Releases of Chemicals in the 2015 TRI National Analysis

Disposal or other releases of Toxics Release Inventory (TRI) chemicals into the environment occur in several ways. Chemicals may be disposed of on a facility's property by being released to the air, water or land. Facilities may also ship (transfer) wastes that contain TRI chemicals to an off-site location for treatment or disposal. Note that most disposal or other release practices are subject to a variety of regulatory requirements designed to limit harm to human health and the environment. To learn more about what EPA is doing to help limit the release of toxic chemicals to the environment, see EPA's laws and regulations webpage.

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

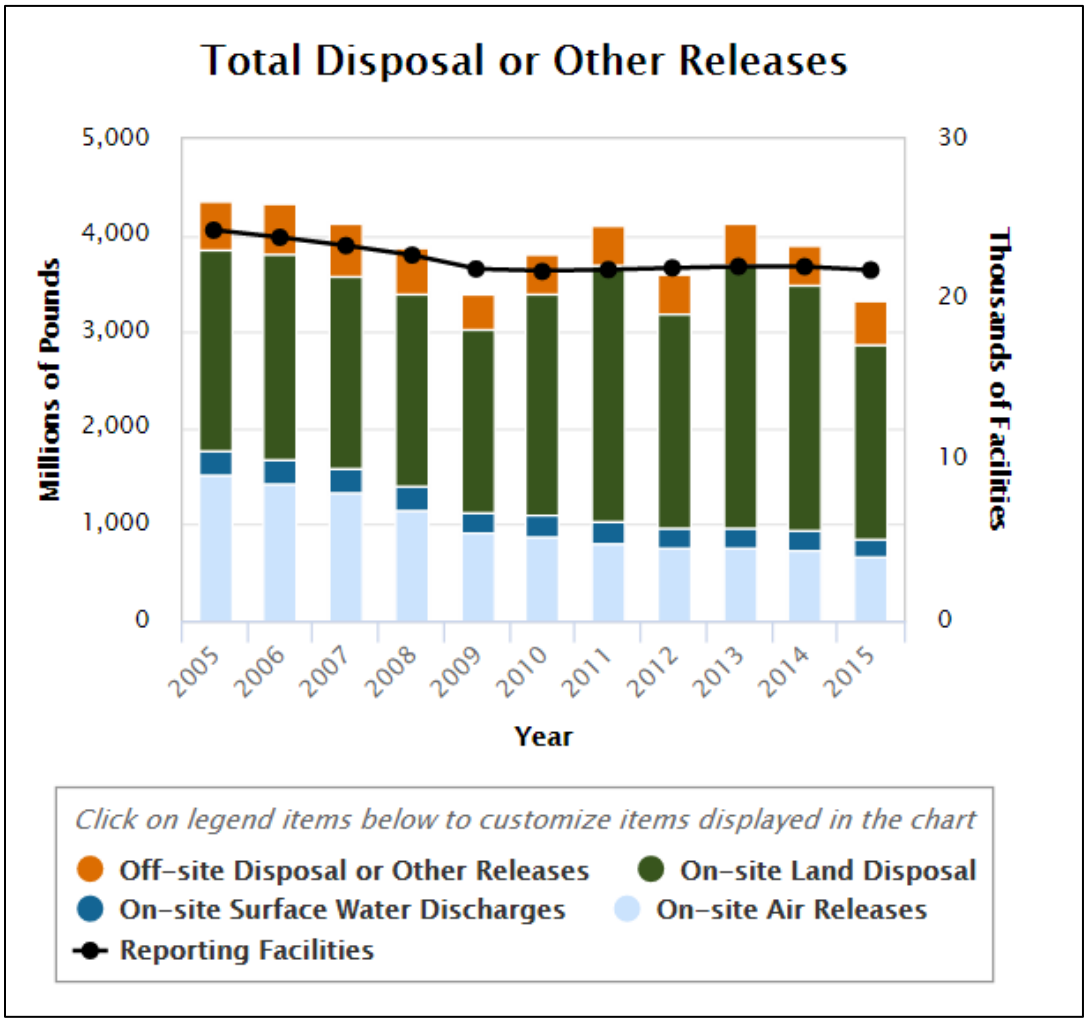
Many factors can affect trends in releases at facilities, including production rates, management practices, the composition of raw materials used, and the installation of control technologies.

The following graph shows the disposal or other releases of TRI chemicals, including on-site disposal to land, water, and air, and off-site transfers for disposal.

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 placed in some type of land disposal unit.



From 2005 to 2015:

- Total disposal or other releases of TRI chemicals decreased by 24%.
- This long-term decrease is driven mainly by declining air releases, down 56% (851 million pounds) since 2005. The decrease is driven by electric utilities due to a shift from coal to other fuel sources and the installation of control technologies at coal-fired power plants, which has led to decreases in hazardous air pollutant (HAP) emissions, such as hydrochloric acid.
- Air emissions also declined during this 10-year period (down from 35% in 2005 to 20% in 2015) while land releases increased (up from 47% in 2005 to 60% in 2015).
- The number of facilities reporting to the TRI Program declined by 10% overall, although the count has remained steady at approximately 22,000 facilities since 2010 (21,849 facilities reported to TRI for 2015).

From 2014 to 2015:

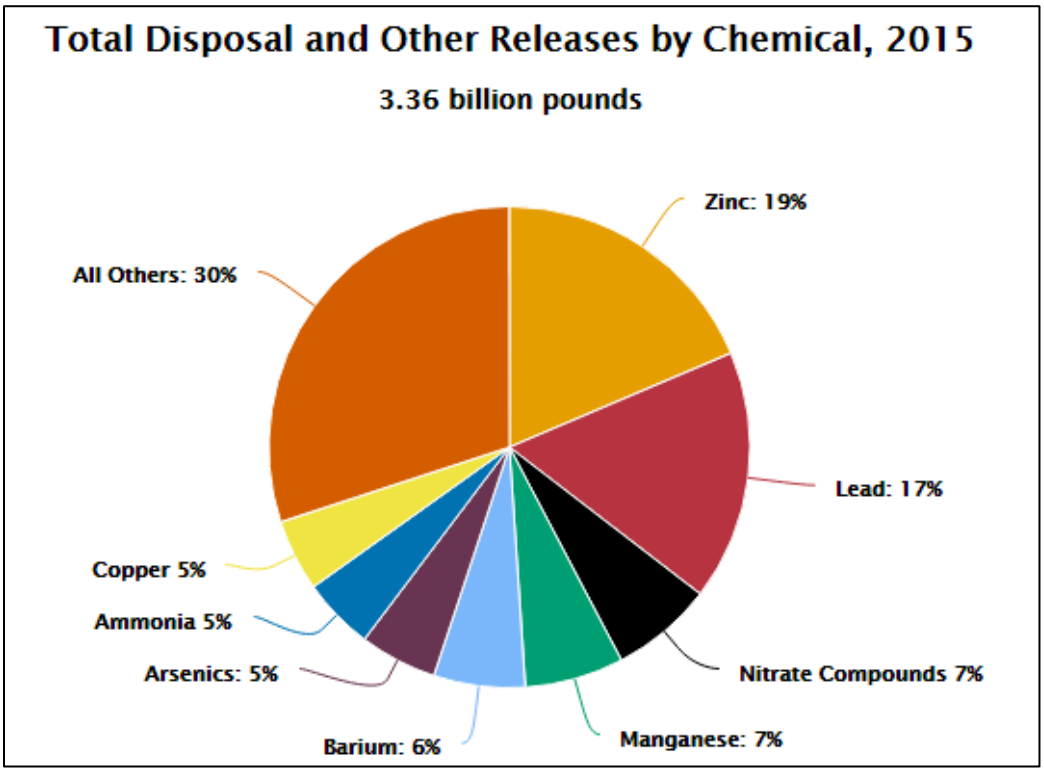
- Total releases decreased by 15% due primarily to decreases in on-site land disposal by the metal mining sector.

Releases in 2015

Use the interactive chart below to explore how total releases of chemicals that occurred in 2015 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

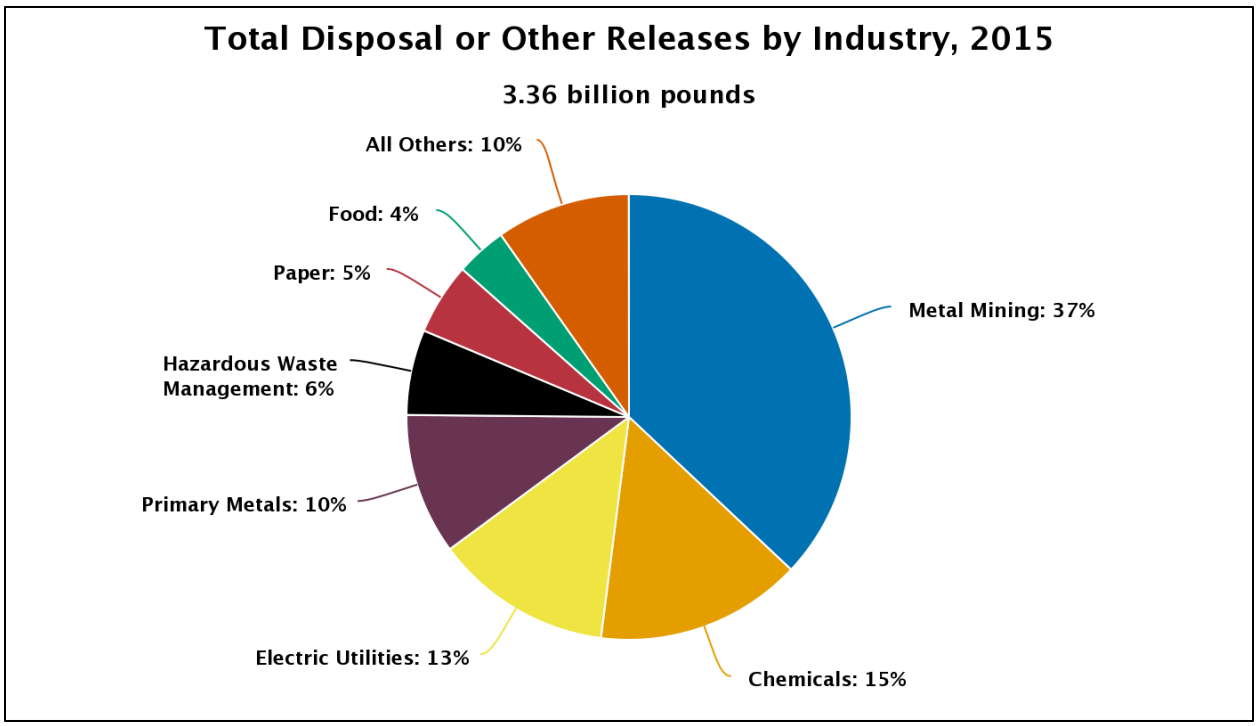
70% of releases are from 8 chemicals.



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

Releases by Industry

The metal mining sector accounts for 37% of releases (1.24 billion pounds), which were primarily disposed of to land.



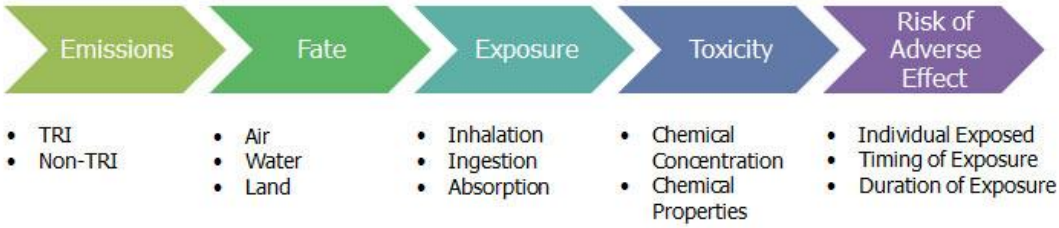
Sections in this chapter

Hazard and Risk of TRI Chemicals in the 2015 TRI National Analysis

Among other information, the Toxics Release Inventory (TRI) Program provides data about environmental releases of toxic chemicals from industrial facilities throughout the United States, measured in pounds. Pounds of releases, however, is not an indicator of any health risks posed by the chemicals. Although TRI data generally cannot indicate to what extent individuals have been exposed to toxic chemicals, TRI can be used as a starting point to evaluate exposure and the potential risks TRI chemicals pose to human health and the environment.

The human health risks resulting from exposure to toxic 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 often includes information on a large portion of the toxic chemicals used by industry, it does not cover all facilities, all toxic chemicals, or all sources of TRI chemicals in communities. For example, potential sources of chemical exposure that are not covered by TRI include exhaust from cars and trucks, chemicals in consumer products, and chemical residues in food and water.

To provide information on the potential hazard and risk posed by disposal or other releases of TRI chemicals, the TRI Program uses EPA's publicly available Risk-Screening Environmental Indicators (RSEI) model, a screening-level model that uses simplifying assumptions to fill data gaps and reduce the complexity of calculations in order to quickly evaluate large amounts of data. 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 release pathways, such as land disposal.

Helpful Concepts

The *hazard* of a toxic chemical is its ability to cause an increased incidence of adverse health effects (e.g., cancer, birth defects). *Toxicity* is a way to measure the hazard of a chemical.

The *risk* of a toxic chemical is the chance of adverse health effects occurring as a result of exposure to the chemical. Risk is a function of hazard and exposure.

RSEI produces hazard estimates and unitless risk "scores," which represent relative chronic human health risk. 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.
- RSEI **risk** scores are estimates of potential human risk based on pathway-specific modeling of chemical concentrations at specific points in the environment, like in the air around a facility or in the water downstream from a facility.

RSEI: Risk-Screening Environmental Indictors

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
  - Fate and transport
  - Human exposure pathway

Note that the RSEI model should be used for screening-level activities such as trend analyses that compare relative risk from year to year, or ranking and prioritization of chemicals or industry sectors for strategic planning. RSEI does not provide a formal risk assessment, which typically requires site-specific information, more refined exposure information, and detailed population distributions.

Top chemicals released[§] in 2015, ranked in order by…

Pounds Released	RSEI Hazard (toxicity*pounds)	RSEI Score (estimated dose*toxicity*exposed population)
1. Nitrate compounds	1. Chromium and compounds	1. Chromium and compounds
2. Methanol	2. Cobalt and compounds	2. Nickel and compounds
3. Ammonia	3. Arsenic and compounds	3. Cobalt and compounds
4. Sulfuric acid	4. Nitroglycerin	4. 1,3-Butadiene
5. Hydrochloric acid	5. Nickel and compounds	5. Arsenic and compounds

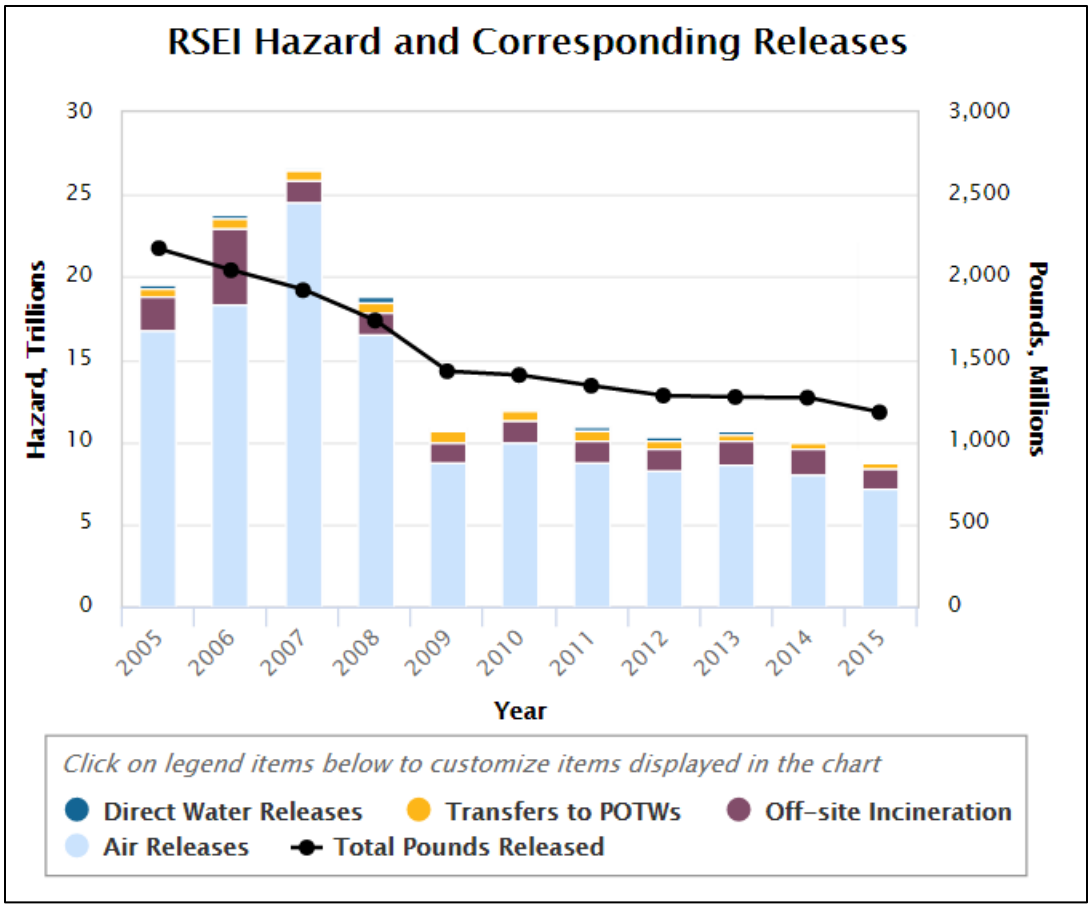
Why are the rankings different?

- The top five chemicals by **pounds** are released in large amounts and are comparatively less toxic than the top chemicals by hazard or score. None of them are known carcinogens - cancer effects usually drive RSEI hazard and RSEI scores.
- The top five chemicals by **RSEI hazard** have very high toxicity weights and all of them are carcinogens.
- For a chemical to have a high **RSEI score**, it must be either very toxic, have a large number of people potentially exposed, or have potential for very high exposures (or some combination).
- Nitroglycerin is in the top five chemicals by **RSEI hazard** but not by **RSEI score** because the two releases driving the hazard results are large off-site transfers to wastewater treatment and incineration. **RSEI hazard** is calculated using the pounds transferred, while **RSEI score** uses the amount of the chemical released into the environment after treatment, which is substantially smaller.
- 1,3 Butadiene is in the top five chemicals by **RSEI score** but it is not in the top five chemicals by **RSEI hazard** because of a small number of releases with a large number of people potentially exposed. Exposure is only a component of **RSEI score.**

[§]This includes chemicals released on-site to air and water by TRI facilities, or transferred and released off-site to air and water by POTWs and incinerators.
Note: RSEI is commonly used to quickly screen and highlight situations that may potentially lead to chronic human health risks. More information about the model can be accessed at the RSEI webpage.

Hazard Trend

EPA's Risk-Screening Environmental Indicators (RSEI) model estimates hazard which considers the amounts of chemicals released on-site to air and water by Toxics Release Inventory (TRI) facilities, or transferred off-site to Publicly Owned Treatment Works (POTWs) or incinerators, and the toxicity of the chemicals. The following graph shows the trend in the RSEI hazard compared to the trend in the corresponding pounds of toxic chemical releases reported to TRI.

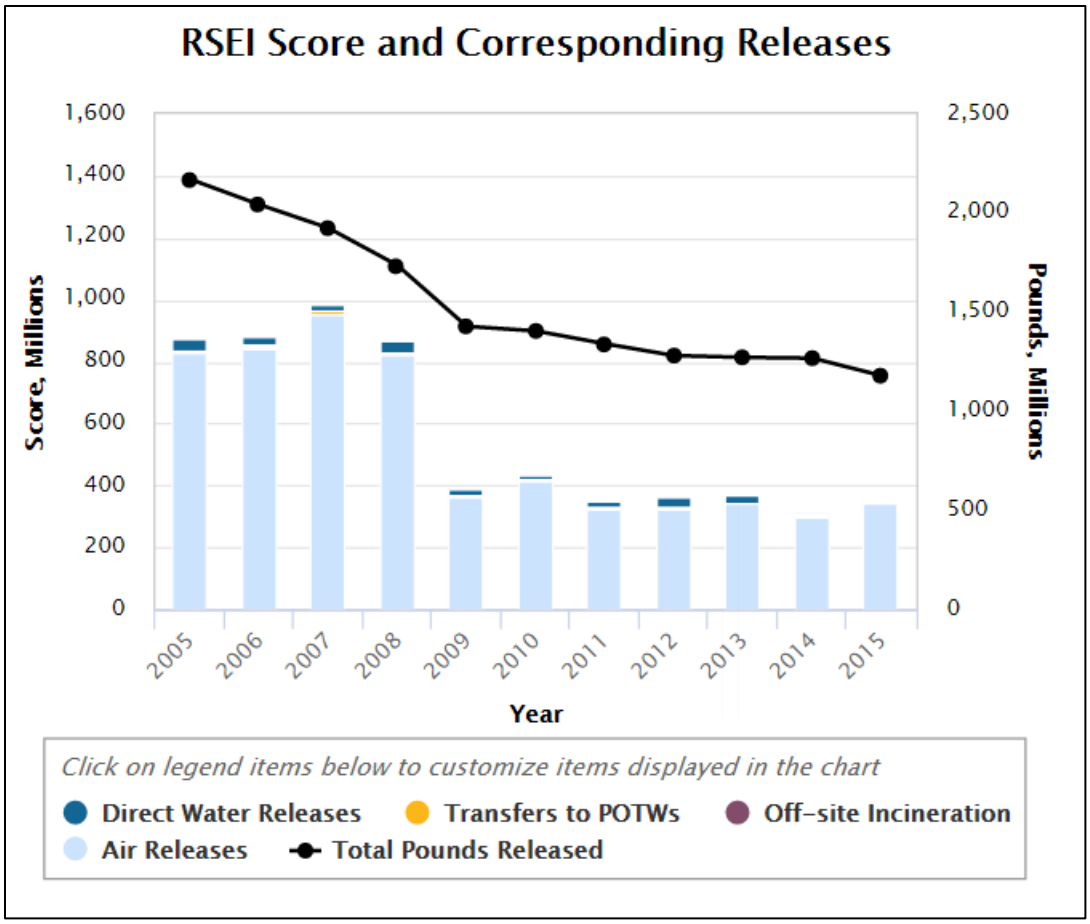


From 2005 to 2015:

- The increase in the hazard estimate from 2005 to 2007 is driven mainly by an increase in chromium releases to air.
- The overall RSEI hazard estimate decreased by 55%, while corresponding pounds released decreased by 46%. This suggests that in recent years TRI reporters may be releasing chemicals that have slightly lower toxicities.

Risk Trend

EPA's Risk-Screening Environmental Indicators (RSEI) model estimates risk "scores" that represent relative chronic human health risk and can be compared to RSEI-generated scores from other years. RSEI scores are different from RSEI hazard estimates because they also consider the location of the release, its fate and transport through 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 toxic chemical releases.

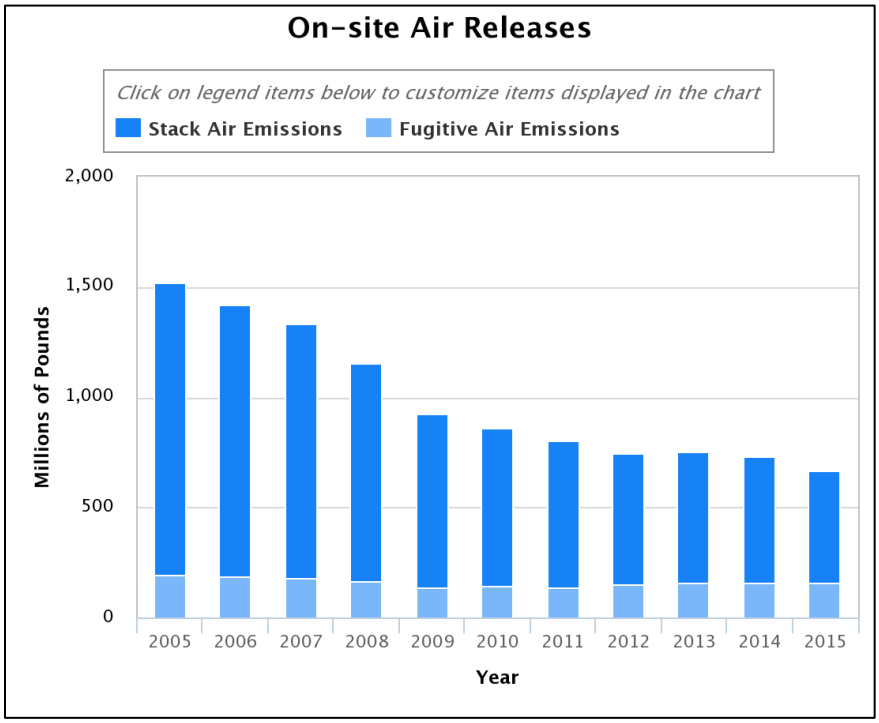


From 2005 to 2015:

- The overall RSEI score estimate decreased by 59%, while corresponding pounds released decreased by 46%. The large decrease in RSEI score between 2007 and 2009 was driven by a large decrease in chromium releases from three facilities. The slight increase in RSEI score from 2014 to 2015 is due to one large fugitive release to air of metal compounds in 2015.

Air Releases

Air emissions continue to decline, serving as a primary driver of decreased total releases. Air releases include both fugitive air emissions and point source air emissions. This graph shows the trend in the pounds of toxic chemicals released to air as reported to the Toxics Release Inventory (TRI) Program.



From 2005 to 2015:

- Air releases declined significantly, serving as a primary driver of decreases in total releases.
- Air releases decreased by 56% (851 million pounds).
    - Hydrochloric acid, sulfuric acid, hydrogen fluoride, methanol and toluene were the chemicals with the greatest reductions in air releases since 2005.
    - The decrease is driven by electric utilities due to a shift from coal to other fuel sources, the installation of control technologies at coal-fired power plants, and the implementation of environmental regulations.
    - Coal- and oil-fired electric utilities accounted for more than 90% of nationwide reductions in air releases of hydrochloric acid, sulfuric acid and mercury from 2005 to 2015.

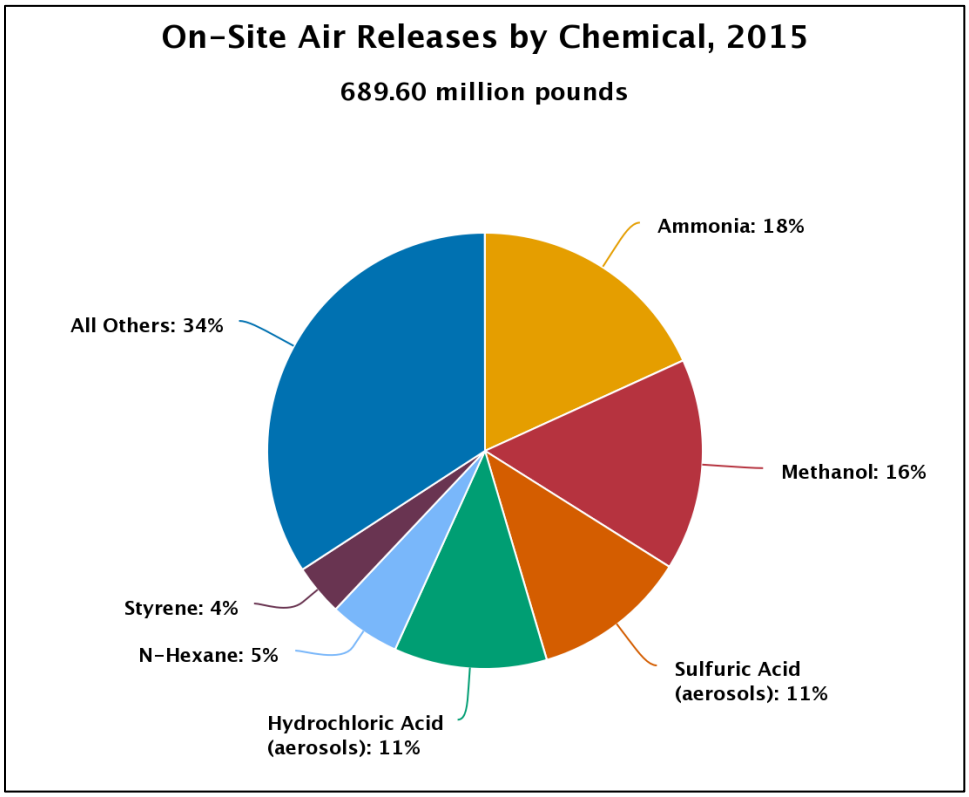
- Air releases of OSHA carcinogens also decreased; see the Air Releases of OSHA Carcinogens figure.
- Air releases of other chemicals of special concern, including lead compounds and mercury, also decreased; see the Chemicals of Special Concern section.
- Air releases are often regulated by other programs as well, such as under Title V of the Clean Air Act, which requires major sources of air pollutants to obtain and comply with an operating permit.

In 2015:

- Ammonia, followed by methanol, accounted for the greatest air releases of TRI chemicals.
- Since 2014, air releases decreased by 8%.

Air Releases by Chemical

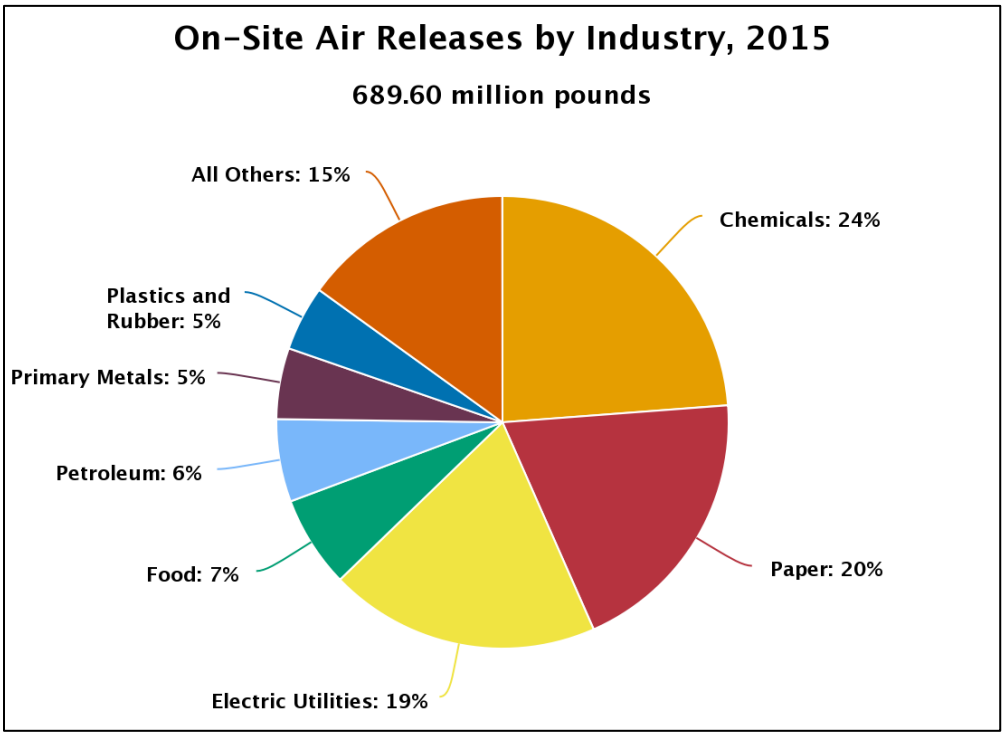
This pie chart shows which toxic chemicals were released to air in the greatest quantities in 2015.



- Air releases of ammonia are largely due to the manufacture of nitrogen fertilizers in the chemicals industry and have remained relatively constant since 2005.
- Air releases of methanol are primarily from pulp and paper mills and have decreased by 31% since 2005.
- The majority of air releases of hydrochloric acid and sulfuric acid result from generating electricity from fossil fuels. Air releases of these two chemicals have decreased consistently since 2005.

Air Releases by Industry

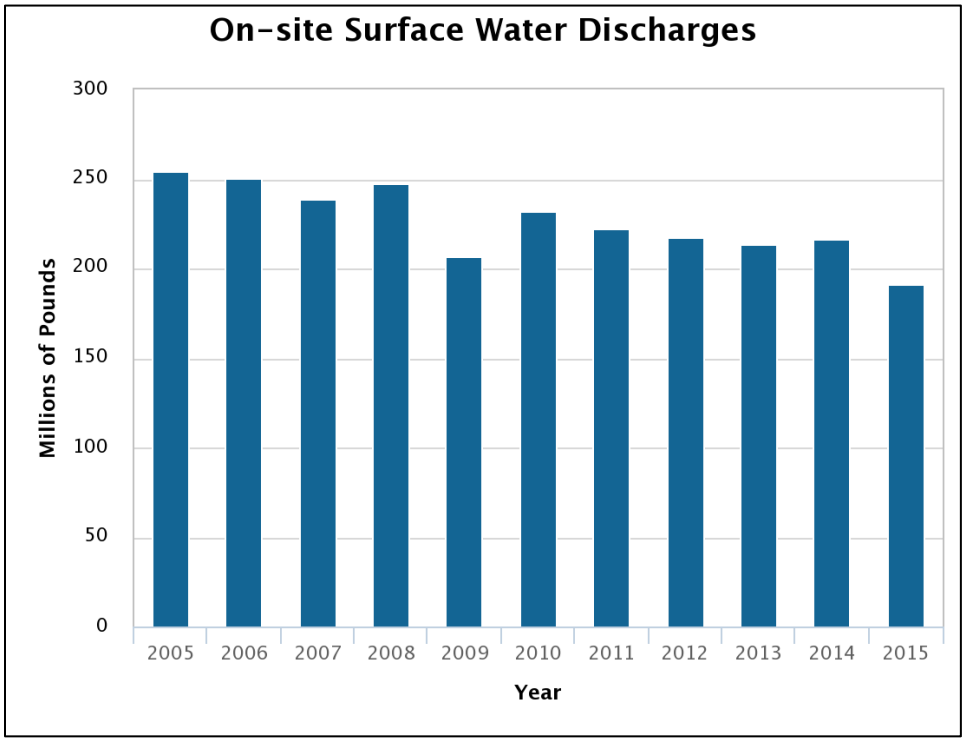
This pie chart shows the industry sectors that reported the greatest releases of toxic chemicals to air in 2015.



- Chemicals, paper, and the electric utility industry sectors accounted for the greatest releases to air in 2015. Together, these three industries contributed almost two-thirds of total air releases.
- Air releases in these three industries have decreased since 2014:
    - Chemicals: 4% decrease (6.8 million pounds)
    - Paper: 4% decrease (6.3 million pounds)
    - Electric utilities: 27% decrease (49.7 million pounds)

Water Releases

Facilities are required to report the total quantity of Toxics Release Inventory (TRI) chemicals they release to receiving streams or other water bodies. The following graph shows the trend in the pounds of toxic chemicals released to water bodies as reported to the TRI Program.



From 2005 to 2015:

- Surface water discharges decreased by 25% (64 million pounds). Most of this decline is due to reduction in water releases of nitrate compounds, which decreased by 25% (57 million pounds).
- 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. More nitrate compounds are released to water than any other TRI chemical.
- Surface water discharges are often regulated by other programs as well, such as under Clean Water Act National Pollutant Discharge Elimination System (NPDES) permits. A NPDES permit is typically a license for a facility to discharge a specified amount of a pollutant into a receiving body of water under certain conditions.

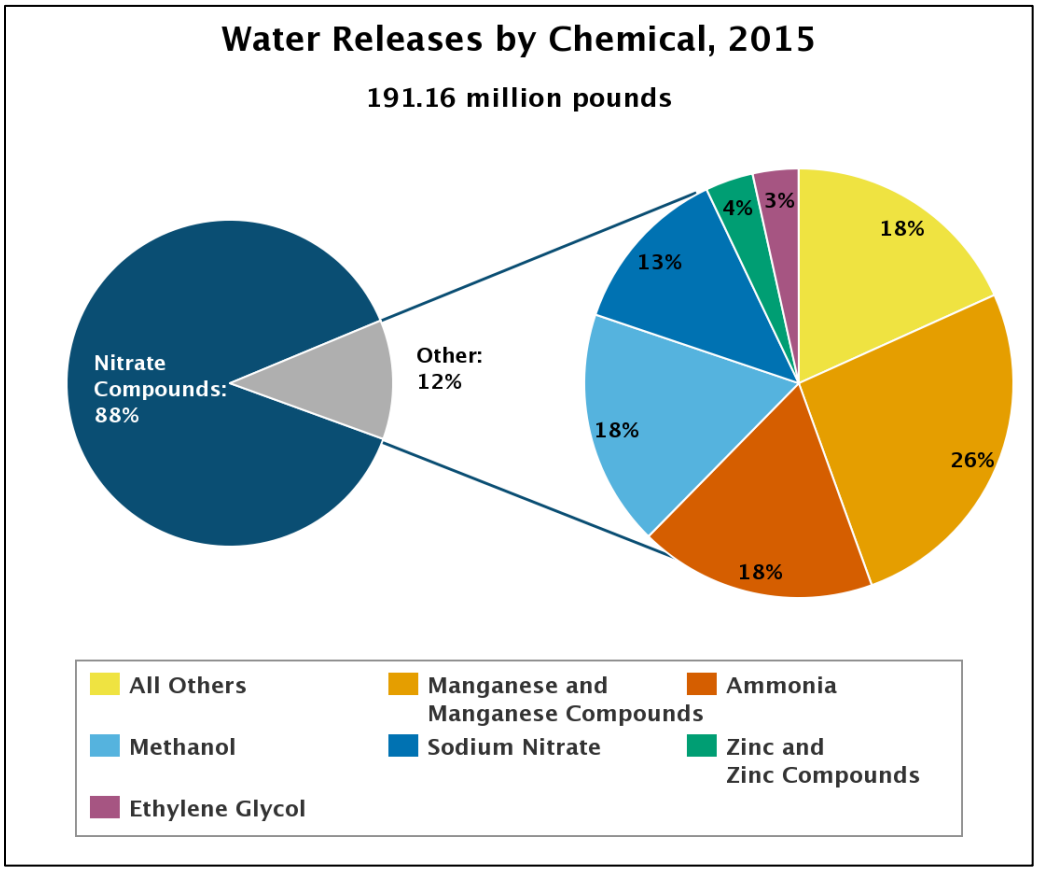
- Surface water discharges of other TRI chemicals, many of which are more toxic to humans than nitrate compounds, have been decreasing at a faster rate. Releases to water are discussed further in the next few figures starting with water releases by chemical.

In 2015:

- Nitrate compounds alone accounted for 88% of the total quantity of all TRI chemicals discharged to surface waters.

Water Releases by Chemical

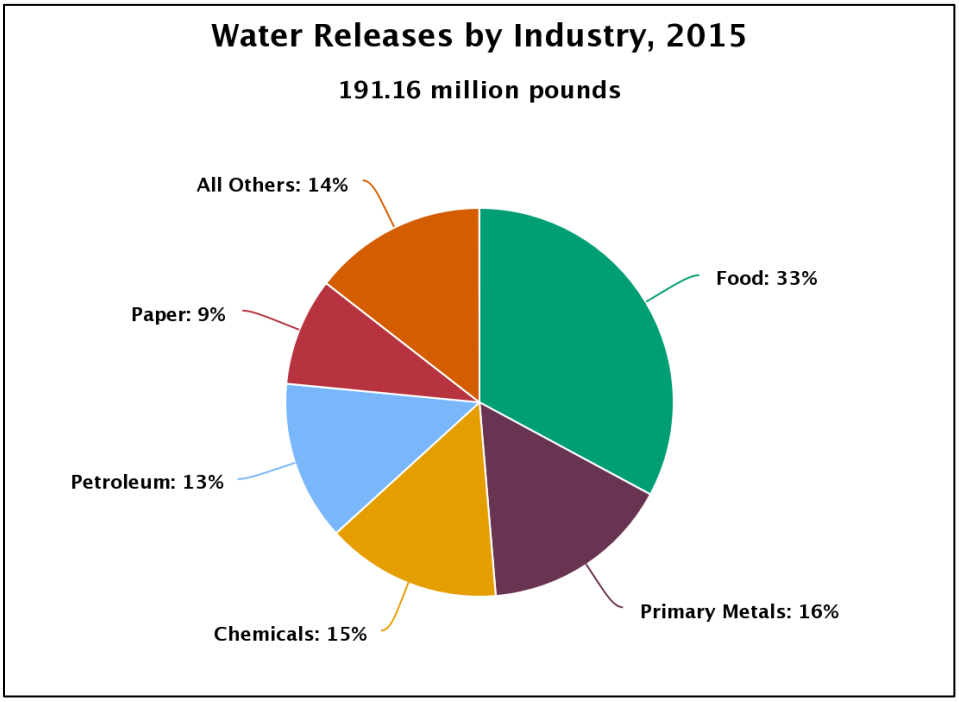
This pie chart shows which toxic chemicals were released to water bodies in the greatest quantities in 2015.



- Nitrate compounds accounted for 88% of the total quantities of TRI chemicals released to water in 2015. Nitrate compounds are soluble in water and commonly formed as part of the wastewater treatment process. The food manufacturing sector contributed 36% 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.
- Manganese and manganese compounds, ammonia, and methanol are the next most commonly released chemicals, and, in terms of combined mass quantities, account for 7% of releases to water.

Water Releases by Industry

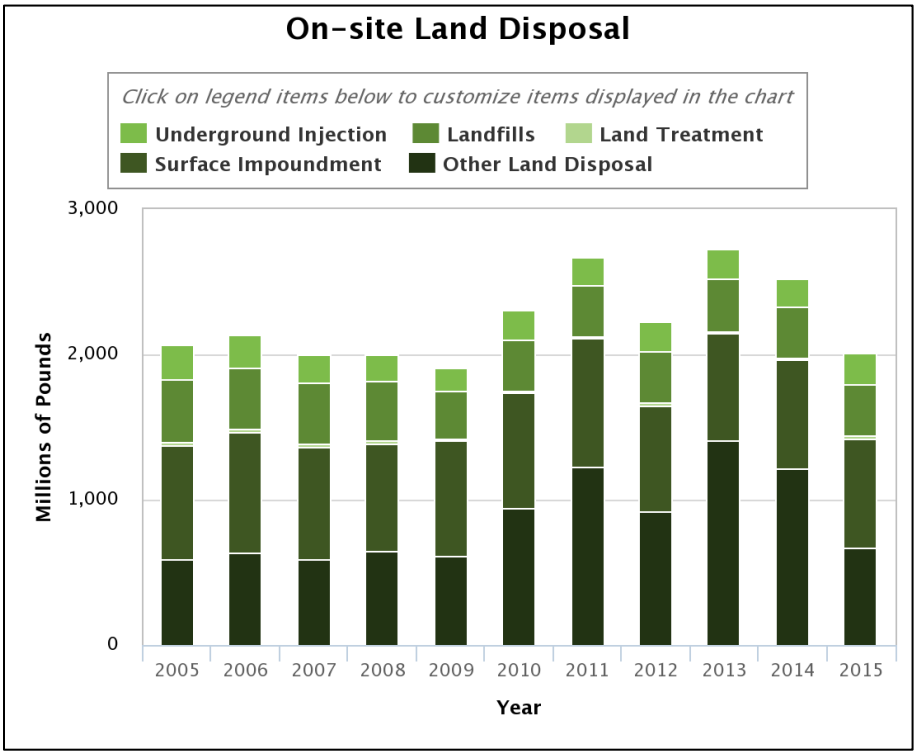
This pie chart shows the industry sectors that reported the greatest releases of toxic chemicals to water bodies in 2015.



- The food manufacturing sector accounted for approximately one-third of water releases in 2015, which is similar to its contribution over the past 10 years.
- Nitrate compounds accounted for 98% of the releases 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.
- Surface water discharges are often regulated by other EPA programs as well, such as the program established under the Clean Water Act that issues National Pollutant Discharge Elimination System (NPDES) permits. A NPDES permit is typically a license for a facility to discharge a specified amount of a pollutant into a receiving body of water under certain conditions.

Land Disposal

The metal mining sector accounts for most of the TRI chemical waste disposed of to land. This graph shows the trend in the pounds of toxic chemicals disposed of to land at the reporting facility's site.



From 2005 to 2015:

- On-site land disposal decreased by 3% (from 2.07 to 2.01 billion pounds).
- Recent fluctuations are primarily due to changes in waste quantities reported to the TRI Program as "other land disposal," which can include chemical waste disposed of in waste piles and spills or leaks.
- "Other land disposal" increased by 13%, while all other types of on-site land disposal decreased. Most of the toxic chemical waste reported as other land disposal is contained in waste rock at metal mines.
- Disposal to land is often regulated by other programs as well, such as under the Resource Conservation and Recovery Act (RCRA).

In 2015:

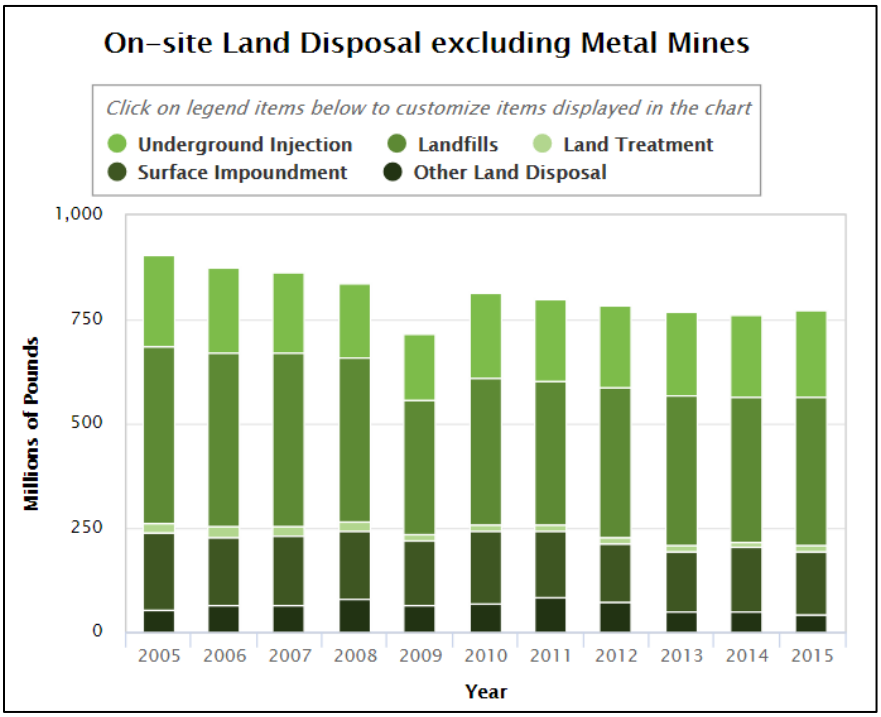
- Land disposal trends are largely driven by the metal mining sector, which accounted for 61% of land disposal quantities. Click the button under the figure above to view the land disposal trend with metal mines excluded from the analysis.
- Most of these quantities are made up of either lead and lead compounds (39%) or zinc and zinc compounds (33%).

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 toxic chemicals reported nationally. In recent years mines have cited changes in production of waste rock, changes in the 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.

Federal and state agencies require that waste rock be placed in engineered structures that contain contaminants. Federal and state land management agencies also require that waste rock and tailings piles and heap leach pads be stabilized and re-vegetated to provide for productive post-mining land use.

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

This graph shows the trend in the pounds of toxic chemicals disposed of to land, excluding metal mining.



From 2005 to 2015:

- Total on-site land disposal for all industries other than metal mining decreased by 14%.
- Disposal to landfills, which accounts for the greatest percentage of land disposal when metal mining is excluded, decreased by 16%.

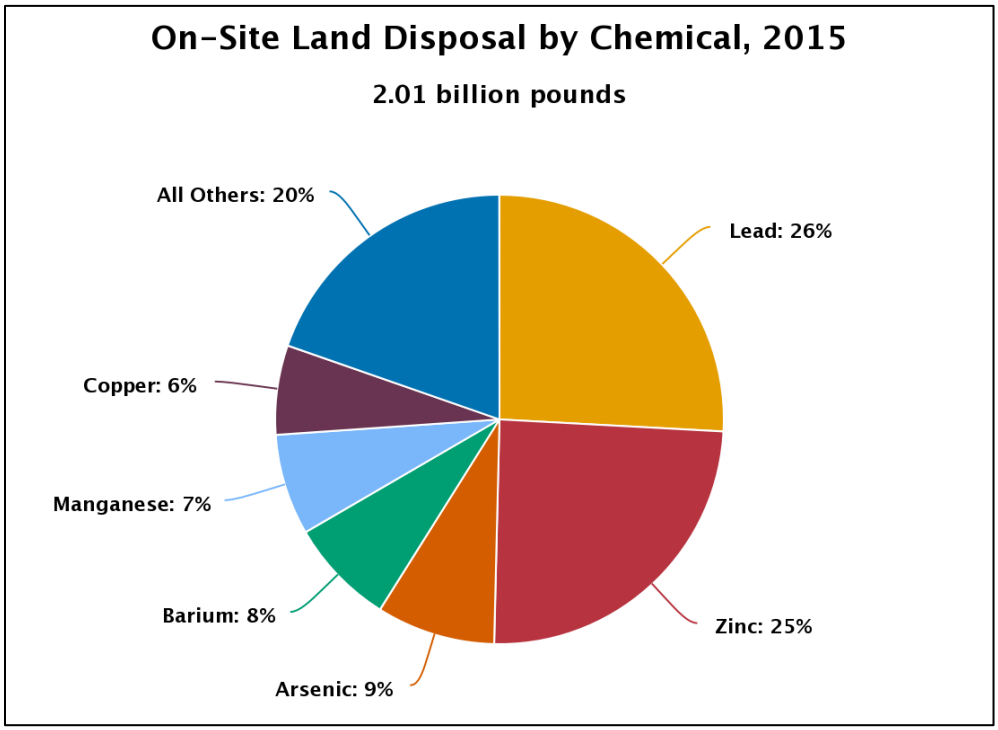
In 2015:

- Excluding metal mining releases, chemicals disposed to land in the largest quantities are: barium and barium compounds (20%), manganese and manganese compounds (13%), and zinc and zinc compounds (11%).

While releases to land have decreased in many sectors, releases by metal mining drive overall land disposal trends. See the graphic, Land Disposal by Industry, for more information.

Land Disposal by Chemical

This pie chart shows which toxic chemicals were disposed of to land on-site in the greatest quantities in 2015.

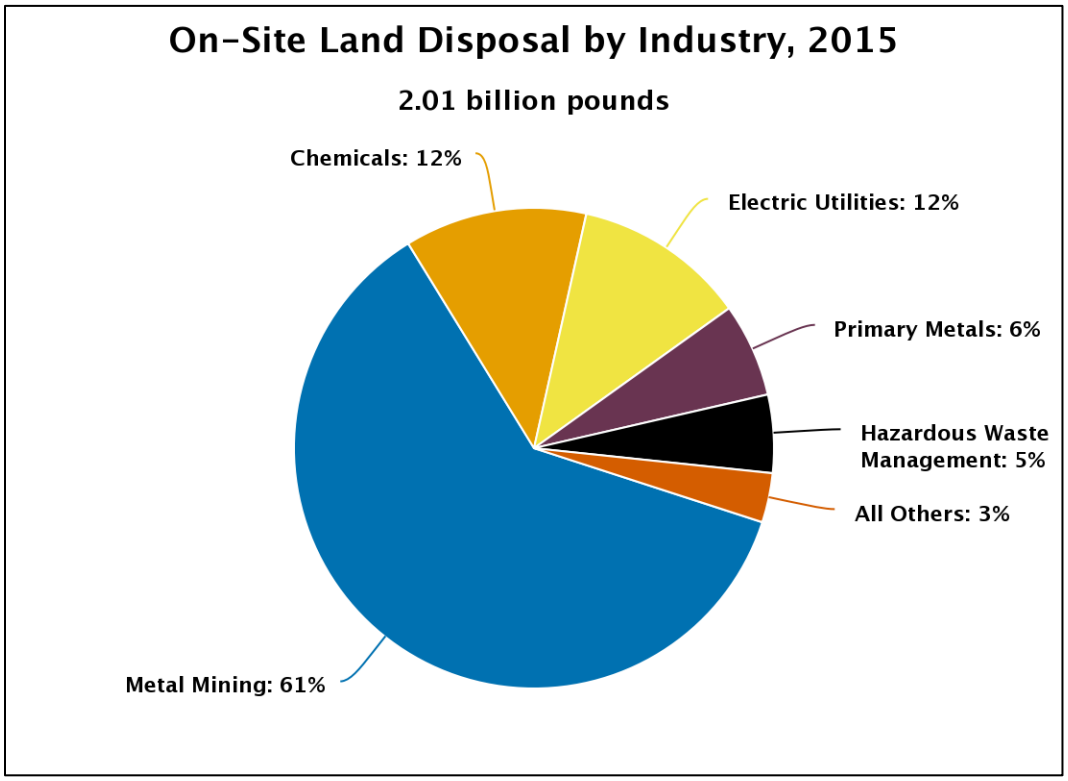


Note: Metals are combined with their metal compounds.

The metal mining sector alone is responsible for 87% of the total quantities of zinc and lead disposed of to land in 2015. Land disposal quantities of these chemicals have not changed significantly in the past 10 years but large fluctuations have occurred from 2010 through 2015. 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 toxic chemicals reported nationally.

Land Disposal by Industry

This pie chart shows the industry sectors that reported the greatest quantities of toxic chemicals disposed of to land on-site in 2015.

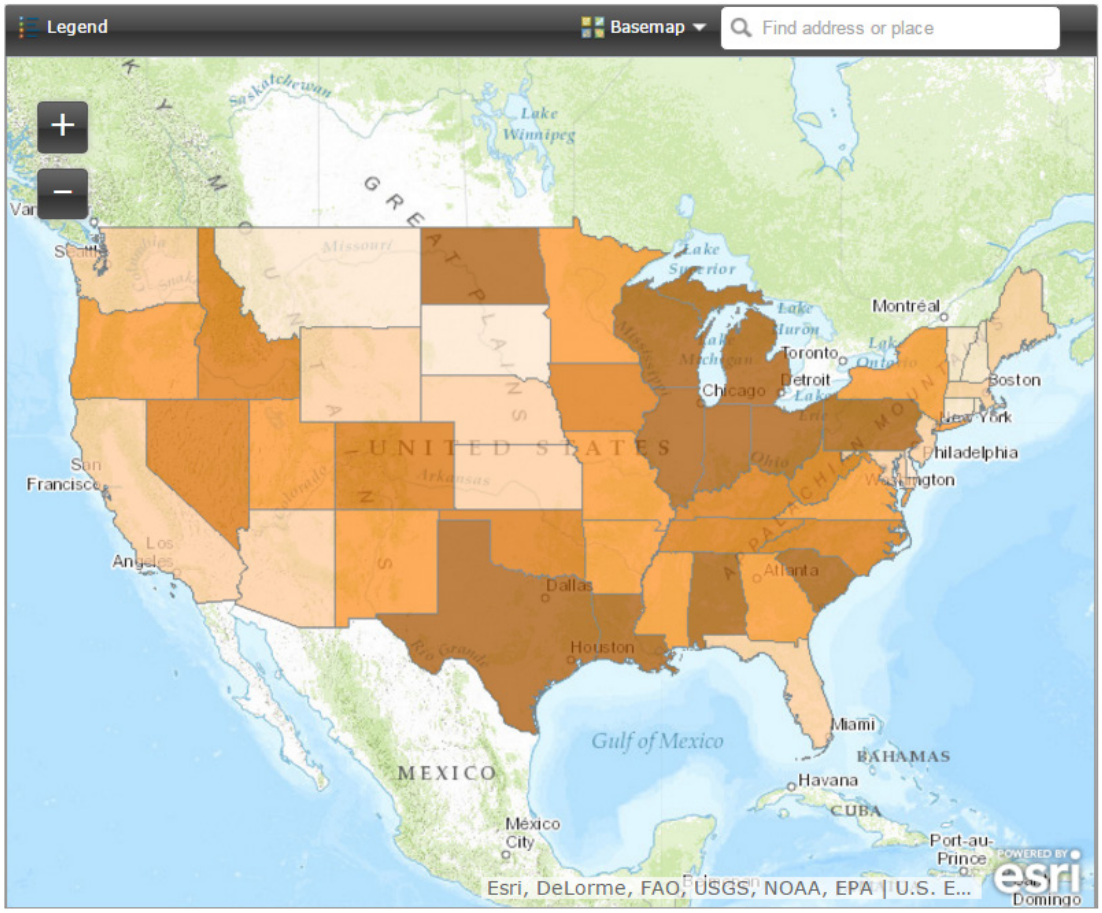


- The metal mining sector accounted for the majority of releases to land in 2015, mostly due to chemicals contained in waste rock.
- The relative contribution by each industry sector to on-site land disposal has not changed considerably in recent years.

Off-Site Disposal or Other Releases

Off-site Disposal or Other Releases, by State Receiving Transfer

TRI facilities report the quantities of chemicals that they transfer off-site for disposal or further waste management. This map shows the quantities of TRI waste received for disposal by state, where the darker shading indicates greater waste quantities.



Note: The transfers shown do not include transfers to Publicly Owned Treatment Works (POTWs) and, thus, reflect only a portion of total TRI transfers.

In 2015:

- Nationally, 83% of the total quantities of off-site transfers for disposal of TRI chemicals were metals and metal compounds.
- Metals transferred for disposal: zinc, manganese, barium, lead, copper, and their compounds were the top five.
- Of other chemicals transferred for disposal, methanol, nitrate compounds, ammonia, nitric acid, and N-methyl-2-pyrrolidone were the top five.

Top States Ranked by Receiving Transfers of TRI Chemicals for Disposal in 2015

State Ranking	Total Transfers	Metal Transfers	Non-Metal Transfers
1	Indiana	Indiana	Texas
2	Pennsylvania	Pennsylvania	Ohio
3	Texas	Illinois	Michigan
4	Ohio	Ohio	Louisiana
5	Illinois	Michigan	Pennsylvania

- The top five states for total transfers received 48% of off-site disposal or other releases.
- 44 of the 50 U.S. states were their own largest sources of transfers for disposal; that is, facilities sent chemical waste for disposal to other sites within their state borders.
- A large number of transfers were from neighboring states (states with directly adjoining borders). Overall, 91% of TRI transfers for disposal came from either the receiving state or from neighboring states.

Chemicals of Special Concern

In this chapter, we take a closer look at some 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 not only toxic, but also 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 that are sensitive to the toxicities the chemicals cause.

Reporting requirements for the sixteen specific chemicals and four chemical categories designated as PBT chemicals on the Toxics Release Inventory (TRI) list of toxic chemicals are more stringent than for other TRI chemicals. See TRI's PBT webpage for the full list of PBT chemicals.

Use these links or the dropdown menu above to find out more about specific PBTs: lead and lead compounds; mercury and mercury compounds; and dioxin and dioxin-like compounds.

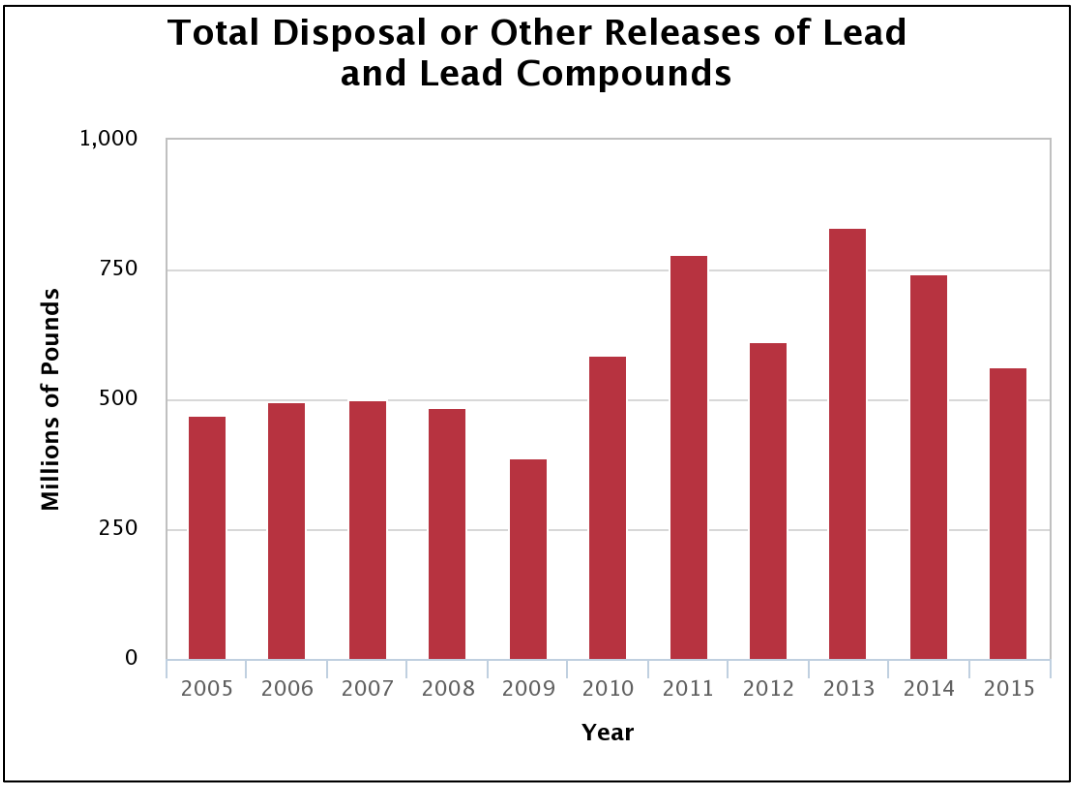
There are also about 180 chemicals included on the TRI chemical list that are known or suspected carcinogens, which EPA refers to as Occupational Safety and Health Administration (OSHA) carcinogens. These chemicals also have different TRI reporting requirements. A full list of these chemicals can be found on the TRI basis of OSHA carcinogens webpage. Select a graphic from the dropdown menu above to see how the volume of OSHA carcinogens released to air has changed over time.

Graphics in this section

Total Releases of Lead and Lead Compounds
Air Releases of Lead and Lead Compounds
Air Releases of Mercury and Mercury Compounds
Releases of Dioxin and Dioxin-like Compounds
Releases of Dioxin and Dioxin-like Compounds by Industry
Air Releases of OSHA Carcinogens

Lead Releases Trend

This graph shows the trend in the pounds of lead and lead compounds disposed of or otherwise released.



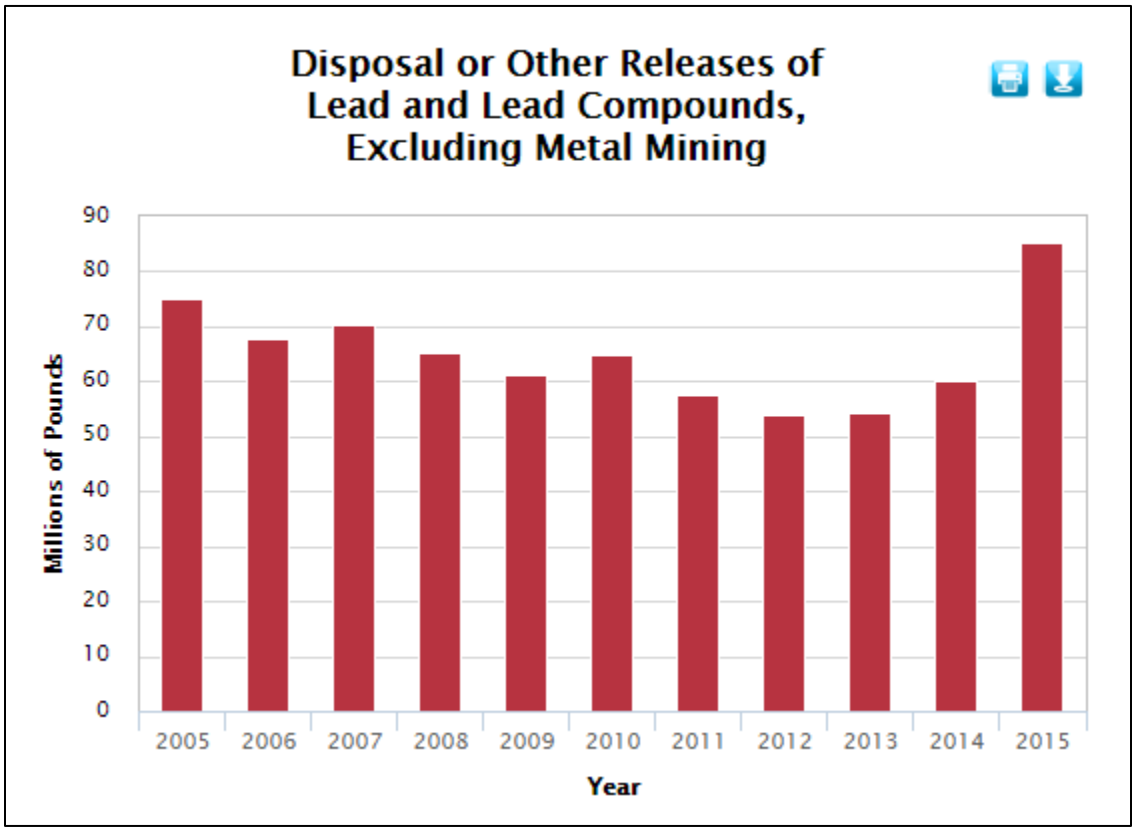
From 2005 to 2015:

- Total releases of lead and lead compounds rose and fell between 2005 and 2015, with an overall increase of 20%.
- Total releases especially fluctuated between 2010 and 2015. The metal mining sector accounts for most of the disposal of lead and lead compounds, driving the overall trend. For example, metal mines reported 85% of total lead and lead compound releases in 2015.

From 2014 to 2015:

- Total releases of lead and lead compounds decreased by 24% (178 million pounds).

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

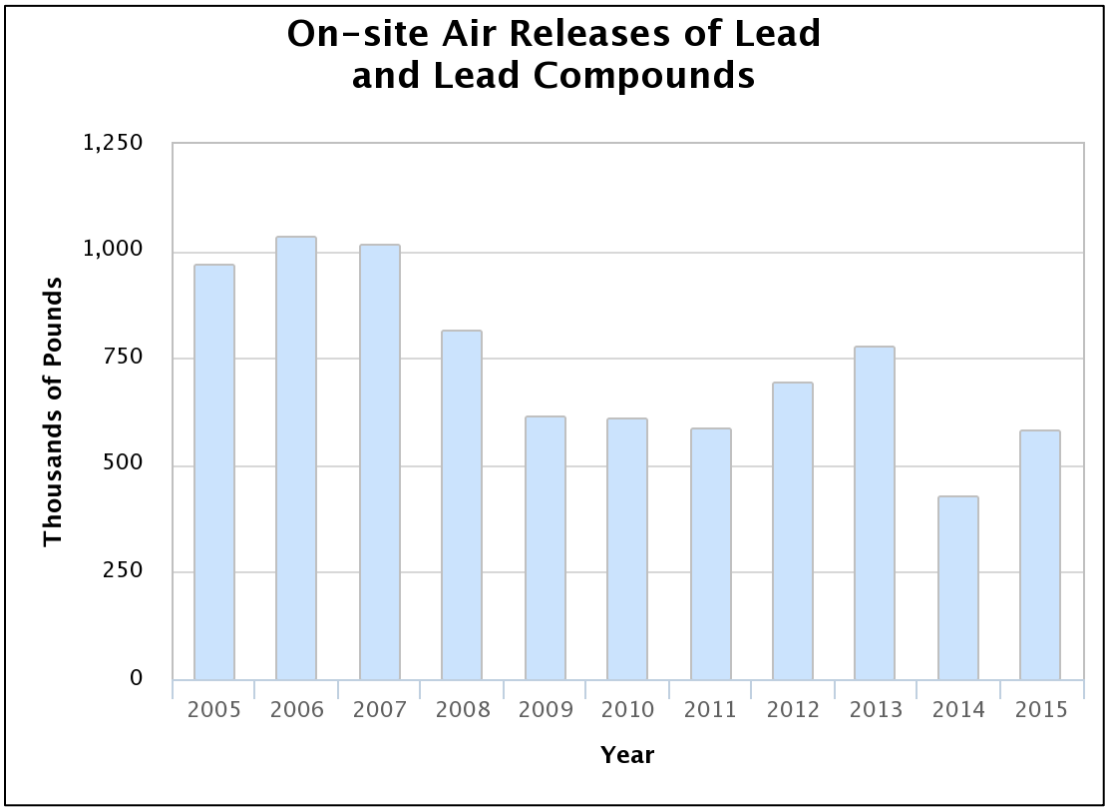


From 2005 to 2015:

- Metal mining accounts for the majority of releases of lead and lead compounds.
- Other sectors increased the release of lead by 14% (10 million pounds).
    - This is primarily due to one hazardous waste management facility that reported releases of 24.9 million pounds of lead compounds in 2015 compared to 0.2 million pounds in 2014.

Lead Air Releases Trend

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



From 2005 to 2015:

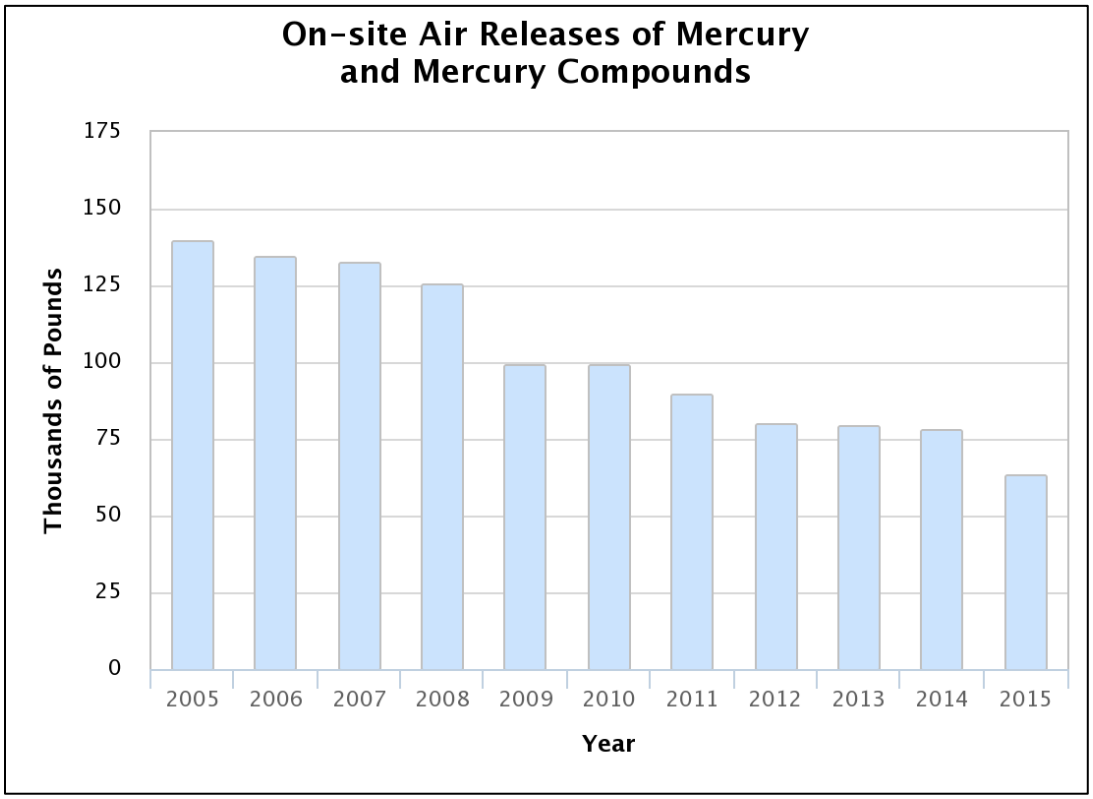
- Air releases of lead and lead compounds decreased by 40%. The electric utility and primary metals industry sectors have driven this decrease-both sectors have decreased air releases of lead and lead compounds by approximately 70%.
- The sector with the greatest quantity of lead and lead compound air releases is the primary metals sector, which includes iron and steel manufacturers and smelting operations.

From 2014 to 2015:

- Air releases of lead and lead compounds increased by 35% due to releases from a motor vehicle metal stamping facility that reported for the first time in 2015.

Mercury Air Releases Trend

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



From 2005 to 2015:

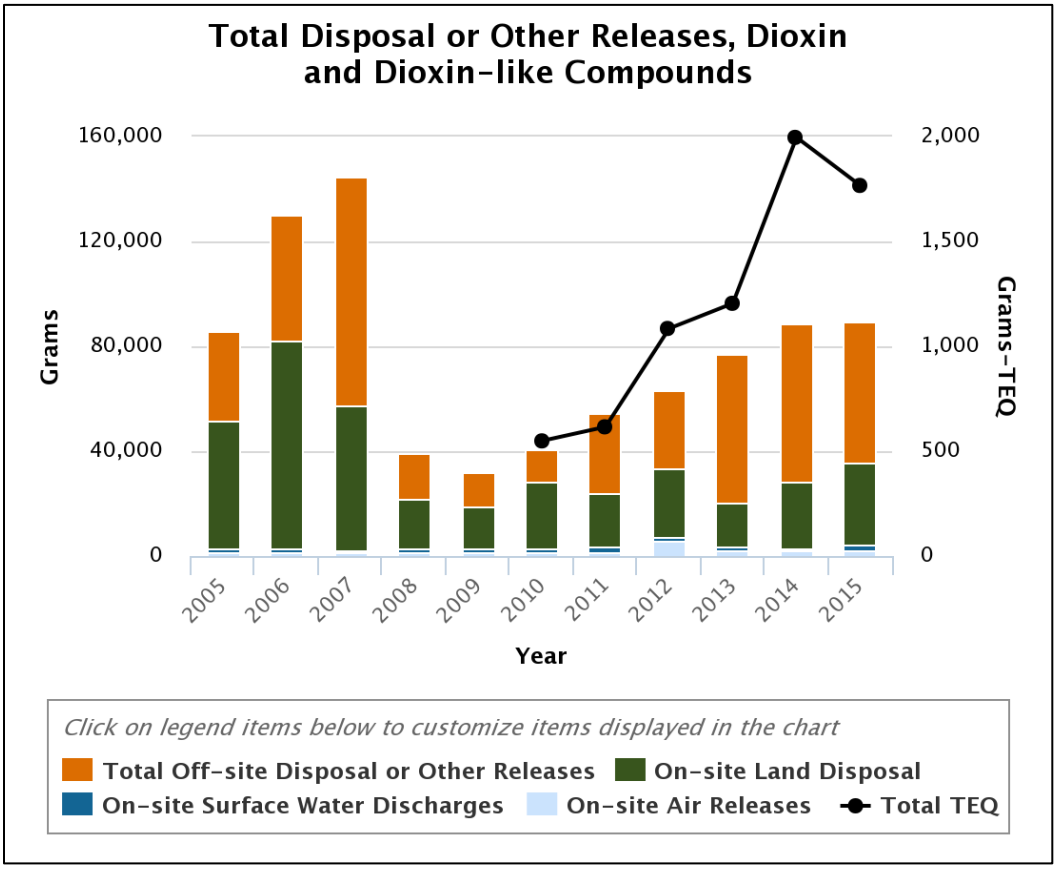
- Releases of mercury and mercury compounds to air decreased by 55%.
- Electric utilities are driving the decline in mercury air emissions, with a 69% reduction. Reasons for this decrease include a shift from coal to other fuel sources and installation of control technologies at coal-fired power plants.

In 2015:

- Electric utilities, which include coal- and oil-fired power plants, accounted for 48% of the mercury and mercury compounds air emissions reported to TRI.

Dioxins Releases Trend

This graph shows the trend in the pounds of dioxin and dioxin-like compounds disposed of or otherwise released.



Dioxin and dioxin-like compounds (dioxins) are Persistent, Bioaccumulative, and Toxic chemicals (PBTs) characterized by EPA as probable human carcinogens. Dioxins are the unintentional byproducts of many forms of combustion and several industrial chemical processes. TRI requires facilities to report on 17 types, or congeners, of dioxin. Congener information was first collected in 2010.

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.

From 2005 to 2015:

- Releases of dioxins increased by 5%, with a decrease in on-site land disposal and increase in off-site disposal or other releases.

From 2010 to 2015:

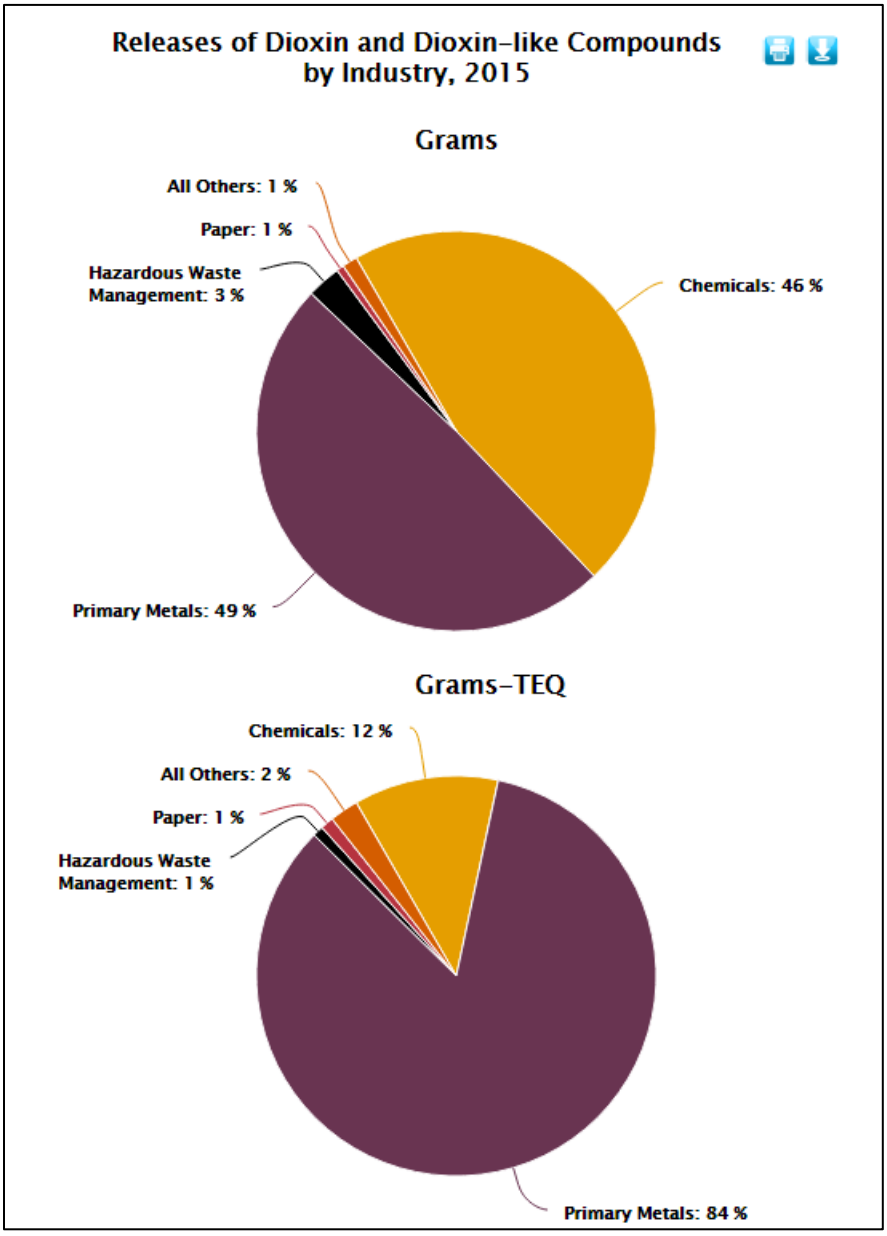
- Since 2010, grams-TEQ increased by 222%, while dioxin grams released increased by 121%.
    - This suggests that releases of the more toxic congeners have increased at a faster rate than releases of dioxins overall, causing grams-TEQ of dioxins to increase at a higher rate than overall grams.

From 2014 to 2015:

- Releases of dioxins increased by 1%, but grams-TEQ decreased by 11%.
- In 2015, most (60%) of the quantity released was disposed of off-site.

Dioxins Releases by Industry

The following two pie charts show: 1) the 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*).

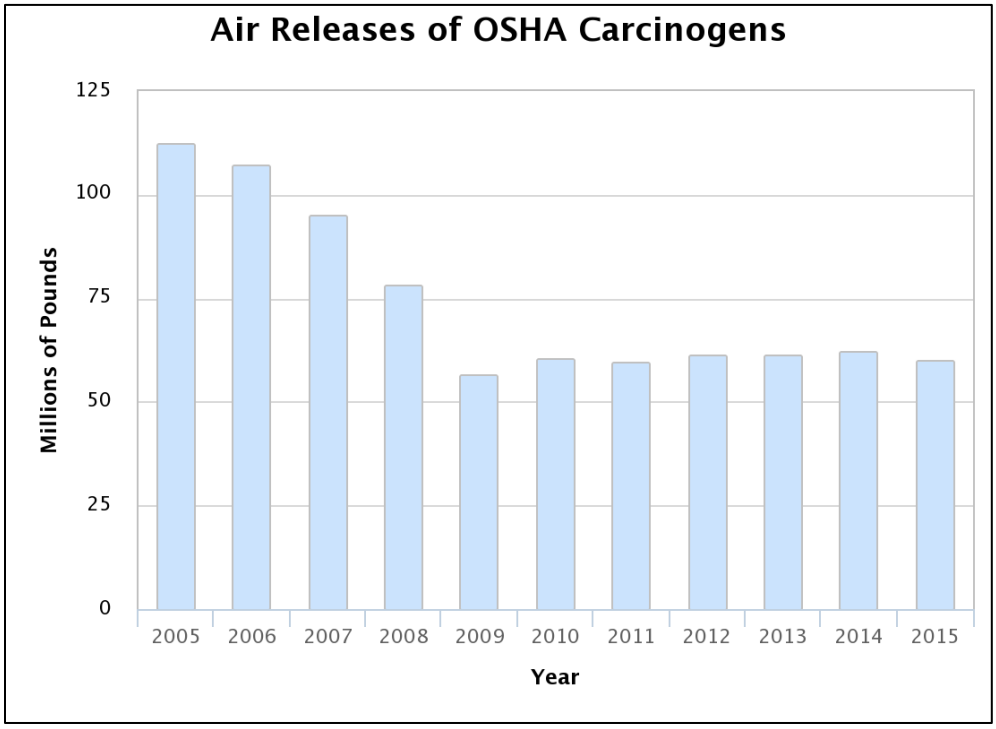


- Various industry sectors may dispose of or otherwise release very different mixes of dioxin congeners.
- In 2015, four industry sectors accounted for most of the grams and grams-TEQ of dioxins released.

- The chemical manufacturing industry accounted for 46% and the primary metals sector for 49% of total grams of dioxins released.
- However, when TEFs are applied, the primary metals sector accounted for 84% and the chemical manufacturing sector for just 12% of the total grams-TEQ released.

OSHA Carcinogens Air Releases Trend

Among the chemicals that are reported to the Toxics Release Inventory (TRI) Program, there are about 180 known or suspected carcinogens, which EPA refers to as OSHA carcinogens. This graph shows the trend in the pounds of OSHA carcinogens released to air.

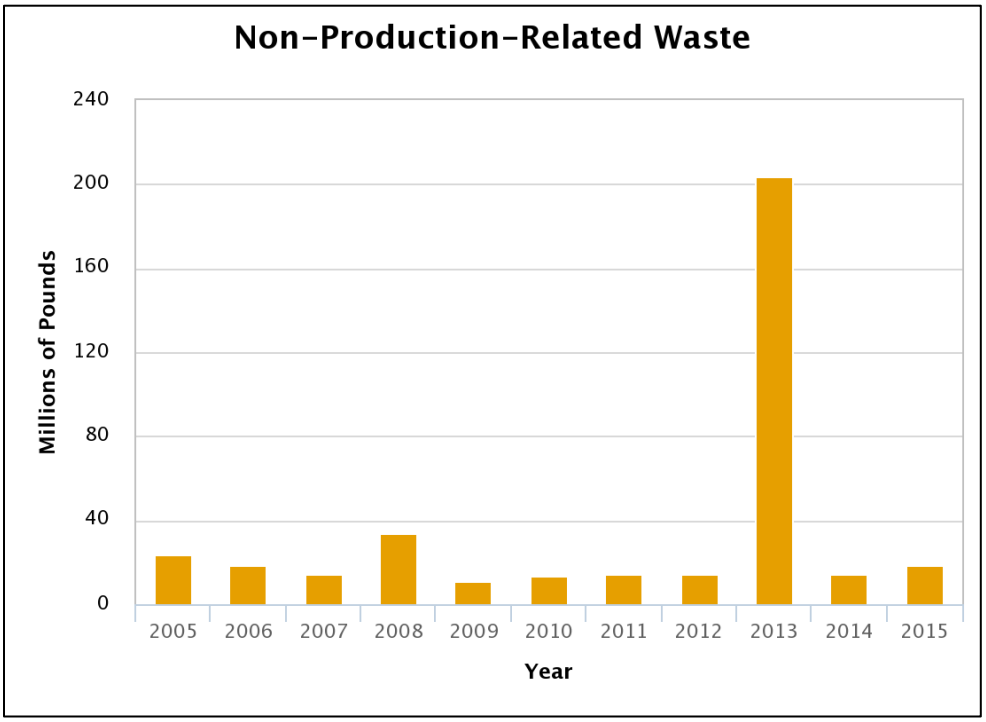


From 2005 to 2015:

- Air releases of these carcinogens decreased by 46%.
- The long-term decreases in air releases of OSHA carcinogens were driven mainly by decreases in styrene air releases from the plastics and rubber and transportation equipment industries.

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, such as decommissioning a heap leach pad, 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 not as part of its production-related waste managed, which may account for discrepancies between the two figures. The following graph shows the annual quantities of non-production-related waste reported to the TRI Program.



Non-production-related waste from all facilities was below 35 million pounds in all years but 2013 when a mining facility reported a one-time only release of 193 million pounds due to decommissioning a heap leach pad. The facility reported zero releases in 2014 and did not report in 2015.

- In 2015, facilities reported 18 million pounds of one-time releases, of which 51% (9.3 million pounds) was reported from the federal cleanup of an old nuclear weapons production site. The chemicals released included toluene, lead, xylene, and naphthalene.