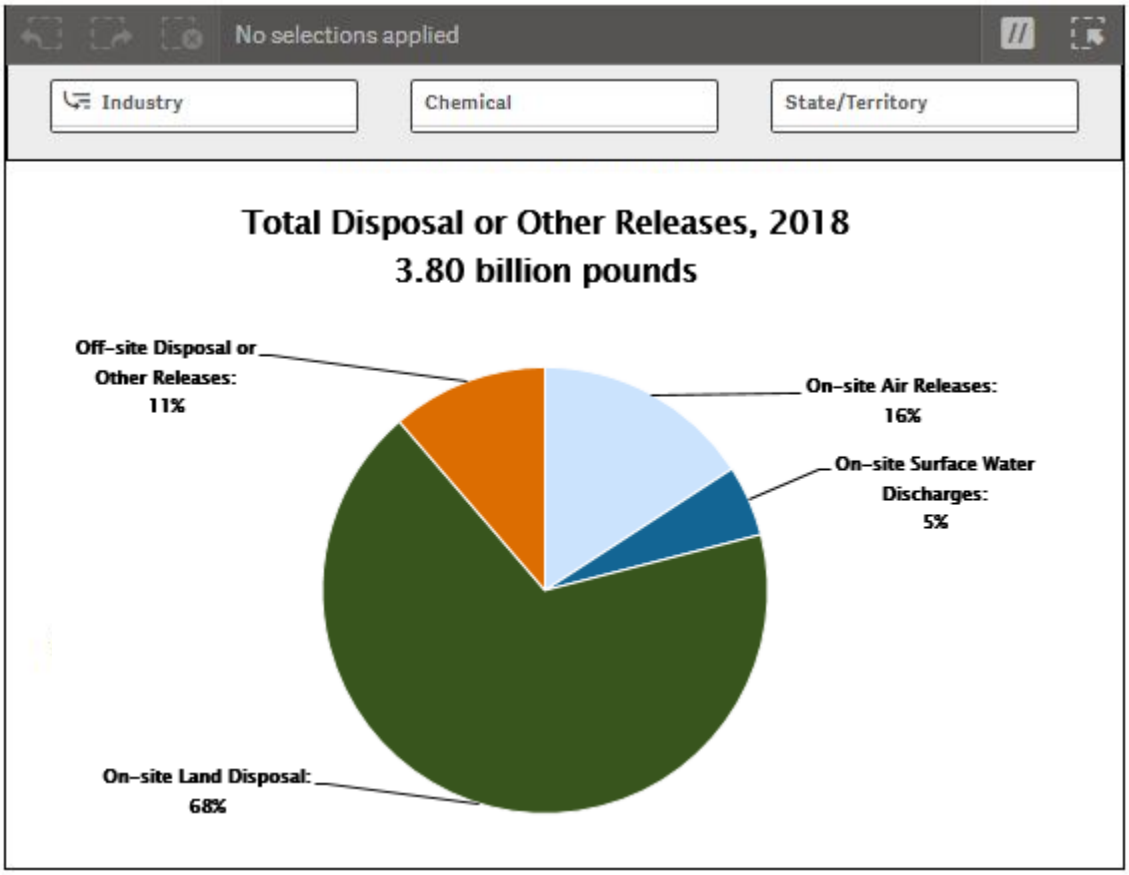
- Total disposal or other releases of TRI chemicals decreased by 9%.
  - Excluding the metal mining sector, releases decreased by 34%.
  - Reduced hazardous air pollutant (HAP) emissions, such as hydrochloric acid, from electric utilities were the most significant contributor to the decline, with additional air emission reductions from the chemical and paper manufacturing sectors.
- Air releases decreased 56%, surface water discharges decreased 18%, and off-site disposal decreased 22%.
- The number of facilities reporting to the TRI Program declined by 8% overall, although the count has remained relatively steady since 2010.

From 2017 to 2018:

- Total disposal or other releases decreased by 3%.
  - On-site land disposal decreased by 6%, which is the main driver for the decrease in total releases. There was little change in on-site air releases or on-site surface water discharges, while off-site disposal increased by 11%.

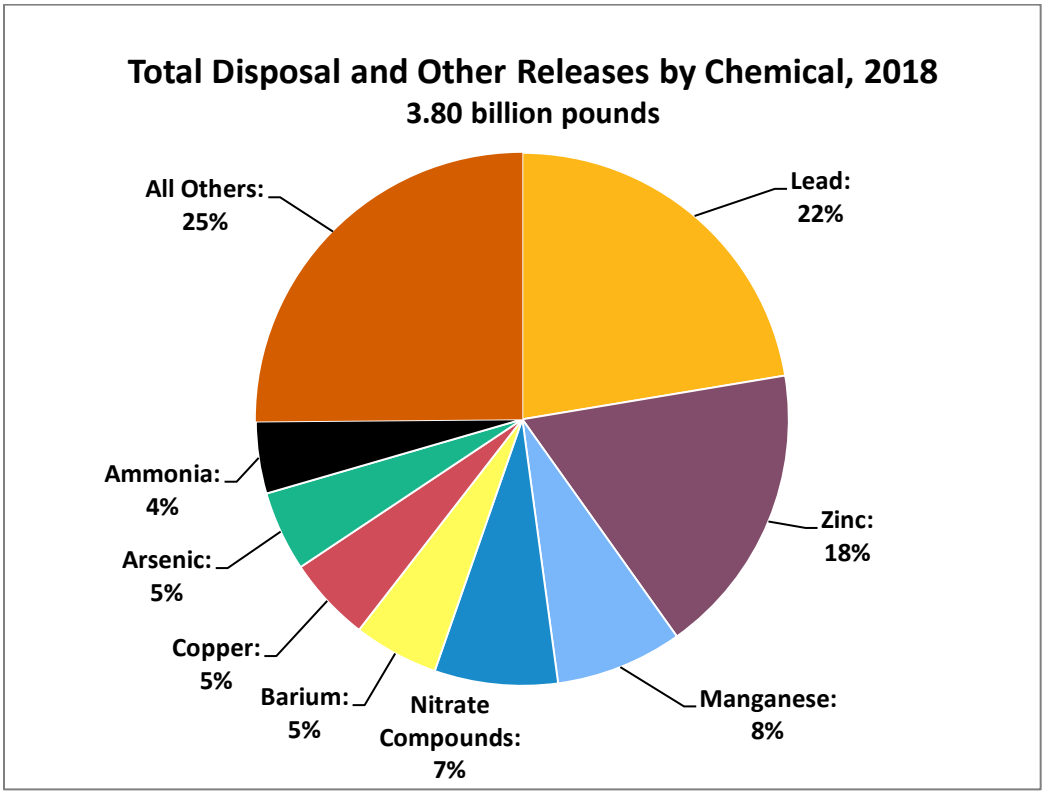
Releases in 2018

Use the interactive chart below to explore how total releases of chemicals that occurred in 2018 are associated with different industry sectors, specific chemicals, and geographies. Visit the full TRI National Analysis Qlik dashboard to explore even more information about releases of chemicals.



Releases by Chemical

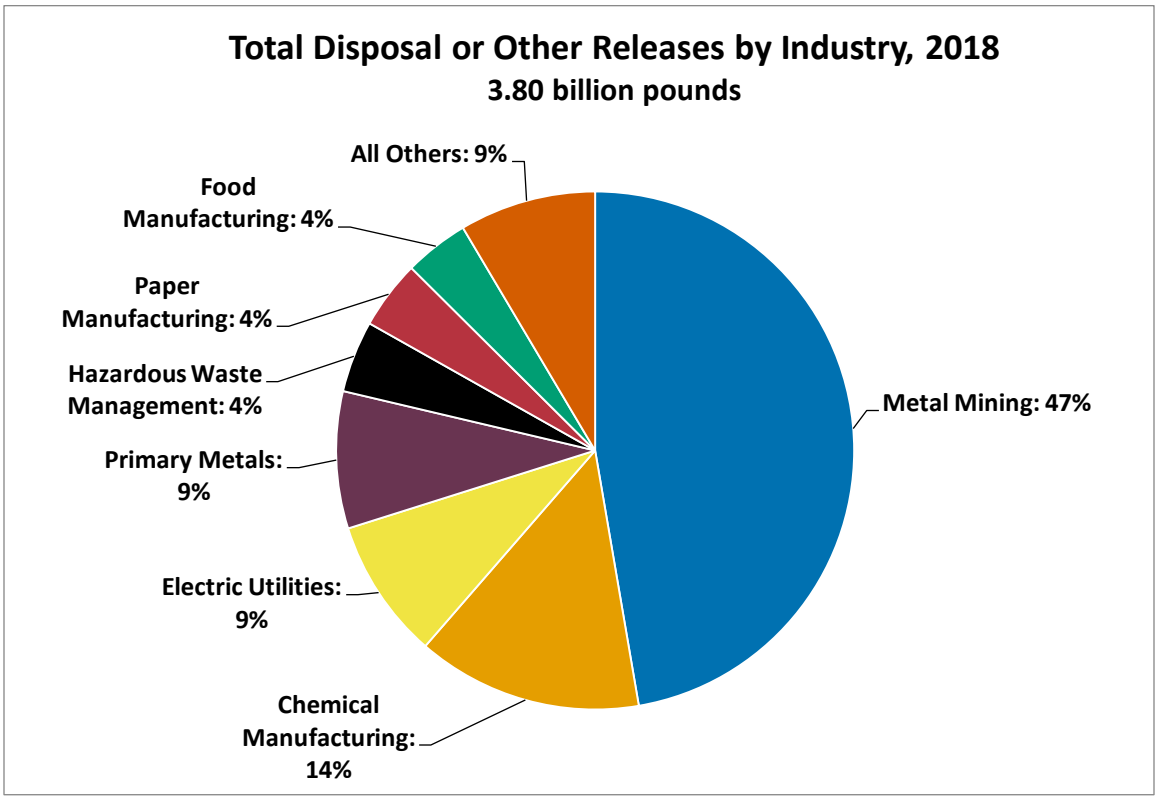
Release quantities of 8 chemicals comprised 75% of total releases.



Note: In this figure, metals are combined with their metal compounds, although metals and compounds of the same metal are listed separately on the TRI list (e.g. lead is listed separately from lead compounds).
Percentages may not sum to 100% due to rounding.

Releases by Industry

The metal mining sector accounted for 47% of releases (1.80 billion pounds), which were primarily in the form of on-site land disposal. Learn more about this sector in the Metal Mining profile.

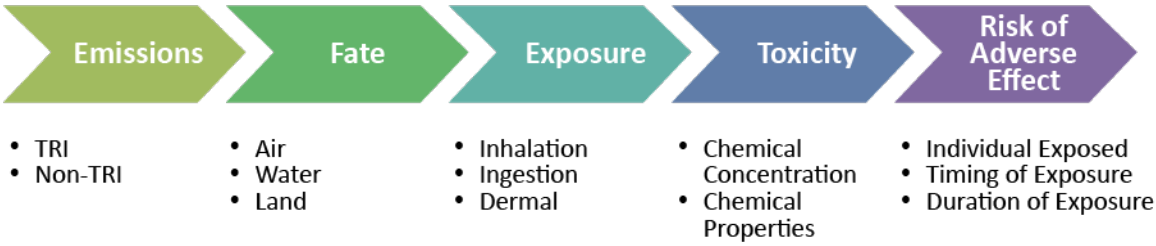


Hazard and Potential Risk of TRI Chemicals

The data collected and made publicly available in the Toxics Release Inventory (TRI) on the quantities of chemical waste released to the environment from industrial and federal facilities throughout the US is measured in pounds. Pounds of releases, however, is not necessarily an indicator of health impacts posed by the chemicals, as described in EPA's Factors to Consider When Using Toxics Release Inventory Data. Although TRI data generally cannot indicate to what extent individuals have been exposed to chemicals, TRI can be used as a starting point to evaluate exposure and potential risks TRI chemicals pose to human health and the environment.

The health risks resulting from exposure to chemicals are determined by many factors, as shown in the figure below. TRI contains some of this information, including what chemicals are released from industrial facilities; the amount of each chemical released; and the amounts released to air, water, and land.

Overview of Factors that Influence Risk



It is important to keep in mind that while TRI includes information on many chemicals used by industry, it does not cover all facilities, all chemicals, or all sources of TRI chemicals in communities. There are other potential sources not tracked by TRI such as exhaust from cars and trucks, chemicals in consumer products, and chemical residues in food and water.

To provide context on the relative hazard and potential for risks posed by certain waste management activities of TRI chemicals (e.g., from releases to the environment), the TRI Program uses EPA's Risk-Screening Environmental Indicators (RSEI) model.

Helpful Concepts

The ***hazard*** of a chemical is its inherent ability to cause an adverse health effect(s) (e.g., cancer, birth defects).

The likelihood that a toxic chemical will cause an adverse health effect following its release into the environment is often referred to as ***risk***. Risk is a function of hazard and exposure.

RSEI is a screening-level, multi-media model that incorporates TRI information together with risk factor concepts to assess the potential chronic human health impacts of TRI chemicals.

RSEI includes TRI data for on-site releases to air and water, transfers to Publicly Owned Treatment Works (POTWs), and transfers for off-site incineration. RSEI does not currently model other TRI-reported waste management activities and release pathways, such as those associated with land disposal.

RSEI produces hazard estimates and unitless risk "scores," which represent relative risks to human health following chronic exposure to a TRI chemical. Each type of result can be compared to other results of the same type.

- RSEI **hazard** estimates consist of the pounds released multiplied by the chemical's toxicity weight. They do not include any exposure modeling or population estimates.
- A RSEI **risk** score is an estimate of potential risk to human health. It is a unitless value that accounts for the magnitude of the release quantity of a chemical, the fate and transport of the chemical throughout the environment, the size and locations of potentially exposed populations, and the chemical's inherent toxicity.

RSEI: Risk-Screening Environmental Indicators

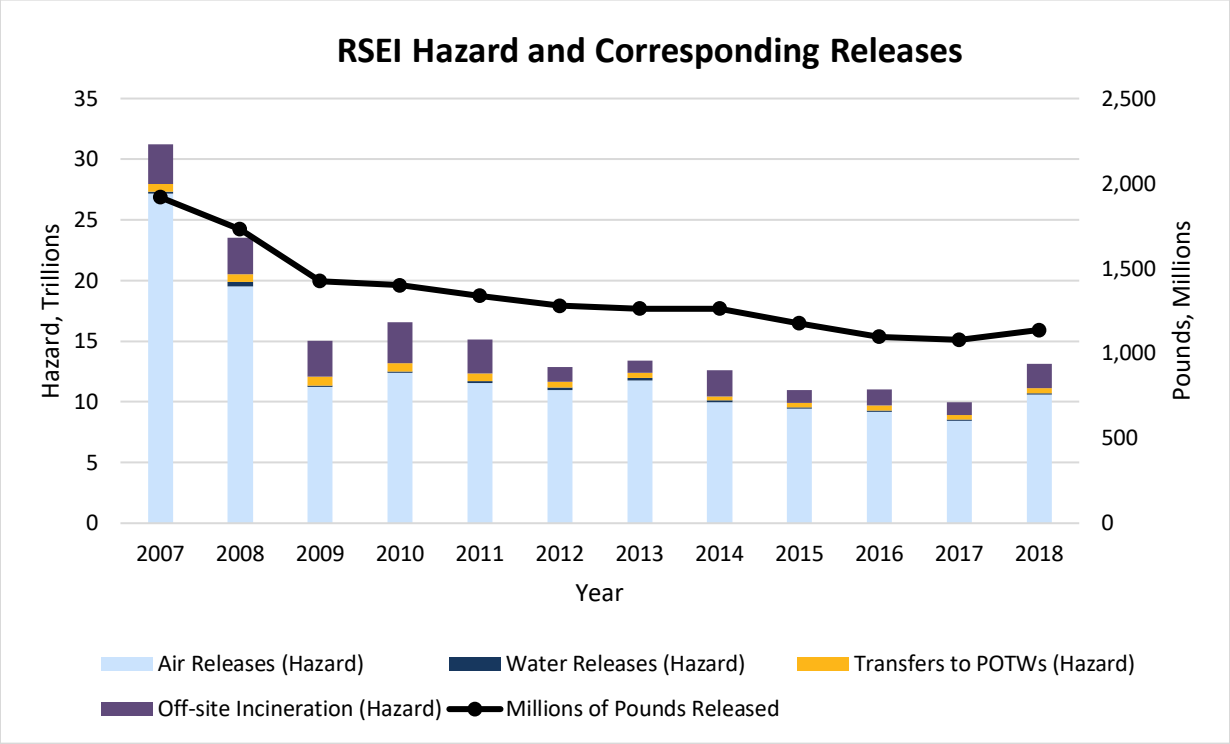
RSEI results consider more than just chemical quantities released.

- **RSEI *hazard*** results also consider:
  - Toxicity of the chemical
- **RSEI *scores*** also consider:
  - Location of releases
  - Toxicity of the chemical
  - Environmental fate and transport
  - Human exposure pathway

Note that RSEI is not a stand-alone source of information for making conclusions or decisions about the risks posed by any particular facility or environmental release of a TRI chemical. RSEI does not produce a formal risk assessment, and RSEI results should not be used to determine whether a facility is in compliance with federal or state regulations. RSEI results should only be used for screening-level activities such as trend analyses that compare potential relative risks from year to year, or ranking and prioritizing chemicals, industry sectors, or geographic regions for strategic planning. RSEI can be used, however, in conjunction with other data sources and information, to help policy makers, researchers, and communities establish priorities for further investigation and to look at changes in potential human health impacts over time.

Hazard Trend

RSEI hazard estimates provide greater insight on the potential impacts of TRI chemical releases than consideration of TRI release quantities alone. RSEI hazard considers the amounts of chemicals released on site to air and water by TRI facilities or transferred off site to Publicly Owned Treatment Works (POTWs) or incinerators, multiplied by the toxicity weight of the chemicals. The following graph shows the trend in RSEI hazard compared to the trend in the corresponding pounds of TRI chemical releases.



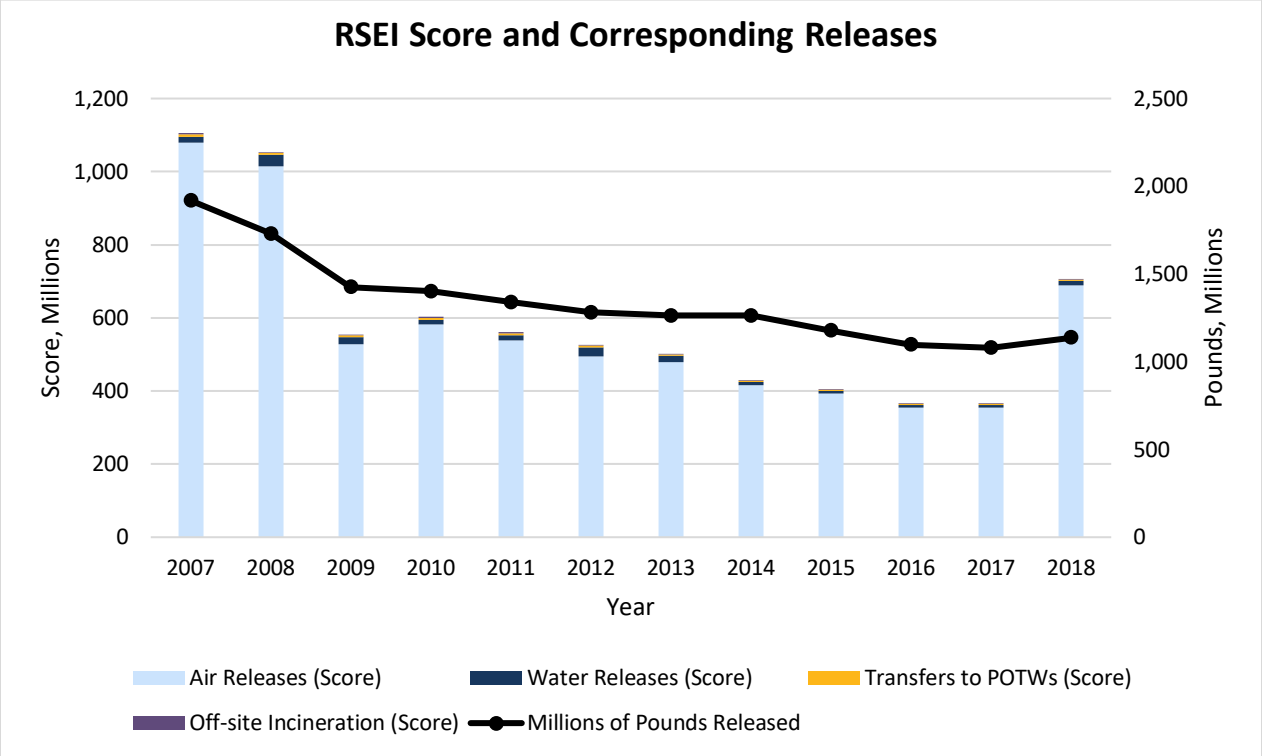
Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- The overall RSEI hazard estimate decreased by 58%, while corresponding pounds released decreased by 41%. Thus, in recent years, TRI-reporting facilities are not only releasing fewer pounds of TRI chemicals, they may be releasing proportionally fewer pounds of the more toxic TRI chemicals relative to the less toxic TRI chemicals.
- The decrease in the hazard estimate from 2008 to 2009 was driven by a large decrease in chromium releases to air from three facilities.
- The increase in the hazard estimate from 2017 to 2018 was driven by large fugitive air releases of chromium at one facility and large off-site transfers to incineration of hydrazine and nitroglycerin by two other facilities.

Risk-Screening Trend

EPA's RSEI model also estimates risk "scores" that represent relative human health risk from chronic exposure to TRI chemicals. These risk scores can be compared to RSEI-generated risk scores from other years. RSEI scores are different from RSEI hazard estimates in that RSEI scores consider the location of the release, chemical fate and transport throughout the environment, and the route and extent of potential human exposure. The following graph shows the trend in the RSEI score compared to the trend in the corresponding pounds of TRI chemical releases.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- The overall RSEI score estimate decreased by 36%, while corresponding pounds released decreased by 41%.
- Of the types of releases modeled by RSEI, air releases, by far, contributed the most to the RSEI scores.
- The increase in RSEI score from 2017 to 2018 was driven by increases in reported fugitive air emissions of chromium and chromium compounds from two facilities located

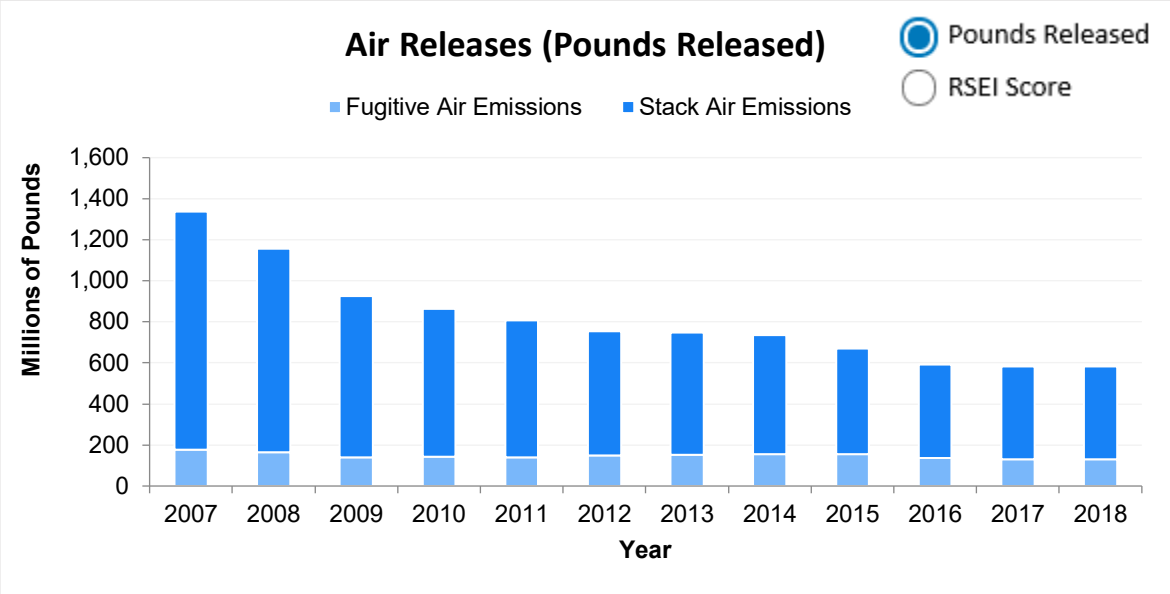
in Houston, Texas and Ocala, Florida, as well as a facility that reported a large stack air release of ethylene oxide for the first time in Jacksonville, Florida.

RSEI Dashboard

- Use the EPA's Risk-Screening Environmental Indicators (RSEI) EasyRSEI dashboard to view the national trend in RSEI hazard and RSEI score, or use the Dashboard's filter capabilities to view RSEI information for a specific chemical or location of interest.

Air Releases

Air emissions reported to TRI continue to decline, serving as a primary driver of decreased total releases. Air releases include both fugitive air emissions and stack air emissions. This graph shows the trend in the pounds of chemicals released to air. Air emissions are regulated by EPA under the Clean Air Act.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- Air releases declined significantly, serving as a primary driver of decreases in total releases.
- Air releases decreased by 56% (755 million pounds).
    - Hydrochloric acid, sulfuric acid, hydrogen fluoride, methanol, toluene, and styrene were the chemicals with the greatest reductions in air releases since 2007.
    - The decrease was driven by electric utilities due to: decreased emissions of Hazardous Air Pollutants (HAPs) such as hydrochloric acid; a shift from coal to other fuel sources (e.g., natural gas); and the installation of control technologies at coal-fired power plants.
    - Electric utilities accounted for 93% of nationwide reductions in air releases of hydrochloric acid and sulfuric acid from 2007 to 2018.

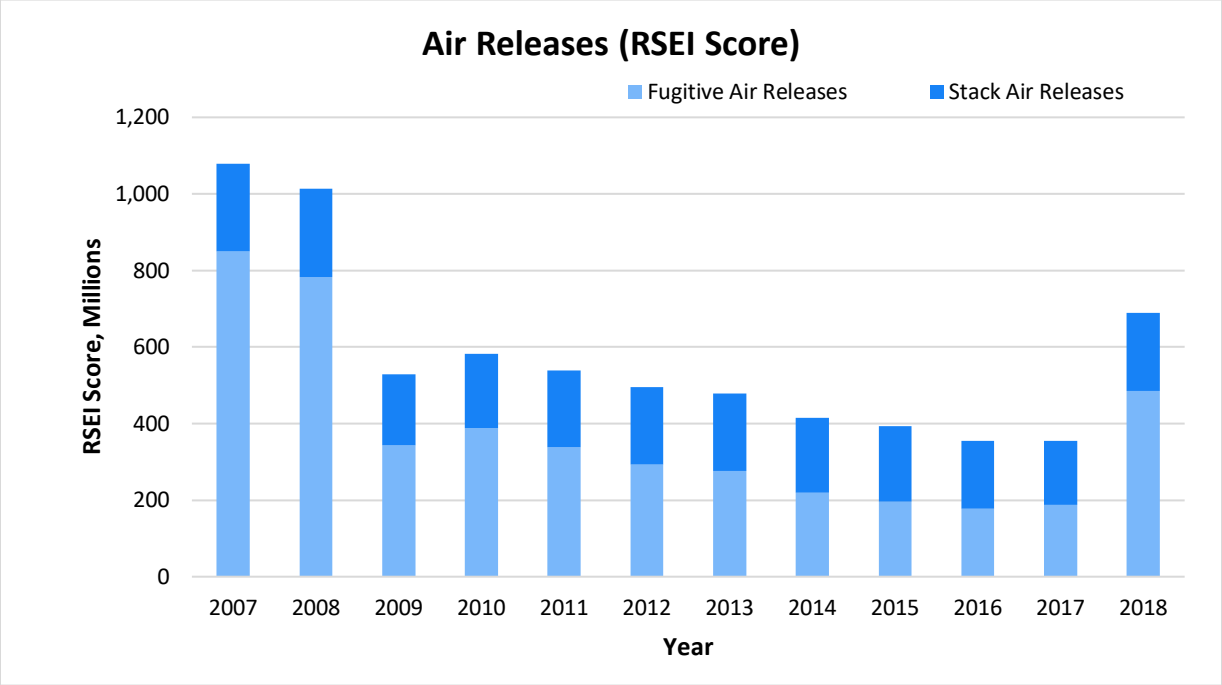
  - Note that only those electric utilities that combust coal or oil to generate power for distribution into commerce are covered under TRI reporting requirements. Therefore, electric utilities that shift from combusting coal or oil to entirely using other fuel sources (such as natural gas) no longer report to TRI.

- Air releases of Occupational Safety and Health Administration (OSHA) carcinogens also decreased; see the Air Releases of OSHA Carcinogens figure.
- For trends in air releases of other chemicals of special concern, including lead and mercury, see the Chemicals of Special Concern section.
- Air releases are regulated by EPA under the Clean Air Act, which requires major sources of air pollutants to obtain and comply with an operating permit.

In 2018:

- Ammonia, followed by methanol, accounted for the greatest air releases of TRI chemicals.
- Air releases decreased by less than one percent since 2017.

This graph shows the trend in the RSEI Scores for TRI air releases.

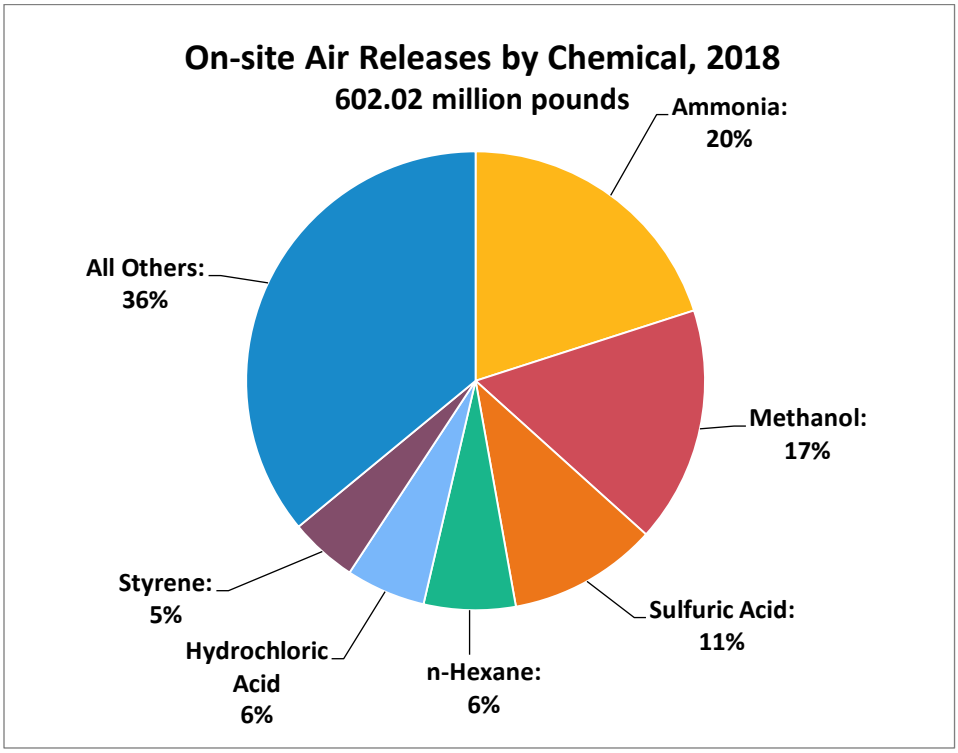


Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

- The top chemicals by RSEI score for air releases were chromium and ethylene oxide.
- The increase in RSEI score from 2017 to 2018 was driven by increases in reported fugitive air emissions of chromium and chromium compounds from two facilities located in Houston, Texas and Ocala, Florida, as well as a facility that reported a large stack air release of ethylene oxide for the first time in Jacksonville, Florida.
- Stack air releases tend to contribute relatively less to the RSEI score than fugitive air releases. This is because chemicals released through stacks tend to get dispersed over a wider area than fugitive air releases, resulting in lower average concentrations, and therewith, lower potential for population exposure.
- For a complete, step-by-step description of how RSEI models air releases and derives RSEI Scores from stack air emissions and fugitive air emissions, see "Section 5.3 Modeling Air Releases" in Chapter 5 ("Exposure and Population Modeling") of EPA's Risk-Screening Environmental Indicators (RSEI) Methodology, RSEI Version 2.3.6.
- For general information on how RSEI Scores are estimated, see Hazard and Potential Risk of TRI Chemicals.

Air Releases by Chemical

This pie chart shows which TRI chemicals were released to air in the greatest quantities during 2018.



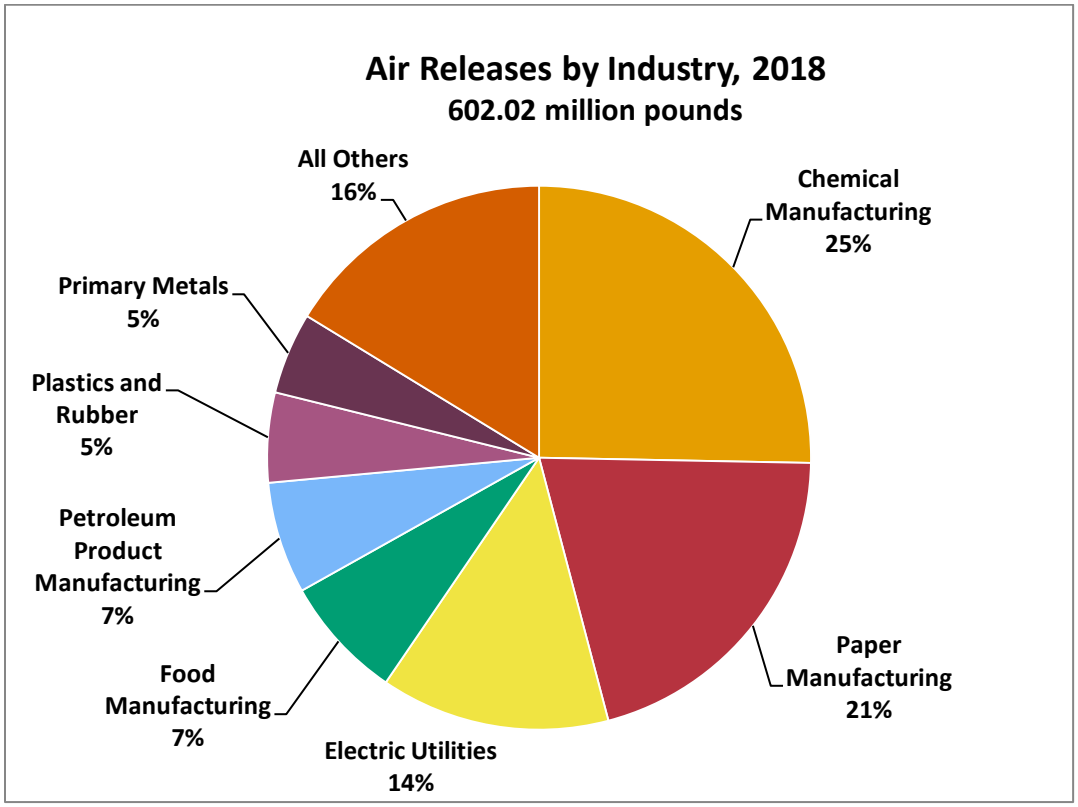
Note: Percentages may not sum to 100% due to rounding.

- Facilities manufacturing nitrogen fertilizers accounted for about one third of the air releases of ammonia reported to TRI for the past five years.
- Air releases of methanol were primarily from pulp, paper, and paperboard mills and have decreased by 24% since 2007.
- Air releases of n-hexane were primarily from food manufacturing facilities. Air releases of n-hexane have increased by 10% since 2007.
- Thirty-three percent of hydrochloric acid and 78% of sulfuric acid emissions to air were reported by facilities in the electric utilities sector. Air releases of these two chemicals reported to TRI have decreased considerably since 2007. One reason for the decrease in air releases of these chemicals reported to TRI is the increase in the use of natural gas

as a fuel for electricity generation. Natural gas power plants are not required to report to TRI.

Air Releases by Industry

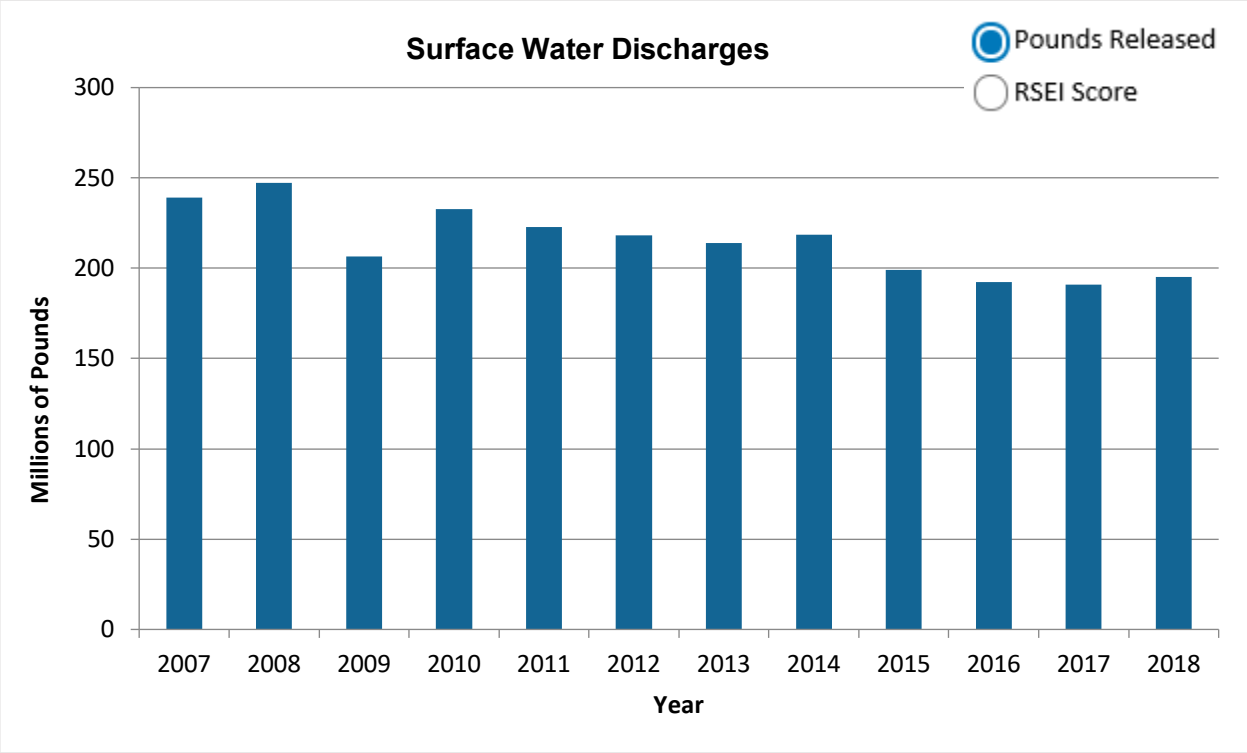
This pie chart shows the TRI-covered industry sectors that reported the greatest releases of TRI chemicals to air during 2018.



- Chemical manufacturing, paper manufacturing, and the electric utility sectors accounted for the greatest releases to air in 2018. Air releases in these three industries each changed by less than 1% since 2017:
    - Chemical manufacturing: 652,000 pound decrease
    - Paper manufacturing: 423,000 pound increase
    - Electric utilities: 336,000 pound decrease

Water Releases

Facilities are required to report the quantity of Toxics Release Inventory (TRI) chemicals they release to receiving streams or other water bodies. Surface water discharges are often regulated by other programs and require permits such as the Clean Water Act National Pollutant Discharge Elimination System (NPDES) permits. The following graph shows the trend in the pounds of TRI chemical waste discharged to water bodies.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

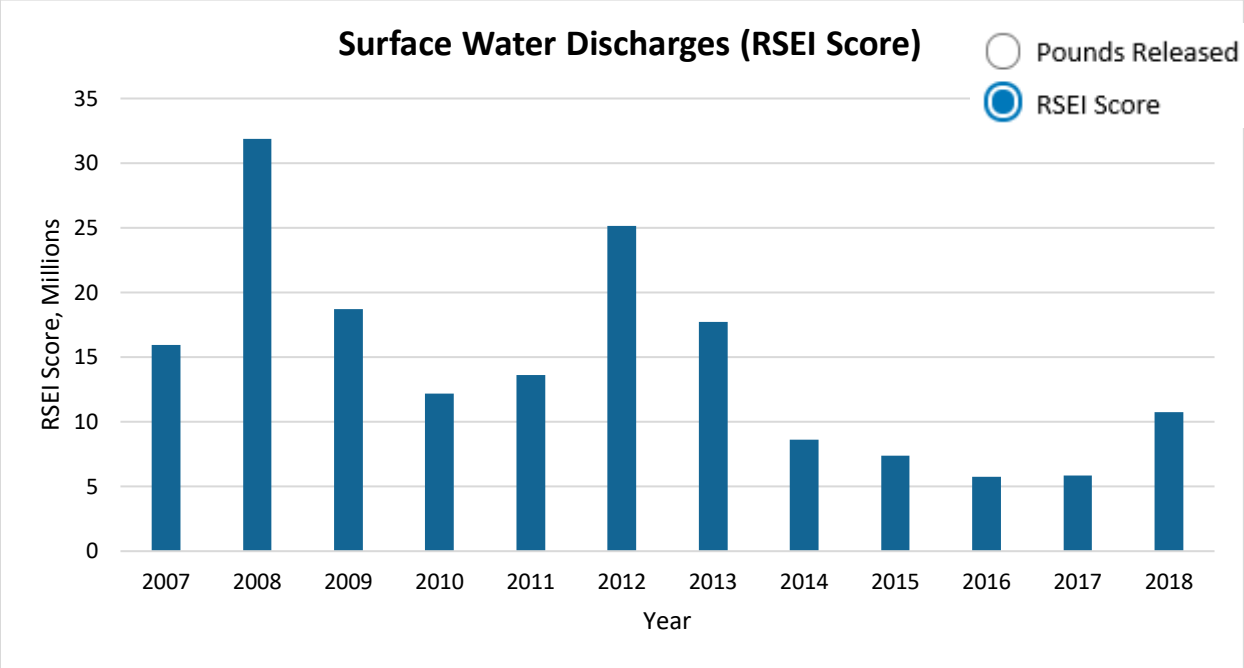
From 2007 to 2018:

- Surface water discharges decreased by 18% (44 million pounds). Most of this decline was due to reduced releases of nitrate compounds to water.
    - Nitrate compounds are often formed as byproducts during wastewater treatment processes such as when nitric acid is neutralized, or when nitrification takes place to meet standards under EPA's effluent guidelines. Nitrate compounds are released to water in quantities that are larger than any other TRI chemical released to water.

In 2018:

- Nitrate compounds alone accounted for 89% of the total quantity of all TRI chemicals discharged to surface waters.

The following graph shows the trend in the RSEI Scores for TRI chemicals released to water bodies.

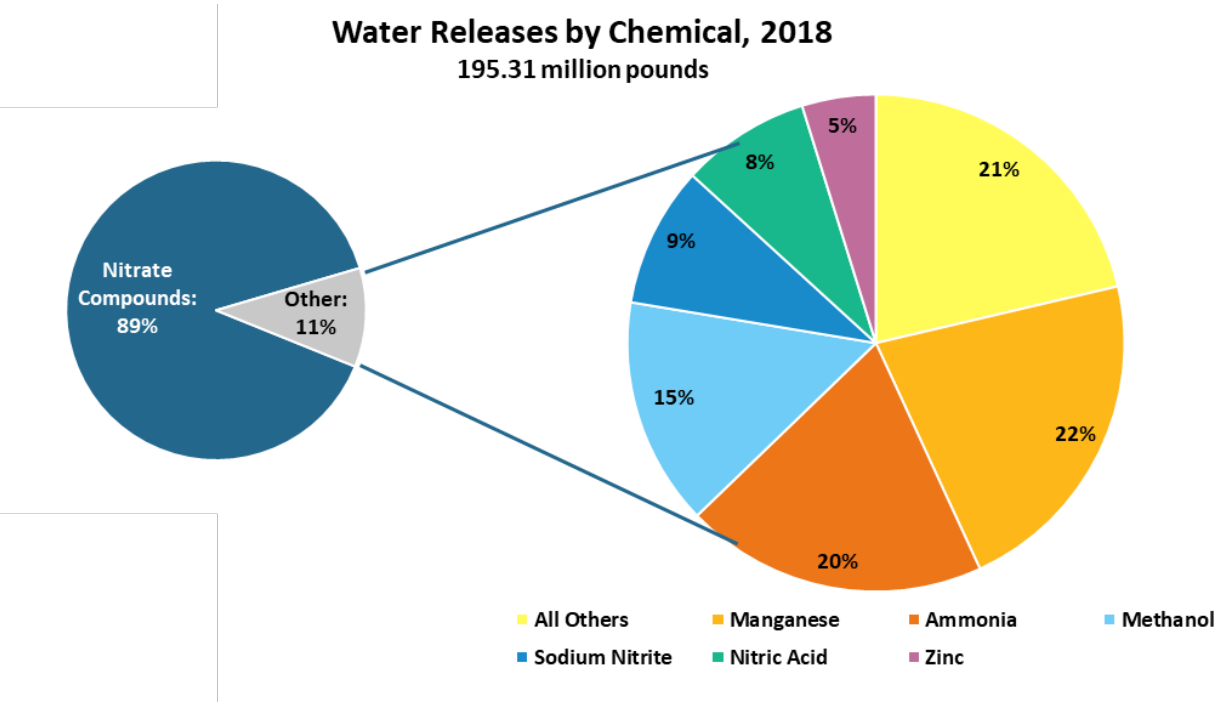


- The biggest contributor to RSEI water scores from 2007 to 2018 was arsenic compounds. For 2018, the largest contributor to RSEI water scores was mercury compounds.
- The increase in the RSEI score from 2017 to 2018 was due to an overall increase in surface water discharges of TRI chemicals, and also large releases to water of mercury from the Chemours Starke facility in Starke, Florida. [Click to view facility details in the P2 tool]
- The high RSEI score for water discharges in 2008 includes a large one-time release of arsenic compounds due to a coal fly ash slurry spill, and a release of benzidine, which has a relatively high toxicity.
- For a complete, step-by-step description of how RSEI derives RSEI Scores from surface water discharges of TRI chemicals see "Section 5.4 Modeling Surface Water Releases" in Chapter 5 ("Exposure and Population Modeling") of EPA's Risk-Screening Environmental Indicators (RSEI) Methodology, RSEI Version 2.3.6.

- For general information on how RSEI Scores are estimated, see Hazard and Potential Risk of TRI Chemicals.

Water Releases by Chemical

This pie chart shows which TRI-listed chemicals were released to water bodies in the greatest quantities during 2018.



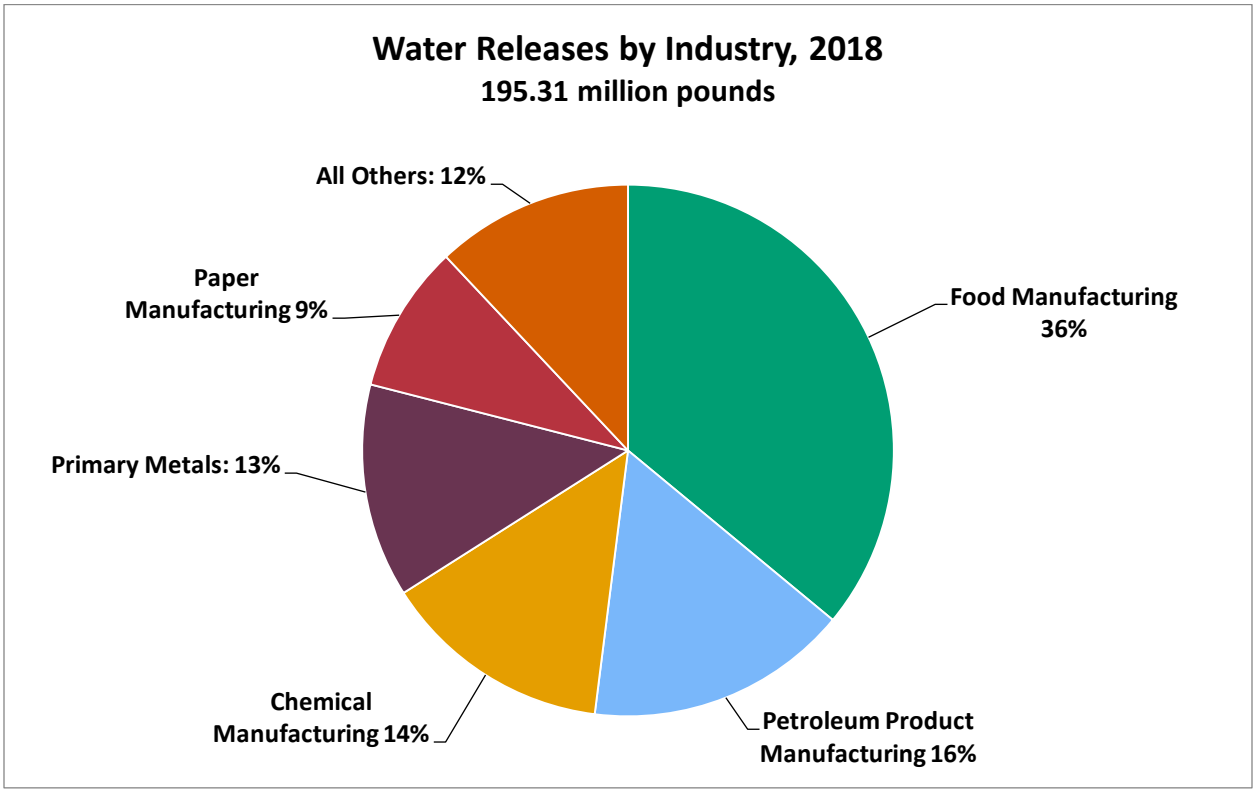
Note: In this chart, metals are combined with their metal compounds, although metals and compounds of the same metal are listed separately on the TRI list (e.g. lead is listed separately from lead compounds).

- Nitrate compounds accounted for 89% of the total quantity of TRI chemicals released to water in 2018. Nitrate compounds are soluble in water and commonly formed as part of facilities' on-site wastewater treatment processes. The food manufacturing sector contributed 40% of total nitrate compound releases to water, due to the treatment required for large quantities of biological materials in wastewaters from meat processing facilities.
    - While nitrate compounds are less toxic to humans than many other TRI chemicals, in nitrogen-limited waters, nitrates have the potential to cause increased algal growth leading to eutrophication in the aquatic environment. See EPA's Nutrient Pollution webpage for more information about the issue of eutrophication.

- Manganese and manganese compounds, ammonia, and methanol were the next most commonly released chemicals, and, in terms of combined mass quantities, accounted for 6% of the chemicals released to water.

Water Releases by Industry

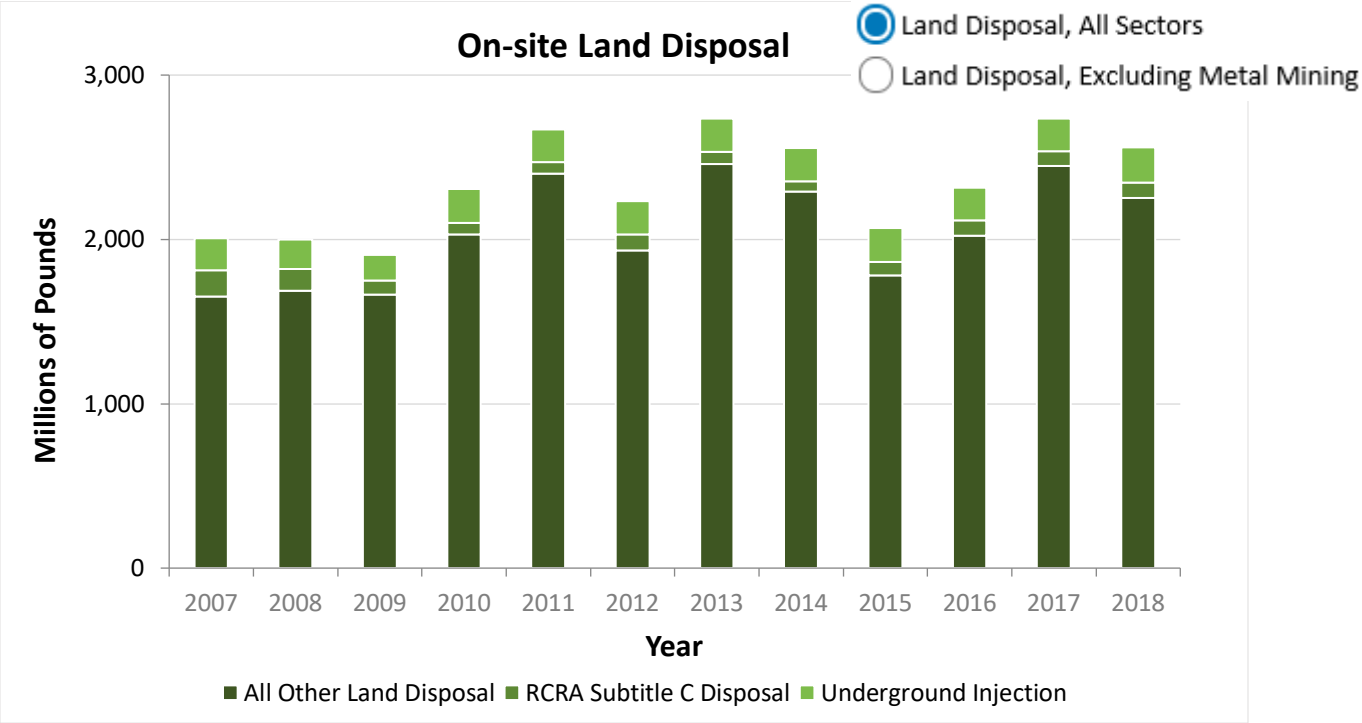
This pie chart shows the TRI-covered industry sectors that reported the greatest releases of TRI chemicals to water bodies during 2018.



- The food manufacturing sector accounted for 36% of the total quantities of TRI chemicals released to water during 2018, which was similar to its contribution over the past 10 years.
    - Nitrate compounds accounted for 99% of the total quantities of TRI chemicals released to water from the food manufacturing sector. Nitrate compounds are relatively less toxic to humans than many other TRI chemicals discharged to surface waters but are formed in large quantities by this sector during wastewater treatment processes due to the high biological content of wastewater.

Land Disposal

This graph shows the trend in chemicals reported to TRI as disposed of to land. The metal mining sector accounts for most of the TRI chemical quantities disposed of to land. Disposal of chemicals to land is often regulated by EPA under the Resource Conservation and Recovery Act (RCRA).



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- On-site land disposal increased by 28% (from 2.0 to 2.6 billion pounds).
- Recent fluctuations were primarily due to changes in TRI chemical quantities disposed of to land on site by metal mines.

- "All Other Land Disposal" in the figure includes disposal: in landfills and surface impoundments that are not regulated under RCRA Subtitle C; to soil (land treatment/application farming); and any other land disposal. Most of the TRI chemical quantities reported as "other land disposal" were from the disposal of waste rock at metal mines.

In 2018:

- Land disposal trends are largely driven by the metal mining sector, which accounted for 70% of land disposal quantities. Select the "Land Disposal, Excluding Metal Mining" button to view the land disposal trend with metal mines excluded from the analysis.
    - Most of the land disposal quantities from the metal mining sector were made up of either lead compounds (44%) or zinc compounds (26%).

Helpful Concepts

What is underground injection?

Underground injection involves placing fluids underground in porous formations through wells.

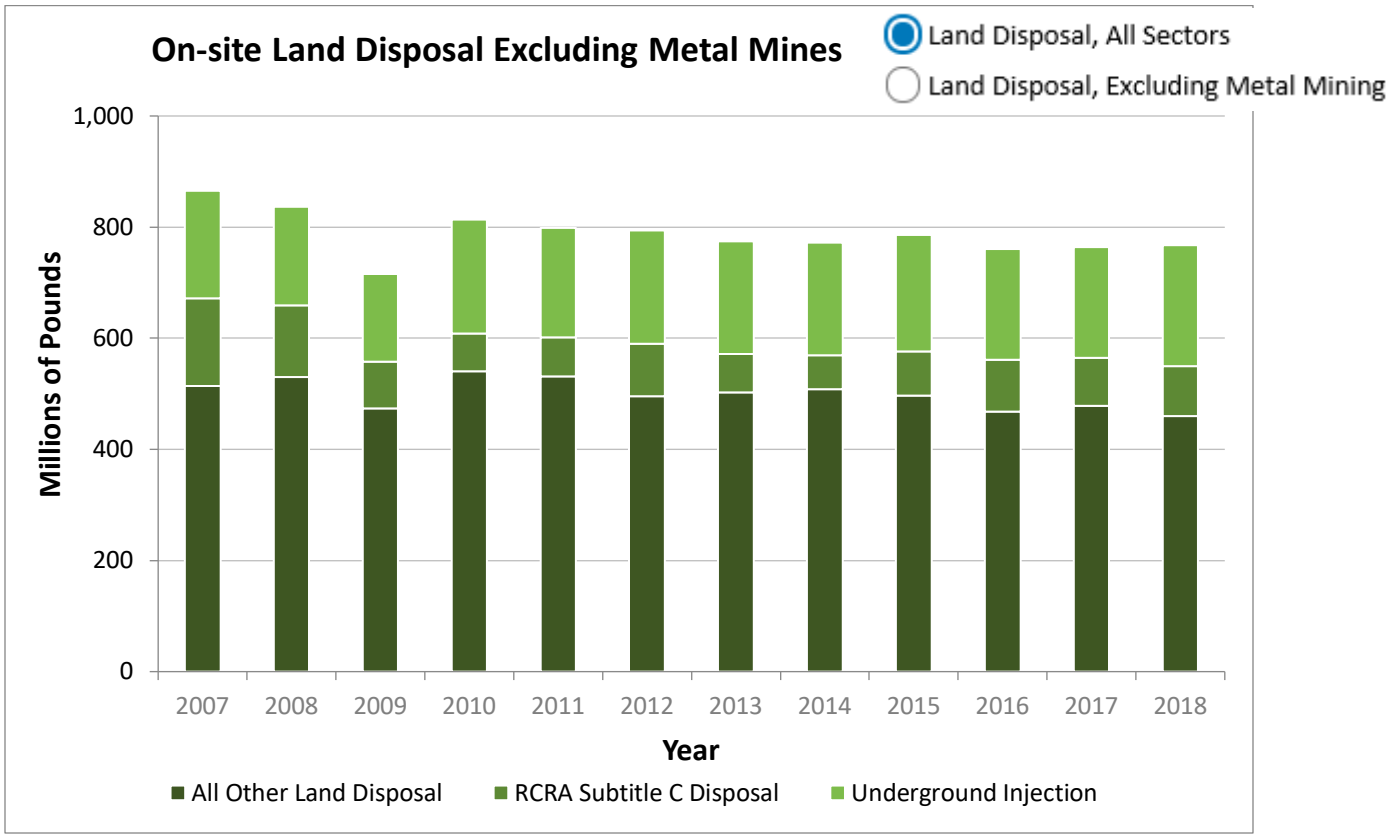
What is RCRA Subtitle C disposal?

The RCRA Subtitle C Disposal category in TRI includes disposal to landfills and surface impoundments authorized to accept hazardous waste under the Resource Conservation and Recovery Act (RCRA). RCRA design standards include a double liner, a leachate collection and removal system, and a leak detection system. Operators must also comply with RCRA inspection, monitoring, and release response requirements.

Metal mining facilities typically handle large volumes of material. In this sector, even a small change in the chemical composition of the mineral deposit being mined can lead to big changes in the amount of TRI-listed chemicals reported. In recent years mines have cited changes in production of waste rock, changes in the chemical composition of waste rock, and the closure of a heap leach pad as the primary reasons for the reported variability in land disposal of TRI chemicals. Changes in waste rock composition can have an especially pronounced effect on TRI reporting because of a regulatory exemption that applies based on a chemical's concentration in the rock, regardless of total chemical quantities generated.

Regulations require that waste rock, which contains contaminants, be placed in engineered piles, and may also require that waste rock piles, tailings impoundments, and heap leach pads be stabilized and re-vegetated to provide for productive post-mining land use.

For more information on the mining industry, see the Metal Mining sector profile.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

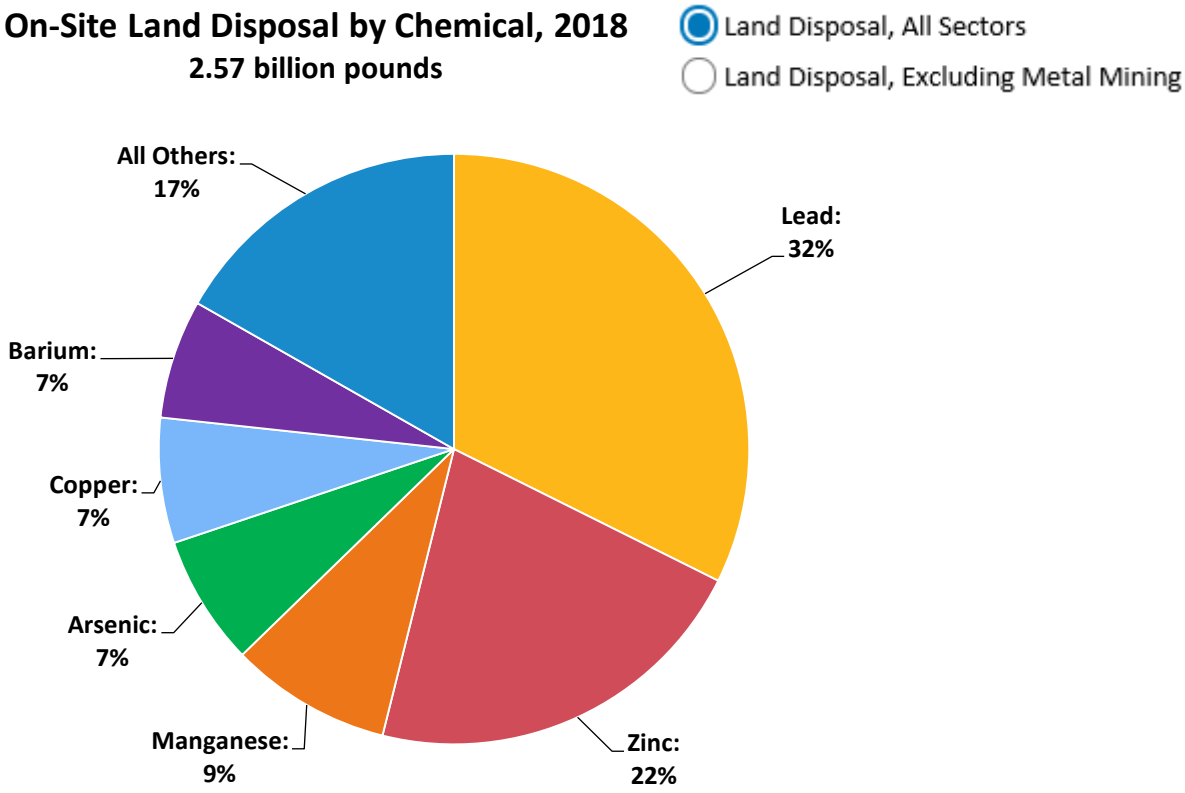
- Total on-site land disposal for all industries other than metal mining decreased by 11%.
- The decrease in land disposal for industries other than metal mining was driven by reduced releases to land from electric utilities and hazardous waste management facilities.

In 2018:

- Excluding on-site land disposal by metal mines, the chemicals disposed of to land in the largest quantities were: barium and barium compounds (18%), manganese and manganese compounds (12%), and zinc and zinc compounds (10%).
- Excluding on-site land disposal by metal mines, most land disposal was reported by the chemical manufacturing, electric utilities, hazardous waste management, and primary metals sectors.

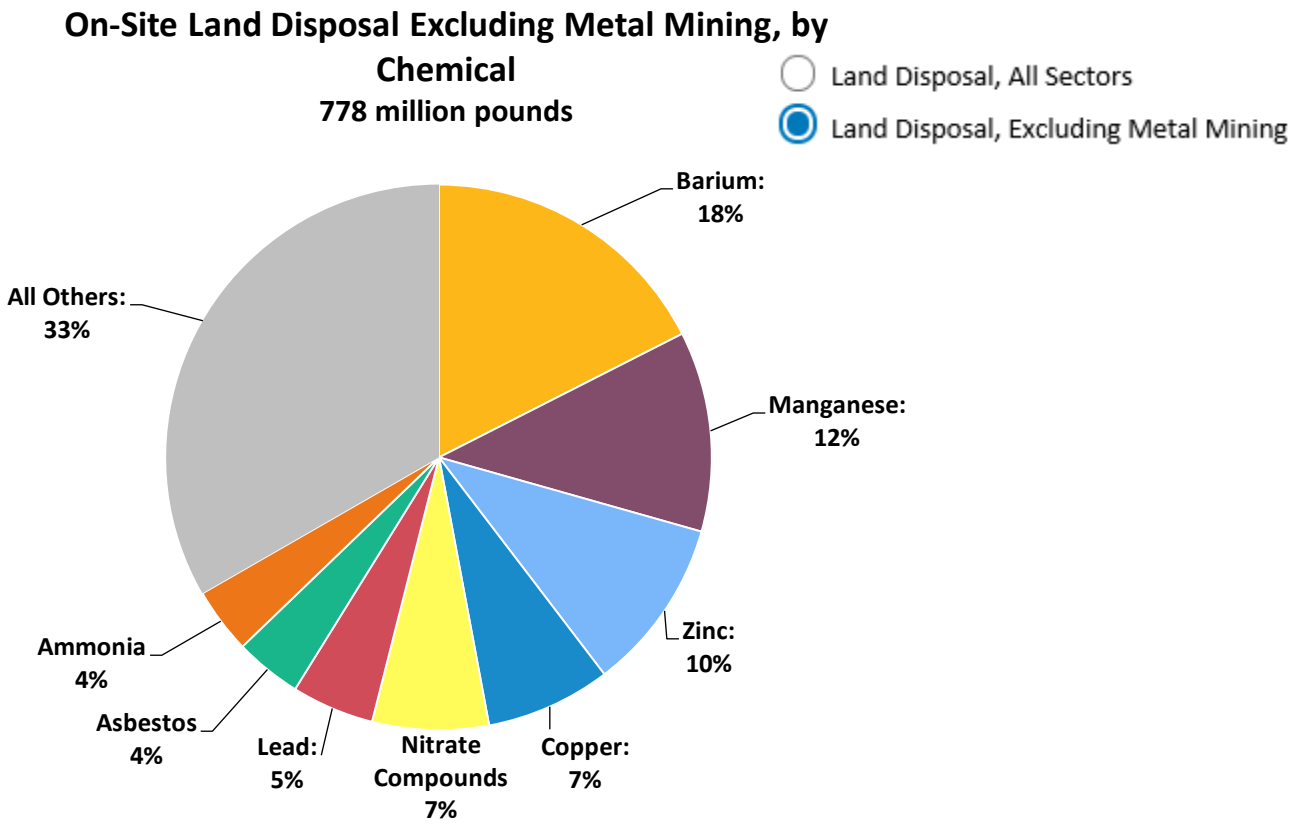
Land Disposal by Chemical

This pie chart shows the chemicals disposed of to land on site in the greatest quantities during 2018.



Note: In this chart, metals are combined with their metal compounds, although metals and compounds of the same metal are listed separately on the TRI list (e.g. lead is listed separately from lead compounds). Percentages may not sum to 100% due to rounding.

The metal mining sector alone was responsible for 95% of the lead and lead compounds and 86% of the zinc and zinc compounds disposed of to land in 2018. Annual fluctuations occur in land disposal quantities reported by metal mines because even a small change in the chemical composition of the mineral deposit being mined can lead to big changes in the amount of TRI-listed chemicals reported nationally.



Note: In this chart, metals are combined with their metal compounds, although metals and compounds of the same metal are listed separately on the TRI list (e.g. lead is listed separately from lead compounds).

From 2007 to 2018:

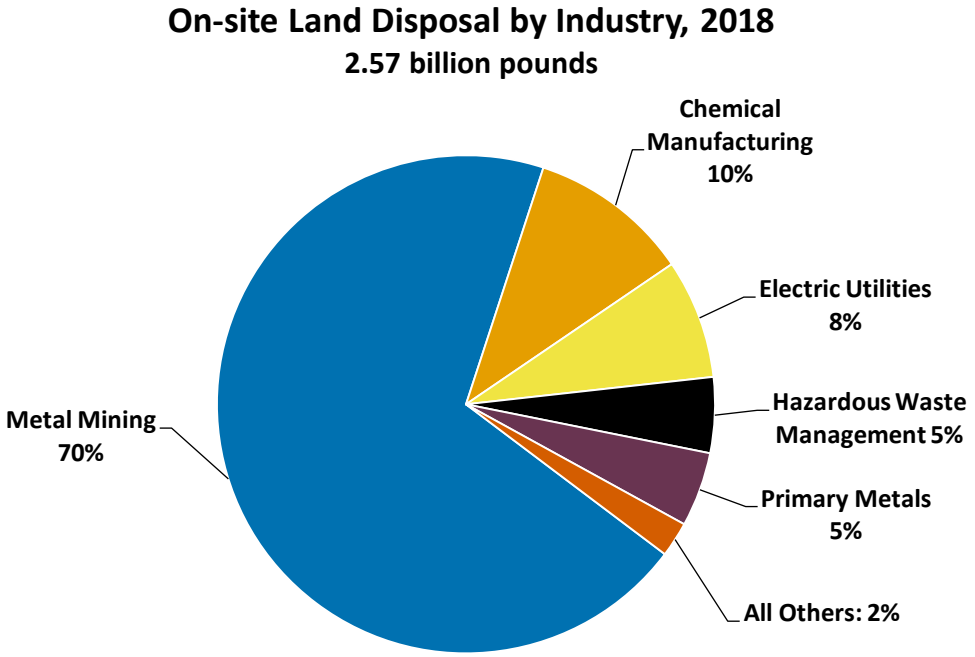
- Barium: Releases decreased 27%.
- Manganese: Releases decreased 17%.
- Zinc: Releases decreased 47%.

In 2018:

- When the metal mining sector is excluded, a wider variety of chemicals contribute to most of the land releases. Eight different chemicals, for example, comprised 67% of land releases, as opposed to three chemicals comprising a comparable 63% of releases when metal mining is included.

Land Disposal by Industry

This pie chart shows the TRI-covered industry sectors that reported the greatest quantities of TRI chemicals disposed of to land on site during 2018.



- The metal mining sector accounted for most of the TRI chemicals disposed of to land in 2018, mostly due to chemicals contained in waste rock.
- The relative contribution by each industry sector to on-site land disposal has not changed considerably in recent years.

Chemicals of Special Concern

In this section, we take a closer look at some Toxics Release Inventory (TRI) chemicals that are of special concern: 1) persistent, bioaccumulative, and toxic (PBT) chemicals; and 2) known or suspected human carcinogens.

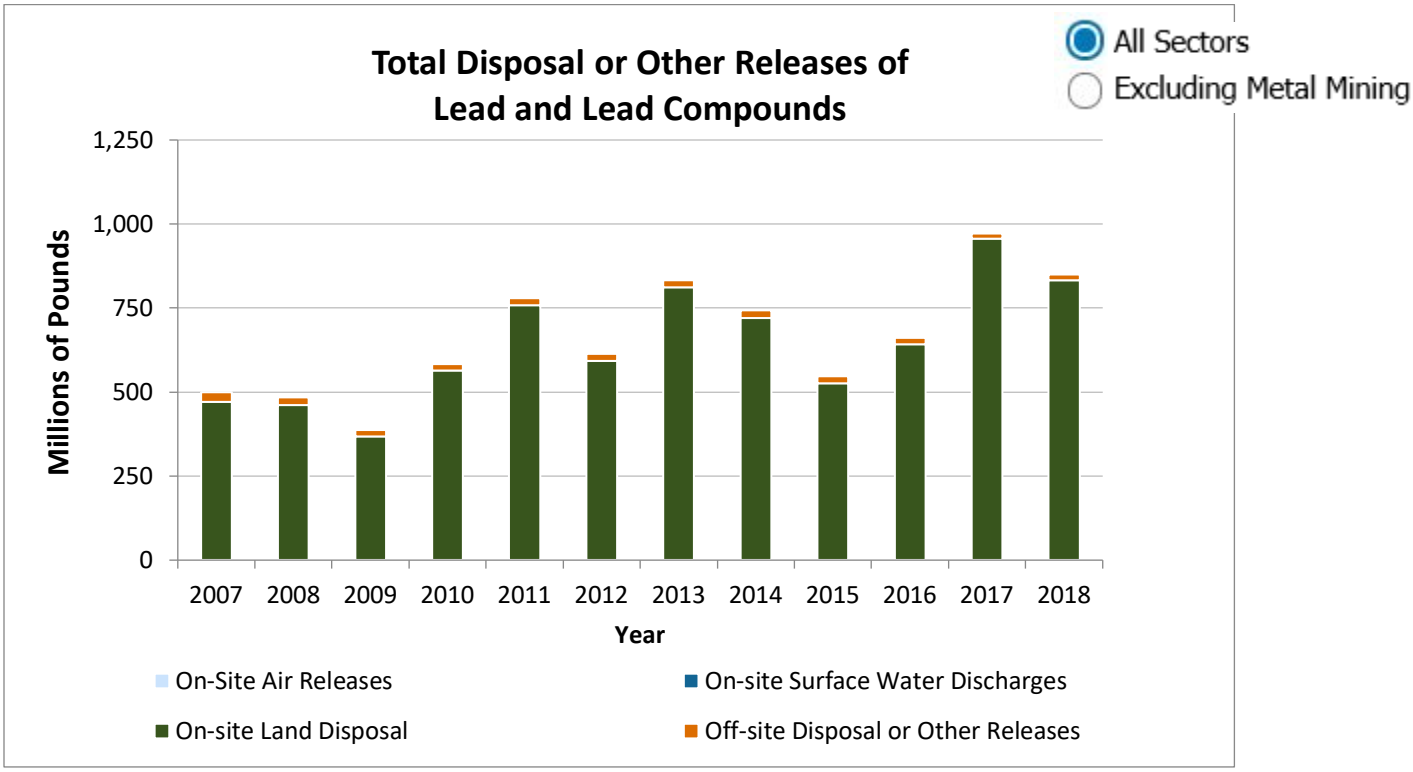
Chemicals designated as PBTs are toxic and remain in the environment for a long time where they tend to build up in the tissue of organisms throughout the food web. These organisms serve as food sources for other organisms, including humans, that are sensitive to the toxic effects of PBT chemicals.

Reporting requirements for the 16 chemicals and 5 chemical categories designated as PBTs on the TRI chemical list for Reporting Year 2018 are more stringent than for other TRI chemicals. This section focuses on the following PBT chemicals: lead and lead compounds; mercury and mercury compounds; and dioxin and dioxin-like compounds.

There are also chemicals included on the TRI chemical list that the Occupational Safety and Health Administration (OSHA) includes on its list of carcinogens. These chemicals also have more stringent TRI reporting requirements. This section presents the trend in air emissions for the OSHA carcinogens reported to TRI. A list of these chemicals can be found on the TRI basis of OSHA carcinogens webpage.

Lead Releases Trend

This graph shows the trend in the pounds of lead and lead compounds disposed of or otherwise released by TRI reporting facilities including metal mines, manufacturing facilities, hazardous waste management facilities and electric utilities.



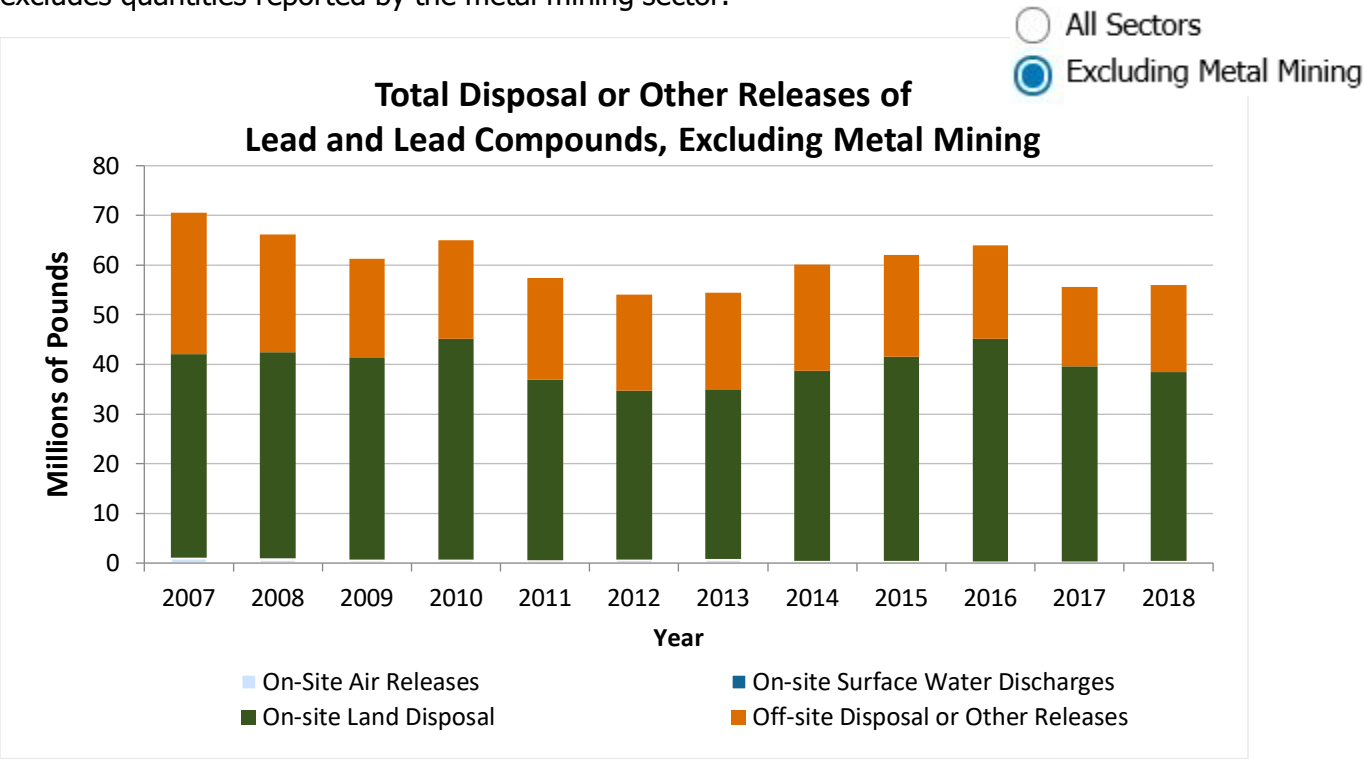
From 2007 to 2018:

- Releases of lead and lead compounds rose and fell between 2007 and 2018, with an overall increase of 71%.
- The metal mining sector accounts for most of the lead and lead compounds disposed of on site to land, driving the overall trend. For 2018, for example, metal mines reported 95% of total lead and lead compounds disposed of to land on site.

From 2017 to 2018:

- Total releases of lead and lead compounds decreased by 12% (121 million pounds).

This graph shows the trend in lead and lead compounds disposed of or otherwise released, but excludes quantities reported by the metal mining sector.

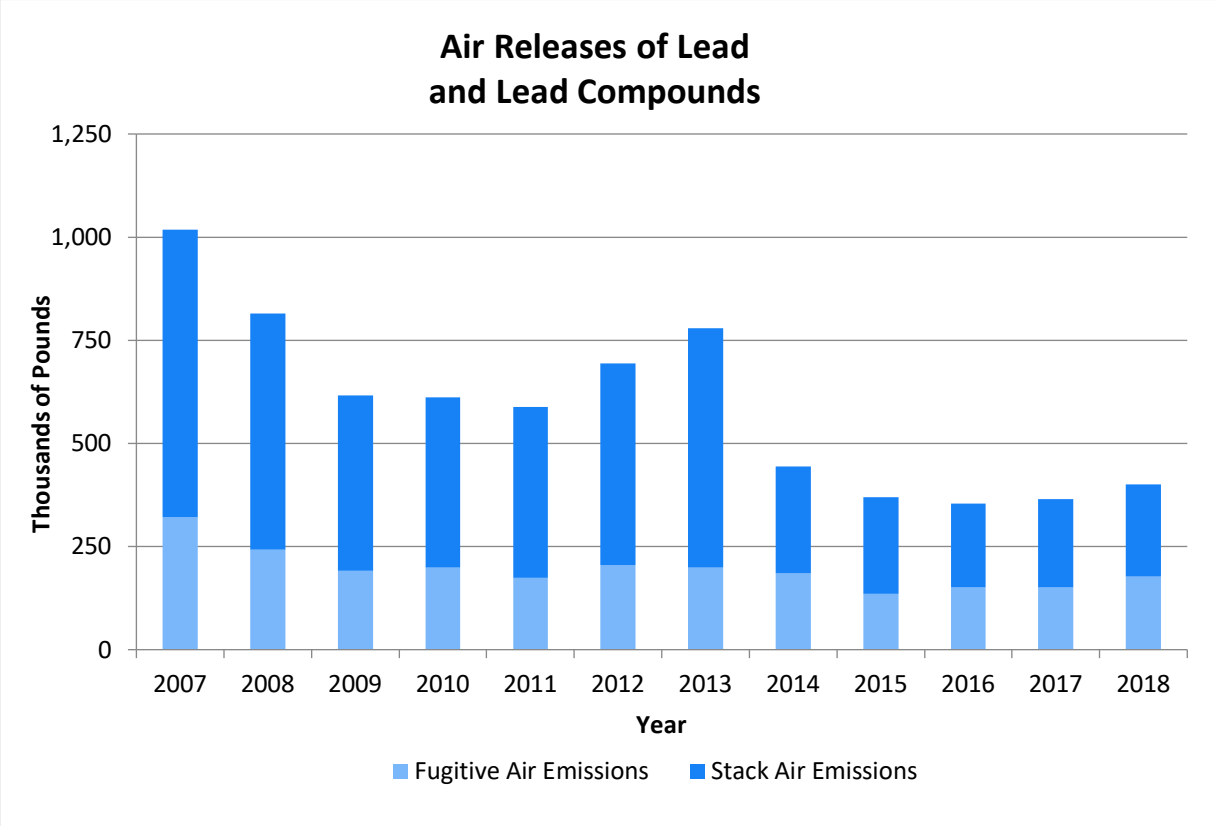


From 2007 to 2018:

- Among sectors other than metal mining, releases of lead and lead compounds have decreased by 21% (14.5 million pounds).
- Among sectors other than metal mining, most releases of lead and lead compounds were from the primary metals and hazardous waste management sectors.

Lead Air Releases Trend

This graph shows the trend in the pounds of lead and lead compounds released to air.



From 2007 to 2018:

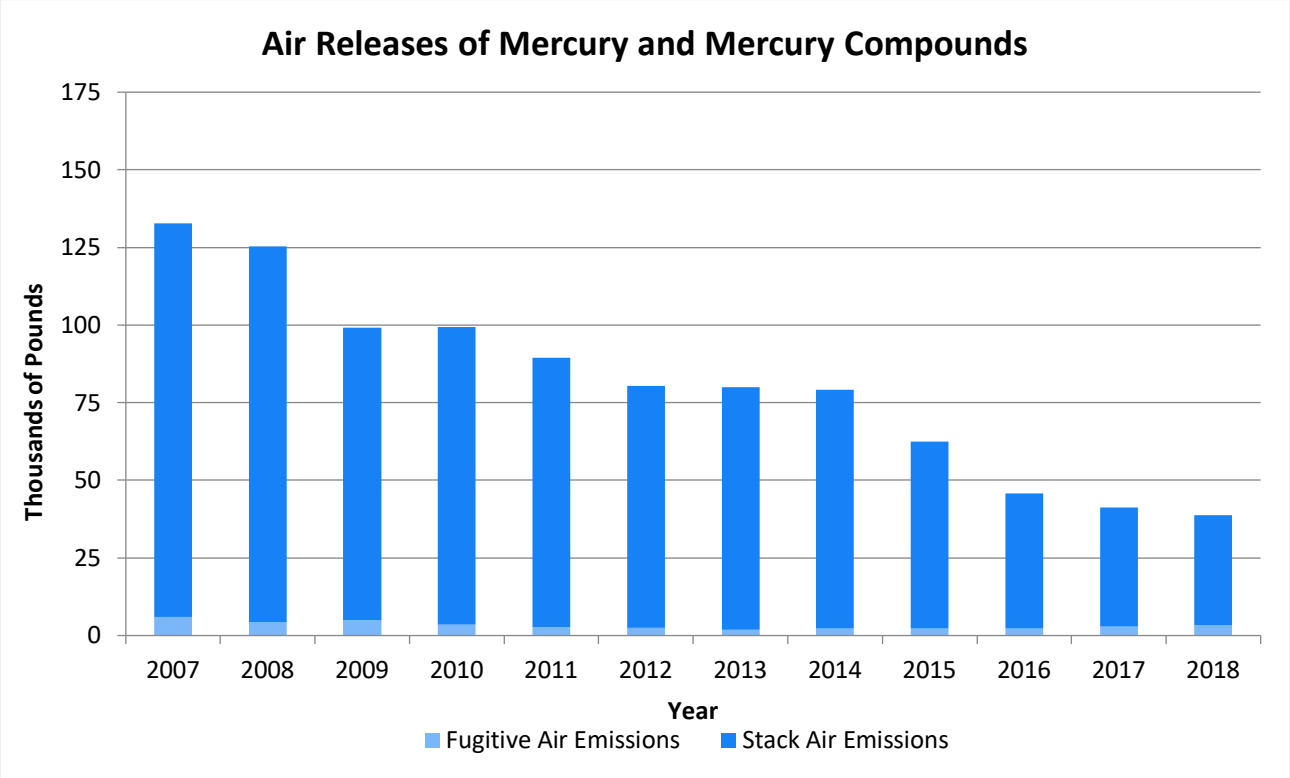
- Air releases of lead and lead compounds decreased by 61%. The primary metals and electric utilities industry sectors have driven this decrease.
- The primary metals sector, which includes iron and steel manufacturers and smelting operations, reported the greatest quantities of releases of lead and lead compounds to air.

From 2017 to 2018:

- Air releases of lead and lead compounds increased by 10%. This is largely due to a single facility in the primary metals sector. The facility attributed its increase in reported air releases of lead for 2018 to higher throughput and updated emission factors.
- In 2018, 44% of air releases of lead were from the primary metals industry sector.

Mercury Air Releases Trend

This graph shows the trend in the pounds of mercury and mercury compounds released to air by TRI reporting facilities.



From 2007 to 2018:

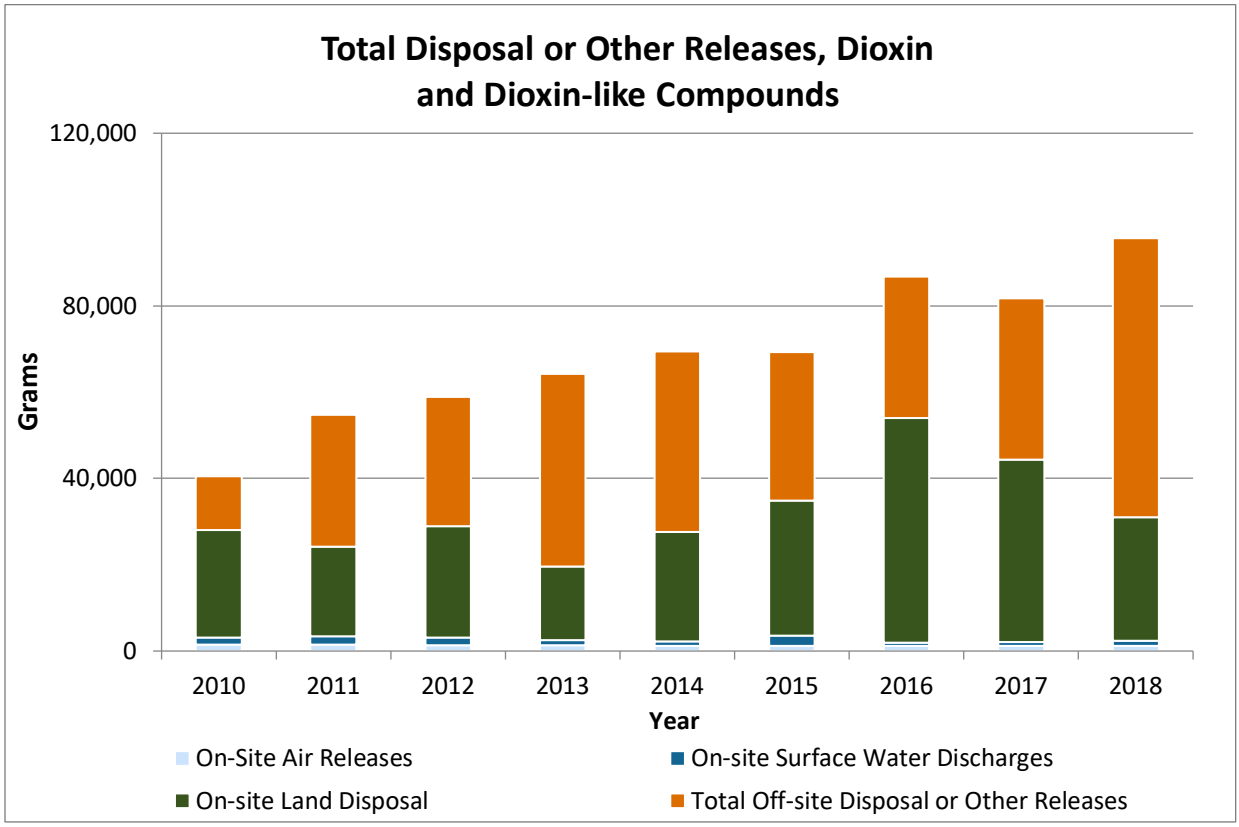
- Releases of mercury and mercury compounds to air decreased by 71%.
- Electric utilities drove the decline in mercury air emissions, with a 90% reduction (84,000 pounds).

From 2017 to 2018:

- Air releases of mercury and mercury compounds decreased by 6%.
- The primary metals sector, which includes iron and steel manufacturers and smelting operations, accounted for 35% of the air emissions of mercury and mercury compounds reported to TRI for 2017 and 2018.

Dioxins Releases Trend

This graph shows the trend in the grams of dioxin and dioxin-like compounds disposed of or otherwise released by TRI-reporting facilities from 2010 to 2018. Note that the dioxins chemical category is reported to TRI in grams while all other TRI chemicals are reported in pounds. The TRI reporting requirements for dioxin and dioxin-like compounds changed in reporting year 2010, so for a consistent presentation this graph starts with 2010.



Dioxin and dioxin-like compounds ("dioxins") are persistent, bioaccumulative, and toxic chemicals (PBTs) characterized by EPA as probable human carcinogens. Dioxins are the byproducts of many forms of combustion and several industrial chemical processes.

From 2010 to 2018:

- Dioxin releases increased by 136%. This increase was largely driven by three facilities which together released over 400,000 grams of dioxins between 2010 and 2018, accounting for 66% of all dioxin releases reported during that time.
    - Increases in off-site releases of dioxins were largely driven by two facilities, both basic organic chemical manufacturing facilities.

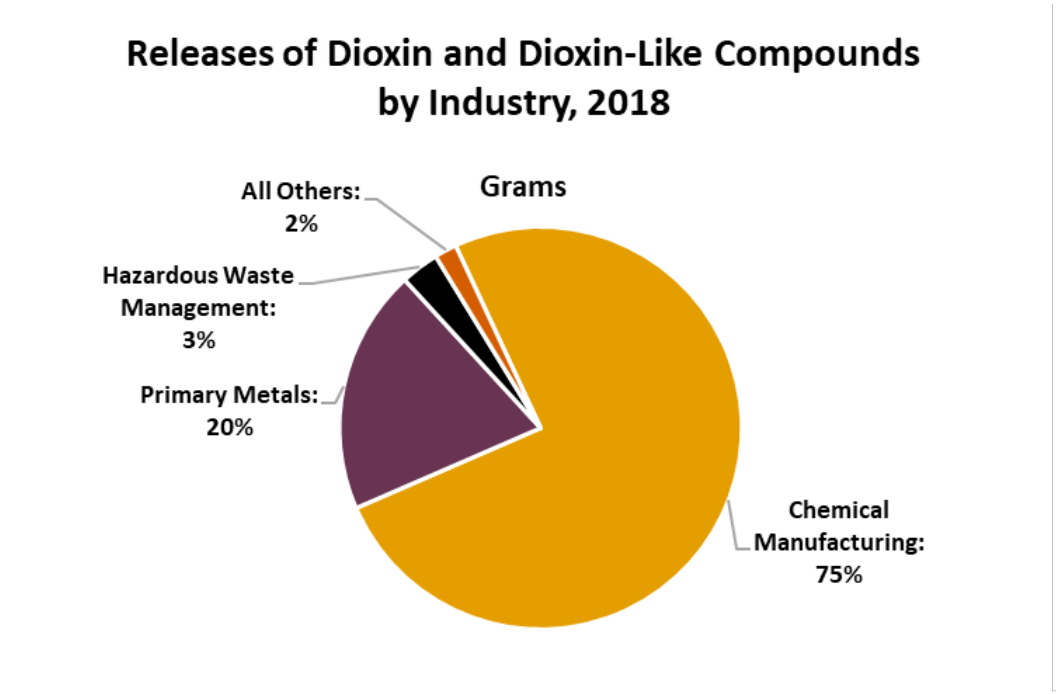
From 2017 to 2018:

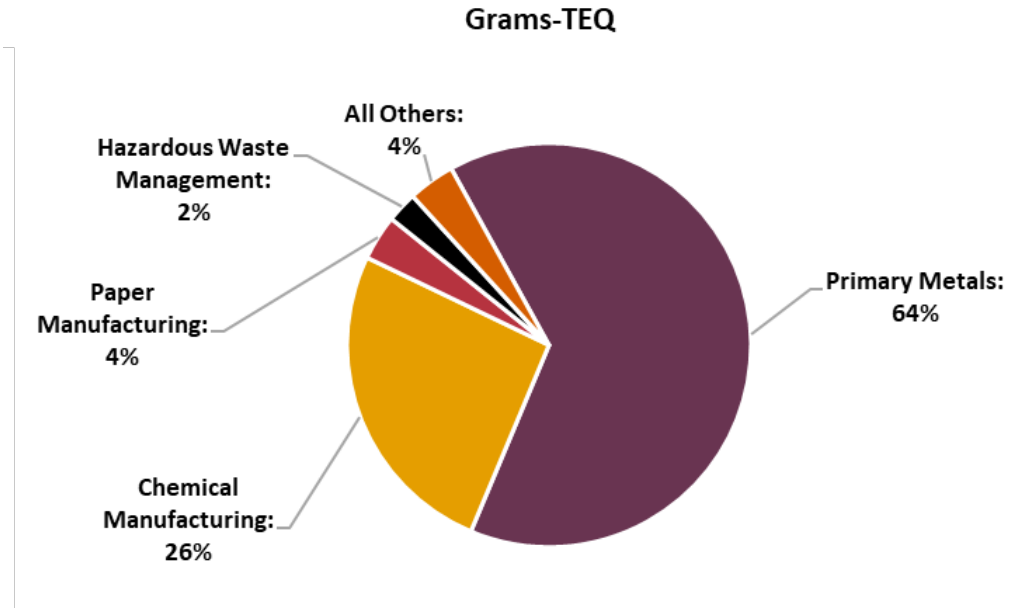
- Releases of dioxins increased by 17%.
    - Off-site disposal or other releases increased by 73% and were largely driven by one basic organic chemical manufacturing facility which reported 35,000 grams released in 2018. In comparison, this facility reported releasing fewer than 6,000 grams annually between 2010 and 2018.
- In 2018, most (68%) of the quantity released was disposed or otherwise released off site.

Dioxins Releases by Industry

TRI also requires facilities to report data on 17 types, or congeners, of dioxin. These congeners have a wide range of toxic potencies. The mix of dioxins from one source can have a very different level of toxicity than the same total amount, but different mix, from another source. These varying toxic potencies can be taken into account using Toxic Equivalency Factors (TEFs), which are based on each congener's toxic potency. EPA multiplies the total grams of each congener reported by facilities by the associated TEF to obtain a toxicity weight and sums all congeners for a total of grams in toxicity equivalents (grams-TEQ). Analyzing dioxins in grams-TEQ is useful when comparing disposal or other releases of dioxin from different sources or different time periods, where the mix of congeners may vary.

The following two pie charts show: 1) the TRI-covered industry sectors that reported the greatest releases of dioxin and dioxin-like compounds in grams, compared to 2) the industry sectors that reported the greatest releases of grams in toxicity equivalents (grams-TEQ). Note that only those TRI reports that included the congener detail for calculating grams-TEQ are included in these charts.



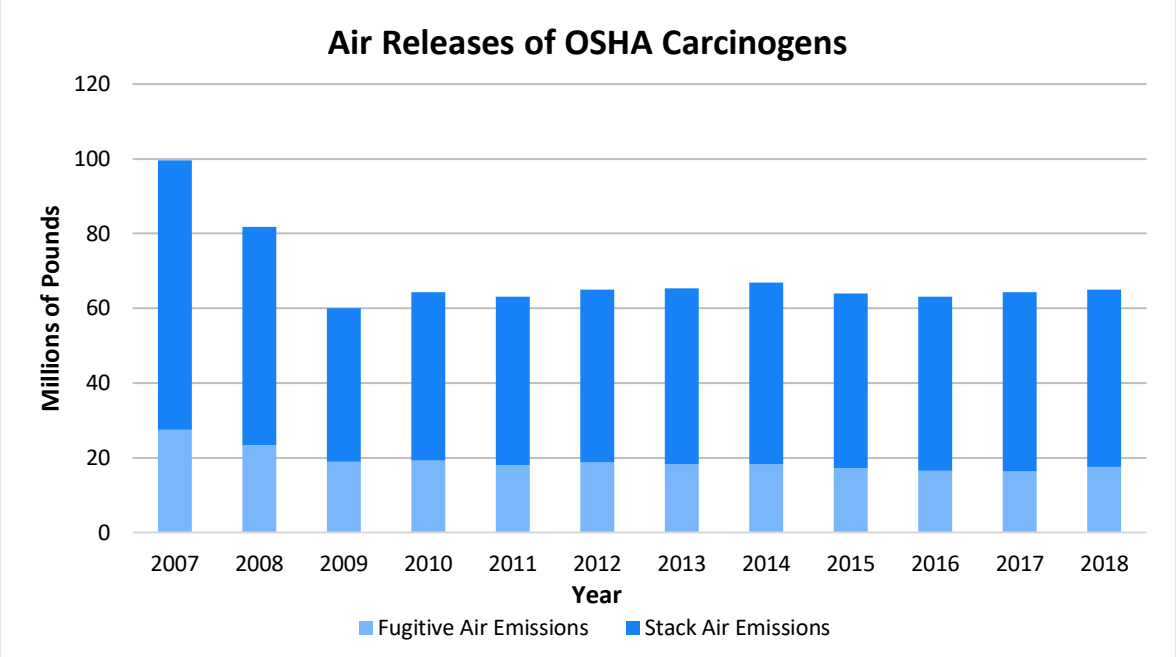


- Various industry sectors may dispose of or otherwise release very different mixes of dioxin congeners.
- The chemical manufacturing industry accounted for 75% and the primary metals sector for 20% of total grams of dioxins released.

- However, when TEFs are applied, the primary metals sector accounted for 64% and the chemical manufacturing sector for 26% of the total grams-TEQ released.

Occupational Safety and Health Administration (OSHA) Carcinogens Air Releases

Among the chemicals that are reportable to the TRI Program, some are also included on OSHA's list of carcinogens. EPA refers to these chemicals as TRI OSHA carcinogens. This graph shows the trend in the pounds of TRI chemicals that are OSHA carcinogens released to air.



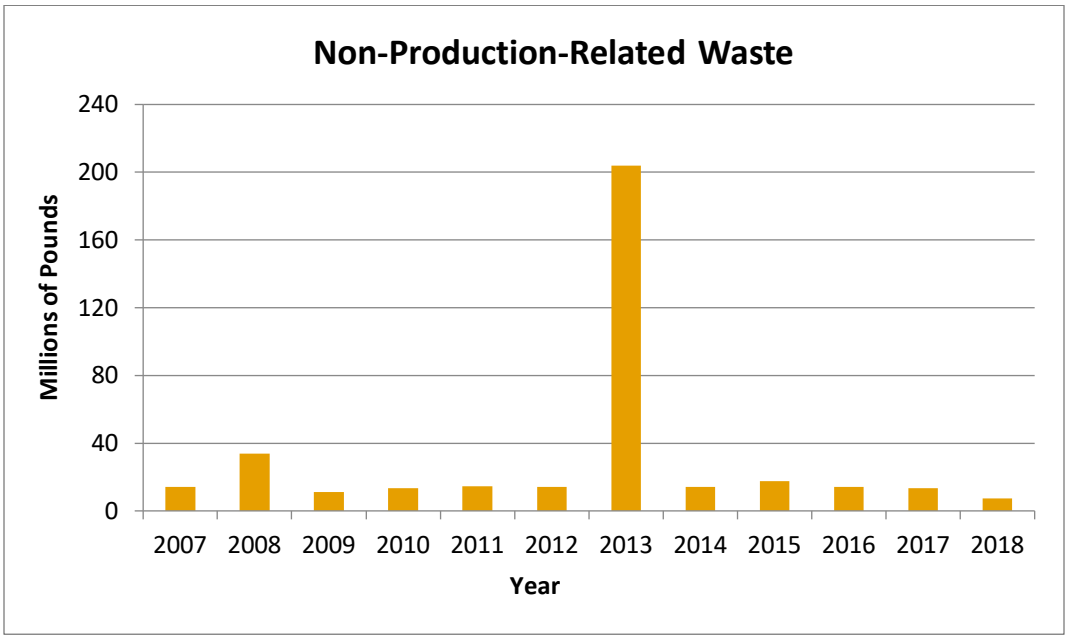
Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- Air releases of these carcinogens decreased by 35%.
- The long-term decreases in air releases of OSHA carcinogens were driven mainly by decreases in releases of styrene to air from the plastics and rubber and transportation equipment industries.
- In 2018, air releases of OSHA carcinogens consisted primarily of styrene (44% of the air releases of all OSHA carcinogens), acetaldehyde (12%) and formaldehyde (7%).

Non-Production-Related Waste

Non-production-related waste refers to quantities of Toxics Release Inventory (TRI) chemicals disposed of or released, or transferred off site, as the result of one-time events, rather than due to standard production activities. These events may include remedial actions, catastrophic events, or other one-time events not associated with normal production processes. Non-production-related waste is included in a facility's total disposal or other releases, but is not included in the its production-related waste managed. The following graph shows the annual quantities of non-production-related waste reported to TRI.



- For 2018, 553 facilities reported 7.4 million pounds of one-time, non-production-related releases of TRI chemicals.
- Non-production-related waste from all facilities was below 35 million pounds in all years except for 2013 when a mining facility reported a one-time release of 193 million pounds. The facility reported zero releases in 2014 and has not reported to TRI since.

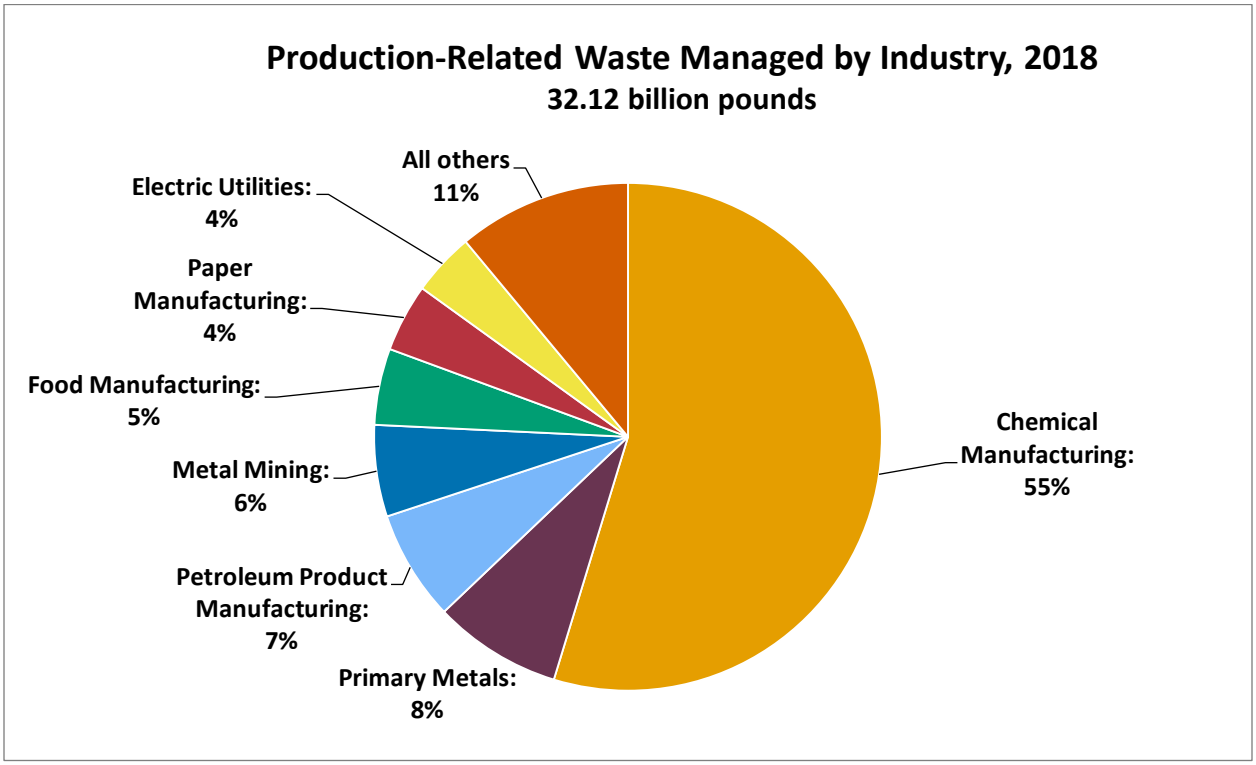
Comparing Industry Sectors

This section examines how different industrial sectors manage their chemical waste. This sector-specific approach can highlight progress made in improving environmental performance, identify emerging issues, and reveal opportunities for better waste management practices.

The industries that are subject to TRI reporting requirements vary substantially in size, scope, and business type. As a result, the amounts and types of chemicals used, generated, and managed by facilities within a given industry sector often differ greatly from those of facilities in other sectors. For facilities in the same sector, however, the processes, products, and regulatory requirements are often similar, resulting in similar manufacture, processing, or other use of chemicals.

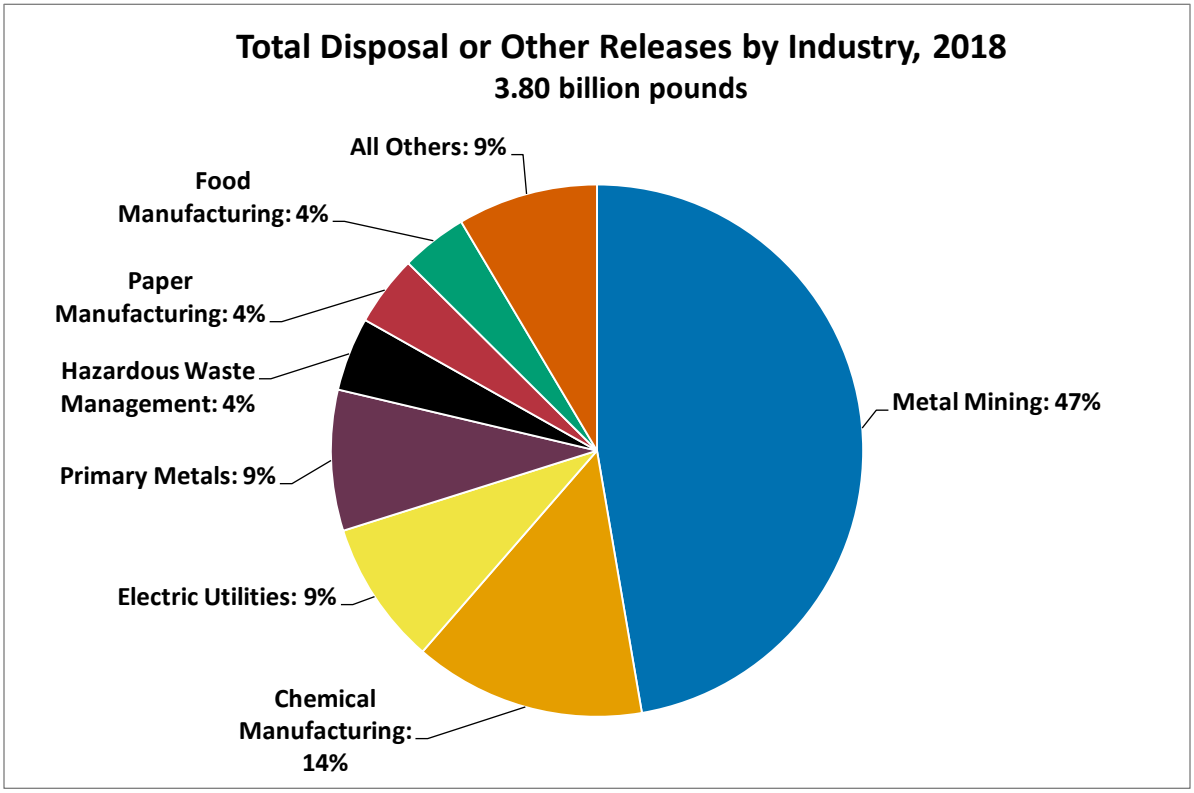
For analysis purposes, the TRI Program has aggregated the North American Industry Classification System (NAICS) codes at the 3- and 4-digit levels, creating 29 industry sector categories. To learn more about which business activities are subject to TRI reporting requirements, see this list of covered NAICS codes.

The following pie chart shows the industry sectors that reported the most production-related waste for 2018.



Seven industry sectors reported 89% of the quantities of TRI chemicals managed as production-related waste in 2018. A majority of TRI chemical waste managed originated from the chemical manufacturing sector (55%).

The following pie chart shows the industry sectors that reported the most disposal or other releases for 2018.



This pie chart shows that 4 of the 29 TRI reporting sectors reported 79% of the quantities of TRI chemicals disposed of or otherwise released: metal mining (47%), chemical manufacturing (14%), electric utilities (9%), and primary metals (9%).

For more details on how the amounts and proportions of TRI chemicals managed as waste have changed over time, see the production-related waste managed by industry trend graph.

For more information on the breakdown of these releases by environmental medium, see air releases by industry, water releases by industry and land disposal by industry.

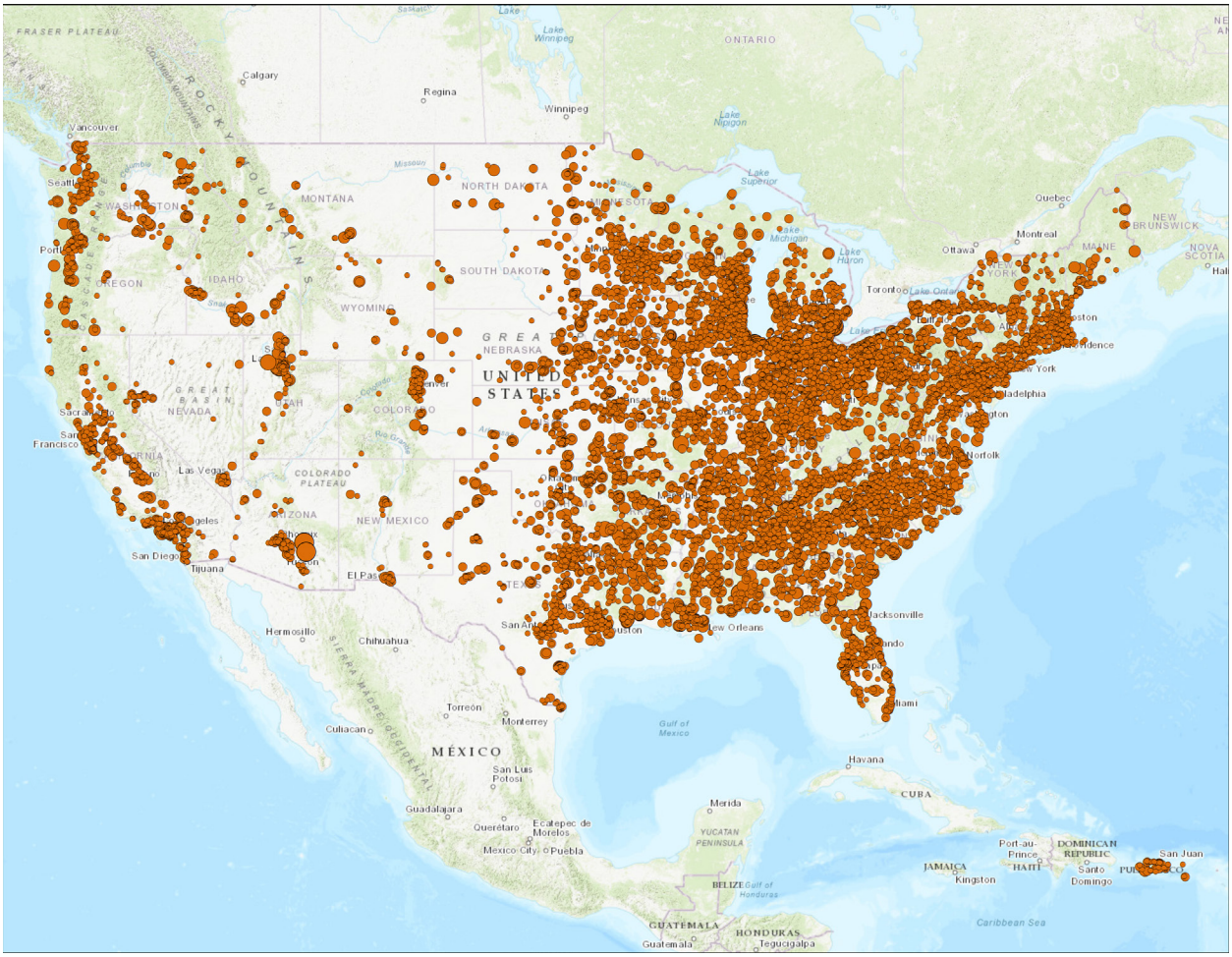
As with any dataset, there are several factors to consider when using the TRI data. Key factors associated with data presented are summarized in the Introduction. For more information see Factors to Consider When Using Toxics Release Inventory Data. Also note that the list of TRI chemicals has changed over the years. For comparability, trend graphs include only those

chemicals that were reportable for all years presented. Figures that focus only on the year 2018 include all chemicals reportable for 2018, therefore, values for a 2018-only analysis may differ slightly from results for 2018 in a trend analysis.

Manufacturing Sectors

This section examines how TRI chemical wastes are managed in the manufacturing sectors.

This map shows the locations of the manufacturing facilities (defined as facilities reporting their primary NAICS codes as 31-33) that reported to TRI for 2018. Click on a facility for details on its TRI reporting.



Manufacturing Facilities Reporting to TRI, 2018

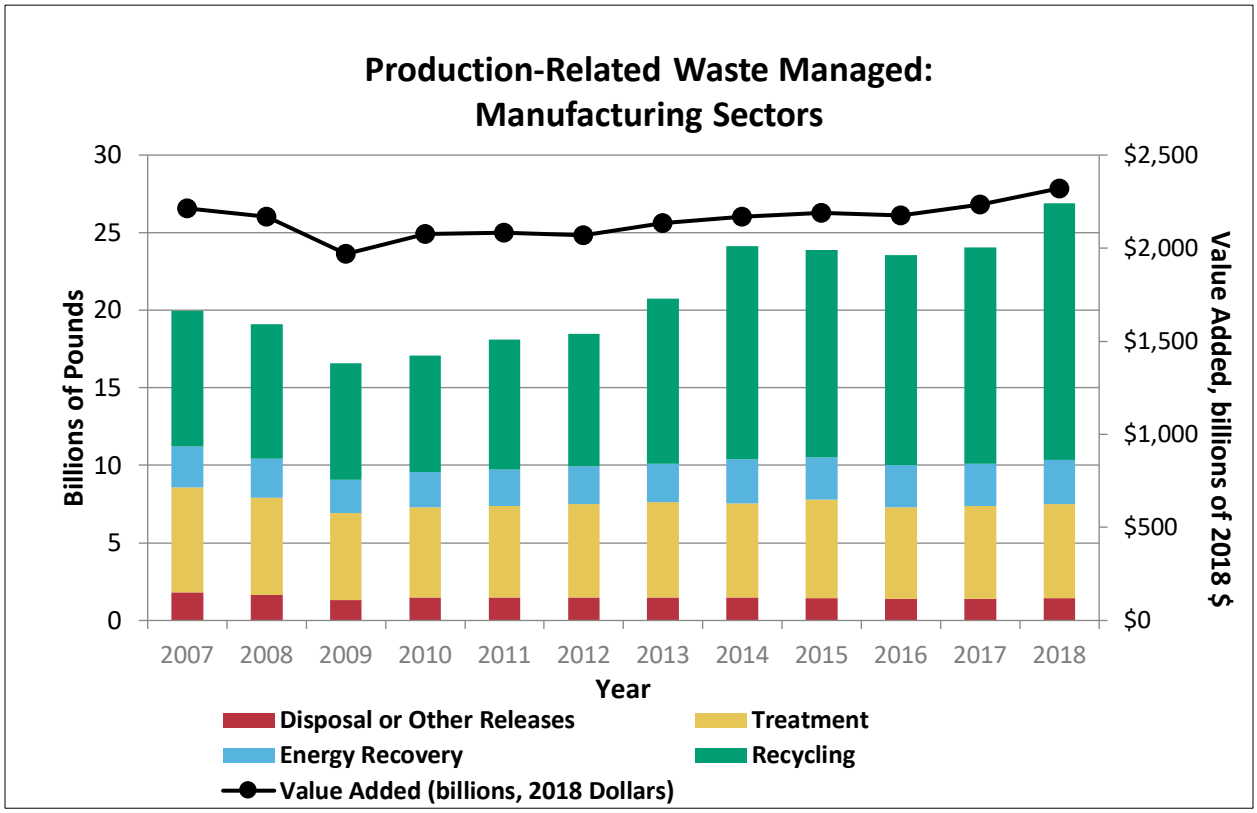
View Larger Map

For 2018, nearly 90% of the facilities that reported to TRI were in a manufacturing sector. These sectors accounted for most (88%) of the 32.1 billion pounds of production-related waste reported to TRI for 2018. Two subsectors of manufacturing, chemical manufacturing and aerospace manufacturing, are highlighted in more detail later in this section.

The TRI-covered industry sectors not categorized under manufacturing include metal mining, coal mining, electric utilities, chemical wholesalers, petroleum terminals, hazardous waste management, and others.

Waste Management Trend

The following graph shows the annual quantities of TRI chemicals managed as waste by the manufacturing sectors.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- Production-related waste managed by the manufacturing sectors decreased through 2009, following the trend of reduced production resulting from the economic recession. Since 2009, total quantities of waste managed have increased.
    - Quantities of waste released and treated decreased, while the quantity of waste combusted for energy recovery and waste recycled increased.
- It is important to consider the influence the economy has on production and production-related waste generation. This figure includes the trend in the manufacturing sectors' value added (represented by the black line as reported by the Bureau of Economic Analysis, Value Added by Industry). Value added is a measure of production that is defined as the contribution of these manufacturing sectors to the national gross

domestic product. Since 2007, value added by the manufacturing sectors increased by 5%.

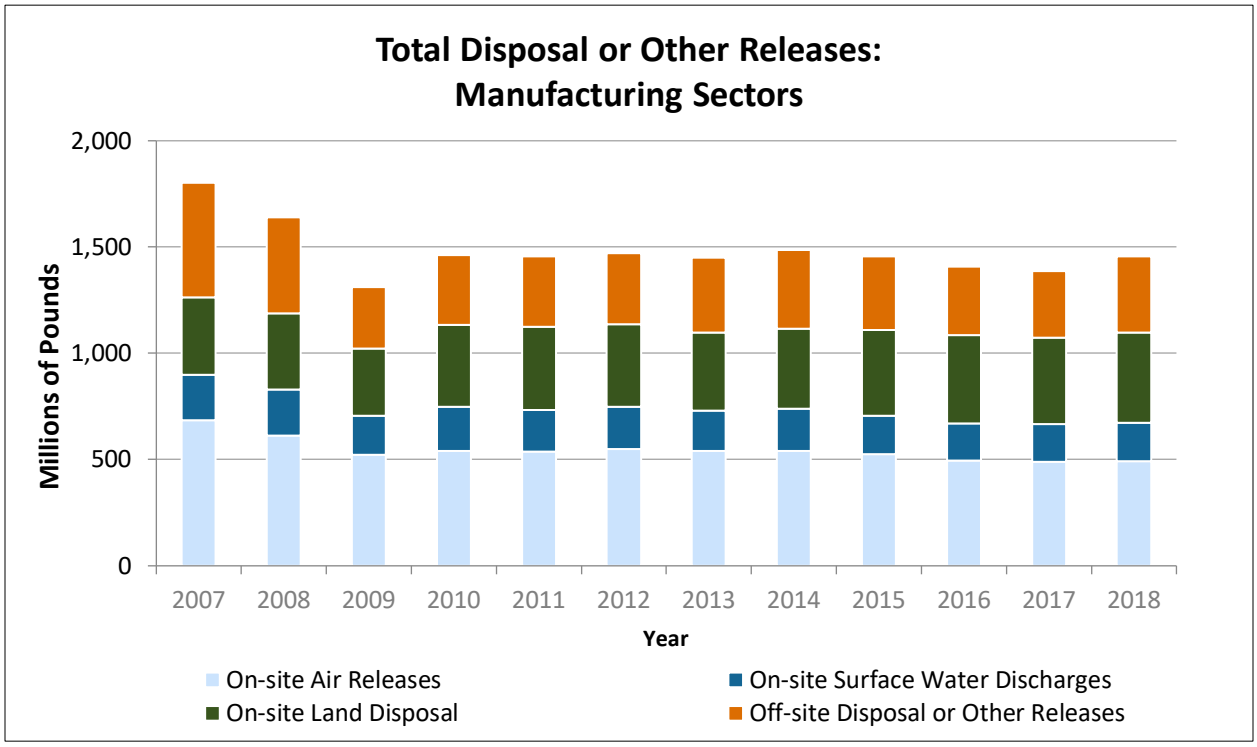
- Production-related waste managed by the manufacturing sectors increased by 35% since 2007, driven by increased recycling. The large increase in recycled chemical waste starting in 2014 was primarily due to an increase in the quantity of cumene recycled by one facility and dichloromethane recycled by two other facilities.

From 2017 to 2018:

- Production-related waste managed increased by 11% (2.87 billion pounds). This increase was largely due to a single facility that reported recycling 2.0 billion pounds of dichloromethane on site in 2018. This facility did not previously report recycling this chemical on site. The facility claimed that for the 2018 reporting year, it had reviewed and reinterpreted the TRI Program's guidance on estimating recycling quantities of TRI chemicals, which is the reason the facility reported recycling such a large quantity of dichloromethane on site during 2018 compared to 2017. Excluding this amount for 2018, the total quantity of the manufacturing sectors' production-related waste managed increased by 4%.
- In 2018, only 5% of the manufacturing sectors' production-related waste was released into the environment, while the rest was managed through treatment, energy recovery, and recycling.

Manufacturing Releases Trend

The following graph shows the annual quantities of TRI chemicals released by the manufacturing sectors.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- Total releases by the manufacturing sectors decreased by 19%. This is primarily due to a reduction in air emissions and off-site disposal or other releases.
- Releases to water also declined, while on-site land disposal increased by 17%.

From 2017 to 2018:

- Total releases increased by 5% (70 million pounds). This is largely due to a 15% increase (48 million pounds) in off-site releases.

Source Reduction in the Manufacturing Sectors:

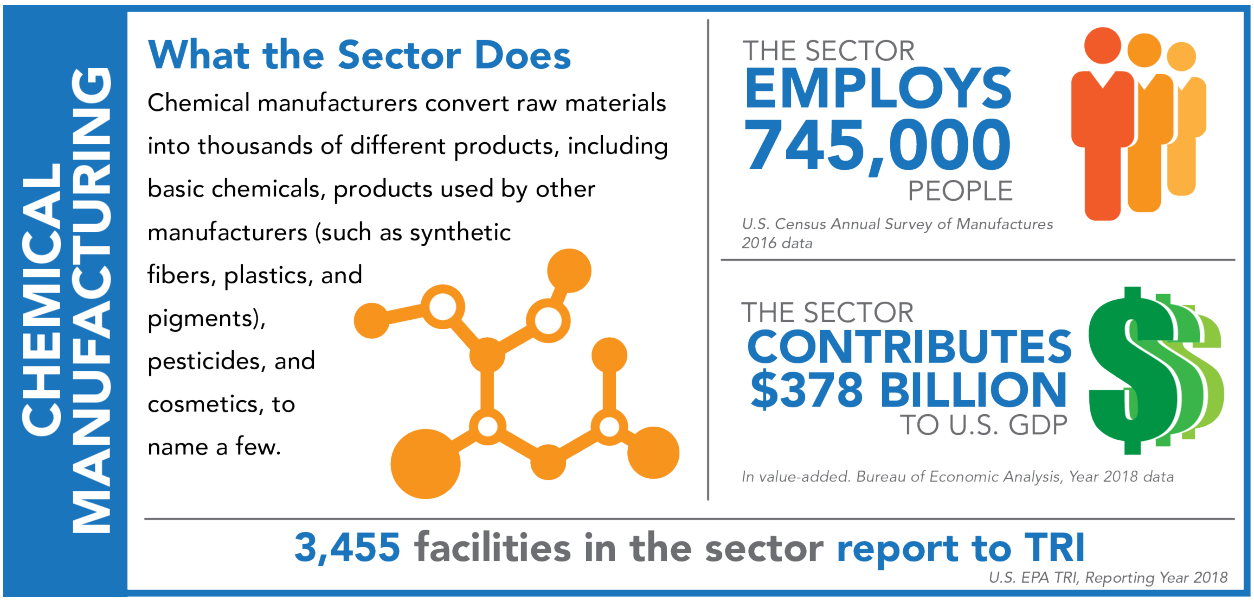
In 2018, 6% of manufacturing facilities initiated more than 2,800 source reduction activities to reduce TRI chemical use and waste generation. The most commonly reported types of source reduction activitites were good operating practices and process modifications. For example:

- A metal container manufacturing facility changed the scheduling of drum production to minimize the number of color changes necessary, thus reducing its use of certain glycol ethers. [Click to view facility details in the Pollution Prevention (P2) Tool]
- A biodiesel manufacturer reported adding a methanol recovery system to reuse the chemical in the process. [Click to view facility details in the P2 tool].

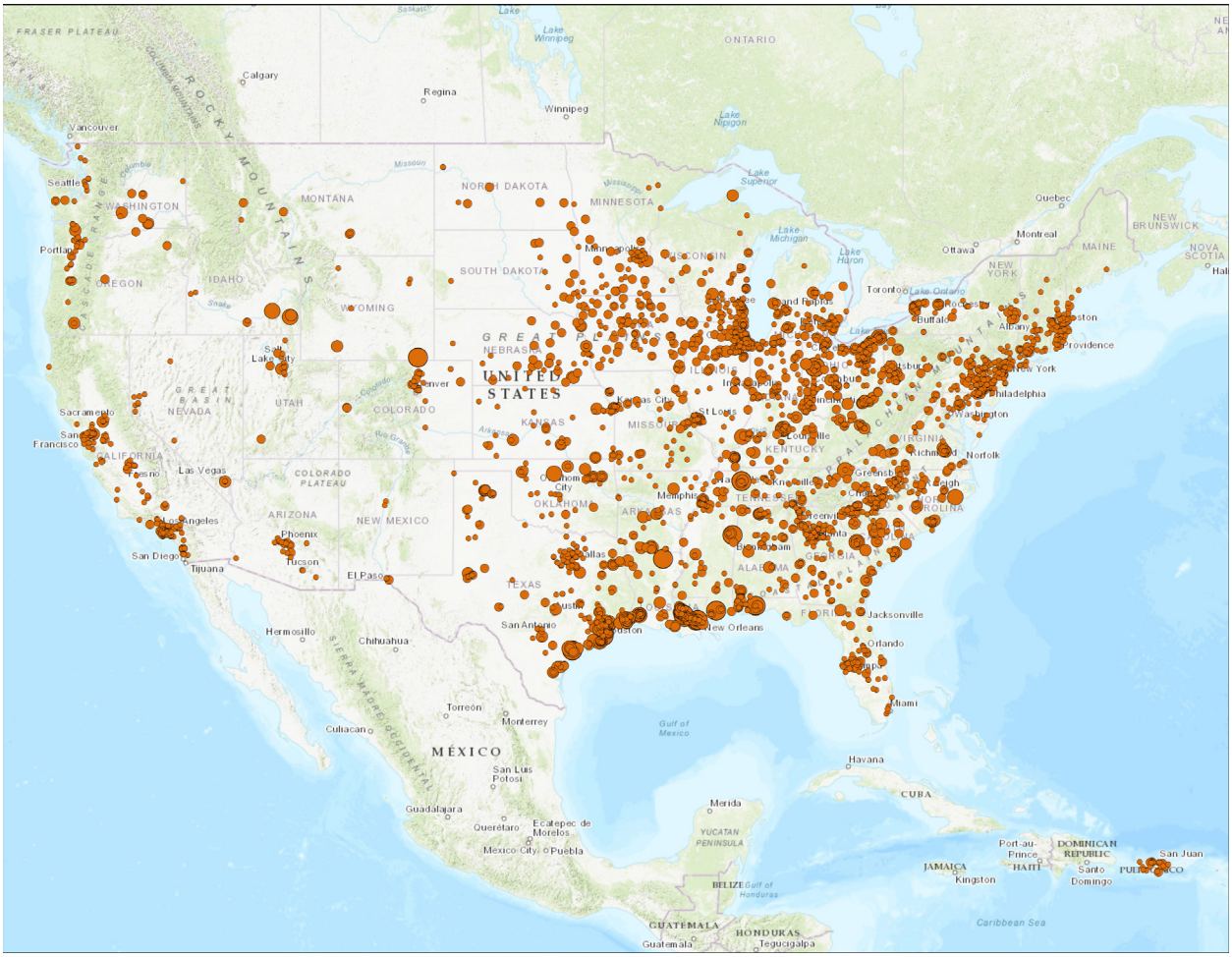
You can learn more about pollution prevention opportunities in this sector by using the TRI Pollution Prevention (P2) Search Tool

Chemical Manufacturing

This section examines how TRI chemical wastes are managed in the chemical manufacturing sector.



This map shows the locations of the chemical manufacturing facilities (defined as facilities reporting their primary NAICS code as 325) that reported to TRI for 2018. Click on a facility for details on its TRI reporting.



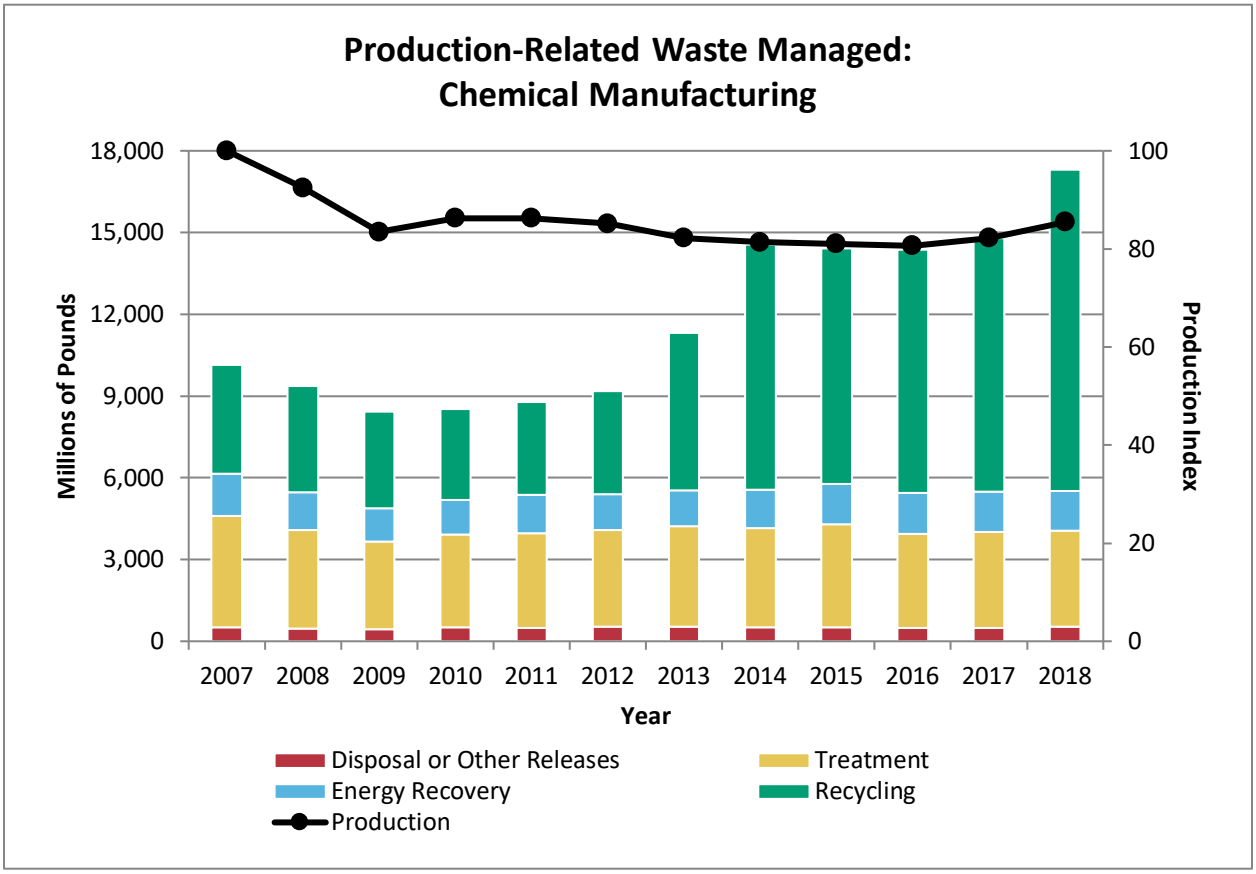
Chemical Manufacturing Facilities Reporting to TRI, 2018

View Larger Map

For 2018, the chemical manufacturing sector had the most facilities (3,455, 16% of facilities that reported for 2018) report to the Toxics Release Inventory (TRI) and reported 55% of all production-related waste managed, more than any other sector.

Chemical Manufacturing Waste Management Trend

The following graph shows the annual quantities of TRI chemicals managed as waste by the chemical manufacturing sector.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- Production-related waste managed by the chemical manufacturing sector increased by 71%, while production volume (represented by the black line as reported by the Federal Reserve Board, Industrial Production Index) decreased by 15%. In recent years, production has been fairly constant and increased in 2018.
    - The large increase in reported quantities of waste recycled starting in 2014 was primarily due to increased quantities of recycling reported by chemical manufacturers, with an increase in the quantity of cumene recycled by one facility and dichloromethane recycled by two other facilities.

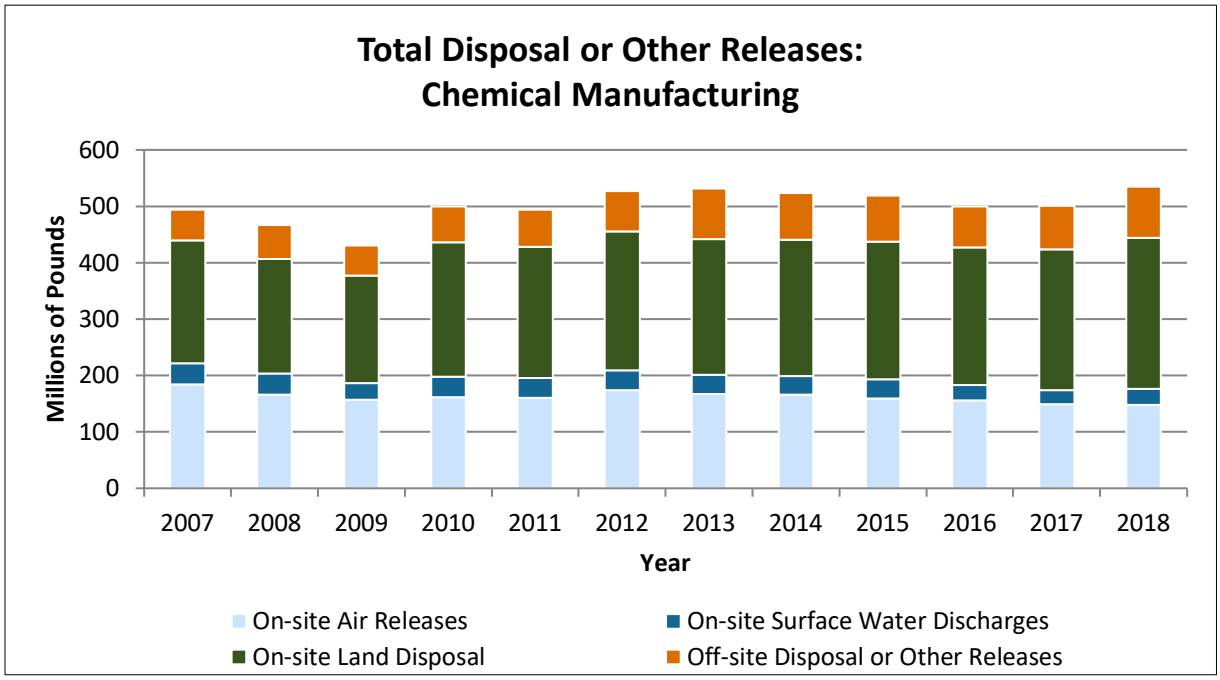
- Quantities of TRI chemicals treated or combusted for energy recovery decreased, while the quantities of TRI chemicals recycled and released increased.

From 2017 to 2018:

- Production-related waste managed at chemical manufacturing facilities increased by 2.5 billion pounds (16%), while production volume increased by 4%.
    - The increase in production-related waste is largely due to a 2.0 billion pound increase in the quantity of dichloromethane reported as recycled by one chemical manufacturing facility [click to view facility details in the P2 tool]. The facility claimed that for the 2018 reporting year, it had reviewed and reinterpreted the TRI Program's guidance on estimating recycling quantities of TRI chemicals, which is the reason the facility reported recycling such a large quantity of dichloromethane on site during 2018 compared to 2017.
- In 2018, only 3% of this sector's waste was managed as releases into the environment, while the rest was managed through treatment, energy recovery, and recycling.

Chemical Manufacturing Releases Trend

The following graph shows the annual quantities of TRI chemicals released by the chemical manufacturing industry.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- Total releases by the chemical manufacturing sector increased by 8%.
- The distribution of releases has changed during this time period. This change has been driven largely by decreased air releases of common chemicals including methanol, hydrochloric acid, and carbonyl sulfide and increased on-site land disposal, particularly for metal compounds.

From 2017 to 2018:

- Total releases increased by 38 million pounds (7%).
- For 2018, the chemical manufacturing sector reported larger air release quantities than any other sector, accounting for 25% of all reported quantities of TRI chemicals emitted to air.

Source Reduction in the Chemical Manufacturing Sector:

Although chemical manufacturing has consistently been the sector with the most production-related waste managed, 280 facilities (8% of facilities) in this sector initiated source reduction activities in 2018 to reduce their TRI chemical use and waste generation. The most commonly reported types of source reduction activities were good operating practices and process modifications. For example,

- An organic chemical manufacturing facility reduced hydroquinone waste by improving the heating system of its outdoor storage tanks to reduce the quantity of sludge formed. Minimizing sludge formation reduces the facility's hazardous waste generated. [Click to view facility details in the Pollution Prevention (P2) Tool]
- A fertilizer manufacturing facility began transitioning to using chlorine dioxide instead of chlorine for cooling water treatment. The transition is expected to eliminate the storage of up to 16,000 pounds of chlorine on site. [Click to view facility details in the P2 Tool]

Additional Resources

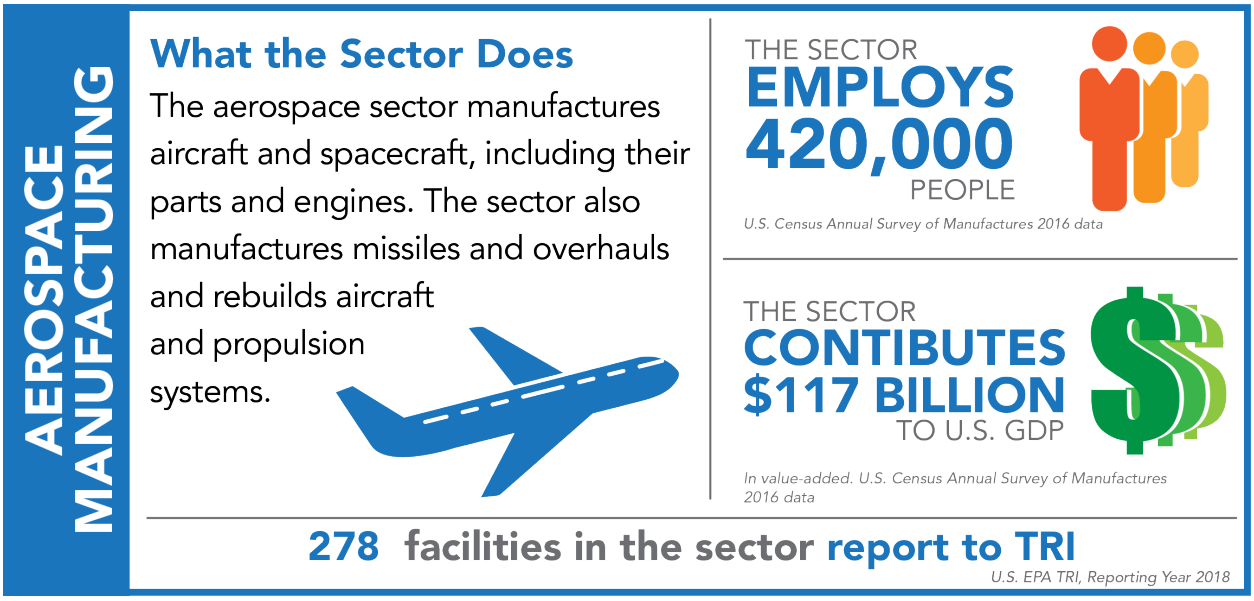
EPA's Smart Sectors Program is partnering with chemical manufacturing trade associations to develop sensible approaches that better protect the environment and public health.

TRI's Pollution Prevention Qlik Dashboard can help you learn more about production-related waste, releases, and pollution prevention opportunities in this sector.

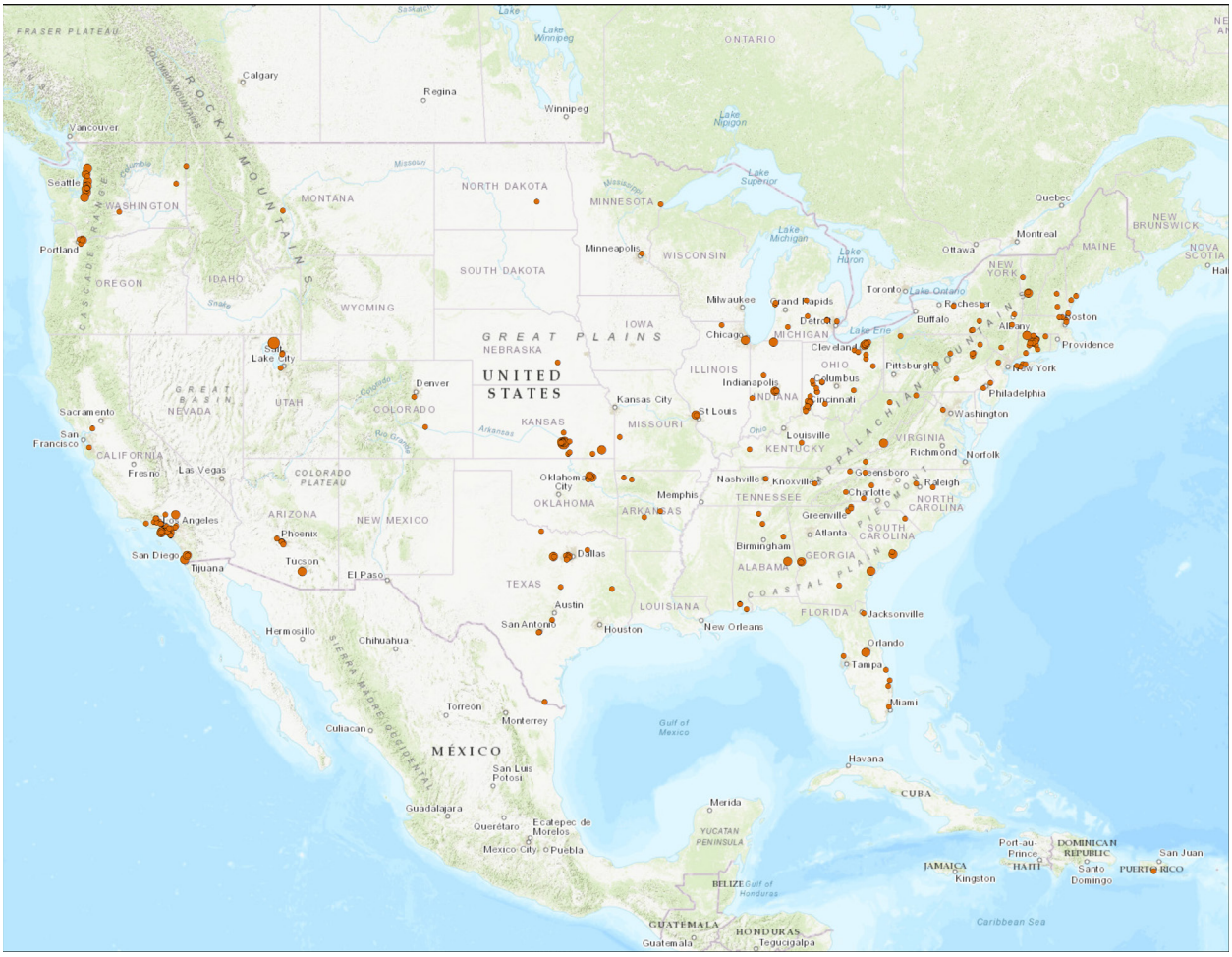
For more information on how this and other industry sectors can choose safer chemicals, visit EPA's Safer Choice Program pages for Alternatives Assessments and the Safer Choice Ingredients List.

Aerospace Manufacturing

This section examines how TRI chemical wastes are managed in the aerospace manufacturing sector.



This map shows the locations of the aerospace manufacturing facilities (defined as facilities reporting their primary NAICS code as 3364) that reported to TRI for 2018. Click on a facility for details on its TRI reporting.



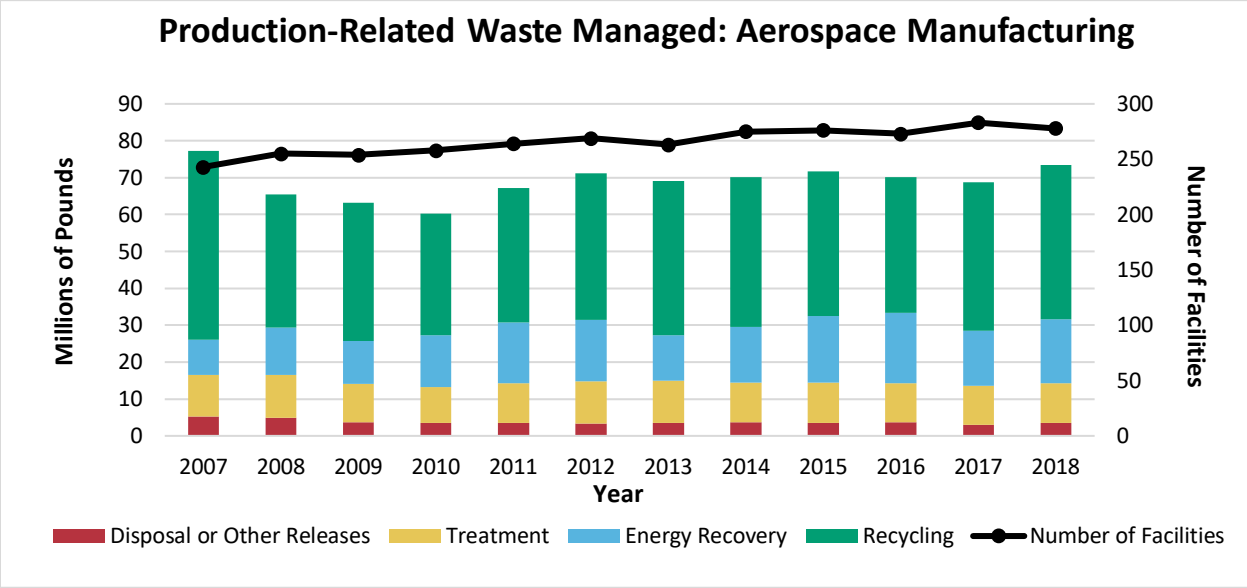
Aerospace Facilities Reporting to TRI, 2018

View Larger Map

For 2018, 278 aerospace manufacturing facilities reported to TRI. Most of the facilities reporting to TRI in this sector manufacture aircraft or aircraft parts and equipment, including engines. The remaining facilities manufacture guided missiles or space vehicles and their parts and equipment.

Aerospace Manufacturing Waste Management Trend

The following graph shows the annual quantities of TRI chemicals managed as waste by the aerospace manufacturing industry.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

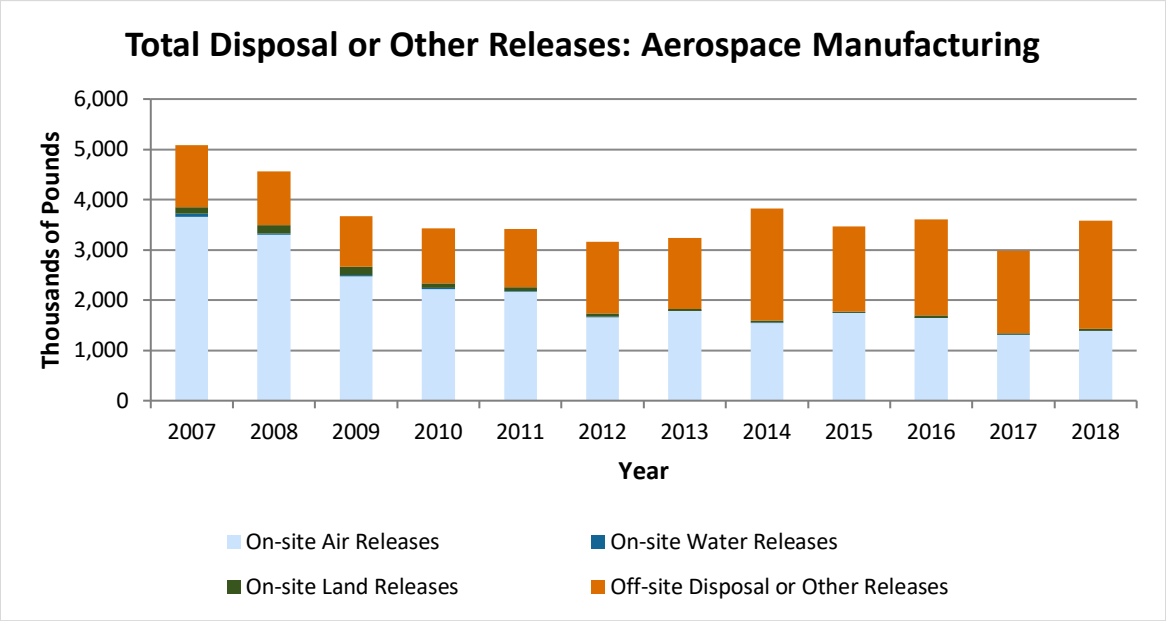
- Although production-related waste managed by the aerospace manufacturing sector fluctuated between years, the quantity of waste managed in 2018 is 3.8 million pounds (5%) less than it was in 2007, while the number of facilities increased from 243 to 278 (14%).

From 2017 to 2018:

- Production-related waste managed increased by 4.8 million pounds (7%), largely due to an aircraft parts manufacturing facility which reported an increase of over 3 million pounds of waste managed through energy recovery from 2017 to 2018. [Click to view facility details in the Pollution Prevention (P2) Tool]
- In 2018, only 5% of this sector's waste was released into the environment, while the rest was managed through treatment, energy recovery, and recycling.

Aerospace Manufacturing Releases Trend

The following graph shows the annual quantities of TRI chemicals released by the aerospace manufacturing industry.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- Total releases by the aerospace manufacturing sector decreased by 29%.
    - The decrease in releases was mainly driven by large releases of hydrochloric acid to air by one aerospace products and parts manufacturing facility in 2007 and 2008, followed by smaller releases in subsequent years. [Click to view facility details in the Pollution Prevention (P2) Tool]

From 2017 to 2018:

- Total releases increased by 591 thousand pounds (19%). The increase in releases was not driven by any one facility.

Source Reduction in the Aerospace Manufacturing Sector:

Between 2010 and 2018, the aerospace manufacturing sector had a higher than average rate of initiating source reduction activities compared with the rate across all industries that report to TRI. For 2018, 8% of facilities in the aerospace manufacturing sector reported source reduction activities, compared to 6% of all facilities that reported to TRI.

The most commonly reported types of source reduction activities in the aerospace manufacturing sector were good operating practices and inventory control. Several facilities in this sector reported initiating source reduction activities to reduce scrap generation. Note that minimizing the generation of scrap metal is a source reduction activity, while recycling scrap metal is a waste management practice. Examples of source reduction activities reported by the sector include:

- An aircraft engine manufacturing facility revised dimensions for raw material purchases to reduce scrap created by cutting pieces to fit production. [Click to view facility details in the P2 Tool]
- An aircraft manufacturing facility installed a non-chemical floor coating that is removable which eliminated the need to clean booth floors with a product containing toluene. [Click to view facility details in the Pollution Prevention (P2) Tool]

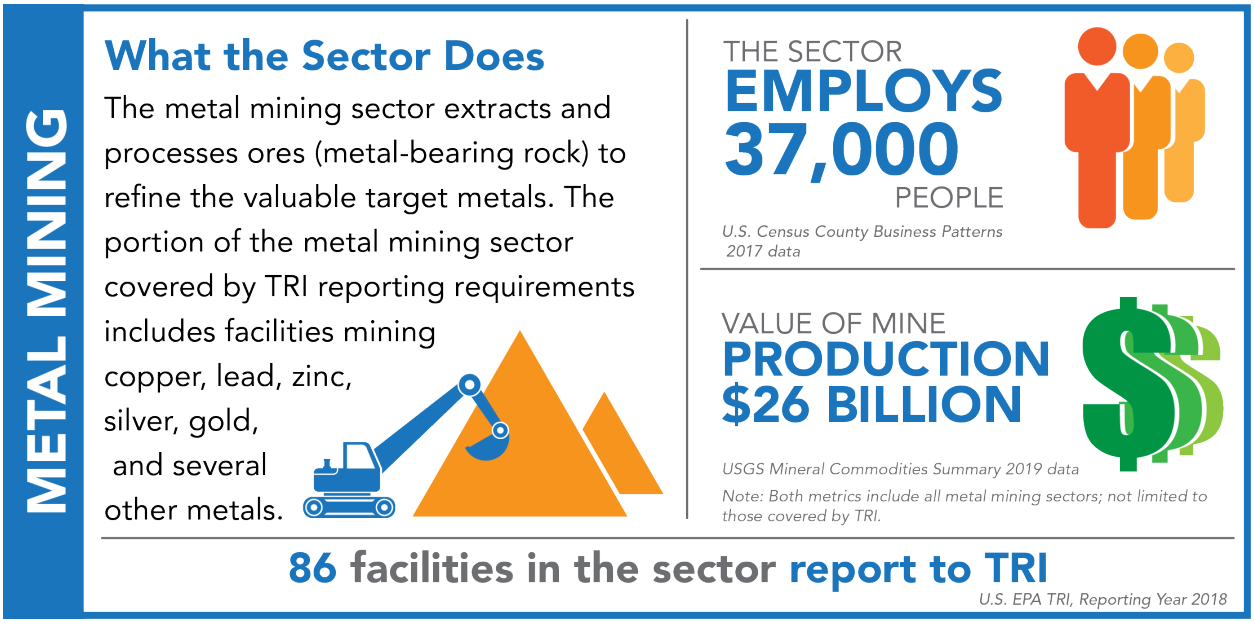
Additional Resources

EPA's Smart Sectors Program is partnering with the aerospace sector to develop sensible approaches that better protect the environment and public health.

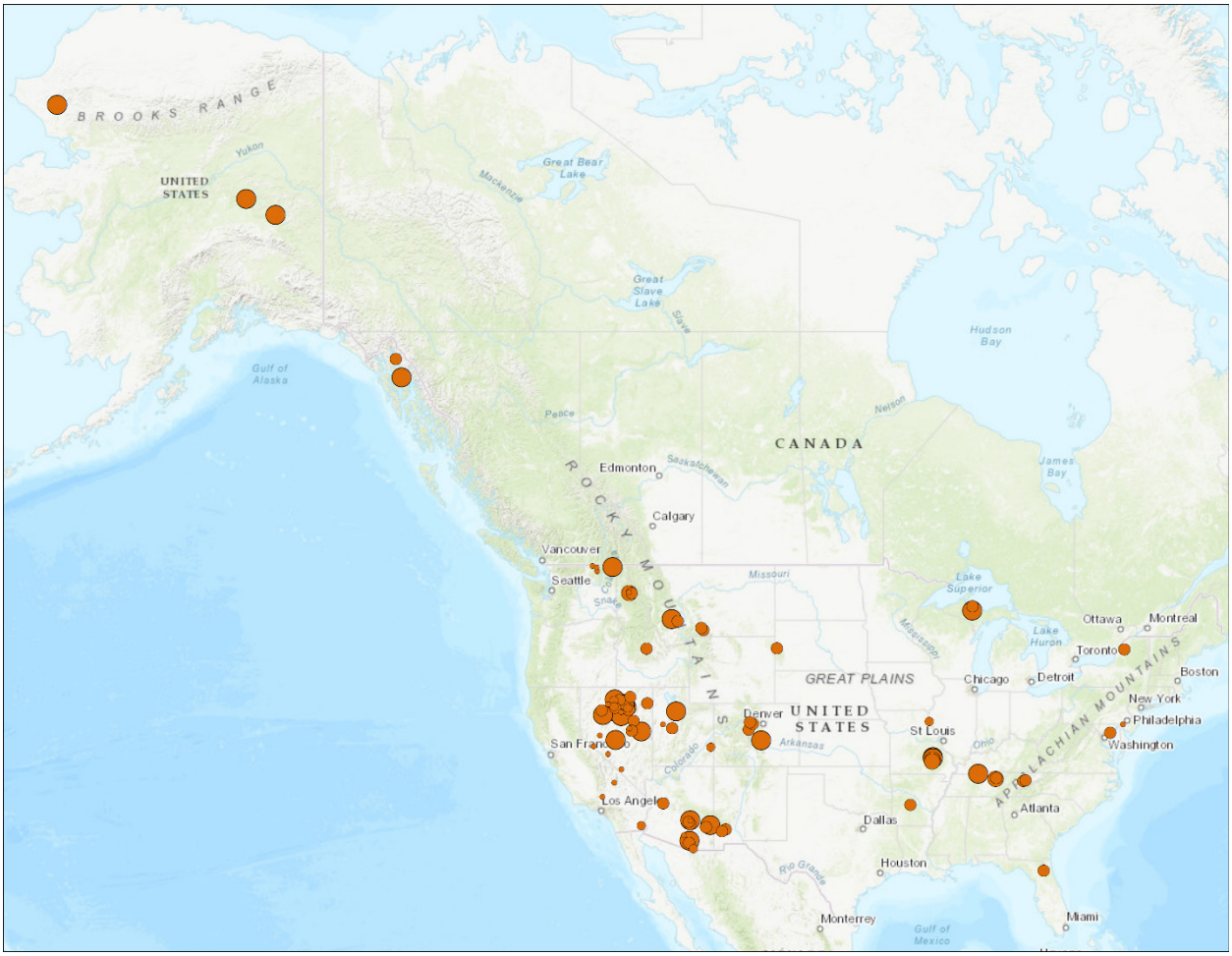
TRI's Pollution Prevention Qlik Dashboard can help you learn more about production-related waste, releases, and pollution prevention opportunities in this sector.

Metal Mining

This section examines how TRI chemical wastes are managed in the metal mining sector.



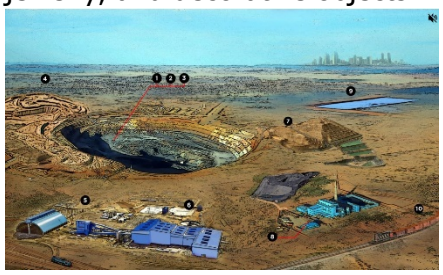
This map shows the locations of the metal mining facilities (defined as facilities reporting their primary NAICS code as 2122) that reported to TRI for 2018. Click on a facility for details on its TRI reporting. Mines are shown on this map based on their longitude/latitude, which may be miles from the city identified on the mine's TRI reporting forms. Mines can qualify their location relative to the city by noting the distance in the street address data field of their TRI reporting forms.



Metal Mines Reporting to TRI, 2018

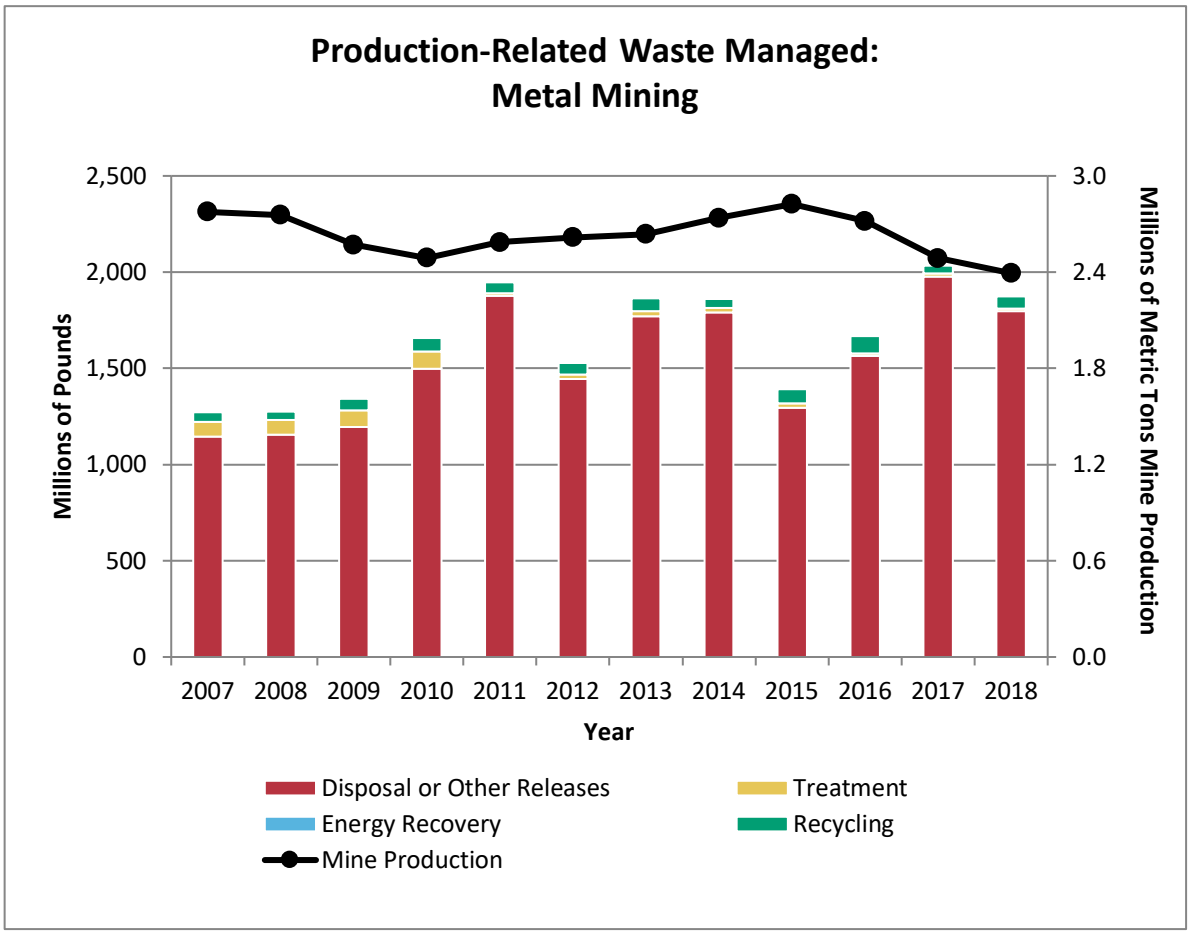
View Larger Map

For 2018, 86 metal mining facilities reported to TRI. They tend to be in western states where most of the copper, silver, and gold mining occurs; however, zinc and lead mining tend to occur in Missouri and Tennessee, as well as Alaska. Metals generated from U.S. mining operations are used in a wide range of products, including automobiles, electric and industrial equipment, jewelry, and decorative objects. The extraction and processing of these minerals generate large amounts of on-site land disposals, primarily of metals included on the TRI list of chemicals contained in the ore and waste rock. To learn more about metal mining operations and their TRI reporting, explore the interactive metal mining diagram. Metal mining operations are subject to federal and state regulations.



Metal Mining Waste Management Trend

The following graph shows the annual quantities of TRI chemicals managed as waste by the metal mining industry from 2007 to 2018, mainly in the form of on-site land disposal.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

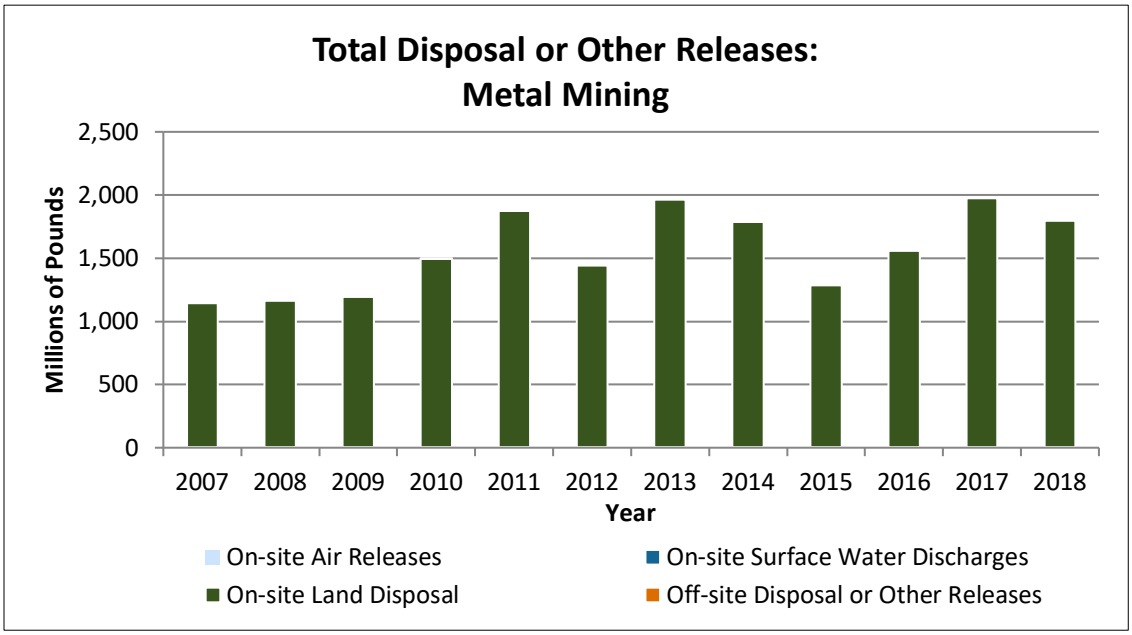
- While metal mining production (as reported in the United States Geological Survey) remained relatively steady, the quantity of waste managed fluctuated.
- Besides production volume, one factor commonly cited by facilities as a contributor to the changes in quantities of waste managed is the chemical composition of the extracted ore, which can vary substantially from year to year. In some cases, small changes in the ore's composition can impact whether chemicals in ore qualify for a concentration-based exemption from TRI reporting in one year but not in the next year or vice versa.

From 2017 to 2018:

- The quantity of TRI chemical waste managed by this sector decreased by 160 million pounds (8%) between 2017 and 2018.
- During 2018, 96% of the metal mining sector's production-related waste was disposed of or otherwise released. The majority of this waste consisted of metals, which were primarily disposed of to land on site at the mine.

Metal Mining Releases Trend

The following graph shows the annual quantities of TRI chemicals released by the metal mining industry, primarily through on-site land disposal.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- More than 99% of the metal mining sector's releases were in the form of on-site land disposal. The quantity of on-site land disposal by metal mines has fluctuated in recent years.
- Several mines have reported that changes in production volume and changes in the chemical composition of the deposit being mined are the primary causes of fluctuations in the amount of chemicals reported as disposed of on site at the mine.
- Metal mining facilities typically handle large volumes of material, and even a small change in the chemical composition of the deposit being mined can lead to big changes in the amount of TRI chemicals reported.
- The quantity of TRI chemicals released is not an indicator of health risks posed by the chemicals, as described in the Introduction. For more information, see the TRI document, Factors to Consider When Using Toxics Release Inventory Data.

In 2018:

- The metal mining sector reported the largest quantity of total disposal or other releases, accounting for 47% of total TRI releases and 70% of on-site land disposal for all industries.

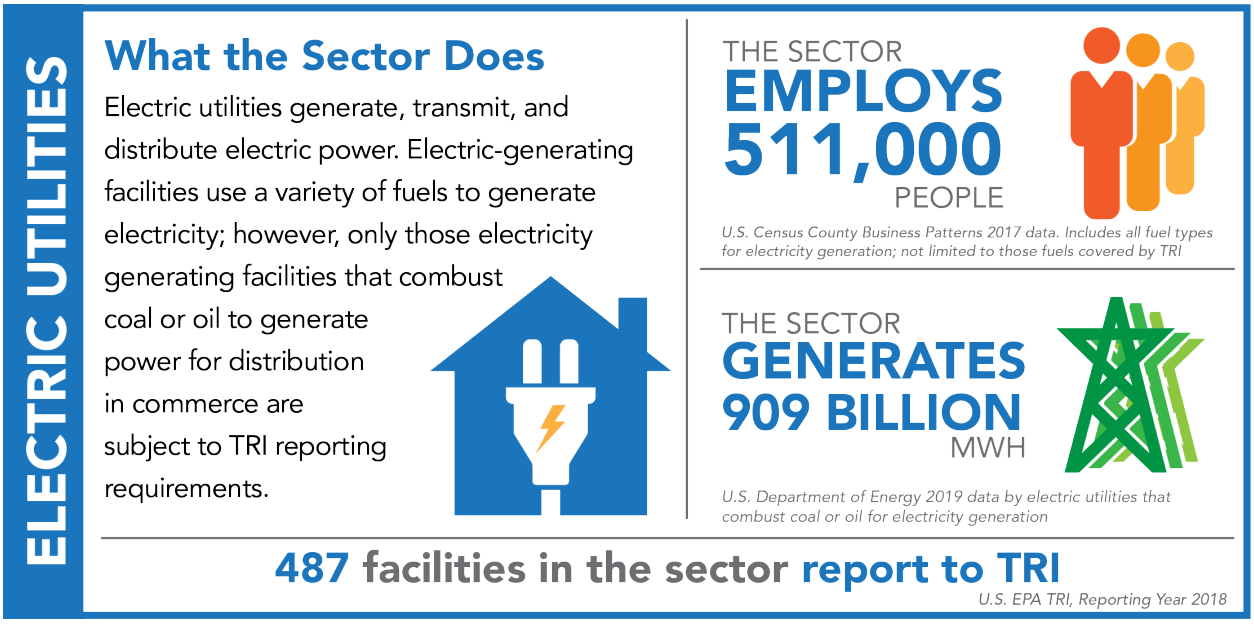
Source Reduction in the Metal Mining Sector:

None of the 86 metal mining facilities reported initiating source reduction activities for TRI chemicals in 2018. Unlike manufacturing, the nature of mining—the necessary movement and disposal of TRI chemicals present in large volumes of earth to access the target ore—does not lend itself to source reduction. TRI's Pollution Prevention Qlik Dashboard can help you learn more about production-related waste, releases, and pollution prevention opportunities in this sector.

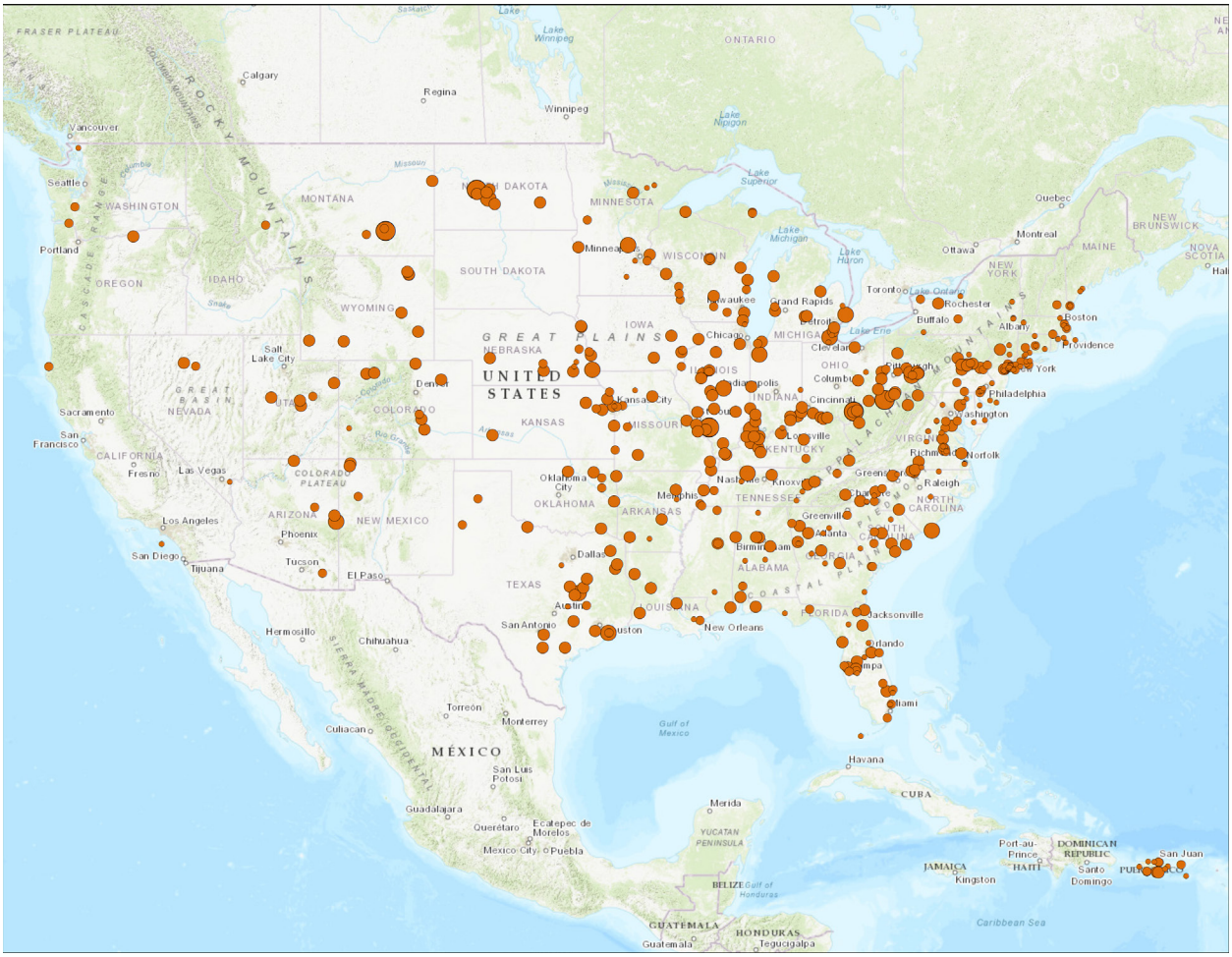
EPA's Smart Sectors Program is partnering with the mining sector to develop sensible approaches that better protect the environment and public health.

Electric Utilities

This section examines how TRI chemical wastes are managed in the electric utilities sector.



This map shows the locations of the electric utilities (defined as facilities reporting their primary NAICS code as 2211) that reported to TRI for 2018. Click on a facility for details on its TRI reporting.



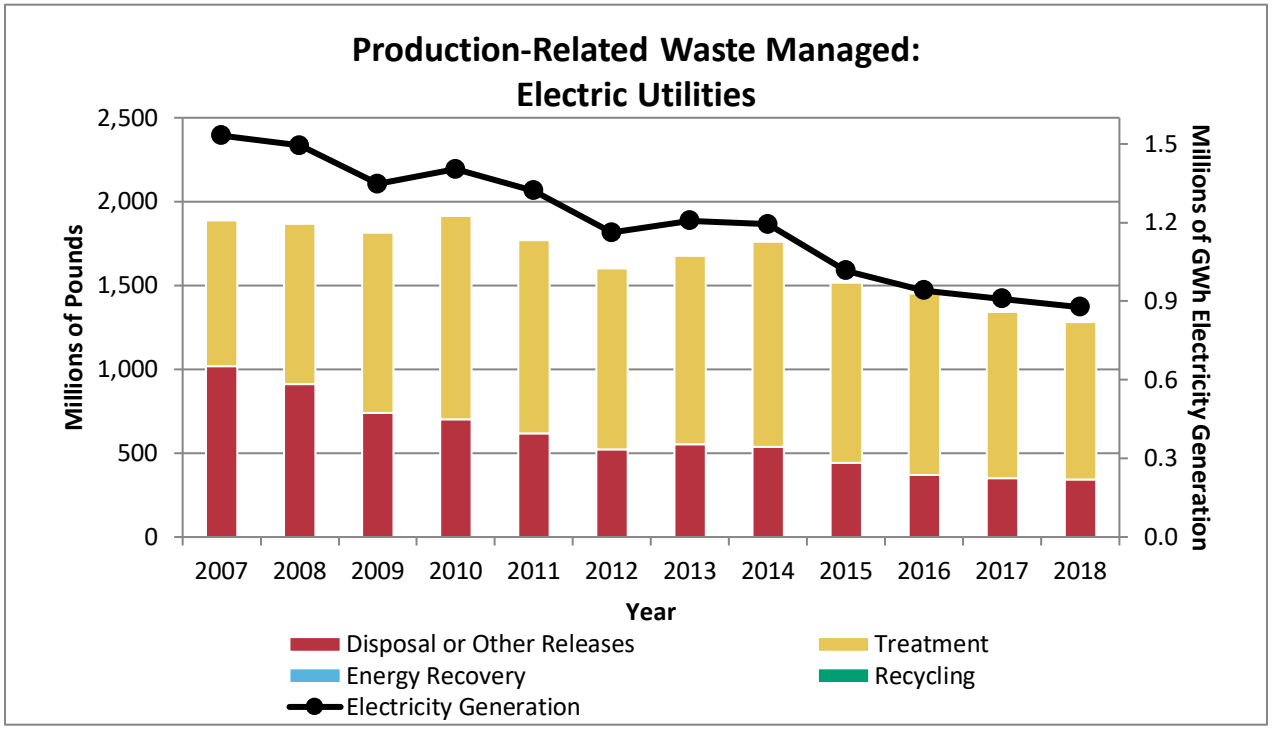
Electric Utilities Reporting to TRI, 2018

View Larger Map

For 2018, 487 electricity generating facilities that combust coal or oil reported to TRI.

Electric Utilities Waste Management Trend

The following graph shows the annual quantities of TRI chemicals that electric utility facilities manage as waste.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- Production-related waste managed decreased by 618 million pounds (32%) since 2007, driven by reduced releases.
- Net electricity generation by electric utilities using coal and oil fuels decreased by 43% (as reported by the U.S. Department of Energy's Energy Information Administration). The recent production decrease (beginning in 2014) was driven by the industry's transition to natural gas. Note that only facilities that combust coal or oil to produce power are covered under TRI reporting requirements.

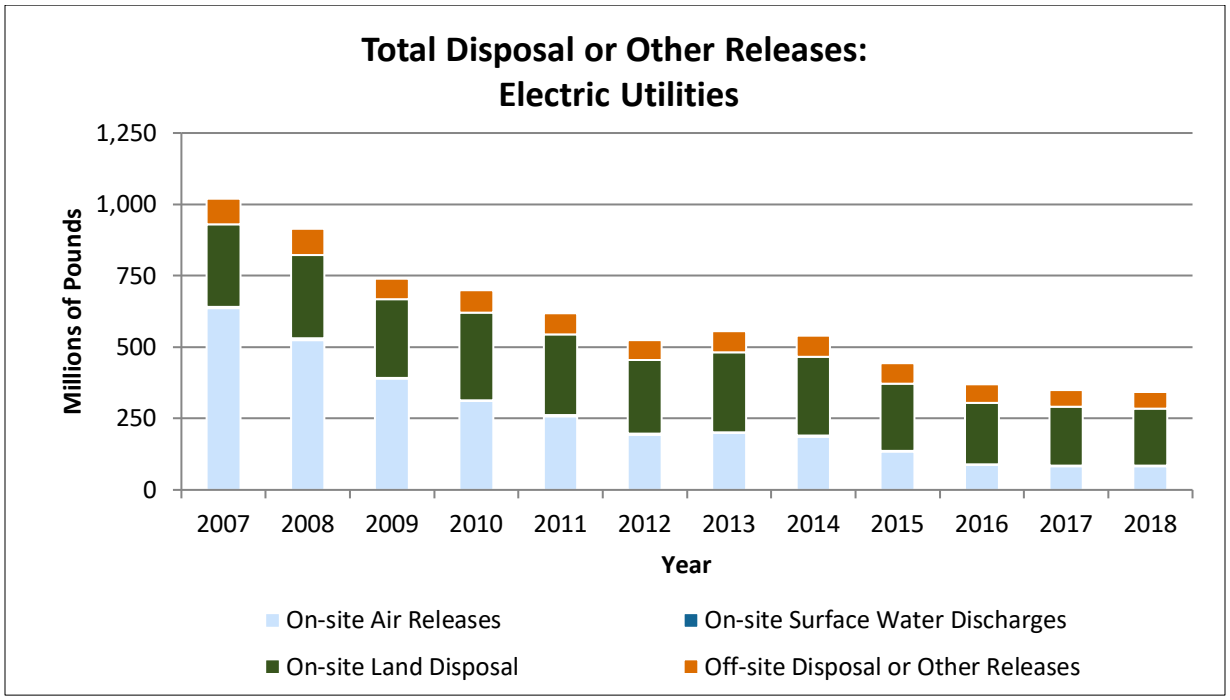
In 2018:

- Approximately three-quarters of the production-related waste was treated, while one-quarter was released to the environment.

- This is in contrast to 2007, when over half of the waste from this sector was released. This trend is largely due to an increase in scrubbers at electric utilities that treat (or destroy) TRI-reportable acid gases to reduce the quantities of the chemicals that would otherwise be released to the air.

Electric Utilities Releases Trend

The following graph shows the annual quantities of TRI chemicals released by electric utilities.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2007 to 2018:

- Releases from the electric utilities sector decreased by 66%. This decrease was driven by an 87% (555 million pounds) decrease in on-site air releases. On-site land disposal and off-site disposal also decreased, but to a lesser extent.

From 2017 to 2018:

- Releases by electric utilities decreased by 2% (8.0 million pounds). This decrease was driven by reductions in on-site land disposal to surface impoundments and off-site disposal.

Source Reduction in the Electric Utilities Sector:

In the electric utilities sector, 8 facilities (2% of the electric utility facilities reporting to TRI) initiated source reduction activities in 2018 to reduce their use of TRI chemicals and generation of wastes that contain TRI chemicals. Note that adding treatment equipment is considered a control technology for TRI chemical waste that is generated, and is not a source reduction

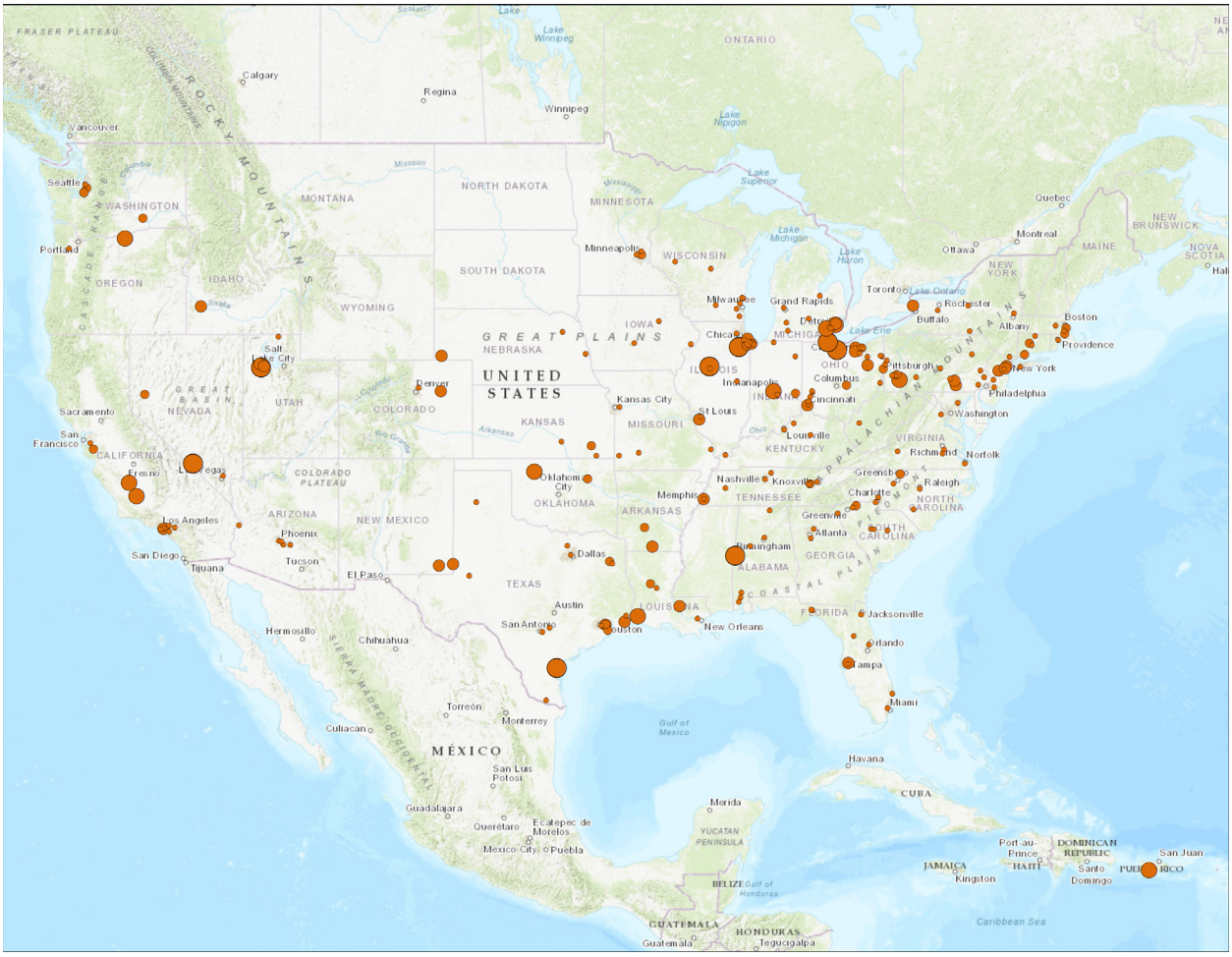
activity that prevents waste from being generated. TRI's Pollution Prevention Qlik Dashboard can help you learn more about production-related waste, releases, and pollution prevention opportunities in this sector.

EPA's Smart Sectors Program is partnering with the sector to develop sensible approaches that better protect the environment and public health.

Hazardous Waste Management

This section examines how TRI chemical wastes are managed in the hazardous waste management sector.

This map shows the locations of the hazardous waste management facilities (defined as facilities reporting their primary NAICS code as 562) that reported to TRI in 2018. Click on a facility for details on its TRI reporting.



Hazardous Waste Management Facilities Reporting to TRI, 2018

View Larger Map

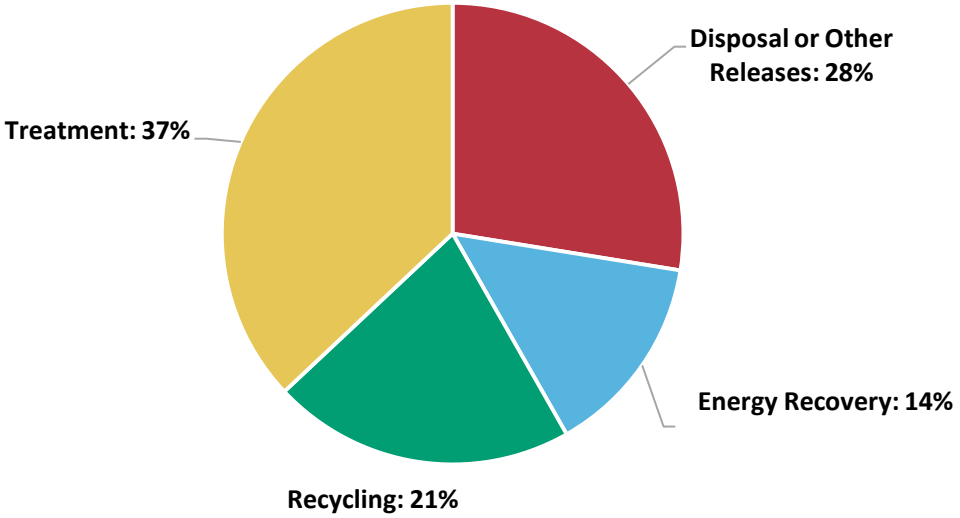
For 2018, 226 facilities in the hazardous waste management sector submitted 2,591 TRI reporting forms for 341 unique chemicals, averaging 11 forms (i.e., forms for 11 different chemicals) per facility. This is considerably higher than the average of 4 forms submitted per facility across all sectors. The sector also includes seven facilities that each submitted forms for more than 100 chemicals for 2018. The high average number of forms per facility reflects the diversity of the sector's operations where wastes of varying chemical composition are received from many different types of industrial processes.

Given the considerable year-to-year variability in facilities' inputs, examining TRI trends of this sector is not meaningful. Therefore, this sector profile only examines the most recent year of data and does not show any long-term trend information.

Hazardous Waste Management Sector Waste Management

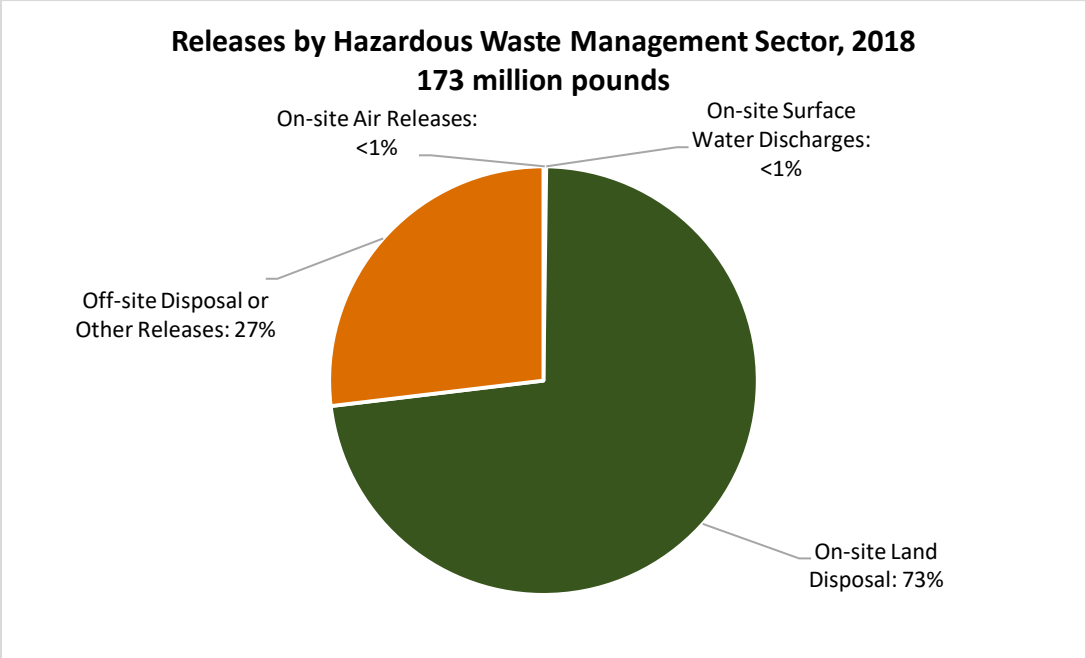
The quantity of waste managed and released by hazardous waste management facilities depends on the quantity of waste received from their customers. The following pie chart shows how hazardous waste management facilities managed waste, as reported to TRI for 2018.

Production-Related Waste Managed by Hazardous Waste Management Sector, 2018
629 Million pounds



Hazardous waste management facilities managed most of their TRI chemical waste through the preferred methods of treatment, recycling, and energy recovery, while 28% was released. This is comparable to other recent years, when about 70–80% of production-related waste managed by the sector was managed through the preferred methods of treatment, recycling, and energy recovery.

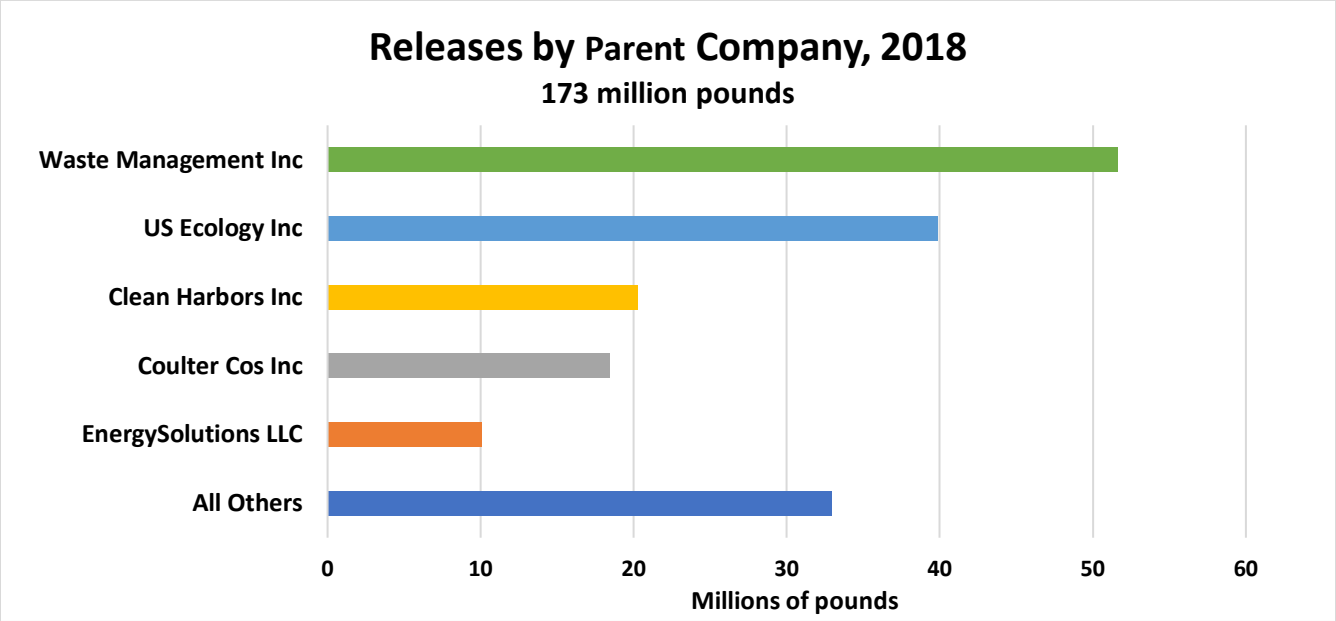
Hazardous Waste Management Sector Releases



- Most of the sector's releases (145 million lb, 83%) were of metal and metal compounds which cannot be treated. Most of the on-site land disposal was to landfills, primarily landfills that are regulated by subtitle C of the Resource Conservation and Recovery Act.

Releases by Parent Company

Releases in the hazardous waste management sector are concentrated in a few parent companies.



Note: This figure uses the standardized TRI parent company name.

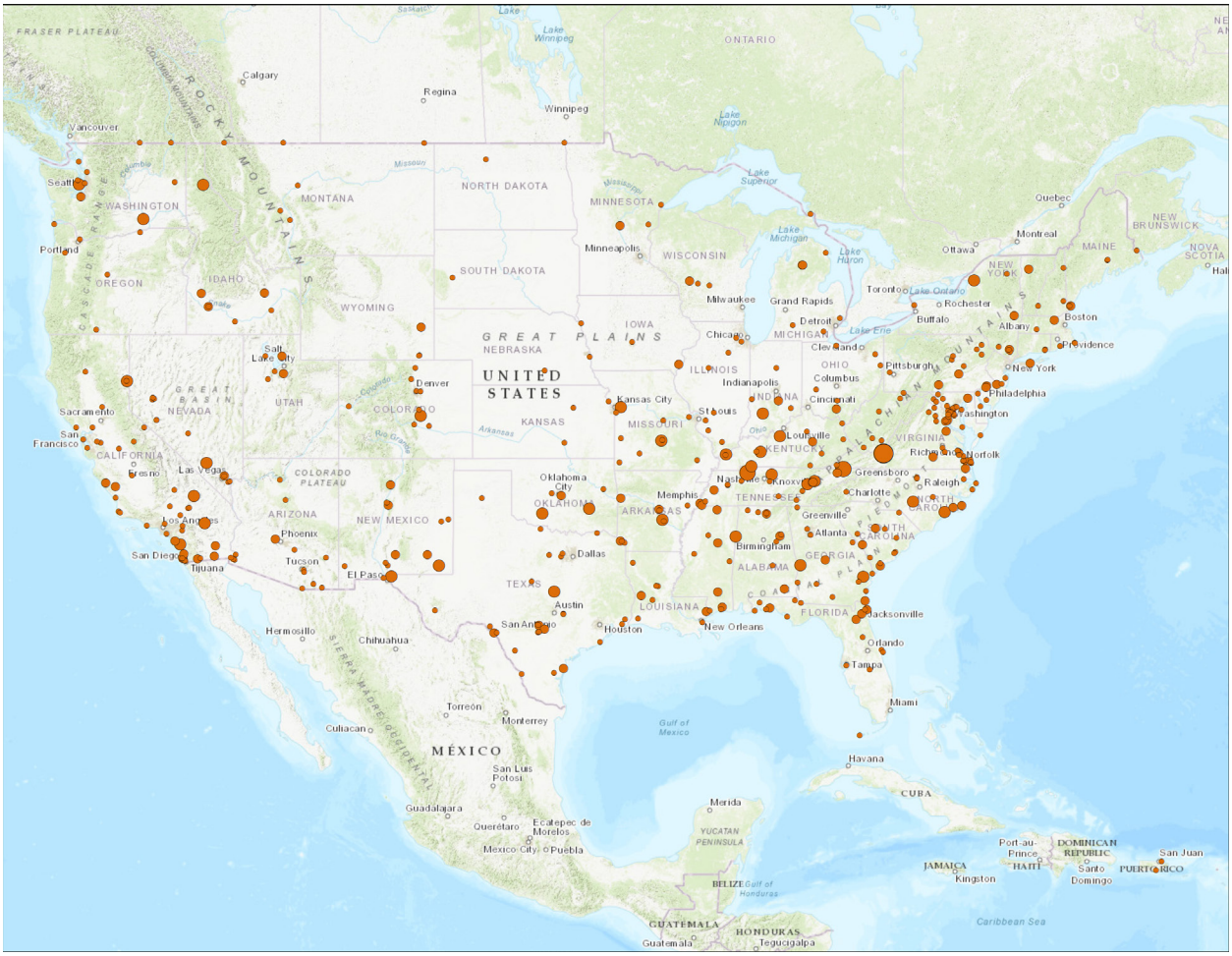
- 5 parent companies accounted for 81% of releases from the hazardous waste management sector for 2018.
- To view the number of facilities that reported to TRI for 2018 by parent company, mouse over the bar graph.

Source Reduction in the Hazardous Waste Management Sector:

The nature of hazardous waste management facilities' operations generally does not lend itself to source reduction activities. Hazardous waste management facilities commonly report that the variable nature of received waste streams is a barrier to source reduction. While not considered source reduction, these facilities apply control technologies and environmental practices like recycling and energy recovery to reduce environmental impacts.

Federal Facilities

This map shows the locations of 449 federal facilities that reported to TRI in 2018. Federal facilities are subject to TRI reporting requirements, regardless of the type of operations at the facility as described by their NAICS code. Click on a facility for details on its TRI reporting.



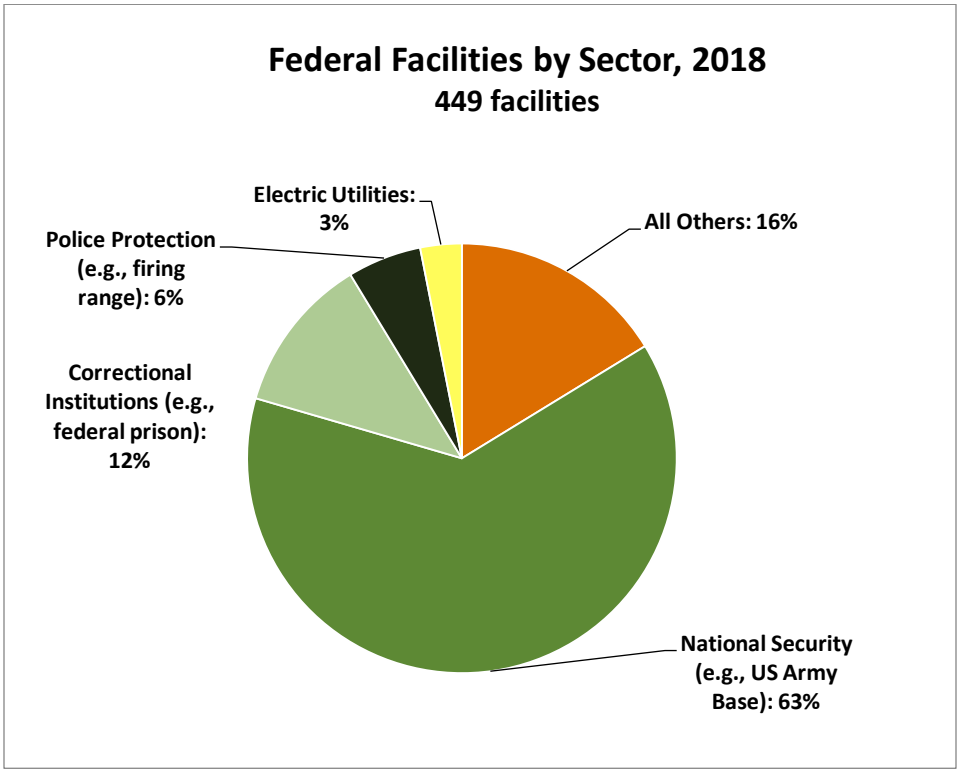
Federal Facilities Reporting to TRI, 2018

View Larger Map

The 1993 Executive Order 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements," established the requirement that all federal facilities, including facilities operated by the EPA, the Department of Defense, and the Department of the Treasury are subject to the TRI reporting requirements, regardless of the type of operations at the facility as described by their NAICS code. This executive order has been reaffirmed by subsequent administrations.

Federal Facilities by Industry

The following chart shows the number of federal facilities reporting to TRI by sector for 2018.



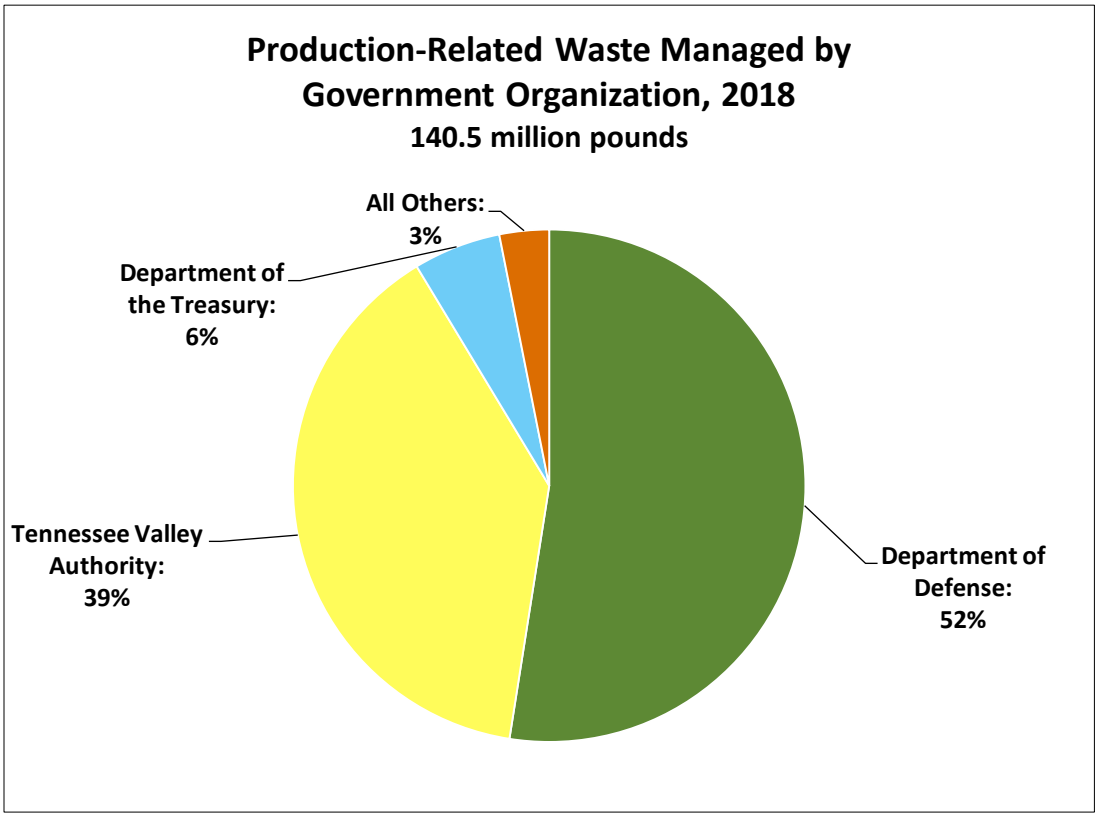
For 2018, 449 federal facilities in 38 different types of operations (based on their 6-digit NAICS codes) reported to TRI. Almost two-thirds of these facilities were in the National Security sector, which includes Department of Defense facilities such as Army and Air Force bases. All federal facilities are subject to TRI reporting requirements regardless of their sector. Therefore, for some industry sectors, the TRI database only includes data from federal facilities. Most federal facilities are in such sectors, including Military Bases (63%); Correctional Institutions (12%); and Police Protection, such as training sites for Border Patrol stations (6%).

As with non-federal facilities, activities at federal facilities drive the types and quantities of chemical waste managed and reported to TRI. Some of the activities at federal facilities that are

captured by TRI reporting are similar to those at non-federal facilities, such as electric utilities. In other cases, federal facilities may report waste managed from specialized activities that are not usually performed by non-federal facilities. For example, all of the federal facilities included under Police Protection and Correctional Institutions only reported for lead and lead compounds, likely due to the use of lead ammunition on firing ranges at these facilities.

Waste Management by Federal Facilities

The following pie chart shows the percentages of TRI chemicals managed as waste by federal government organizations in 2018.



- The types of waste reported by federal facilities vary by the type of operation.
    - The Tennessee Valley Authority (TVA) is a government-owned electric utility that provides power to southeastern states. Out of the 18 TVA facilities that reported to TRI for 2018, virtually all of the production-related waste comes from the fossil fuel plants that report in the electric utilities sector. Over 80% of their reported waste was hydrochloric and sulfuric acid aerosols which were mostly treated on site.
    - The Department of the Treasury facilities reporting to TRI are mints for manufacturing currency and, accordingly, they report metals (e.g., copper and nickel) to TRI. Almost all of their metal waste was recycled off site.

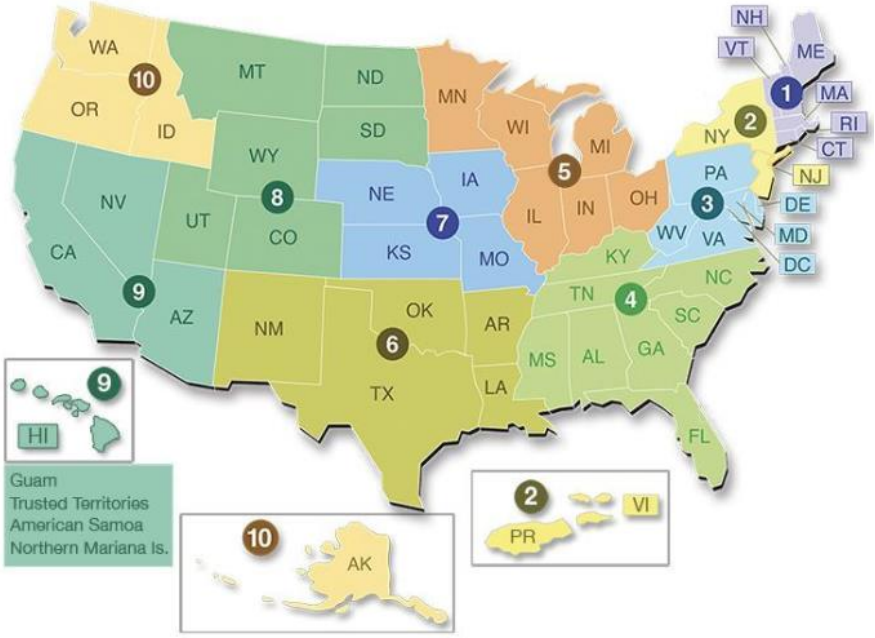
Source Reduction at Federal Facilities:

Since federal facilities are subject to TRI reporting regardless of their industry sector classification, their operations are diverse and few focus on manufacturing processes. Due to their unique functions, some federal facilities may face challenges in implementing source reduction strategies to reduce chemical waste. For the 2018 reporting year, 18 federal facilities (4%) reported implementing source reduction activities.

Federal facilities have often indicated barriers to reducing use of lead because it is contained in ammunition used at National Security and Park Service facilities. For 2018, several federal facilities reported using green ammuntion in accordance with National Park Service policy to use non-lead ammunition where feasible. To find more examples of federal facilities' source reduction activities and the barriers they face to implementing source reduction, visit TRI's Pollution Prevention Search Tool and select industry sectors such as National Security, Correctional Institutions or Police Protection from the dropdown menu under "search criteria."

EPA Regional Profiles

This section of the National Analysis looks at production-related waste management and releases of Toxics Release Inventory (TRI) chemicals at the EPA regional level during 2018. EPA has 10 regional offices (shown on the map below) across the country, each of which is responsible for several states and in some cases, territories and tribes.

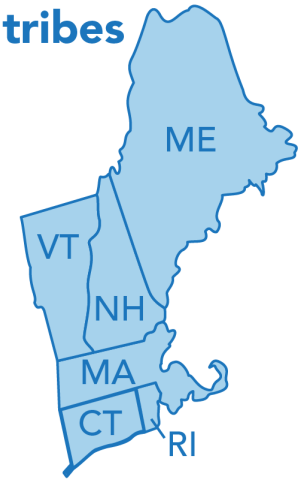


EPA regions vary significantly in many important characteristics, including size, population, and the types of facilities located in the region. These factors can result in significant differences between national and regional trends. For example, certain activities such as metal mining are geographically concentrated and report large quantities of TRI chemical waste disposed of, therefore release trends in regions with many metal mines often do not mirror national release trends.

Regional Profile for EPA Region 1

This section examines TRI reporting in EPA Region 1. Region 1 includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, and 10 tribes.

Region 1 serves 6 states and 10 tribes



REGION 1'S POPULATION IS **14.9 million** PEOPLE

U.S. Census Annual Estimates of the Resident Population: July 1, 2018

The **sectors** with the greatest TRI releases in the region are:

- Paper
- Food

The TRI **chemicals** released in the greatest quantities in the region are:

- Nitrate compounds
- Zinc and zinc compounds

U.S. EPA TRI, Reporting Year 2018

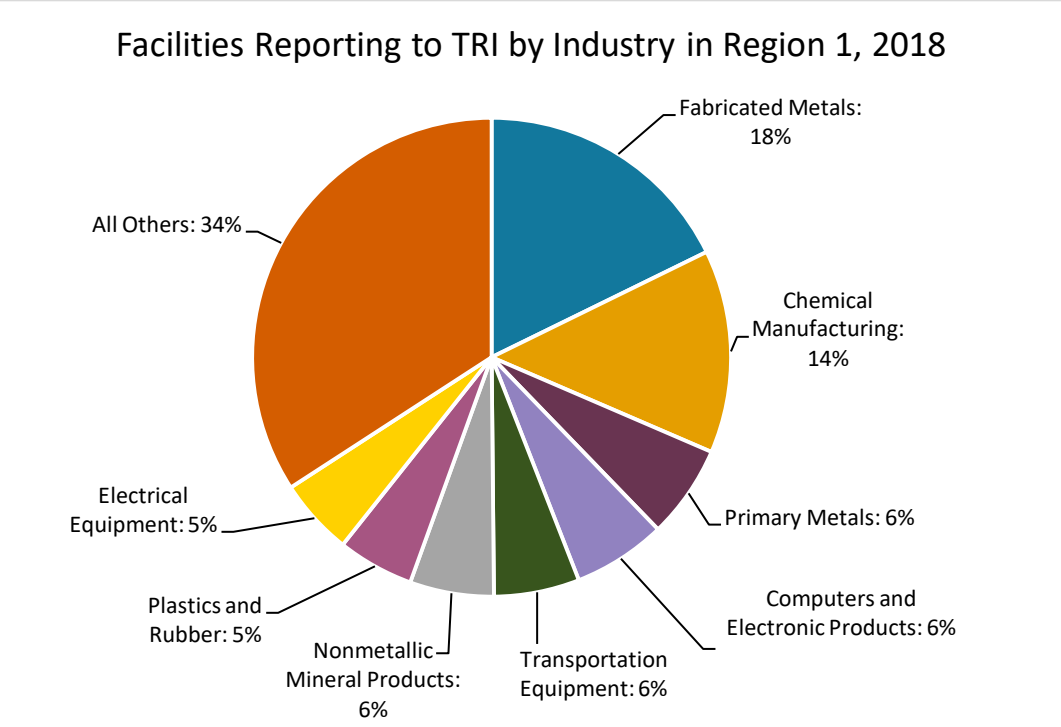
967 facilities in the region report to TRI

U.S. EPA TRI, Reporting Year 2018

Region 1 covers 4% of the US population and includes 4% of all facilities that report to TRI. For state- and tribe-specific TRI data, see the Where You Live section and the Tribal Communities section.

Industry Sectors

This chart shows the industry sectors with the most TRI-reporting facilities in Region 1.



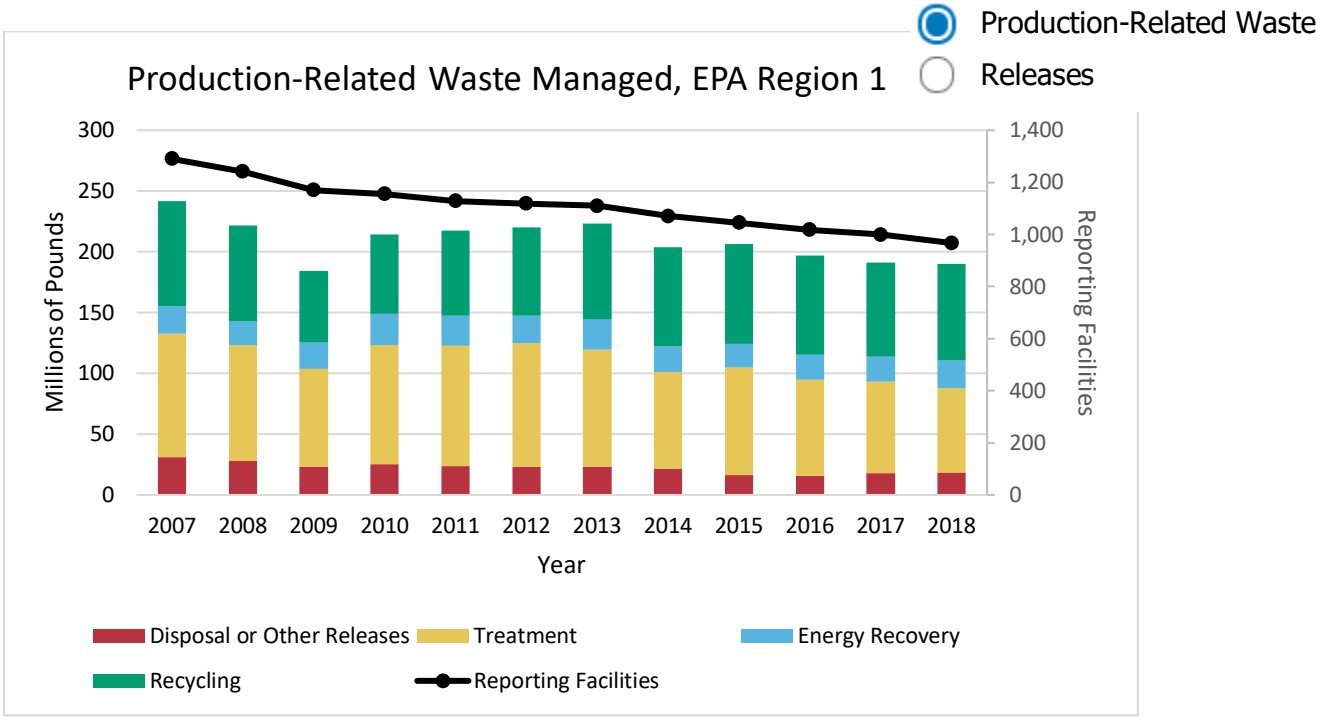
In 2018:

- 967 facilities in Region 1 reported to TRI. These facilities were most commonly in the fabricated metals (i.e., manufacture of metal products) or chemical manufacturing sectors. The number of facilities and sectors reporting for 2018 were similar to 2017 reporting for the region.
- Most releases in Region 1 were from the paper manufacturing, food manufacturing, chemical manufacturing, and fabricated metals (i.e., manufacture of metal products) sectors. Note that relatively few facilities in the paper manufacturing and food manufacturing sectors reported to TRI in this region and those sectors are included in "All Others" in the pie chart above. Nationwide, the metal mining, chemical manufacturing, electric utilities, and primary metals (including iron and steel manufacturing, and foundries) sectors reported the highest releases.

For information on the facilities with the greatest releases in the region, see the Region 1 TRI Factsheet.

TRI Waste Management Trend

The following graph shows the annual quantities of TRI chemicals in production-related waste managed by facilities located in Region 1. For more details on quantities released, toggle to the Releases graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported managing 193 million pounds of production-related waste, 90% of which was recycled, combusted for energy recovery, or treated. Only 10% was disposed of or otherwise released into the environment. Nationally, 12% of production-related waste was disposed of or otherwise released into the environment.
- Since 2017, quantities of production-related waste managed decreased by 1%.
    - Quantities of waste treated decreased, while quantities of waste recycled and combusted for energy recovery increased. Quantities of production-related waste disposed of or otherwise released were comparable to 2017 quantities.

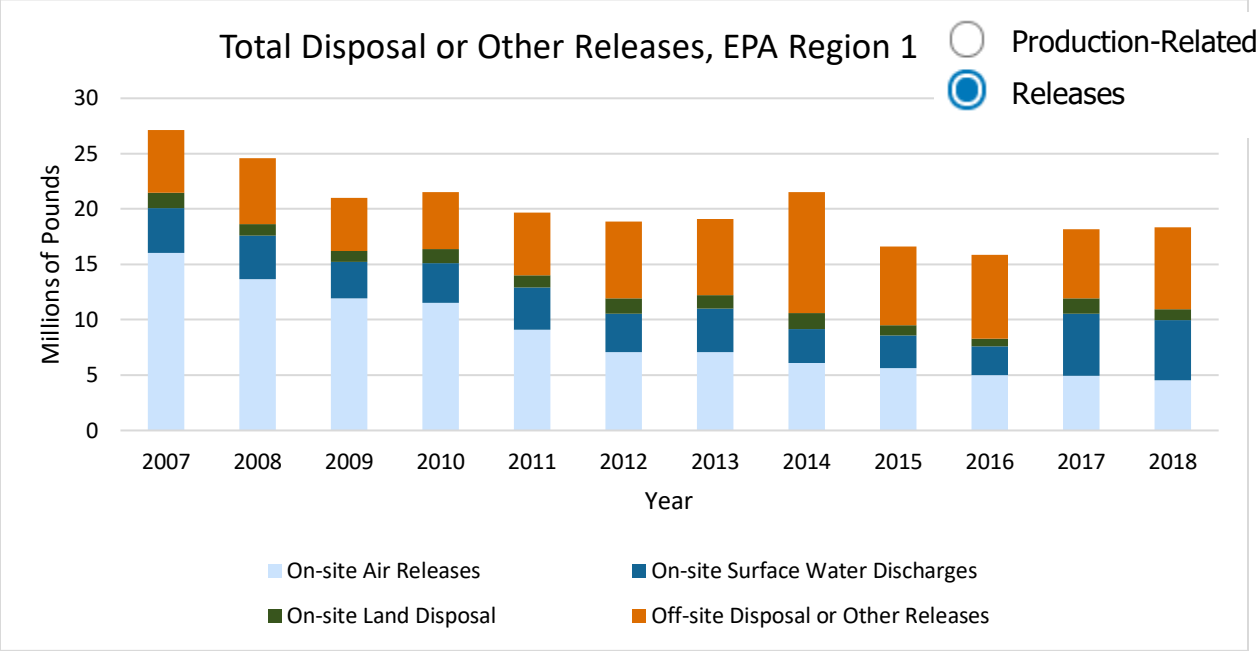
From 2007 to 2018:

- Total production-related waste managed decreased by 52 million pounds (21%), driven by reductions in the quantities of production-related waste disposed of or otherwise

released (41% decrease, 13 million pounds) and treated (32% decrease, 32 million pounds). Production-related waste managed by most sectors in the region decreased, with the largest decreases in the paper and primary metals sectors.

- Nationally, quantities of production-related waste managed increased by 28% since 2007, driven by increased recycling.

The following graph shows the annual quantities of TRI chemicals released by facilities located in Region 1.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported 19 million pounds of releases.
- The chemicals released in the greatest quantities by medium were:
  - methanol and ammonia to air;
  - nitrate compounds to water;
  - zinc and zinc compounds and manganese and manganese compounds to land; and
  - zinc and zinc compounds and nitrate compounds transferred off site for disposal.
- Since 2017, releases increased by 163 thousand pounds (<1%). On-site releases to air, land, and water decreased while off-site transfers for disposal increased. Nationally, releases decreased by 3% since 2017.
- Contribution by state to the Region 1 releases in pounds were: Maine (61%), Massachusetts (21%), Connecticut (11%), Rhode Island (2%), New Hampshire (2%), and Vermont (2%).
- To consider the potential health risk from chronic exposure to these releases, EPA uses a risk-screening score from the RSEI model. Contributions by state to the RSEI score for

2018 Highlight

Production-related waste managed in Region 1 decreased by 21% since 2007, driven by reductions in production-related waste managed by paper manufacturing and chemical manufacturing facilities in the region.

Region 1 were: Connecticut (59%), Massachusetts (35%), Maine (4%), Rhode Island (1%), New Hampshire (1%), and Vermont (<1%).

From 2007 to 2018:

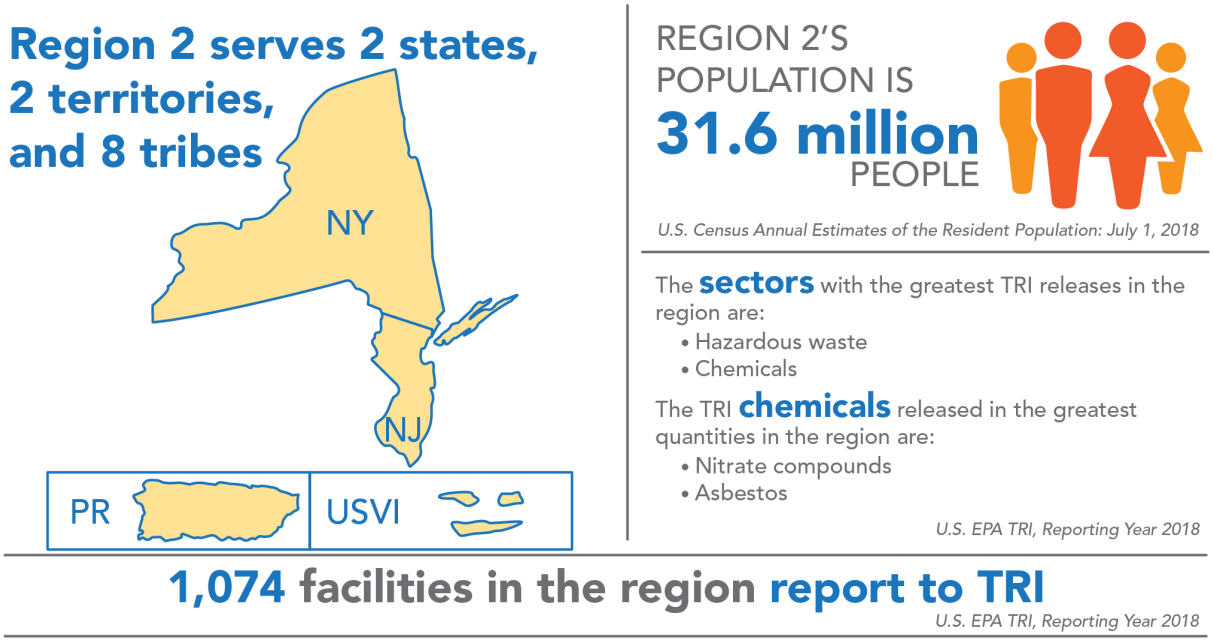
- Releases in Region 1 decreased by 8.8 million pounds (32%). This reduction was driven by decreased air releases by electric utilities. Nationally, total disposal or other releases of TRI chemicals decreased by 9% since 2007.
- Quantities of chemicals released to air and land decreased, while quantities of chemicals released to water and transferred off-site for disposal increased.

Source Reduction

In 2018, 10% of facilities in Region 1 (97 facilities) reported implementing new source reduction activities. Source reduction reporting rates in the region were among the highest in the chemical manufacturing sector, where 14% of facilities reported source reduction activities. For example, one biodiesel manufacturer reported adding a methanol recovery system to reuse the chemical in the process. [Click to view facility details in the P2 tool].

Regional Profile for EPA Region 2

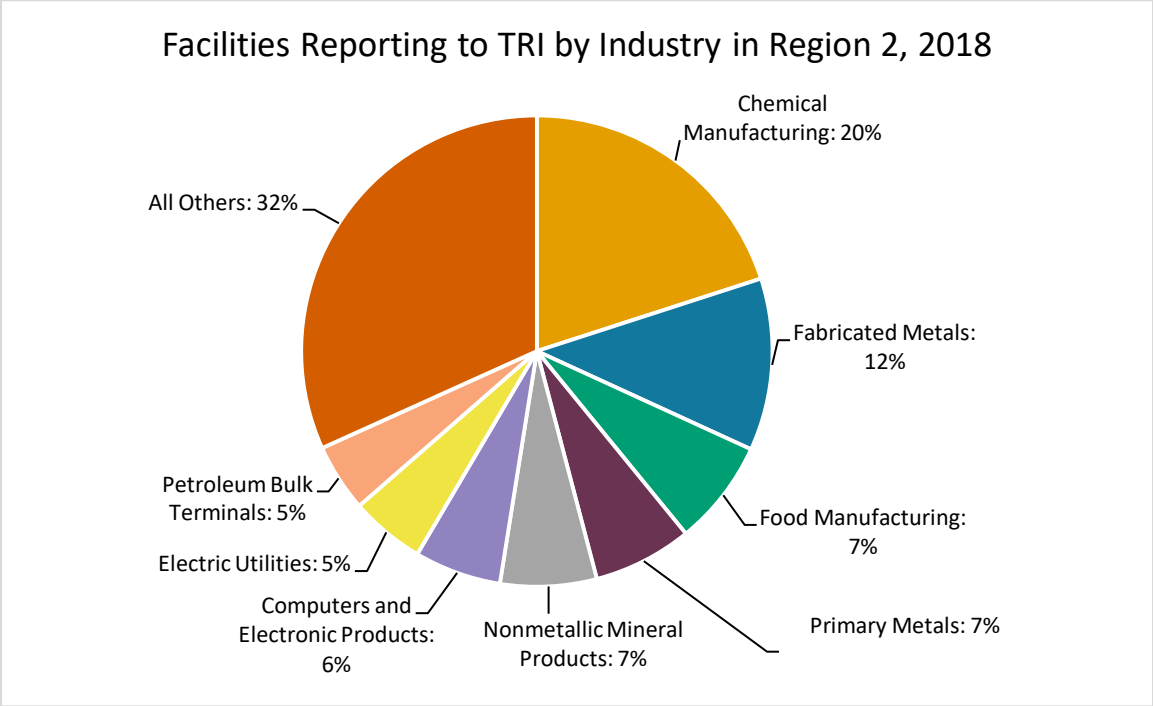
This section examines TRI reporting in EPA Region 2. Region 2 includes New Jersey, New York, Puerto Rico, US Virgin Islands, and 8 tribes.



Region 2 covers 10% of the US population and includes 5% of all facilities that report to TRI. For state- and tribe-specific TRI data, see the Where You Live section and the Tribal Communities section.

Industry Sectors

This chart shows the industry sectors with the most TRI-reporting facilities in Region 2.



Note: Percentages may not sum to 100% due to rounding.

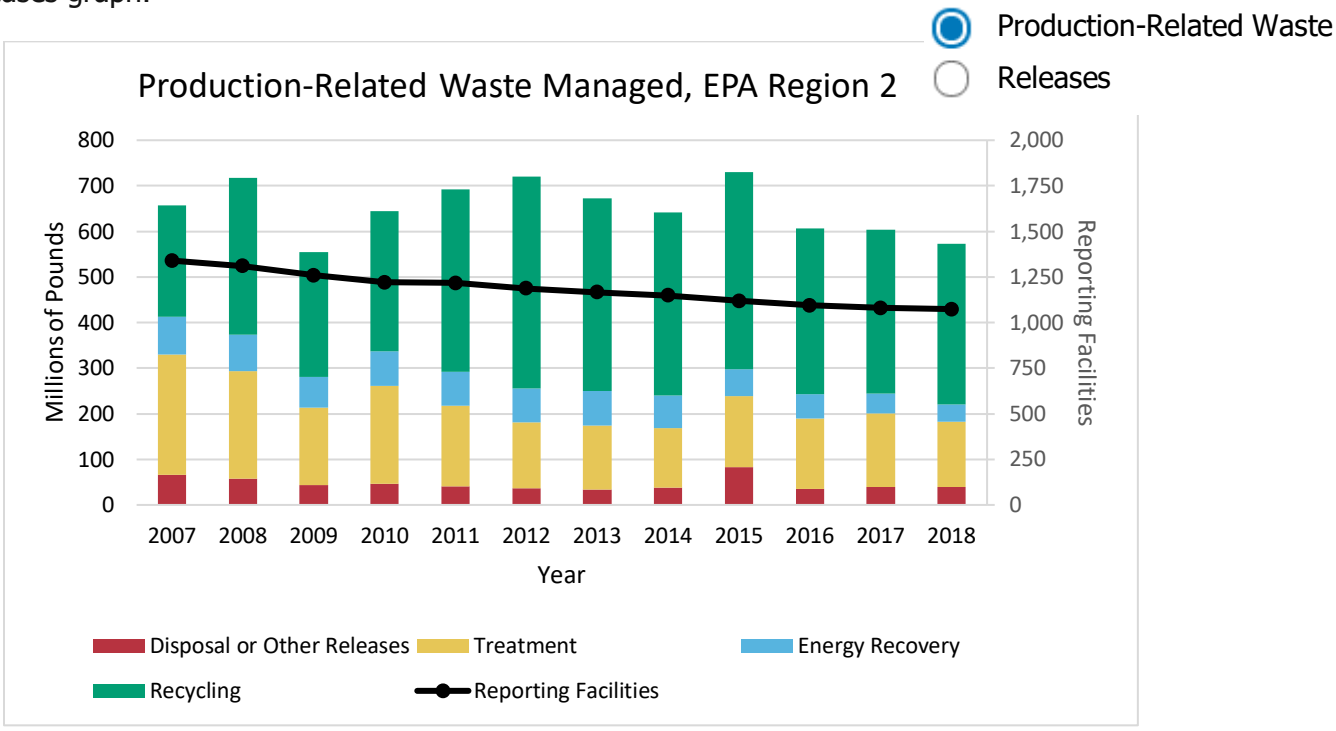
In 2018:

- 1,074 facilities in Region 2 reported to TRI. These facilities were most commonly in the chemical manufacturing or fabricated metals (i.e., manufacture of metal products) sectors. The number of facilities and sectors reporting for 2018 were similar to 2017 reporting for the region.
- Most releases in Region 2 were from the hazardous waste management, chemical manufacturing, petroleum products manufacturing, electric utilities, and primary metals (including iron and steel manufacturing, and foundries) sectors. Note that relatively few facilities in the hazardous waste management and petroleum products sectors reported to TRI in this region and those sectors are included in "All Others" in the pie chart above. Nationwide, the metal mining, chemical manufacturing, electric utilities, primary metals, and hazardous waste management sectors reported the highest releases.

For information on the facilities with the greatest releases in the region, see the TRI Region 2 TRI Factsheet.

TRI Waste Management Trend

The following graph shows the annual quantities of TRI chemicals in production-related waste managed by facilities located in Region 2. For more details on quantities released, toggle to the Releases graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented. Total production-related waste reported for 2018 in Region 2 was higher than shown here due to large treatment quantities of hydrogen sulfide, which was added to the TRI chemical list in 2012.

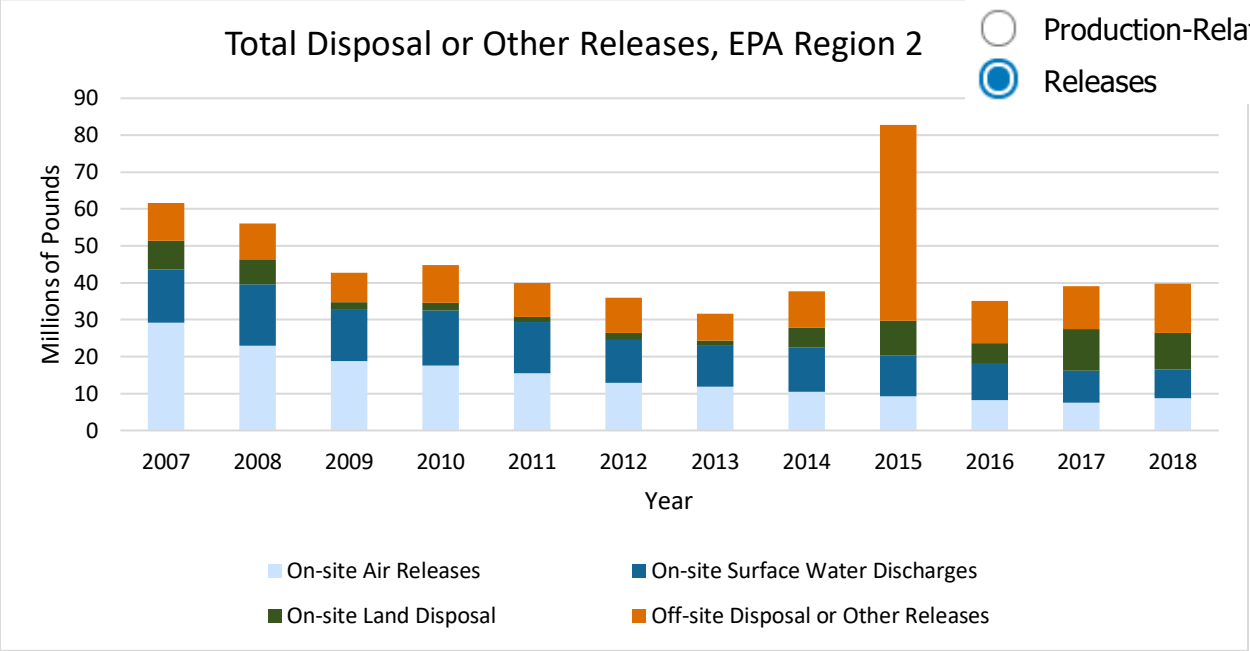
In 2018:

- Facilities reported managing 760 million pounds of production-related waste, 95% of which was recycled, combusted for energy recovery, or treated. Only 5% was disposed of or otherwise released into the environment. Nationally, 12% of production-related waste was disposed of or otherwise released into the environment.
- Since 2017, quantities of production-related waste managed decreased by 5%, driven by a reduction in the quantity of waste treated.

From 2007 to 2018:

- Total production-related waste managed decreased by 85 million pounds (13%). Quantities of production-related waste treated, combusted for energy recovery, and disposed of or otherwise released decreased, while quantities of production-related waste recycled increased. Nationally, quantities of production-related waste managed increased by 28% since 2007, driven by increased recycling.

The following graph shows the annual quantities of TRI chemicals released by facilities located in Region 2.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported 40 million pounds of releases.
- The chemicals released in the greatest quantities by medium were:
  - ammonia and sulfuric acid to air;
  - nitrate compounds to water;
  - asbestos to land; and
  - zinc and zinc compounds and nitrate compounds transferred off site for disposal.
- Since 2017, releases increased by 749,000 pounds (2%). Air releases and off-site transfers for disposal increased, while water and land releases decreased. Nationally, releases decreased by 3% since 2017.
- Contribution by state or territory to the Region 2 releases in pounds were: New York (53%), New Jersey (31%), Puerto Rico (15%), and US Virgin Islands (<1%).
- To consider the potential health risk from chronic exposure to these releases, EPA uses a risk-screening score from the RSEI model. Contributions by state or territory to the

2018 Highlight

Variability in TRI releases in Region 2 is due to changes in releases reported by hazardous waste management facilities, where release quantities can vary widely year to year. In recent years, the sector's releases in the region have fluctuated by 2.5 million to 46 million pounds per year.

RSEI score for Region 2 were: New Jersey (42%), New York (40%), Puerto Rico (18%), and US Virgin Islands (<1%).

From 2007 to 2018:

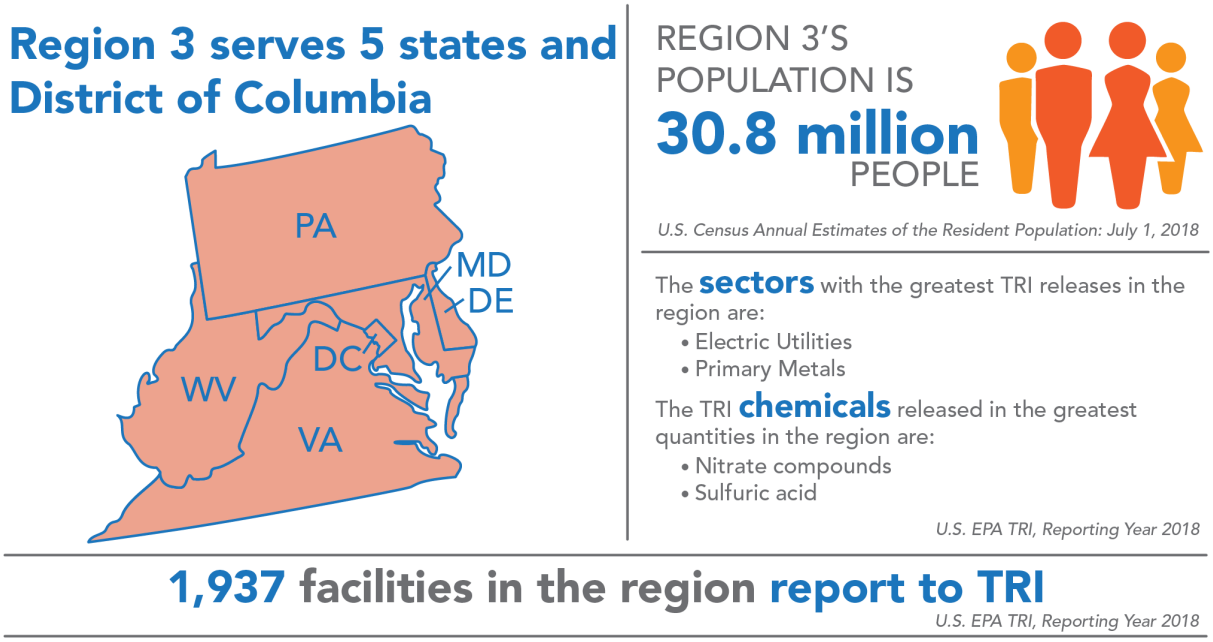
- Releases in Region 2 decreased by 22 million pounds (35%), driven by reduced releases from electric utilities. Nationally, total disposal or other releases of TRI chemicals decreased by 9% since 2007.
- Quantities of chemicals released to air and water substantially decreased, while releases to land and off-site transfers for disposal increased.
- The increased releases for 2015 shown in the graph were caused by off-site transfers for disposal of several chemicals from a hazardous waste management facility in Kearny, New Jersey. [Click to view facility details in the P2 tool].

Source Reduction

In 2018, 7% of facilities in Region 2 (73 facilities) reported implementing new source reduction activities. Source reduction reporting rates in the region were among the highest in the computers and electronic products sector, where 11% of facilities reported source reduction activities. As one example of source reduction in Region 2, a facility's metal shop uses a nesting software program to help mate dissimilar parts into one blank of raw material. This reduces raw material use and waste, including material containing copper. [Click to view facility details in the P2 tool].

Regional Profile for EPA Region 3

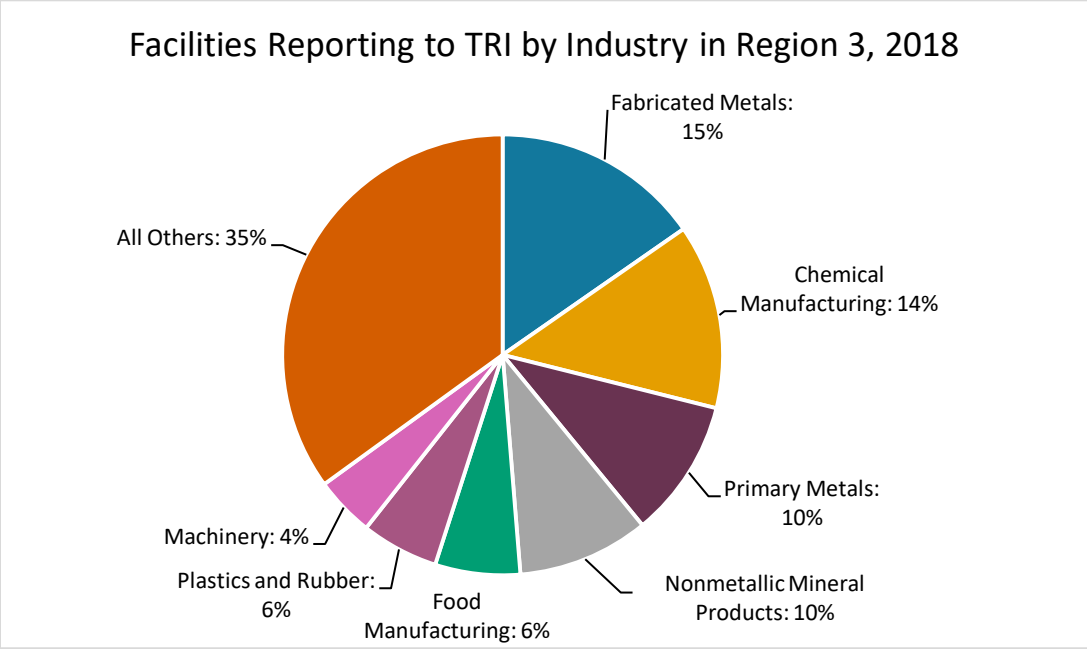
This section examines TRI reporting in EPA Region 3. Region 3 includes Delaware, the District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia.



Region 3 covers 9% of the US population and includes 9% of all facilities that report to TRI. For state-specific TRI data, see the Where You Live section.

Industry Sectors

This chart shows the industry sectors with the most TRI-reporting facilities in Region 3.



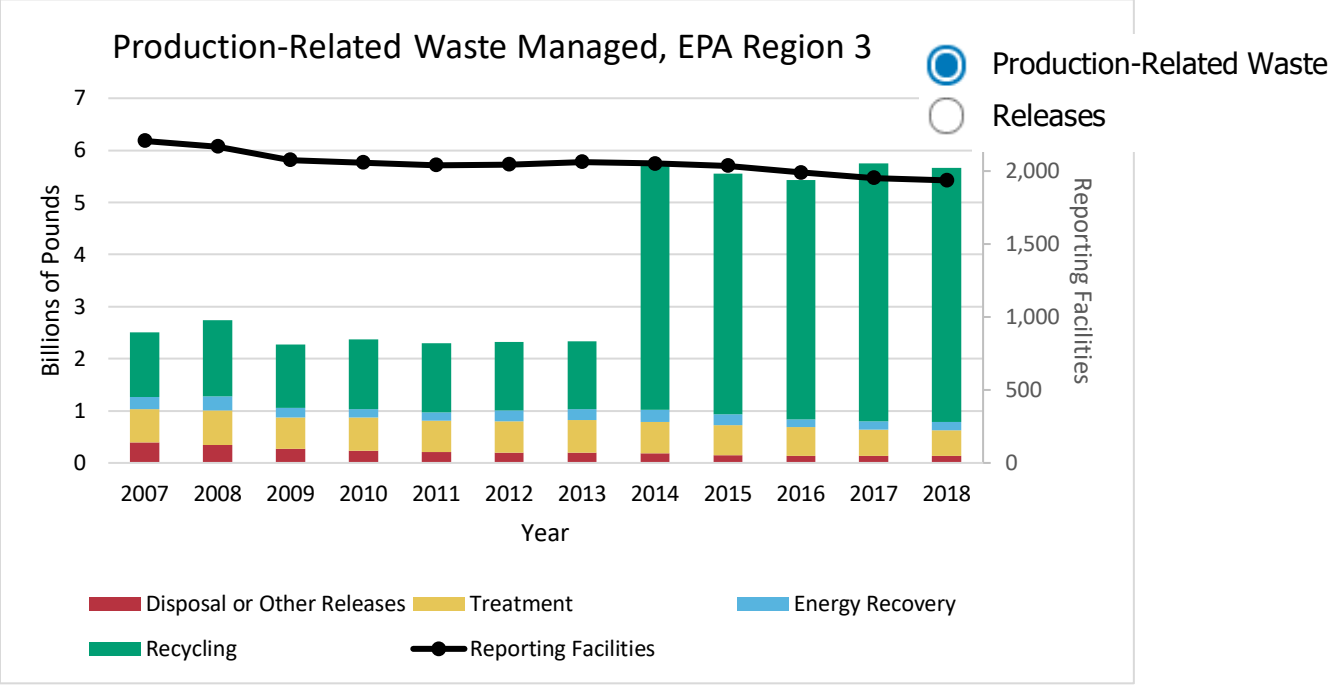
In 2018:

- 1,937 facilities in Region 3 reported to TRI. These facilities were most commonly in the fabricated metals (i.e., manufacture of metal products) or chemical manufacturing sectors. The number of facilities and sectors reporting for 2018 were similar to 2017 reporting for the region.
- Most releases in Region 3 were from the electric utilities, primary metals (including iron and steel manufacturing, and foundries), petroleum products manufacturing, and chemical manufacturing sectors. Note that relatively few facilities in the electric utilities and petroleum products sectors reported to TRI in this region and those sectors are included in "All Others" in the pie chart above. Nationwide, the metal mining, chemical manufacturing, electric utilities, and primary metals sectors reported the highest releases.

For information on the facilities with the greatest releases in the region, see the Region 3 TRI Factsheet.

TRI Waste Management Trend

The following graph shows the annual quantities of TRI chemicals in production-related waste managed by facilities located in Region 3. For more details on quantities released, toggle to the Releases graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

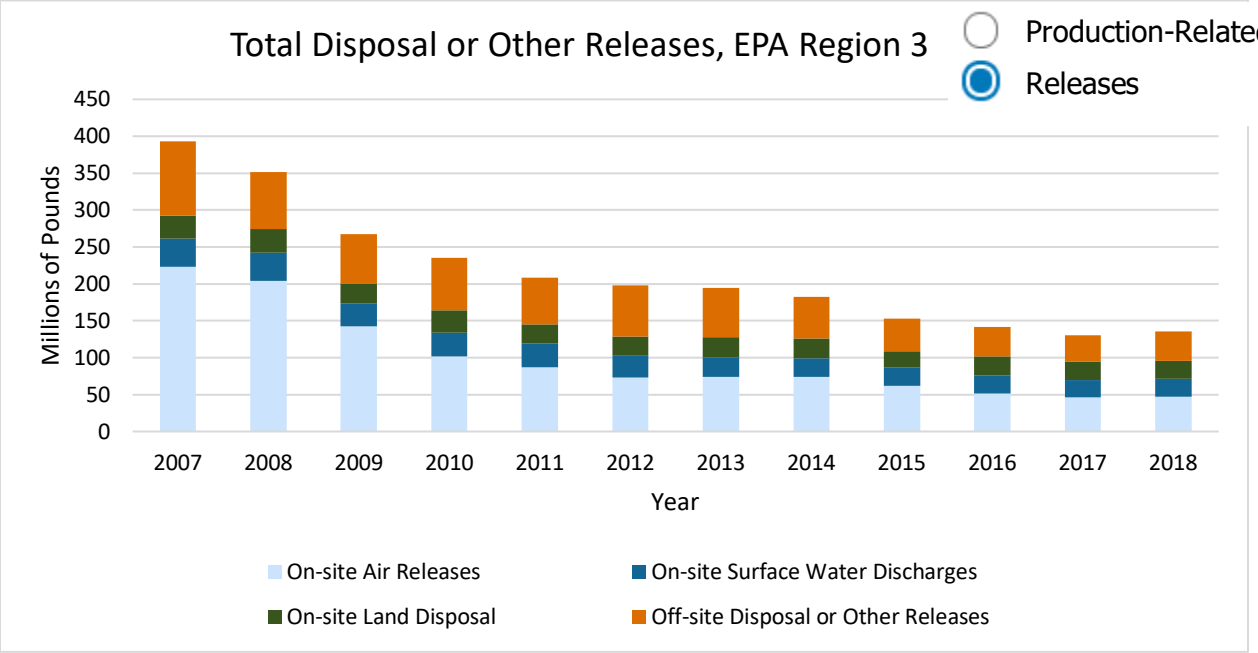
- Facilities reported managing 6.1 billion pounds of production-related waste, 80% of which was managed through recycling. Nationally, 53% of production-related waste was managed through recycling.
- Since 2017, quantities of production-related waste managed remained about the same.

From 2007 to 2018:

- Total production-related waste managed increased by 3.1 billion pounds (126%), driven by one facility which reported over 3 billion pounds of cumene recycling each year from 2014 to 2018. [Click to view facility details in the P2 tool]. Excluding this facility, production-related waste managed in the region decreased by 583 million pounds (23%).

- Nationally, quantities of production-related waste managed increased by 28% since 2007, driven by increased recycling.

The following graph shows the annual quantities of TRI chemicals released by facilities located in Region 3.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported 137 million pounds of releases.
- The chemicals released in the greatest quantities by medium were:
  - sulfuric acid, ammonia, and hydrochloric acid to air;
  - nitrate compounds to water;
  - manganese and manganese compounds and barium and barium compounds to land; and
  - zinc and zinc compounds and manganese and manganese compounds transferred off site for disposal.
- Since 2017, releases increased by 5.1 million pounds (4%). Releases increased to all media except land. Nationally, releases decreased by 3% since 2017.
  - The increase in releases was driven by increased releases from several sectors including primary metals, food manufacturing, and petroleum.
- Contribution by state to the Region 3 releases in pounds were: Pennsylvania (43%), Virginia (25%), West Virginia (23%), Delaware (5%), and Maryland (5%).

2018 Highlight

TRI releases in Region 3 increased from 2017 to 2018 after decreasing every year since 2007. The increase for 2018 was driven by several sectors including primary metals and petroleum products manufacturing.

- To consider the potential health risk from chronic exposure to these releases, EPA uses a risk-screening score from the RSEI model. Contributions by state to the RSEI score for Region 3 were: Pennsylvania (67%), Virginia (14%), West Virginia (9%), Delaware (8%), and Maryland (1%).

From 2007 to 2018:

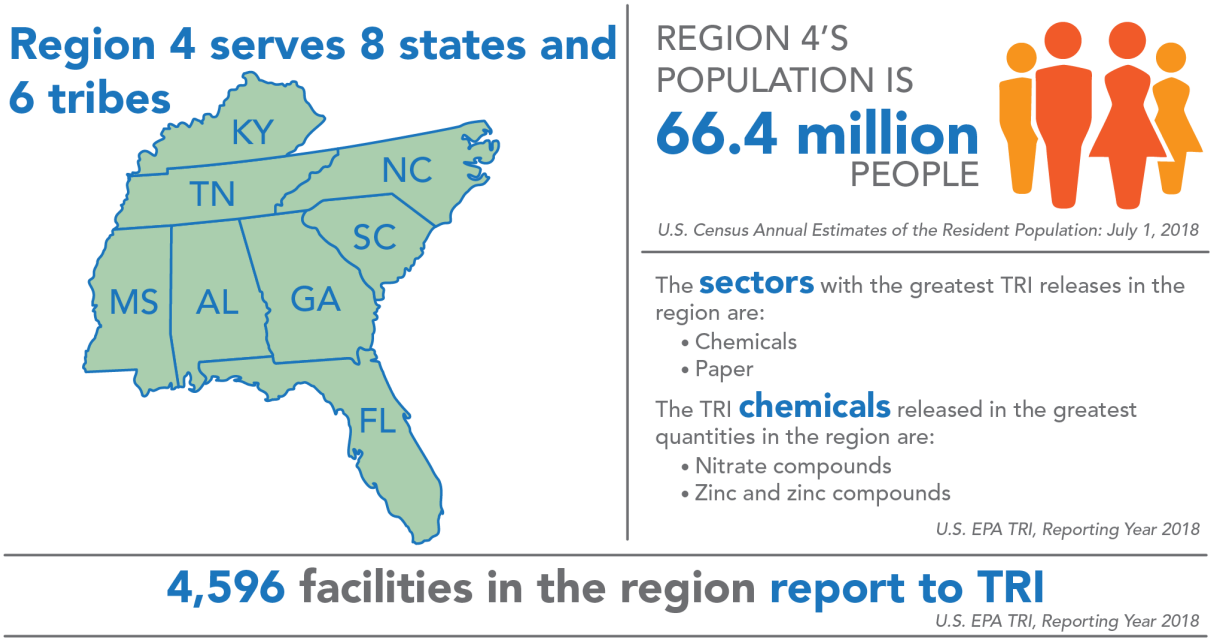
- Releases in Region 3 decreased by 258 million pounds (66%). Nationally, total disposal or other releases of TRI chemicals decreased by 9% since 2007.
- Quantities of chemicals released to every medium (air, water, land, and off-site transfers for disposal) decreased, with a 176 million pound reduction in air releases driving the overall decrease.

Source Reduction

In 2018, 6% of facilities in Region 3 (108 facilities) reported implementing new source reduction activities. Source reduction reporting rates in the region were among the highest in the plastics and rubber sector, where 12% of facilities reported source reduction activities. For example, a rubber products manufacturer changed the start time for a process to be based on production volume instead of production time, reducing the facility's nitrate compound consumption. [Click to view facility details in the P2 tool].

Regional Profile for EPA Region 4

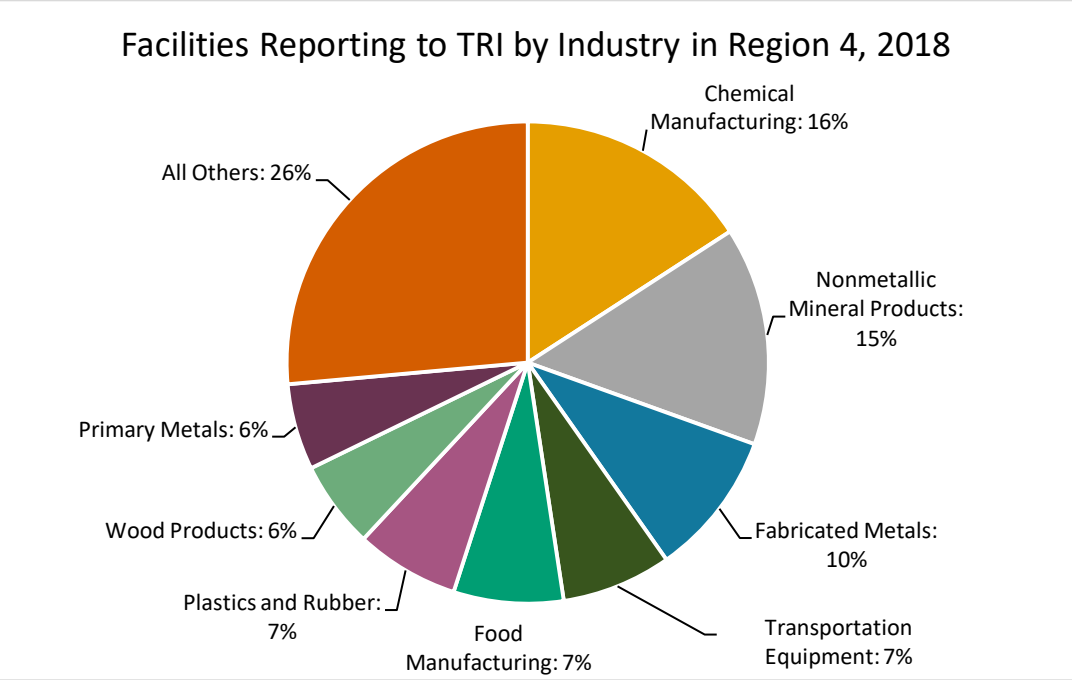
This section examines TRI reporting in EPA Region 4. Region 4 includes Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, and 6 tribes.



Region 4 covers 20% of the US population and includes 21% of all facilities that report to TRI. For state- and tribe-specific TRI data, see the Where You Live section and the Tribal Communities section.

Industry Sectors

This chart shows the industry sectors with the most TRI-reporting facilities in Region 4.



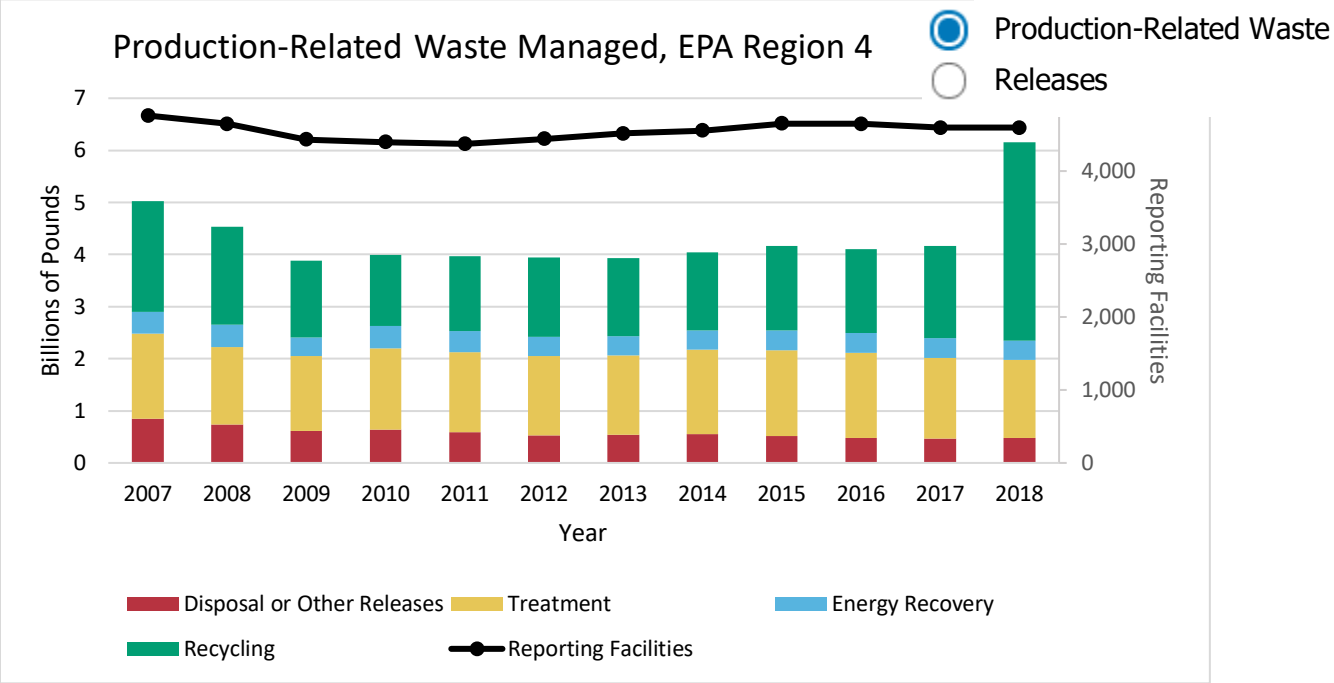
In 2018:

- 4,596 facilities in Region 4 reported to TRI. These facilities were most commonly in the chemical manufacturing or nonmetallic mineral products (including cement and concrete manufacturing) sectors. The number of facilities and sectors reporting for 2018 were similar to 2017 reporting for the region.
- Most releases in Region 4 were from the chemical manufacturing, paper manufacturing, electric utilities, and primary metals (including iron and steel mills) sectors. Note that relatively few facilities in the paper manufacturing and electric utilities sectors reported to TRI in this region and those sectors are included in "All Others" in the pie chart above. Nationwide, the metal mining, chemical manufacturing, electric utilities, and primary metals sectors reported the highest releases.

For information on the facilities with the greatest releases in the region, see the Region 4 TRI Factsheet.

TRI Waste Management Trend

The following graph shows the annual quantities of TRI chemicals in production-related waste managed by facilities located in Region 4. For more details on quantities released, toggle to the Releases graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported managing 6.3 billion pounds of production-related waste, 61% of which was managed through recycling. Nationally, 53% of production-related waste was managed through recycling.
- Since 2017, quantities of production-related waste managed increased by 46%, driven by one facility that reported recycling 2 billion pounds of dichloromethane for 2018. [Click to view facility details in the P2 tool].
    - Excluding that facility, production-related waste managed in Region 4 increased by 19 million pounds (<1%).

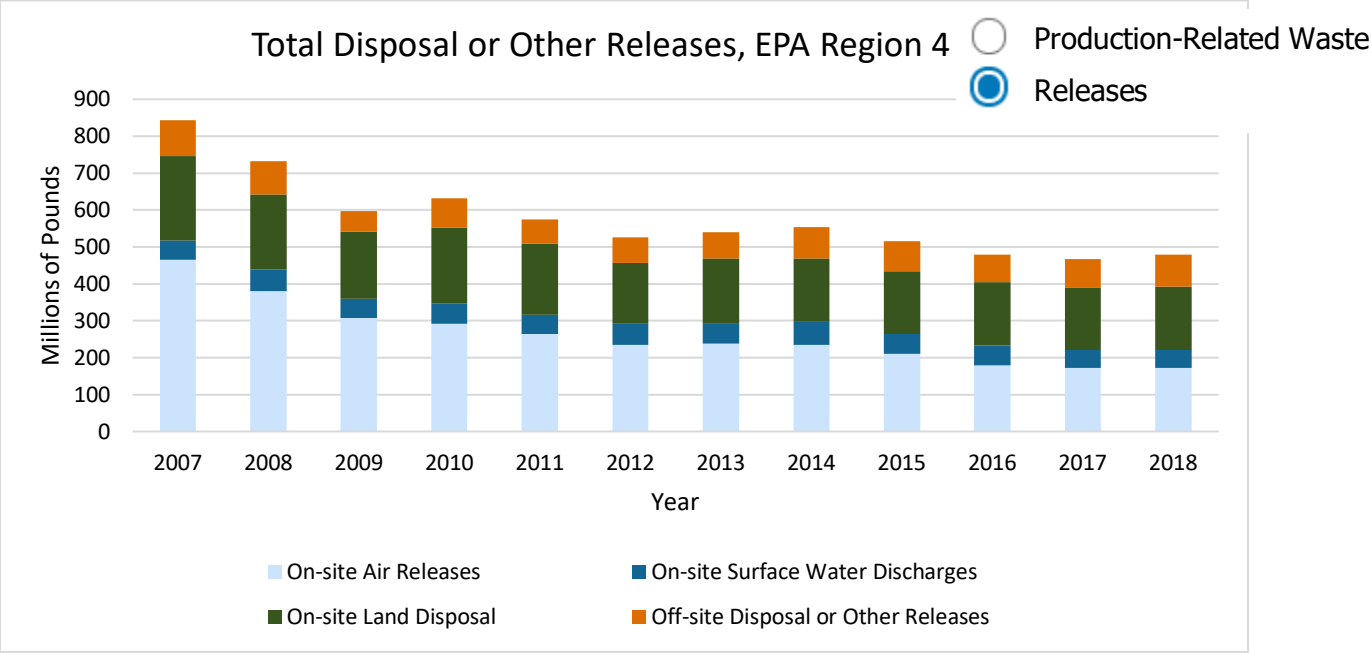
From 2007 to 2018:

- Total production-related waste managed increased by 1.1 billion pounds (22%), driven by one facility that reported recycling 2 billion pounds of dichloromethane for 2018.

Excluding this facility, production-related waste managed in the region decreased by 910 million pounds (18%). Quantities of waste managed by every method (i.e., recycling, treatment, energy recovery, and disposal and releases) decreased.

- Nationally, quantities of production-related waste managed increased by 28% since 2007, driven by increased recycling.

The following graph shows the annual quantities of TRI chemicals released by facilities located in Region 4.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported 491 million pounds of releases.
- The chemicals released in the greatest quantities by medium were:
  - methanol and ammonia to air;
  - nitrate compounds to water;
  - manganese and manganese compounds and zinc and zinc compounds to land; and
  - zinc and zinc compounds, manganese and manganese compounds, and nitrate compounds transferred off site for disposal.
- Since 2017, releases increased by 12.4 million pounds (3%), driven by increased off-site transfers for disposal. Nationally, releases decreased by 3% since 2017.
  - The increase in releases was driven by one facility which reported a 7.2 million pound increase in releases from 2017 to 2018 [Click to view facility details in the P2 tool].

2018 Highlight

On-site air releases in Region 4 decreased by 61% since 2007. The largest decrease in air releases was reported by electric utilities, which continued to report decreased air releases from 2017 to 2018.

- Contribution by state to the Region 4 releases in pounds were: Tennessee (18%), Alabama (17%), Mississippi (13%), Florida (13%), North Carolina (11%), Kentucky (10%), Georgia (10%), and South Carolina (8%).
- To consider the potential health risk from chronic exposure to these releases, EPA uses a risk-screening score from the RSEI model. Contributions by state to the RSEI score for Region 4 were: Florida (60%), Tennessee (12%), North Carolina (7%), Georgia (6%), Alabama (6%), South Carolina (5%), Kentucky (3%), and Mississippi (2%).

From 2007 to 2018:

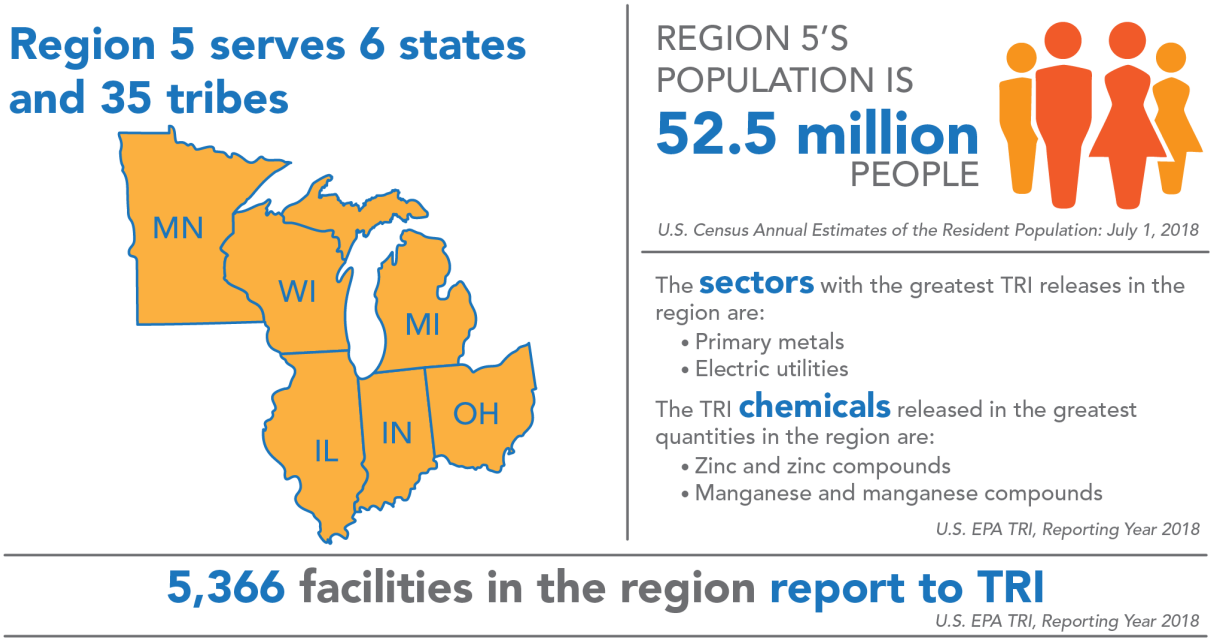
- Releases in Region 4 decreased by 364 million pounds (43%). Nationally, releases of TRI chemicals decreased by 9% since 2007.
- Quantities of chemicals released to every medium (air, water, land, and off-site transfers for disposal) decreased, with the largest reduction in releases to air.

Source Reduction

In 2018, 5% of facilities in Region 4 (243 facilities) reported implementing new source reduction activities. Source reduction reporting rates in the region were among the highest in the computers and electronic products sector, where 18% of facilities reported source reduction activities. As one example of source reduction in Region 4, a railcar manufacturer in Alabama began purchasing low-manganese welding wire for use in production. [Click to view facility details in the P2 tool].

Regional Profile for EPA Region 5

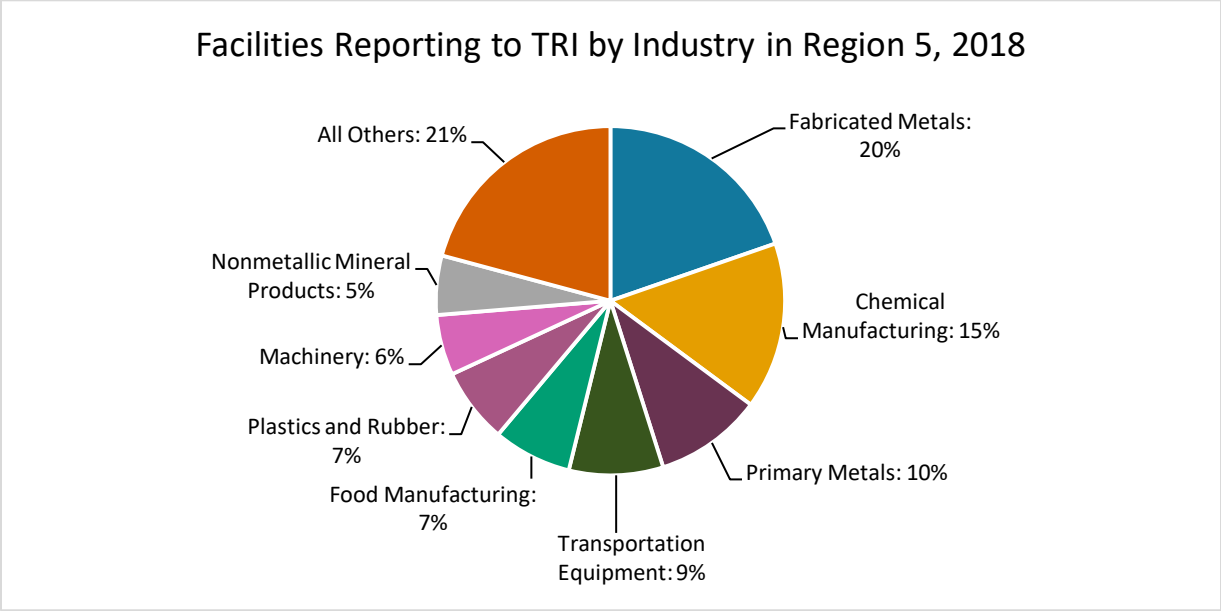
This section examines TRI reporting in EPA Region 5. Region 5 includes Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, and 35 tribes.



Region 5 covers 16% of the US population and includes 25% of all facilities that report to TRI. For state- and tribe-specific TRI data, see the Where You Live section and the Tribal Communities section.

Industry Sectors

This chart shows the industry sectors with the most TRI-reporting facilities in Region 5.



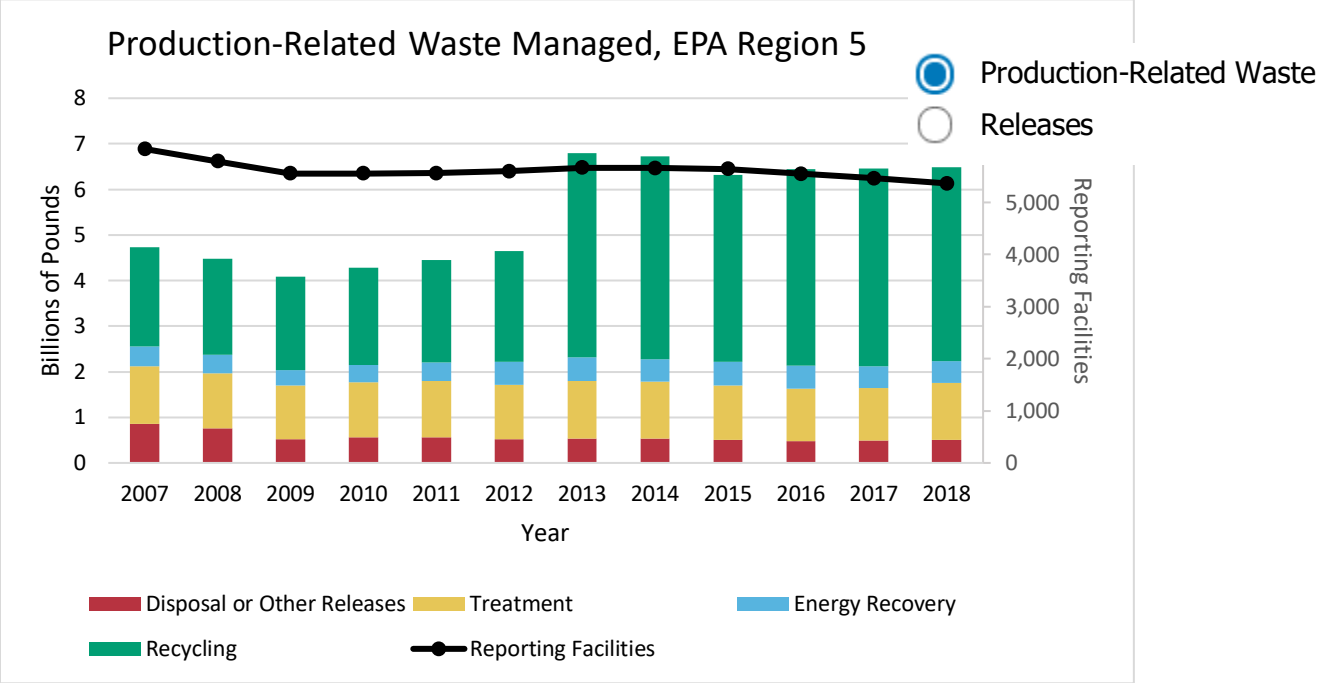
In 2018:

- 5,366 facilities in Region 5 reported to TRI. These facilities were most commonly in the fabricated metals (i.e., manufacture of metal products) or chemical manufacturing sectors. The number of facilities and sectors reporting for 2018 were similar to 2017 reporting for the region.
- Most releases in Region 5 were from the primary metals (including iron and steel manufacturing, and foundries), electric utilities, hazardous waste management, and chemical manufacturing sectors. Note that relatively few facilities in the electric utilities and hazardous waste management sectors reported to TRI in this region and those sectors are included in "All Others" in the pie chart above. Nationwide, the metal mining, chemical manufacturing, electric utilities, primary metals, and hazardous waste management sectors reported the highest releases.

For information on the facilities with the greatest releases in the region, see the Region 5 TRI Factsheet.

TRI Waste Management Trend

The following graph shows the annual quantities of TRI chemicals in production-related waste managed by facilities located in Region 5. For more details on quantities released, toggle to the Releases graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

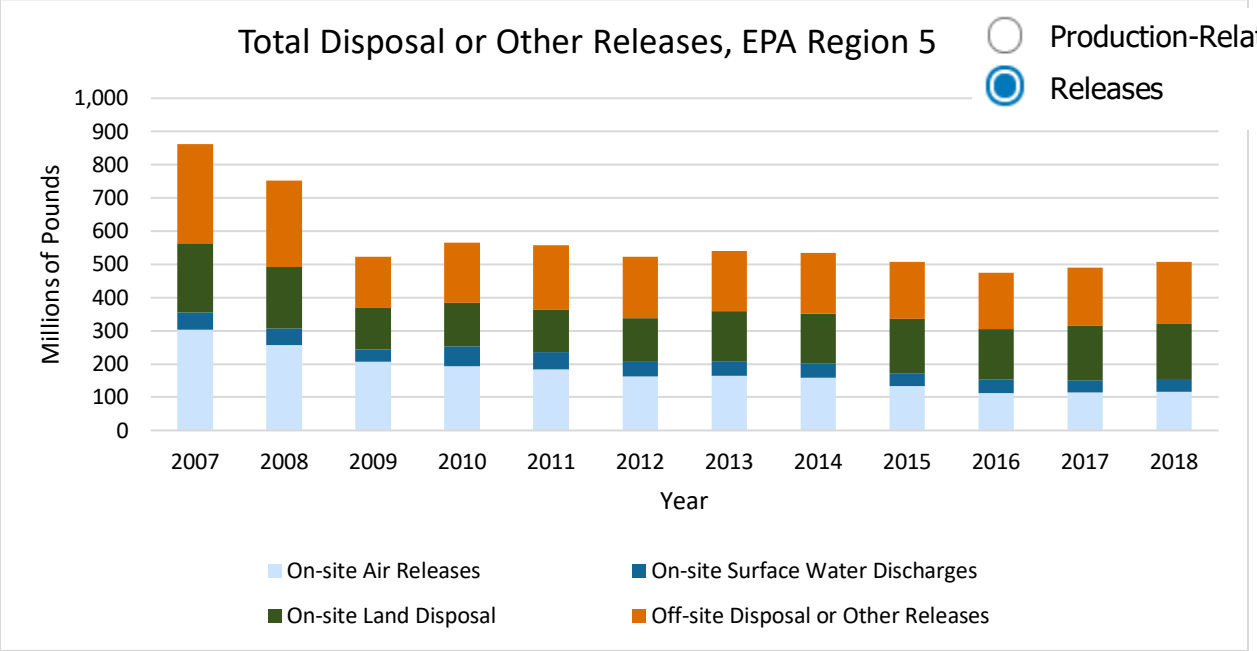
In 2018:

- Facilities reported managing 6.5 billion pounds of production-related waste, 65% of which was managed through recycling. Nationally, 53% of production-related waste was managed through recycling.
- Since 2017, quantities of production-related waste managed remained about the same.

From 2007 to 2018:

- Total production-related waste managed increased by 1.8 billion pounds (37%), driven by one facility which reported more than 1.6 billion pounds of dichloromethane recycling every year from 2013 to 2018 [Click to view facility details in the P2 tool]. Excluding this facility, production-related waste managed in the region increased by 154 million pounds (3%). Nationally, quantities of production-related waste managed increased by 28% since 2007, driven by increased recycling.

The following graph shows the annual quantities of TRI chemicals released by facilities located in Region 5.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported 509 million pounds of releases.
- The chemicals released in the greatest quantities by medium were:
  - sulfuric acid and ammonia to air;
  - nitrate compounds to water;
  - barium and barium compounds and zinc and zinc compounds to land; and
  - zinc and zinc compounds and manganese and manganese compounds transferred off site for disposal.
- Since 2017, releases increased by 17.5 million pounds (4%). The increase in releases occurred across many sectors, with the largest increases in the primary metals and hazardous waste management sectors. Releases increased to all media. Nationally, releases decreased by 3% since 2017.
- Contribution by state to the Region 5 releases in pounds were: Indiana (26%), Illinois (24%), Ohio (23%), Michigan (16%), Wisconsin (6%), and Minnesota (5%).

2018 Highlight

Although releases in Region 5 have decreased since 2007, releases increased from 2017 to 2018. The increase in releases occurred across many sectors, and releases increased to all media.

- To consider the potential health risk from chronic exposure to these releases, EPA uses a risk-screening score from the RSEI model. Contributions by state to the RSEI score for Region 5 were: Ohio (37%), Illinois (29%), Indiana (13%), Michigan (12%), Wisconsin (6%), and Minnesota (3%).

From 2007 to 2017:

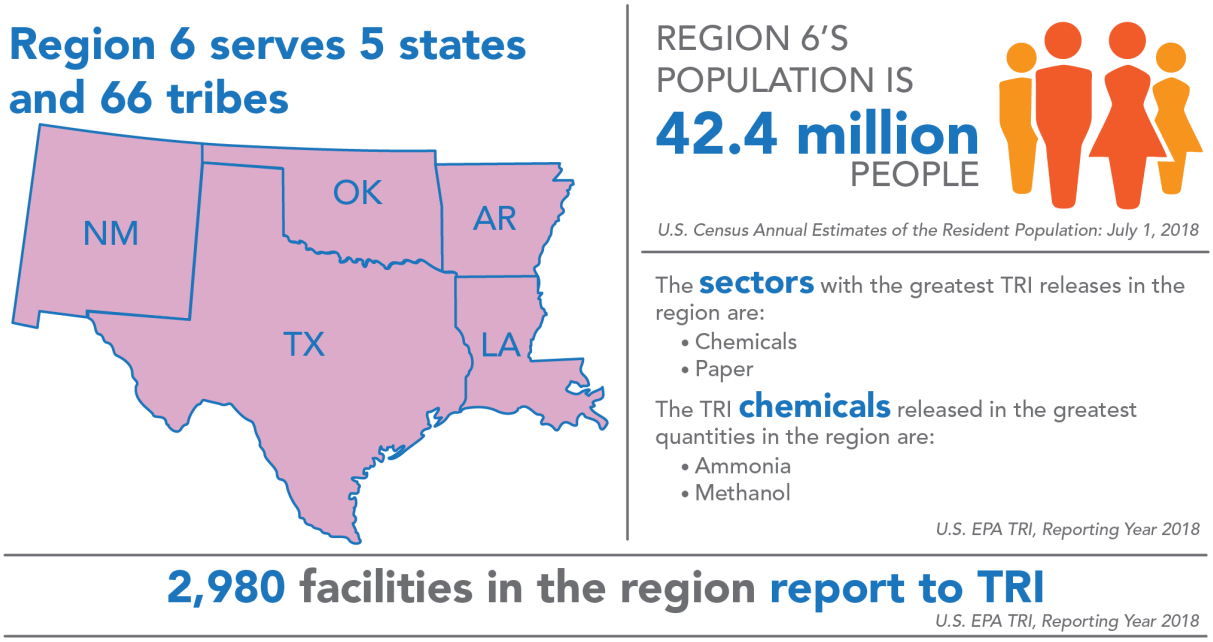
- Releases in Region 5 decreased by 353 million pounds (41%). This decrease was driven by decreased releases by electric utilities and the primary metals sector. Nationally, total disposal or other releases of TRI chemicals decreased by 9% since 2007.
- Quantities of chemicals released to every medium (air, water, land, and off-site transfers for disposal) decreased, with the largest decreases in releases to air and off-site transfers for disposal.

Source Reduction

In 2018, 6% of facilities in Region 5 (332 facilities) reported implementing new source reduction activities. Source reduction reporting rates in the region were among the highest in the computers and electronic products sector, where 17% of facilities reported source reduction activities. For example, a navigation systems manufacturer implemented additional nitrogen atmosphere soldering capability, reducing lead solder waste. [Click to view facility details in the P2 tool].

Regional Profile for EPA Region 6

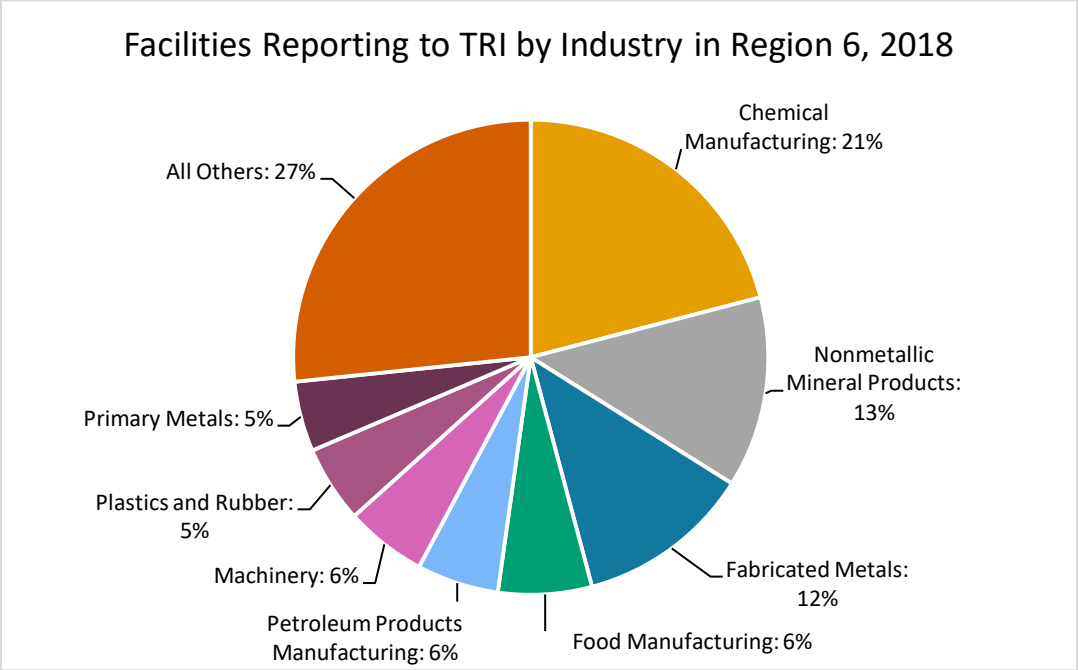
This section examines TRI reporting in EPA Region 6. Region 6 includes Arkansas, Louisiana, New Mexico, Oklahoma, Texas, and 66 Tribes.



Region 6 covers 13% of the US population and includes 14% of all facilities that report to TRI. For state- and tribe-specific TRI data, see the Where You Live section and the Tribal Communities section.

Industry Sectors

This chart shows the industry sectors with the most TRI-reporting facilities in Region 6.



Note: Percentages may not sum to 100% due to rounding.

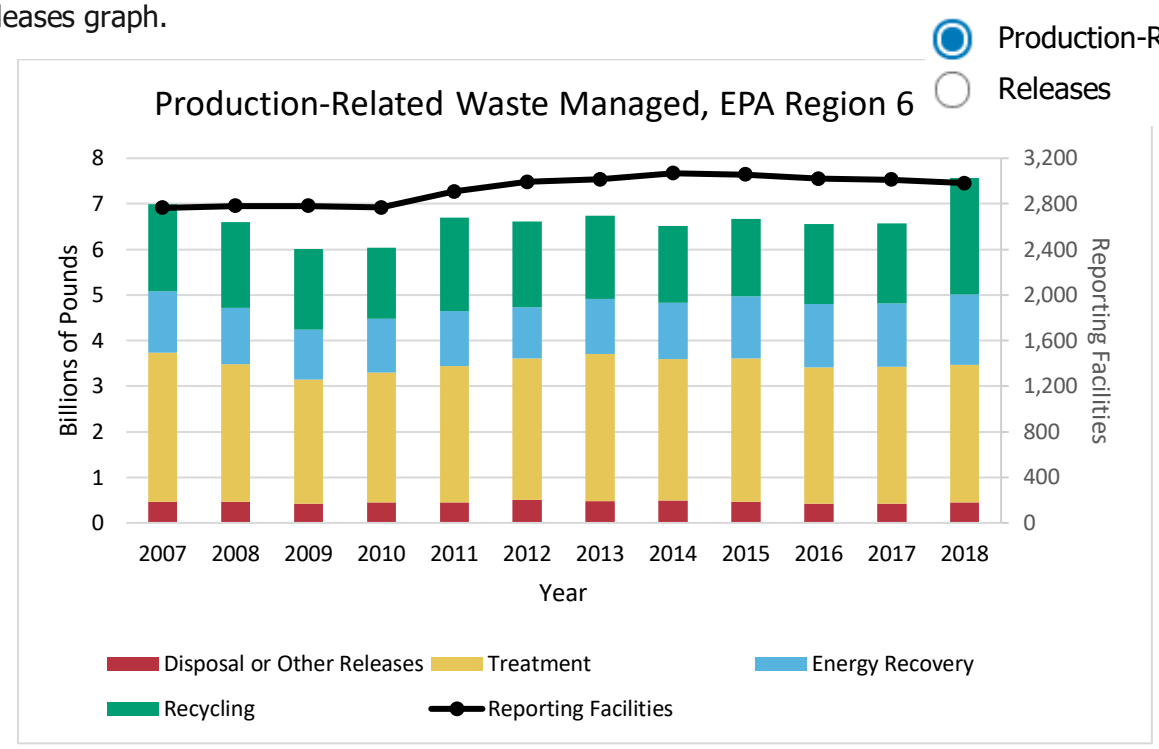
In 2018:

- 2,980 facilities in Region 6 reported to TRI. These facilities were most commonly in the chemical manufacturing or nonmetallic mineral products (including concrete manufacturing) sectors. The number of facilities and sectors reporting for 2018 were similar to 2017 reporting for the region.
- Most releases in Region 6 were from the chemical manufacturing, paper manufacturing, electric utilities, and petroleum products manufacturing sectors. Note that relatively few facilities in the paper manufacturing and electric utilities sectors reported to TRI in this region and those sectors are included in "All Others" in the pie chart above. Nationwide, the metal mining, chemical manufacturing, electric utilities, and primary metals (including iron and steel manufacturing, and foundries) sectors reported the highest releases.

For information on the facilities with the greatest releases in the region, see the Region 6 TRI Factsheet.

TRI Waste Management Trend

The following graph shows the annual quantities of TRI chemicals in production-related waste managed by facilities located in Region 6. For more details on quantities released, toggle to the Releases graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

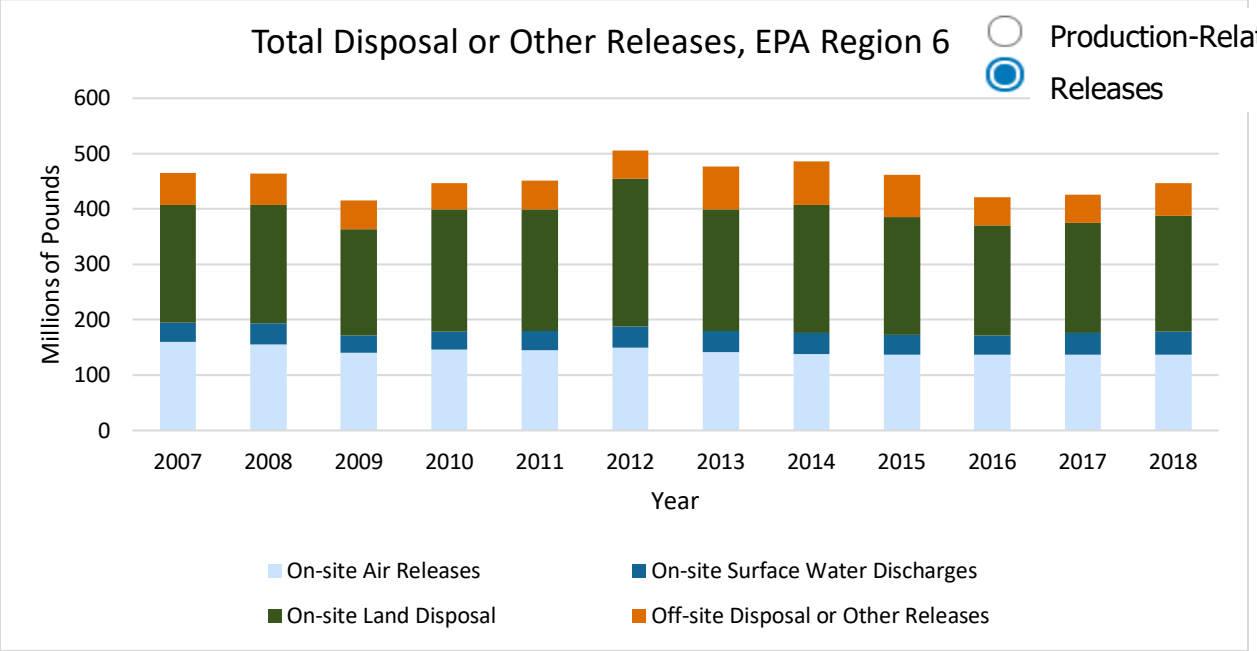
In 2018:

- Facilities reported managing 7.9 billion pounds of production-related waste, 41% of which was managed through treatment and 20% of which was combusted for energy recovery. Nationally, 26% of production-related waste was managed through treatment and 10% was combusted for energy recovery.
- Since 2017, quantities of production-related waste managed increased by 14%, driven by one facility that reported recycling 562 million pounds of n-hexane and cyclohexane in 2018 [Click to view facility details in the P2 tool].
    - Excluding that facility, production-related waste managed in Region 6 increased by 433 million pounds (6%). Releases reported by most sectors increased, with the largest increases reported by the primary metals and hazardous waste management sectors. Quantities of production-related waste combusted for energy recovery, recycled, and released all increased.

From 2007 to 2018:

- Total production-related waste managed increased by 575 million pounds (8%), driven by one facility which reported 562 million pounds of recycling for 2018. Excluding this facility, quantities of production-related waste managed in the region were about the same in 2018 as 2007.
- Nationally, quantities of production-related waste managed increased by 28% since 2007, driven by increased recycling.

The following graph shows the annual quantities of TRI chemicals released by facilities located in Region 6.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported 466 million pounds of releases.
- The chemicals released in the greatest quantities by medium were:
  - ammonia and methanol to air;
  - nitrate compounds to water;
  - ammonia and barium and barium compounds to land; and
  - zinc and zinc compounds and methanol transferred off site for disposal.
- Since 2017, releases increased by 27 million pounds (6%) across media. Nationally, releases decreased by 3% since 2017.
- Contribution by state to the Region 6 releases in pounds were: Texas (49%), Louisiana (32%), Arkansas (8%), Oklahoma (7%), and New Mexico (4%).
- To consider the potential health risk from chronic exposure to these releases, EPA uses a risk-screening score from the RSEI model. Contributions by state to the RSEI score for Region 6 were: Texas (93%), Louisiana (5%), Arkansas (1%), Oklahoma (1%), and New Mexico (<1%).

2018 Highlight

Releases decreased from 2007 to 2018 and continued to decrease from 2017 to 2018 in the coal mining, electric utilities, paper, and petroleum products manufacturing sectors, among others.

From 2007 to 2018:

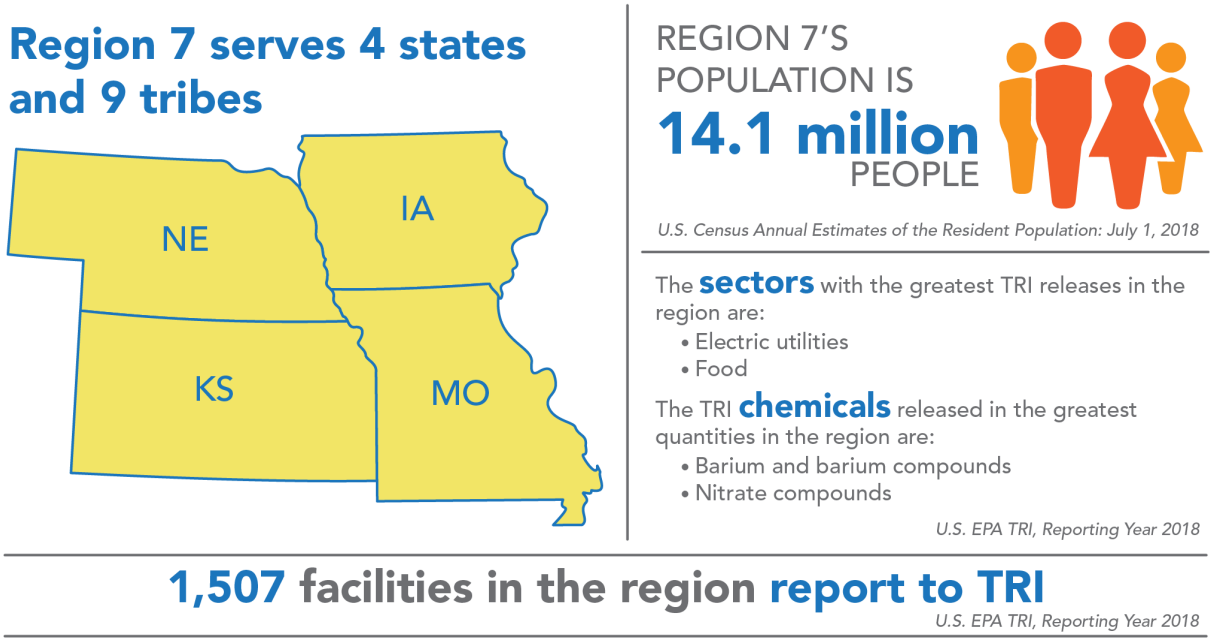
- Releases in Region 6 decreased by 18.4 million pounds (4%). Nationally, total disposal or other releases of TRI chemicals decreased by 9% since 2007.
- Quantities of chemicals released to air and land decreased, while releases to water and off-site transfers for disposal increased.

Source Reduction

In 2018, 5% of facilities in Region 6 (153 facilities) reported implementing new source reduction activities. As one example of source reduction in Region 6, a petroleum products manufacturer removed toluene from its lubricant formulas as part of an overall product strategy. It reported that all toluene had been removed from the manufacturing plant as of November 2018. [Click to view facility details in the P2 tool].

Regional Profile for EPA Region 7

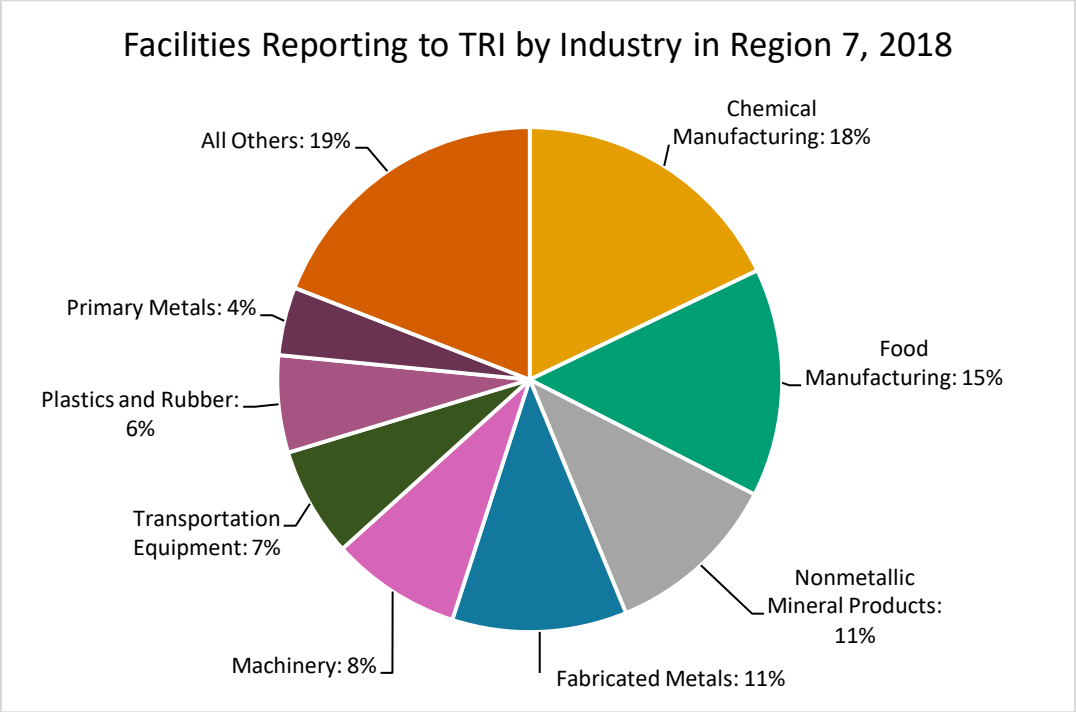
This section examines TRI reporting in EPA Region 7. Region 7 includes Iowa, Kansas, Missouri, Nebraska, and 9 tribes.



Region 7 covers 4% of the US population and includes 7% of all facilities that report to TRI. For state- and tribe-specific TRI data, see the Where You Live section and the Tribal Communities section.

Industry Sectors

This chart shows the industry sectors with the most TRI-reporting facilities in Region 7.



Note: Percentages may not sum to 100% due to rounding.

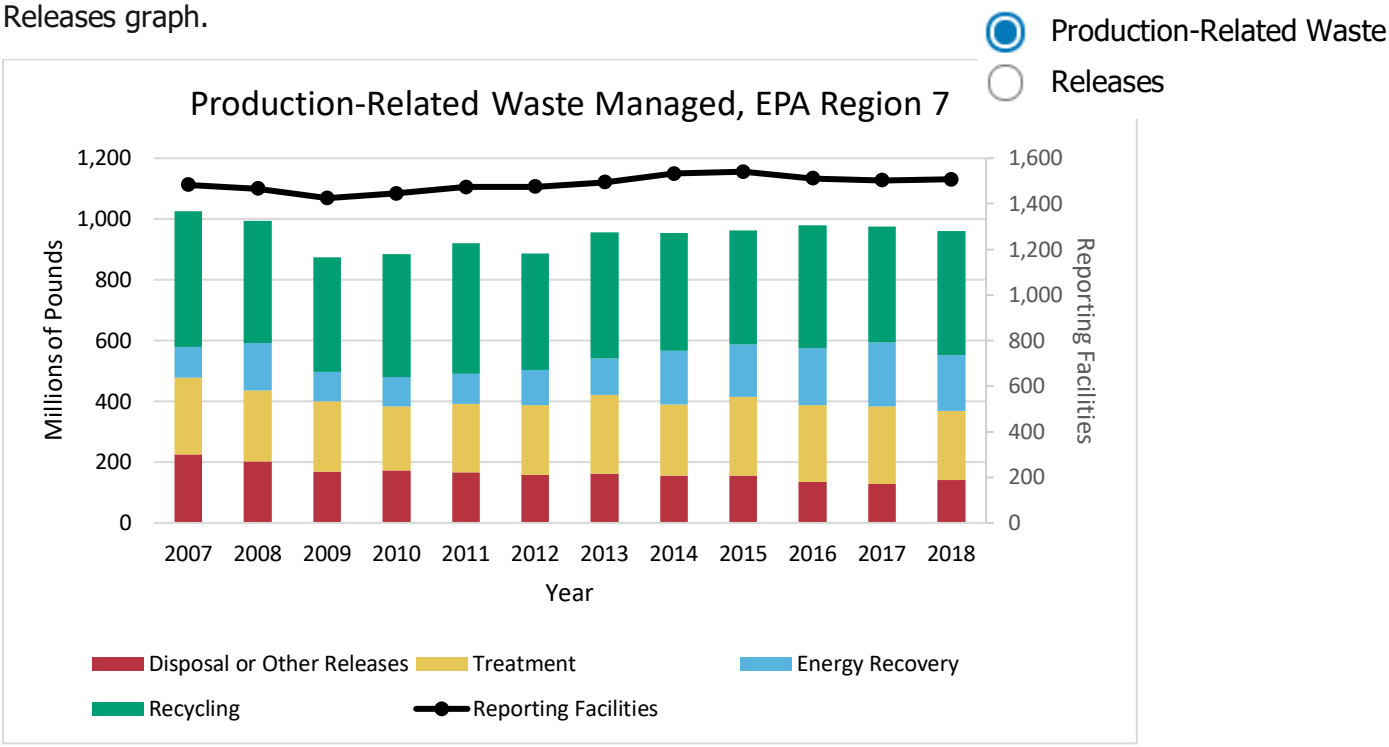
In 2018:

- 1,507 facilities in Region 7 reported to TRI. These facilities were most commonly in the chemical manufacturing or food manufacturing sectors. The number of facilities and sectors reporting for 2018 were similar to 2017 reporting for the region.
- Most releases in Region 7 were from the electric utilities, food manufacturing, metal mining, and chemical manufacturing sectors. Note that relatively few facilities in the electric utilities and metal mining sectors reported to TRI in this region and those sectors are included in "All Others" in the pie chart above. Nationwide, the metal mining, chemical manufacturing, electric utilities, and primary metals (including iron and steel manufacturing, and foundries) sectors reported the highest releases.

For information on the facilities with the greatest releases in the region, see the Region 7 TRI Factsheet.

TRI Waste Management Trend

The following graph shows the annual quantities of TRI chemicals in production-related waste managed by facilities located in Region 7. For more details on quantities released, toggle to the Releases graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

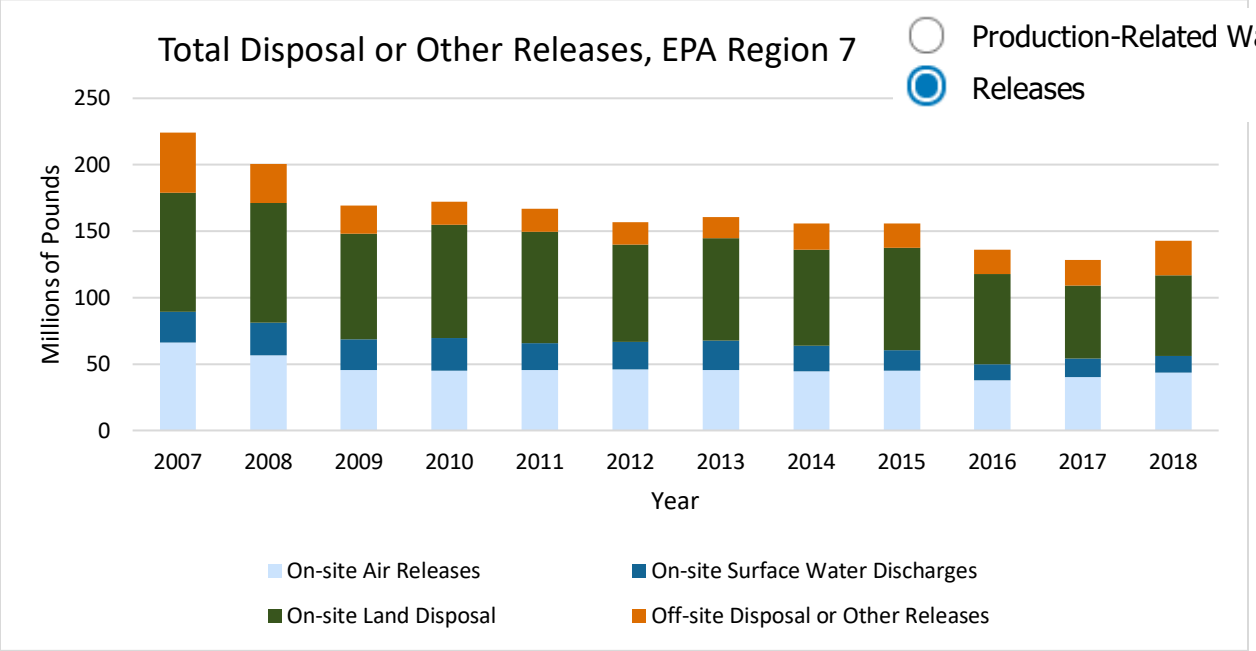
In 2018:

- Facilities reported managing 1 billion pounds of production-related waste, 17% of which was combusted for energy recovery. Nationally, 10% of production-related waste was combusted for energy recovery.
- Since 2017, quantities of production-related waste managed decreased by 5%.

From 2007 to 2018:

- Total production-related waste managed decreased by 66 million pounds (6%). Quantities of waste recycled, treated, and disposed of or otherwise released all decreased, while quantities of waste combusted for energy recovery increased. Nationally, quantities of production-related waste managed increased by 28% since 2007, driven by increased recycling.

The following graph shows the annual quantities of TRI chemicals released by facilities located in Region 7.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported 144 million pounds of releases.
- The chemicals released in the greatest quantities by medium were:
  - ammonia and n-hexane to air;
  - nitrate compounds to water;
  - barium and barium compounds and lead and lead compounds to land; and
  - nitrate compounds and barium and barium compounds transferred off site for disposal.
- Since 2017, releases increased by 14 million pounds (11%). Releases increased to all media except water. Nationally, releases decreased by 3% since 2017.
- Contribution by state to the Region 7 releases in pounds were: Missouri (42%), Iowa (28%), Kansas (17%), and Nebraska (13%).
- To consider the potential health risk from chronic exposure to these releases, EPA uses a risk-screening score from the RSEI model. Contributions by state to the RSEI score for Region 7 were: Kansas (35%), Missouri (35%), Iowa (24%), and Nebraska (6%).

2018 Highlight

Although releases in Region 7 have decreased since 2007, releases increased for 2018 due to increased releases in the electric utilities, food manufacturing, metal mining, and chemical manufacturing sectors.

From 2007 to 2018:

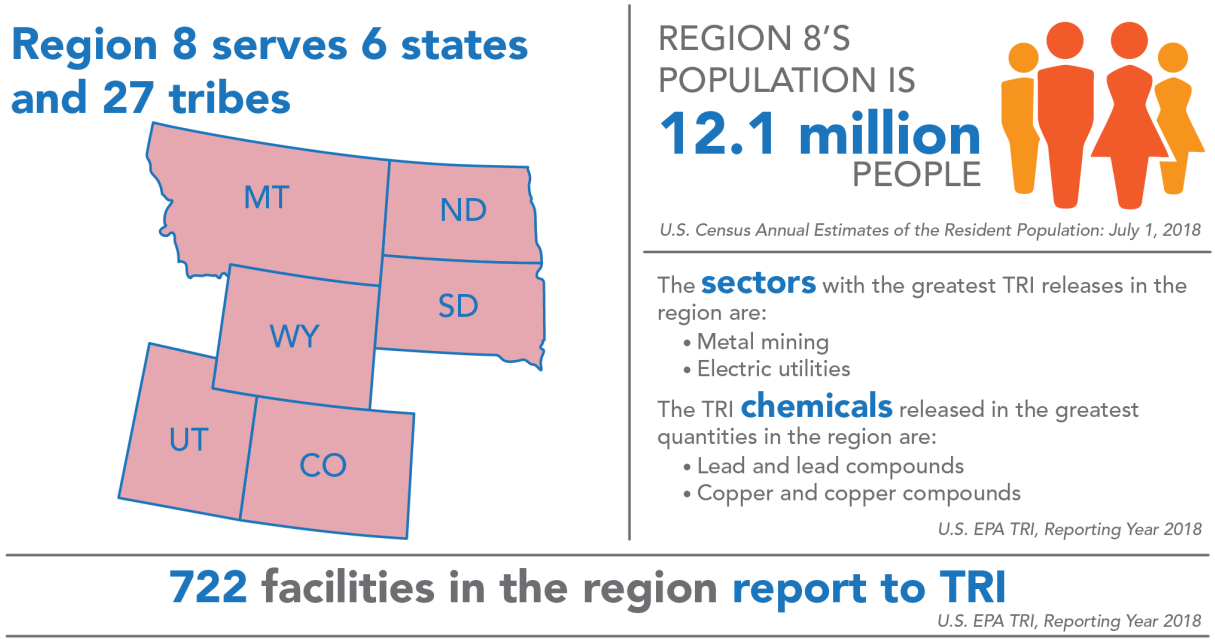
- Releases in Region 7 decreased by 81 million pounds (36%). This decrease was driven by decreased releases in the primary metals and metal mining sectors. Nationally, total disposal or other releases of TRI chemicals decreased by 9% since 2007.
- Quantities of chemicals released to every medium (air, water, land, and off-site transfers for disposal) decreased.

Source Reduction

In 2018, 5% of facilities in Region 7 (70 facilities) reported implementing new source reduction activities. Source reduction reporting rates in the region were among the highest in the chemical manufacturing sector, where 8% of facilities reported source reduction activities. For example, an organic chemical manufacturer changed equipment and software controls to better control ammonia dosing. [Click to view facility details in the P2 tool].

Regional Profile for EPA Region 8

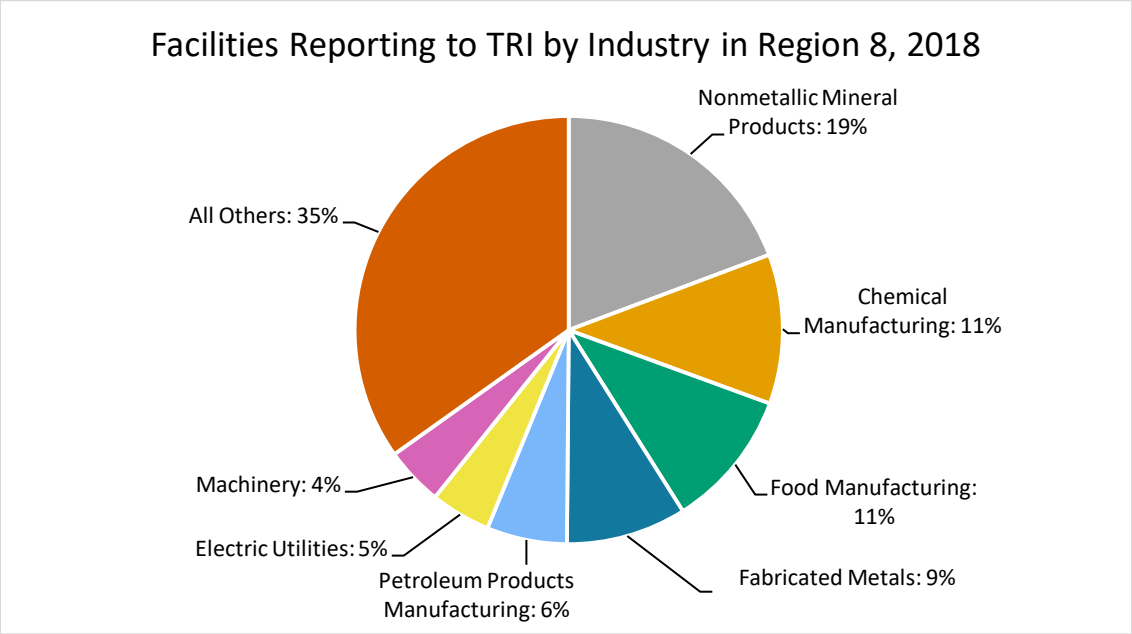
This section examines TRI reporting in EPA Region 8. Region 8 includes Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 tribes.



Region 8 covers 4% of the US population and includes 3% of all facilities that report to TRI. For state- and tribe-specific TRI data, see the Where You Live section and the Tribal Communities section.

Industry Sectors

This chart shows the industry sectors with the most TRI-reporting facilities in Region 8.



Note: Percentages may not sum to 100% due to rounding.

In 2018:

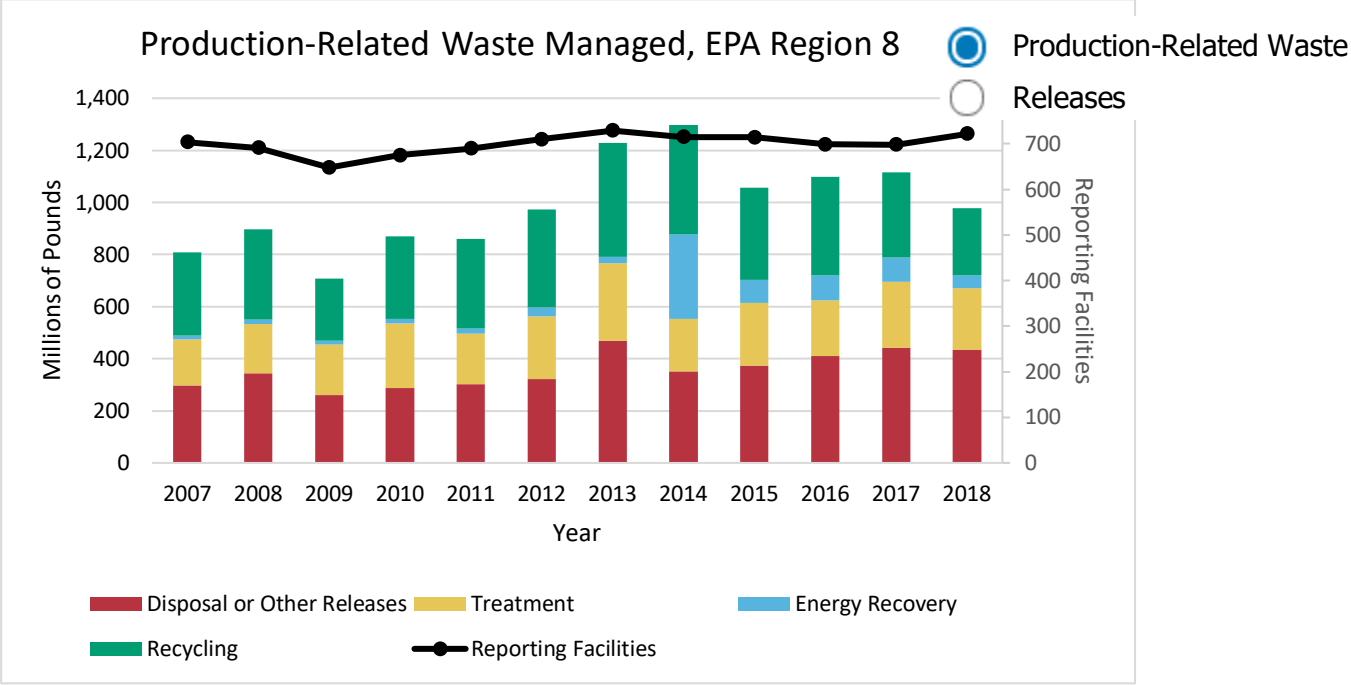
- 722 facilities in Region 8 reported to TRI. These facilities were most commonly in the nonmetallic mineral products (including concrete manufacturing), chemical manufacturing, or food manufacturing sectors. The number of nonmetallic mineral product facilities reporting for 2018 increased by 24 facilities (a 21% increase in the number of facilities reporting for that sector) from 2017. The number of facilities reporting from other sectors for 2018 was similar to the reporting for 2017 in the region.
- Most releases in Region 8 were from the metal mining sector, which accounted for 66% of releases reported in the region. After metal mining, the electric utilities, primary metals (including smelters), and chemical manufacturing sectors reported the highest releases. Note that relatively few facilities in the metal mining and primary metals sectors reported to TRI in this region and those sectors are included in "All Others" in the pie chart above. Nationwide, the metal mining, chemical manufacturing, electric utilities, and primary metals sectors reported the highest releases.

- Metal mining facilities typically handle large volumes of material. In this sector, even a small change in the chemical composition of the mineral deposit being mined can lead to big changes in the amount of TRI-listed chemicals reported. Therefore releases in Region 8, where 13 metal mines reported to TRI for 2018, may differ from national trends. For more information on the metal mining sector, see the metal mining sector profile.

For information on the facilities with the greatest releases in the region, see the Region 8 TRI Factsheet.

TRI Waste Management Trend

The following graph shows the annual quantities of TRI chemicals in production-related waste managed by facilities located in Region 8. For more details on quantities released, toggle to the Releases graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

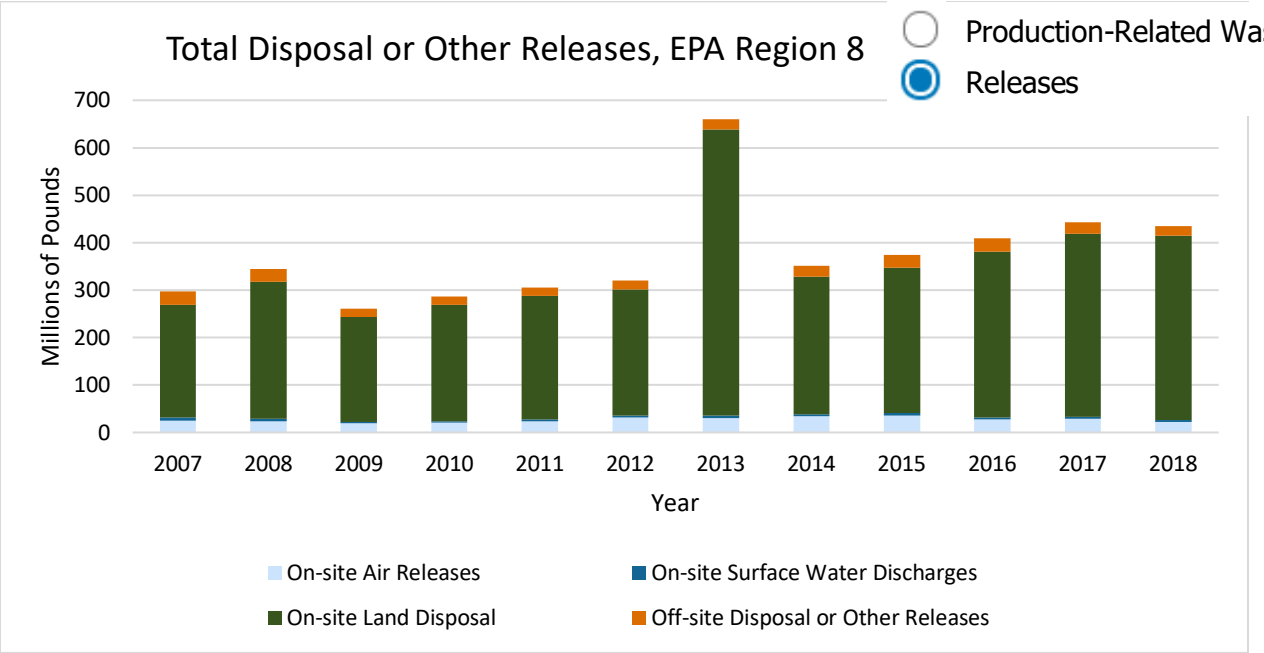
In 2018:

- Facilities reported managing 989 million pounds of production-related waste, 44% of which was disposed of or otherwise released. Nationally, 12% of production-related waste was disposed of or otherwise released. The high proportion of production-related waste that is released in Region 8 is driven by metal mines, which disposed of or otherwise released 99% of their production-related waste for 2018.
- Since 2017, quantities of production-related waste managed decreased by 12%. The greatest reductions were in recycling and energy recovery. The reductions in recycling were largely driven by one metal smelter, while the reduction in energy recovery was driven by a petroleum refinery.

From 2007 to 2018:

- Total production-related waste managed increased by 170 million pounds (21%), driven by increased disposal from the metal mining sector. Excluding the metal mining sector, production-related waste managed in Region 8 increased by 55 million pounds (9%). Nationally, quantities of production-related waste managed increased by 28% since 2007, driven by increased recycling.

The following graph shows the annual quantities of TRI chemicals released by facilities located in Region 8.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported 435 million pounds of releases.
- The chemicals released in the greatest quantities by medium were:
  - ammonia and chlorine to air;
  - nitrate compounds to water;
  - lead and lead compounds and copper and copper compounds to land; and
  - barium and barium compounds transferred off site for disposal.
- Since 2017, releases decreased by 7.5 million pounds (2%). Releases decreased to all media except land. Nationally, releases decreased by 3% since 2017.
- Contribution by state to the Region 8 releases in pounds were: Utah (67%), Montana (12%), North Dakota (9%), Colorado (6%), Wyoming (5%), and South Dakota (2%).
- To consider the potential health risk from chronic exposure to these releases, EPA uses a risk-screening score from the RSEI model. Contributions by state to the RSEI score for

2018 Highlight

For 2018, 66% of total disposal or other releases reported in Region 8 were from the metal mining sector, and one copper mining facility in Utah reported more than half of the Region's releases [view facility details].

Region 8 were: Colorado (55%), Utah (39%), Montana (3%), North Dakota (3%), South Dakota (1%), and Wyoming (<1%).

From 2007 to 2018:

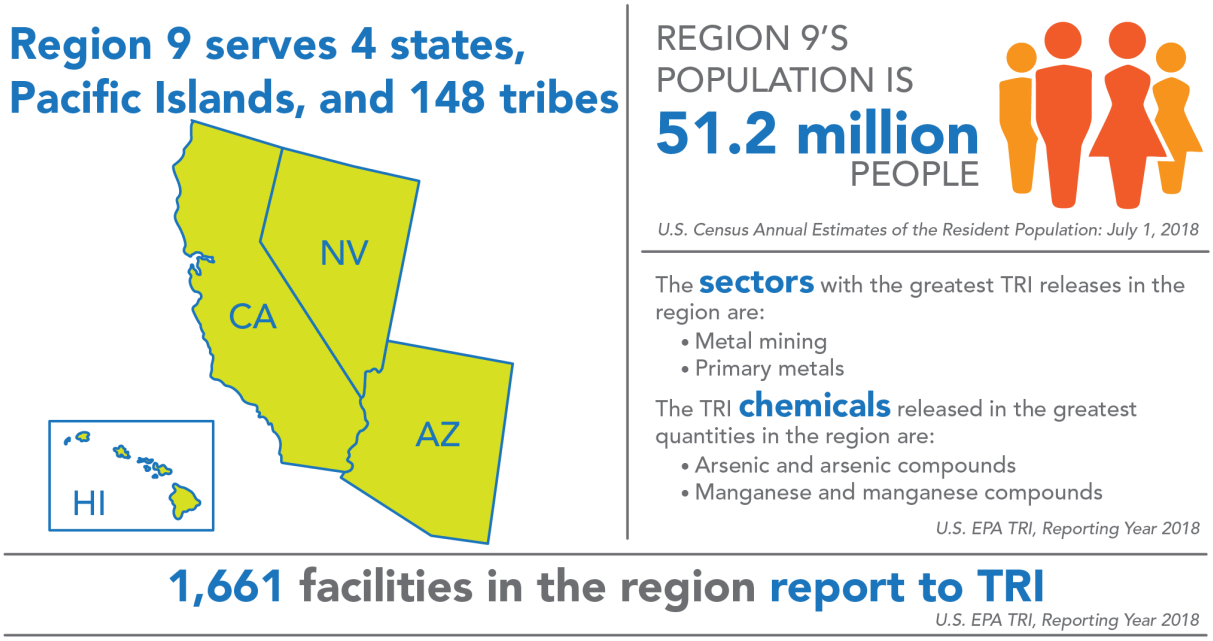
- Releases in Region 8 increased by 138 million pounds (47%). This increase was driven by increased land disposal by the metal mining sector. Excluding metal mining, releases in Region 8 increased by 22 million pounds (17%) since 2007. Nationally, total disposal or other releases of TRI chemicals decreased by 9% since 2007.
- Quantities of chemicals released to every medium except land decreased.

Source Reduction

In 2018, 6% of facilities in Region 8 (46 facilities) reported implementing new source reduction activities. Source reduction reporting rates in the region were among the highest in the machinery sector, where 13% of facilities reported source reduction activities. For example, a turbine manufacturer changed its blade production process so that only one of the two blade types requires diisocyanates for production. [Click to view facility details in the P2 tool].

Regional Profile for EPA Region 9

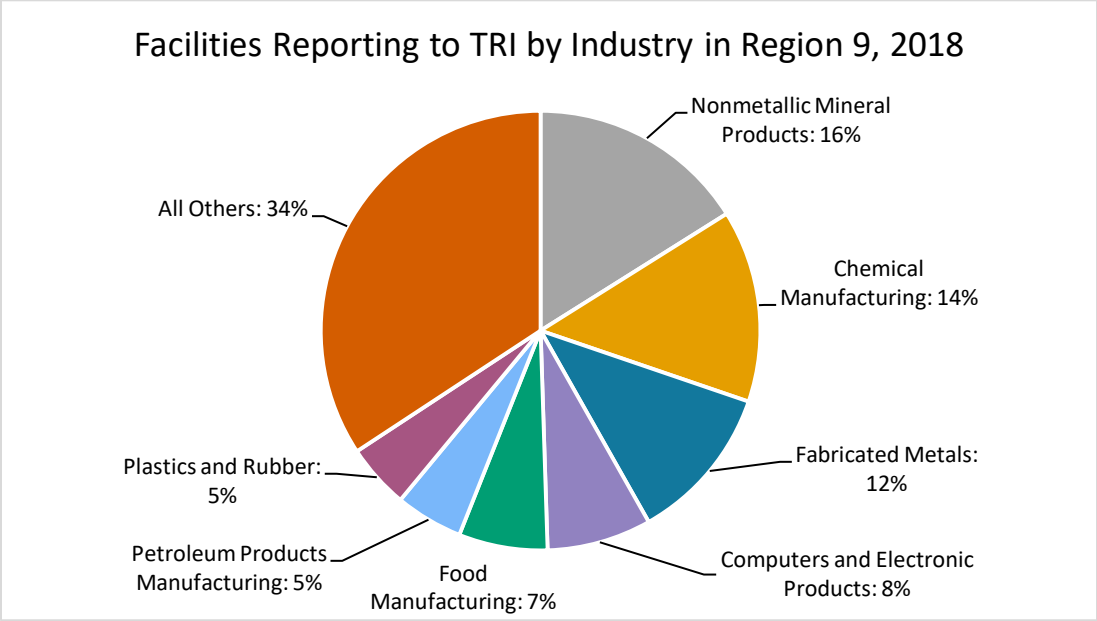
This section examines TRI reporting in EPA Region 9. Region 9 includes Arizona, California, Hawaii, Nevada, the Pacific Islands (American Samoa, Guam, and the Northern Mariana Islands), and 148 Tribes.



Region 9 covers 15% of the US population and includes 8% of all facilities that report to TRI. For state- and tribe-specific TRI data, see the Where You Live section and the Tribal Communities section.

Industry Sectors

This chart shows the industry sectors with the most TRI-reporting facilities in Region 9.



Note: Percentages may not sum to 100% due to rounding.

In 2018:

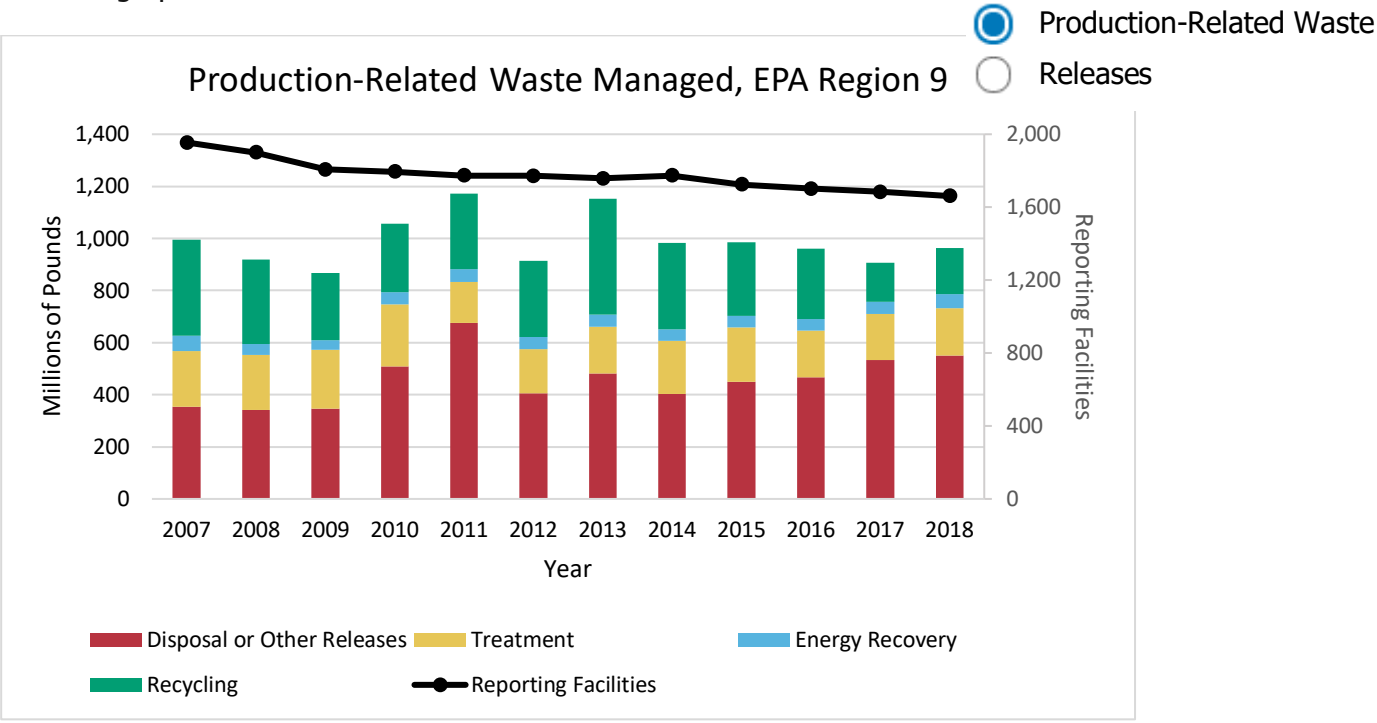
- 1,661 facilities in Region 9 reported to TRI. These facilities were most commonly in the nonmetallic mineral products (including concrete and cement manufacturing) or chemical manufacturing sectors. The number of facilities and sectors reporting for 2018 were similar to 2017 reporting for the region.
- Most releases in Region 9 were from the metal mining sector, which accounted for 81% of the region's releases for 2018. After metal mining, the primary metals (including smelting), hazardous waste management, and petroleum products manufacturing sectors reported the highest releases. Note that relatively few facilities in the metal mining, primary metals, and hazardous waste management sectors reported to TRI in this region and those sectors are included in "All Others" in the pie chart above. Nationwide, the metal mining, chemical manufacturing, electric utilities, and primary metals sectors reported the highest releases.
    - Metal mining facilities typically handle large volumes of material. In this sector, even a small change in the chemical composition of the mineral deposit being

mined can lead to big changes in the amount of TRI-listed chemicals reported. Therefore releases in Region 9, where 41 metal mines reported to TRI for 2018, may not follow national trends. For more information on the metal mining sector, see the metal mining sector profile.

For information on the facilities with the greatest releases in the region, see the TRI Region 9 fact sheet.

TRI Waste Management Trend

The following graph shows the annual quantities of TRI chemicals in production-related waste managed by facilities located in Region 9. For more details on quantities released, toggle to the Releases graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

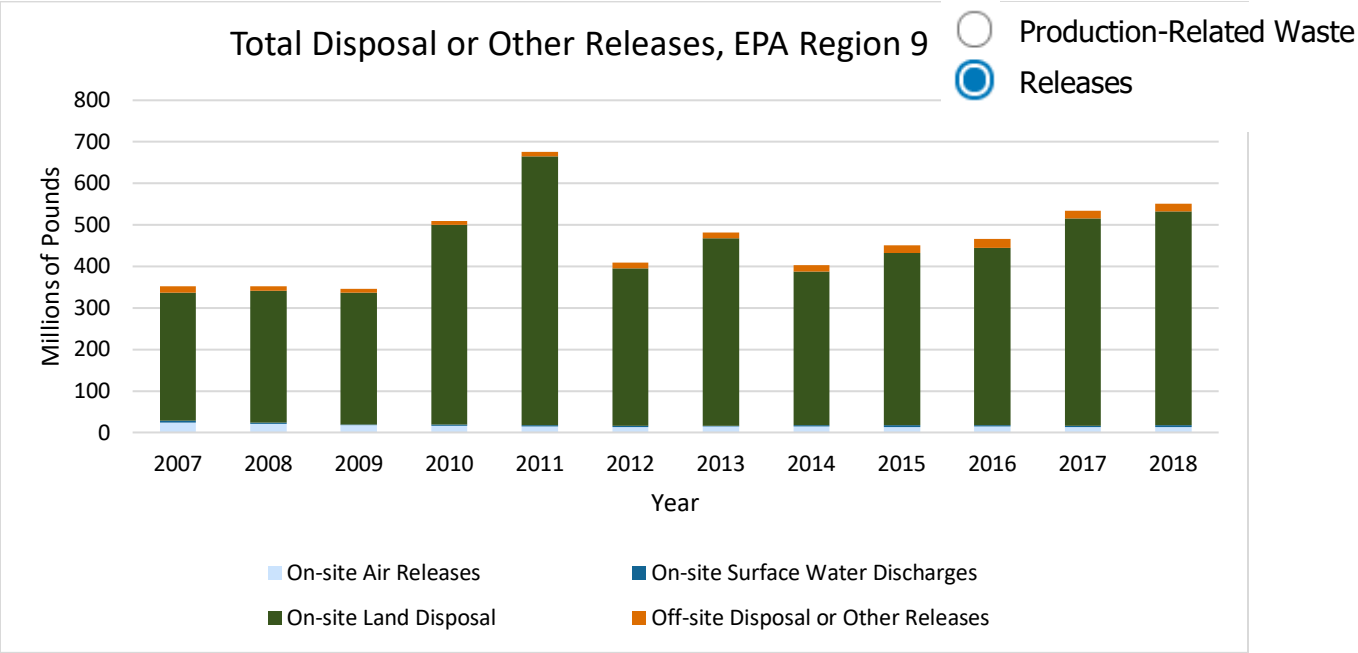
In 2018:

- Facilities reported managing 965 million pounds of production-related waste, 57% of which was disposed of or otherwise released. Nationally, 12% of production-related waste was disposed of or otherwise released. The high proportion of production-related waste that is released in Region 9 is driven by metal mines, which disposed of or otherwise released 93% of their production-related waste for 2018.
- Since 2017, quantities of production-related waste managed increased by 6%, driven by increased production-related waste managed in the primary metals and metal mining sectors.

From 2007 to 2018:

- Total production-related waste managed decreased by 32 million pounds (3%), driven by decreases in the primary metals sector. Nationally, quantities of production-related waste managed increased by 28% since 2007, driven by increased recycling.

The following graph shows the annual quantities of TRI chemicals released by facilities located in Region 9.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported 551 million pounds of releases.
- The chemicals released in the greatest quantities by medium were:
  - ammonia and sulfuric acid to air;
  - nitrate compounds to water;
  - arsenic and arsenic compounds and manganese and manganese compounds to land; and
  - nitrate compounds and manganese and manganese compounds transferred off site for disposal.
- Since 2017, releases increased by 16.3 million pounds (3%). Releases increased to all media, except off-site transfers for disposal. Nationally, releases decreased by 3% since 2017.
- Contribution by state to the Region 9 releases in pounds were: Nevada (62%), Arizona (31%), California (7%), and Hawaii (1%).
- To consider the potential health risk from chronic exposure to these releases, EPA uses a risk-screening score from the RSEI model. Contributions by state to the RSEI score for Region 9 were: California (80%), Arizona (16%), Nevada (3%), and Hawaii (1%).

2018 Highlight

TRI releases in Region 9 are primarily from metal mines. Metal mines reported 81% of the region's releases for 2018.

From 2007 to 2018:

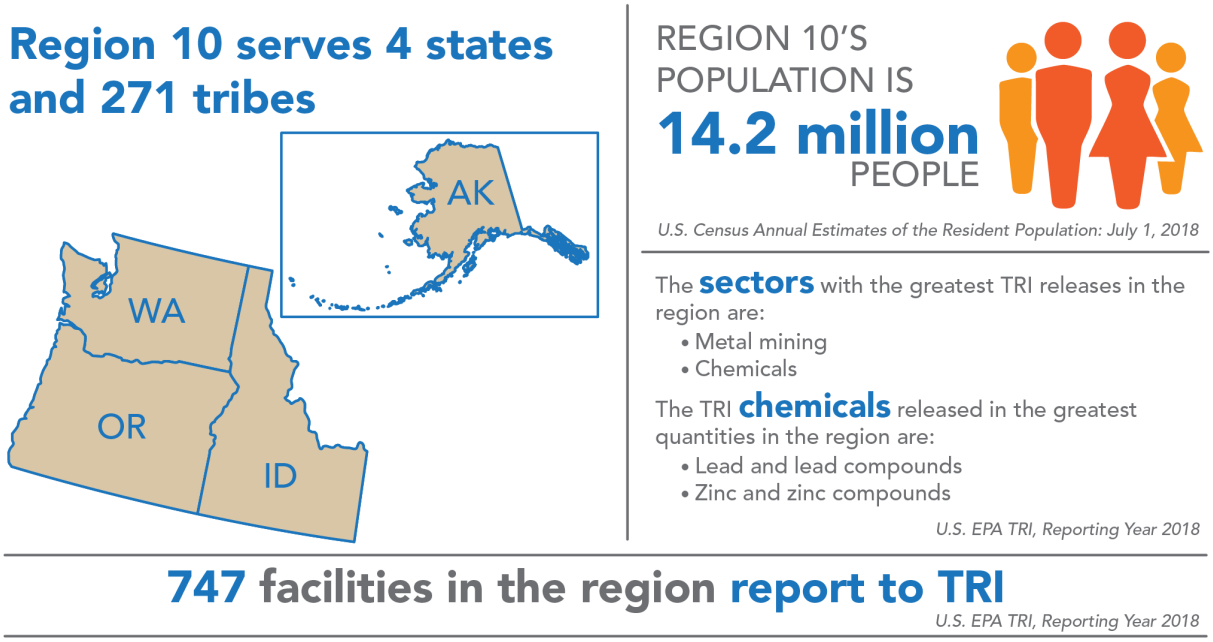
- Releases in Region 9 increased by 200 million pounds (57%), driven by increased releases reported by the metal mining sector, where releases often vary substantially from year to year. Excluding the metal mining sector, releases in Region 9 increased by 7 million pounds (7%). Nationally, total disposal or other releases of TRI chemicals decreased by 9% since 2007.
- Quantities of chemicals released to air and water decreased, while land disposal and off-site transfers for disposal increased.

Source Reduction

In 2018, 6% of facilities in Region 9 (103 facilities) reported implementing new source reduction activities. Source reduction reporting rates in the region were among the highest in the electrical equipment sector, where 16% of facilities reported at least one source reduction activity. For example, a storage battery manufacturer improved its single shot method of delivering electrolyte in formation to reduce its use of raw materials containing lead compounds. [Click to view facility details in the P2 tool].

Regional Profile for EPA Region 10

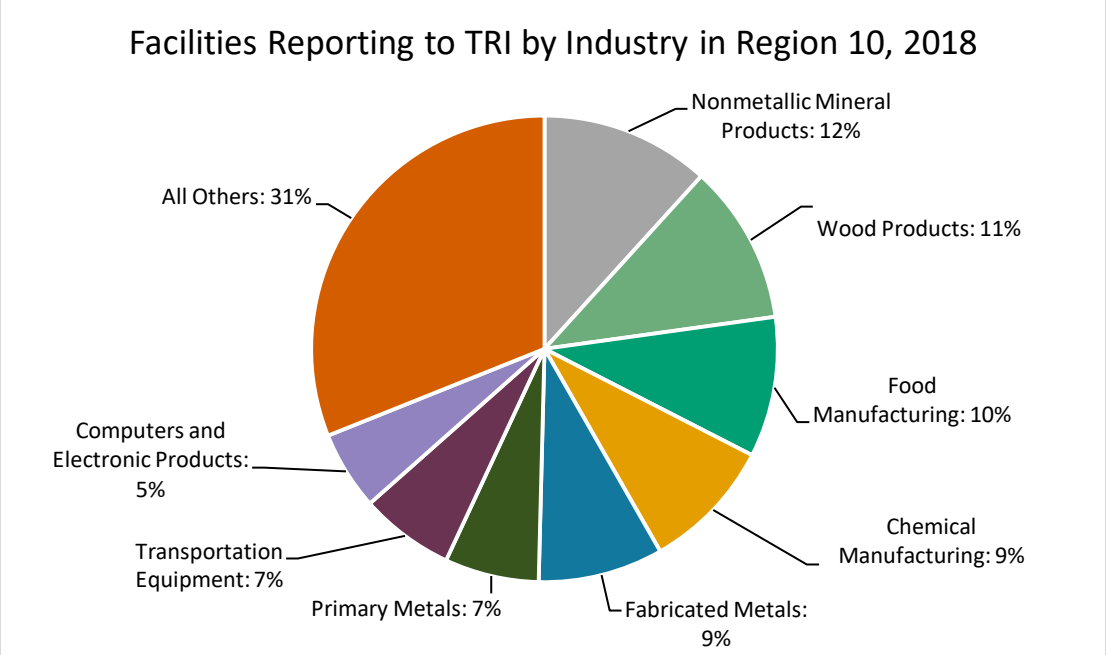
This section examines TRI reporting in EPA Region 10. Region 10 includes Alaska, Idaho, Oregon, Washington, and 271 tribes.



Region 10 covers 4% of the US population and includes 3% of all facilities that report to TRI. For state- and tribe-specific TRI data, see the Where You Live section and the Tribal Communities section.

Industry Sectors

This chart shows the industry sectors with the most TRI-reporting facilities in Region 10.



Note: Percentages may not sum to 100% due to rounding.

In 2018:

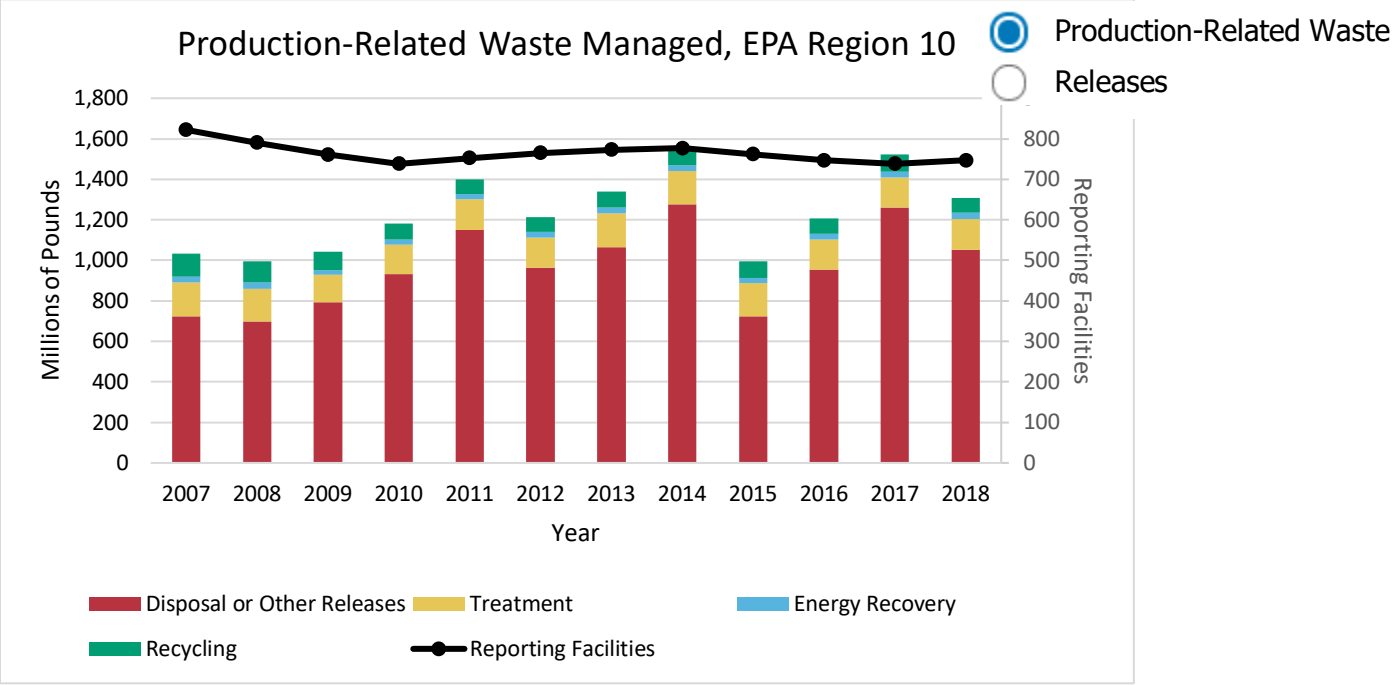
- 747 facilities in Region 10 reported to TRI. These facilities were most commonly in the nonmetallic mineral products (including concrete manufacturing) or wood product manufacturing sectors. The number of facilities and sectors reporting for 2018 were similar to 2017 reporting for the region.
- Most releases in Region 10 were from the metal mining sector, which accounted for 94% of the region's releases for 2018. After metal mining, the chemical manufacturing, food manufacturing, and paper manufacturing sectors reported the highest releases. Note that relatively few facilities in the metal mining sector or paper manufacturing sectors reported to TRI in this region and those sectors are included in "All Others" in the pie chart above. Nationwide, the metal mining, chemical manufacturing, electric utilities, and primary metals (including iron and steel manufacturing, and foundries) sectors reported the highest releases.

- Metal mining facilities typically handle large volumes of material. In this sector, even a small change in the chemical composition of the mineral deposit being mined can lead to big changes in the amount of TRI-listed chemicals reported. Therefore releases in Region 10, where 13 metal mines reported to TRI for 2018, may not follow national trends. For more information on the metal mining sector, see the metal mining sector profile.

For information on the facilities with the greatest releases in the region, see the Region 10 TRI Factsheet.

TRI Waste Management Trend

The following graph shows the annual quantities of TRI chemicals in production-related waste managed by facilities located in Region 10. For more details on quantities released, toggle to the Releases graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

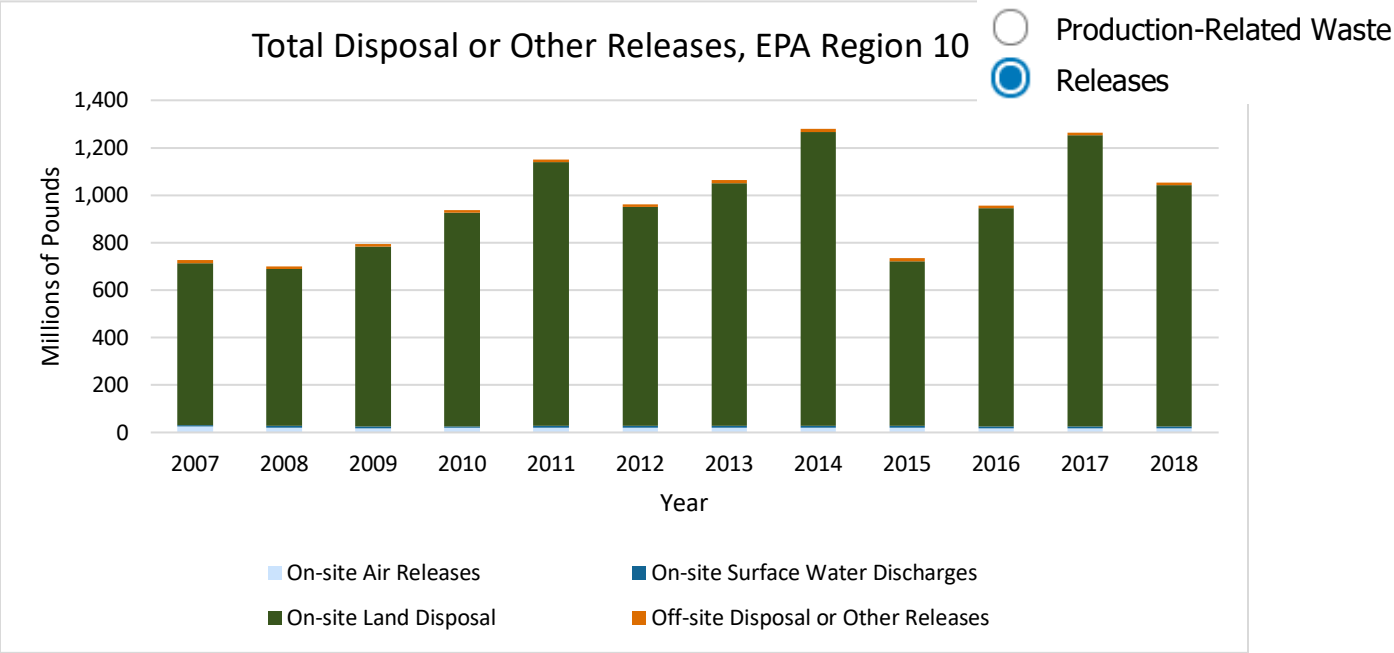
- Facilities reported managing 1.4 billion pounds of production-related waste, 77% of which was disposed of or otherwise released. Nationally, 12% of production-related waste was disposed of or otherwise released. The high proportion of production-related waste that is released in Region 10 is driven by metal mines, which disposed of or otherwise released 99.9% of their production-related waste for 2018.
- Since 2017, quantities of production-related waste managed decreased by 14%, driven by decreased releases by metal mines. Excluding metal mines, production-related waste in Region 10 decreased by 15.7 million pounds (4%).

From 2007 to 2018:

- Total production-related waste managed increased by 275 million pounds (27%), driven by increased releases reported by metal mines. Excluding metal mines, production-

related waste managed in the region decreased by 91.4 million pounds (22%). Nationally, quantities of production-related waste managed increased by 28% since 2007, driven by increased recycling.

The following graph shows the annual quantities of TRI chemicals released by facilities located in Region 10.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

In 2018:

- Facilities reported 1.1 billion pounds of releases.
- The chemicals released in the greatest quantities by medium were:
  - methanol and ammonia to air;
  - nitrate compounds to water;
  - lead and lead compounds and zinc and zinc compounds to land; and
  - nitrate compounds and zinc and zinc compounds transferred off site for disposal.
- Since 2017, releases decreased by 211 million pounds (17%). This decrease was driven by the metal mining sector. Excluding metal mining, releases decreased by 8.1 million pounds (12%) since 2017. Nationally, releases decreased by 3% since 2017.
- Contribution by state to the Region 10 releases in pounds were: Alaska (92%), Idaho (3%), Washington (3%), and Oregon (2%).

2018 Highlight

TRI releases in Region 10 are dominated by one metal mine. For 2018, the Red Dog mine reported 84% of the region's releases [View facility details].

- To consider the potential health risk from chronic exposure to these releases, EPA uses a risk-screening score from the RSEI model. Contributions by state to the RSEI score for Region 10 were: Oregon (79%), Washington (21%), Idaho (<1%), and Alaska (<1%).

From 2007 to 2018:

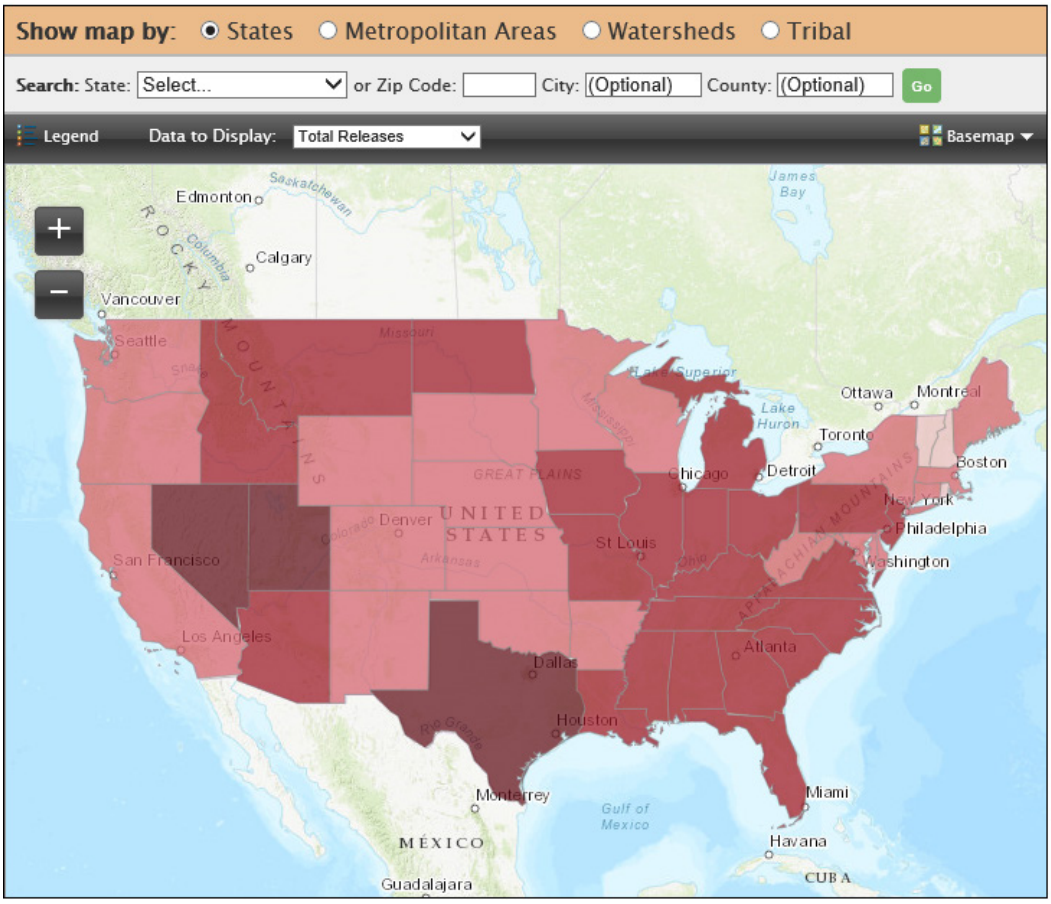
- Releases in Region 10 increased by 326 million pounds (45%). This was driven by the metal mining sector. Excluding the metal mining sector, releases in Region 10 decreased by 40 million pounds (40%). Nationally, total disposal or other releases of TRI chemicals decreased by 9% since 2007.
- Quantities of chemicals released to every medium except land decreased.

Source Reduction

In 2018, 6% of facilities in Region 10 (45 facilities) reported implementing new source reduction activities. As one example of source reduction in Region 10, a ship manufacturer reduced styrene waste by ensuring that resins were used before expiration and by implementing infusion processes during hull and other small parts manufacturing. [Click to view facility details in the P2 tool].

Where You Live

Use the selections above the map to look at disposal and other releases of Toxics Release Inventory (TRI) chemicals that occurred at various geographic levels throughout the United States during 2018.



Click on any one of the locations on the map to see detailed information.

View Larger Map

To view a summary of TRI release data, choose from the two rows of options above the map or search directly within the map by zooming in on a particular area and clicking on a state, metropolitan area, or watershed. In addition to viewing maps based on release quantities, you can also view maps based on risk-screening scores, which are estimates of potential human health risk generated by EPA's Risk-Screening Environmental Indicators (RSEI) model. These unitless scores represent relative human health risk from chronic exposures to TRI chemicals and allow one to compare RSEI scores across locations. For more on RSEI, see the Hazard and Potential Risk of TRI Chemicals section.

As with any dataset, there are several factors to consider when reading about or using the TRI data. Key factors associated with data presented are summarized in the Introduction. For more information see Factors to Consider When Using Toxics Release Inventory Data.

States and Metropolitan Areas

For TRI purposes, "states" includes all U.S. territories. For 2018, all 56 states and territories had facilities that reported releases to the TRI Program. Texas, Ohio, and California had the most facilities that reported to TRI, and together accounted for 20% of total TRI-reporting facilities in 2018.

More than 80% of the United States' population and many of the industrial and federal facilities that report to the TRI Program are located in urban areas. "Metropolitan statistical areas" and "micropolitan statistical areas" in the United States are defined by the Office of Management and Budget (OMB) and consist of one or more socially and economically integrated adjacent counties, cities, or towns.

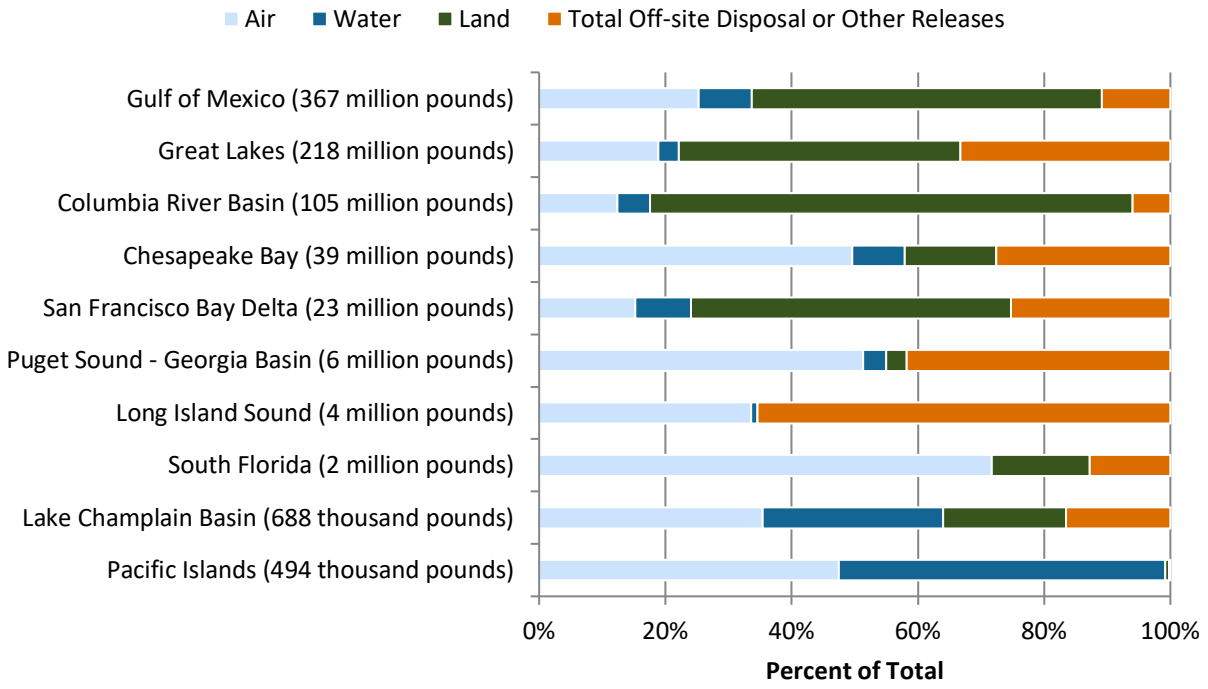
Watersheds

A watershed is the land area that drains to a common waterway. Rivers, lakes, estuaries, wetlands, streams, and oceans are catch basins for the land adjacent to them. Ground water aquifers are replenished based on water flowing down through the land area above them.

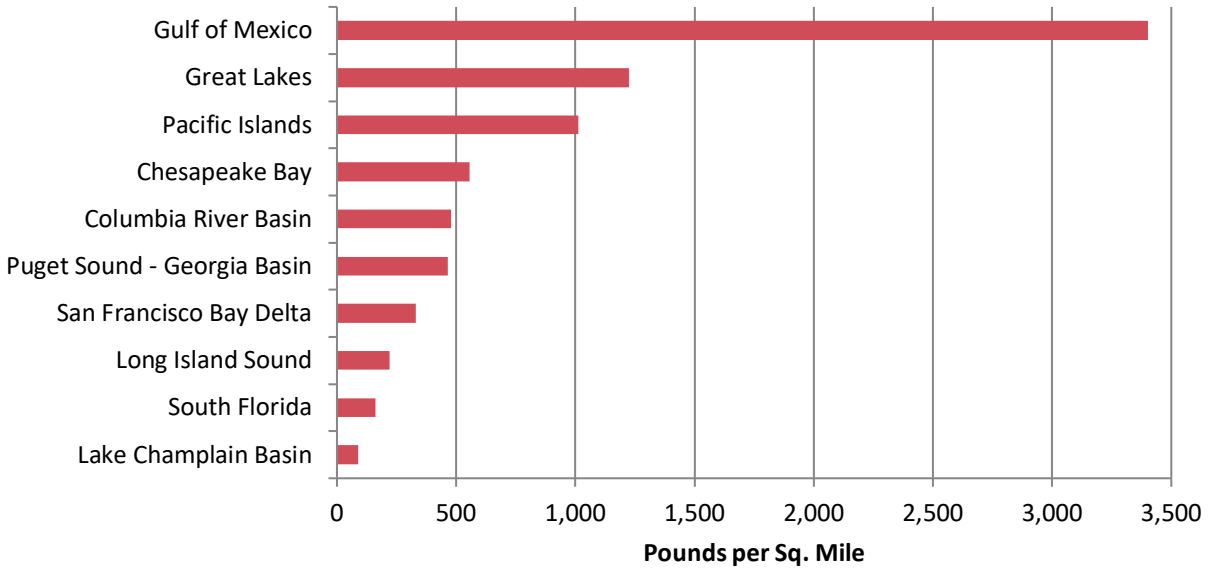
Large aquatic ecosystems (LAEs) comprise multiple small watersheds and water resources within a large geographic area. The Large Aquatic Ecosystems Council was created by the U.S. Environmental Protection Agency in 2008 to focus on protecting and restoring the health of critical aquatic ecosystems. Currently, there are 10 LAEs in this program.

Water pollution, surface runoff, contaminated sediment, discharges of chemicals, and air emissions can affect the quality of the land, water, and living resources within an aquatic ecosystem. Persistent, bioaccumulative and toxic chemicals can be especially problematic in aquatic ecosystems because pollutants can accumulate in sediments and may bioaccumulate in aquatic organisms and the tissues of fish and other wildlife within the food chain to concentrations many times higher than in the water or air, which ultimately may cause environmental health problems for humans and wildlife.

TRI Disposal or Other Releases within Large Aquatic Ecosystems, 2018



Total Disposal or Other Releases within Large Aquatic Ecosystems per Square Mile, 2018



Tribal Communities

Under EPA policy, the Agency works with federally recognized tribes on a government-to-government basis to protect the land, air, and water in Indian country and Alaska Native villages and to support tribal assumption of program authority. Facilities located in Indian country that meet TRI reporting requirements must indicate the appropriate three-digit Bureau of Indian Affairs (BIA) tribal code on annual TRI reporting forms. These codes tell the EPA on which tribal land the facility is located.

In 2018, there were 43 facilities located in the Indian country of 19 different federally recognized tribes. These facilities collectively reported 41 million pounds of production-related waste and 13 million pounds of releases (total disposal or other releases). Of the releases reported, 99% of the TRI releases in Indian country occurred on site, and 94% of these releases were disposal to land reported by electric utilities and metal mining facilities. In 2018, these facilities primarily released metal compounds such as lead, copper and barium. Lead and copper are often present in the mineral ore disposed of by metal mines, and barium is present in coal and oil combusted at electric utilities.

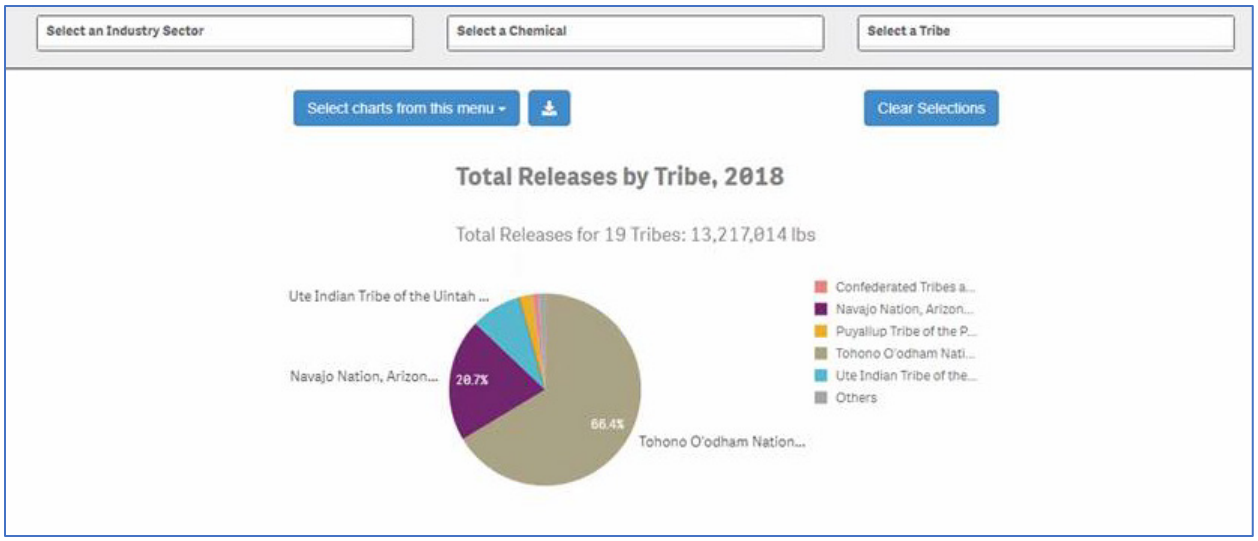
The table below provides more details about various types of releases and waste management reported by facilities on federally recognized tribal lands.

Quick Facts for 2018: Facilities on Tribal Lands

Measure	*Value*
Number of Facilities that Reported to TRI	**43**
Number of Tribes with TRI Facilities	19
Production-Related Waste Managed	**40.59 million lb**
Recycling	15.47 million lb
Energy Recovery	4.41 million lb
Treatment	7.49 million lb
Disposal or Other Releases	13.22 million lb
Total Disposal or Other Releases	**13.22 million lb**
On-site	**13.09 million lb**
Air	0.61 million lb
Water	3.22 thousand lb

Measure	*Value*
Land	12.47 million lb
Off-site	**0.13 million lb**

The interactive chart below includes various data related to TRI releases by the facilities located on tribal lands. Use the buttons in the top gray row to filter the data by industry sector, chemical, and/or tribe. The blue dropdown button on the left allows you to view the data differently by changing which chart is displayed. Visit the TRI for Tribal Communities Qlik dashboard to explore even more information about releases of chemicals on or near tribal lands. Additional information about all TRI facilities is also available in the full 2018 TRI National Analysis Qlik dashboard.



The interactive table below lists the federally recognized tribes that had at least one TRI-reporting facility on their lands, along with the total releases reported by facilities, the number of facilities, and a link to a fact sheet with more information about TRI facilities on each tribe's land. Click on a column header to change the sorting of the table.

Total Disposal or Other Releases on Tribal Lands by Tribe, 2018

Tribes in 2018, Sorted by Releases and Number of Facilities

This table is interactive - click the column headers to change the sorting of the table.

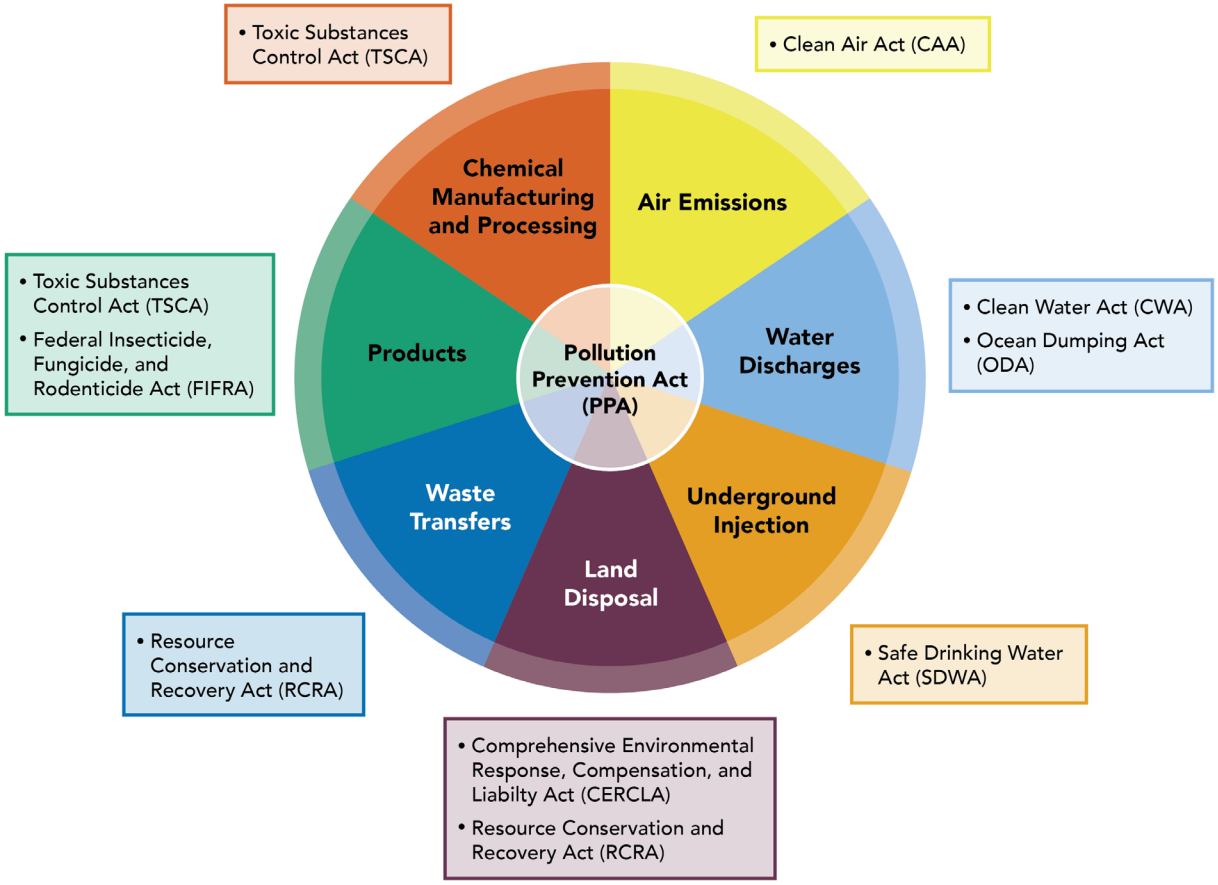
Tribe	Total Releases (lbs)	Number of Facilities	Fact Sheet
Totals	**13,217,014**	**43**	
Tohono O'odham Nation of Arizona	8,775,888	1	Link
Navajo Nation, Arizona, New Mexico & Utah	2,735,137	2	Link
Ute Indian Tribe of the Uintah & Ouray Reservation, Utah	1,120,882	1	Link
Puyallup Tribe of the Puyallup Reservation	296,633	10	Link
Confederated Tribes and Bands of the Yakama Nation	145,732	3	Link
Coeur D'Alene Tribe (previously listed as the Coeur D'Alene Tribe of the Coeur D'Alene Reservation, Idaho)	108,344	2	Link
Eastern Band of Cherokee Indians	27,880	1	Link
Saginaw Chippewa Indian Tribe of Michigan	3,118	1	Link
Arapaho Tribe of the Wind River Reservation, Wyoming	1,570	1	Link
Colorado River Indian Tribes of the Colorado River Indian Reservation, Arizona and California	715	1	Link
Oneida Tribe of Indians of Wisconsin	340	4	Link
Gila River Indian Community of the Gila River Indian Reservation, Arizona	325	8	Link
Salt River Pima-Maricopa Indian Community of the Salt River Reservation, Arizona	240	1	Link
Poarch Band of Creeks (previously listed as the Poarch Band of Creek Indians of Alabama)	183	1	Link
Choctaw Nation of Oklahoma	10	2	Link
Tulalip Tribes of Washington (previously listed as the Tulalip Tribes of the Tulalip Reservation, Washington)	10	1	Link
Nez Perce Tribe (previously listed as Nez Perce Tribe of Idaho)	6	1	Link
Rincon Band of Luiseno Mission Indians of the Rincon Reservation, California	0	1	Link
Suquamish Indian Tribe of the Port Madison Reservation	0	1	Link

Additional resources for tribes are available on the TRI for Tribal Communities webpage. The webpage includes more detailed analyses of TRI data, links to other online tools, and Tribal Program Manager contact information.

TRI and Beyond

The Toxics Release Inventory (TRI) is a powerful resource that provides the public with information about how TRI chemicals are managed by facilities in the United States. However, there are many other programs at EPA that collect information about chemicals and the environment. The next figure is an overview of some of the laws that EPA implements, and the industrial activities or processes EPA regulates under these laws.

While many programs at EPA focus on one area, TRI covers waste management activities including the release of chemicals to air, water, and land, and waste transfers. As a result, TRI data are especially valuable, as they can be used with many other datasets to provide a more complete picture of national trends in chemical use, chemical management, environmental release and other waste management practices, and environmental performance.



Note: The Emergency Planning and Community Right-to-Know Act (EPCRA) establishes requirements for emergency planning, preparedness, and reporting on hazardous and toxic chemicals involving air releases, water releases, land disposal, waste transfers, and the quantities of chemicals on site, the type and location of storage of those chemicals, and their use.

Throughout EPA, offices use TRI data to support their mission to protect human health and the environment. These uses include technical analysis for regulation, informing program priorities, providing information to stakeholders, and many other applications.

This section of the National Analysis highlights how TRI data contribute to Toxic Substances Control Act (TSCA) data and risk evaluations, and how TRI has served as a model for other pollutant release and transfer inventories around the world.

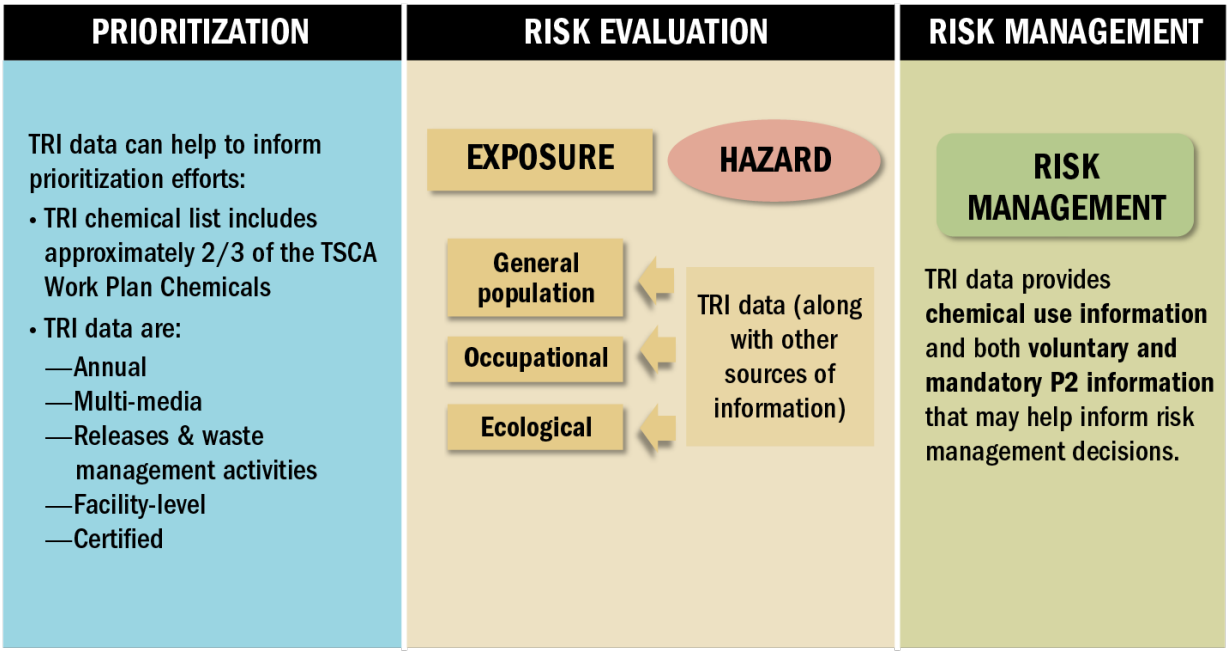
As with any dataset, there are several factors to consider when reading about or using the TRI data. Key factors associated with data presented are summarized in the Introduction. For more information see Factors to Consider When Using Toxics Release Inventory Data.

TSCA and TRI

The Toxic Substances Control Act (TSCA), as amended by the Frank R. Lautenberg Chemical Safety for the 21st Century Act, is the nation's primary chemicals management law. Under TSCA, existing chemicals in commerce and new chemicals intended for use in commerce are reviewed for safety through a risk-based process with increased public transparency. EPA has identified chemicals for further assessment under TSCA, referred to as work plan chemicals, to help focus and direct EPA's activities.

The three stages of EPA's process for evaluating the safety of existing chemicals are prioritization, risk evaluation, and risk management. During both the prioritization and risk evaluation stages of the process, TRI serves as a source of information as illustrated in the figure below. TRI data may also be used in the risk management stage of the process.

TRI Data Use in TSCA Chemical Evaluations



Prioritization. Approximately two-thirds of the chemicals identified in the 2014 update of the TSCA Work Plan are also included on the TRI list of chemicals. TRI can inform prioritization of chemicals for risk evaluation because TRI data are submitted annually and contain information on the location of the facility and its release quantities of TRI chemicals to air, water and land, and transferred to off-site locations. Note that designation as a TRI chemical by itself does not determine high or low priority for a chemical.

Risk evaluation. A TSCA risk evaluation of a chemical is a comprehensive evaluation of the risk the chemical poses to human health and the environment over the chemical's life cycle. EPA evaluates the conditions of use for the chemical, which may include manufacturing and import, processing, use, distribution in commerce, and disposal. During risk evaluation, EPA is required to assess exposure to the chemical in the workplace, to the general population and to ecological receptors. This includes assessment of exposure to susceptible subpopulations that may be sensitive to the potential hazards posed by the chemical under review. The TRI data are used to estimate these exposures that may impact the general population and ecological resources.

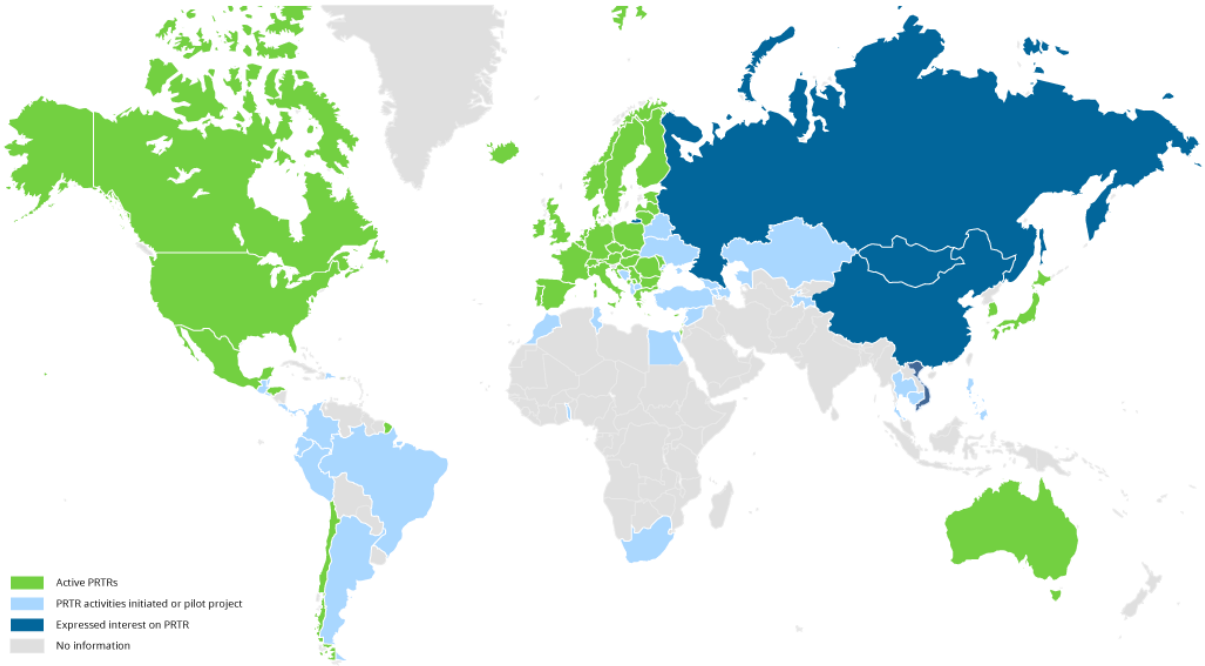
Risk Management. If EPA determines that a chemical presents unreasonable risk of adverse effects to human health or the environment, EPA will evaluate options for lessening that risk. EPA is required to implement, via regulation, restrictions on the manufacture, processing, distribution in commerce, use and/or disposal of the chemical to eliminate the unreasonable risk. EPA is given a range of risk management options under TSCA, including labeling with warnings and instructions for use, recordkeeping or notice requirements, actions to reduce human exposure or environmental release, or a ban of the chemical or of certain uses of the chemical. EPA often uses TRI data, such as on chemical use and pollution prevention, to inform these risk management decisions.

High-priority Substances for TSCA Risk Evaluation

In 2017, EPA published the scope of the risk evaluations to be conducted for the initial ten chemicals undergoing risk evaluation under the amended TSCA. In December 2019, EPA announced the next 20 chemicals to undergo risk evaluation. Finalizing this list of high-priority chemicals for risk evaluation represents the final step in the TSCA prioritization process and marks another major TSCA milestone for EPA in its efforts to ensure the safety of existing chemicals in the marketplace. Of these 20 chemical substances, 13 are currently individually listed TRI chemicals. TRI is well suited to help inform the risk evaluation process because TRI includes annual data on the location of reporting facilities and their releases of TRI chemicals to air, water, land, and quantities transferred off site.

TRI Around the World

In 1986, the TRI Program was established as the first national Pollutant Release and Transfer Register (PRTR) in the world. Since then, environmental agencies around the world have been increasingly implementing their own right-to-know PRTR programs with the TRI serving as a model. Currently, at least 50 countries have fully established PRTRs or have implemented pilot programs, as shown in the map below. More are expected to be developed over the coming years, particularly in Asian, South American, and African countries.



Source: United Nations Economic Commission for Europe

As global PRTR implementation continues to grow, the TRI Program will continue to work with international organizations to:

- Assist in the development of PRTR programs in other countries,
- Encourage other countries to develop initiatives aimed at making existing PRTR data more comparable to allow better analysis of the data on a global scale, and
- Make PRTR data more useful for assessing progress towards sustainability.

As an example, the TRI Program is currently working with the Organization for Economic Co-operation and Development (OECD) EXIT on a project to use global PRTR data to assess progress toward the Sustainable Development Goals established in the United Nation's 2030 Agenda for Sustainable Development EXIT, as described in the Project Spotlight below. For

information on international PRTR activities, projects and partners, see TRI's International webpage.

International Project Spotlight: Using PRTR Data to Assess Progress toward the U.N. Sustainable Development Goals

Background. The TRI Program is collaborating in a project to use global PRTR data to assess progress toward the United Nations' (U.N.) Sustainable Development Goals (SDGs). These goals are designed to "shift the world on to a sustainable and resilient path" by setting targets that encompass the economic, environmental, and social dimensions of sustainability. As stakeholders act toward achieving the SDGs, the U.N. will measure progress toward the Goals using existing data where possible. One such existing data source for some of the SDGs may be found in countries' PRTR data.

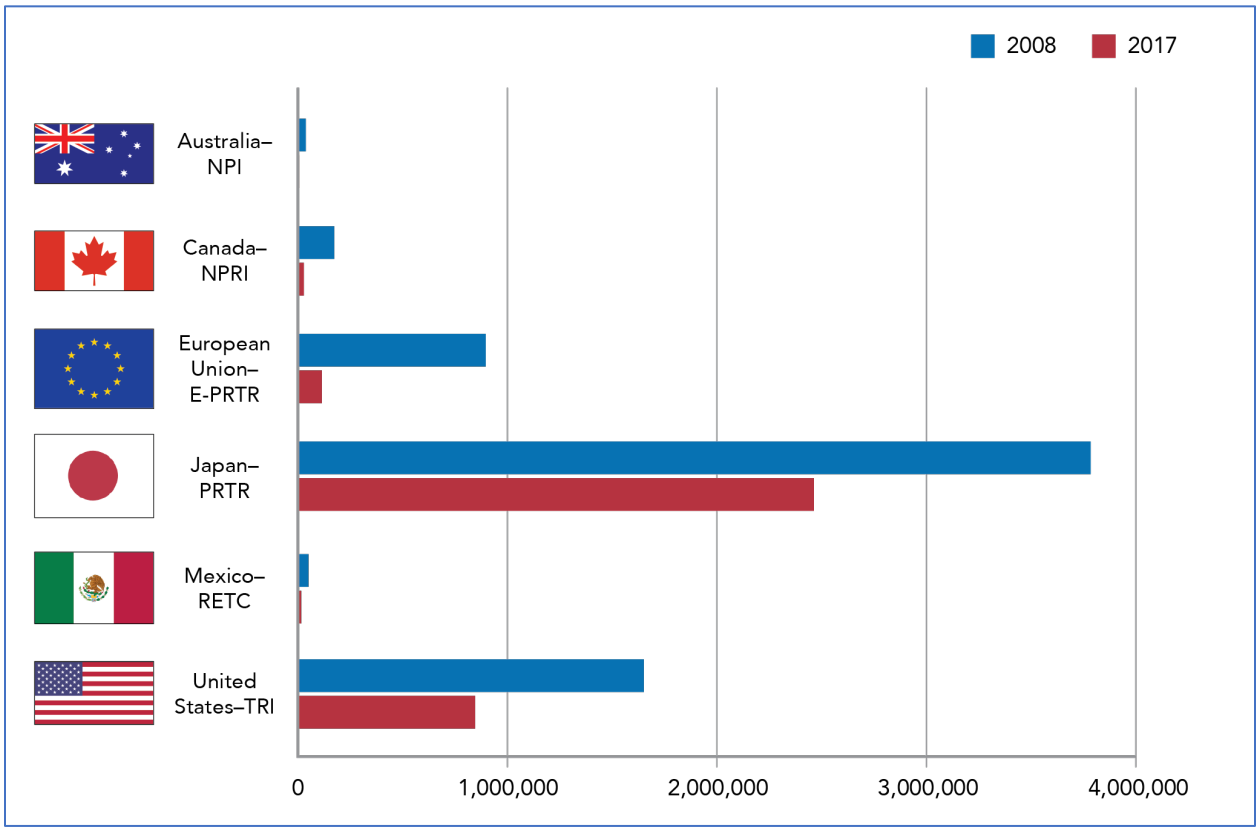
SDG Target 12.4

By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

Initial Project Focus. The U.N. SDG Target 12.4 EXIT was identified as the target most directly relevant to PRTR data and is the focus of this initial phase of the project. This target focuses on reducing chemical releases to the environment.

Project Status. Global analyses of PRTR data are currently underway based on aggregated data for multiple chemicals from multiple countries in order to recommend possible metrics to track progress in reducing chemical releases to the environment. A sample figure below shows the trend for air and water releases of one pollutant from manufacturing facilities as reported to 6 of the 7 PRTRs in the project.

Releases of trichloroethylene to air and water from manufacturing facilities by PRTR (kg)



PRTRs included in the analyses: Australia – National Pollutant Inventory (NPI), Canada – National Pollutant Release Inventory (NPRI), Chile – Registro de Emisiones y Transferencia de Contaminantes (RETC, not shown here), European Union – European Pollutant Release and Transfer Register (E-PRTR), Japan Pollutant Release and Transfer Register (PRTR), Mexico – Registro de Emisiones y Transferencia de Contaminantes (RETC), United States – Toxics Release Inventory (TRI).

Next steps. As the project progresses and the methods and metrics are reviewed and refined, the findings may be included in the next update of the U.N. Sustainable Development Goals Report EXIT.

Read more about the TRI Around the World.