



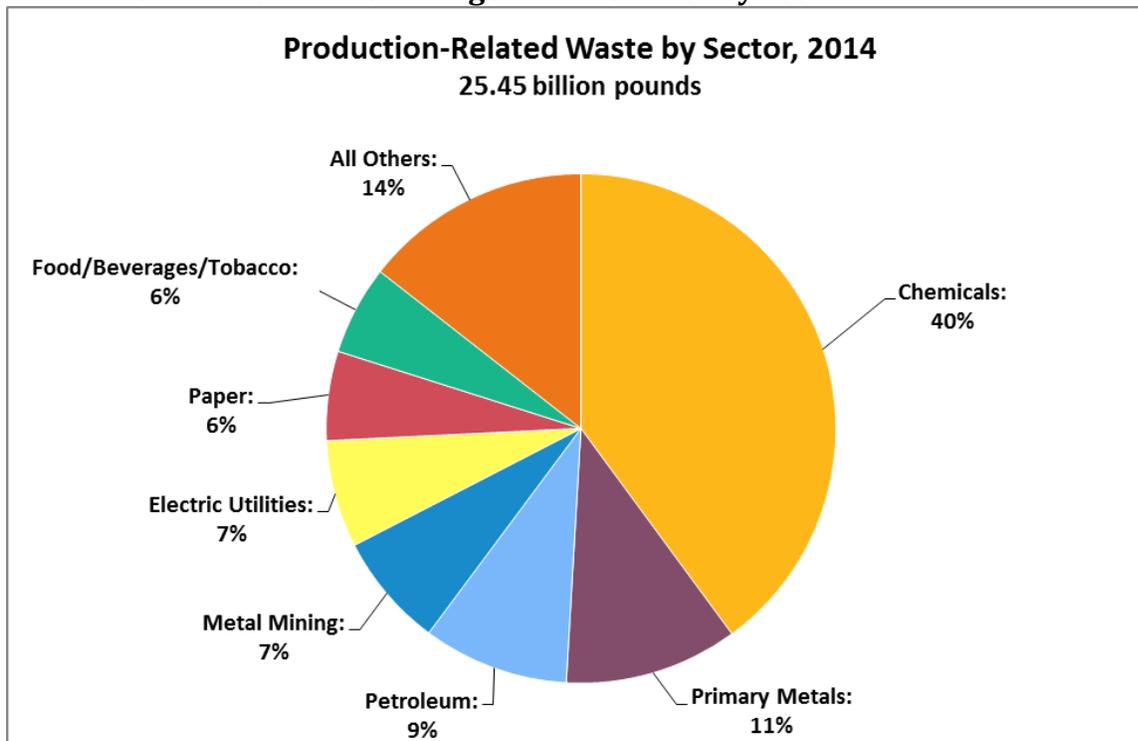
Industry Sectors

Comparing Industry Sectors

This chapter examines which sectors contribute the most to production-related waste managed and total disposal or other releases in 2014, and highlights several industry sectors to show trends occurring over time within each. It also includes a discussion about the trends among federal facilities, which report to the Toxics Release Inventory (TRI) regardless of industry sector. For analysis purposes, the TRI program has combined 3- and 4-digit North American Industry Classification System (NAICS) codes to create 27 distinct industry sector categories.

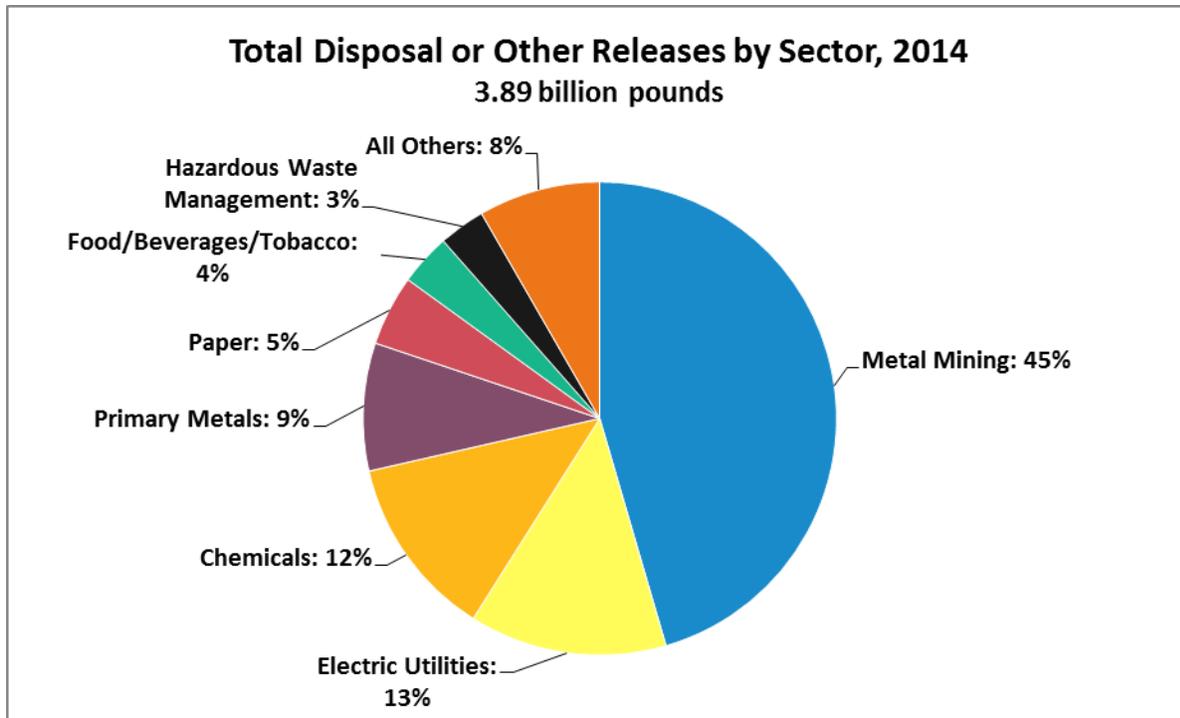
The industry sectors that are subject to TRI reporting requirements vary substantially in size, scope, composition, and business type. As a result, the amounts and types of chemicals used, generated, and managed by the facilities within a given industry sector often differ greatly from those of facilities in other sectors. For facilities within the same industry sector, however, the processes, products, and regulatory requirements are often similar, resulting in similar manufacture, processing, or other use of toxic chemical use and waste generation. Looking at waste management trends within a sector can identify emerging issues, highlight progress made in environmental performance, and reveal opportunities for better waste management practices.

Production-related waste managed and releases by sector



Seven industry sectors reported 86% of TRI chemicals managed as production-related waste in 2014. A majority (60%) of TRI chemicals managed as production-related waste originated

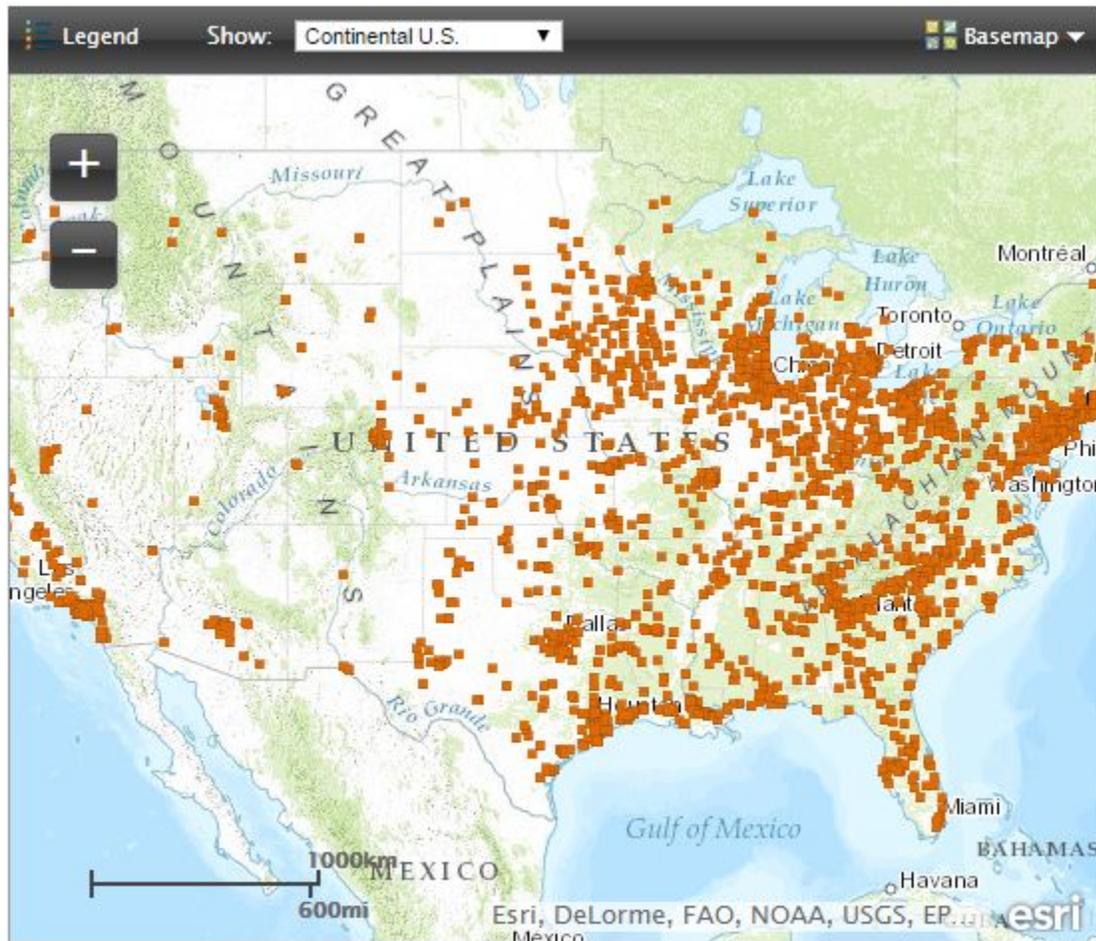
from three sectors: chemical manufacturing (40%), primary metals (11%), and petroleum products manufacturing, primarily from petroleum refineries (9%).



This pie chart shows that 92% of TRI chemicals disposed of or otherwise released originated from seven of the 27 TRI industry sectors. More than two-thirds originated from just three industry sectors: metal mining (45%), electric utilities (13%), and chemical manufacturing (12%). The chemical manufacturing sector is in the top three for both production-related waste managed and total releases.

- For more details on how the amounts and proportions of TRI chemicals managed and released have changed over time, see the [production-related waste managed by industry](#) trend graph and the [releases by industry](#) trend graph.
- For more information on sectors with significant decreases in waste managed and releases in recent years, see the [industry sectors with largest percentage decrease in waste managed](#) graph and the [types of source reduction activities](#) graph.
- For more information on the influence that production and the economy have on waste managed and releases, see the [production-related waste managed and value added by the manufacturing sectors graph](#) and the [total releases and value added by the manufacturing sectors graph](#).

Chemical Manufacturing



Chemical Manufacturing Facilities that Reported to the TRI Program for 2014

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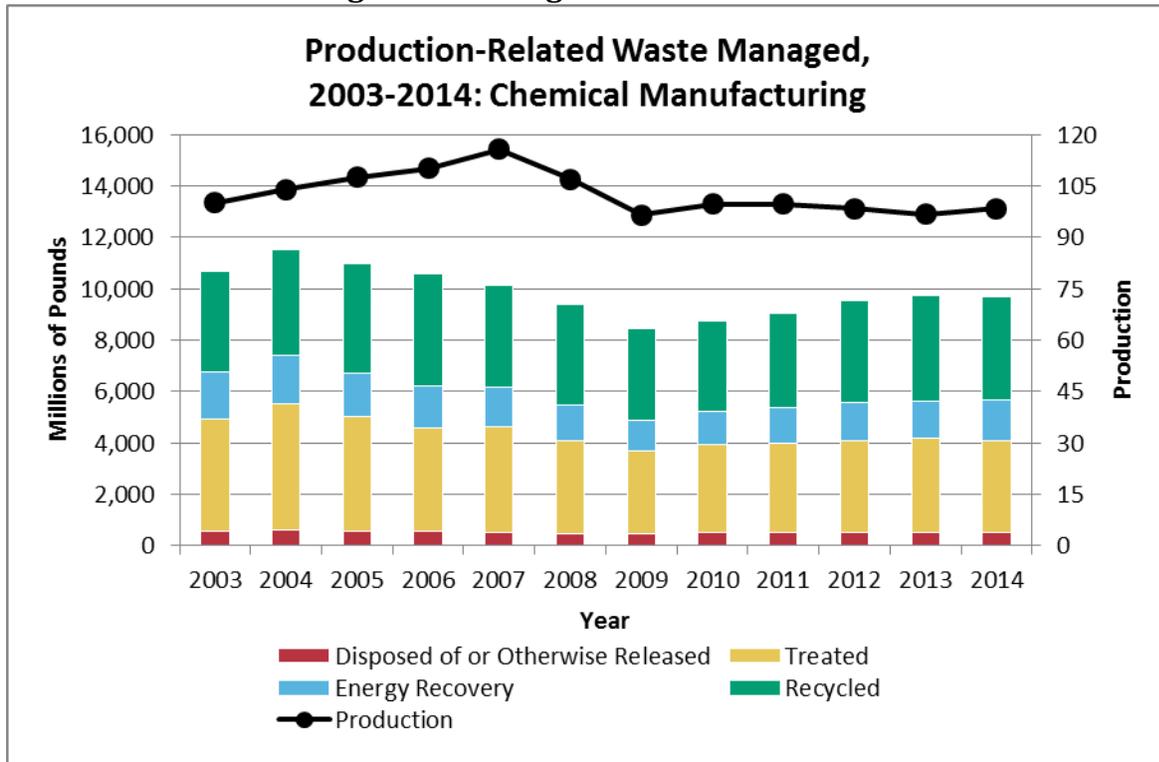
Chemical manufacturers produce a variety of important products, including basic chemicals, products used by other manufacturers (such as synthetic fibers, plastics, and pigments), pesticides, pharmaceuticals, paints, and cosmetics, to name a few. In 2014, the chemical manufacturing sector had the most facilities (3,460) report to the TRI Program and also reported the largest portion of production-related waste managed (40% of all reported production-related waste).



Quick Facts for 2014: Chemical Manufacturing	
Number of TRI Facilities	3,460
Facilities Reporting Newly Implemented Source Reduction Activities in 2014	584
Production-Related Waste Managed	10,157.7 million lb
Recycled	4,068.6 million lb
Energy Recovery	1,745.9 million lb
Treated	3,845.7 million lb
Disposed of or Otherwise Released	497.5 million lb
Total Disposal or Other Releases	494.6 million lb
On-site	431.8 million lb
Air	156.4 million lb
Water	32.9 million lb
Land	242.5 million lb
Off-site	62.8 million lb

Note: Numbers may not sum exactly due to rounding.

Chemical manufacturing waste management trend



From 2003 to 2014:

- Production-related waste managed by the chemical manufacturing sector decreased by 9%, while production (represented by the black line as reported by the [Federal Reserve Board Industrial Production Index](#)) fluctuated but changed little overall.
- Quantities of waste released, treated, or used in energy recovery have decreased, while the quantity of waste recycled has increased.

From 2013 to 2014:

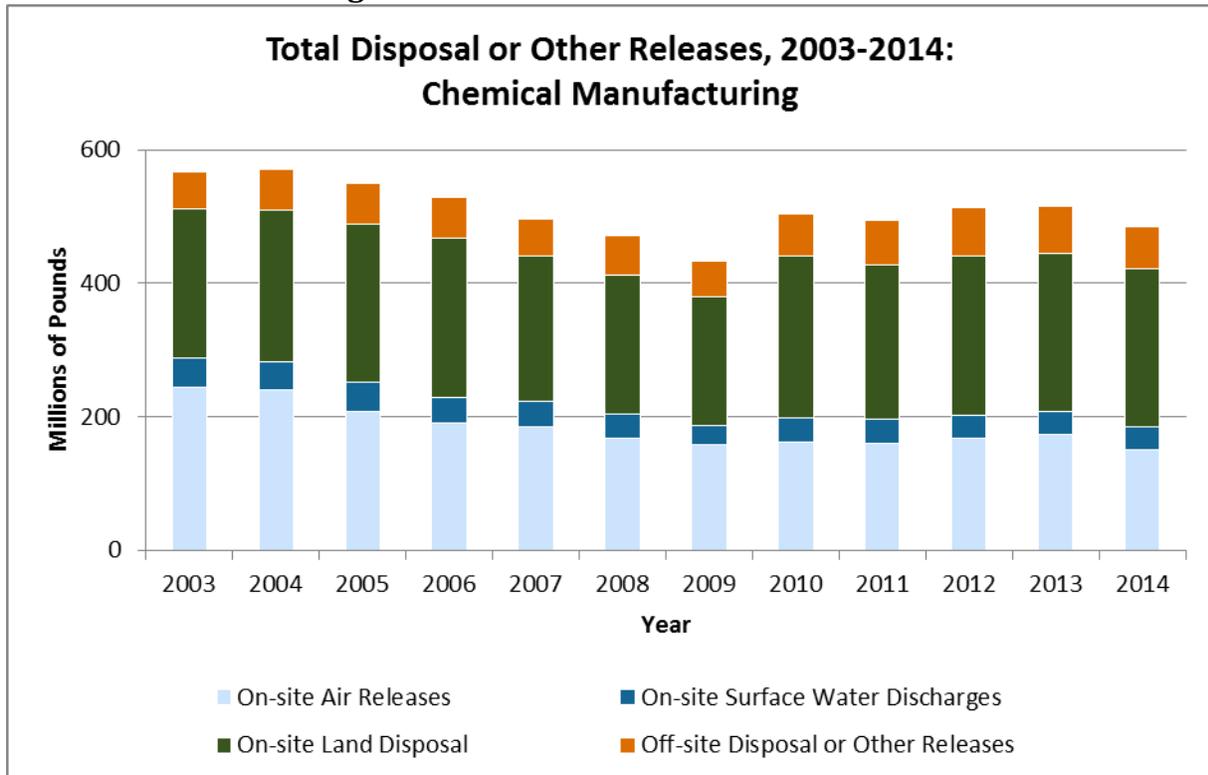
- Production-related waste managed decreased by 86.0 million pounds (1%).
- In 2014, 5% of the sector's waste was released, while the rest was managed through treatment, energy recovery, and recycling.

Source Reduction in the Chemical Manufacturing Sector

Although this has consistently been the sector with the most production-related waste managed, 17% of facilities in the sector initiated source reduction activities in 2014 to reduce their toxic chemical use and waste generation. The most commonly reported category of source reduction activities for the sector was good operating practices. For example, [one facility](#) reduced the amount of [formaldehyde](#) waste managed by using a materials balance audit to determine how many drums of formaldehyde it could recycle and use again. Other common source reduction activities in the chemical manufacturing sector include process modifications and spill and leak prevention. TRI's [Pollution Prevention Search Tool](#) can help you learn more about pollution prevention opportunities in this sector.



Chemical manufacturing releases trend



From 2003 to 2014:

- Total releases by the chemical manufacturing sector decreased by 14%. This is primarily due to a reduction in air emissions.
- Water releases have also declined since 2003, while on-site releases to land and off-site disposal have increased.

From 2013 to 2014:

- Total releases decreased by 29 million pounds (6%).

For more information on how facilities in this sector and other sectors can choose safer chemicals, visit EPA's [Safer Choice Program](#) pages for [Alternatives Assessments](#) and the [Safer Chemical Ingredients List](#).

Metal Mining



Metal Mining Facilities that Reported to the TRI Program for 2014

[View Larger Map](#)

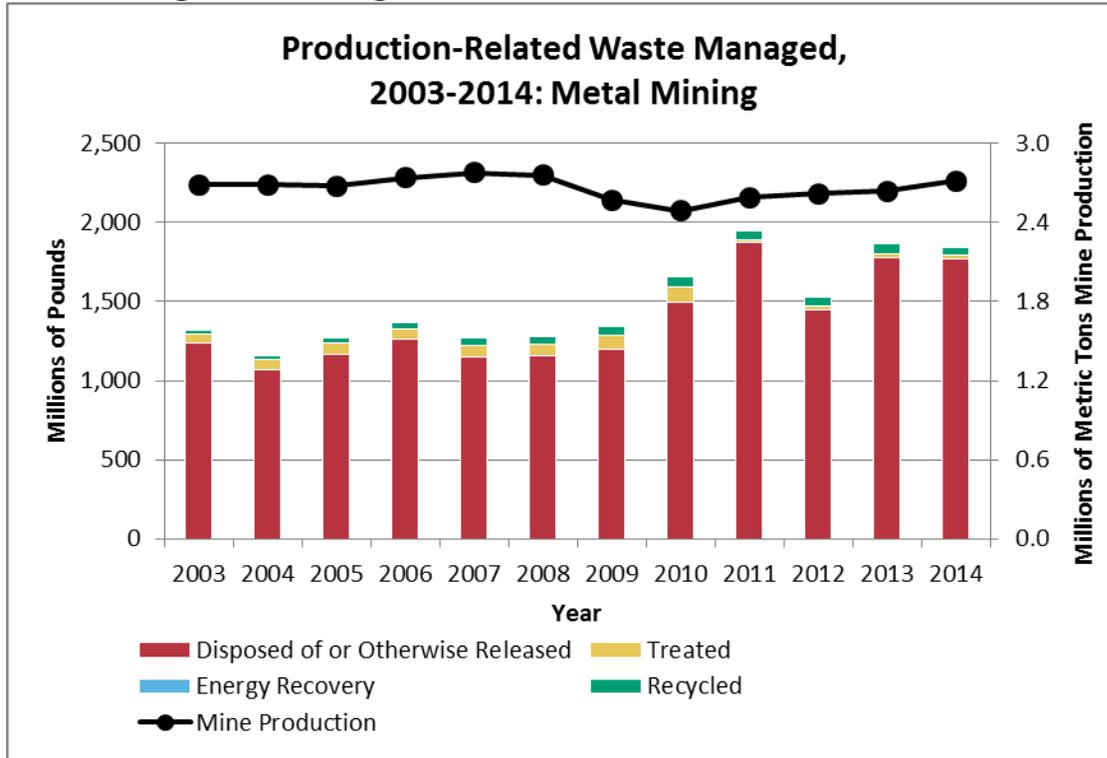
The portion of the metal mining sector subject to TRI reporting includes facilities mining copper, lead, zinc, silver, gold, and several other metals. In 2014, 89 metal mining facilities reported to the TRI Program. They tend to be in western states where most of the copper, silver, and gold mining occurs; however, zinc and lead mining tend to occur in Missouri, Tennessee, and Alaska. Metals generated from U.S. mining operations are used in a wide range of products, including automobiles and electrical and industrial equipment. The extraction and beneficiation of these minerals generate large amounts of waste.



Quick Facts for 2014: Metal Mining	
Number of TRI Facilities	89
Facilities Reporting Newly Implemented Source Reduction Activities in 2014	9
Production-Related Waste Managed	1,842.7 million lb
Recycled	48.5 million lb
Energy Recovery	5 lb
Treated	23.0 million lb
Disposed of or Otherwise Released	1,771.3 million lb
Total Disposal or Other Releases	1,771.7 million lb
On-site	1,768.4 million lb
Air	2.9 million lb
Water	1.7 million lb
Land	1,763.7 million lb
Off-site	3.3 million lb

Note: Numbers may not sum exactly due to rounding.

Metal mining waste management trend



From 2003 to 2014:

- While metal mining production (as reported in the [U.S. Geological Survey Mineral Commodities Surveys](#)) has remained relatively steady, the quantity of waste managed has fluctuated.
 - One factor other than production frequently cited by facilities as a contributor to the changes in quantities of waste managed is the composition of the extracted ore and waste rock, which can vary substantially from year to year. In some cases, small changes in the waste’s composition can impact whether chemicals in waste rock qualify for a concentration-based exemption from TRI reporting in one year, but not qualify for the exemption the next year or vice versa.

In 2014:

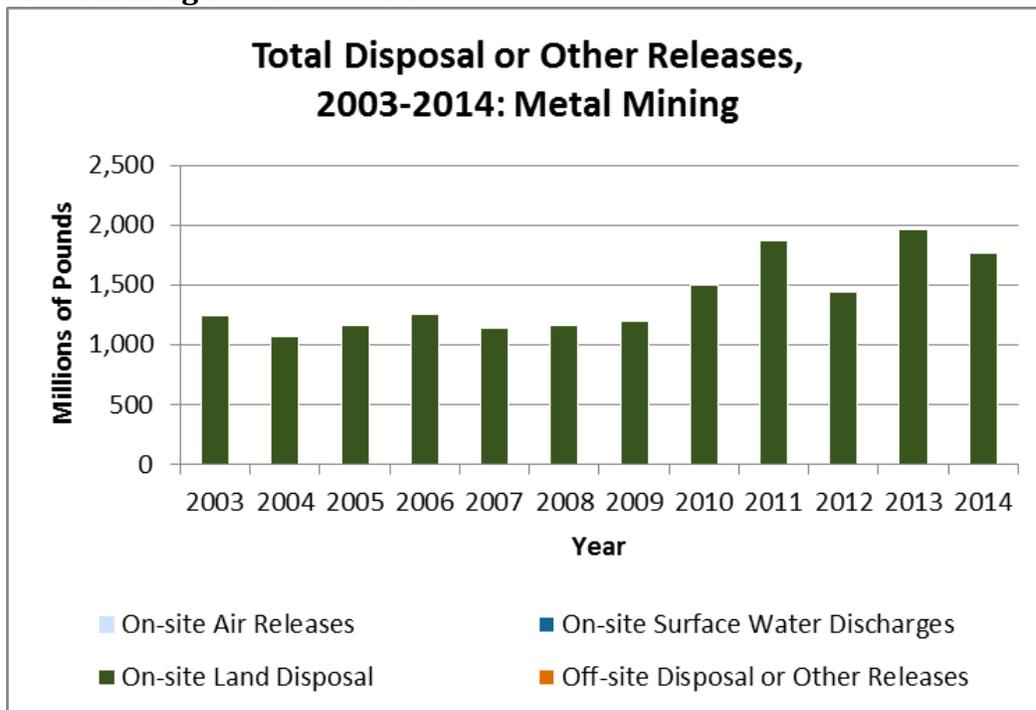
- 96% of the metal mining sector’s production-related waste managed is disposed of or otherwise released.

Source Reduction in the Metal Mining Sector

Nine of the 89 facilities initiated source reduction activities in 2014 to reduce their toxic chemical use and waste generation. Toxic chemical quantities reported by this sector are not especially amenable to source reduction, because they primarily reflect the natural composition of the ore and waste rock. The most commonly reported source reduction activity was good operating practices, which includes activities such as improving

maintenance scheduling, record keeping, or procedures. TRI's [Pollution Prevention Search Tool](#) can help you learn more about pollution prevention opportunities in this sector.

Metal mining releases trend



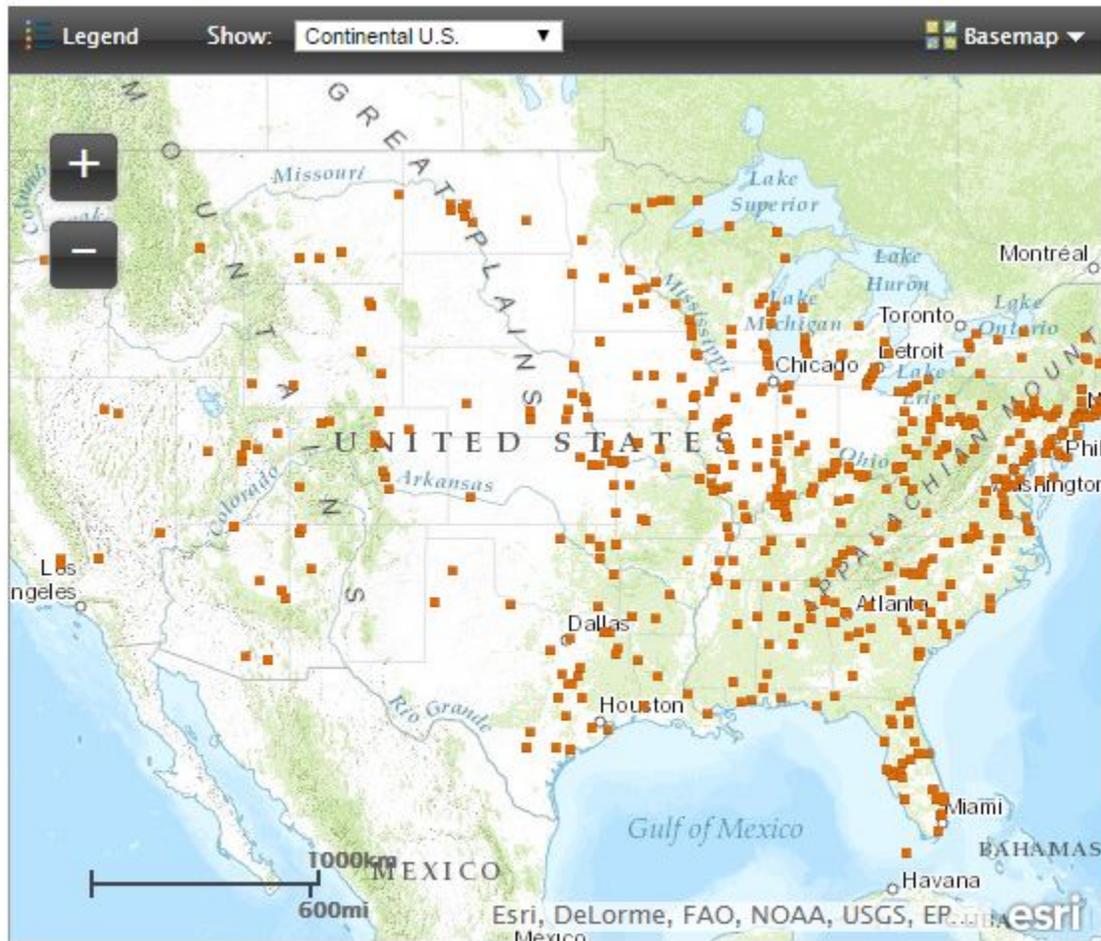
From 2003 to 2014:

- More than 99% of the metal mining sector’s releases were in the form of on-site land disposal. On-site land disposal by metal mines has fluctuated in recent years, increasing significantly in 2013 and then decreasing in 2014.
- Several mining facilities have reported that changes in production and changes in the chemical composition of the deposit being mined are the primary cause of these fluctuations in the amount of chemicals reported.
- 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 toxic chemicals reported nationally.

In 2014:

- The metal mining sector reported the largest quantity of total disposal or other releases, accounting for 45% of the releases for all industries. It also represents almost three quarters (70%) of the on-site land disposal for all sectors.

Electric Utilities



Electric Utilities that Reported to the TRI Program for 2014

[View Larger Map](#)

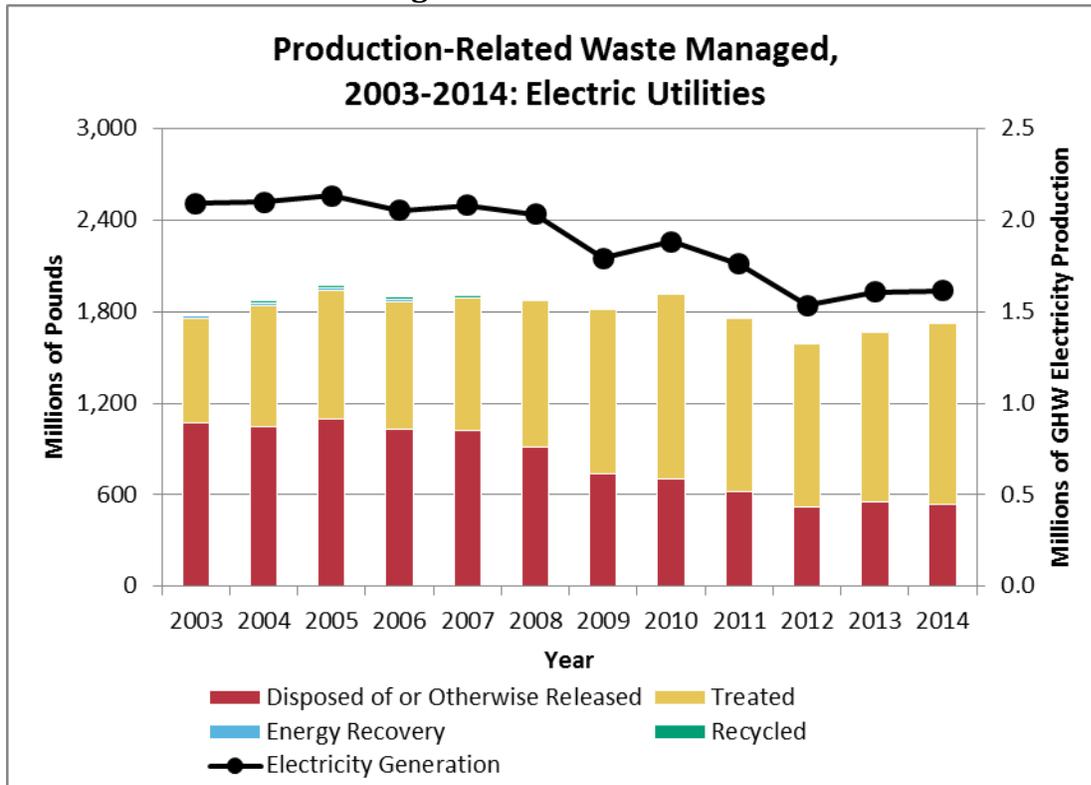
The electric utilities sector consists of establishments primarily engaged in generating, transmitting, and distributing electric power. Electricity-generating facilities combust or otherwise use a variety of substances to generate electricity; however, only the combustion of coal or oil to generate power for distribution in commerce is covered under TRI reporting requirements. In 2014, 573 electric generating facilities reported to the TRI Program.



Quick Facts for 2014: Electric Utilities	
Number of TRI Facilities	573
Facilities Reporting Newly Implemented Source Reduction Activities in 2014	22
Production-Related Waste Managed	1,733.4 million lb
Recycled	7.6 million lb
Energy Recovery	462 thousand lb
Treated	1,191.3 million lb
Disposed of or Otherwise Released	534.0 million lb
Total Disposal or Other Releases	534.7 million lb
On-site	461.3 million lb
Air	182.3 million lb
Water	4.2 million lb
Land	274.8 million lb
Off-site	73.4 million lb

Note: Numbers may not sum exactly due to rounding.

Electric utilities waste management trend



From 2003-2014:

- Production-related waste managed has decreased by 49.9 million pounds (3%).
- Net electricity generation (in terms of electricity generated using coal and oil fuels as reported by the [U.S. Department of Energy's Energy Information Administration](http://www.eia.doe.gov)), has decreased by 23%. The recent production decrease is driven by the industry's transition to natural gas, and only combustion of coal or oil to produce power is covered under TRI reporting requirements.
- The releases per gigawatt-hour (GWh) produced have dramatically decreased, offset by an increase in quantities treated per GWh produced.

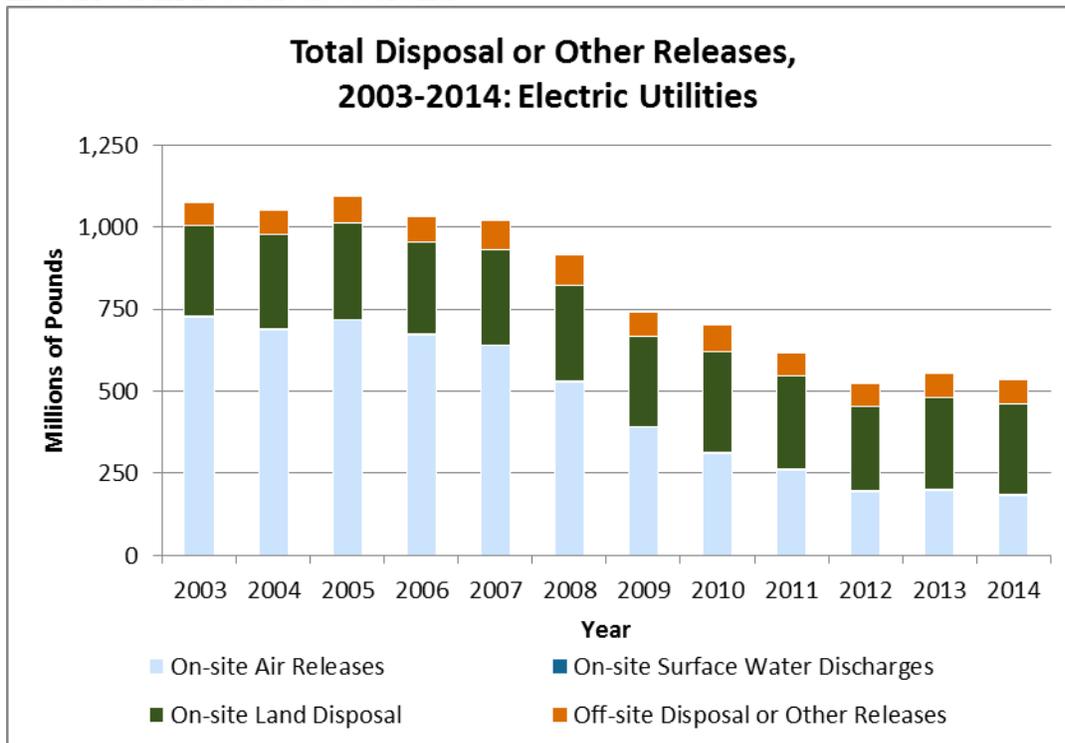
In 2014:

- Approximately two-thirds of production-related waste managed was treated, while approximately one-third was released.
 - This is in contrast to 2003, when the opposite occurred – almost two-thirds of the waste was released, and over one-third was treated. This trend is in large part due to an increase in the number of scrubbers at electric utilities that treat (or destroy) acid gases that would otherwise be released on-site to air.

Source Reduction in the Electric Utilities Sector

Only 4% of facilities initiated source reduction activities in 2014 to reduce their toxic chemical use and waste generation (note: adding a scrubber would not be considered a source reduction activity because it controls waste rather than prevents the generation of waste). The most frequently reported type of source reduction activities for this sector was process modifications, which include activities such as modifying equipment, layout, or piping. TRI's [Pollution Prevention Search Tool](#) can help you learn more about pollution prevention opportunities in this sector.

Electric utilities releases trend



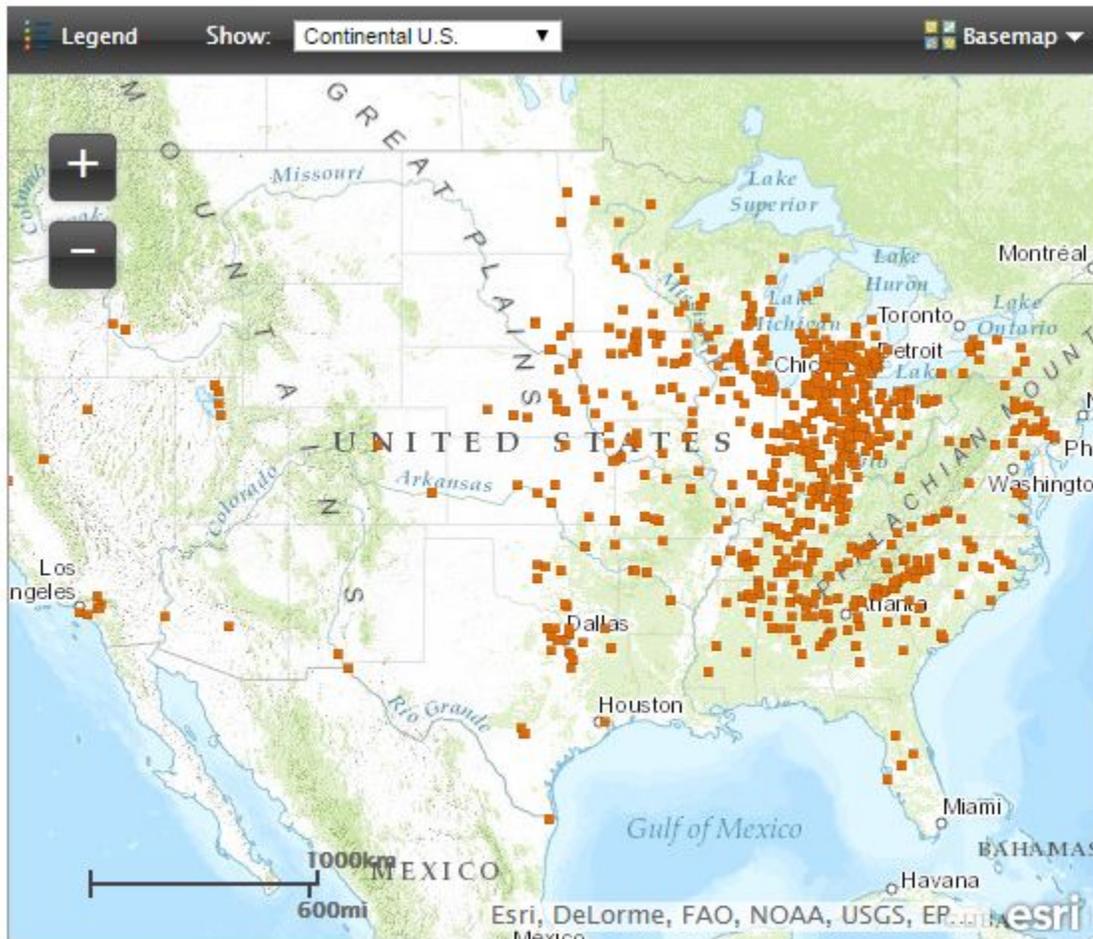
From 2003 to 2014:

- Releases from the electric utilities sector decreased by 50%. This decrease is driven by a 75% decrease in on-site air releases, whereas on-site land disposal and off-site disposal or other releases remained relatively constant over this time period

From 2013 to 2014:

- Releases by electric utilities decreased by 3% (18 million pounds). This decrease was primarily driven by a decrease in on-site air releases.
- This sector reported the second-greatest total disposal or other releases of any industry sector for 2014, including the greatest on-site air emissions, which represented 25% of air emissions from all industries.

Automotive Manufacturing



Automotive Manufacturing Facilities that Reported to the TRI Program for 2014

[View Larger Map](#)

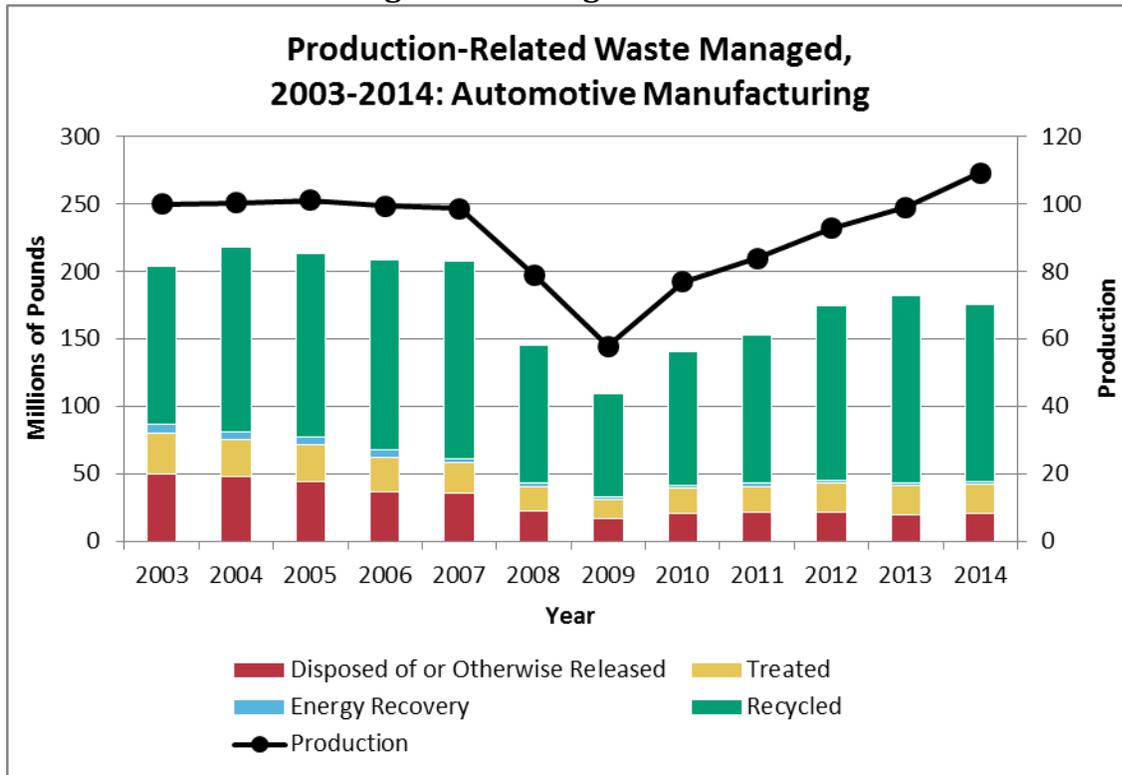
The automotive manufacturing sector includes facilities that assemble automobiles, light trucks, and utility vehicles to produce finished vehicles, as well as facilities that manufacture automotive vehicle parts and bodies. It includes the NAICS codes 3361, 3362, and 3363, which are a subset of the Transportation Equipment industry sector category. Compared to the other industry sectors profiled, this sector is small in terms of the quantities of chemicals released or managed as waste. However, given the attention on the automotive sector's production levels in recent years, the sector is included as one of the Industry Sector Profiles.



Quick Facts for 2014: Automotive Manufacturing	
Number of TRI Facilities	810
Facilities Reporting Newly Implemented Source Reduction Activities in 2014	124
Production-Related Waste Managed	175.8 million lb
Recycled	131.1 million lb
Energy Recovery	2.1 million lb
Treated	22.0 million lb
Disposed of or Otherwise Released	20.7 million lb
Total Disposal or Other Releases	19.9 million lb
On-site	14.9 million lb
Air	14.8 million lb
Water	13 thousand lb
Land	134 thousand lb
Off-site	5.0 million lb

Note: Numbers may not sum exactly due to rounding.

Automotive manufacturing waste management trend



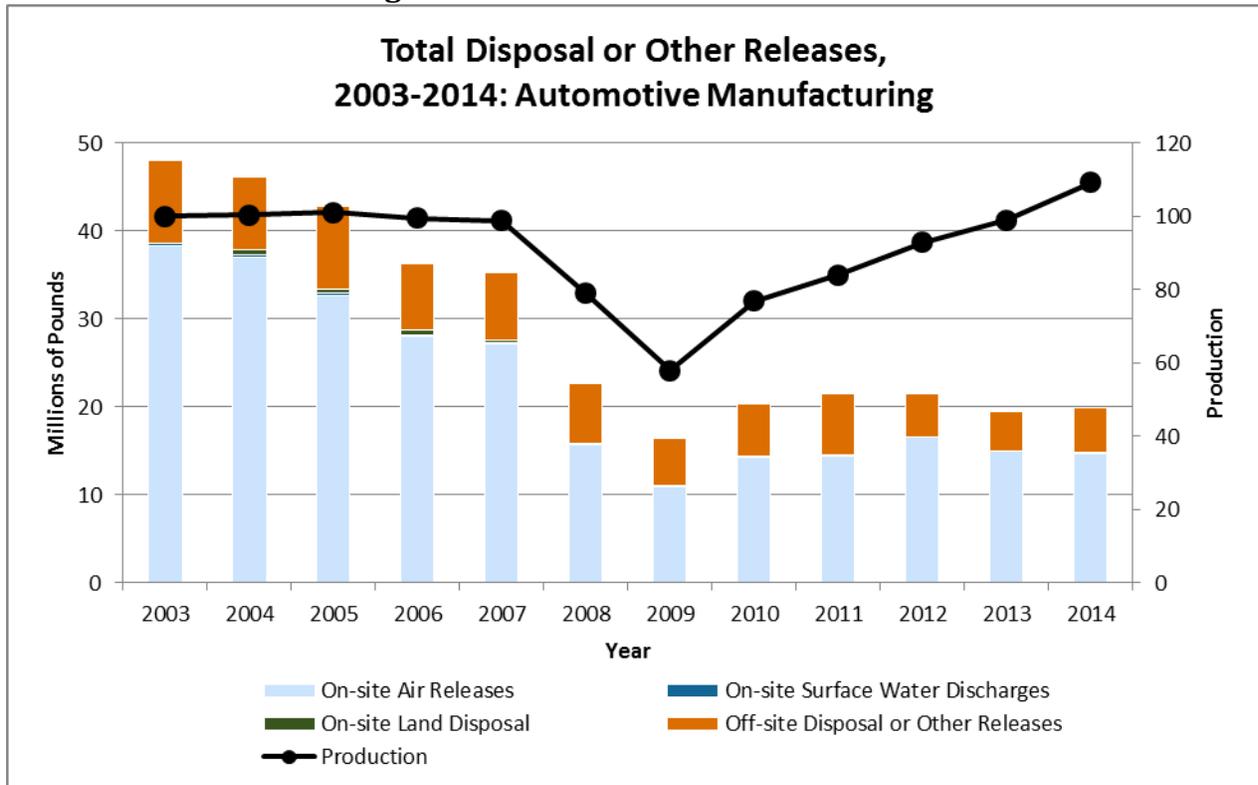
From 2003 to 2014:

- Automotive manufacturing production (as reported by the [Federal Reserve Board Industrial Production Index](#)) dropped by 41% from 2007 to 2009, and has since increased to a level in 2014 that exceeds 2003 production.
- The sector's production-related waste followed a trend similar to production, but still remains below 2003 levels. Overall, production-related waste decreased by 14% from 2003 to 2014 while production increased by 9%, indicating that waste per vehicle decreased over this time period.
- The proportion of managed waste that is recycled has increased from 2003, when 57% of total production-related waste was recycled, to 2014 when 75% was recycled.
- During the same time period, quantities disposed or otherwise released declined from 24% of total production-related waste in 2003 to 12% in 2014.

Source Reduction in the Automotive Manufacturing Sector

Fifteen percent of facilities reported having initiated practices to reduce their toxic chemical use and waste generation through source reduction activities implemented in 2014. The most frequently reported source reduction activities for the sector were good operating practices and process modifications. For example, [one facility](#) incorporated closed molding systems to reduce releases of [methyl methacrylate](#). TRI's [Pollution Prevention Search Tool](#) can help you learn more about pollution prevention opportunities in this sector.

Automotive manufacturing releases trend



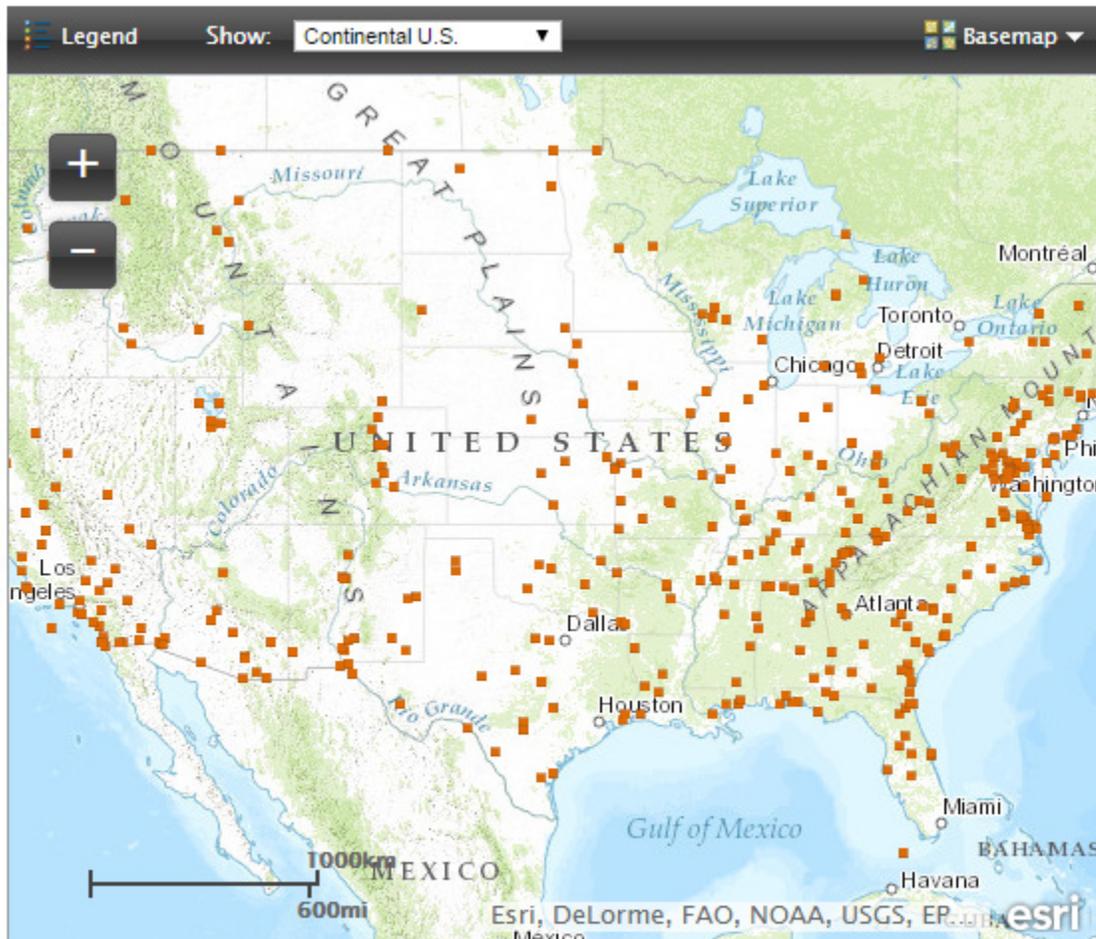
From 2003 to 2014:

- The sector's total disposal or other releases decreased by 58%, driven by a 24-million-pound reduction in on-site air releases. This is in contrast to the 9% increase in production since 2003.
- Notably, since 2009, releases have remained relatively stable while production has almost doubled.

In 2014:

- The automotive manufacturing sector's disposal or other release quantities are dominated by on-site air releases (74%), with the remaining releases largely reported as off-site disposal or other releases.

Federal Facilities



Federal Facilities that Reported to the TRI Program for 2014

[View Larger Map](#)

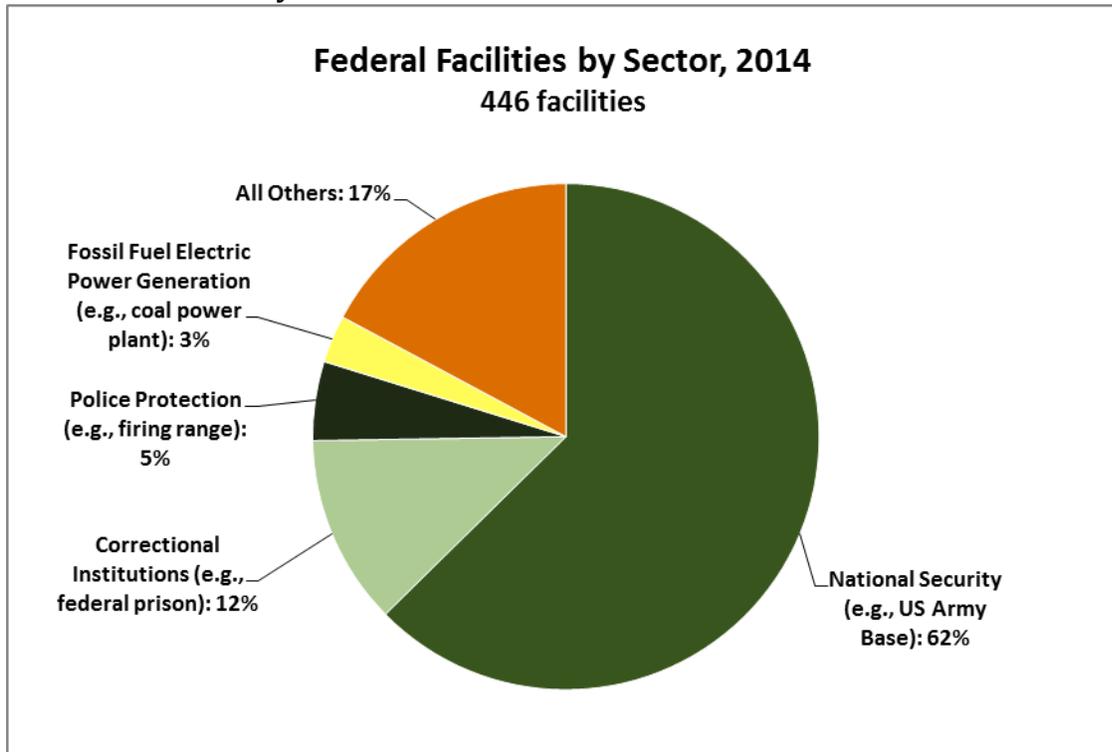
In 1993, President Clinton signed Executive Order 12756, "Federal Compliance with Right-to-Know Law and Pollution Prevention Requirements." This order established toxic chemical release reporting by all federal facilities that meet TRI threshold reporting criteria regardless of the type of operations at the facility, as described by their NAICS code. These actions were recently affirmed in March 2015 by President Obama through Executive Order 13693, "Planning for Federal Sustainability in the Next Decade." Due to these requirements, federal facilities are subject to the TRI reporting requirements.



Quick Facts for 2014: Federal Facilities	
Number of TRI Facilities	446
Facilities Reporting Newly Implemented Source Reduction Activities in 2014	28
Production-Related Waste Managed	199.4 million lb
Recycled	53.3 million lb
Energy Recovery	2.7 million lb
Treated	90.2 million lb
Disposed of or Otherwise Released	53.2 million lb
Total Disposal or Other Releases	57.3 million lb
On-site	53.6 million lb
Air	13.7 million lb
Water	12.1 million lb
Land	27.8 million lb
Off-site	3.7 million lb

Note: Numbers may not sum exactly due to rounding.

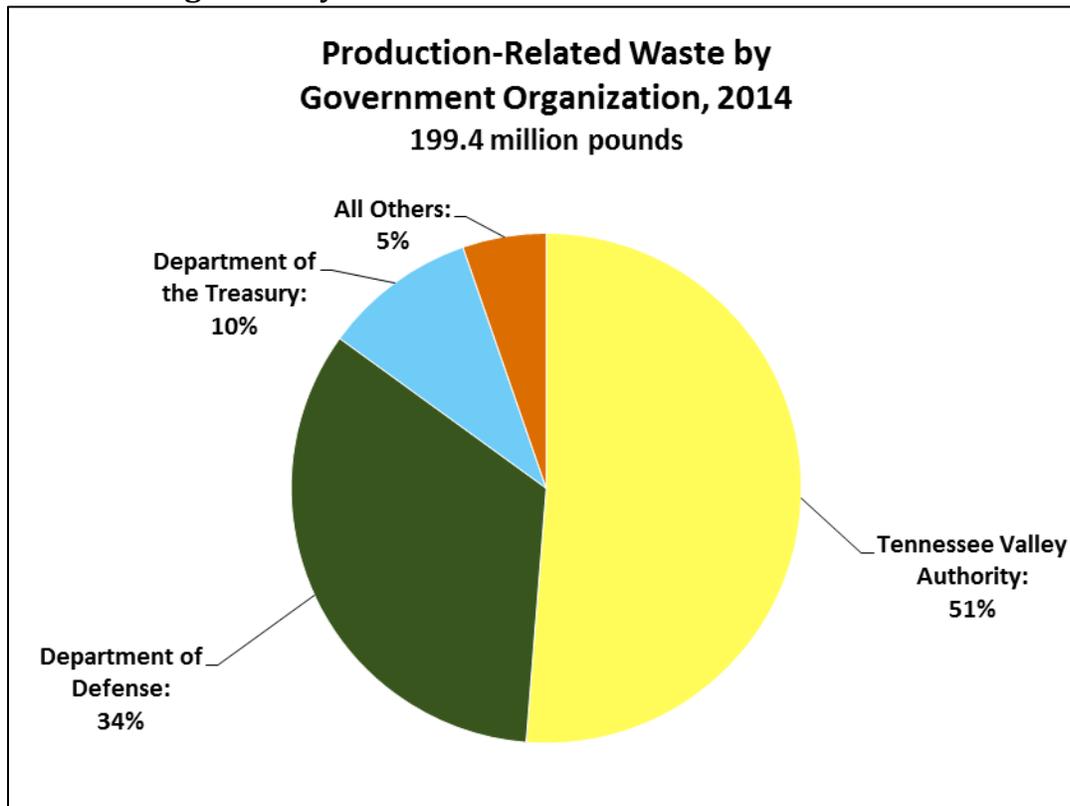
Federal facilities by sector



For the year 2014, 446 federal facilities in 38 different types of operations (based on their 6-digit NAICS codes) reported to the TRI Program. 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. While all federal facilities are subject to TRI reporting requirements regardless of their industry sector classification, for some industry sectors the TRI database only contains information from federal facilities. In fact, more than three-quarters of federal facilities are in just three sectors: National Security, such as military bases (62%); Correctional Institutions (12%); and Police Protection, such as training sites for Border Patrol stations (5%). No non-federal facilities in these three sectors have reported to the TRI Program.

As with non-federal facilities, activities at federal facilities drive the types and quantities of releases reported. Some of the activities at federal facilities that are captured by TRI reporting are similar to those at non-federal facilities, such as hazardous waste treatment. In other cases, federal facilities may report due to a more specialized activity 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-containing ammunition on firing ranges at these facilities.

Waste management by federal facilities



This figure shows that 95% of the TRI chemicals managed as production-related waste at federal facilities in 2014 was reported by: the Tennessee Valley Authority (51%), the Department of Defense (34%), and the Department of the Treasury (10%). All other government organizations comprised 5% of the production-related waste managed and reported by federal facilities.

The types of waste reported by federal facilities vary by the type of operation. For example, 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 the TRI Program for 2014, virtually all of the production-related waste comes from the fossil fuel plants that report in the Fossil Fuel Electric Power Generation sector. Similarly, out of the six Department of the Treasury facilities that reported, most are mints for manufacturing currency and, accordingly, report in the Metal Stamping sector NAICS classification.

Case study: federal facility source reduction

Since federal facilities are subject to TRI reporting regardless of their industry sector classification, their operations are diverse and few focus on manufacturing processes. With their unique operations, some federal facilities may face challenges in implementing source reduction strategies to reduce chemical waste. For the 2014 reporting year, 28 federal facilities (6%) reported implementing source reduction activities.

Facilities that do not implement source reduction activities may elect to indicate the types of barriers to source reduction they encountered. For federal facilities, most of the facilities that indicate barriers to implementing source reduction are national security or correctional institutions that report on lead or copper. For example, several facilities in the National Security sector indicated that they reported on lead because it is contained in the ammunition used on site and they have not been able to identify ammunition that does not contain lead. However, other federal facilities have been able to implement some source reduction activities.

Source Reduction Example: Reducing TRI Releases at Anniston Army Depot

[Anniston Army Depot](#) (ANAD) is a U.S. Army maintenance center and munitions storage site in northeast Alabama. ANAD previously used a paint stripping solvent that contained approximately 75% dichloromethane, 20% formic acid, and 5% aromatics. ANAD began research in 2009 to find a replacement paint stripper that was water-based and would reduce the total volume of Hazardous Air Pollutants (HAPs) emitted by the facility. The new paint stripper selected by ANAD is free of dichloromethane and formic acid. ANAD also implemented ultrasonic cleaning solutions and equipment as a replacement to trichloroethylene used in degreasing operations. As shown in the figure below, ANAD has reduced TRI reportable chemical wastes significantly since they began implementing these initiatives. Note that for the 2014 reporting year, the releases from a separate facility were reclassified to be included under ANAD's release inventory, which likely explains the slight increase in total production-related waste managed.

