

2010 Toxics Release Inventory National Analysis Overview



*25th Anniversary of the Emergency Planning
and Community Right-to-Know Act*

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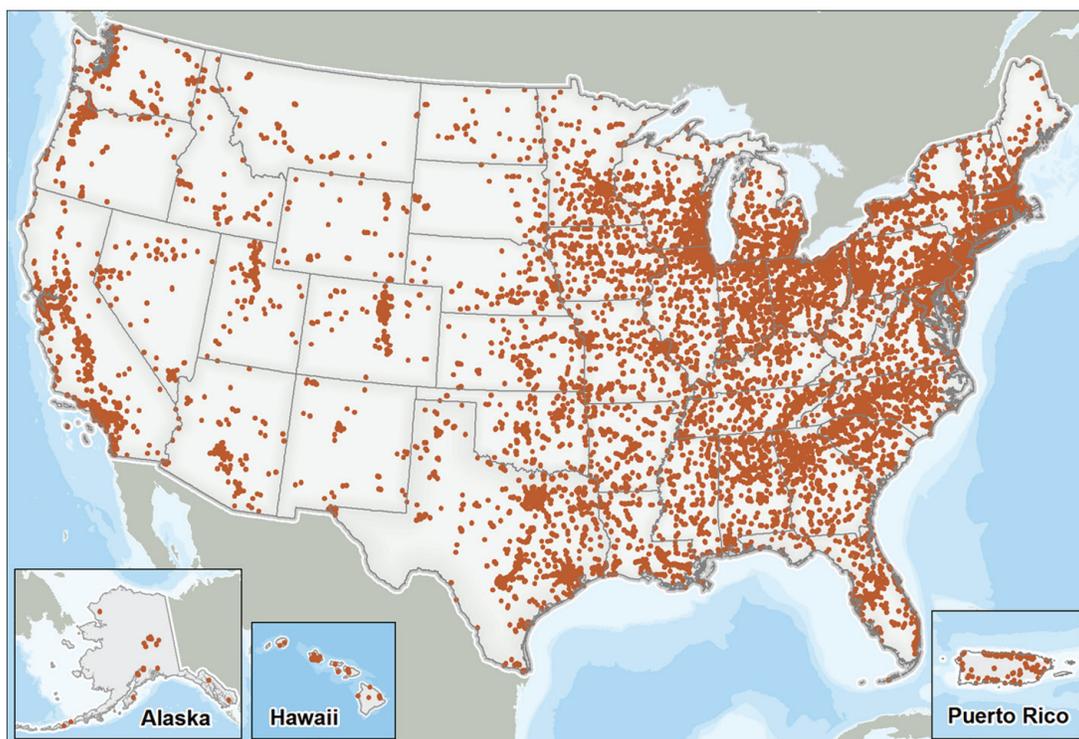


Introduction: What is the TRI National Analysis?

Tens of thousands of chemicals are used by industries and businesses in the United States to make the products on which our society depends, such as pharmaceuticals, clothing, and automobiles. Many of the chemicals needed to create these products are toxic; therefore, some releases of toxic chemicals into the environment are inevitable.

The Toxics Release Inventory (TRI) is a database that contains detailed information on disposal or other releases of over 650 chemicals from the thousands of U.S. facilities that report to TRI (see Figure 1). This year the Environmental Protection Agency (EPA) marks 25 years since the passage of the statute that created TRI in 1986, the Emergency Planning and Community Right-to-Know Act (EPCRA). EPCRA plays a significant role in protecting human health and the environment by providing communities and emergency planners with valuable information on toxic chemicals in their areas.

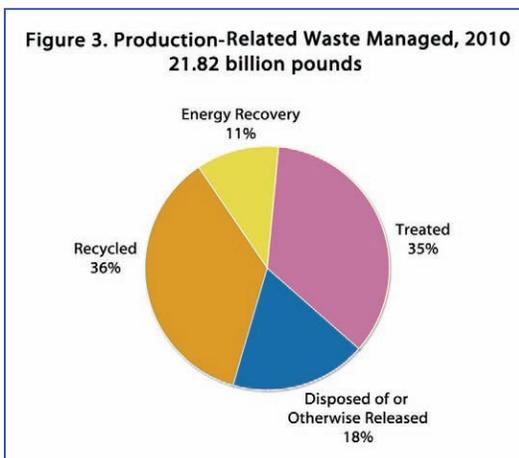
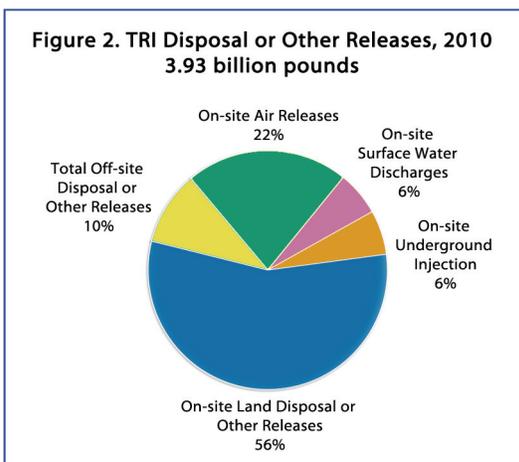
Figure 1. Geographic Distribution of TRI-Reporting Facilities



TRI contributes to EPA's community right-to-know effort by providing information on how facilities manage chemicals through recycling, energy recovery, treatment, and disposal or other releases. Facilities reporting to TRI are typically larger facilities involved in manufacturing, metal mining, electric power generation, and hazardous waste treatment. Federal facilities are also required by Executive Order to report to TRI. The 2010 TRI National Analysis provides the public with valuable information on how toxic chemicals were managed, where toxic chemicals ended up, and how 2010 compares to previous years.

Users of TRI data should be aware that TRI captures a significant portion of toxic chemicals in wastes that are managed by industrial facilities, but it does not cover all toxic chemicals or all sectors of the U.S. economy. Furthermore, the quantities of chemicals reported to TRI are self-reported by facilities and are often estimates. Each year EPA conducts an extensive data quality analysis before publishing the National Analysis. During the data quality review, forms with potential errors are identified to help provide the most accurate and useful information possible. This effort makes it possible for TRI data presented in the National Analysis to be used along with other information as a starting point in understanding how the environment and communities may be exposed to toxic chemicals.

The National Analysis provides a snapshot of the data at one point in time. If reports are submitted to EPA after the July 1 reporting deadline, they may not be processed in time to be included in the National Analysis. The most recent data available are accessible in the TRI tools listed at the end of this document.



Quick Facts for 2010

Number of TRI Facilities: 20,904

On-site and Off-site Disposal or Other Releases: 3.93 billion lbs

On-site: 3.52 billion lbs

- Air: 0.86 billion lbs
- Water: 0.23 billion lbs
- Land: 2.20 billion lbs
- Underground Injection: 0.23 billion lbs

Off-site: 0.41 billion lbs

Production-Related Waste Managed: 21.82 billion lbs

- Recycled: 7.90 billion lbs
- Energy Recovery: 2.40 billion lbs
- Treated: 7.56 billion lbs
- Disposed of or Otherwise Released: 3.97 billion lbs

In 2010, 20,904 facilities reported to TRI. Together they reported total on- and off-site disposal or other releases of 3.93 billion pounds of toxic chemicals. Most were disposed of or released on-site to land, air or water, or injected underground, as shown in Figure 2.

While total on- and off-site disposal or other releases mentioned above focus on the ultimate disposition of a chemical, production-related waste includes waste that is recycled, burned for energy recovery, and treated as well as disposed of or otherwise released. In other words, it attempts to encompass all waste generated from facilities' processes and operations. In 2010 more than 21.82 billion pounds of toxic chemicals were reported as generated at TRI facilities in production-related wastes. Of this total, almost 17.85 billion pounds were recycled, burned for energy recovery, or treated, and 3.97 billion pounds were disposed of or otherwise released to the environment, as shown in Figure 3.

Note that the two metrics related to disposal or other releases shown in Figures 2 and 3 are similar (3.93 billion pounds and 3.97 billion pounds, respectively), but are not the same. Differences in the definitions for the two metrics and how they are reported lead to the variation observed. At the national level, one key source of the difference is that adjustments are made to the aggregated quantities to ensure that transfers of TRI chemicals sent off-site to other TRI facilities are not counted twice. In addition, production-related waste managed does not include chemicals in waste from catastrophic, remedial or one-time events not related to production.

This National Analysis Overview presents information on the quantities and types of TRI chemicals in waste on a national scale for 2010, and these quantities are compared to previous years. In addition, several of the industry sectors and companies that report the largest quantities of toxic chemicals in waste are highlighted. EPA's TRI Program provides much more detail about the TRI data on its website, and it posts a variety of tools and resources to help you find information specific to your interests and communities. These include geographic profiles that focus on individual communities, tribal lands, and large aquatic ecosystems. Links to all of these resources can be found in the TRI Tools and Resources Section at the end of this document.

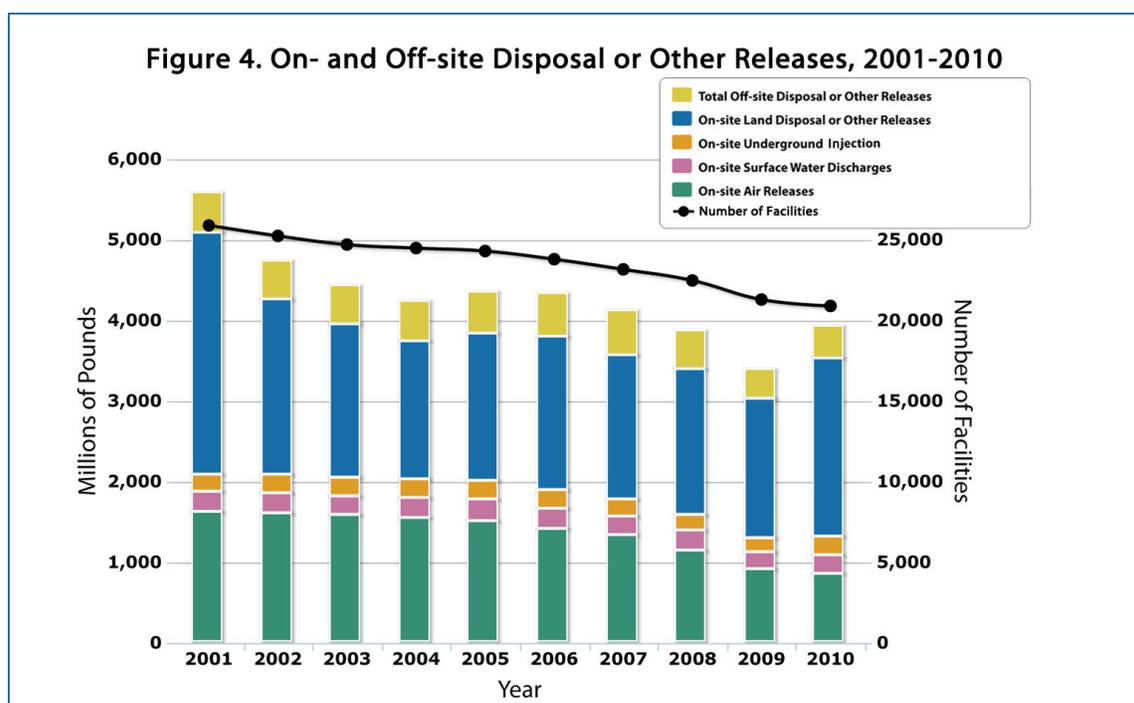
Trends in Disposal or Other Releases of TRI Chemicals

Disposal or other releases of chemicals into the environment occur through a range of practices that could ultimately affect human exposure to the toxic chemicals. They may take place at a facility as an on-site disposal or other release to air, water, land or an underground injection well; or they may take place at an off-site location when a facility transfers its waste containing TRI chemicals as an off-site disposal or other release.



Evaluating disposal and other releases can help the public identify potential concerns and gain a better understanding of possible hazards related to TRI chemicals. It can also help identify priorities and opportunities for government to work with industry to reduce toxic chemical disposal or other releases and potential associated risks.

Figure 4 shows that facility disposal or other releases of TRI chemicals have generally decreased in the long-term: down 30% from 2001 to 2010. This downward trend over the ten-year period was driven by reductions in air emissions and on-site land disposal. From 2009 to 2010, however; there was a 16% increase in disposal or other releases, mostly due to increases in the metal mining sector, although many other sectors experienced increases (see the Industry Sector Profiles section for more information). The number of facilities reporting to TRI decreased 2% from 2009 to 2010.



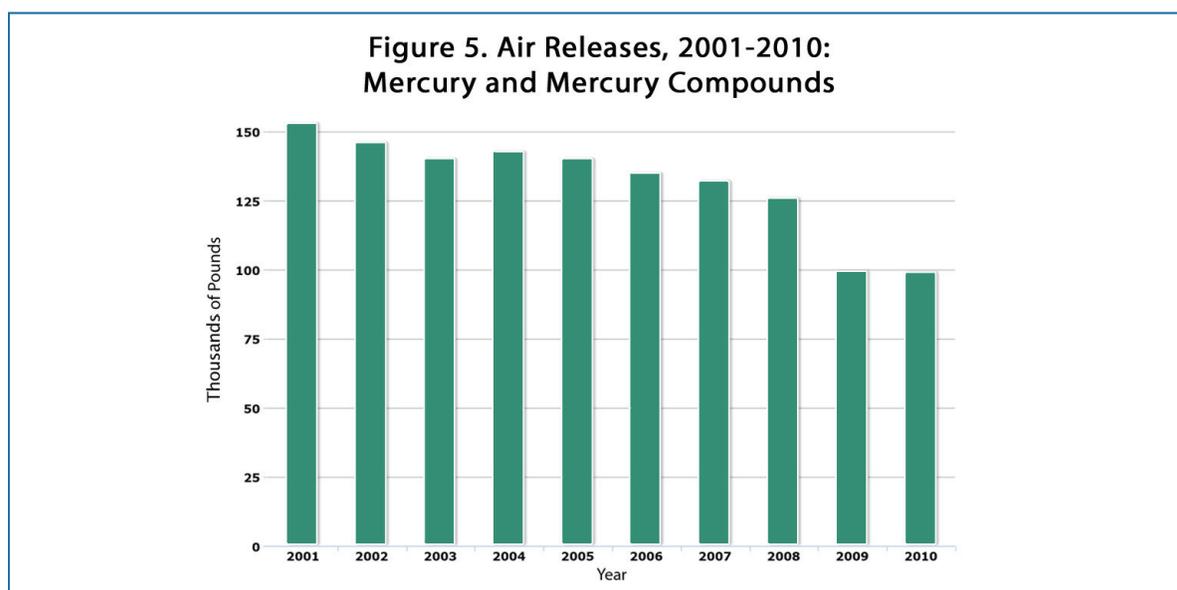
Long-term decreases in disposal or other releases could be due to a variety of reasons including a decrease in chemical use; a shift to other management methods, such as recycling and treatment of chemicals, which reduces the amount disposed of or otherwise released; a gradual decrease in the number of facilities reporting to TRI; a change in the composition of raw materials; or changes in production. Long-term trends could also be due to a change in the composition of the economy, for instance an expansion of one industry and the contraction of another. Also, they could be due to the metal mining sector responding to rulings in court cases such as *Barrick Goldstrike Mines, Inc. v. Whitman* (Civ. Action No. 99-958 (TPJ)).

The increase from 2009 to 2010 in disposal or other releases could be due to a change in the composition of raw materials used at facilities, for example, a change in the chemical composition of ore bodies at metal mines. Other possible reasons for an increase include changes in management methods, changes in release estimation methods, changes in production, increases in chemical use, or an economic change.

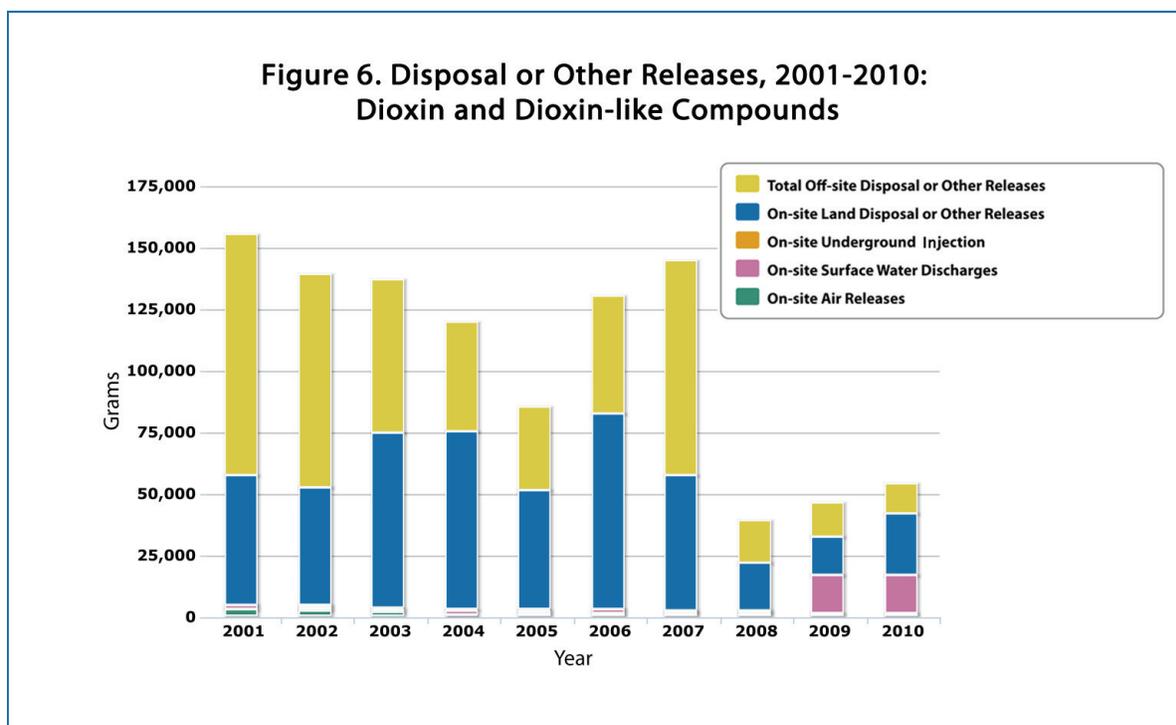
Some of the chemicals on the TRI chemical list have been designated as persistent, bioaccumulative, and toxic (PBT) chemicals. PBT chemicals are of particular concern not only because they are toxic, but also because they remain in the environment for long periods of time, and they tend to build up, or bioaccumulate, in the tissue of organisms. Here we look more closely at several PBT chemicals: lead and lead compounds; mercury and mercury compounds; dioxin and dioxin-like compounds; and PCBs.

Reflecting its widespread use in industrial processes and products, lead and lead compounds accounted for the vast majority (98%) of the disposal or other releases of PBT chemicals in 2010. The quantities of lead and lead compounds disposed of or otherwise released rose and fell between 2001 and 2010, with a substantial increase occurring from 2009 to 2010 (51%); trends were primarily driven by changes in on-site land disposal or other releases from the metal mining sector.

Mercury, another PBT chemical of concern, has traditionally been used to make products like thermometers, switches, and some light bulbs, but it is also found in many naturally occurring ores and minerals, including coal. The overall trend in disposal or other releases of mercury and mercury compounds is driven by metal mines, which accounted for 97% of the on-site land disposal of mercury. In the United States, coal-burning power plants are the largest source of mercury emissions to the air. Electric utilities, which include coal- and oil-fired power plants, accounted for 68% of the mercury and mercury compounds air emissions reported to TRI in 2010. Since 2001, air releases of mercury and mercury compounds decreased by 35%, with little change from 2009 to 2010, as shown in Figure 5.

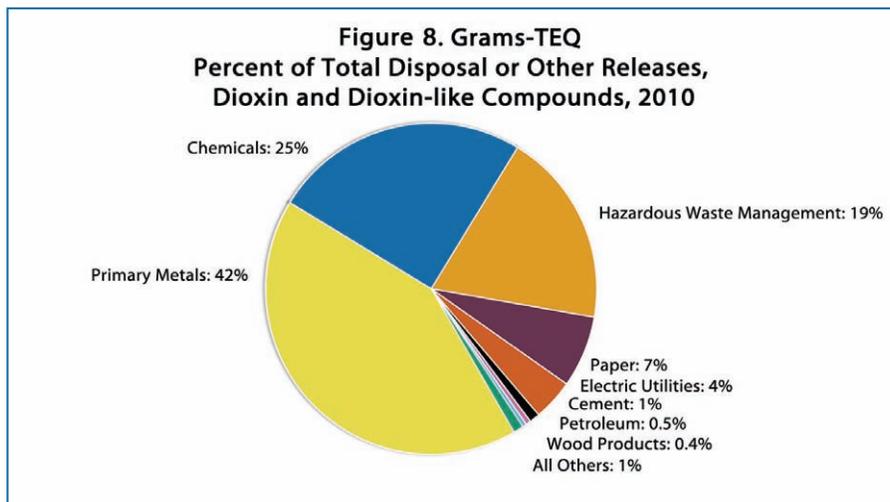
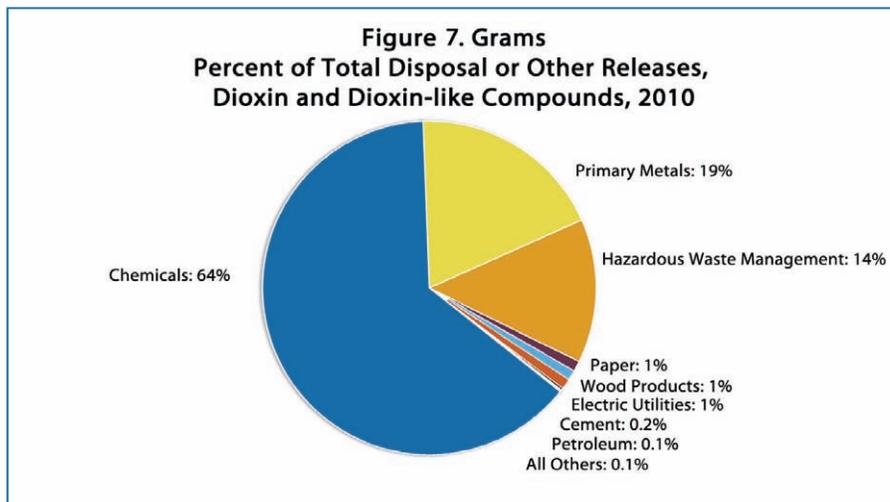


Dioxin and dioxin-like compounds (dioxins) are not only PBTs but are also characterized by EPA as likely to be human carcinogens and are thought to increase the risk of cancer even at background levels of exposure. Dioxins are the unintentional by-products of most forms of combustion and several industrial chemical processes. Figure 6 shows the amount of dioxins disposed of or otherwise released in total grams. Disposal or other releases of dioxins increased 18% from 2009 to 2010 but decreased by 65% from 2001 to 2010. The figure also shows increased surface water discharges for 2009 and 2010, which are primarily due to discharges from one chemical manufacturing facility.



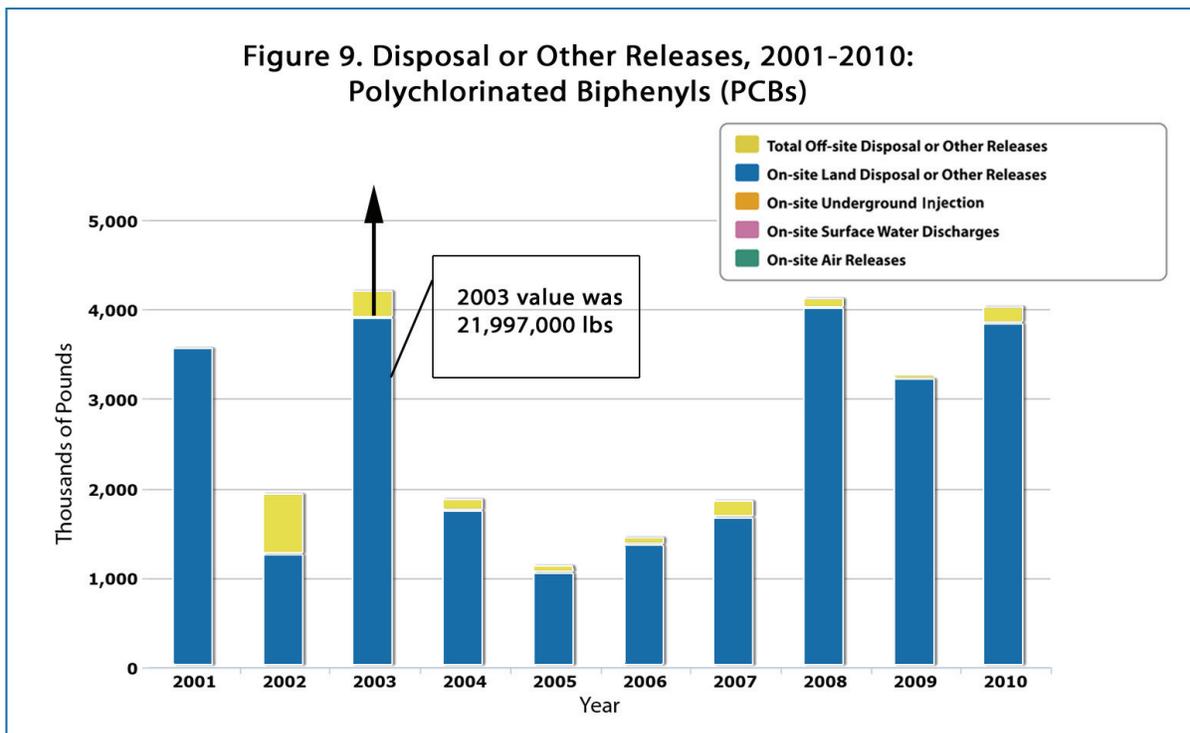
TRI requires facilities to report on 17 dioxin and dioxin-like compounds (or congeners). These congeners have a wide range of toxicities. The mix of dioxins from one source can have a very different level of toxicity than the same total amount, but different mix, from another source. These varying toxicities can be taken into account with Toxic Equivalency Factors (TEFs), which are based on each congener's toxicity data. The total grams of each congener can be multiplied by its TEF to obtain a toxicity weight. The results can then be summed for a total of grams in toxicity equivalents (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. EPA only recently began collecting comprehensive data on the individual dioxin congeners; so, trends of TRI dioxin data in grams-TEQ are not possible at this time. Various industry sectors may dispose of or otherwise release very different mixes of dioxin congeners. Eight industry sectors accounted for most of both the grams and grams-TEQ of dioxin disposed of or otherwise released in 2010; however, their ranking in terms of percentage of the total is quite different for grams and grams-TEQ, as shown in Figures 7 and 8.

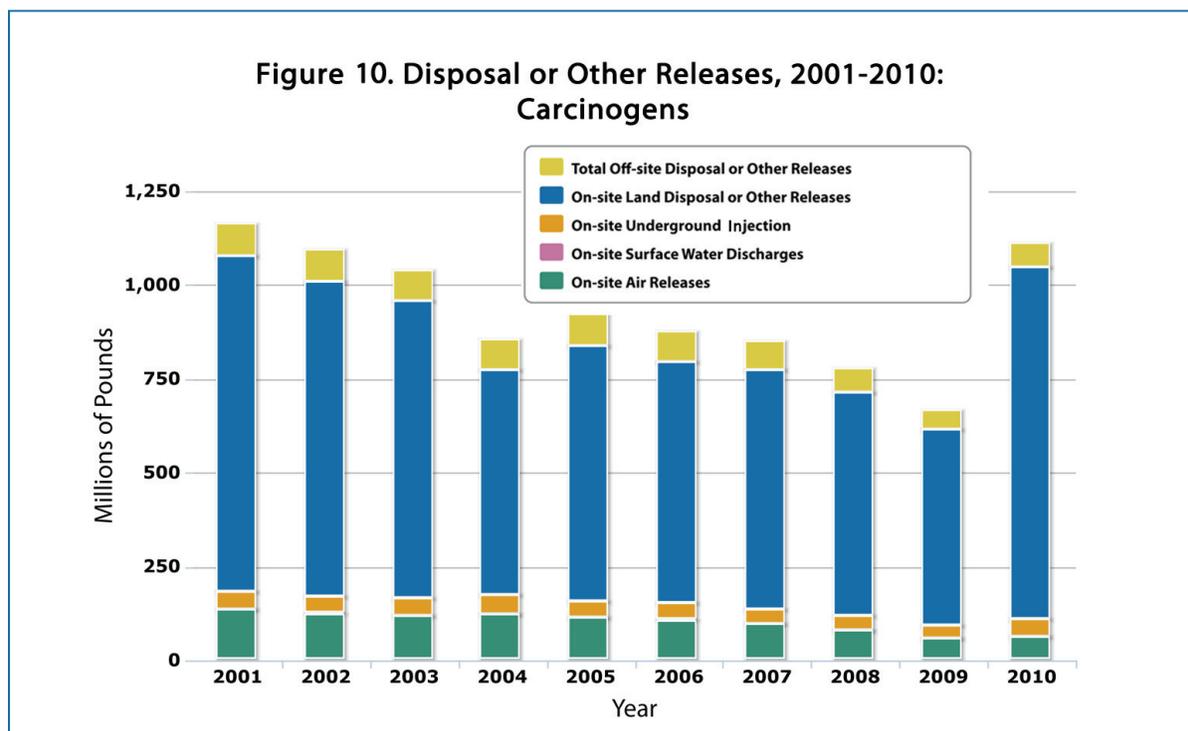


In 2010, the chemical manufacturing industry accounted for 64% of the total grams of dioxin and dioxin-like compounds disposed of or otherwise released, while the primary metals sector accounted for 19% of the total grams. However, when TEFs are applied, the primary metals sector accounted for 42% of the total grams-TEQ and the chemical manufacturing industry for 25% of the total grams-TEQ.

While polychlorinated biphenyls (PCBs), another PBT chemical category, are no longer manufactured or used in new products, the disposal or other releases of PCBs represents amounts that are being cleaned up or capacitors and transformers being taken out of service and properly disposed of in facilities that minimize risk to human health and the environment. PCB disposal or other releases typically fluctuate from year to year, as shown in Figure 9, based on how many significant cleanup activities are underway or how many PCB transformers are removed from service. Over 99% of disposal or other releases of PCBs are disposed of in RCRA Subtitle C landfills at hazardous waste management facilities. Note that in 2003, almost 22 million pounds of PCBs were disposed of in landfills, as shown in Figure 9 by the black arrow indicating the pounds reported that year exceed the scale of the figure. This 2003 spike in the trend was primarily due to one hazardous waste management facility disposing of PCBs in a RCRA subtitle C landfill.



Among the chemicals that are reported to TRI, there are about 180 known or suspected carcinogens, which EPA sometimes refers to as Occupational Safety & Health Administration (OSHA) carcinogens. Figure 10 shows that the total disposal or other releases of these carcinogens increased 67% between 2009 and 2010 but decreased by 5% from 2001 to 2010. Most of these carcinogens (84%) were disposed of or otherwise released on-site to land. On-site air releases of carcinogens increased 7% from 2009 to 2010, but had a 55% reduction from 2001 to 2010.

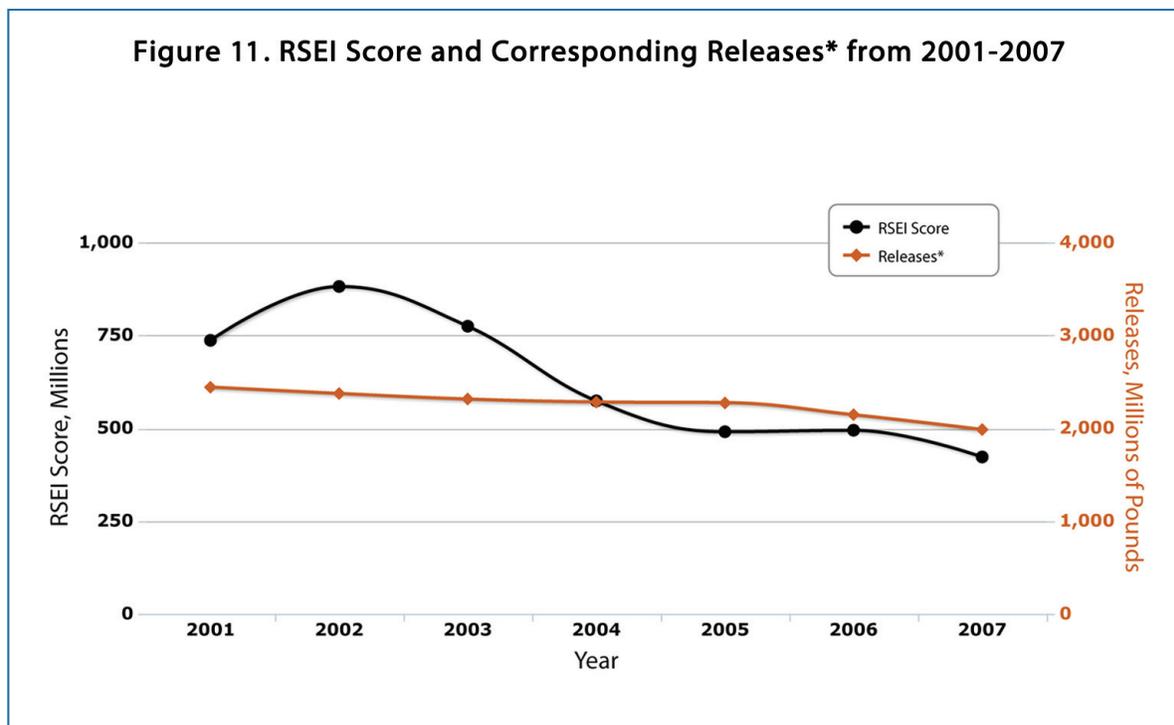


Trends in pounds of disposal or other releases do not account for potential risk of chemical releases. Risk can vary depending on chemical toxicity, how chemicals are released (e.g., to the air or water), where chemicals travel, and where human populations are located.

To provide information on the potential risk of disposal or other releases, the TRI program presents its data from a risk-related perspective using EPA's publicly-available Risk-Screening Environmental Indicators (RSEI) model. The model produces unitless "scores," which represent relative chronic human health risk and can be compared to RSEI-generated scores from other years or geographical regions.

RSEI scores are calculated using on-site releases to air and water, transfers to Publicly Owned Treatment Works (POTWs), and transfers for off-site incineration as reported to TRI. Note that other release pathways, such as land disposal, are not currently modeled in RSEI. The scores are calculated based on many factors including: the amount of chemical released; the location of the release; the chemical's toxicity; its fate and transport through the environment; and the route and extent of human exposure. Because modeling the exposure of TRI chemicals is time and resource intensive, RSEI data through 2007 are currently available, but updates through 2010 are scheduled to be available in 2012.

Figure 11 shows the RSEI score and corresponding TRI releases.* From 2001 to 2007, the RSEI score decreased by 43% (with a slight rise in 2002), while the corresponding pounds released over the same time period decreased by 19%. These results suggest that TRI reporters are making progress in reducing their use of higher toxicity chemicals and/or reducing releases in areas that would result in higher human exposure.



*Includes only those pounds currently modeled through RSEI which are on-site releases to air and water, transfers to POTWs, and off-site transfers for incineration. Pounds and corresponding RSEI scores were corrected to account for a large, subsequent change in chromium releases for TRIFID 67277BNGML3801S. Updated data used according to Envirofacts, accessed 7-2011, http://oaspub.epa.gov/enviro/tris_control_v2.tris_print?tris_id=67277BNGML3801S

Note that RSEI is 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 and produce a simple score. The model focuses on chronic human toxicity. It should be used for screening-level activities such as trend analyses that compare relative risk from year to year, or ranking and prioritizing chemicals and industry sectors for strategic planning. RSEI is not a formal risk assessment, which typically requires site-specific information on the toxicity of TRI chemicals and detailed population distributions to predict exposures for estimating potential health effects. Instead, RSEI is commonly used to quickly screen and highlight situations that may lead to potential chronic human health risks. More information about the model can be accessed at www.epa.gov/opptintr/rsei/. Analyses using RSEI data providing a quantitative relative estimate of risk posed by a facility can be generated in Envirofacts using the following link: www.epa.gov/enviro/facts/topicsearch.html#toxics.

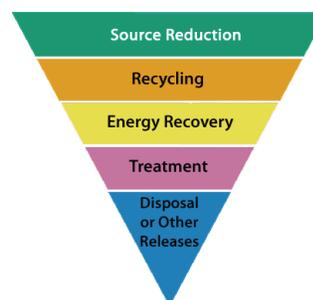
Most disposal or other release practices are subject to a variety of regulatory requirements designed to limit environmental harm. To learn more about what EPA is doing to help limit the release of harmful chemicals to the environment see EPA's laws and regulations page at www.epa.gov/lawsregs/.

Trends in Management of TRI Chemicals

In addition to collecting information on the disposal or other releases of chemicals to the environment, TRI collects information on the quantities of toxic chemicals recycled, combusted for energy recovery, and treated both on- and off-site. This production-related waste includes the total amounts of toxic chemicals in waste managed by facilities, which helps track industry progress in reducing waste generation and moving towards safer waste management alternatives.

Looking at production-related waste over time also allows us to focus on management of toxic chemicals rather than only on their final disposition. Proper waste management techniques are key to reducing the human health and environmental risks associated with toxic chemicals. The waste management hierarchy, shown in Figure 12, established in the Pollution Prevention Act of 1990, encourages facilities to first eliminate waste at its source. However, for waste that is generated, the preferred management methods are recycling, followed by burning for energy recovery, treating and, as a last resort, disposing of or otherwise releasing the waste. The hope is that, when possible, waste management techniques will shift over time from disposal or other releases toward the preferred techniques in the waste management hierarchy.

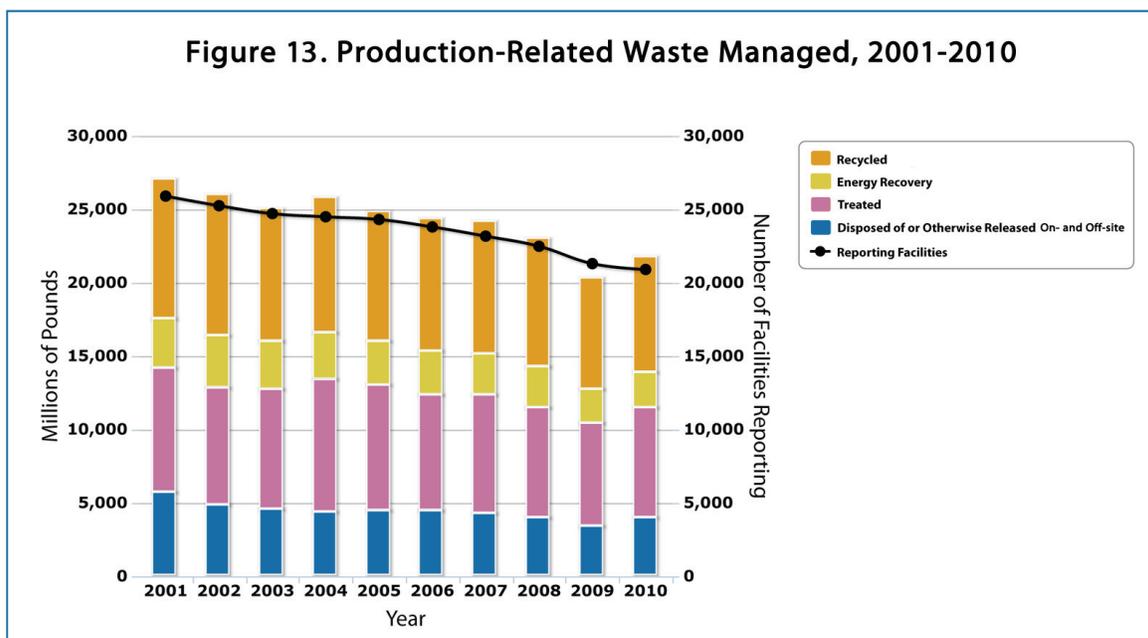
Figure 12. Waste Management Hierarchy



As shown in Figure 13, from 2001 to 2010, total production-related waste managed by TRI facilities declined by 19% (more than 5 billion pounds). However, from 2009 to 2010, the total production-related waste managed increased 7%. The quantities of TRI chemicals in waste which were recycled, combusted for energy recovery, treated, and disposed of or otherwise released all increased from 2009 to 2010:

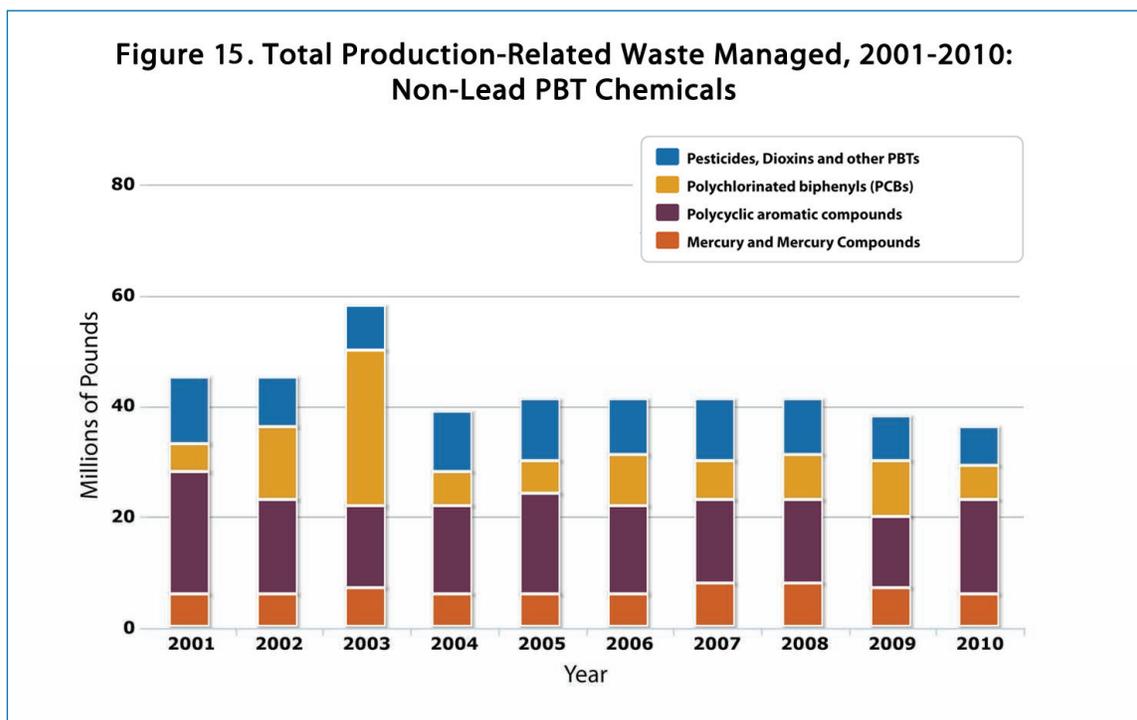
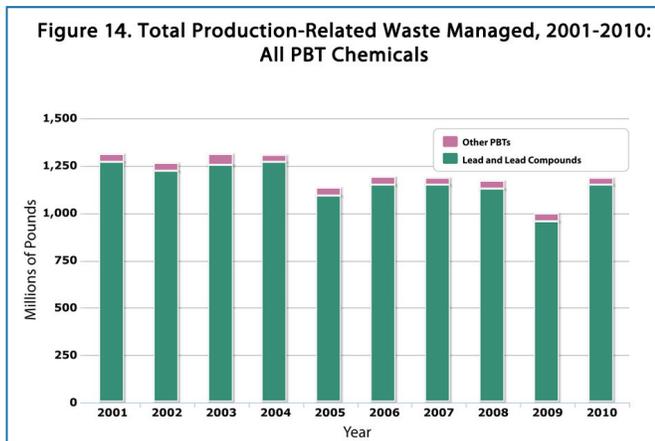
- recycling increased by 3%
- combustion for energy recovery increased by 7%
- treatment increased by 8% and
- disposal or otherwise released increased by 15%.

Figure 13. Production-Related Waste Managed, 2001-2010

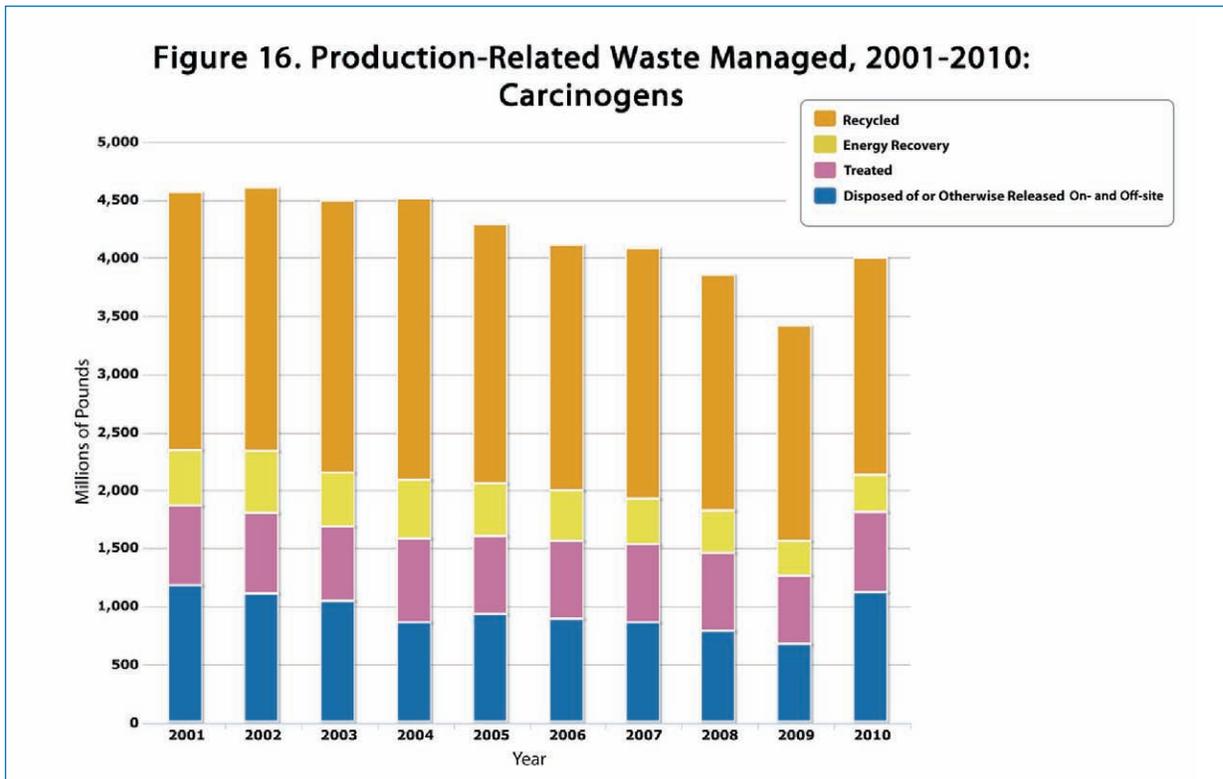


As with disposal or other releases, production-related waste managed can increase or decrease due to various factors, such as changes in operations that alter the chemicals used, the adoption of pollution prevention or control activities, or changes in business activity.

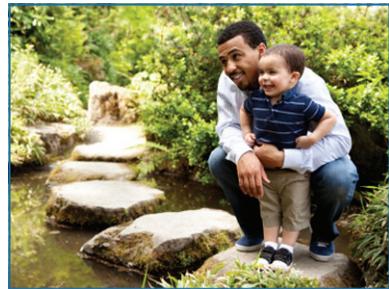
Taking a closer look at chemicals of interest, facilities managed almost 1.2 billion pounds of PBT chemicals in production-related waste in 2010. Lead and lead compounds accounted for 97% (1.1 billion pounds) of that amount. Mercury and mercury compounds, polycyclic aromatic compounds (PACs), polychlorinated biphenyls (PCBs), certain pesticides, dioxin and dioxin-like compounds and other chemicals made up the remainder. Figure 14 shows that the quantities of PBT chemicals managed in wastes have risen and fallen over the years, with the most recent time period from 2009 to 2010 showing an increase of 19% but an overall reduction of 10% since 2001. Figure 15 focuses on PBTs other than lead. The amount of these chemicals in production-related waste managed was 4% lower in 2010 compared to 2009. To learn more about what EPA has done to increase public access to information about PBTs in the TRI Program, visit www.epa.gov/tri/lawsandregs/pbt/pbtrule.htm.



Facilities managed almost 4 billion pounds of carcinogens in production-related waste in 2010. The quantities of carcinogens managed as waste at TRI facilities decreased by 12% between 2001 and 2010 but increased from 2009 to 2010 by 17% (Figure 16). Almost half of these carcinogens (47%) were recycled. Another 8% was used for energy recovery, 17% was treated, and 28% was disposed of or otherwise released.



The significant drop in total amounts of TRI chemicals managed as wastes since 2001 is due in part to many facilities and industry sectors embracing source reduction and pollution prevention in their operations. These are positive efforts that benefit both human health and the environment. To learn more about pollution prevention and what EPA is doing to encourage these practices, visit EPA's Pollution Prevention website (www.epa.gov/p2/).



Industry Sector Profiles

Because individual industry sectors reporting to TRI can vary substantially in size, scope, makeup, relevant drivers and barriers, the amounts and types of toxic chemicals generated and managed by each differs greatly. Within a sector, however, the industrial processes, products, and regulatory requirements are often similar, resulting in similar toxic chemical use and waste generation. Therefore, it is useful to look at waste management trends within a sector to identify potential emerging issues. While sector-specific waste management trends can be used as indicators of environmental performance, reflecting changes in management practices or the adoption of pollution prevention and control technologies, it is important to consider the influence that changes in production and the economy have on chemical generation.

To get an idea of how changes in production levels at TRI facilities may influence disposal or other releases, EPA uses “value added” from the Bureau of Economic Analysis to estimate production for the manufacturing sector. Value added is a measure of the contribution of each sector to the Nation's Gross Domestic Product (GDP). While the manufacturing sector does not include all TRI facilities, it does make up 89% of facilities reporting to TRI in 2010. The solid line in Figure 17 shows value added (adjusted for inflation) increased by 4% from 2001 to 2010. For the same time period, the figure shows a 29% decrease in disposal or other releases. This decrease occurs despite the 4% increase in production. Because one would expect disposal or other releases to increase as production increases, the graph suggests that other factors may have a greater effect on reducing disposal and other releases than production had on increasing them.

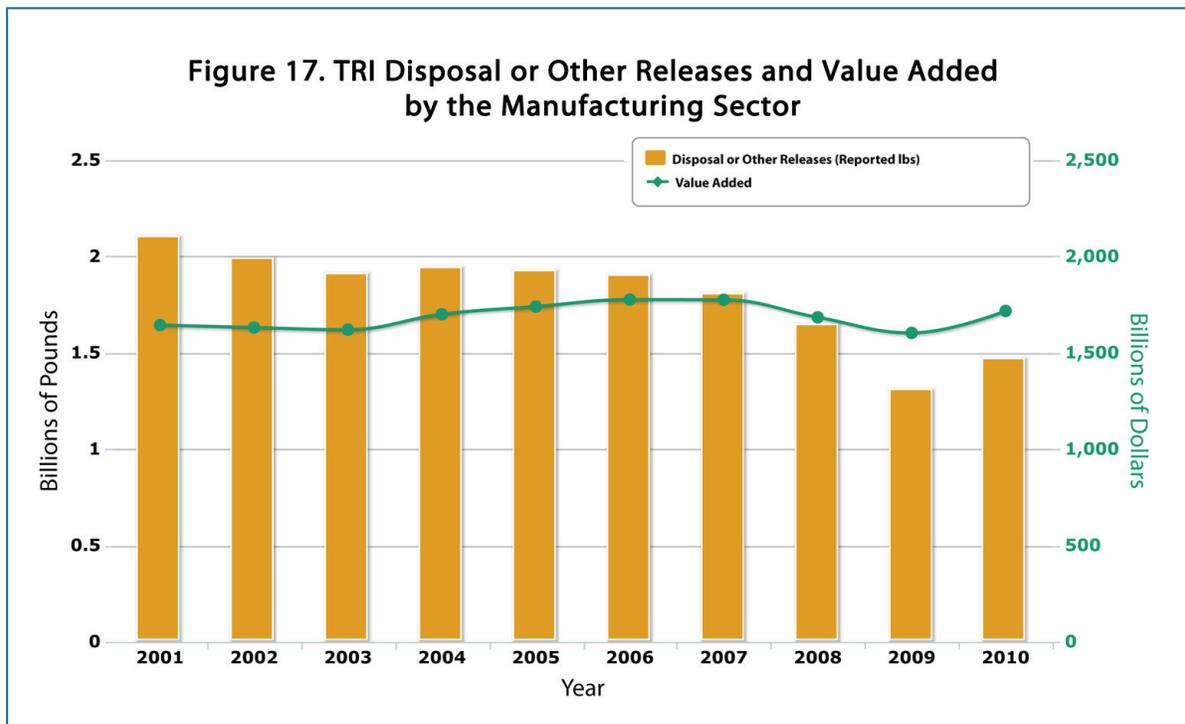
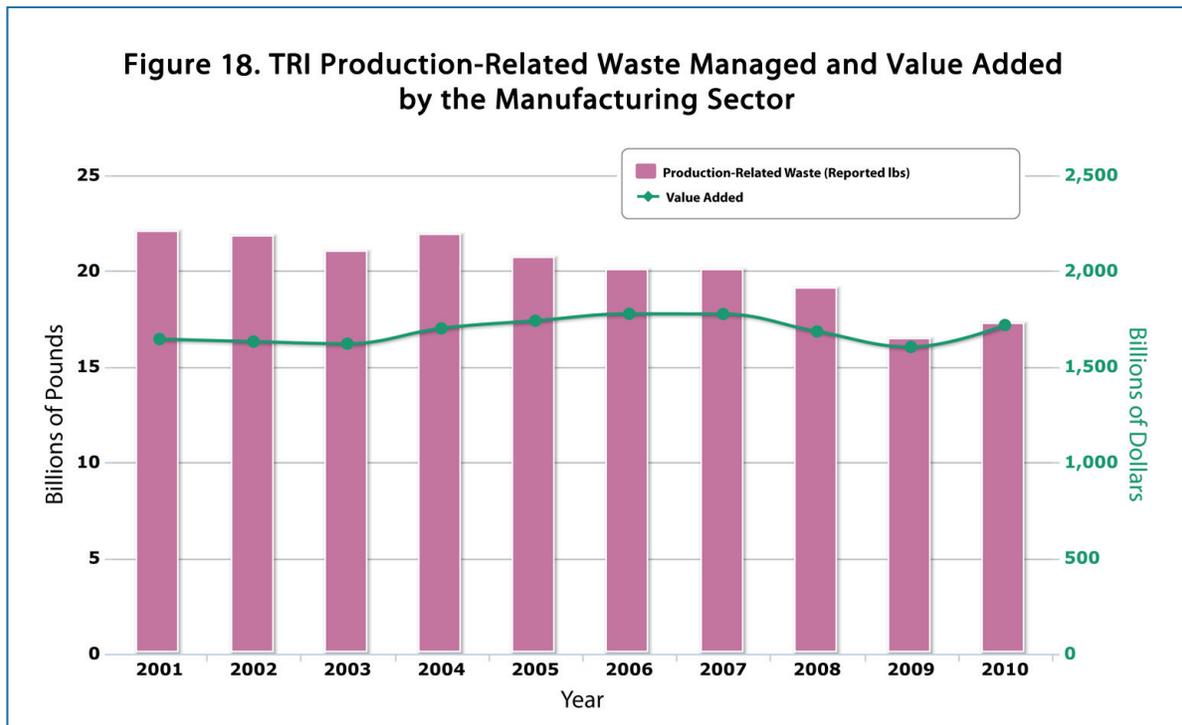
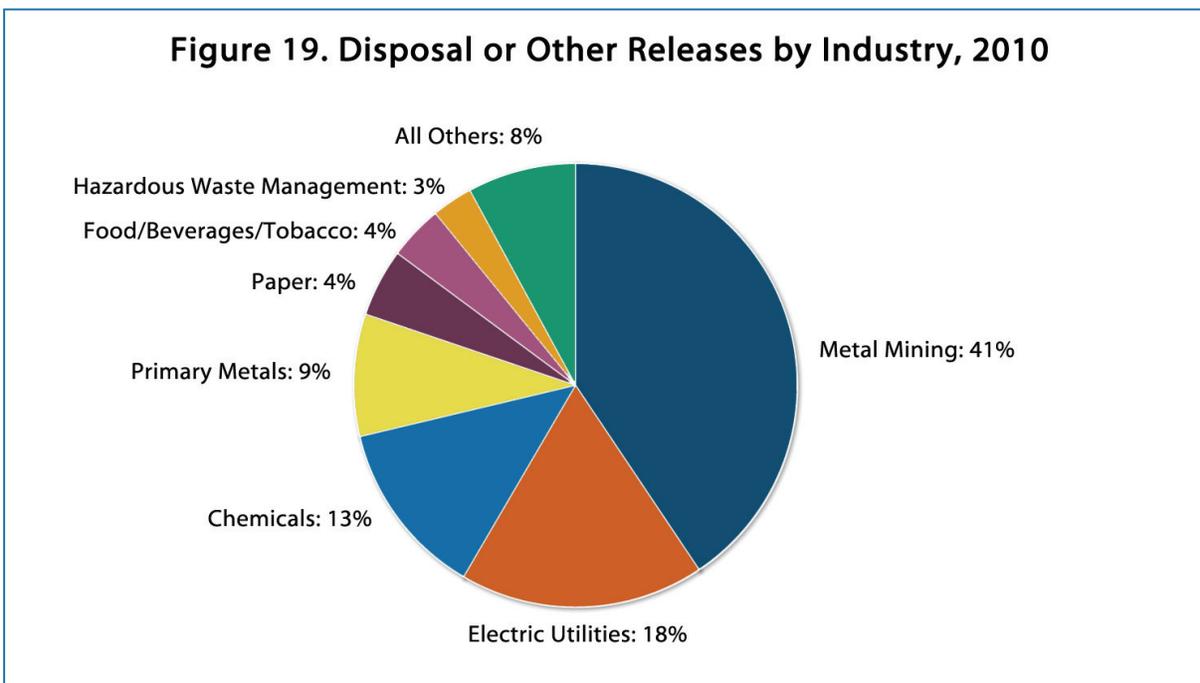


Figure 18 presents the trend in production-related waste managed by the manufacturing sector and the trend in the manufacturing sector's value added (as shown by the solid line). Similar to the trend for disposal or other releases, the manufacturing sector's production-related waste decreased by 21% from 2001 to 2010, despite a 4% increase in value added. More information on the production trends for individual sectors can be found in the sector profiles in this section.



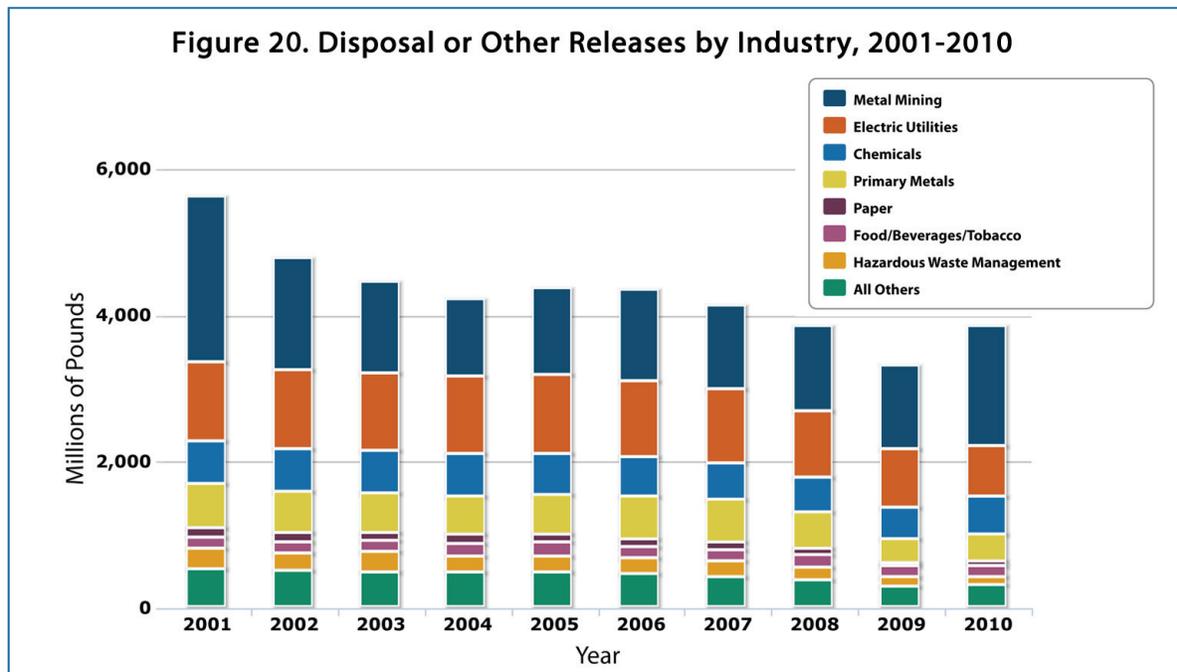
In this section, EPA uses the best available data to present select sectors' economic trends. The sources of the data vary by sector. For the electric utilities sector, electricity generation data from the U.S. Department of Energy were used (www.eia.gov/electricity/data.cfm#generation). Mine production data are from the U.S. Geological Survey (<http://minerals.usgs.gov/minerals/pubs/mcs/>). The production index from the Federal Reserve was used as an estimate of business activity for the chemical manufacturing, paper manufacturing, and cement sectors (www.federalreserve.gov/datadownload/default.htm).

To take a closer look at the individual sectors, Figure 19 shows that in 2010, 92% of all disposal or other releases of TRI chemicals originated from just seven of the 26 TRI industry sectors. More than half originated from just two industry sectors: metal mining (41%) and electric utilities (18%).

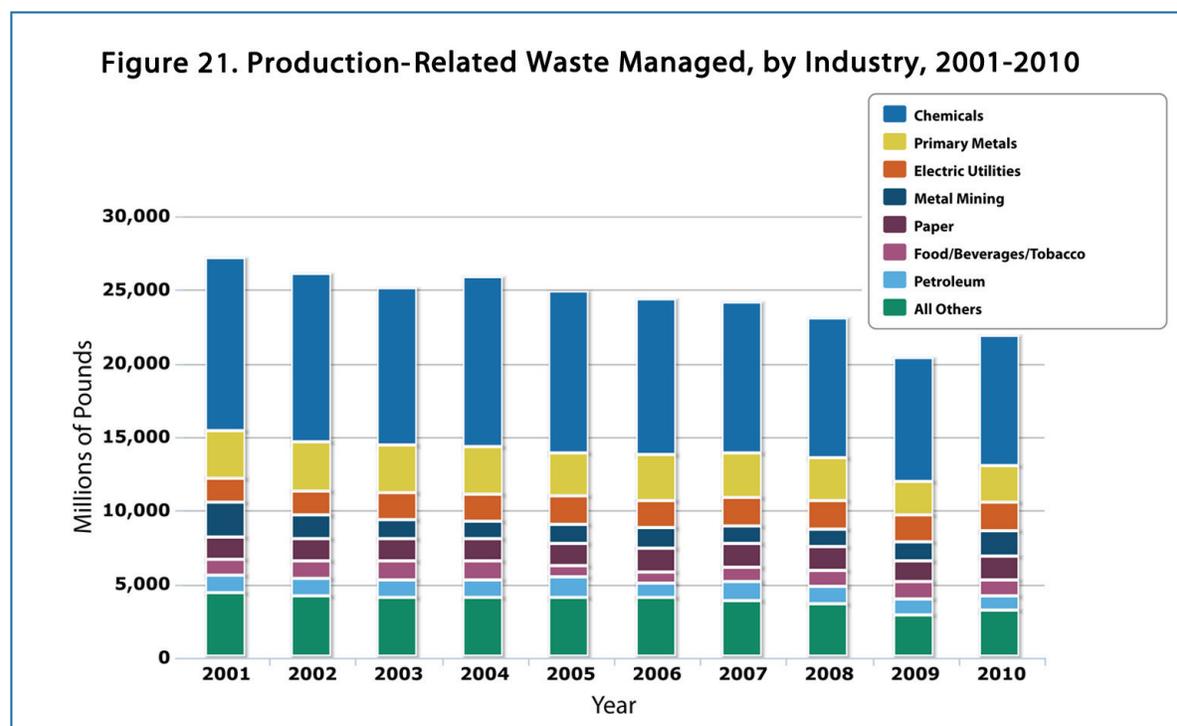


Over time, the amounts and proportions of TRI chemicals disposed of or otherwise released by each industry sector has varied as shown in Figure 20. All of the seven industry sectors with the largest reported total disposal or other releases fell from their 2001 levels, although four of them (metal mining, chemicals, primary metals and paper) had an overall increase from 2009 to 2010. The greatest decrease over the period 2001 to 2010 was observed in metal mining with a decrease of 652 million pounds (29%) from 2001, mostly due to decreases in on-site land disposal. In the early 2000s, this sector may have been adjusting their reporting in response to a ruling in a court case, *Barrick Goldstrike Mines, Inc. v. Whitman (Civ. Action No. 99-958 (TPJ))*. The decrease could also be due to other factors, such as changes in management practices and chemical composition of the ore body.

Electric utilities had the second largest decrease in disposal or other releases, 368 million pounds (34%) since 2001, with much of this occurring since 2007. They had a decrease of 12% from 2009 to 2010. Among other reasons, these reductions may be due to improved pollution prevention, improved estimation methods, and/or changes in coal composition.



As shown in Figure 21, between 2001 and 2010, the chemical manufacturing sector has reported the largest total production-related waste of any sector. In 2010, it accounted for 40% of all production-related waste from all sectors.



Most industry sectors reported a decline in total production-related waste from 2001 to 2010; however some sectors increased from 2009 to 2010:

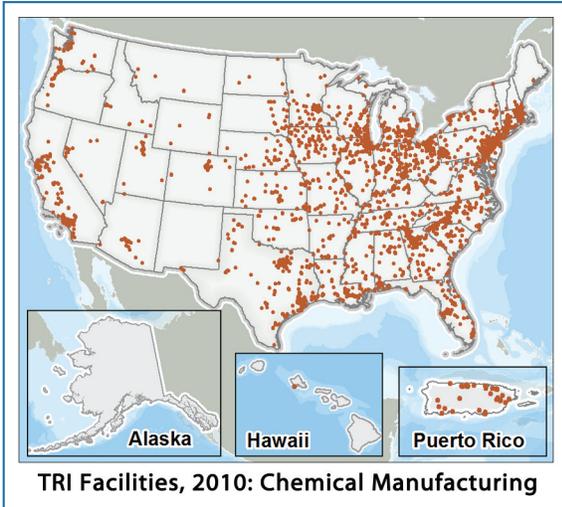
- Chemical manufacturers decreased by 25% from 2001 to 2010 although they had an increase of 3% from 2009 to 2010.
- The primary metals sector (which includes smelters and steel mills), with the second largest total production-related waste managed in all years, decreased 21% from 2001 to 2010 but had an increase of 14% from 2009 to 2010.
- Metal mining, with the third largest total in 2001 and fourth largest total in 2010, decreased 25% from 2001 to 2010 but had an increase of 38% from 2009 to 2010.
- The food/beverages/tobacco sector, with the seventh largest total in 2001 and the sixth largest in 2010, decreased 3% from 2001 to 2010, including a decrease of 9% from 2009 to 2010.
- The petroleum sector, which includes petroleum refineries and other petroleum and coal products manufacturing, with the sixth largest total in 2001 and seventh largest total in 2010, decreased 14% from 2001 to 2010, including a decrease of 3% from 2009 to 2010.



However, some industry sectors showed an increase in total production-related waste managed from 2001 to 2010:

- Electric utilities, with the third largest total for all years except 2001, increased 16%, including an increase of 2% from 2009 to 2010.
- The paper sector, which includes paper mills as well as manufacturers of paper products, with the fifth largest total in 2010, increased 6%, including an increase of 11% from 2009 to 2010.

Chemical Manufacturing



Chemical manufacturers produce a variety of products, such as basic chemicals, products used by other manufacturers (such as synthetic fibers, plastics, and pigments) and consumer products (such as paints, fertilizers, drugs, cosmetics, and soaps). The sector had the third largest total disposal or other releases for 2010 with an increase of 19% from 2009 to 2010, half of which was disposal to on-site underground injection wells. The sector accounts for almost 81% of on-site

Quick Facts for 2010

Number of TRI Facilities: 3,444

On-site and Off-site Disposal or Other Releases: 512.7 million lbs

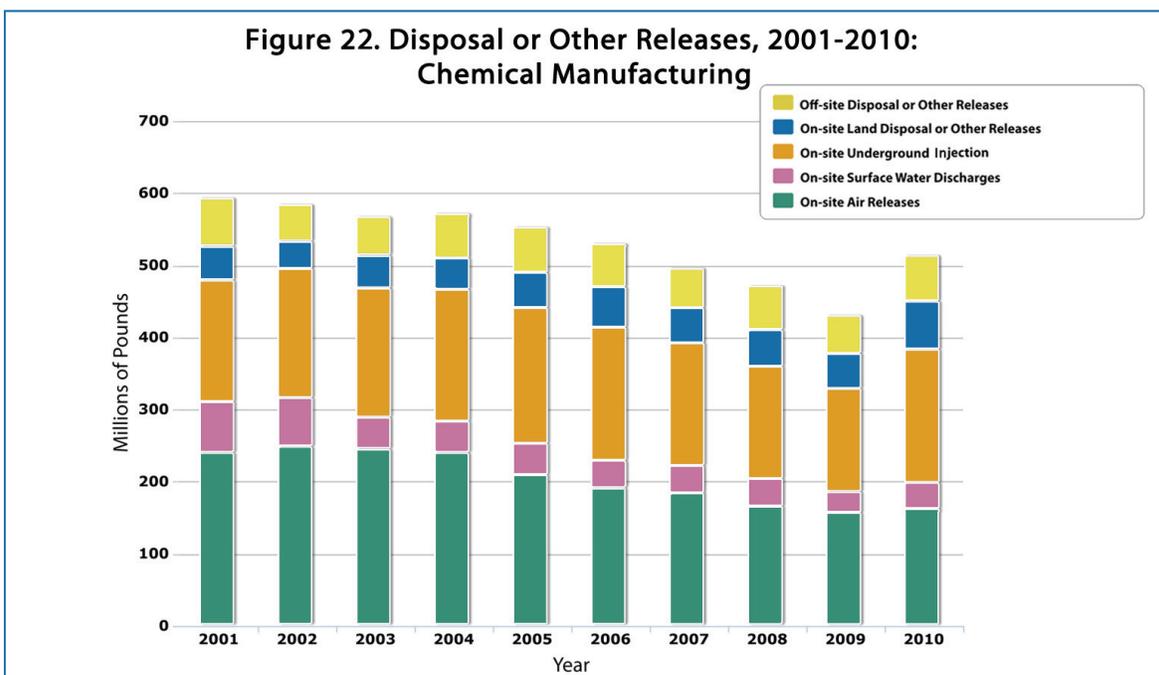
On-site: 449.3 million lbs

- Air: 161.6 million lbs
- Water: 35.9 million lbs
- Land: 66.5 million lbs
- Underground Injection: 185.3 million lbs

Off-site: 63.4 million lbs

Production-Related Waste Managed: 8,768.1 million lbs

- Recycled: 3,532.8 million lbs
- Energy Recovery: 1,272.1 million lbs
- Treated: 3,444.7 million lbs
- Disposed of or Otherwise Released: 518.6 million lbs



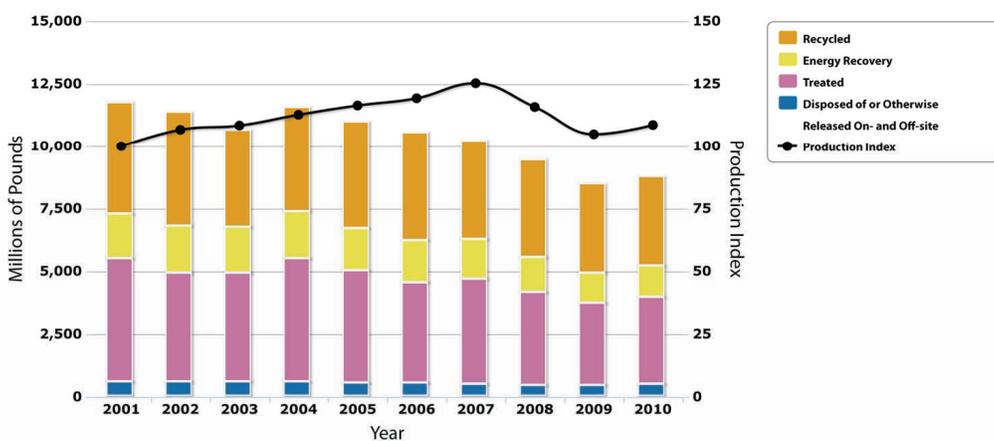
underground injection from all industries. Since 2001, the sector's disposal or other releases decreased by 13%, mainly due to a reduction in air emissions.

Partly due to the size and scope of the chemical manufacturing sector, it has consistently had the largest production-related waste managed every year since 2001, representing 40% of the total for all industries.

As shown in Figure 23, the sector's total production-related waste managed decreased in almost every year since 2005, for an overall reduction of 25%. Compare this to the black solid line in the figure, which shows a 9% increase in this sector's production from 2001 to 2010. Production-related waste managed decreased despite the sector's increased production, suggesting that the decrease in production-related waste managed by the sector was due to factors other than production.



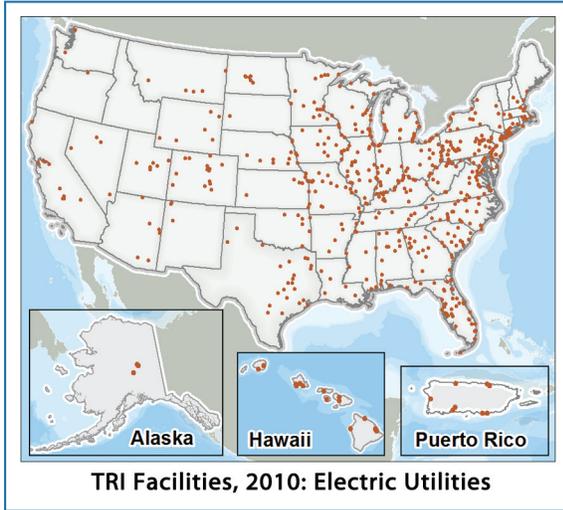
Figure 23. Production-Related Waste Managed, 2001-2010: Chemical Manufacturing



Although the chemical manufacturing sector has consistently had the largest production-related waste managed, 15% of facilities in the sector reported having initiated practices to reduce their toxic chemical use and waste generation through source reduction activities in 2010. The most commonly reported source reduction activity for the sector was good operating practices, which includes activities such as improved maintenance procedures or production schedules. One example of good operating practices was “training machine operators to reduce downtime and waste” reported for styrene. Process modifications were also commonly reported.

To learn more about this sector, visit EPA’s Chemical Compliance Assistance website at www.epa.gov/compliance/assistance/sectors/chemical.html.

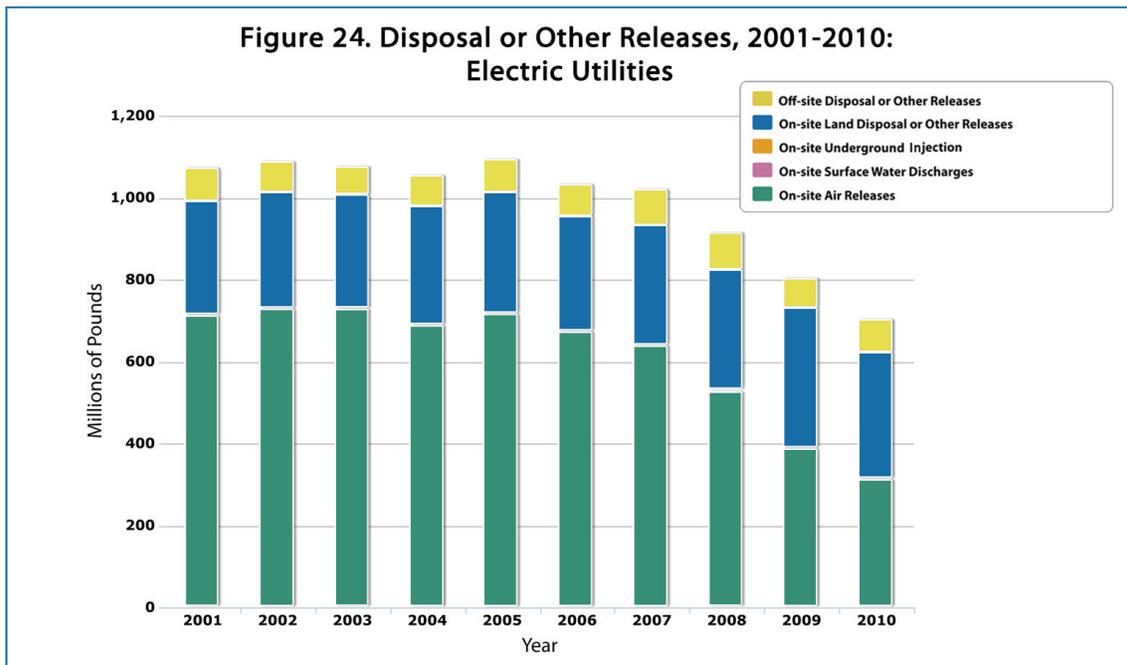
Electric Utilities



The electric utilities sector consists of establishments primarily engaged in generating, transmitting, and/or distributing electric power. Electric utility facilities may use a variety of fuels to generate electricity; however, only facilities that combust coal and/or oil to generate power for distribution in commerce must report to TRI. These electric utilities reported the second largest disposal or other releases of any industry sector for 2010, including the largest on-site air emissions, which represented over 36% of air emissions from all industries.

Quick Facts for 2010

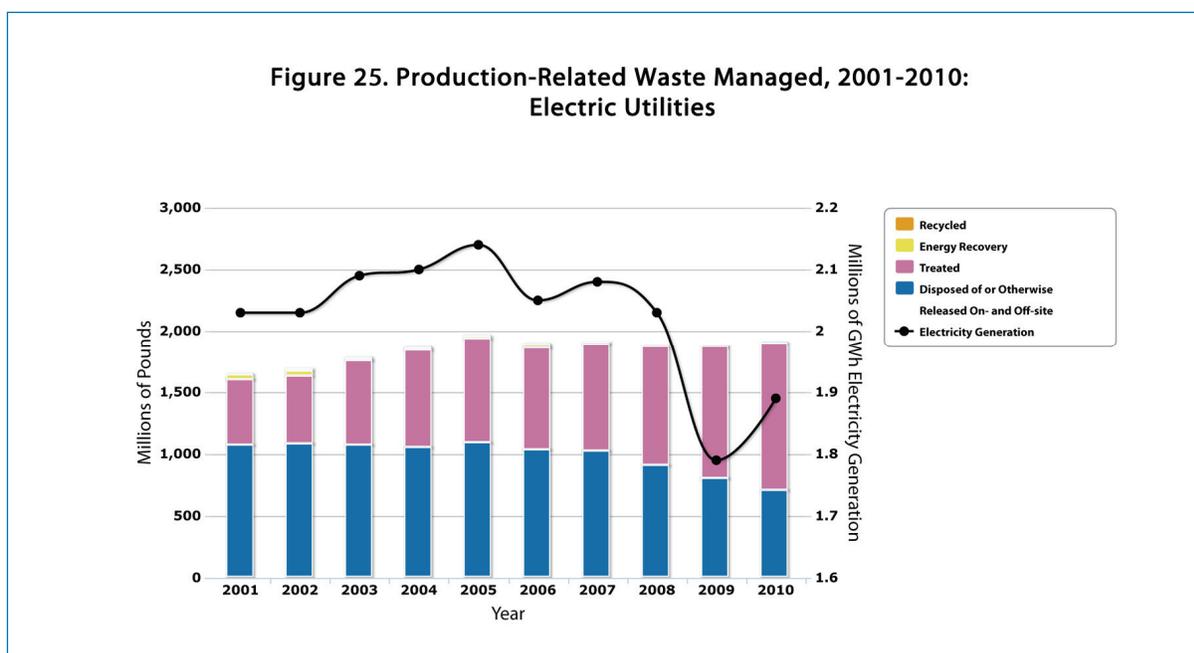
Number of TRI Facilities:	636
On-site and Off-site Disposal or Other Releases:	702.4 million lbs
On-site:	622.7 million lbs
• Air:	312.9 million lbs
• Water:	3.4 million lbs
• Land:	306.4 million lbs
• Underground Injection:	2,925 lbs
Off-site:	79.6 million lbs
Production-Related Waste Managed:	1,906.5 million lbs
• Recycled:	5.2 million lbs
• Energy Recovery:	0.5 million lbs
• Treated:	1,198.7 million lbs
• Disposed of or Otherwise Released:	702.0 million lbs



The sector's total disposal or other releases decreased by 34% from 2001 to 2010, including a 12% decrease from 2009 to 2010. Almost 45% of this sector's disposal or other releases were on-site air emissions, which decreased by 56% from 2001 to 2010, including a 19% decrease from 2009 to 2010.

The electric utilities sector had the third largest total production-related waste managed of TRI industry sectors in 2010. As shown in Figure 25, production-related waste managed increased by 16% from 2001 to 2010, including a 2% increase from 2009 to 2010. The increase was due to an increase in chemicals treated on-site, which more than doubled from 2001 to 2010. Almost two-thirds of production-related waste generated by electric utilities in 2001 was disposed of or otherwise released, but this had dropped to one-third in 2010.

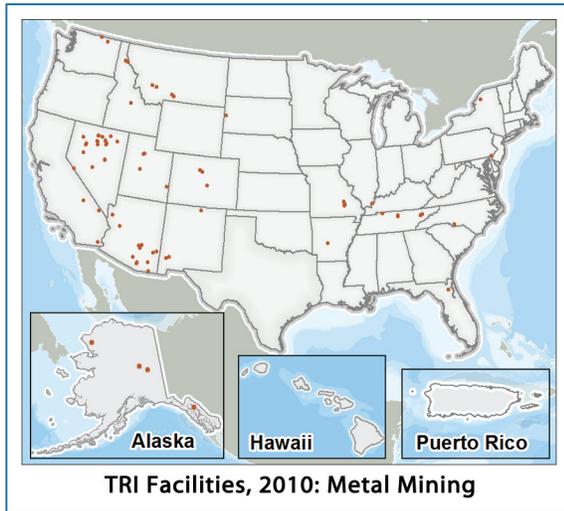
While production-related waste increased by 16% from 2001 to 2010, production, represented by the black solid line in Figure 25, decreased by 7%. The increase in production-related waste managed despite a downward trend in production suggests that factors other than production are having a greater impact increasing production-related waste than the decrease in production is having on decreasing production-related waste.



In the electric utilities sector, 3% of facilities reported having initiated practices to reduce their toxic chemical use and waste generation through source reduction activities in 2010. The most commonly reported source reduction activity for the sector was good operating practices, which includes activities such as improved maintenance procedures or production schedules. For example, one facility reported having “tested and improved the equipment performance and procedures to operate the boiler in a more efficient manner” to reduce ammonia, dioxin and dioxin-like compounds, hydrochloric acid, and lead waste.

To learn more about this sector, visit EPA’s Power Generators Compliance Assistance website at www.epa.gov/compliance/assistance/sectors/power.html.

Metal Mining



The portion of the metal mining sector covered by TRI includes facilities mining for copper, lead, zinc, silver, gold, and several other metals. These facilities tend to be in Western states where most of the copper, silver and gold mining occurs, while zinc mining occurs in Tennessee and lead mining in Missouri. 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 2010

Number of TRI Facilities: 79

On-site and Off-site Disposal or Other Releases: 1,622.6 million lbs

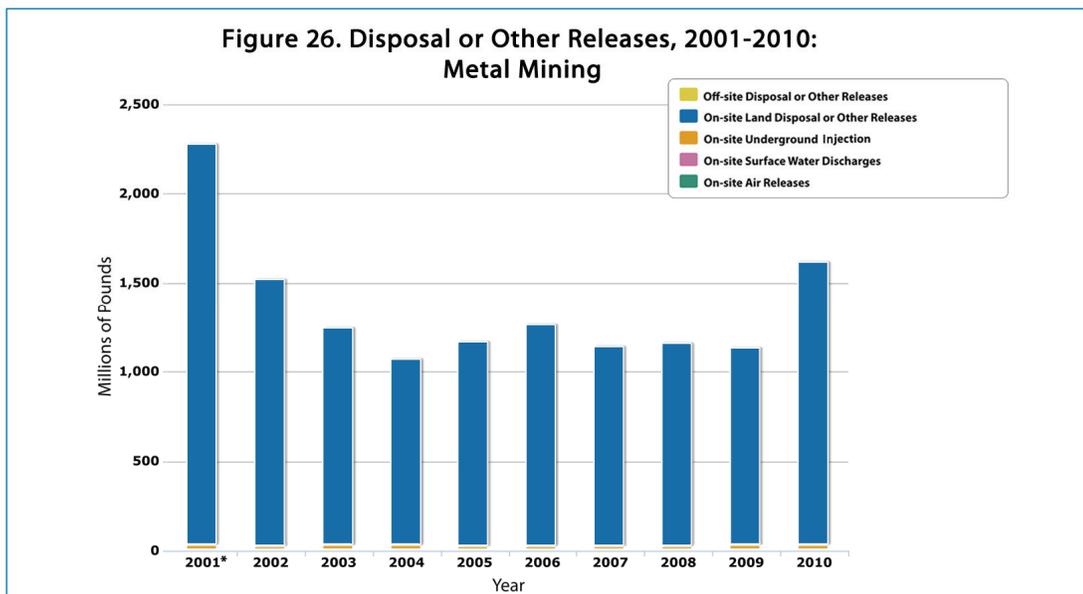
On-site: 1,620.2 million lbs

- Air: 3.3 million lbs
- Water: 1.9 million lbs
- Land: 1,587.6 million lbs
- Underground Injection: 27.5 million lbs

Off-site: 2.3 million lbs

Production-Related Waste Managed: 1,775.1 million lbs

- Recycled: 63.8 million lbs
- Energy Recovery: 133 lbs
- Treated: 89.8 million lbs
- Disposed of or Otherwise Released: 1,621.5 million lbs



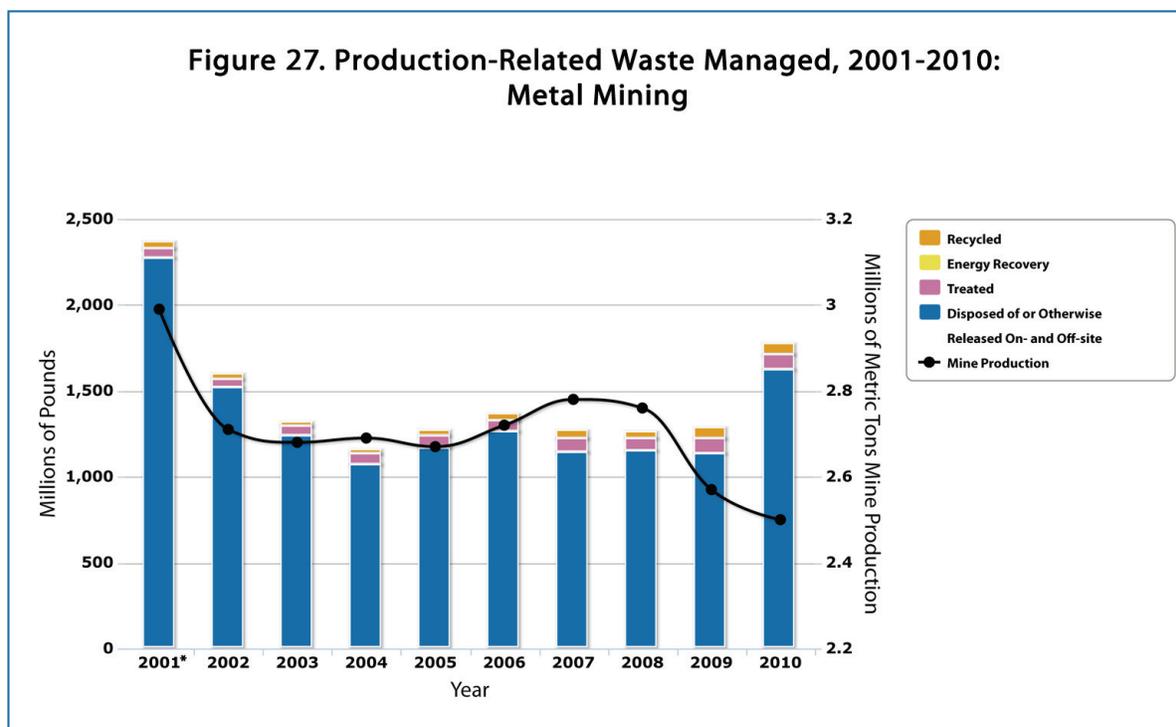
*Predates court rulings that chemicals in waste rock may be exempt based on concentration in *Barrick Goldstrike Mines, Inc. v. Whitman* (Civ. Action No. 99-958(TPJ)).

In 2010, the metal mining sector reported the largest disposal or other releases representing about 41% of the total disposal or other releases for all industries. It also reported more than two-thirds (72%) of the on-site land disposal reported for 2010 for all industries.



The metal mining sector had the fourth largest total production-related waste managed in 2010. As shown in Figure 27, total production-related waste managed shows a large decrease, particularly from 2001 to 2004. The large decrease in earlier years reflects changes in the industry's reporting in response to a ruling in a court case, *Barrick Goldstrike Mines, Inc. v. Whitman (Civ. Action No. 99-958 (TPJ))*.

Production-related waste managed decreased 25% from 2001 to 2010; however, because of the court case and resulting changes in reporting, trends are examined for 2004 to 2010. From 2004 to 2010, production-related waste managed increased by 54%, while mine production, represented by the black solid line in Figure 27, shows a 7% decrease over the same period. The increase in production-related waste despite a downward trend in production suggests that factors other than production are having a greater impact increasing production-related waste than the decrease in production is having on decreasing production-related waste.



*Predates court rulings that chemicals in waste rock may be exempt based on concentration in *Barrick Goldstrike Mines, Inc. v. Whitman (Civ. Action No. 99-958(TPJ))*.

More recently, from 2009 to 2010, the metal mining sector reported an increase in production-related waste managed of 38%. Several mining facilities revised their method of estimation for 2010, which may account for some of the reported increase between 2009 and 2010. However, increases may also be due to other reasons such as changes in the composition of the ore body.

In the metal mining sector, 5% of facilities reported having initiated practices to reduce their toxic chemical use and waste generation through source reduction activities in 2010. The most commonly reported source reduction activity for the sector was good operating practices, such as improved maintenance scheduling.

To learn more about this sector, visit EPA's Minerals/Mining/Processing Compliance Assistance website at www.epa.gov/compliance/assistance/sectors/mineralsmining.html.

Paper and Paper Products



Facilities in this sector include pulp and paper mills, as well as manufacturers of paper products such as boxes and bags. Compared to other TRI industry sectors, the paper sector reported the fifth largest total disposal or other releases in 2010. It had the third largest air emissions of any sector, accounting for 16% of total air emissions. Total disposal or other releases from this sector decreased by 16% from 2001 to 2010, but increased by 1% from 2009 to 2010. Air emissions decreased by 21% from 2001 to 2010, but increased by 3% from 2009 to 2010.

Quick Facts for 2010

Number of TRI Facilities: 402

On-site and Off-site Disposal or Other Releases: 178.0 million lbs

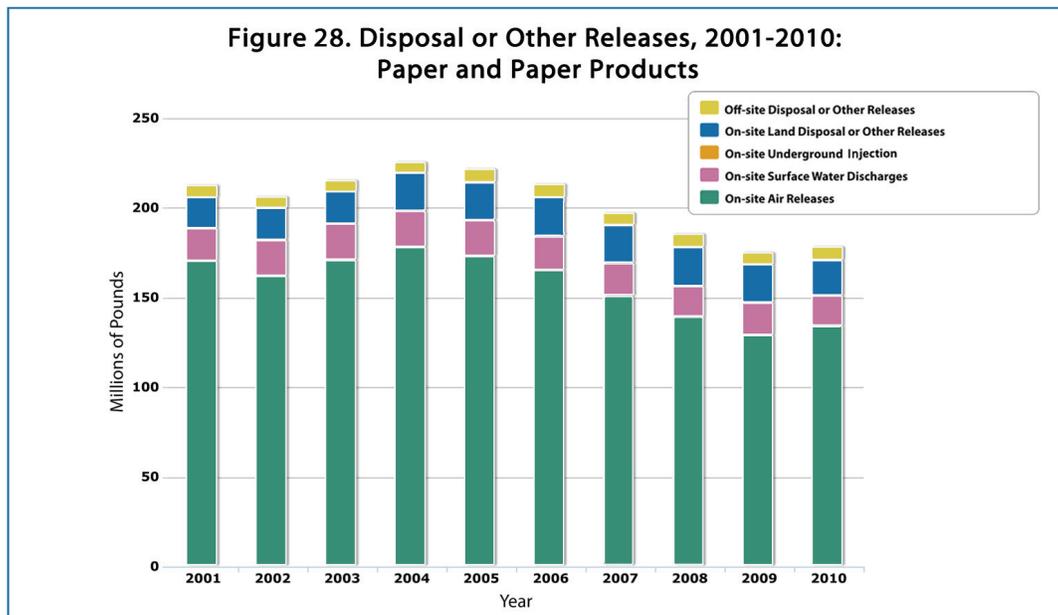
On-site: 170.7 million lbs

- Air: 133.6 million lbs
- Water: 17.0 million lbs
- Land: 20.1 million lbs
- Underground Injection: none

Off-site: 7.3 million lbs

Production-Related Waste Managed: 1,595.7 million lbs

- Recycled: 44.7 million lbs
- Energy Recovery: 206.9 million lbs
- Treated: 1,160.9 million lbs
- Disposed of or Otherwise Released: 183.1 million lbs

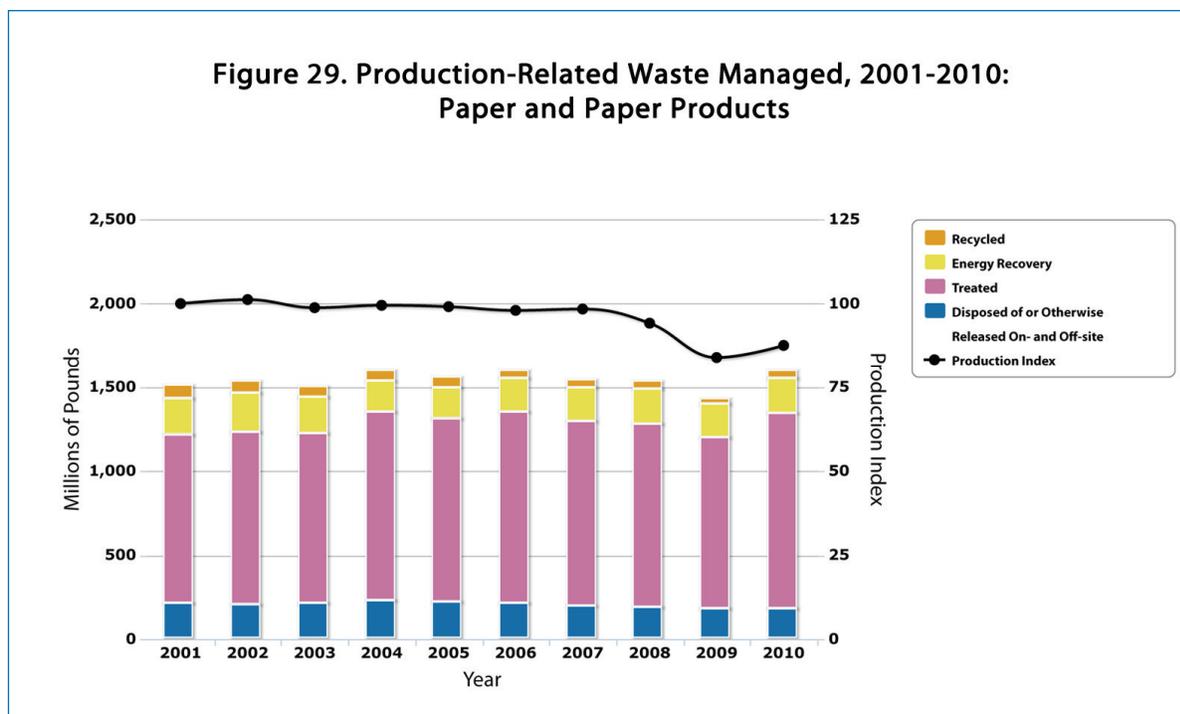


Paper manufacturers had the fifth largest production-related waste managed in 2010. As shown in Figure 29, the sector had an increase of 6% from 2001 to 2010, including an increase of 11% from 2009 to 2010. The increase in total production-related waste managed was mainly due to increases in the amount of chemicals treated on-site. Other types of waste management decreased from 2001 to 2010. Compare the 6% increase in production-related waste managed from 2001 to 2010 to the black solid line in Figure 29, which shows a 12% decrease in production from 2001 to 2010. The increase in production-related waste despite a downward trend in production suggests that factors other than production are having a greater impact increasing production-related waste than the decrease in production is having on decreasing production-related waste.

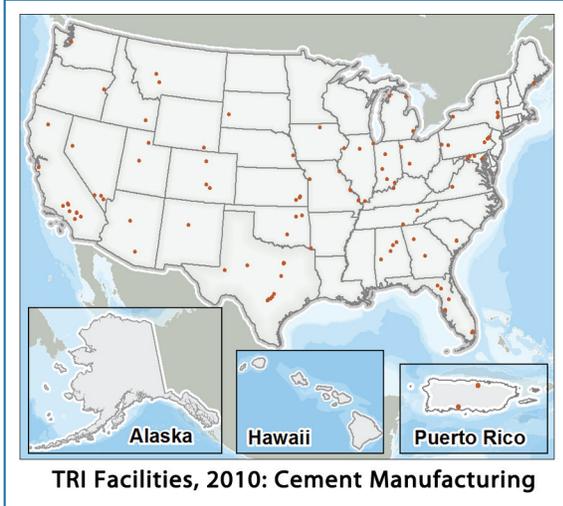


In the paper manufacturing sector, 9% of facilities reported having initiated practices to reduce their toxic chemical use and waste generation through source reduction activities in 2010. The most commonly reported source reduction activity for the sector was raw materials modifications. One example of raw material modification at a paper manufacturer was the “substitut[ion of] sodium hypochlorite solution for chlorine in disinfecting applications” to reduce chlorine waste. Process modifications were also commonly reported. For example, one manufacturer’s reporting forms for polycyclic aromatic compounds and benzo[g,h,i]perylene stated that the facility had “retubed boilers to increase fuel efficiency.”

To learn more about this sector, visit EPA’s Pulp/Paper/Lumber Compliance Assistance website at www.epa.gov/compliance/assistance/sectors/pulp.html.



Cement Manufacturing



Facilities in the cement sector produce cement from limestone, clay, and sand, mixed in a kiln at high temperatures. Cement is used extensively in the construction industry, primarily to make ready-mix concrete. In 2010, the sector ranked 19th compared to other sectors in terms of total disposal or other releases. Three-quarters (76%) of its disposal or other releases were air emissions.

Quick Facts for 2010

Number of TRI Facilities: 109

On-site and Off-site Disposal or Other Releases: 5.3 million lbs

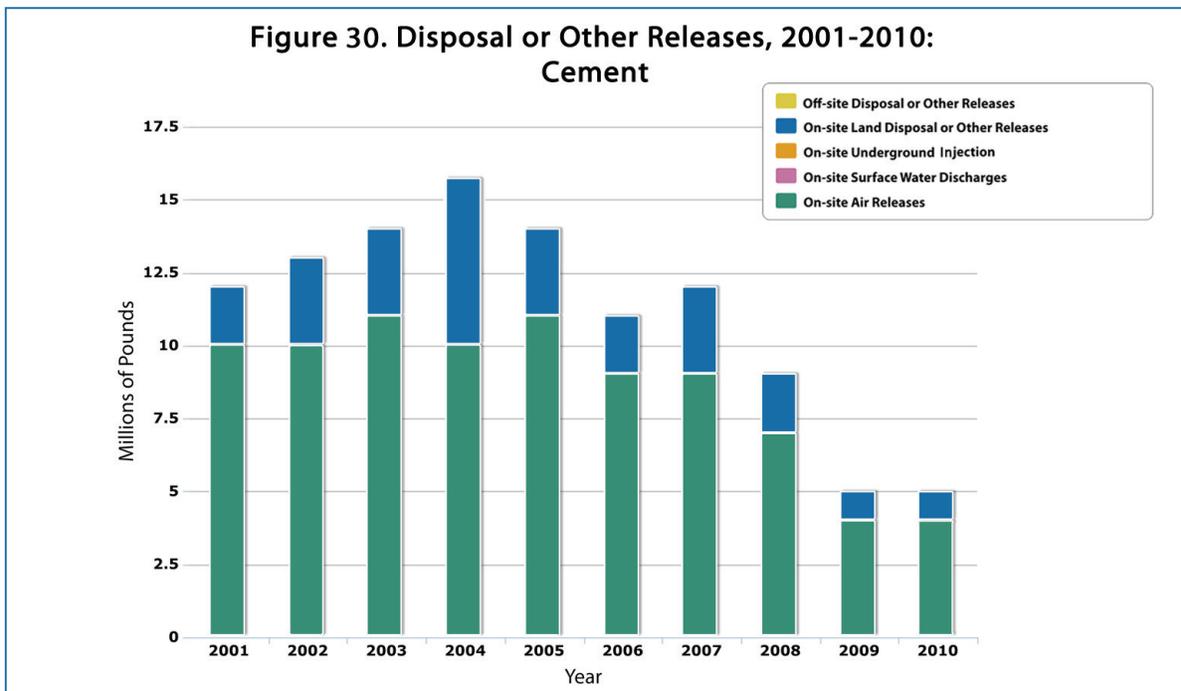
On-site:

- Air: 4.0 million lbs
- Water: 2,092 lbs
- Land: 1.2 million lbs
- Underground Injection: none

Off-site: 110 thousand lbs

Production-Related Waste Managed: 255.5 million lbs

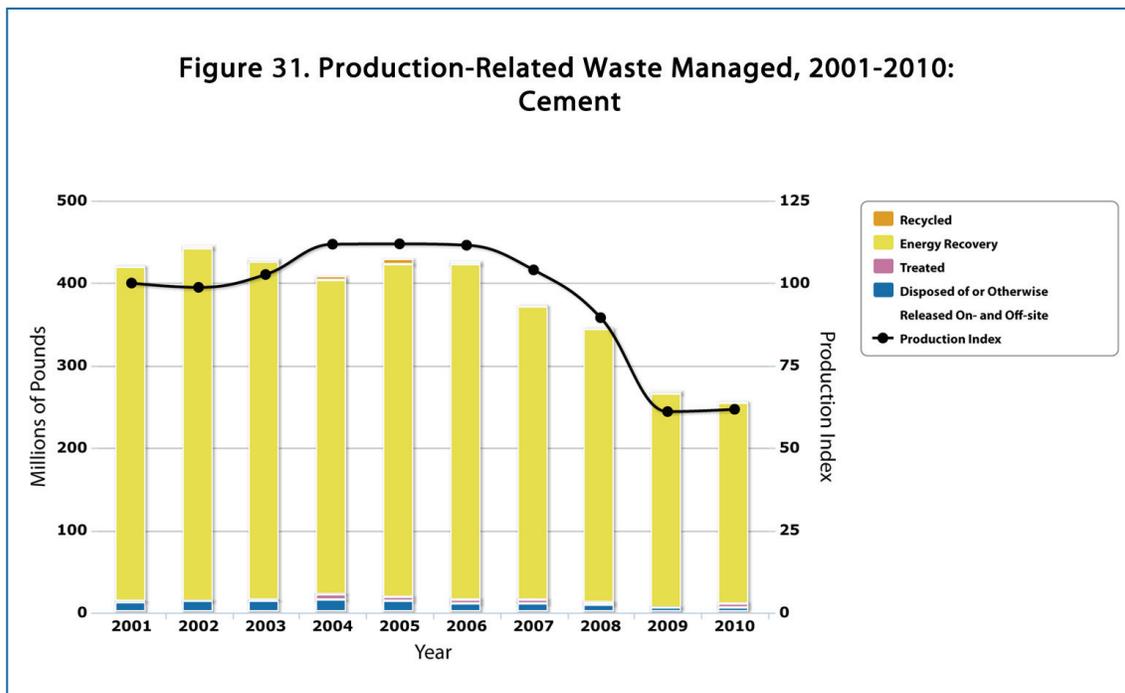
- Recycled: 2.0 million lbs
- Energy Recovery: 243.6 million lbs
- Treated: 4.7 million lbs
- Disposed of or Otherwise Released: 5.3 million lbs



The sector had a 56% decrease in total disposal or other releases from 2001 to 2010, including a decrease of 2% from 2009 to 2010. Air emissions decreased by 59% from 2001 to 2010 and by 6% from 2009 to 2010.



Cement manufacturers had the 13th largest quantity of production-related waste managed of TRI industry sectors in 2010. As shown in Figure 31, they have reported a decrease in total production-related waste managed in every year since 2005, including a 5% decrease from 2009 to 2010. From 2001 to 2010 production-related waste dropped 39%. Compare this to the black solid line in the figure, which shows a similar drop (down 38%) in this sector's production from 2001 to 2010, suggesting that the decline in production-related waste managed was affected by the decreased production.



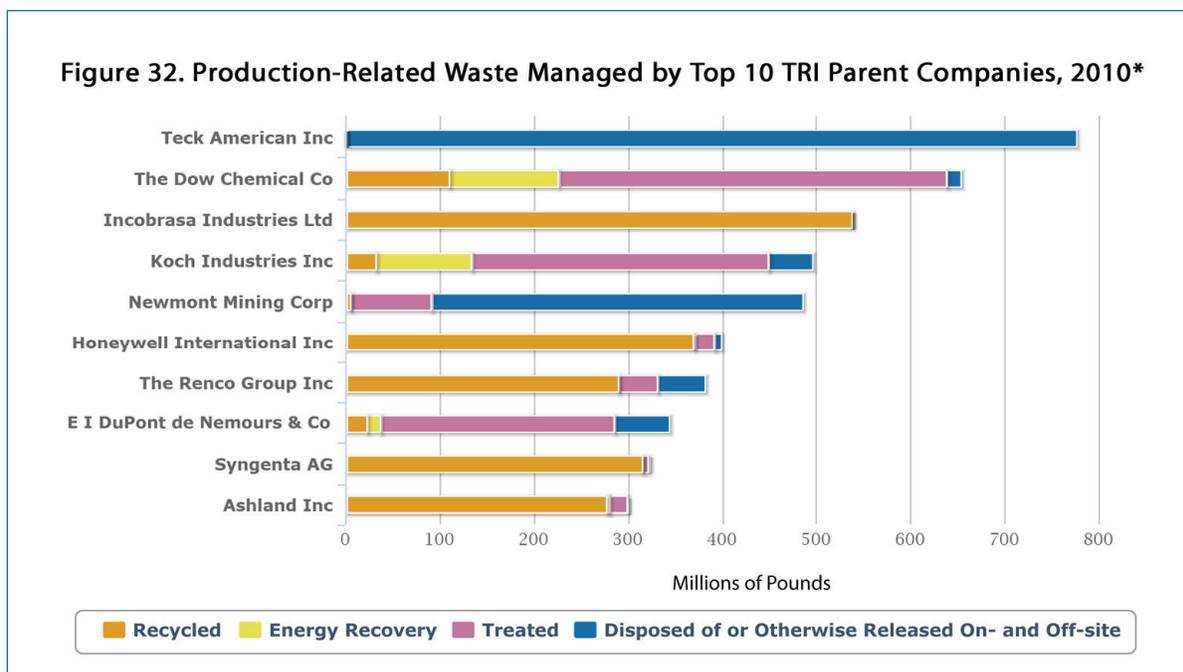
In the cement sector, 3% of facilities reported having initiated practices to reduce their toxic chemical use and waste generation through source reduction activities in 2010. These facilities all reported process modifications as their source reduction activity. For example, one manufacturer's form reported a "substantial reduction in use of shotgun shells to remove rings inside kilns from 2009 to 2010 resulting in significant reduction in lead emissions."

To learn more about the cement sector, visit EPA's compliance assistance website at www.epa.gov/compliance/assistance/sectors/readymix-aggregate.html.

Parent Companies

Many of the facilities reporting to TRI are owned by parent companies that also own other facilities reporting to TRI. Facilities reporting to TRI are asked to provide information on their parent company if they have one. The TRI parent companies must be located in the United States.

The parent companies and single facilities with no parent company that reported the largest total quantity of chemicals in TRI production-related waste managed are shown in Figure 32. As stated earlier in this document, production-related waste includes the total amounts of toxic chemicals in waste managed by facilities, which helps track industry progress in reducing waste generation and in moving toward safer waste management alternatives. It includes quantities of chemicals recycled, used for energy recovery, treated, and disposed of or otherwise released on- and off-site.



* EPA has placed an added emphasis on the importance of improved data quality for parent company names. These rankings reflect the parent company information provided by facilities in Reporting Year 2010 and have not been independently verified. There was one facility, Incobrasa Industries Ltd, with a comparable quantity of production-related waste managed that does not have a parent company; it is also included.

These companies vary in size and sector. The number of TRI reporting facilities owned by these companies ranges from 1 to 101. Four of the top ten companies operate primarily in the chemical manufacturing sector (Dow Chemical, DuPont, Syngenta AG, and Ashland). Others are in the food products sector (Incobrasa Industries) and metal mining (Teck American and Newmont Mining). The Renco Group operates mines and primary metals smelters. Koch Industries' TRI facilities operate in a variety of industry sectors including pulp and paper, petroleum refining, chemicals, and polymers and fibers. Honeywell International operates TRI facilities involved in manufacturing chemicals, plastics/rubber, primary and fabricated metals, machinery, and computers/electronics.

As stated earlier, the waste management hierarchy, established by the 1990 Pollution Prevention Act, guides and encourages waste generators toward the best options for managing their wastes. At the top of the hierarchy is the most preferable option: the prevention of toxic waste generation through pollution prevention or source reduction activities. Pollution prevention practices can include modifications to equipment, processes, and procedures, as well as reformulation or redesign of products, substitution of raw materials, and improvement in maintenance and inventory controls.

Facilities are asked to report on the pollution prevention activities they initiate each year. In 2010, almost 11% of all facilities reporting to TRI indicated that they initiated pollution prevention activities. Over 18% of all facilities reporting to TRI indicated that they initiated pollution prevention activities in at least one year since 2006. Table 1 shows the percent of facilities of the top 10 parent companies that have reported source reduction for 2010, and in the recent past (2006 to 2010).

Parent Company	Facilities Reporting for 2010	Percent of Facilities Reporting Source Reduction Activities for 2010	Percent of Facilities Reporting Source Reduction Activities at Least One Year 2006-2010
Teck American Inc	1	0%	0%
The Dow Chemical Co	51	10%	31%
Incobrasa Industries Ltd	1	0%	0%
Koch Industries Inc	101	3%	7%
Newmont Mining Corp	7	0%	0%
Honeywell International Inc	70	20%	27%
The Renco Group Inc	7	0%	0%
E I DuPont de Nemours & Co	61	34%	43%
Syngenta AG	3	33%	33%
Ashland Inc	61	8%	20%

Some companies report additional information to EPA about their pollution prevention or waste management activities. For example, among the top 10 parent companies, additional information reported included:

- A Dow Chemical Company facility reported reducing toluene waste by implementing an in-line toluene recovery system to reuse recovered toluene as a raw material in the process rather than generate it as a waste.
- To reduce ethylene glycol waste, a Syngenta facility installed an improved valve configuration for their surfactant unloading to eliminate cross contamination and disposal of off-specification material.
- Honeywell reduced lead use and waste through a new product development effort focused on no-lead solders.
- By changing to a higher grade dicyclopentadiene, an Ashland facility reduced the total solvent waste generated during the process.

This information can be accessed on each facility's individual Form Rs (Section 8.11) through TRI Explorer or Envirofacts (www.epa.gov/tri/tridata/index.html).

TRI Tools and Resources

Tools and resources that can help you find information specific to your concerns and communities:

For more information about the Toxics Release Inventory Program

- EPA's TRI website – www.epa.gov/tri/triprogram/whatis.htm

For geography-specific analysis of TRI data

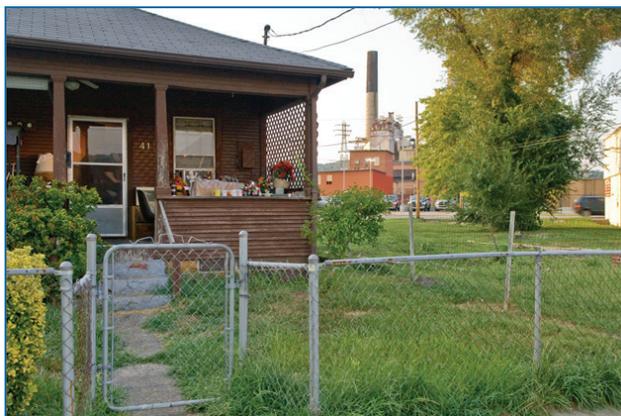
- State Data Sheets – www.epa.gov/triexplorer/statefactsheet.htm
- Urban Communities – www.epa.gov/tri/tridata/tri10/nationalanalysis/tri-urban-comm-intro.html
- Large Aquatic Ecosystems – www.epa.gov/tri/tridata/tri10/nationalanalysis/tri-lae-intro.html
- Indian Country and Alaska Native Villages – www.epa.gov/tri/tridata/tri10/nationalanalysis/tri-indian-country-alaska.html

To access the following analysis tools – www.epa.gov/tri/tridata/index.htm

- TRI Explorer is an on-line tool that generates TRI reports based on facilities, chemicals, geographic areas, or industry type at the county, state, and national level.
- Envirofacts provides access to information contained in TRI and other EPA databases, including Air, Chemicals, Facility Information, Hazardous Waste, Risk Management Plans, and Superfund.
- TRI.NET is a downloadable high performance data engine supporting large and complex TRI queries and trends.
- myRTK is a Web application designed for mobile devices that maps nearby facilities that report to TRI, as well as other facilities that comply with EPA permitting programs.
- TRI-CHIP is a database system containing technical hazard information for the TRI chemicals.
- TRI Comparative Analysis Tool provides comparisons of TRI data with facility-level data from other EPA databases.

See also

- Chemical Right 2 Know (www.chemicalright2know.org/) – a site developed by the Environmental Council of the States through a cooperative agreement with EPA.





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