

**U.S. EPA Toxics Release Inventory
Reporting Year 2008 National Analysis**

Summary of Key Findings

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U.S. EPA Toxics Release Inventory Reporting Year 2008 National Analysis

Summary of Key Findings

I. Background Information

A. U.S. EPA TRI Program

The United States (U.S.) Environmental Protection Agency (EPA) Toxics Release Inventory (TRI) program collects information on disposal or other releases (and other waste management activities) for over 650 chemicals from industrial sources in all 50 states and the U.S. territories. The information has been collected annually since 1988. For 2008, the latest year for which data are available, disposal or other releases of TRI chemicals totaled almost 3.9 billion pounds from almost 21,700 U.S. facilities submitting approximately 83,600 chemical forms.

The 2008 TRI data are now available online in a searchable, sortable format at www.epa.gov/triexplorer. We invite you to visit our web site and explore the data to learn more about toxic chemical releases and waste management activities across the U.S. by state, county or even zip code – and more! Summary tables are also available in a separate document as part of this TRI 2008 National Analysis (available at www.epa.gov/tri/tridata/tri08/national_analysis/index.htm). Please read *Background on TRI Data Collection* (available at www.epa.gov/tri/tridata/tri07/pdr/background2009.pdf) prior to reviewing these key findings, as that document explains the kinds of data collected under TRI and helps with data analysis and interpretation. The following information reflects the TRI data as of December 2009.

B. Time Period for the TRI 2008 National Analysis

The time period covered for this year's data release is January 1 to December 31, 2008. These 2008 data were reported to EPA by July 1, 2008. They were released to the public on a form-by-form basis in September 2009, and were released to the public in a consolidated format with summary analysis in December 2009. Data for previous years back to 1988 are also available.

C. Recent Changes to Reporting Requirements

There were two reporting change for the 2008 data. Beginning with Reporting Year 2008, facilities that file reports for the dioxin and dioxin-like compounds category may also need to file a Form R Schedule 1. The Form R Schedule 1 is a four-page form which includes chemical-specific information for each type of disposal or other release as well as the waste managed data (Form R, Sections 5, 6, and 8 (current year only)). The Form R Schedule 1 requires the reporting of the individual grams data for each member of the dioxin and dioxin-like compounds category and is submitted as an adjunct to the Form R. Facilities that have any of the information required by Form R Schedule 1 must submit a Form R Schedule 1 in addition to the Form R. Using the reported grams data, Toxic Equivalency (TEQ) total values can be calculated for each of the reported media. TEQ total values are calculated by multiplying the grams data for each reported member of the media type by its Toxic Equivalency Factor (TEF) value and then summing the results.

The second reporting change occurred when the 2009 Omnibus Appropriations Act returned TRI reporting requirements back to the rules in effect prior to December 22, 2006. The change requires that all reports on persistent, bioaccumulative, and toxic (PBT) chemicals be submitted on the Form R, the more detailed form. For all other chemicals the shorter form, Form A, may be used only if the “annual reporting amount” is 500 pounds or less and that the chemical was manufactured, processed or otherwise used in an amount not exceeding 1 million pounds during the reporting year.

In addition, beginning with the 2006 data, facilities were required to submit appropriate 2007 North American Industry Classification System (NAICS) designations for their facility rather than the 1987 Standard Industrial Classification (SIC) codes previously used (71 Federal Register 32464 June 6, 2007, see www.epa.gov/tri/lawsandregs/naic/). To do trends analysis, EPA has assigned NAICS codes to data for years prior to 2006. The assignments were done based on the NAICS code reported by the facility for 2006 or 2007 or, if not available, the SIC code was translated to the NAICS code, where possible.

II. Methodology for TRI Analysis

EPA takes the data submitted by facilities, conducts extensive quality assurance reviews and compiles the data into two databases:

- Total Disposal or other Releases, and
- Production-Related Waste Managed

Total disposal or other releases addresses the amount of chemicals disposed of or released on-site and off-site during the year and is based on the definition of release in Section 329 of the Emergency Planning and Community Right-to-Know Act (EPCRA). “Disposal or other releases” represent a wide range of management methods, from highly controlled disposal, such as in hazardous waste landfills, to uncontrolled releases due to accidental leaks or spills. Generally, when EPA analyzes the data on total disposal or other releases, the focus is on final disposition or release of TRI chemicals. The data used in such analyses come from Sections 5 and 6 of the TRI Reporting Form R¹. *Such analyses do not include amounts that are reported as transferred to other TRI facilities.* Receiving TRI facilities (i.e. facilities that report to TRI and also accept wastes from other TRI-reporting facilities) report these amounts as on-site disposal or other releases. EPA only counts the on-site disposal or other release to avoid double counting the amount disposed of or released during the year.

Production-Related Waste Managed addresses the entire amount of waste generated during normal production processes and how it was managed. The Pollution Prevention Act of 1990 (PPA) requires facilities to report information about the quantities of TRI chemicals they manage in waste, both on-and off-site, including amounts reported as recycled, burned for energy recovery, treated, as well as waste that is disposed, or otherwise released. While Total Disposal or other Releases focuses on the ultimate disposition of a chemical, Production-related Waste Managed focuses on waste management and counts a waste as many times as it is managed during the year. It does not include non-production related releases, which include releases due to natural disasters, accidentally leaks or other one-time occurrences that are not part of the routine production process. The data used in this analysis come from Section 8 of the TRI Reporting Form R. These data allow

¹ TRI reporting Form R can be viewed at www.epa.gov/tri/report/index.htm#forms

tracking of progress in reducing waste generation and movement towards preferred methods of waste management, called the waste management hierarchy.

The waste management hierarchy indicates that source reduction (i.e., preventing the creation of waste) is the preferred approach, followed by recycling. Waste that cannot be prevented or recycled can be used for energy recovery or treated. Disposal or other releases is the least preferred.

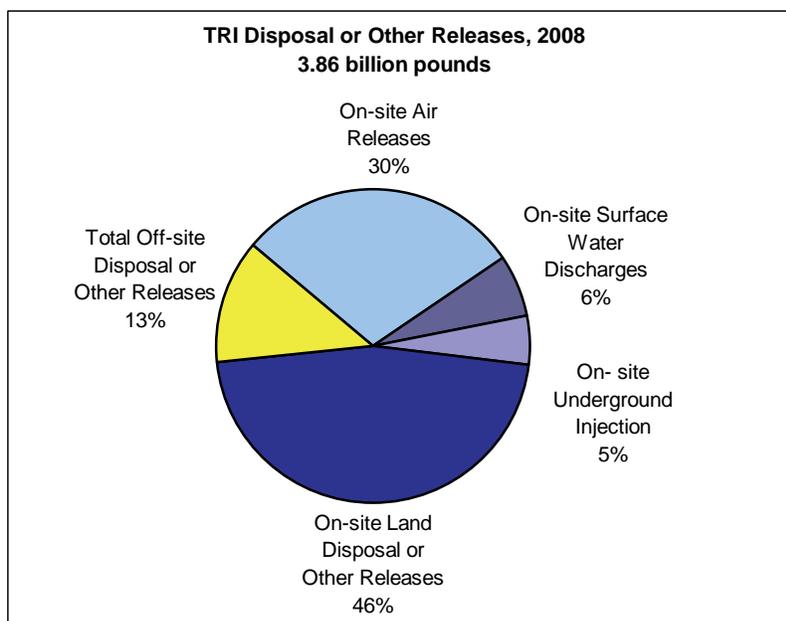
III. Overview of the TRI 2008 Data

A. What was reported for 2008?

1. Total Disposal or Other Releases

Almost 3.9 billion pounds were disposed of or otherwise released in 2008 by facilities that are required to report to EPA under EPCRA Section 313. Most of the chemicals are managed on-site (Figure 1).

Figure 1. TRI Disposal or Other Releases, 2008



- 87% (3.37 billion pounds) was disposed of or otherwise released **on-site**, including
 - ▶ 30% (1.14 billion pounds) as air emissions
 - ▶ 6% (247 million pounds) as surface water discharges
 - ▶ 5% (187 million pounds) in on-site underground injection wells, including
 - 4% (169 million pounds) in Class I Wells and
 - 0.5% (18 million pounds) in Class II-V Wells
 - ▶ 46% (1.80 billion pounds) as land disposal or other releases, including
 - 3% (123 million pounds) in RCRA Subtitle C landfills,
 - 8% (291 million pounds) in other on-site landfills,
 - 0.1% (4.2 million pounds) in RCRA Subtitle C surface impoundments,
 - 19% (732 million pounds) in other surface impoundments, and

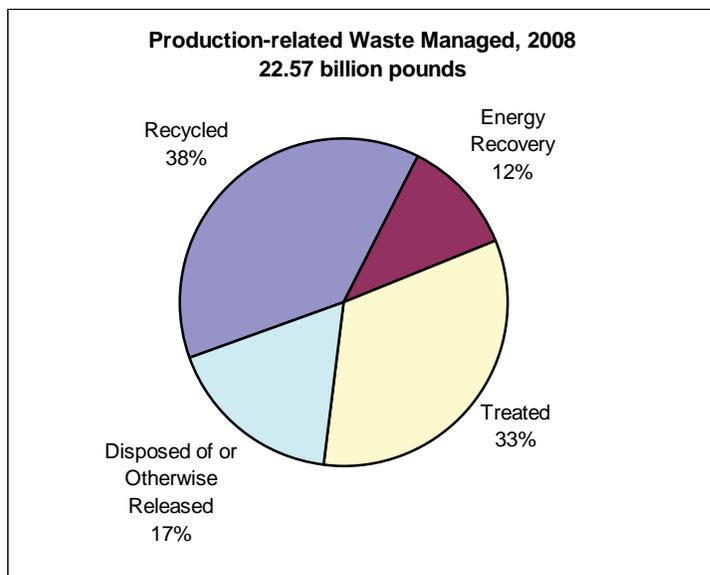
- 16% (622 million pounds) in other land disposal (such as waste piles, spills or leaks)
- 13% (489 million pounds) was sent **off-site** for disposal or other releases, including
 - ▶ 10% (383 million pounds) to land disposal or other releases, including
 - 2% (64 million pounds) to RCRA Subtitle C landfills,
 - 7% (259 million pounds) to other landfills, and
 - 1% (46 million pounds) to other land disposal (such as waste piles, spills or leaks)
 - ▶ less than 0.1% (3.6 million pounds) of metals and metal compounds for wastewater treatment, and
 - ▶ 2% (93 million pounds) of other types of transfers, including
 - 1% (47 million pounds) of metals and metal compounds sent for solidification and/or stabilization, and
 - 0.5% (20 million pounds) transferred to waste brokers for disposal.

Over 15% of total disposal or other releases were in on-site Class I wells, RCRA Subtitle C and other landfills and almost 9% were in off-site Class I wells, RCRA Subtitle C and other landfills. These facilities may limit contamination and human exposure by using engineering controls. For example, disposal of harmful materials in Class I Underground Injection wells located in isolated formations beneath the lowermost underground source of drinking water limits potential for contamination. Similarly, disposal to landfills that are designed with liners, covers, leak detection systems, and groundwater monitoring systems also limits the potential for human exposure and contamination.

2. Total Production-related Waste Managed

Almost 22.6 billion pounds of production-related waste were managed by TRI facilities in 2008. The quantities of TRI chemicals are reported by the management method used. The waste management hierarchy establishes that once the waste is generated the preferred management methods are recycling, followed by burned for energy recovery, treatment and, as a last resort, disposal or otherwise released. (Figure 2)

Figure 2. Production-related Waste Managed, 2008



- 38% (8.59 billion pounds) was recycled on- and off-site.
- 12% (2.61 billion pounds) was combusted for energy recovery on- and off-site.
- 33% (7.44 billion pounds) was treated on- and off-site.
- 17% (3.94 billion pounds) was the quantity disposed of or otherwise released on- and off-site.

Why is the quantity disposed of or otherwise released here (3.94 billion) different from total disposal or other releases above (3.86 billion)?

When looking at total production-related waste, the quantity disposed of or otherwise released includes all reported disposal or other releases except those due to remedial, catastrophic or one-time releases. On the other hand, total disposal or other releases, discussed above, excludes amounts that were sent to other TRI facilities and reported as disposed or otherwise released (to avoid double-counting).

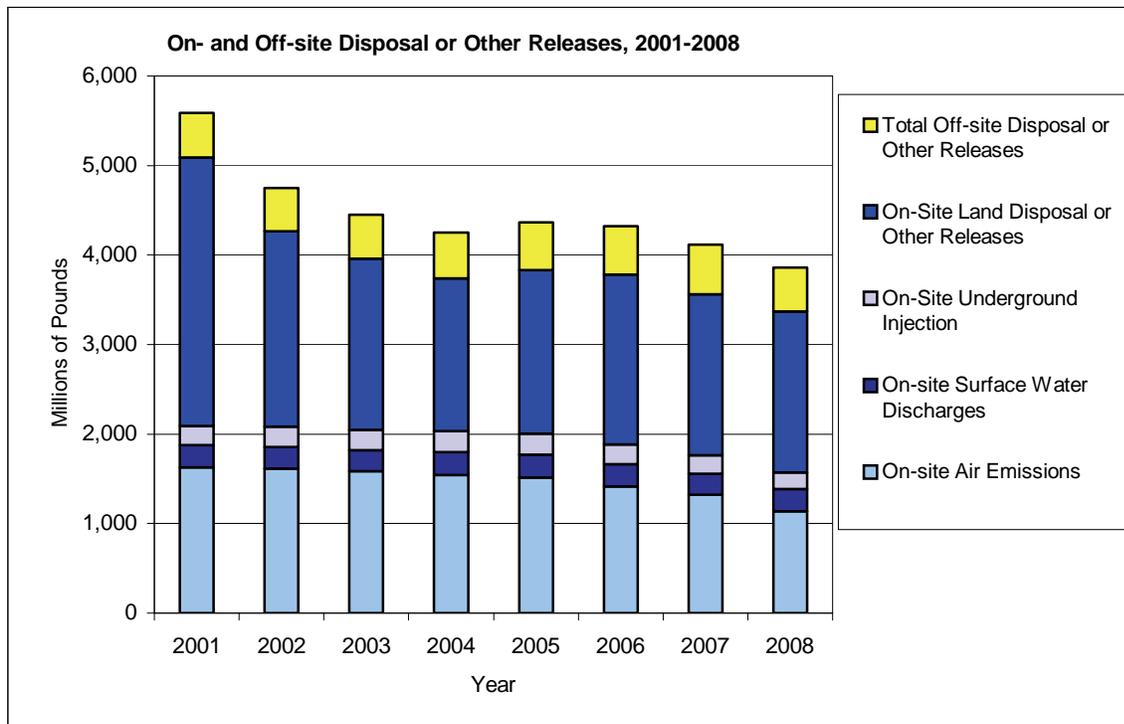
B. How do 2008 TRI data compare to years past?

In this section, we present net changes from 2007 to 2008 and from 2001 to 2008. The base year 2001 is chosen since it was the last year that chemicals were added to the TRI list. Reporting year 1998 was the last time industry sectors were added to TRI.

1. Total Disposal or Other Releases

In 2008, there was an overall **decrease** of 6% (257 million pounds) from 2007 and a **decrease** of 31% (1.73 billion pounds) from 2001 in total disposal or other releases of TRI chemicals (Figure 3).

Figure 3. On- and Off-site Disposal or Other Releases, 2001-2008

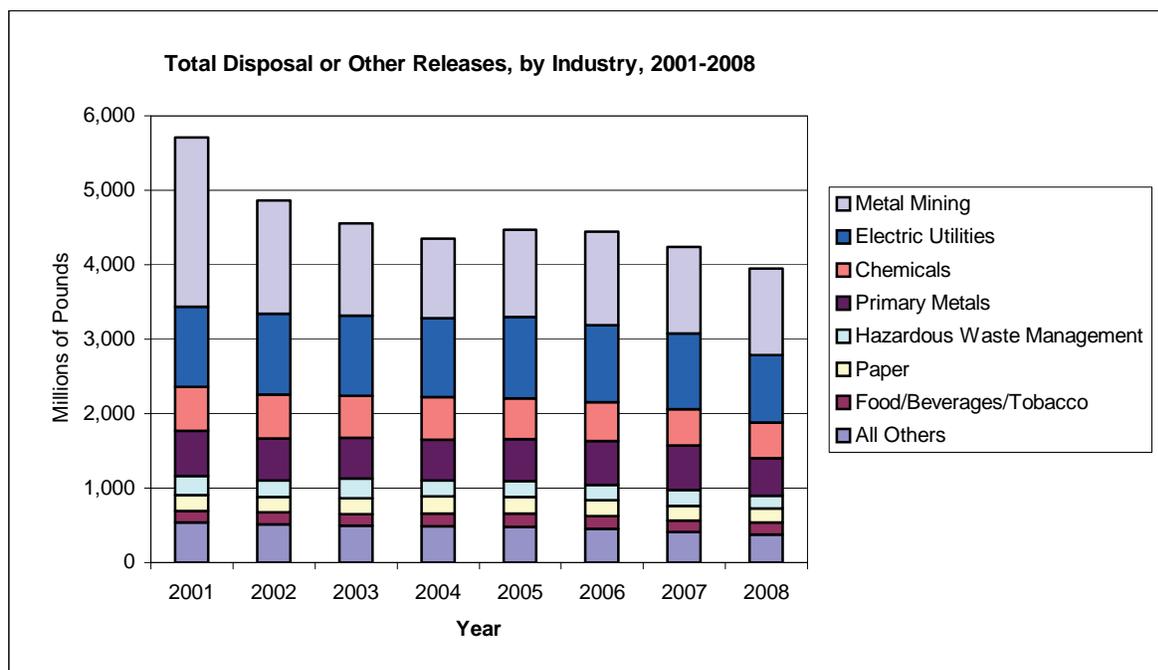


- On-site disposal or other releases
 - ▶ From 2007 to 2008, total on-site disposal or other releases **decreased** by 5% (187 million pounds).
 - Air emissions had the largest **decrease**, of 14% (179 million pounds),
 - Underground injection also **decreased**, by 9% (19 million pounds).
 - However, surface water discharges **increased** by 3% (8.1 million pounds), and
 - On-site land disposal or other releases **increased** by 0.1% (2.2 million pounds), including
 - Other land disposal (such as waste piles, spills and leaks) which **increased** by 5% (31 million pounds) and
 - On-site landfills other than RCRA Subtitle C landfills which **increased** by 9% (24 million pounds).
 - However, surface impoundments **decreased** by 4% (28 million pounds) and
 - RCRA Subtitle C landfills **decreased** by 18% (28 million pounds).
 - ▶ From 2001 to 2008, there was an overall **decrease** in on-site disposal or other releases of 34% (1.72 billion pounds), including
 - Air emissions with a **decrease** of 30% (490 million pounds),
 - On-site land disposal or other releases with a **decrease** of 40% (1.20 billion pounds) and
 - Underground injection wells with a **decrease** of 13% (29 million pounds).
 - However, surface water discharges **increased** by 1% (3.6 million pounds) from 2001 to 2008.

- Off-site disposal or other releases
 - ▶ From 2007 to 2008, off-site disposal or other releases **decreased** by 13% (70 million pounds).
 - Solidification/stabilization of metals and metal compounds **decreased** by 50% (48 million pounds) and
 - Landfills other than RCRA Subtitle C landfills **decreased** by 13% (39 million pounds).
 - However, RCRA Subtitle C landfills **increased** by 25% (13 million pounds) and
 - Other land disposal (such as waste piles, spills and leaks) **increased** by 24% (9 million pounds).
 - ▶ From 2001 to 2008, off-site disposal or other releases **decreased** by 2% (10 million pounds) including
 - Solidification/stabilization of metals and metal compounds with a **decrease** of 28% (18 million pounds) and
 - Landfills/surface impoundments with a **decrease** of 3% (11 million pounds).
 - However, other land disposal (such as waste piles, spills and leaks) **increased** by 59% (17 million pounds).

Figure 4 shows total disposal or other releases from 2001 to 2008 by industry sector.

Figure 4. Total Disposal or Other Releases, by Industry, 2001-2008



- The metal mining sector reported the largest total disposal or other releases in 2001 and 2008 (1.16 billion pounds in 2008). This sector had the largest **decrease** in disposal or other releases from 2001: 1.12 billion pounds (49%). However, this industry reported a decrease of less than 1% (3.0 million pounds) from 2007 to 2008.
- In 2001, metal mining represented 40% of the total. While overall there was a decrease of 31% from 2001 to 2008, the decrease without the metal mining sector was a decrease of

19%. Metal mining has large releases to other land disposal on-site. The large decrease from 2001 to 2008 seen in on-site land disposal or other releases reflects the large decrease in reporting by the metal mining sector.

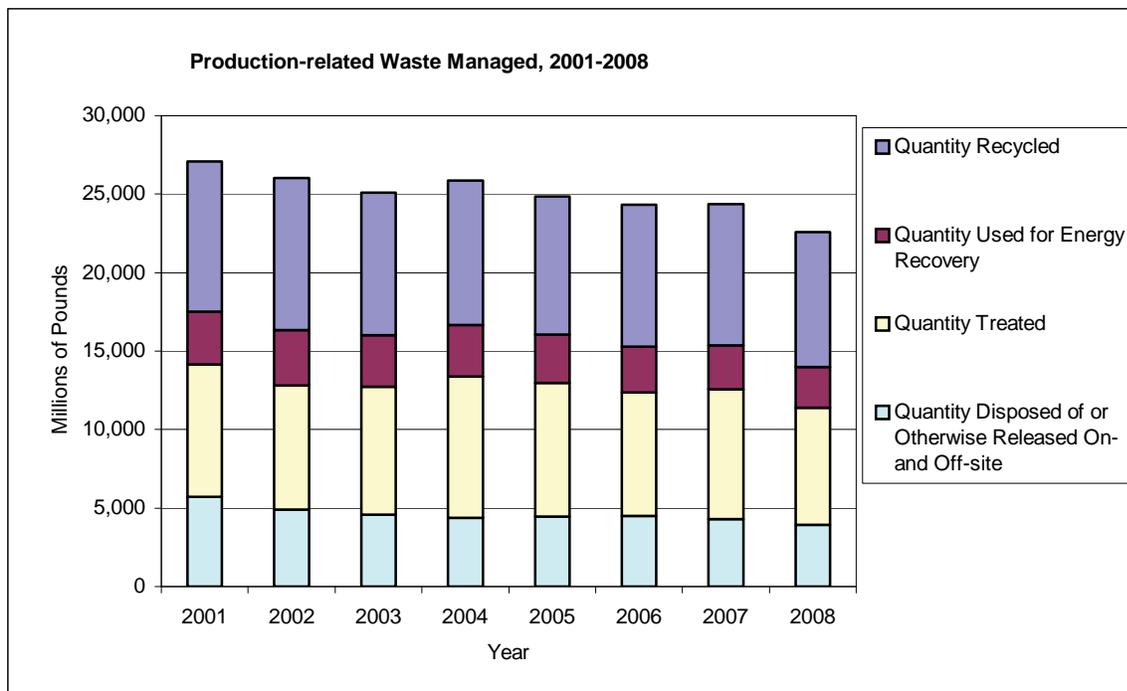
- Electric utilities had the second largest total in 2001 and 2008 (910 million pounds in 2008) and the second largest **decrease**, of 161 million pounds (15%) from 2001. From 2007 to 2008, electric utilities reported a **decrease** of 10% or 106 million pounds.
- The chemical manufacturing sector reported 481 million pounds in 2008, a **decrease** of 19% (111 million pounds) from 2001 and 2% (7.7 million pounds) from 2007.
- However, among the industries with the largest total disposal or other releases, the food and beverage sector reported an **increase**, of 10% (15 million pounds) from 2001 and an **increase** of 5% (7.3 million pounds) from 2007 to 2008.

What are some of the reasons for the overall decrease in disposal or other releases from 2001 to 2008?
The metal mining sector had a decrease of 49% (1.12 billion pounds) from 2001 to 2008. This sector may have been adjusting their reporting to conform to a court case, Barrick v. EPA. The decrease could also be due other factors, such as changes in composition of the ore.

2. Total Production-related Waste Managed

In 2008, there was an overall **decrease** of 7% (1.80 billion pounds) from 2007 and a **decrease** of 17% (4.53 billion pounds) from 2001 in total production-related waste managed (Figure 5).

Figure 5. Production-related Waste Managed, 2001-2008



- From 2007 to 2008,
 - ▶ Recycling on- and off-site **decreased** by 5% (415 million pounds),
 - ▶ Energy recovery on- and off-site **decreased** by 7% (205 million pounds),
 - ▶ Treatment on- and off-site **decreased** by 10% (831 million pounds), and
 - ▶ The quantity disposed of or otherwise released **decreased** by 8% (352 million pounds).
- From 2001 to 2008, total production-related waste managed **decreased** by 17% (4.53 billion pounds) including a decrease of 31% (1.77 billion pounds) in the quantity disposed of or otherwise released.

Most industry sectors reported decreases in total production-related waste over this time period, including

- Chemical manufacturers, with the largest total production-related waste of all industry sectors in all years, decreased by 23%
- Primary metals sector, with the second largest total production-related waste in all years, decreased by 6%
- Metal mining, with the third largest in 2001 and fifth largest in 2008, decreased by 47%

However, some industry sectors showed increases in total production-related waste from 2001 to 2008, including

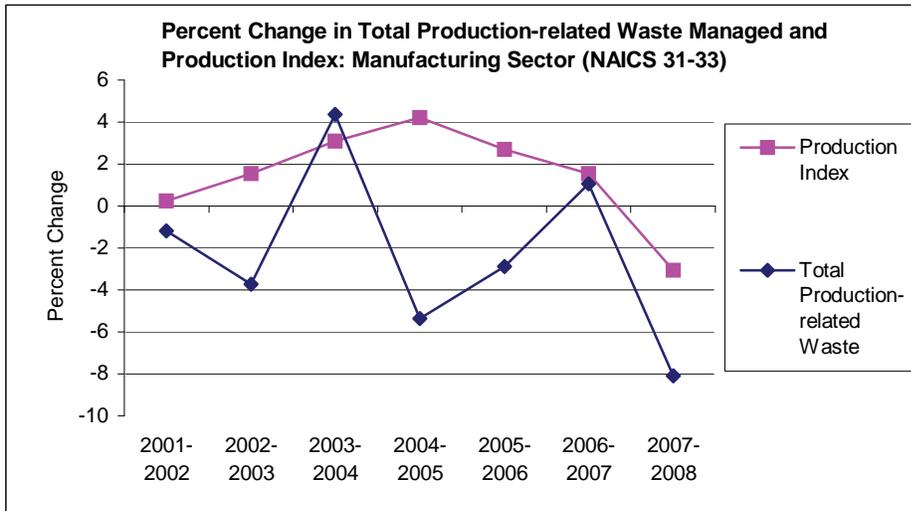
- Electric utilities, with the fourth largest total in 2001 and the third largest total in 2008, increased by 13%
- Petroleum refining, with the sixth largest total in both 2001 and 2008, had an increase of 7%
- Paper products sector, with the fifth largest total in 2001 and the fourth largest total in 2008, had an increase of 1%

Production-related waste 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. One measure of business activity is the production index, which measure how production levels change over time for a particular industry sector.²

The manufacturing sector in the US **increased** production levels each year from 2001 to 2007 by an average of about 2%. However, from 2007 to 2008 it showed a **decrease** of 3%. On the other hand, TRI manufacturing facilities (those reporting in the NAICS codes 31-33) showed an average **decrease** of 1% in total production-related waste from 2001 to 2007 and a **decrease** of 8% from 2007 to 2008. (Figure 6.)

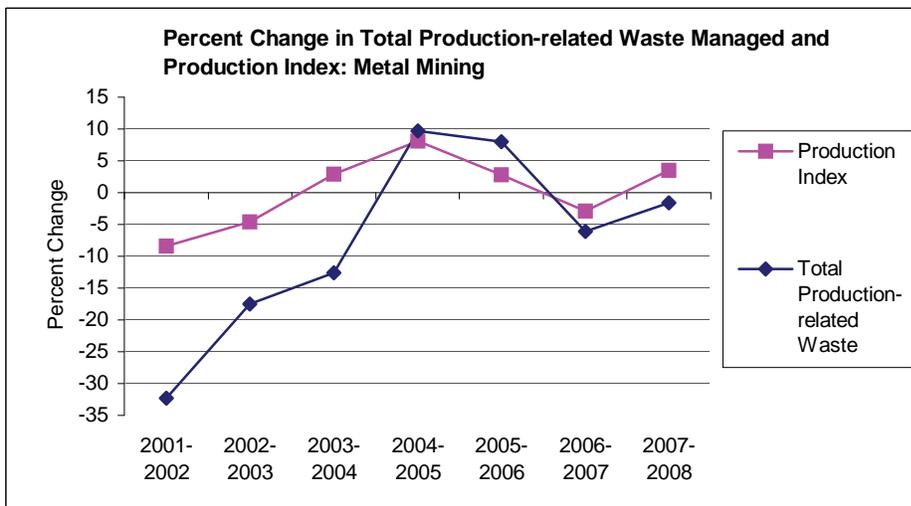
² Production index data from Federal Reserve Board, G17 Series (www.federalreserve.gov/datadownload) October 13, 2009.

Figure 6. Percent Change in Total Production-related Waste and Production Index, 2001-2008: Manufacturing Sector



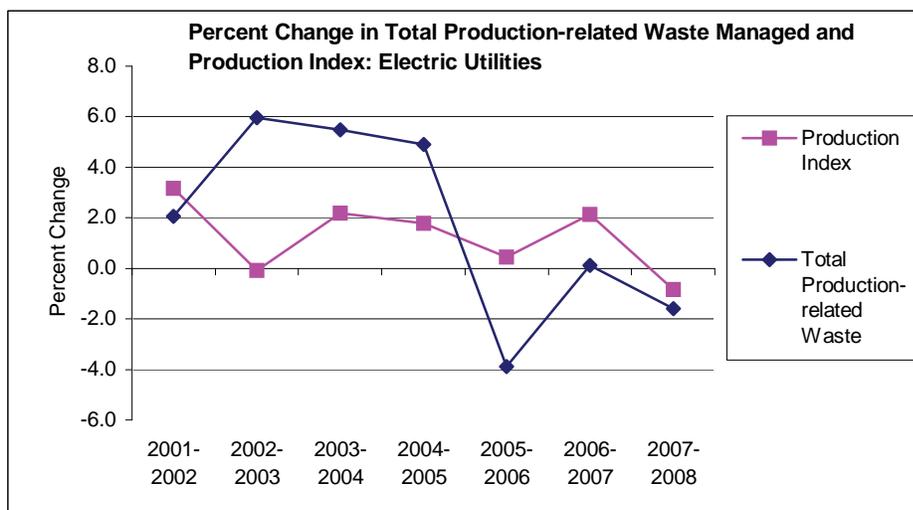
For other industry sectors, the metal mining sector had a large decrease in the years 2001-2003, when this sector may have been adjusting their reporting to conform to a court case, Barrick v. EPA. In recent years, the percent change in total production-related waste has been similar to the change in the production index. (Figure 7.)

Figure 7. Percent Change in Total Production-related Waste Managed and Production Index, 2001-2008: Metal Mining



Electric utilities had increases in total production-related waste managed on average higher than the increase in production index for this sector. However, in recent years, it has decreased production-related waste managed while production index continued to rise. From 2007 to 2008, both production-related waste and production index decreased. (Figure 8.)

Figure 8. Percent Change in Total Production-related Waste and Production Index, 2001-2008: Electric Utilities



IV. A Closer Look at Facilities of Interest

A. Which facilities had the largest disposal or other releases in 2008?

EPA has historically provided a list of facilities that have the largest disposal or other releases of TRI chemicals to the environment. It is important to note that these facilities do not necessarily pose the greatest potential risk to the environment. As explained in detail in the EPA report, *Factors to Consider When Using TRI Data* (available at www.epa.gov/tri/triprogram/FactorsToConPDF.pdf), total quantities of TRI chemicals released or otherwise disposed of is one important factor among several that determine the potential risk that may be posed.

EPA presents the “Top 50” facilities with largest disposal or other releases in charts that are available on this web site (www.epa.gov/tri/tridata/tri08/index.htm). It is important to note that there is a huge variation in the amounts of TRI chemicals released per facility. In 2008, the range of TRI disposal or other releases is from 0 to 517 million pounds. The average disposal or other releases of TRI chemicals per facility is approximately 181,905 pounds. The reason some facilities have disposal or other releases far in excess of the average are several:

- Certain industry sectors, such as mining and primary metals, and electric utilities, handle large volumes of material and, not surprisingly, the totals for TRI chemicals are also larger than average. Also, from year-to-year constituent concentrations in raw materials can change.
- Even within a given sector, certain facilities are simply larger (in terms of economic parameters such as production levels, sales, employment, etc.) and so they handle relatively large amounts of input material to produce large amounts of output material (product).
- Facilities differ in their relative efficiency in handling material, i.e., for a given unit of output, and differ in the amount of release or waste that is produced.

Facilities with the largest disposal or other releases are mining facilities. The top 5 facilities, which each had over 44 million pounds of total on and off-site disposal or other releases, are mining operations. Other facilities in the Top 50 represent a variety of industries, including primary metals facilities, electric utilities, chemical manufacturers and hazardous waste management facilities. These top facilities reported disposal-or-other-release totals ranging from 10.5 million to 34 million pounds for 2008. Note that an increase in the amount of toxic chemicals managed at hazardous waste sites can represent a generally positive environmental trend because these facilities are in the business of managing hazardous waste and do so under strict controls.

EPA also presents facility rankings taking into account the management methods used for the TRI chemicals. In addition to presenting the Top 50 facilities with largest total on- and off-site disposal or other releases, we also present the Top 50 facilities with total disposal or other releases, subtracting out the totals that are managed in Class I underground injection wells, Subtitle C landfills, and other landfills. This second group of rankings is perhaps a better, although still imperfect, indication of the amount of TRI chemicals that may be available to the environment. In this second group of rankings, a limited number of facilities that manage TRI chemicals mostly or totally in Class I wells or landfills drop down in the rankings, or drop out of the Top 50 altogether. (The top 5 mining facilities mentioned above remain the top 5 in these rankings, however.)

Finally, for similar reasons, EPA has provided two sets of rankings (top 20) of US counties with the largest releases. One set of rankings shows total disposal or other releases, and the second shows total disposal or other releases adjusted to subtract out quantities in Class I wells and landfills. As with facilities, the very top (in this case 6) counties do not change, but there is some shifting in the next 14 to reflect that some counties are home to Class I wells or landfills, and when those totals are not counted, they are no longer among the counties with the most TRI chemical releases.

Generally, national totals and trends tend to reflect reporting by facilities with the largest total disposal or other releases but may not necessarily reflect state and local totals and trends. Over the longer term, 2001-2008, total disposal or other releases decreased by 31%. However, an analysis of facilities reporting in both 2001 and 2008 found that the total disposal or other releases for the group of “smaller reporting” facilities (those reporting less than 100,000 pounds for 2001 and representing almost 89% of TRI facilities) **increased** while the total for the group of facilities reporting larger amounts **decreased**.

Just as the national totals and trends tend to reflect reporting by the metal mining facilities with large disposal or other releases, the average pounds per facility over time also reflect these facilities. While the average pounds per facility decreased by 18% from 2001 to 2008, without the metal mining facilities, the average decrease was 3%. (Table 1.) Indeed, the average pounds of total production-related waste managed for all TRI facilities decreased by 1% from 2001 to 2008. However, without the metal mining facilities, the average pounds increased by 2%.

Table 1. Average per Facility, 2001, 2007 and 2009

	2001	2007	2008	Change 2007-2008	Change 2001-2008
	Pounds/facility	Pounds/facility	Pounds/facility	Percent	Percent
Total Disposal or Other Releases					
All Industry Sectors	221,402	186,083	181,905	-2%	-18%
Without metal mining	133,622	135,564	129,017	-5%	-3%
Total Production-Related Waste Managed					
All Industry Sectors	1,051,554	1,070,355	1,040,543	-3%	-1%
Without metal mining	963,155	1,017,288	985,894	-3%	2%

B. Federal Facilities

All federal facilities, whether operated by federal agencies or contractors (e.g. some military bases), that meet the chemical thresholds are required to report to EPA's TRI Program.

- For 2008, 389 federal facilities reported 101 million pounds of total on- and off-site disposal or other releases and 273 million pounds of total production-related waste managed.
- Disposal or other releases by federal facilities **increased** by 6.0 million pounds (6%) from 2007 to 2008.
- Total production-related waste managed at federal facilities **increased** by 17 million pounds (7%) from 2007 to 2008. Recycling on-site **increased** by 14 million pounds, on-site treatment **increased** by 4.0 million pounds and quantity released or otherwise disposed of **increased** by 2.7 million pounds.

What are some of the reasons for the increase in disposal or other releases from 2007 to 2008?

The Department of Defense Army facilities, which reported almost one-quarter of the total disposal or other releases from federal facilities for 2008, showed an increase of 3 million pounds (13%) from 2007 to 2008 and Department of Energy facilities showed an increase of 3 million pounds (60%). Also, one Tennessee Valley Authority facility reported almost 3 million pounds as surface water discharges due to a spill.

V. A Closer Look at Chemicals of Interest

A. Persistent Bioaccumulative Toxic (PBT) Chemicals

Since 2000 TRI includes data, at reduced reporting thresholds, on PBT chemicals such as dioxins, mercury, and polychlorinated biphenyls (PCBs). TRI includes data for lead and lead compounds at reduced thresholds since 2001.

Why is there particular concern for PBT chemicals?

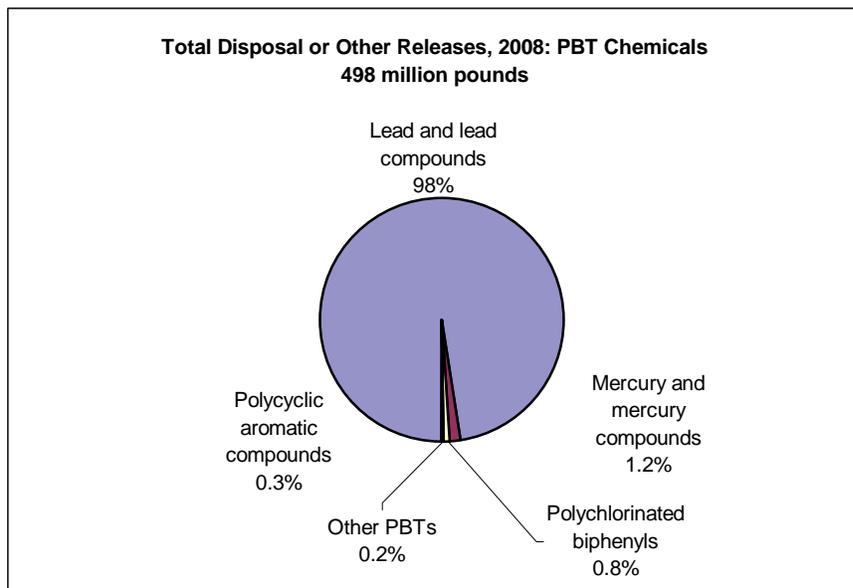
PBT chemicals are of particular concern not only because they are toxic, but also because they remain in the environment for long periods of time and are not readily destroyed (they persist) and build up or accumulate in body tissues (they bioaccumulate).

1. What was reported for 2008?

a) Total Disposal or Other Releases

In 2008, 498 million pounds of PBT chemicals were disposed of or otherwise released. Almost 98% (486 million pounds) of that amount was lead and lead compounds (Figure 9).

Figure 9. Total Disposal or Other Releases, 2008: PBT Chemicals

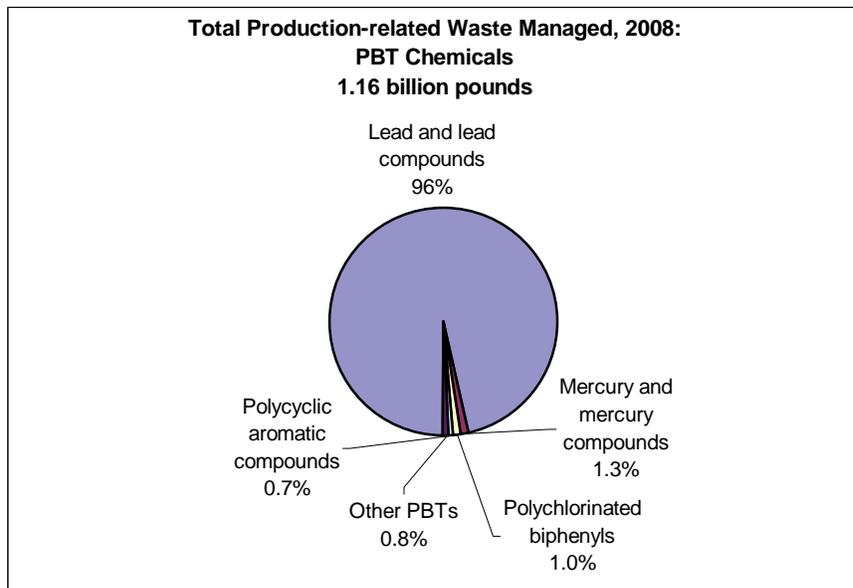


- Disposal or other releases of other PBT chemicals in 2008 included:
 - ▶ 6.2 million pounds of mercury and mercury compounds,
 - ▶ 4.1 million pounds of polychlorinated biphenyls (PCBs), and
 - ▶ 1.3 million pounds of polycyclic aromatic compounds (PACs).
- 33,702 **grams** (approximately 74 pounds) of total disposal or other releases of PBT chemicals in 2008 were accounted for by dioxin and dioxin-like compounds.

b) Total Production-related Waste Managed

Over 1.16 billion pounds of production-related waste of PBT chemicals was managed in 2008. Lead and lead compounds accounted for over 96% (1.12 billion pounds) of that amount (Figure 10).

Figure 10. Total Production-related Waste Managed, 2008: PBT Chemicals



2. How do 2008 PBT data compare to years past?

a) Total Disposal or Other Releases

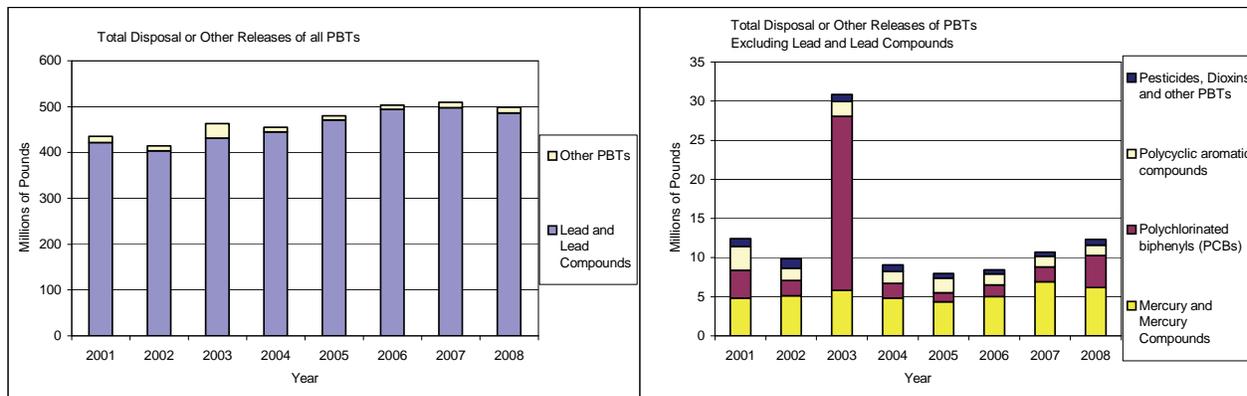
Total disposal or other releases of persistent bioaccumulative and toxic (PBT) chemicals **decreased** by 10 million pounds or 2% from 2007 to 2008.

- Lead and lead compounds **decreased** by 12 million pounds (2%),
- Mercury and mercury compounds **decreased** by almost 766,000 pounds (11%),
- Polycyclic aromatic compounds **decreased** by over 94,000 pounds (7%), and
- Dioxin and dioxin-like compounds **decreased** by 111,058 grams (about 245 pounds) (77%).
- However, polychlorinated biphenyls (PCBs) **increased** by 2.3 million pounds (over 120%).

From 2001 to 2008, total disposal or other releases of PBT chemicals **increased** by 64 million pounds or 15% (Figure 11).

- Lead and lead compounds **increased** by 64 million pounds (15%),
- Mercury and mercury compounds **increased** by 1.4 million pounds (28%), and
- Polychlorinated biphenyls (PCBs) **increased** by over 555,000 pounds (16%).
- However, polycyclic aromatic compounds **decreased** by 1.7 million pounds (57%), and
- Dioxin and dioxin-like compounds **decreased** by 121,672 grams (about 268 pounds) (78%).

Figure 11. Total Disposal or Other Releases, by Chemical, 2001-2008: PBT Chemicals



b) Total Production-related Waste Managed

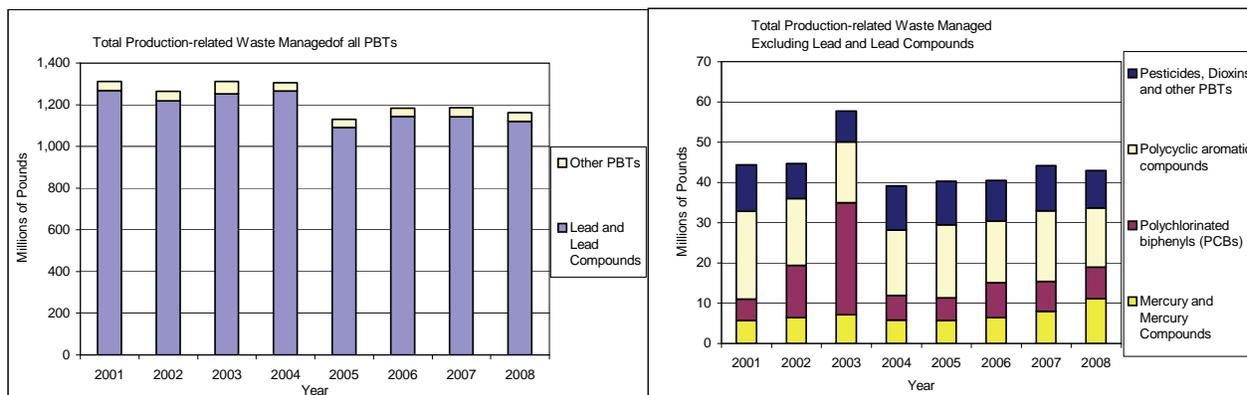
Total production-related waste managed of PBT chemicals **decreased** by 24 million pounds or 2% from 2007 to 2008.

- Lead and lead compounds **decreased** by 22 million pounds (2%),
- Polycyclic aromatic compounds **decreased** by 2.9 million pounds (16%),
- Dioxin and dioxin-like compounds **decreased** by 282,769 grams (about 624 pounds) (45%).
- However, mercury and mercury compounds **increased** by 3.2 million pounds (40%), and
- Polychlorinated biphenyls (PCBs) **increased** by almost 400,000 million pounds (5%).

From 2001 to 2008, total production-related waste managed of PBT chemicals **decreased** by 149 million pounds or 11% (Figure 12).

- Lead and lead compounds **decreased** by 148 million pounds (12%),
- Polycyclic aromatic compounds **decreased** by 7.3 million pounds (33%), and
- Dioxin and dioxin-like compounds **decreased** by 119,648 grams (about 264 pounds) (26%).
- However, mercury and mercury compounds **increased** by 5.4 million pounds (94%), and
- Polychlorinated biphenyls (PCBs) **increased** by 2.6 million pounds (50%).

Figure 12. Total Production-related Waste Managed, by Chemical, 2001-2008: PBT Chemicals



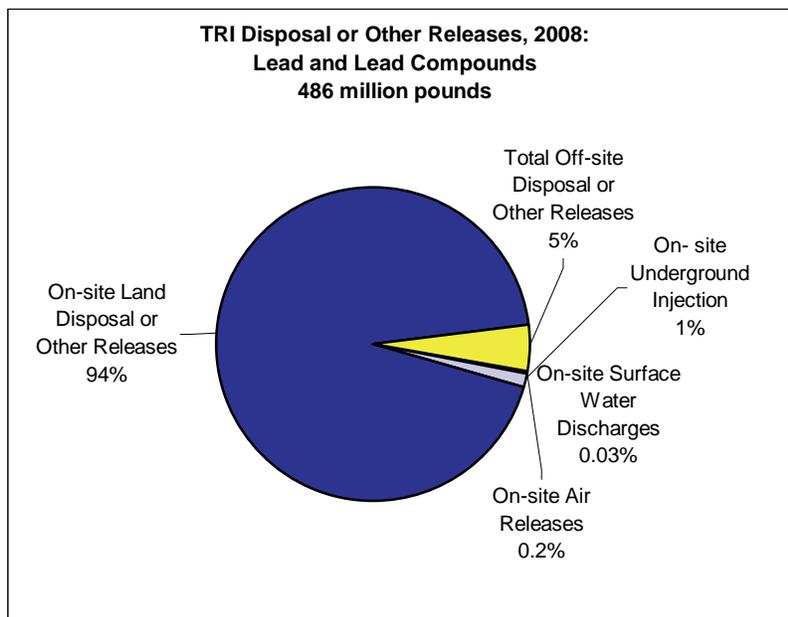
3. Lead and Lead Compounds

The reporting threshold for lead (except for lead contained in steel, brass or bronze alloys) and lead compounds was lowered to 100 pounds beginning with 2001.

a) What was reported for 2008?

Total disposal or other releases of lead and lead compounds was 486 million pounds for 2008 (Figure 13).

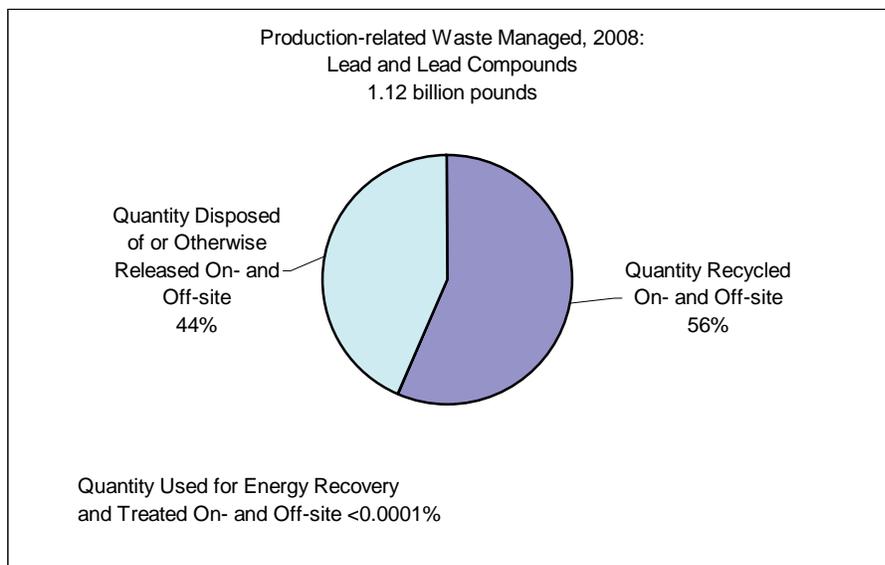
Figure 13. Disposal or Other Releases, 2008: Lead and Lead Compounds



- 95% (463 million pounds) was disposed of or otherwise released **on-site**, including:
 - ▶ 94% (455 million pounds) of land disposal or other releases, including
 - 60% (293 million pounds) of land disposal other than landfills and surface impoundments (such as waste piles, spills or leaks) and
 - 28% (134 million pounds) to surface impoundments, other than RCRA Subtitle C surface impoundments;
 - ▶ 1% (6.4 million pounds) in underground injection wells, mainly in Class II-V wells, and
 - ▶ 0.2% (1.1 million pounds) of air emissions.
- 5% (23 million pounds) were **off-site** disposal or other releases, including
 - ▶ 2% (12 million pounds) to landfills other than RCRA Subtitle C landfills,
 - ▶ 1% (3.2 million pounds) to RCRA Subtitle C landfills, and
 - ▶ 1% (5.0 million pounds) of metals sent to solidification/stabilization.

Total production-related waste managed of lead and lead compounds was 1.12 billion pounds for 2008 (Figure 14).

Figure 14. Production-related Waste Managed, 2008: Lead and Lead Compounds



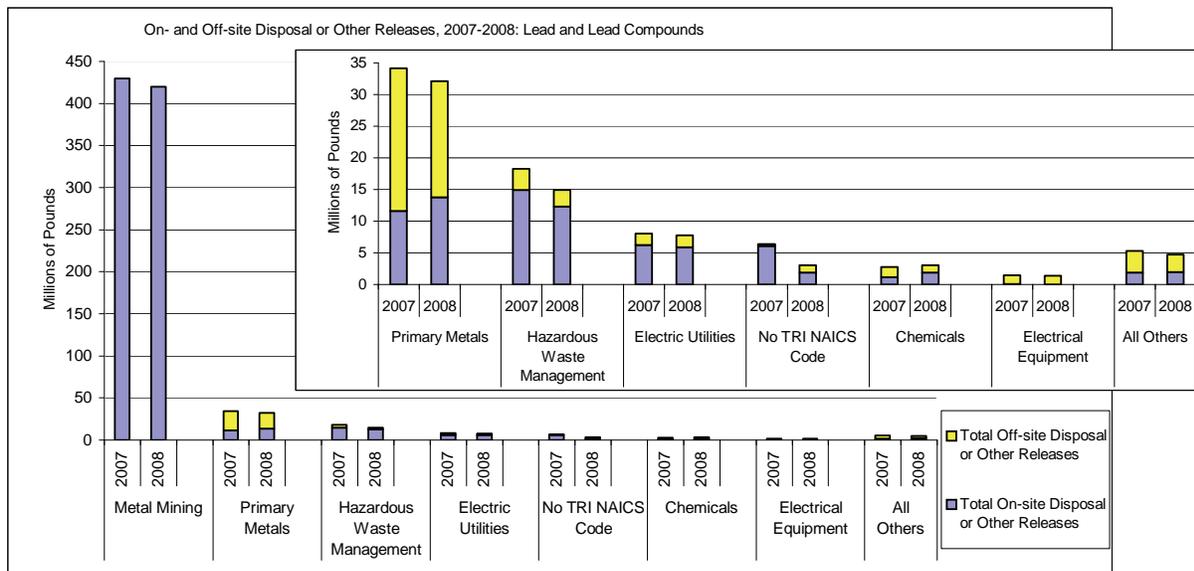
- 56% (632 million pounds) was recycled on- and off-site, including
 - ▶ 29% (324 million pounds) recycled on-site and
 - ▶ 28% (308 million pounds) recycled off-site.
- 44% (488 million pounds) was disposed of or otherwise released.

b) How do lead and lead compounds data compare to years past?

From 2007 to 2008, **total disposal or other releases** for lead and lead compounds **decreased** by 12 million pounds (2%). (Figure 15.)

- The metal mining sector accounted for 86% (420 million pounds) of the total disposal or other releases in 2008. The mining sector had a **decrease** of 2% (9.6 million pounds) from 2007 to 2008.
- Without the metal mining sector, total on- and off-site disposal or other releases of lead and lead compounds **decreased** by 3% (2.3 million pounds) from 2007 to 2008, including.
 - ▶ **Decrease** of 18% (3.3 million pounds) from hazardous waste management facilities and
 - ▶ **Decrease** of 3% (over 239,000 pounds) from electric utilities.
 - ▶ However, facilities not reporting a TRI NAICS code (includes federal facilities) had an **increase** of 12% (over 763,000 pounds) and
 - ▶ The chemical manufacturing sector had an **increase** of 33% (almost 722,000 pounds).

Figure 15. Disposal or Other Releases, by Industry, 2007-2008: Lead and Lead Compounds



From 2007 to 2008, **on-site** disposal or other releases of lead and lead compounds **decreased** by 9.1 million pounds (2%).

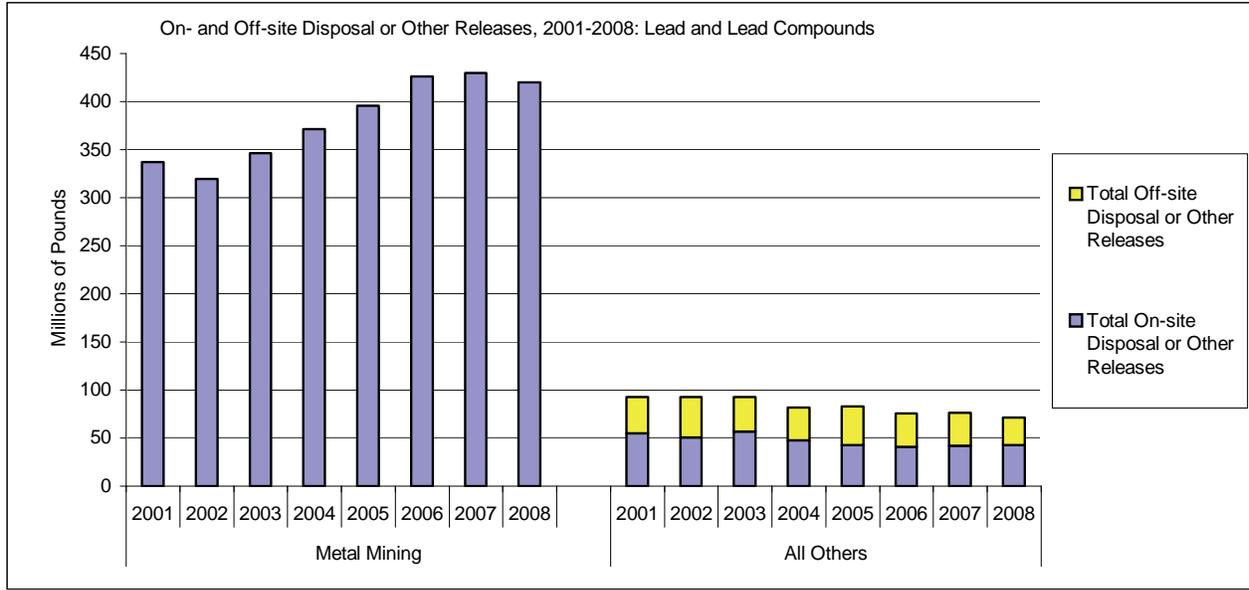
- On-site land disposal or other releases **decreased** by 8.1 million pounds (2%)
- Underground injection **decreased** by 1.1 million pounds (15%)
- However, air emissions **increased** by over 77,800 pounds (8%)
 - ▶ which included an **increase** of over 250,000 pounds reported by federal facilities
- Surface water discharges also **increased**, by almost 64,600 pounds (65%).

From 2007 to 2008, **off-site** disposal or other releases of lead and lead compounds **decreased** by 2.8 million pounds (11%).

From 2001 to 2008, **total disposal or other releases** of lead and lead compounds **increased** by 64 million pounds or 15% (Figure 16).

- The metal mining sector had an **increase** of 83 million pounds (25%) from 2001 to 2008.
- Without the metal mining sector, total disposal or other releases of lead and lead compounds **decreased** by 18 million pounds (22%) from 2001 to 2008.
- Other sectors reported **decreases** from 2001 to 2008, including:
 - ▶ Primary metals facilities, with a **decrease** of 8.0 million pounds (22%),
 - ▶ Hazardous waste management facilities, with a **decrease** of 9.7 million pounds (40%), and
 - ▶ Electric utilities, with a **decrease** of 1.5 million pounds (16%).

Figure 16. Disposal or Other Releases, 2001-2008: Lead and Lead Compounds



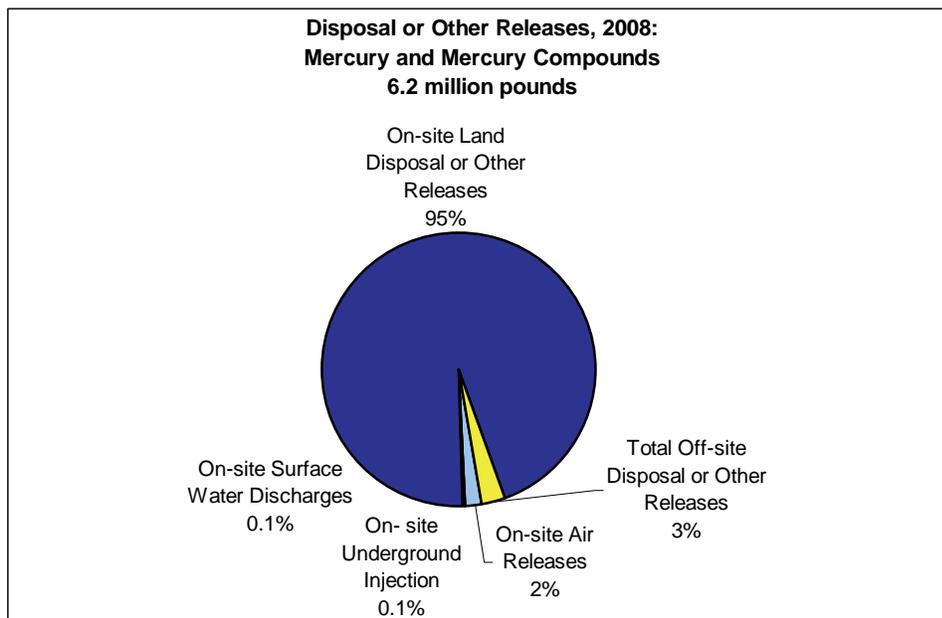
4. Mercury And Mercury Compounds

The reporting threshold for mercury and mercury compounds was lowered to 10 pounds beginning with reporting year 2000.

a) What was reported for 2008?

Total disposal or other releases of mercury and mercury compounds was 6.2 million pounds in 2008 (Figure 17).

Figure 17. Disposal or Other Releases, 2008: Mercury and Mercury Compounds

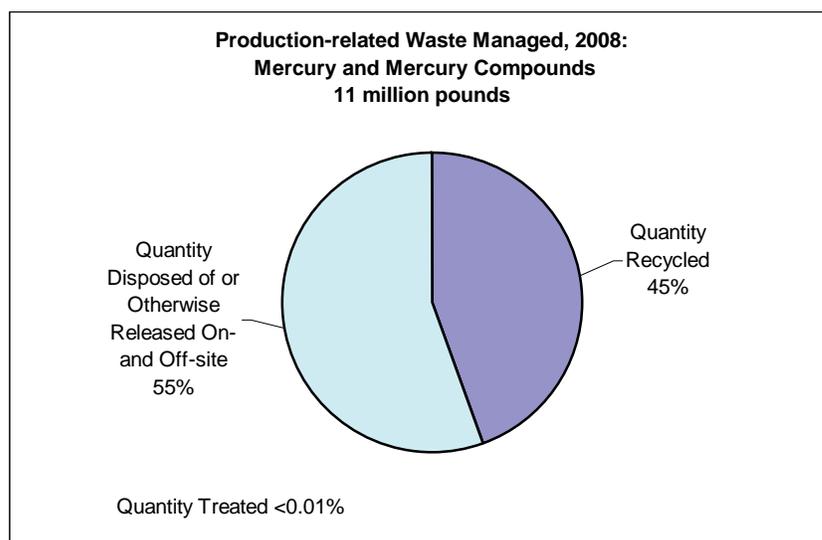


- 97% (6.0 million pounds) was **on-site** disposal or other releases, including
 - ▶ 95% (5.9 million pounds) of land disposal or other releases, including
 - 79% (4.9 million pounds) of land disposal other than landfills and surface impoundments (such as waste piles, spills or leaks)
 - ▶ 2% (almost 124,500 pounds) of air emissions
 - ▶ 0.1% (over 5,600 pounds) of underground injection
 - ▶ 0.1% (3,100 pounds) of surface water discharges
- 3% (over 169,000 pounds) was **off-site** disposal or other releases.
- The metal mining industry reported the largest disposal or other releases of mercury and mercury compounds (89% or 5.5 million pounds) in 2008.
 - ▶ Three metal mining facilities accounted for 79% (4.3 million pounds) of the total on- and off-site disposal or other releases of mercury and mercury compounds for 2008.
 - ▶ These facilities reported disposal or other releases mainly to on-site land disposal other than landfills (such as waste piles).
- Hazardous waste/solvent recovery facilities reported the second largest disposal or other releases of mercury and mercury compounds and over 99% (333,792 pounds) of all on-site RCRA Subtitle C landfills.
- Electric utilities, with the third largest total disposal or other releases of mercury and mercury compounds, reported the largest air emissions of any industry sector, with 72% (89,444 pounds) of all air emissions of mercury and mercury compounds.

Total production-related waste managed of mercury and mercury compounds was 11 million pounds in 2008 (Figure 18).

- 55% (6.2 million pounds) was disposed of or otherwise released.
- 45% (5.0 million pounds) was recycled, mainly on-site.

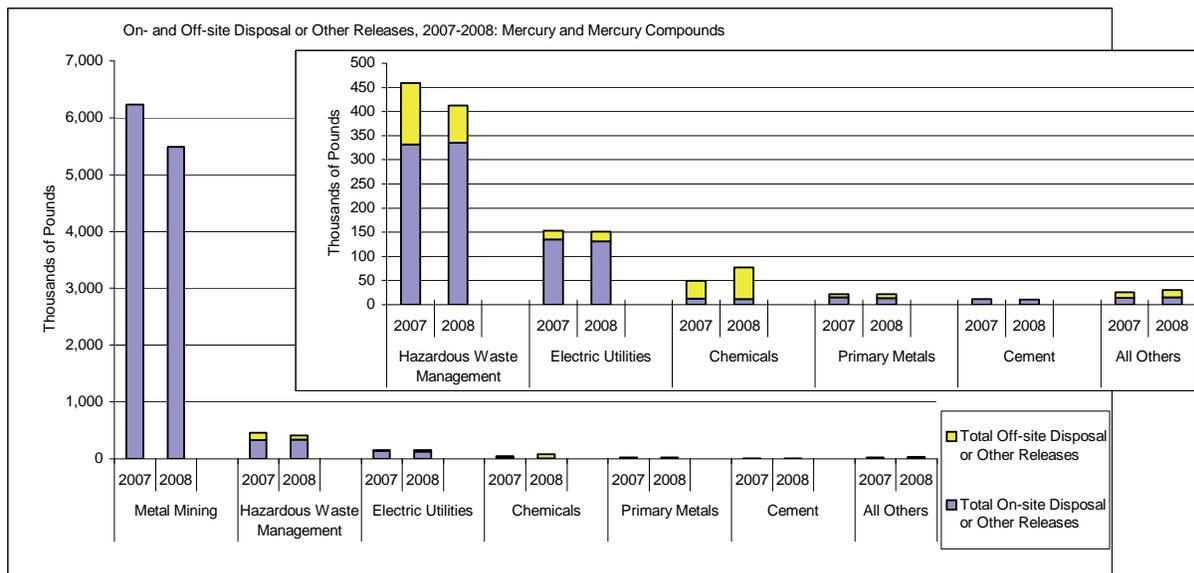
Figure 18. Production-related Waste Managed, 2008: Mercury and Mercury Compounds



b) How do mercury and mercury compounds data compare to years past?

From 2007 to 2008, total disposal or other releases for mercury and mercury compounds decreased by 11% (over 765,500 pounds) (Figure 19).

Figure 19. Disposal or Other Releases, by Industry, 2007-2008: Mercury and Mercury Compounds

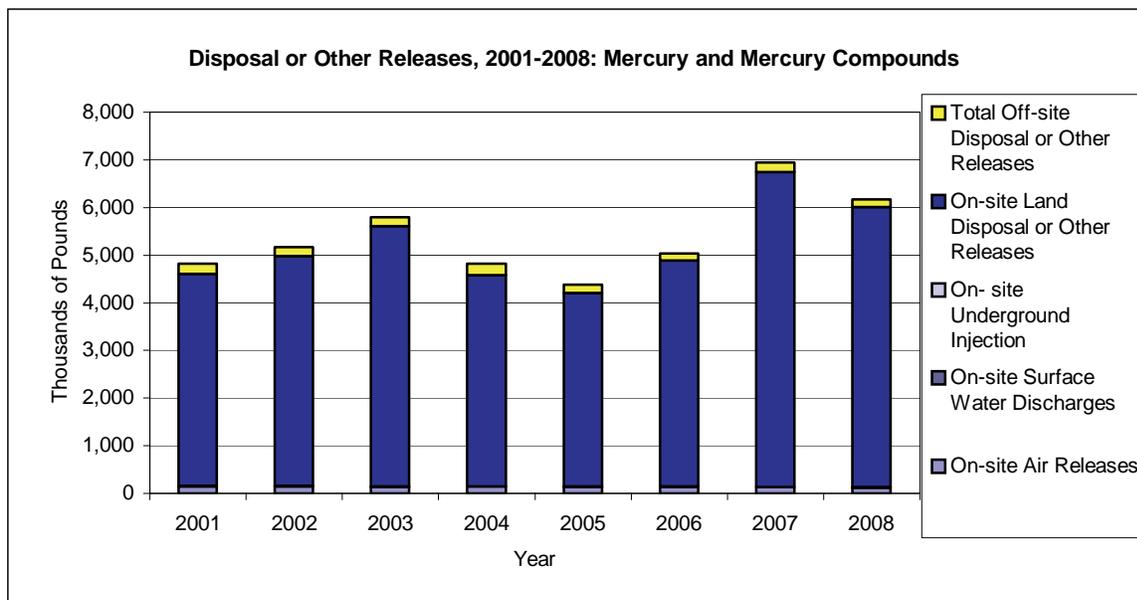


- Total on- and off-site disposal for the metal mining sector **decreased** 12% (over 742,600 pounds) and for hazardous waste/solvent recovery facilities **decreased** by 10% (over 46,400 pounds).
- Total on-site disposal or other releases **decreased** by 11% (over 746,200 pounds), including
 - ▶ A **decrease** of over 737,100 pounds (55%) in surface impoundments.
 - ▶ On-site air emissions **decreased** by 6,362 pounds (5%).
 - ▶ However, on-site surface water discharges **increased** by 839 pounds (37%).
- Total off-site disposal or other releases **decreased** by 10% (over 19,300 pounds).
 - ▶ Including a **decrease** of almost 58,000 pounds (50%) in RCRA Subtitle C landfills.
 - ▶ However, solidification/stabilization **increased** by over 19,900 pounds (57%) and
 - ▶ Transfers to waste brokers for disposal **increased** by over 10,500 pounds (369%).

Air emissions of mercury and mercury compounds.
Electric utilities reported 72% of all air emissions of mercury and mercury compounds in 2008. Air emissions from electric utilities decreased by 4,412 pounds from 93,885 pounds in 2007 to 89,444 pounds in 2008.

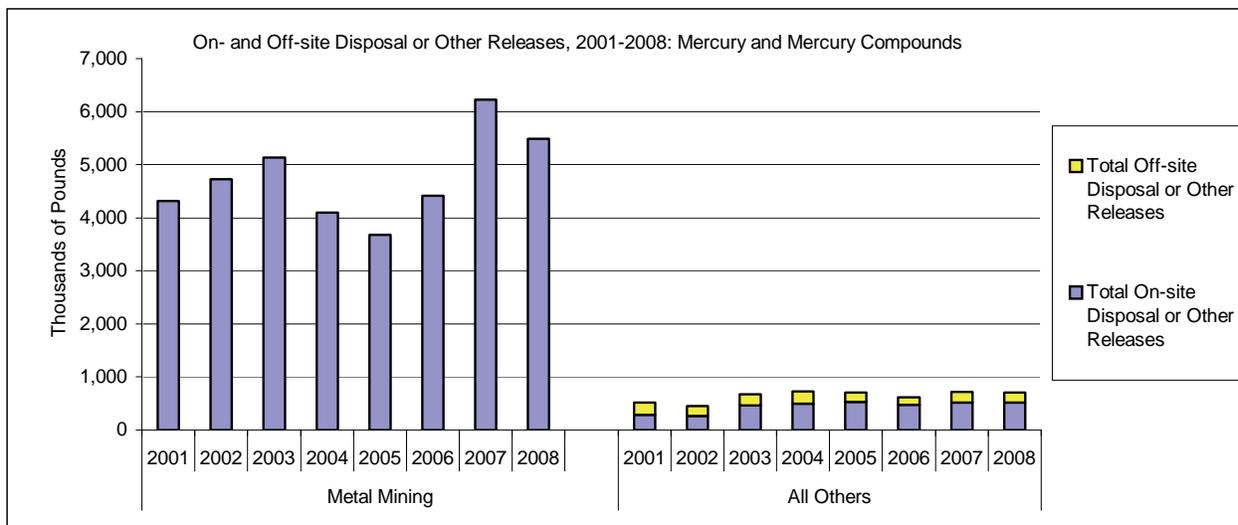
From 2001 to 2008, disposal or other releases for mercury and mercury compounds **increased** by 28% (1.4 million pounds). (Figure 20.)

Figure 20. Disposal or Other Releases, 2001-2008: Mercury and Mercury Compounds



- Total on-site disposal or other releases **increased** by 30% (1.4 million pounds)
- Total off-site disposal or other releases **decreased** by 22% (over 47,500 pounds)
- On-site air emissions of mercury and mercury compounds **decreased** by 19% (over 28,400 pounds) from 2001 to 2008.
- Total disposal or other releases by metal mining facilities **increased** by 27% (1.2 million pounds) (Figure 21).
 - ▶ Two metal mining facilities reported a combined **increase** of 1.4 million pounds from 2001 to 2008.

Figure 21. Disposal or Other Releases, 2001-2008: Mercury and Mercury Compounds



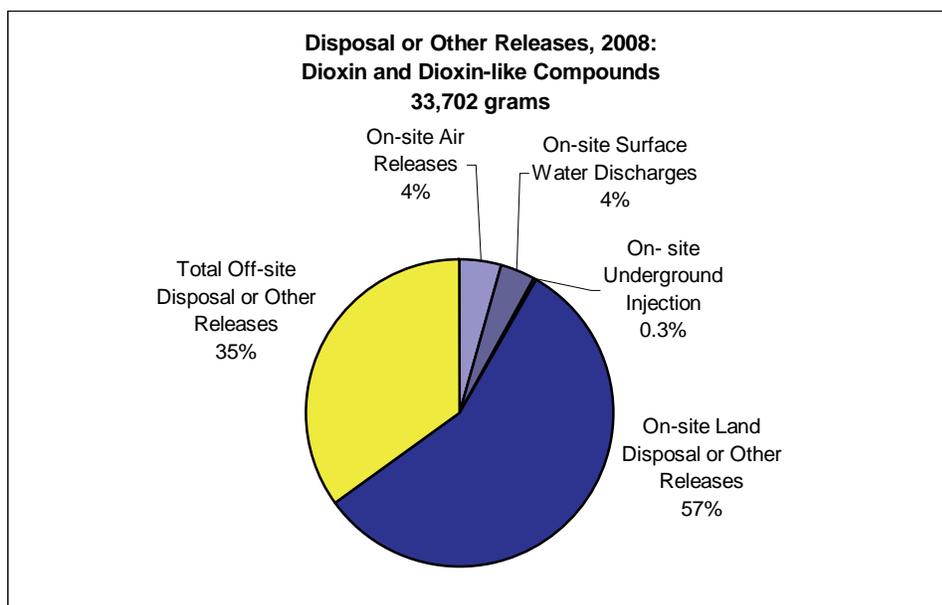
5. *Dioxin and Dioxin-Like Compounds*

Dioxin and dioxin-like compounds were added to the TRI list for 2000 at a reporting threshold of 0.1 grams.

a) What was reported for 2008?

Total disposal or other releases for dioxin and dioxin-like compounds was 33,702 grams (approximately 74 pounds) in 2008 (Figure 22).

Figure 22. Disposal or Other Releases, 2008: Dioxin and Dioxin-like Compounds

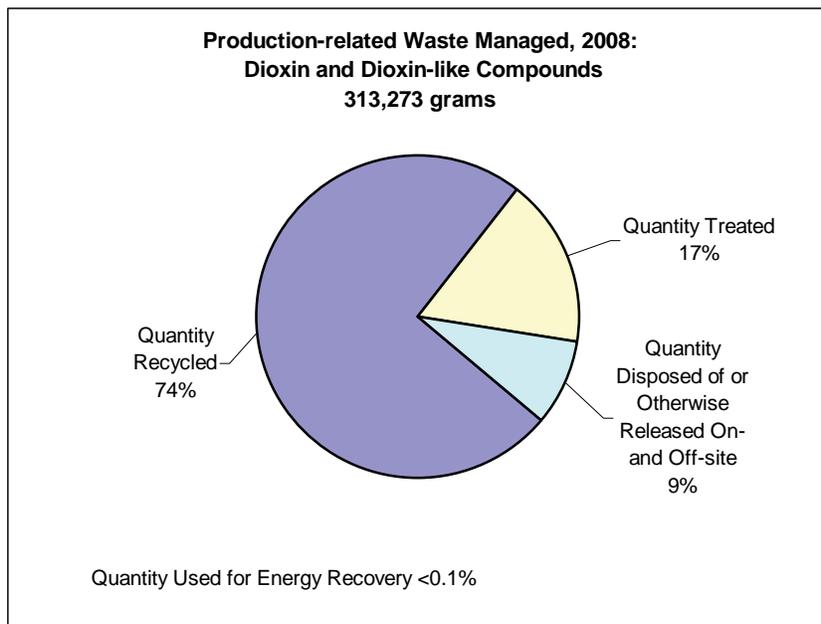


- 65% (21,948 grams or 48 pounds) were **on-site** disposal or other releases, including:
 - ▶ 57% (19,159 grams or 42 pounds) of land disposal or other releases, including
 - 23% (7,693 grams or 17 pounds) in RCRA Subtitle C landfills
 - 19% (6,320 grams or 14 pounds) in other on-site landfills, and
 - 15% (5,082 grams or 11 pounds) in surface impoundments other than RCRA Subtitle C surface impoundments;
 - ▶ 4% (1,487 grams or 3.3 pounds) of air emissions; and
 - ▶ 4% (1,215 grams or 2.7 pounds) of surface water discharges.
- 35% (11,754 grams or 26 pounds) were **off-site** disposal or other releases, including
 - ▶ 18% (6,092 grams or 13 pounds) in off-site RCRA Subtitle C landfills and
 - ▶ 16% (5,412 grams or 12 pounds) in other off-site landfills.

Total production-related waste managed contained 313,273 grams of dioxin and dioxin-like compounds in 2008 (Figure 23).

- 74% (233,015 grams) was in waste recycled, mainly on-site,
- 55% (27,100 grams) was in waste disposed of or otherwise released, and
- 17% (52,608 grams) was in waste treated on- and off-site.

Figure 23. Production-related Waste Managed, 2008: Dioxin and Dioxin-like Compounds



b) How do dioxin and dioxin-like compounds data compare to years past?

From 2007 to 2008, total disposal or other releases of dioxin and dioxin-like compounds **decreased** by 111,058 grams or 245 pounds (77%).

What are some of the reasons for the decrease in total disposal or other releases of dioxin and dioxin-like compounds from 2007 to 2008?
Three chemical manufacturers reported a total decrease of 112,267 grams from 2007 to 2008 in disposal on- and off-site in landfills other than RCRA Subtitle C landfills.

- On-site disposal or other releases **decreased** by 62% (35,227 grams or 78 pounds), including a decrease of 37,561 grams reported by one chemical manufacturer.
 - ▶ On-site air emissions **decreased** by 4% (58 grams or 0.1 pounds) from 2007 to 2008.

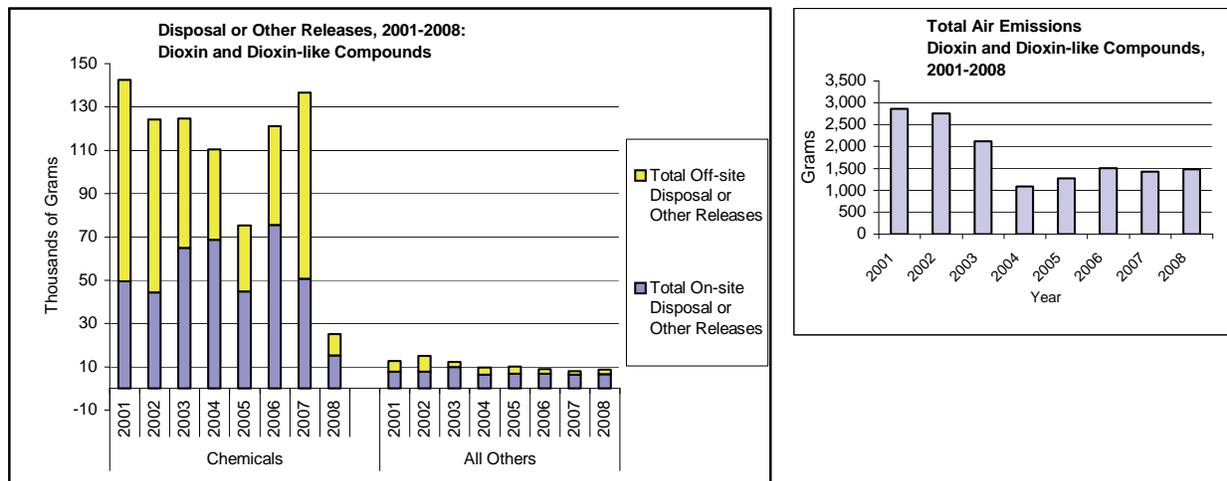
Air emissions of dioxin and dioxin-like compounds.
Electric utilities reported 42% of all air releases of dioxins in 2008 and had an overall decrease of 92 grams (13%) from 2007. However, the primary metals sector increased air releases by 117 grams (36%) from 2007 to 2008 and accounted for 29% of air releases of dioxins in 2008.

- Off-site disposal or other releases **decreased** by 87% (75,831 grams or 167 pounds), including decreases totaling 74,706 grams by two chemical manufacturers in off-site landfills other than RCRA Subtitle C landfills.

From 2001 to 2008, total disposal or other releases of dioxin and dioxin-like compounds **decreased** by 78% (121,667 grams or 268 pounds) (Figure 24).

- On-site air emissions **decreased** by 48% (1,375 grams or 3.0 pounds) from 2001 to 2008.

Figure 24. Total Disposal or Other Releases and Air Releases, 2001-2008: Dioxin and Dioxin-like Compounds



c) Dioxin TEQs

Starting with the 2008 reporting year, in addition to reporting the total gram quantity for the category, facilities with the data must also report grams data for each of the 17 members of the category for each media/type of transfer are reported. Prior to 2008, the total amount of the category members plus a distribution, which represented either the distribution of the total quantity of dioxins released to all media from the facility or the facility’s one best media-specific distribution, was reported.

The reporting threshold is 0.1 grams per year, based on the total grams of the category members. This threshold applies to each of the amounts manufactured, processed or otherwise used. “Manufacturing” includes coincidental manufacture as a byproduct or impurity. “Processing or otherwise used” applies to dioxin and dioxin-like compounds that are present as contaminants in a chemical or that are created during the manufacture of that chemical.

Dioxins and dioxin-like compounds are formed during incomplete combustion, and air releases are the major type of release. Human exposure occurs largely through food. The chemicals become incorporated into food when airborne dioxin and dioxin-like compounds fall onto plants that are eaten by animals or when waterborne dioxin and dioxin-like compounds contaminate fish and aquatic animals.

Each member of the dioxin category has a different toxicity, with 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) generally being considered the most toxic. Some members of the dioxin category are considered carcinogens and are suspected neurotoxicants, developmental toxicants, and

endocrine disruptors. Dioxins and dioxin-like compounds are considered to be persistent, bioaccumulative and toxic chemicals.

With the new reporting, such differing toxicities can be taken into account. Toxic Equivalency Factors (TEFs) are developed based on toxicity data. The World Health Organization (WHO) has a process based on scientific consensus to develop TEFs for mammals, birds and fish. It re-evaluates them approximately every five years. The WHO TEFs for 2005 (the latest evaluation) for the 17 dioxin and dioxin-like compounds are shown in the Table 2. The amount in grams of each chemical is multiplied by its TEF and then summed for a total (as grams-TEQ). This is done for each type of release and transfer.

Table 2. Dioxin and Dioxin-like Compounds and their Toxic Equivalency Factors

CAS Number	Chemical	TEF
01746-01-6	2,3,7,8-Tetrachlorodibenzo- p-dioxin	1
40321-76-4	1,2,3,7,8-Pentachlorodibenzo- p-dioxin	1
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo- p-dioxin	0.1
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo- p-dioxin	0.1
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo- p-dioxin	0.1
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo- p-dioxin	0.01
03268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo- p-dioxin	0.0003
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	0.1
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	0.03
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	0.3
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	0.1
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	0.1
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	0.1
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	0.1
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.01
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.01
39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	0.0003

Source: Martin Van den Berg, et. al. 2006. The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds. *Toxicological Sciences* 93(2), 223–24 available at toxsci.oxfordjournals.org/cgi/reprint/93/2/223?ijkey=piogXG6dhrnD&keytype=ref

There were 1,144 forms for dioxin and dioxin-like compounds submitted for 2008 of which 1,121 forms (98%) had non-zero total disposal or other releases. About 81% (927 forms) of the facilities reporting on dioxin and dioxin-like compounds reported grams data for each of the 17 individual members of the category for each media of release/transfer. Among the sectors with the largest total disposal or other releases, the percent of facilities reporting individual member grams data included:

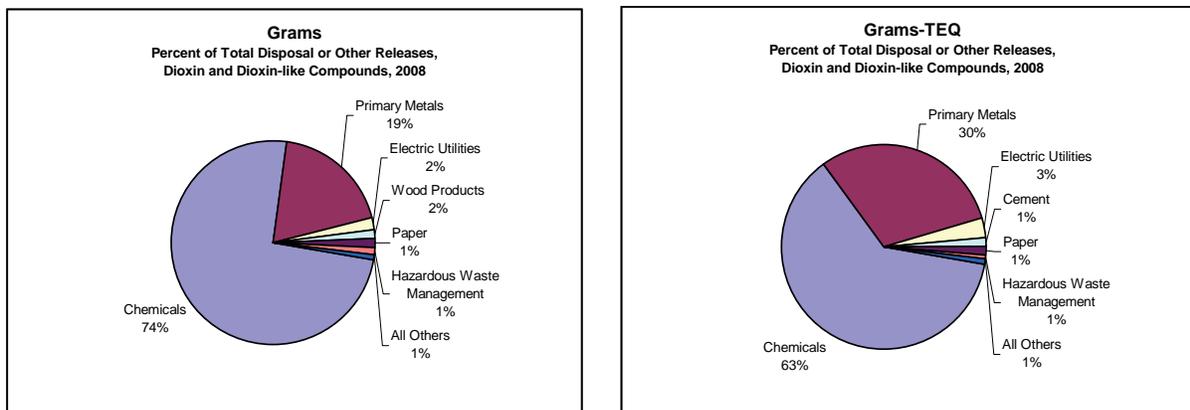
- 95% of paper facilities
- 85% of electric utilities and of cement manufacturers
- 81% of wood products manufacturers
- 80% of chemical manufacturers
- 72% of primary metals facilities
- 66% of petroleum refining and products, and
- 62% of hazardous waste management facilities.

Of the dioxin forms with individual member grams data, three industry sectors have accounted for over 95% of both total grams and total grams-TEQ:

- chemical manufacturers,
- primary metals facilities and
- electric utilities.

When toxicity equivalent factors (TEFs) are applied, these three sectors had the same ranking for total disposal or other releases in grams-TEQ as they did for total grams. (Figure 25.)

Figure 25. Total Disposal or Other Releases of Dioxin and Dioxin-like Compounds, by Industry, 2008: Grams and Grams-TEQ



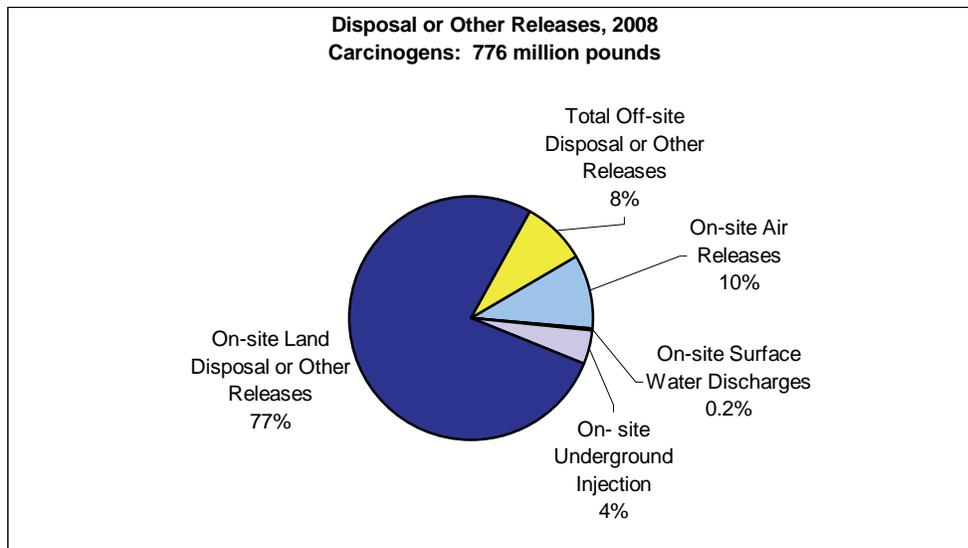
B. Carcinogens

EPA has separated carcinogens for additional analysis in 2008. For this analysis, EPA included all TRI chemicals that appear as known or suspected carcinogens in one of three sources: National Toxicology Program (NTP), International Agency for Research on Cancer (IARC) and/or 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Hazardous Safety and Health Administration (OSHA). There were 179 on the TRI list for 2008; 35 of the 179 carcinogens were not reported for 2008.

1. What was reported for 2008?

Total disposal or other releases of carcinogens reported was 776 million pounds in 2008 (Figure 26).

Figure 26. Disposal or Other Releases, 2008: Carcinogens



- 92% (711 million pounds) were disposed of or otherwise released **on-site**, including
 - ▶ 77% (598 million pounds) in land disposal or other releases, including
 - 39% (306 million pounds) in land disposal other than landfills and surface impoundments (such as waste piles, spills or leaks)
 - 28% (217 million pounds) in on-site surface impoundments other than RCRA Subtitle C surface impoundments
 - ▶ 10% (76 million pounds) in on-site air emissions.
- 8% (66 million pounds) were disposed of or otherwise released **off-site**.
 - ▶ 4% (34 million pounds) in landfills other than RCRA Subtitle C landfills and
 - ▶ 1% (8.3 million pounds) was sent off-site for solidification/stabilization of metals and metal compounds.

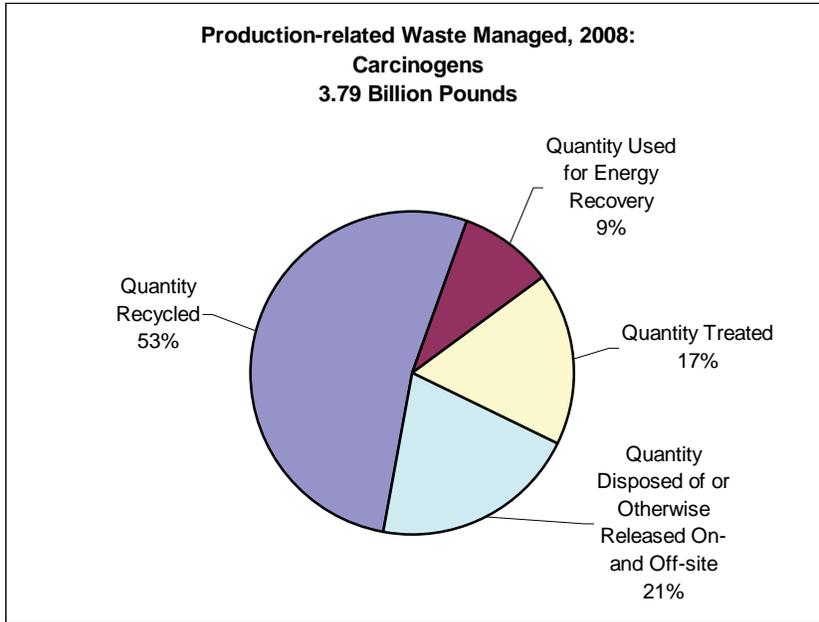
The carcinogens with the largest total disposed or other releases in 2008, included

- Lead and lead compounds with 63% (486 million pounds) of total disposal or other releases
- Arsenic and arsenic compounds with 10% (74 million pounds)
- Other disposal or other releases of carcinogens in 2008 included:
 - ▶ 46 million pounds of chromium compounds and
 - ▶ 33 million pounds of styrene (with 30 million pounds of that as air releases).

Total production-related waste managed of carcinogens was 3.79 billion pounds in 2008 (Figure 27).

- 53% (2.00 billion pounds) was recycled on- and off-site,
- 21% (782 million pounds) was disposed of or otherwise released on- and off-site,
- 17% (654 million pounds) treated on- and off-site, and
- 9% (354 million pounds) was used for energy recovery on- and off-site.

Figure 27. Production-related Waste Managed, 2008: Carcinogens

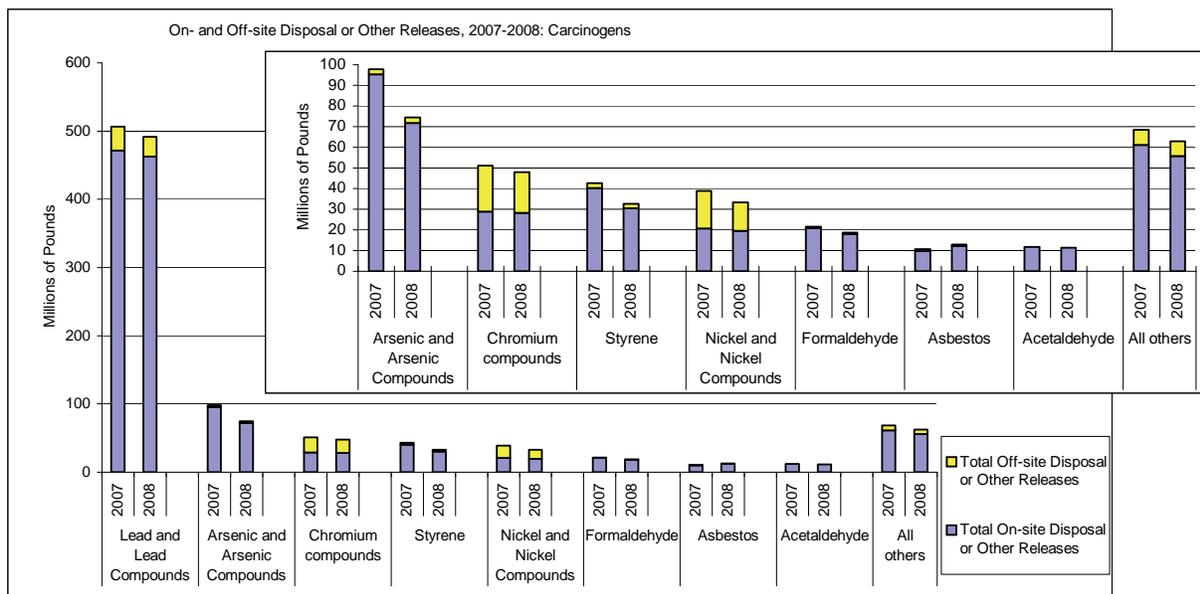


2. How do the carcinogen data compare to years past?

From 2007 to 2008, total disposal or other releases of carcinogens **decreased** by 60 million pounds or 7% (Figure 28). Air releases **decreased** by 16 million pounds or 18%.

- Lead and lead compounds **decreased** by 12 million pounds (2%), but had an **increase** in air releases of 77,844 pounds (8%),
- Arsenic and arsenic compounds **decreased** by 24 million pounds (24%),
- Chromium compounds **decreased** by 3.1 million pounds (6%),
- Styrene air releases **decreased** by 9.6 million pounds (24%), and
- Formaldehyde air releases **decreased** by 1.9 million pounds (22%).

Figure 28. Total Disposal or Other Releases, by Chemical, 2007-2008: Carcinogens



From 2001 to 2008, total disposal or other releases of carcinogens **decreased** by 33% (388 million pounds), including a **decrease** of 44% (59 million pounds) in air releases.

C. TRI Chemical Hazard

In an attempt to look at chemical hazards, EPA has used the Risk Screening Environmental Indicators (RSEI) “toxicity-weighted-pounds” methodology to conduct additional analysis.³ The idea is to provide additional insights that go beyond simple pounds analysis and reflect some basic measure of chemical toxicity. This analysis does not address fate and transport of chemicals or specific containment methods, populations, non-TRI chemical burdens or other factors that would be addressed in in-depth risk assessments.

The RSEI toxicity weighting method uses a proportional system of numeric weights that reflect the relative toxicities of chemicals. RSEI toxicity weights use calculated human health values from various EPA toxicity data sources that generally are considered protective of human health. RSEI toxicity weights are available for both cancer and non-cancer health effects.

For this analysis, EPA included all TRI chemicals that have RSEI hazard weights and addresses total disposal or other releases to all media. Two analyses are done, one using the cancer toxicity weights and one using the non-cancer toxicity weights. If a TRI chemical has both, then the chemical is included in each analysis. The analysis does not address dioxin and some other chemicals where relative toxicity weightings are not available.

Methodology Used:

Toxicity Weighted Pounds is total air releases times inhalation toxicity weight plus surface water discharges times oral toxicity weight plus maximum of inhalation/oral times all other disposal or other releases.

There are separate weights for cancer effects and for non-cancer health effects. A particular chemical may have both types and, in that case, is included in each analysis.

Major Caveats to RSEI Toxicity Weights Analysis:

- *Approach does not address containment (such as landfill liners, etc.) or fate and transport of chemicals*
- *Does not address dioxin or certain other chemicals*
- *Must consider unique caveats for 23 chemicals, including chromium (e.g., only hexavalent fraction of chromium used).*
- *Assigned toxicity weights include uncertainty factors depending on the amount and quality of data that is available for a particular chemical (i.e., toxicity weights may be high due to lack of information on a chemical as well as due to proven high toxicity).*
- *Toxicity weighted pounds depends on relative assignment of hazard and can only be used for comparison purposes from year to year and chemical to chemical. Toxicity weighted pounds should not be viewed as any kind of a single stand-alone measure.*

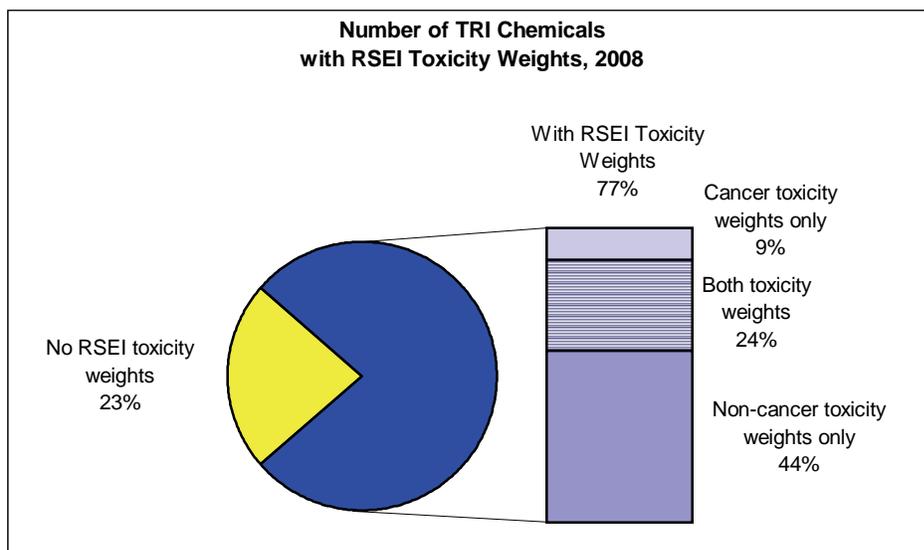
³ For additional information on RSEI, please see www.epa.gov/oppt/rsei/

1. RSEI Toxicity Weighting for TRI Chemicals

For 2008, 493 TRI chemicals were reported on by TRI facilities.

- 33% of the chemicals have RSEI cancer toxicity weights
- 68% of the chemicals have RSEI non-cancer toxicity weights
- 24% of the chemicals have both cancer and non-cancer RSEI toxicity weights.
- 23% of the chemicals reported on for 2008 do not have RSEI toxicity weights, including known or suspected carcinogens such as dioxins, creosote and polychlorinated alkanes. (Figure 29.)

Figure 29. Number of TRI Chemicals with RSEI Toxicity Weights, 2008



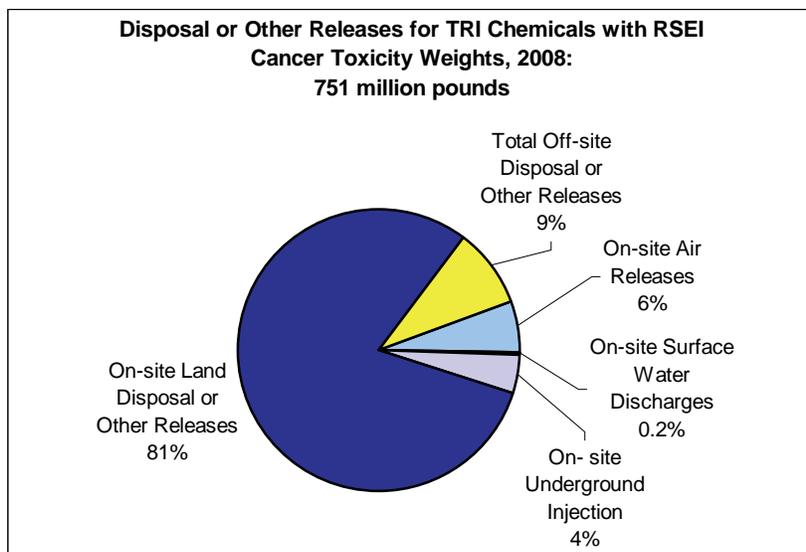
2. RSEI Cancer Toxicity Weighting

a) What are the results for 2008?

Total disposal or other releases for the 162 TRI chemicals reported on for 2008 with RSEI toxicity weights for cancer effects was 751 million pounds. (Figure 30.)

- 81% was on-site land disposal or other releases, including
 - ▶ 41% in other land disposal (such as waste piles, spills or leaks) and
 - ▶ 29% in non-RCRA Subtitle C surface impoundments
- 9% was sent off-site primarily to land disposal or other releases, including
 - ▶ 5% to non-RCRA Subtitle C landfills and
 - ▶ 2% to RCRA Subtitle C landfills
- 6% was on-site air releases

Figure 30. Disposal or Other Releases for TRI Chemicals with RSEI Cancer Toxicity Weights, 2008



When RSEI toxicity weights for cancer effects are applied for 2008, two chemicals accounted for 91% of the total toxicity weighted pounds.

- Asbestos accounted for 78% of total disposal or other releases weighted by RSEI toxicity values for cancer effects
 - ▶ Asbestos has a high value due to an assigned toxicity weighting of 1,000,000, the largest of all TRI chemicals with RSEI toxicity weights for cancer effects.
 - ▶ In 2008, most asbestos was landfilled, with 71% going to on-site RCRA Subtitle C landfills, 24% to other on-site landfills and 5% to off-site non-RCRA Subtitle C landfills.
- Arsenic and its compounds accounted for 14% of total disposal or other releases weighted by RSEI toxicity values for cancer effects.
 - ▶ Arsenic and its compounds has a relatively high toxicity weight (31,000 inhalation toxicity weight) but also had large amounts reported, ranking thirteenth for total disposal or other releases (not weighted), among TRI chemicals with RSEI toxicity weights.
 - ▶ In 2008, disposal or other releases consisted of 81% in on-site non-RCRA Subtitle C surface impoundments and 8% in on-site other land disposal (such as waste piles, leaks and spills).

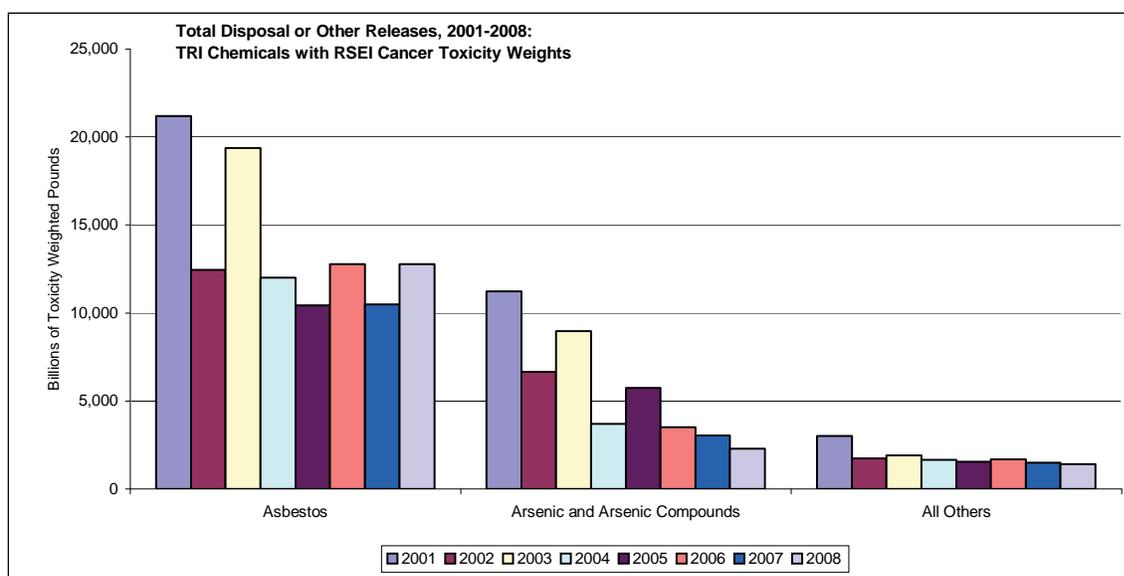
b) What were the changes in toxicity weighted pounds from 2007 to 2008 and from 2001 to 2008?

Comparing the nationally aggregated total toxicity weighted pounds of disposal or other releases using the RSEI cancer toxicity weights to years past shows that (Figure 31):

- For 2007 to 2008, there was an **increase** of 10% using RSEI cancer toxicity weighted pounds, for TRI chemicals with RSEI cancer toxicity weights.
 - ▶ The increase is largely due to the 21% **increase** in total disposal or other releases of **asbestos**. The hazardous waste management facilities report more than 90% of total disposal or other releases of asbestos and reported an increase of 34% from 2007 to 2008, mainly in on-site RCRA Subtitle C landfills.

- ▶ The change in pounds for the same group of TRI chemicals (those with RSEI cancer toxicity weights) was a **decrease** of 6%.
- For 2001 to 2008, there was a **decrease** of 53% using RSEI cancer toxicity weighted pounds, for TRI chemicals with RSEI cancer toxicity weights.
 - ▶ The change in pounds for the same group of TRI chemicals (those with RSEI cancer toxicity weights) was a **decrease** of 33%.
 - ▶ As with the large decrease in total pounds over this period, much of this decrease could be due to the change in reporting by mining facilities, particularly for arsenic and its compounds. The metal mining sector reported 95% of total disposal or other releases of arsenic and its compounds for 2001 and a decrease of 82% from 2001 to 2008. The hazardous waste management facilities had the largest total disposal or other releases of asbestos during this period.

Figure 31. Total Disposal or Other Releases, by Chemical, 2001-2008: TRI Chemicals with RSEI Cancer Toxicity Weights



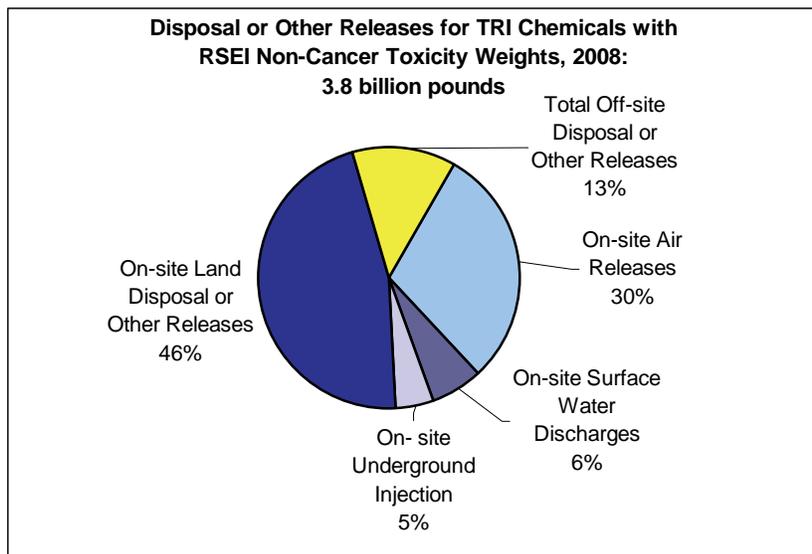
3. RSEI Non-Cancer Toxicity Weighting

a) What are the results for 2008?

Total disposal or other releases for the 337 TRI chemicals reported on for 2008 with RSEI toxicity weights for non-cancer health effects was 3.8 billion pounds. (Figure 32.)

- 46% was on-site land disposal or other releases, including
 - ▶ 19% in non-RCRA Subtitle C surface impoundments
 - ▶ 16% in other land disposal (such as waste piles, spills or leaks) and
- 30% was on-site air releases
- 13% was sent off-site primarily to land disposal or other releases, including
 - ▶ 7% to non-RCRA Subtitle C landfills and
 - ▶ 2% to RCRA Subtitle C landfills
- 6% was on-site surface water discharges
- 5% was in on-site underground injection wells

Figure 32. Disposal or Other Releases for TRI Chemicals with RSEI Non-Cancer Toxicity Weights, 2008



When RSEI toxicity weights for non-cancer health effects are applied for 2008, three chemicals accounted for 80% of the total toxicity weighted pounds.

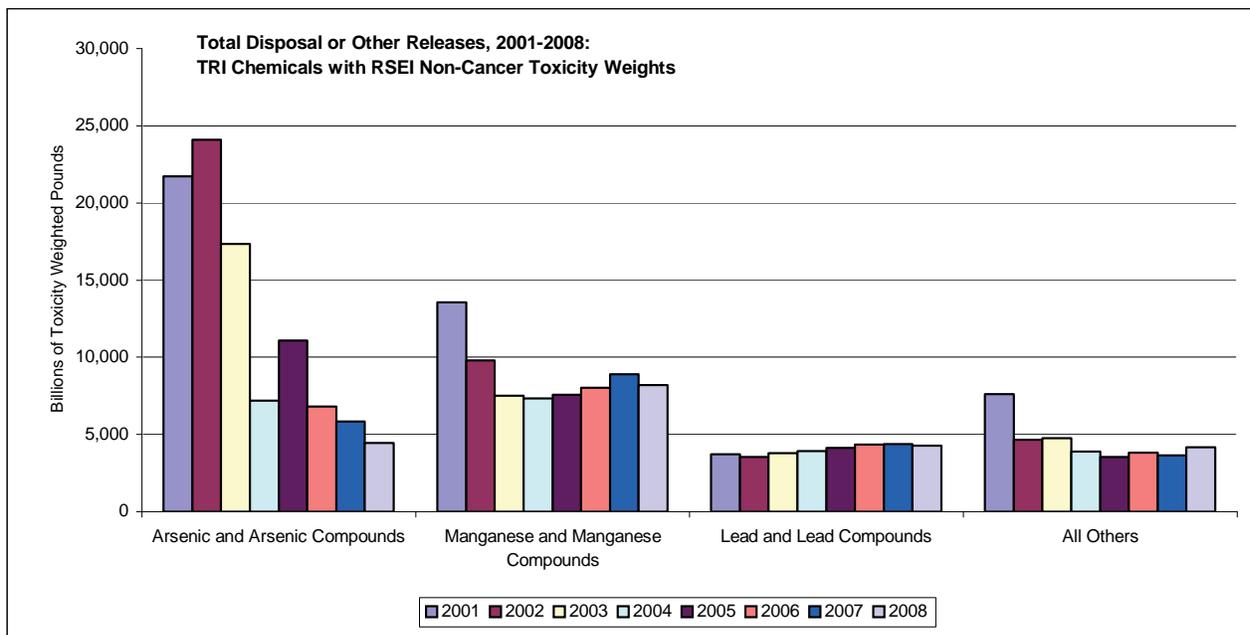
- Manganese and its compounds accounted for 39% of total disposal or other releases weighted by RSEI toxicity values for non-cancer effects.
 - ▶ Manganese and its compounds has a relatively high toxicity weight (36,000 inhalation toxicity weight) but also had large amounts reported, ranking sixth for total disposal or other releases (not weighted), among TRI chemicals with RSEI toxicity weights.
 - ▶ In 2008, disposal or other releases consisted of 30% in on-site and 22% in off-site non-RCRA Subtitle C landfills and 19% in on-site non-RCRA surface impoundments.
- Arsenic and its compounds accounted for 21% of total disposal or other releases weighted by RSEI toxicity values for non-cancer effects. The second largest for non-cancer toxicity weighted pounds as it is for cancer toxicity weighted pounds.
 - ▶ Arsenic and its compounds has a relatively high toxicity weight (60,000 inhalation toxicity weight for non-cancer effects) but also had large amounts reported, ranking thirteenth for total disposal or other releases (not weighted), among TRI chemicals with RSEI toxicity weights.
 - ▶ In 2008, disposal or other releases consisted of 81% in on-site non-RCRA Subtitle C surface impoundments and 8% in on-site other land disposal (such as waste piles, leaks and spills).
- Lead and its compounds accounted for 20% of total disposal or other releases weighted by RSEI toxicity values for non-cancer effects.
 - ▶ Lead and its compounds ranks high because it had the second largest total disposal or other releases (not weighted), among TRI chemicals with RSEI toxicity weights.
 - ▶ In 2008, disposal or other releases consisted of 60% in on-site other land disposal (such as waste piles, leaks and spills) and 28% in on-site non-RCRA Subtitle C surface impoundments.

b) What were the changes in toxicity weighted pounds from 2007 to 2008 and from 2001 to 2008?

Comparing the nationally aggregated total toxicity weighted pounds of disposal or other releases using the RSEI non-cancer toxicity weights to years past shows that (Figure 33):

- For 2007 to 2008, there was a **decrease** of 7% using RSEI non-cancer toxicity weighted pounds, for TRI chemicals with RSEI non-cancer toxicity weights. The change in pounds for the same group of TRI chemicals (those with RSEI non-cancer toxicity weights) was a **decrease** of 6%.
- For 2001 to 2008, there was a **decrease** of 55% using RSEI non-cancer toxicity weighted pounds, for TRI chemicals with RSEI non-cancer toxicity weights.
 - ▶ The change in pounds for the same group of TRI chemicals (those with RSEI non-cancer toxicity weights) was a **decrease** of 31%.
 - ▶ As with the large decrease in total pounds over this period, much of this decrease could be due to the change in reporting by mining facilities.
 - For arsenic and its compounds, the metal mining sector reported 95% of total disposal or other releases for 2001 and a **decrease** of 82% from 2001 to 2008.
 - For manganese and its compounds, the metal mining sector reported 52% of total disposal or other releases for 2001 and a **decrease** of 82% from 2001 to 2008.
 - ▶ However, for lead and its compounds, the metal mining sector reported 78% of total disposal or other releases for 2001 and an **increase** of 25% from 2001 to 2008, representing 85% of the total for 2008. Both the hazardous waste management facilities and the primary metals sector had substantial decreases in lead and its compounds from 2001 to 2008. Hazardous waste facilities had an overall **decrease** of 39% and the primary metals sector **decrease** was 24%.

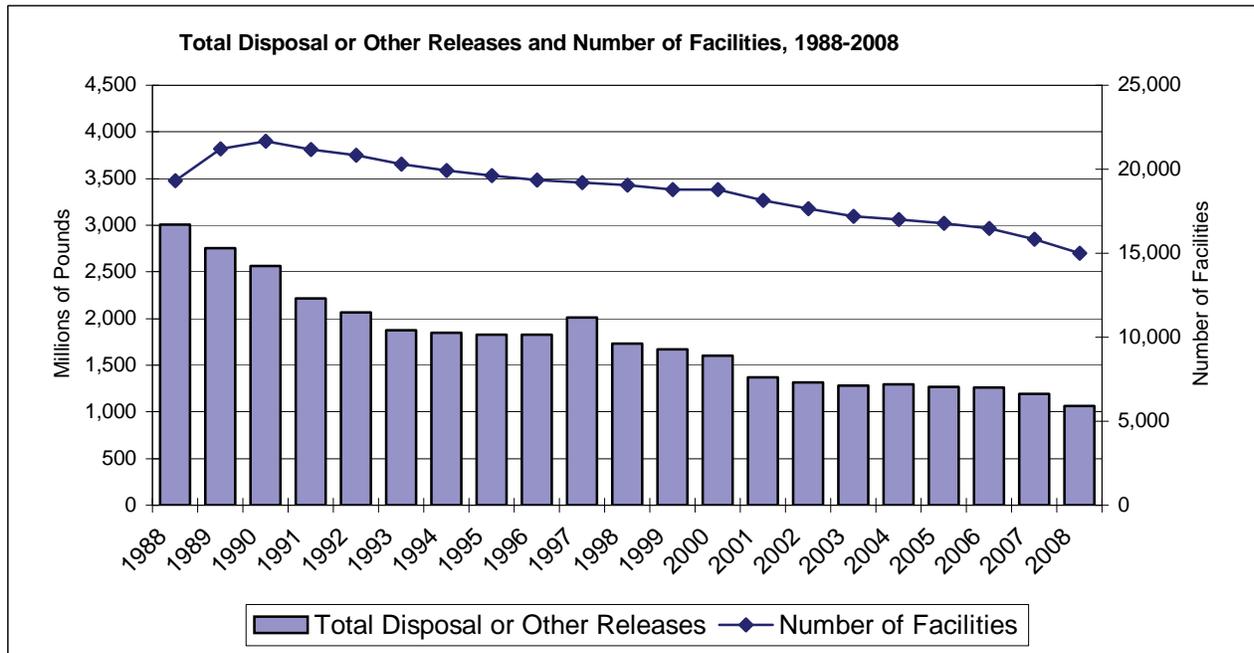
Figure 33. Total Disposal or Other Releases, 2001-2008: TRI Chemicals with RSEI Non-Cancer Toxicity Weights



VI. TRI Data, 1988-2008

Looking at trends in the industries and chemicals that have been reported consistently since 1988, total on- and off-site disposal or other releases of TRI chemicals **decreased** by 65% (1.94 billion pounds). The number of facilities reporting to TRI **decreased** by 22% over that same time period. This decrease only takes into consideration the 1988 core set of chemicals and industry sectors (i.e., those chemicals/industry sectors that have been on the TRI list and have had the same reporting definition since 1988). (Figure 34.)

Figure 34. Total Disposal or Other Releases and Number of Facilities, 1988-2008



Note: Data are from TRI Form, Sections 5 (all parts) and 6.1 (metals and metal compounds only) and 6.2 (Disposal codes only and metals and metal compounds reported under codes M40 and M61). Does not include delisted chemicals, chemicals added in 1990, 1994 and 1995, aluminum oxide, ammonia, hydrochloric acid, PBT chemicals, sulfuric acid, vanadium and vanadium compounds. For the years 1998 and after, does not include industries, other than manufacturing industries, that are required to report for 1998 and later years only. Data as of December 2009.