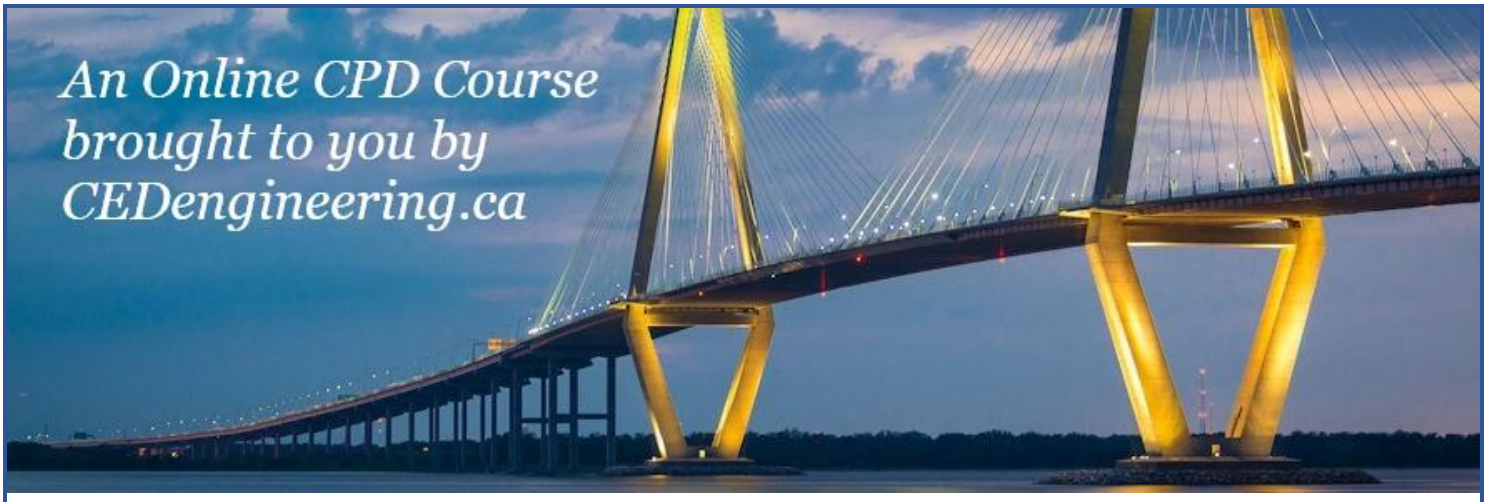


# Factors to Consider When Using Toxic Release Inventory Data

Course No: H01-003
Credit: 1 PDH

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*This course was adapted from the U.S. Environmental Protection Agency (EPA), Publication No. 260R19001, "Factors to Consider When Using Toxic Release Inventory Data", which is in the public domain.*

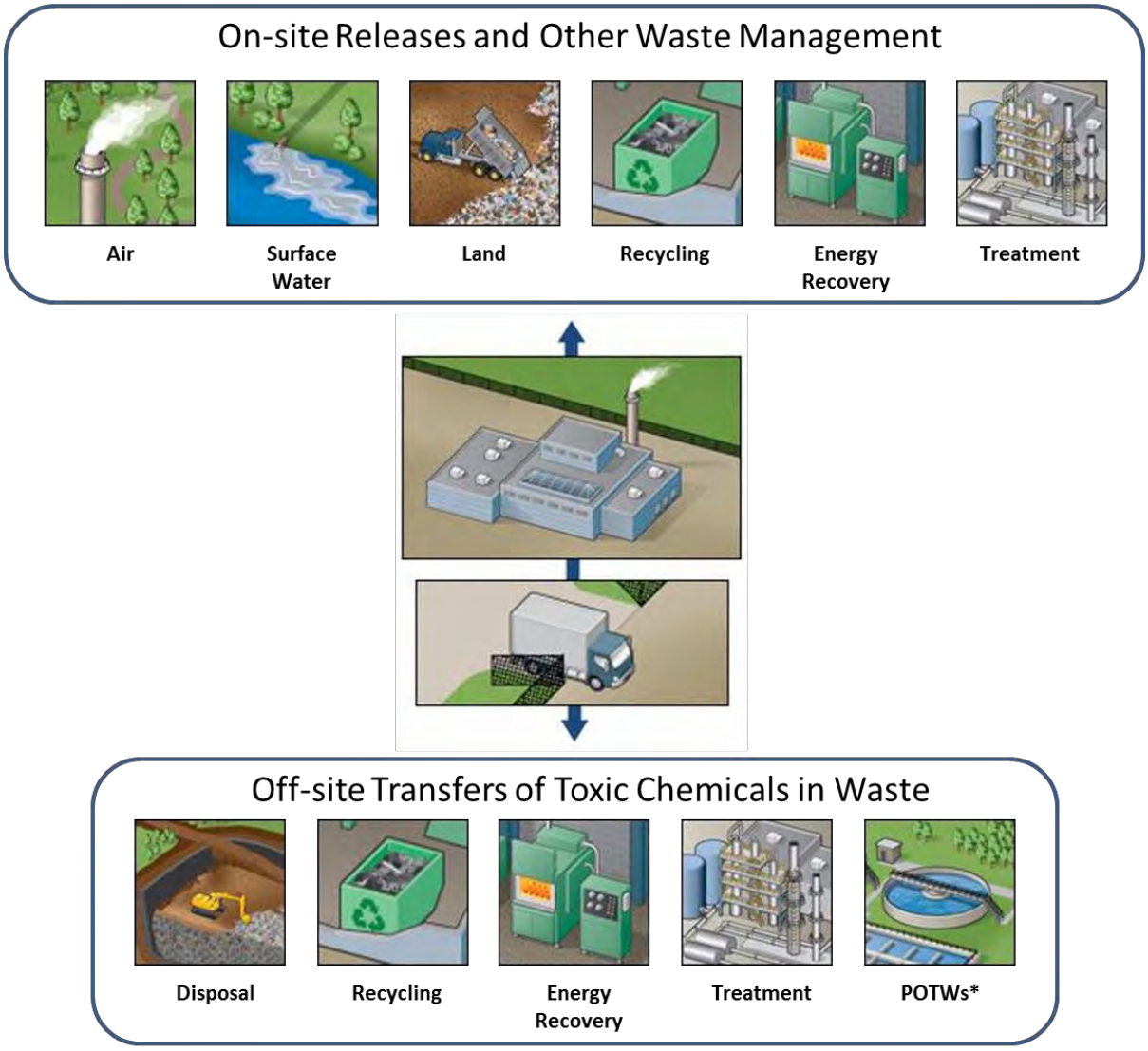
# Factors to Consider When Using TRI Data

## Contents

## The Toxics Release Inventory (TRI)

The Toxics Release Inventory (TRI) is a dataset compiled by the U.S. Environmental Protection Agency (EPA). It contains information on toxic chemicals handled by many facilities across the United States, including details on quantities of chemicals managed through disposal or other releases, recycling, energy recovery or treatment (Figure 1).

**Figure 1: Release and Waste Management Data Available in TRI**




*Publicly owned treatment works

Using TRI data access tools developed by EPA, anyone can explore data for over 53,000 facilities that have reported at least once in the more than 30 years of the TRI Program's existence. More information on TRI and the data collected can be found at www.epa.gov/tri/.

The goal of the TRI Program is to empower citizens and other TRI stakeholders through information about how toxic chemicals are managed. Using TRI data and EPA's suite of TRI-related tools, one can:

- Identify potential environmental concerns and gain a better understanding of potential risks;
- Identify priorities and opportunities to work with industry, government and communities to reduce toxic chemical releases and potential risks associated with them;
- Provide the members of your community with information and insights regarding toxic chemical releases and waste management practices in the community;
- Make informed decisions on the consequences of such practices and take action; and
- Establish reduction targets and measure progress toward those targets.

Since its inception, the program has grown in several important ways, including expanding the businesses covered and the chemicals on which they report. Equally important is the number of creative ways the general public, government agencies and reporting industries use the available TRI information. This paper introduces and gives background on TRI and identifies a number of important factors that must be considered when reviewing or using the data.

## Key Factors to Consider When Analyzing TRI Data

The bulk of TRI data reflect annual quantities (in pounds) of toxic chemicals released from a facility to the environment, managed by the facility as waste, transferred from the facility to another facility for release or other waste management.[1] These data are particularly useful for:

- Determining priorities for facilities based on pounds of toxic chemicals released or otherwise managed as waste,
- Tracking trends in year-to-year totals of toxic chemicals released or otherwise managed as waste,
- Comparing toxic chemical releases and other waste management among industry sectors, for particular chemicals or individual facilities and
- Assessing individual records to learn about specific facilities.

Key factors to consider when analyzing TRI data include:[2]

- **Toxicity** - The level of toxicity varies among the covered chemicals; data on amounts of the chemicals alone are inadequate to reach conclusions on health-related risks.
- **Environment and Exposure** - The presence of a chemical in the environment must be evaluated along with the potential and actual exposures and the route of exposures, the chemical's fate in the environment and other factors before any statements can be made about potential risks associated with the chemical or a release.
- **Regulation by Environmental Statutes** - Regulatory controls apply to many of the releases reported; reporting facilities must comply with environmental standards under statutes such as the Clean Air Act and the Clean Water Act, in addition to reporting releases to TRI.
- **On-Site Waste Management** - Many options for managing wastes are subject to stringent technical standards and exacting state and federal regulatory oversight.
- **Off-Site Waste Management** - Some TRI reporters send chemicals off-site in waste to be managed at specialized waste management facilities that are also subject to TRI reporting requirements. Since both the facilities sending waste and the facilities receiving waste report to TRI, adjustments must be made to avoid double counting (see Box 5 for additional detail).

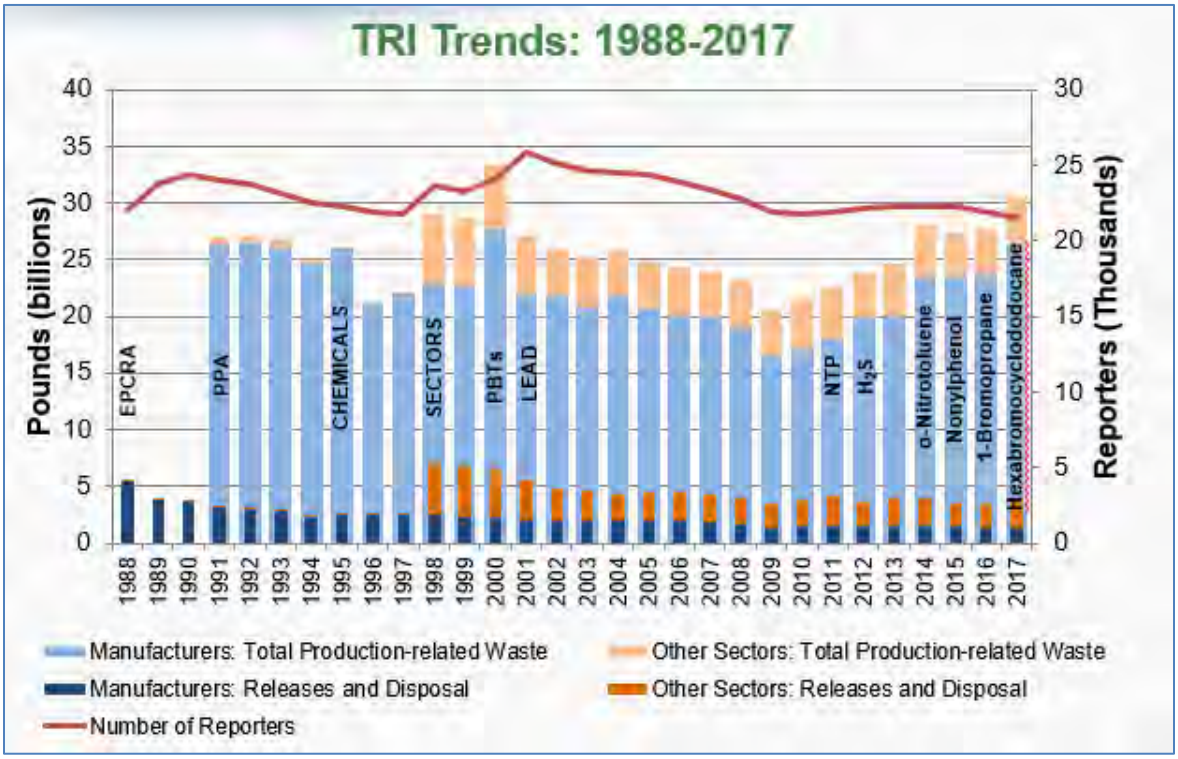
[1] Specifics on TRI terminology and data for release, transfer and waste management can be found in Boxes 2-9 in the Appendix.

[2] Additional detail on factors to consider concerning the use of specific TRI data elements and the interpretation of trend data can be found in the Appendix.

- **Context** - It is also important to consider how the toxicity and exposure associated with a TRI-reported quantity compares to the toxicity and exposure of other chemicals that are not in TRI, such as chemicals not on the list (e.g., certain criteria air pollutants), unreported releases (e.g., below the threshold or from a non-TRI-reportable industry sector) and chemicals from other sources (e.g., area and mobile sources).
- **TRI continues to evolve** with ongoing advances in information technology, needs of the public and EPA priorities. Since 1991, EPA has made many changes to the program (Figure 2).

Figure 2 shows how TRI data trends and total production related waste have changed over time with changes to the TRI Program. The horizontal axis displays reporting year, starting with the second year for which data are reported. The left vertical axis displays the number of pounds of chemicals reported to TRI (in billions); it corresponds to the bars that show releases and disposal and total production-related waste in each year, as reported by manufacturers. The right vertical axis displays the number of TRI reporters (in thousands); it corresponds to the red line that shows the number of facilities reporting to TRI in each year. Major changes to the TRI Program are listed on the chart in words within the bars and further explained below the chart, by reporting year. Quantities of chemicals reported to TRI in response to program changes are color coded on the bar graph, as indicated in the legend (Note: in 1991, additional waste management information is reported to TRI (e.g., quantities treated, recycled or burned for energy recovery) as required by the Pollution Prevention Act of 1990 (PPA).

**Figure 2: TRI Data Trends and Program Expansion: 1988 – 2017**




**1988:** Second year[3] of TRI reporting under Emergency Planning and Community Right-to-Know Act (EPCRA).

**1991:** Additional waste management information is reported to TRI (e.g., quantities treated, recycled or burned for energy recovery) as required by the Pollution Prevention Act of 1990 (PPA). Light blue indicates waste management information reported to TRI under the PPA, total production-related waste[4].

**1995:** Chemical expansion rule adds nearly 300 chemicals to the TRI chemical list. Hydrogen Sulfide was added with the expansion of the chemical risk however an administrative stay was issued to evaluate issues brought to the Agency's attention after promulgation of the final rule so it was not reported under the rulemaking.

**1998:** Seven additional industry sectors ("Other Sectors") are added to TRI. Dark orange indicates releases and disposal from these seven sectors; light orange indicates total production-related waste from these seven sectors[4].

[3] The first year of TRI (1987) was not included in the figure above because the manufacturing and production thresholds were higher, 75,000 lbs for manufacturing and 10,000 lbs for otherwise using TRI reportable chemicals, therefore making comparisons to later years problematic. In 1988 the threshold was 50,000 lbs for manufacturing and 10,000 lbs for otherwise using TRI reportable chemicals (this is included for illustrative purposes). All other years the threshold for reporting was 25,000 lbs for manufacturing and 10,000 lbs for otherwise using TRI reportable chemicals.

[4] For most facilities, release and disposal (dark blue and dark orange bars) may be considered a subset of the total production related waste (light blue and light orange bars). However, if there was a non-production related release at a facility (e.g., remedial actions or catastrophic events), it would be counted as release and disposal, but not as total production related waste (light blue and light orange bars). In this case, the release and disposal at a facility would not be included in the facility's total production related waste.

**2000:** Several persistent bioaccumulative toxic (PBT) chemicals are added to TRI chemical list, the reporting thresholds are lowered for these and PBT chemicals already on the list.
**2001:** Lead and Lead Compounds are designated as PBTs and TRI reporting thresholds lowered.
**2011:** 16 chemicals classified as "reasonably anticipated to be a human carcinogen" by the National Toxicology Program (NTP) in their Report on Carcinogens (RoC) are added to TRI.
**2012:** The Administrative Stay of the TRI reporting requirements for hydrogen sulfide is lifted.
**2014:** ortho-Nitrotoluene is added to TRI. This chemical has been classified as "reasonably anticipated to be a human carcinogen" by the National Toxicology Program (NTP) in their Report on Carcinogens (RoC) document. ortho-Nitrotoluene reporting will be required beginning in the 2014 TRI reporting year.
**2015:** Nonylphenol is added to the TRI list.
**2016:** 1-bromopropane is added to the TRI list.
**2017:** Hexabromocyclododecane (HBCD) is added to the TRI list.

## TRI Covers an Important Subset of Chemicals Managed

Reports must be filed by owners and operators of facilities that meet the following criteria:

- The facility falls within a TRI-reportable industry sector or is federally-owned or operated;
- The facility has 10 or more full-time (or equivalent) employees; and
- The facility manufactures, processes or otherwise uses (MPOU) a TRI-listed chemical in an amount above the TRI reporting threshold during a calendar year (thresholds vary depending upon chemical).[5]

If a facility meets all three of these criteria, it must submit a TRI report for each chemical for which it exceeded an MPOU threshold.[6]

If a facility does not meet all these criteria, it is not required to report to TRI.

Information on facilities exempt from TRI reporting might be available in EPA databases compiled by other programs that regulate the facilities. Other EPA databases with release and waste management information include:

- RCRAInfo[7] – contains hazardous waste management information;
- PCS and ICIS-NPDES [8] – contains monthly measurements of chemicals released to water at facilities with discharge permits;
- National Emissions Inventory (NEI)[9] – contains air release estimates for stationary and mobile sources;
- Risk Management Plan (RMP)[10] – contains risk management plans that state the amount of chemicals facilities have in on-site processes; and

[5] **Manufacture** is to produce, prepare, compound or import a chemical. **Process** is to prepare a chemical, after its manufacture, for distribution in commerce. Processing is usually the incorporation of a chemical into a product. However, a facility may process an impurity that already exists in a raw material. **Otherwise use** is any use of a chemical that is not covered by the terms manufacture or process. Chemicals that are otherwise used include chemical processing aids like solvents and manufacturing aids like lubricants, refrigerants or catalysts. Otherwise use often includes ancillary activities, for example, to remediate wastes or to clean process equipment.

[6] For details, see TRI Reporting Forms and Instructions: https://ofmpub.epa.gov/apex/guideme_ext/f?p=guideme:rfi-home:2096522329119

[7] Resource Conservation and Recovery Act Information (RCRAInfo) database; available through http://echo.epa.gov and www.epa.gov/enviro/facts/rcrainfo/search.html. RCRA Biennial Report (BR) data, a subset of RCRAInfo, are available through https://rcrapublic.epa.gov/rcrainfoweb/action/modules/br/summary/view

[8] Permit Compliance System (PCS) and Integrated Compliance Information System for the National Pollutant Discharge Elimination System (ICIS-NPDES); available through http://echo.epa.gov/ and www.epa.gov/enviro/facts/pcs-icis/search.html.

[9] Available through https://www.epa.gov/air-emissions-inventories

[10] Available in EPA Federal Reading Rooms. For details, see: https://www.epa.gov/dockets/epa-docket-center-reading-room

- Greenhouse Gas Reporting Program (GHGRP)[11] – contains greenhouse gas emissions estimates for facilities and suppliers.

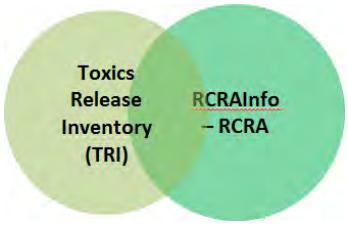
Each of these programs has different requirements for who must report and the data and frequency of the reporting; however, there is overlap between the facilities in these databases and the facilities that report to TRI (Figure 3).

Users who want to find information that is not available in TRI can check these other databases. For example, NEI can be used to find estimates of air releases for facilities that do not report to TRI or for mobile sources, which are not covered by TRI.

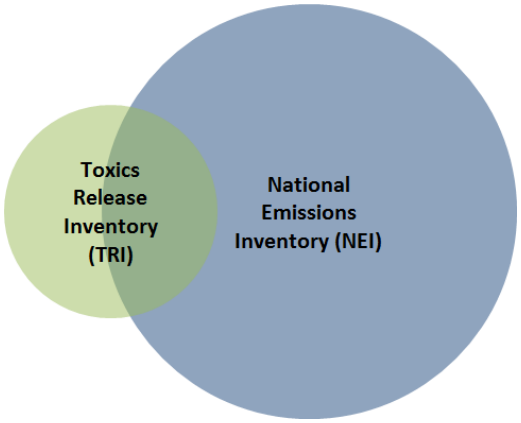
Figure 3 below shows the degree of overlap, in terms of facilities that report, between TRI and the RCRA info, ICIS-NPDES, RMPs, NEI and GHGRP databases.

[11] GHG Reporting Program data are available through https://www.epa.gov/ghgreporting/ghg-reporting-program-data-sets

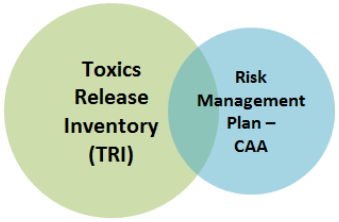
**Figure 3: TRI Overlap for Air, Water and Waste Programs at EPA**



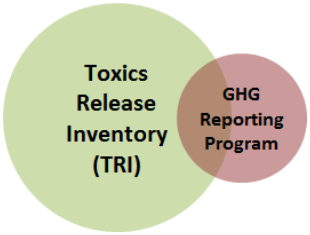

Approximately 6,300 facilities reported hazardous waste generation to RCRA BR* and also reported to TRI in 2013. That is, 24% of about 25,900 facilities reporting hazardous waste generation to RCRA BR also reported to TRI and 29% of about 21,600 TRI filers in RY2013 also reported hazardous waste generation to RCRA BR.**



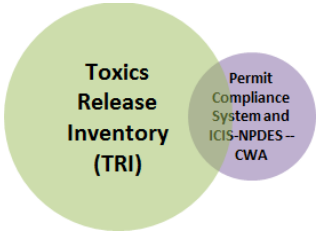

Approximately 10,500 facilities reported to TRI in 2013 and were listed as stationary sources in NEI in 2011 That is, 11% of about 97,200 stationary sources in NEI reported to TRI, and 49% of about 21,600 TRI filers were stationary sources in NEI in 2011.




Approximately 2,600 facilities were RMP registered and also reported to TRI in 2013. That is, 20% of about 13,000 RMP-registered facilities reported to TRI and 12% of about 21,600 TRI filers also were RMP-registered facilities in RY2013.




Approximately 2,400 facilities reported direct emissions of greenhouse gases to the atmosphere under EPA's Greenhouse Gas Reporting Program (GHGRP) and also reported to TRI in 2013. 30% of almost 7,900 direct emitters reporting to GHGRP also reported to TRI and 11% of about 21,600 TRI filers also reported as direct emitters in GHGRP in RY2013.




Approximately 6% of facilities that reported releases to TRI in RY2013 were also NPDES permittees. Among active NPDES permittees, 19% reported discharges to both TRI and ICIS-NPDES.

* Resource Conservation and Recovery Act (RCRA) Biennial Report (BR)
** "RY 2012" refers to Reporting Year 2012. The "Reporting Year" is the calendar year to which the reported information applies

Note that toxic chemical release and other waste management quantities tend to be higher for facilities in TRI than facilities exempt from TRI reporting. For example, although only a small percentage of the stationary sources in NEI are also found in TRI, 79% of the hazardous air pollutant releases found in the 2002 NEI dataset were also in TRI.

## Additional Factors to Consider for Exposure and Risk Analysis

TRI provides information about releases of toxic chemicals from facilities throughoutthe United States; however, TRI data do not reveal whether or to what degree the public is exposed to listed chemicals. TRI data can, in conjunction with other information, be used as a starting point in evaluating such exposures and the risks posed by such exposures. The determination of potential risk to human health and/or the environment depends upon many factors, including the toxicity of the chemical, the fate of the chemical in the environment, and the amount and duration of human or other exposure to the chemical. Box 1 highlights some of the factors that should be considered when reviewing TRI data for exposure and risk analysis.

An example to illustrate how consideration of exposure pathways can influence analysis and interpretation of TRI data comes from the chemical manufacturing industry (NAICS 325). Using TRI Explorer, in RY2013, the chemical manufacturing facilities with the highest *on- and off-site disposal or other releases* were Ascend Performance Materials LLC, Ascend Performance Materials - Chocolate Bayou Facility, Basin Electric, Monsanto Luling, and Dupont Delisle Plant. If releases to RCRA Subtitle C landfills and Class I underground injection wells – waste management options with lower probabilities of exposure - are excluded, a different set of top-five facilities would be identified: Basin Electric, Tronox LLC, Dupont Johnsonville Plant, CF Industries Nitrogen LLC, and Weylchem US Inc. Table 1 provides the rankings of these chemical manufacturing facilities based on total *on- and off-site disposal or other releases* (column 3) compared to rankings when RCRA Subtitle C landfills and Class I underground injection wells are excluded (right-hand column). Chemical manufacturing facilities, with the highest rankings for total disposal or other releases, rank much lower when only looking at the disposal or other releases that are more likely to migrate beyond the fence line. When evaluating potential risks from exposure to toxic chemicals, disposal and other releases that are more likely to migrate beyond the fence line might be of greater concern than disposal in more physically controlled RCRA Subtitle C landfills and Class I underground injection wells.

**Table 1: Top Chemical Manufacturing Facilities, RY2013**

| Facility | Location (City, State) | Rank based on Total *On- and Off-site Disposal or Other Releases* | Rank based on Total *On- and Off-site Disposal or Other Releases* More Likely to Migrate Beyond the Fence Line* |
|---|---|---|---|
| **Facilities with Top On- and Off-site Disposal or Other Releases** | | | |
| Ascend Performance Materials LLC | Cantonment, FL | 1 | 321 |
| Ascend Performance Materials - Chocolate Bayou Facility | Alvin, TX | 2 | 251 |
| Basin Electric | Beulah, ND | 3 | 1 |
| Monsanto Luling | Luling, LA | 4 | 258 |
| Dupont Delisle Plant | Pass Christian, MS | 5 | 37 |
| **Facilities with Top *On- and Off-site Disposal or Other Releases* More Likely to Migrate Beyond the Fence Line**** | | | |
| Basin Electric | Beulah, ND | 3 | 1 |
| Tronox LLC | Hamilton, MS | 7 | 2 |
| Dupont Johnsonville Plant | New Johnsonville, TN | 8 | 3 |
| CF Industries Nitrogen LLC | Donaldsonville, LA | 11 | 4 |
| Weylchem US Inc | Elgin, SC | 12 | 5 |

* Rank based on Total On- and Off-site Disposal or Other Releases Excluding RCRA Subtitle C Landfills and Class I Underground Injection Wells

** Facilities with Top On- and Off-site Disposal or Other Releases Excluding RCRA Subtitle C Landfills and Class I Underground Injection Wells

**Box 1. Factors to Consider in Using TRI Data for Exposure and Risk Analysis**

**Toxicity of the Chemical:** TRI chemicals vary widely in toxicity. High volume releases of less toxic chemicals may appear to be a more serious problem than lower volume releases of highly toxic chemicals, when just the opposite may be true.

**Exposure Considerations:** The potential for exposure may be greater the longer the chemical remains unchanged in the environment. Sunlight, heat or microorganisms may or may not decompose the chemical. For example, microorganisms readily degrade some chemicals, such as methanol, into less toxic chemicals, whereas metals are persistent and will not degrade in the environment.

**Bioconcentration of the Chemical in the Food Chain:** As a chemical becomes incorporated in the food chain, it may concentrate or disperse.

- Some chemicals, such as mercury, accumulate and magnify in concentration in organisms as they move up the food chain.
- Small amounts of a chemical that bioaccumulate may result in significant exposures to consumers.

**Type of Disposal or Release (Environmental Medium):** The extent to which chemical exposure of a population occurs depends on the environmental medium (air, water, land) to which a chemical is either disposed or otherwise released. The medium also affects the types of exposures possible, such as inhalation, dermal exposure or ingestion. For example, disposal in underground injection wells is regulated by EPA's Underground Injection Control Program to provide safeguards so that injection wells do not endanger current and future underground sources of drinking water. When wells are properly sited, constructed and operated, underground injection is an effective and environmentally-safe method to dispose of wastes.

**Type of Off-Site Facility Receiving the Chemical and the Efficiency of its Waste Management Practices:** The amount of a toxic chemical that ultimately enters the environment depends on how the chemical was handled during treatment, energy recovery or recycling activities. Several factors to keep in mind when considering amounts sent off-site are presented below:

- The efficiency of recycling operations varies depending on the method of recycling and the chemical being recycled.
- Use of a combustible toxic chemical for energy recovery typically results in the destruction of 95% to 99% or more of the toxic chemical. The remaining quantity may be either released to air or disposed of in ash to land.

**On-Site Waste Management of the Toxic Chemical:** As with off-site waste management, the amount of the toxic chemical disposed of or otherwise released to the environment depends on how the chemical was handled during treatment, energy recovery or recycling activities. However, since the waste management is on-site, any amount of the chemical that enters the environment after waste management is reported to TRI as part of that facility's disposal or other releases.

## Concern About Pollution in a Neighborhood

People often want to use TRI to assess the vulnerability of their communities to the hazards posed by TRI chemicals released in their neighborhoods. When conducting exposure and risk analysis for a community, it is important to keep in mind that:

1. TRI releases do not necessarily constitute cause for concern,
2. EPA works to decrease the potential for harm from exposure to toxic chemicals, and
3. Additional resources and information for assessing releases to a community are available.

TRI provides useful information on the quantity of a toxic chemical that is being released from a facility. However, it does not provide all the information necessary to answer questions about health risks. The two main considerations to keep in mind when exploring TRI release information and health risks are:

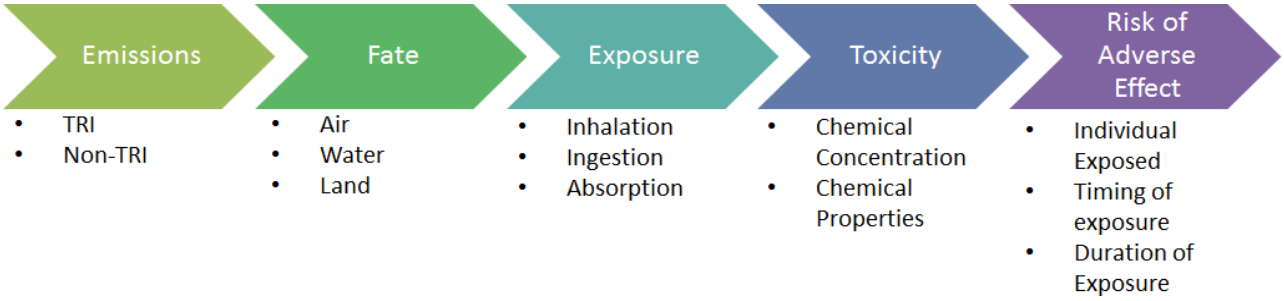
- **TRI data only provide information on releases of certain chemicals from certain sources.** While facilities that report to TRI often represent major sources of releases or discharges of toxic chemicals to the environment, they are not responsible for all releases or discharges of chemicals to the environment, even for all releases of chemicals included on the TRI list of toxic chemicals. For example, releases of TRI or other chemicals from natural sources, releases of TRI or other chemicals from facilities not subject to TRI reporting requirements and even releases of chemicals from consumer products may contribute to one's total exposure to a given chemical. Users of TRI data should be aware that the TRI database represents only a portion of total chemical releases.

  However, given that TRI generally collects a large portion of the total quantities of releases of TRI chemicals nationwide, it provides useful information. One tool that is useful in examining chemical releases in your neighborhood is called myRTK, which combines chemical release data from TRI with information from other EPA programs. More information on using myRTK can be found at www.epa.gov/tri/myrtk/. Another useful tool is EPA's Risk-Screening Environmental Indicators (RSEI) tool, which combines chemical releases reported in TRI with other factors to compare location specific risks of chemicals, facilities and industries. More information on using RSEI can be found at www.epa.gov/rsei/.

- **More information and analyses are needed to determine an individual's risk associated with TRI releases.** The release of a chemical in a neighborhood is not by itself cause for concern. Even though chemicals may be stored at, used by or released from a particular facility, an individual may or may not be exposed to any of the chemicals or

may not be exposed to the extent needed to cause adverse health effects. Figure 4 below displays the typical sequence of investigating known chemical emissions and estimated health risks. For additional information on the range of factors associated with health risks, visit EPA's risk assessment portal at www.epa.gov/riskassessment/.

**Figure 4: Overview of Factors that Influence Risk**




There are several online TRI data tools,[12] as noted above, that retrieve the set of facilities within a specific neighborhood and characterize information on the quantities of toxic chemicals those facilities release or otherwise manage as waste. This information gives an idea of the potential magnitude of exposure, most likely pathways of exposure (i.e. air, water or land), and exposure routes (i.e., inhalation, oral ingestion or dermal). To estimate the adverse health effects associated with releases in a community, it is important to consider the fate, exposure and toxicity of the chemicals that were released, as well as the factors that contribute to individuals' vulnerabilities to chemical releases in their neighborhoods.

## EPA's Work to Minimize Potential for Harm from Exposure to Toxic Chemicals

EPA compiles facilities' TRI reports and provides them to the public. By making information about industrial management of toxic chemicals available to the public, TRI creates a strong incentive for companies to improve environmental performance.

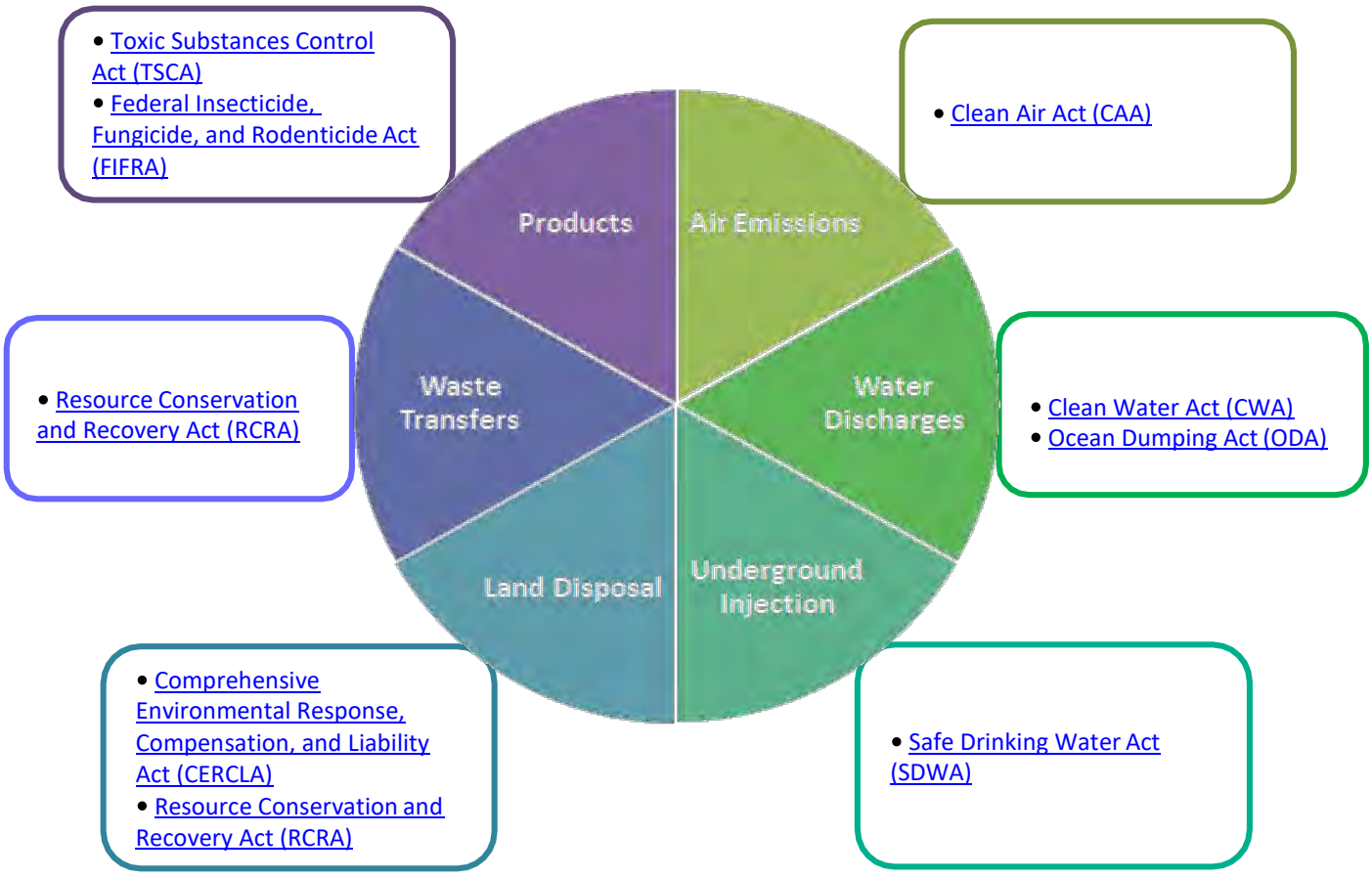
Information dissemination is not the only approach EPA uses to help communities understand and reduce the potential risks to human health and the environment associated with the use of toxic chemicals. EPA also:

1. Regulates how and to what extent facilities use, handle, release and dispose of toxic chemicals;
2. Collects additional environmental information regarding toxic chemicals; and
3. Encourages pollution prevention.

[12] For details on available TRI data tools, see www.epa.gov/tri/tri-data-and-tools

EPA issues regulations that require facilities and their owners to make process changes, install and operate pollution controls, and undertake other environmental management activities under the authority granted by federal environmental laws. These laws and the industrial processes they regulate are summarized in Figure 5 below. How each environmental statute applies to a facility depends on the chemicals the facility handles, the industrial processes requiring the regulated chemical(s), and the environmental pathways by which the chemicals are released to the environment. Chemicals may be released to the environment directly from the facility (e.g., air emissions through stacks; water discharges through pipes) or indirectly (e.g., chemicals transferred to a waste treatment facility may be released during or after treatment; chemicals incorporated into a product are purchased and may be released during consumer use or at product disposal).

**Figure 5: EPA's Role in Protecting Public Health**



## Appendix: Factors in Detail

This section addresses a few factors to consider in greater detail. A better understanding of these factors can enhance the overall use of TRI data in complex analyses. These factors are:

- TRI On- and Off-site Disposal or Other Releases
- TRI Transfers Off-site for Further Waste Management, including transfers for Disposal or Other Releases
- Source Reduction
- Making Year-to-Year Comparisons

Note: This section frequently refers to TRI Form R. The Form R is the form that most facilities fill out and submit to EPA when they report to TRI.[13] It is used to collect release, other waste management and source reduction information.

### TRI On- and Off-site Disposal or Other Releases

The following section describes the categories of on- and off-site disposal or other releases that are reportable to TRI. Box 2 describes reportable disposal or other releases that may occur on-site at the facility and identifies types of activities that may contribute to the disposal or other releases to various media.

Box 3 describes disposal or other releases that may result from a facility's transferring chemicals off-site. As noted in Box 3, off-site disposal or other releases include additional details about off-site transfers of metals and metal compounds. How metals and metal category compounds are reported to TRI is explained in Box 4.

For analyses that present all on- and off-site disposal or other releases categories together, consideration must be given to off-site transfers reported by one facility that are reported as on-site disposal or releases by another facility. To avoid double counting, the off-site transfers should be omitted in these analyses. The methodology used to avoid duplication of off-site transfers to disposal or other releases is found in Box 5.

[13] Under certain circumstances, and only for non-PBT chemicals, facilities required to report to TRI have the option of using the Form A in place of the Form R. Facilities using Form A report only facility and chemical identifying information, so Form A requires less time to complete than Form R and reduces the burden ordinarily associated with filing a Form R. For additional details on how data are reported to TRI, see https://www.epa.gov/toxics-release-inventory-tri-program/basics-tri-reporting

## On-Site Disposal or Other Releases

### Box 2. An Explanation of On-Site Disposal or Other Releases

On-site disposal or other releases include emissions to the air, discharges to bodies of water, disposal to land including disposal in underground injection wells at the facility. Disposal or other releases are reported to TRI by media type. On-site disposal or other releases are reported in Section 5 of Form R.

**Fugitive Air Emissions (Section 5.1).** All releases to air that are not released through a confined air stream. Fugitive air emissions include equipment leaks, evaporative losses from surface impoundments and spills, and releases from building ventilation systems.

**Point Source Air Emissions (Section 5.2).** Air emissions, also referred to as stack emissions that occur through confined air streams, such as stacks, vents, ducts or pipes.

**Surface Water Discharges (Section 5.3).** Discharges to streams, rivers, lakes, oceans and other bodies of water. This includes releases from contained sources, such as industrial process outflow pipes or open trenches. Releases due to runoff, including storm water runoff, are also reported to TRI as surface water discharges.

**On-Site Disposal in Underground Injection Class I wells (Section 5.4.1).** Disposal in Class I wells includes the emplacement of hazardous and nonhazardous fluids (industrial and municipal wastes) into isolated formations beneath the lowermost underground source of drinking water (USDW). Because they may inject hazardous waste, Class I wells are the most strictly regulated under the Safe Drinking Water Act (SDWA) and are further regulated under the Resource Conservation and Recovery Act (RCRA).

**Disposal in Underground Injection Class II-V Wells (Section 5.4.2).** The subsurface emplacement of fluids through wells. TRI chemicals associated with manufacturing, the petroleum industry, mining, commercial and service industries, and federal and municipal government-related activities may be injected into Class I, II, III, IV or V wells, if they do not endanger underground sources of drinking water (USDW), public health or the environment. Disposal in Class I wells (see above) are reported separately from disposal in Class II-V wells.

- Class II wells are used for injection of brines and other fluids associated with oil and gas production.
- Class III wells are used for injection of fluids associated with solution mining of minerals.
- Class IV wells are used for injection of hazardous or radioactive wastes into or above a USDW and is banned unless authorized under ground water remediation laws.
- Class V wells inject nonhazardous fluids into or above a USDW and are typically shallow, on-site disposal systems, such as floor and sink drains which discharge directly or indirectly to ground water, dry wells, leach fields and similar types of drainage wells.

Beginning with the 1996 reporting year, facilities report amounts injected into Class I wells separately from amounts injected into all other wells (Class II-V). This change was made to reflect the difference in management standards and regulatory oversight provided by the Underground Injection Control Program for Class I wells as distinguished from other forms of injection reportable to TRI.

**Box 2. An Explanation of On-site Disposal or Other Releases (Continued)**

**RCRA Subtitle C Landfills (Section 5.5.1A)**. Disposal in RCRA Subtitle C landfills in which wastes are buried. These are landfills that are subject to stringent requirements for liners, leak detection systems and groundwater monitoring.

**Other Landfills (Section 5.5.1B).** Disposal of toxic chemicals in landfills other than RCRA Subtitle C landfills.

Beginning with the 1996 reporting year, facilities report amounts disposed of in RCRA Subtitle C landfills separately from amounts disposed of in other on-site landfills. This change was made to recognize the difference in management and regulatory oversight provided for RCRA Subtitle C landfills.

**Land Treatment/Application Farming (Section 5.5.2).** Management techniques in which a waste containing a listed chemical is applied to or incorporated into soil.

**RCRA Subtitle C Surface Impoundments (Section 5.5.3A).** The total amount of the EPCRA Section 313 chemical that was placed in and remained in (did not volatilize from the impoundment during the reporting year) the RCRA Subtitle C surface impoundments. A surface impoundment is a holding area used to volatilize and/or settle waste materials. Examples of surface impoundments include holding, settling, storage and elevation pits; ponds and lagoons.

**Other Surface Impoundments (Section 5.5.3B).** The total amount of the EPCRA Section 313 chemical that was placed in surface impoundments other than RCRA Subtitle C surface impoundments.

Beginning with the 2003 reporting year, facilities report amounts disposed of in RCRA Subtitle C surface impoundments separately from amounts disposed of in other on-site surface impoundments. This change was made to recognize the difference in management and regulatory oversight provided for RCRA Subtitle C surface impoundments.

**Other Disposal (Section 5.5.4).** Other disposal methods including waste piles, spills or leaks. Most of the toxic chemical waste reported as other disposal to TRI is from waste rock at metal mines. Rock removed from a mine is called ""“waste rock” if it does not contain economically recoverable amounts of targeted metals (e.g., copper, gold). TRI chemicals naturally present in waste rock in small concentrations are almost all reported to TRI as “other disposal.”

## Off-Site Disposal or Other Releases

**Box 3. An Explanation of Off-Site Disposal or Other Releases**

An off-site disposal or other release is a discharge of a toxic chemical to the environment that occurs as a result of a facility's transferring a waste containing a TRI chemical off-site for disposal or other release, as reported in Section 6 of Form R. Certain other types of transfers are also categorized as off-site disposal or other release because, except for location, the outcome of transferring the chemical off-site is the same as disposing of it or releasing it on-site. For each transfer, the amount of the chemical in the waste, type of management activity (chosen from a list of codes referred to as "M" codes) undertaken by the receiving facility and the address of the receiving site is reported.

**Off-site Disposal to Underground Injection to Class I Wells (Section 6.2, M81).** Toxic chemicals in waste may be transferred off-site to sites that inject the wastes underground. Class I wells are the most strictly regulated under the SDWA. (See discussion of on-site underground injection for a description of these disposal types in Box 2.)

**Off-Site Disposal to Underground Injection to Class II-V Wells (Section 6.2, M82).** Toxic chemicals in waste may be transferred off-site to sites that inject the wastes underground, including into Class II, III, IV or V wells. (See discussion of on-site underground injection for a description of these disposal types in Box 2.)

**Off-Site Disposal to RCRA Subtitle C Landfills (Section 6.2, M65).** Toxic chemicals in waste may be transferred off-site for disposal in RCRA Subtitle C landfills. (See discussion of on-site disposal to RCRA Subtitle C landfills for a description of these disposal types.) Beginning with the 2002 reporting year, facilities report amounts transferred off-site for disposal in RCRA Subtitle C landfills separately from those sent to other landfills. This change was made to recognize the difference in management and regulatory oversight provided for RCRA Subtitle C landfills as distinguished from other landfills. The Section 6.2 code for off-site disposal in landfills prior to the 2002 reporting year was M72.

**Off-Site Disposal in Other Landfills (Section 6.2, M64).** Toxic chemicals in waste may be transferred off-site for disposal in landfills other than RCRA Subtitle C landfills. (See Box 2 for a discussion of on-site disposal to other landfills for a description of these disposal types.) Prior to the 2002 reporting year, off-site transfers to landfills/disposal surface impoundments were all reported in Section 6.2 under code M72. Any transfers reported erroneously under M72 for 2002 are included in this category.

**Storage Only (Section 6.2, M10).** On occasion, a toxic chemical is sent off-site for storage if there is no known disposal method. One example is toxic chemicals in mixed hazardous and radioactive waste. EPA considers this an off-site disposal or release because this method is being used as a form of disposal and the toxic chemical will remain there indefinitely.

**Solidification/Stabilization (metals only) (Section 6.2, M41 or M40 (metals and metal category compounds only)).** Waste solidification/stabilization is a physical or chemical process used to either reduce the mobility of the chemical or to eliminate free liquids in a hazardous waste. A waste stabilization process includes mixing the hazardous waste with binders or other materials, and curing the resulting hazardous waste and binder mixture.

**Box 3. An Explanation of Off-Site Disposal or Other Releases (continued)**

**Transfers to POTWs (Section 6.1, limited to amounts designated as releases).** Transfers to publicly-owned treatment works (POTWs) that are ultimately released (e.g., to surface waters). For RY 2013 and earlier, this includes metals and metal category compounds only, because metals are not destroyed by sewage treatment processes. For RY 2014 and subsequent years, this also includes amounts of non-metals that a facility indicates are ultimately released at the POTW. Facilities make this determination based on their best readily available information; as guidance, EPA publishes default chemical-specific removal and destruction rates based on experimental and estimated data from POTWs.

**Wastewater Treatment (metals only) (Section 6.2, M62 or M61 (metals and metal category compounds only)).** Transfers to wastewater treatment facilities (excluding to facilities that are publicly-owned treatment works (POTWs)) of metals and metal category compounds only.

**Subtitle C Surface Impoundment (Section 6.2, M66).** Subtitle C Surface impoundments are holding areas used to volatilize and/or settle waste materials that are regulated under RCRA Subtitle C.

**Other Surface Impoundments (Section 6.2, M67).** Surface impoundments are holding areas used to volatilize and/or settle waste materials. M67 is limited to surface impoundments other than RCRA Subtitle C surface impoundments.

**Land Treatment (Section 6.2, M73).** Management techniques in which a waste containing a listed chemical is applied to or incorporated into soil.

**Other Land Disposal (Section 6.2, M79).** Other land disposal methods include waste piles, spills or leaks.

**Other Off-site Management (Section 6.2, M90).** Chemicals in waste sent to sites where the waste is managed by techniques not specifically listed in Section 6.2.

**Transfers to Waste Broker (Section 6.2, M94).** Chemicals in waste sent to a broker where the broker sends the waste for disposal, but the facility sending the waste does not know the location of the disposal site and, therefore, reported the name of the waste broker instead. The Section 6.2 code for transfers to waste broker prior to the 1991 reporting year was M91.

**Unknown (Section 6.2, M99).** The "unknown" category of disposal indicates that a facility is not

## How Metals and Metal Category Compounds Should be Reported to TRI

Transfers of metals and metal category compounds to solidification/stabilization, to publicly owned treatment works (POTWs or municipal sewage treatment) and wastewater treatment facilities (excluding POTWs) also result in disposal or other releases and are classified as off-site disposal or other releases. How such transfers should be reported to TRI is described in Box 4.

**Box 4. How Metals and Metal Category Compounds Should be Reported to TRI**

In Section 6.2 of the Form R, facilities report the amounts sent to each off-site location to which the facility transfers wastes containing the reported toxic chemical for the purposes of recycling, energy recovery, treatment or disposal or other release. Metals and metal category compounds are managed in waste either by being disposed of or otherwise released or by being recycled. The metal has no heat value and thus cannot be combusted for energy recovery and cannot be treated because it cannot be destroyed regardless of whether the stream containing the metal is sent for energy recovery or treatment. Thus, transfers of metals and metal category compounds for further waste management should be reported as either a transfer for recycling or a transfer for disposal or other release. The applicable waste management codes for transfers of metals and metal category compounds for recycling are M24, M26 or M93. Applicable codes for transfers for disposal or other releases include M10, M41, M62, M66, M67, M64, M65, M81, M82, M73, M79, M90, M94 and M99.

Two codes, M41 and M62, were new for the 1997 reporting year. These codes are for transfers to waste management in which the waste stream may be treated but the metal contained in the waste stream is not treated and is ultimately disposed of or otherwise released. For example, M41 would be used for a metal or metal category compound which is stabilized in preparation for disposal. Prior to the 1997 reporting year, some facilities reported transfers of metals and metal category compounds for further waste management using two waste treatment codes, M40 and M61. Beginning in reporting year 1997, metals and metal category compounds must be reported under Section 6.2 using one of the disposal or other release codes or the applicable recycling code (M24 for metals recovery, M26 for other reuse or recovery or M93 for transfers to waste broker - recycling).

In Section 8.1 of the Form R, facilities report quantities of listed chemicals disposed of or otherwise released on- and off-site (excluding one-time catastrophic or remedial releases). Except for those quantities recycled, metals and metal category compounds should be reported in Section 8.1 of the Form R. This includes those quantities of metals and metal category compounds reported in:

- Section 5 as on-site disposal or other releases,
- Section 6.1 as discharges to POTWs.
- Section 6.2 as sent off-site for stabilization/solidification (M41) or wastewater treatment (excluding POTWs) (M62) and/or,

These quantities should not be reported in Section 8.7 of the Form R.

## Duplication of Off-Site Transfers to Disposal or Other Releases

TRI facilities transfer chemicals in waste off-site to other facilities for disposal or other releases. These recipient facilities can place the wastes in on-site landfills, disposal surface impoundments, land treatment facilities or other types of land disposal methods. They may also dispose of wastes in underground injection wells or, if metals and metal category compounds are sent to a wastewater treatment facility, they may be discharged to surface

waters. The recipient facilities generally are treatment, storage and disposal (TSD) facilities regulated under the federal Resources Conservation and Recovery Act (RCRA). TSD facilities are one of the added industries that must, beginning with the 1998 reporting year, report their disposal and other releases, transfers and other waste management to TRI. Thus, the facility that transfers chemicals to a TSD facility would report to TRI the quantities transferred as transfers to disposal or other releases and the TSD facility that receives the chemicals would report the amounts managed as on-site disposal or other releases to underground injection, land or surface waters. Box 5 describes EPA's methodology for avoiding duplication of amounts reported in off-site transfers that are also reported as on-site disposal or other releases by facilities that received such transfers.[14]

**Box 5. Duplication of Off-Site Transfers to Disposal or Other Releases**

To avoid double counting the transfers off-site to the TSD facilities that are also reported to TRI as on-site disposal or other releases by the TSD facilities, the off-site transfer quantities should be omitted from statistics that compare or summarize on-site and off-site disposal or other releases for all industries. Only the on-site disposal or other releases from the TSD facilities are included in analyses.

Facilities' RCRA ID numbers are used to identify such transfers and match them to on-site disposal or other releases reported by TSD facilities. A TRI facility must report the RCRA ID number of the TSD facility receiving the transfer; each amount of off-site transfer to TSDs should have the RCRA ID number of the receiving facility. RCRA IDs are then identified for the facilities that report to TRI using EPA's Facility Registry System (FRS).

If a facility is listed as receiving a waste transfer from another TRI reporter (based on RCRA ID), and reports to TRI on-site disposal or other releases of the same chemical (or the metal and its compounds in the case of metals) that were greater than or equal to the sum of the off-site transfers reported as transferred, then the amount of chemicals transferred from other TRI facilities should be omitted from the analysis. If the TRI facility receiving the waste reported an amount of on-site disposal or other releases of the chemical less than the total amount reported as transferred to the facility, then the amount omitted from the analysis should be reduced proportionally. For example, if Facility A reported 20,000 pounds transferred to Facility C and Facility B reported 80,000 pounds transferred to Facility C, but Facility C only reported 90,000 pounds disposed of or otherwise released on-site (which is 90 percent of the total amount of 100,000 pounds reported as transferred), then the amount of transfers omitted from the analysis for Facility A is 18,000 pounds (or 90 percent of 20,000 pounds) and for Facility B is 72,000 pounds (or 90 percent of 80,000 pounds).

[14] EPA's National Analysis and several of EPA's TRI data access tools omit duplicate off-site transfer quantities as appropriate. However, "early release" data, published prior to the National Analysis, do not omit duplicate off-site transfer quantities. For more information on the National Analysis, see www.epa.gov/trinationalanalysis. For more information on TRI data access tools, see www.epa.gov/tri/tri-data-and-tools

**Box 5. Duplication of Off-Site Transfers to Disposal or Other Releases (Continued)**

In analyses that present off-site transfers but not on-site disposal or other releases, these amounts should not be omitted in order to present complete data on off-site transfers for analysis. Also, analyses that present data on waste managed should not omit any reported data in order to present complete data on how waste is being managed. In addition, analyses that do not include all TRI facilities (for example, data for one state or one industry sector) should not omit any reported data because the transfers may be sent to facilities not included in the analysis.

The following table shows which types of off-site transfers to disposal or other releases are matched with which types of on-site disposal or other releases to determine if the transfers should be omitted.

| Off-site Transfer M Code | Section 5 Checked for Recipient TRI Facilities Based on Matching Chemical or, if Metal, Metal plus Metal Category Compounds (Section 6.2) |
|---|---|
| M10 | 5.5.4 |
| M41* | 5.5.1 A and B |
| M62* | 5.5.1 A and B, 5.5.3 and 5.3 |
| M64 | 5.5.1B |
| M65 | 5.5.1A |
| M66 | 5.5.3A |
| M67 | 5.5.3B |
| M73 | 5.5.2 |
| M79 | 5.5.4 |
| M81 | 5.4.1 |
| M82 | 5.4.2 |
| M90 | All Section 5 |
| M99 | All Section 5 |

*Includes metals and metal category compounds reported under codes M40 and M61.
M94 (transfer to waste broker) is not included since a waste broker does not dispose of or release the chemical.

## TRI Transfers Off-Site for Further Waste Management, Including Transfers for Disposal or Other Release

### Off-Site Transfers

Off-site transfers of TRI chemicals in waste include, in addition to transfers to disposal or other releases described above, transfers to treatment, publicly-owned treatment works (POTWs), recycling and energy recovery. These transfers are reported in Section 6.1 and 6.2 of Form R. Analyses that focus specifically on types of off-site transfers include transfers to disposal or other releases as well as the other types of transfers. Box 6 describes the various categories of transfers off-site for further waste management including for disposal or other releases.

**Box 6. An Explanation of Transfers Off-site for Further Waste Management, including Transfers for Disposal or Other Release**

An off-site transfer, reported in Section 6 of Form R, is the transfer of toxic chemicals in waste to a facility that is geographically or physically separate from the facility reporting under TRI. Chemicals reported to TRI as transferred are sent to off-site facilities for purposes categorized as recycling, energy recovery, treatment, or disposal or other release. The amounts reported represent a movement of the chemical away from the reporting facility. Except for off-site transfers to disposal or other release, these amounts do not necessarily represent entry of the chemical into the environment.

**Transfers to Publicly Owned Treatment Works (POTWs) (Section 6.1).** A POTW is a wastewater treatment facility that is owned by a state or municipality. Wastewaters from facilities reporting under TRI are transferred through pipes or sewers to a POTW. Treatment or removal of a chemical from the wastewater depends upon the nature of the chemical, as well as the treatment methods present at the POTW. In general, chemicals that are easily utilized as nutrients by microorganisms or have a low solubility in water, are likely to be removed to some extent. Chemicals that are volatile and have a low solubility in water may evaporate into the atmosphere. Not all TRI chemicals can be treated or removed by a POTW. Some chemicals, such as metals, may be removed, but are not destroyed and may be disposed of in landfills or discharged to receiving waters; these chemical quantities are categorized as off-site disposal or other releases, as explained in Box 3.

**Transfers Off-Site to Recycling (Section 6.2, M20, M24, M26, M28, M93).** Toxic chemicals in waste that are sent off-site for the purposes of recycling are generally recovered by a variety of recycling methods, including solvent recovery and metals recovery. The choice of the recycling method depends on the toxic chemical being sent for recycling. Once they have been recycled, these chemicals may be returned to the originating facility for further processing or made available for use in commerce.

**Transfers Off-Site to Energy Recovery (Section 6.2, M56, M92).** Toxic chemicals in waste sent off-site for purposes of energy recovery are combusted off-site in industrial furnaces (including kilns) or boilers that generate heat or energy for use at that location. Treatment of a chemical by incineration is not considered to be energy recovery.

**Transfers Off-Site to Treatment. (Section 6.2, M40 (except metals and metal category compounds), M50, M54, M61 (except metals and metal category compounds), M69, M95)**. Toxic chemicals in waste that are transferred off-site may be treated through a variety of methods, including biological treatment, neutralization, incineration and physical separation. These methods typically result in varying degrees of destruction of the toxic chemical.

**Other Off-Site Transfers (Section 6.2, invalid or no codes).** Toxic chemicals in waste that were reported as transferred off-site but for which the off-site activity (i.e., recycling, energy recovery, treatment or disposal) was not specified or was not an accepted code are considered as "other off-site transfers."

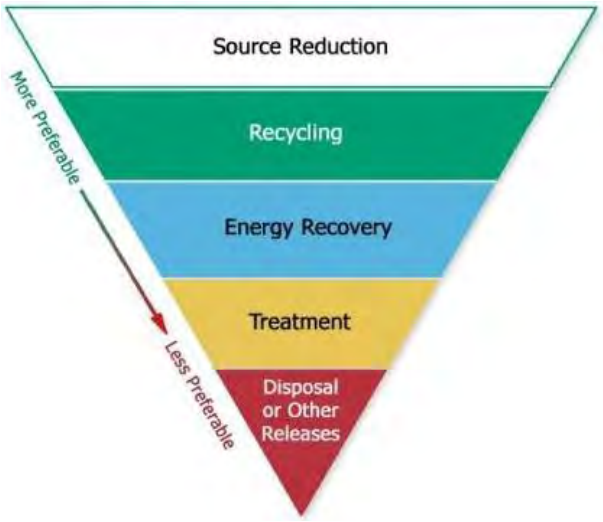
**Other Transfers Off-Site for Disposal or Other Releases.** See Box 3, except does not include any transfers to POTWs.

### TRI Chemicals Managed in Waste

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. The PPA established as national policy that source reduction is the preferred approach to managing waste. Source reduction is defined as an activity that prevents the generation of waste (see Box 9). The PPA also established as national policy a hierarchy of waste management options, illustrated in Figure 6, for situations where source reduction cannot be implemented feasibly.

Although source reduction is the preferred method of reducing risk, environmentally sound recycling shares many of its advantages. Like source reduction, recycling reduces the need for treatment or disposal of waste and helps conserve energy and natural resources. Where source reduction and recycling are not feasible, waste can be treated. Disposal or other releases of a chemical is viewed as a last resort, to be employed only if the preferred methods of waste management cannot be implemented. The PPA did not specifically address the combustion of waste for energy recovery as a waste management option. However, because energy recovery shares aspects of recycling and treatment, EPA chose to list this activity separately in the waste management hierarchy.

**Figure 6: Waste Management Hierarchy**



## Waste Management Information in TRI

Box 7 describes the waste management information facilities must report to TRI. The amount of TRI chemicals in waste reported includes both waste generated by the facility and waste received by the facility for the purpose of waste management. Facilities report these data in Section 8 of the Form R as estimates for the current reporting year, the previous year and projections for the two following years. The PPA requires this data projection, which encourages facilities to consider their future waste generation, opportunities for source reduction and potential improvements in waste management options as presented in the hierarchy. Future-year estimates are not commitments that facilities reporting to TRI must meet.

### Box 7. An Explanation of On- and Off-site Waste Management Information

On-site and off-site waste management activities are reported in Section 8 of Form R. In this section, amounts due to one-time events not associated with production processes are reported separately and are not included in the amounts reported as recycled, burned for energy recovery, treated or disposed of or otherwise released on- or off-site.

**Quantity Disposed of or Otherwise Released On-and Off-site (Section 8.1).** This is the total quantity of the toxic chemical that was released to the environment or disposed of at the facility (discharged to air, land, water and injected underground on-site) or sent off-site for disposal or other release. This quantity is the sum of the amounts reported in Sections 5 and 6 of Form R (on-site disposal or other releases plus off-site transfers to disposal or other releases and transfers to POTWs of chemicals such as metals and metal compounds that are not destroyed at the POTW) less any amount(s) associated with one-time events. Beginning in the 2003 reporting year, Section 8.1 was divided into four Subsections:

- Total on-site disposal to Class I, Underground Injection Wells, RCRA Subtitle C landfills and other landfills (Section 8.1a),
- Total other on-site disposal or other releases (Section 8.1b),
- Total off-site disposal to Class I Underground Injection Wells, RCRA Subtitle C landfills and other landfills (Section 8.1c) and
- Total other off-site disposal or other releases (Section 8.1d).

**Combusted for Energy Recovery On-site (Section 8.2).** This is the quantity of the toxic chemical that was combusted in some form of energy recovery device, such as a furnace (including kilns) or boiler. The toxic chemical should have a heating value high enough to sustain combustion. To avoid double-counting, the amount reported represents the amount destroyed in the combustion process, not the amount that entered the energy recovery unit. For example, 100,000 pounds of toluene entered a boiler that, on average, combusted 98% of the toluene. Any remaining toluene was discharged to air. A total of 98,000 pounds is reported as combusted for energy recovery (the remaining 2,000 pounds is reported as disposed of or otherwise released).

**Box 7. An Explanation of On- and Off-Site Waste Management Information (continued)**

**Combusted for Energy Recovery Off-Site (Section 8.3).** This is the quantity of the toxic chemical that left the facility boundary for energy recovery, not the amount combusted at the off-site location. The toxic chemical must have a significant heating value and the off-site location must have some form of energy recovery unit in place. This quantity includes the amount(s) reported in Section 6 of Form R as transferred off-site for energy recovery, less any amount(s) associated with non-routine events.

**Recycled On-Site (Section 8.4).** This is the quantity of the toxic chemical recovered at the facility and made available for further use. To avoid double-counting, the amount reported represents the amount exiting the recycling unit. It is not the quantity that entered an on-site recycling or recovery operation. For example, 3,000 pounds of a listed chemical enters a recycling operation. Of this, 500 pounds of the chemical are in residues from the recycling operation that are subsequently sent off-site for disposal. The quantity reported as recycled on-site would be 2,500 pounds.

**Recycled Off-Site (Section 8.5).** This is the quantity of the toxic chemical that left the facility boundary for recycling, not the amount recovered at the off-site location. This quantity includes the amount(s) reported in Section 6 of Form R as transferred off-site for recycling, less any amount(s) associated with non-routine events.

**Treated On-Site (Section 8.6).** This is the quantity of the toxic chemical destroyed in on-site waste treatment operations, not the amount that entered a treatment operation. For example, if 100,000 pounds of benzene were combusted in an incinerator that destroyed 99% of the benzene, the facility would report 99,000 pounds as treated on-site (the remaining 1,000 pounds would be reported as disposed of or otherwise released).

**Treated Off-Site (Section 8.7).** This is the quantity of the toxic chemical that left the facility boundary and was sent to POTWs or other off-site locations for treatment, excluding quantities sent to POTWs but not actually destroyed (such as quantities of metals and metal category compounds). This quantity includes the amount(s) reported in Section 6 of Form R as transferred to POTWs or other off-site locations for treatment, less any amount(s) associated with non-routine events and not including quantities not destroyed at POTWs.

**Non-Production-Related Waste Managed – Released to the Environment Due to One-Time Events (Section 8.8).** This amount is referred to as non-production-related waste and is the quantity disposed of or otherwise released to the environment or sent off-site for recycling, energy recovery, treatment, or disposal or other release due to one-time events not associated with routine production practices. Such events include catastrophic events, such as accidental releases, as well as remedial actions (clean-up). Separating this quantity from the quantities recycled, used for energy recovery, treated, and disposed of or otherwise released, allows data users to distinguish between quantities that are routinely associated with production operations and are more amenable to source reduction and those that are not routinely associated with production processes and are not so amenable to source reduction because they are not readily anticipated (e.g., releases due to damage from a tornado). This separation is important in assessing progress in source reduction at facilities.

The individual waste management quantities reported in Sections 8.1 through 8.8 are mutually exclusive to avoid double-counting. For example, an incinerator may destroy 99% of a chemical in waste; in this case, the amount reported as treated on-site would be the amount destroyed by the incinerator, not the amount that entered the incinerator. The amount not destroyed in incineration (1%) would be reported as disposed of or otherwise released. The sum of the individual quantities in Sections 8.1 through 8.7 in a given year equals the total quantity of TRI chemicals in waste resulting from routine production operations at a facility during that year.

Facilities must also report the quantity of waste disposed of or otherwise released as a result of activities other than routine production operations during the reporting year. This quantity appears in data tables as “non-production-related waste managed.” It includes waste disposed of or otherwise released to the environment at the facility or transferred off-site because of catastrophic events or remedial (clean-up) actions at the facility. Non-production-related waste is considered less amenable to source reduction because facilities cannot always anticipate these quantities.

It is important to note that facilities may vary in how they interpret some of the reporting requirements under the PPA. Differences in estimation or calculation techniques may cause a difference in the quantity of a chemical reported to TRI for the same amount of the chemical managed.

Box 8 explains the differences between “total on- and off-site disposal or other releases” and “quantity disposed of or otherwise released on- and off-site.”

**Box 8. Differences Between Amounts Reported in Sections 5 and 6 and in Section 8 of Form R**

"Total on- and off-site disposal or other releases" (amounts reported in Sections 5 and 6) and "quantity disposed of or otherwise released on- and off-site" (amounts reported in Section 8) are not the same. This difference arises primarily from the types of disposal or other releases reported on different sections of the Form R.

- "Total on- and off-site disposal or other releases" reflects all on-site disposal or other releases as collected in Section 5 of the Form R and transfers off-site for disposal or other releases as reported in Section 6. The amounts included from Section 6.2 are for codes M10, M41, M62, M64, M65, M66, M67, M73, M79, M81, M82, M90, M94 and M99 and from Section 6.1 for metals and metal category compounds only.
- "Quantity disposed of or otherwise released on- and off-site" is limited to production-related on- and off-site disposal or other releases as collected in Section 8.1 of the Form R. This quantity is the sum of the amounts included from Section 6.2 for codes M10, M41, M62, M64, M65, M66, M67, M73, M79, M81, M82, M90, M94 and M99 and from Section 6.1 for chemicals such as metals and metal category compounds that are not destroyed at the POTW minus the amount for one-time events not related to production as reported in Section 8.8 and reported under each of these parts of Sections 5 and 6.

**Box 8. Differences Between Amounts Reported in Sections 5 and 6 and in Section 8 of Form R (continued)**

Although total amounts analyzed in these two categories are often the same, they may differ to the extent that disposal or other releases associated with catastrophic events, remedial actions or other onetime events not related to production occur. That is, Production-related disposal or other releases reported in Section 8.1 do not include the amounts associated with the one-time events while disposal and other releases in Section 5 and Section 6 (those codes listed above) do include them.

For the same reason, the quantity used for energy recovery offsite (Section 8.3), quantity recycled offsite (Section 8.5) and quantity treated offsite (Section 8.7) do not include transfers for recycling, energy recovery and treatment (including POTWs for non-metals) reported in Section 6 to the extent that amounts from one-time events are reported. Once again, the relevant parts in Section 8 include only production-related wastes and not amounts from one-time events whereas Section 6 includes all off-site waste management amounts.

- The amounts in Section 8.3 (quantity used for energy recovery offsite) correspond to the amounts reported in Section 6.2 under codes M56 and M92 minus amounts for one-time events not related to production as reported in Section 8.8.
- The amounts in Section 8.5 (quantity recycled offsite) correspond to the amounts reported in Section 6.2 under codes M20, M24, M26, M28 and M93 minus amounts for one-time events not related to production as reported in Section 8.8.
- The amounts in Section 8.7 (quantity treated off-site) correspond to the amounts reported in Section 6.1 excluding metals and metal category compounds or other chemicals not destroyed at the POTW and Section 6.2 under codes M40, M50, M54, M61, M69 and M95, minus amounts for one-time events not related to production as reported in Section 8.8.

The amounts from one-time events not related to production are reported in Section 8.8.

Other reasons also contribute to the different quantities reported in different sections of the Form R. For example, an amount of less than 1,000 pounds may be reported in ranges in Section 5 and 6 whereas an exact amount must be included in Section 8. Furthermore, facilities may round off amounts, except those for PBT chemicals, to two significant digits.

## Source Reduction

As noted above, the Pollution Prevention Act (PPA) of 1990 requires facilities to report the quantities of TRI chemicals they manage in waste, both on- and off-site. The PPA also requires facilities to provide information about the efforts they have made to reduce or eliminate those quantities. With the 1991 reporting year, facilities began reporting to TRI information about any source reduction activities they implemented during the year.

Source reduction activities are undertaken to reduce the amount of a toxic chemical which enters a waste stream or is otherwise released to the environment. By reducing the generation of toxic chemicals in waste, source reduction activities reduce the need to recycle, treat or

dispose of toxic chemicals. Box 9 explains source reduction as defined by the PPA.

**Box 9. What Is Source Reduction?**

Source reduction is defined in the Pollution Prevention Act of 1990 as any practice that:

- Reduces the amount of any hazardous substance, pollutant or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment or disposal; and
- Reduces the hazards to public health and the environment associated with the release of such substances, pollutants or contaminants.

Through source reduction, risks to people and the environment can be reduced, financial and natural resources can be saved that would otherwise have to be expended on environmental clean-up or pollution control and industrial processes can become more efficient. Source reduction practices can include modifications in equipment, process, procedure or technology, reformulation or redesign of products, substitution of raw materials and improvements in maintenance and inventory controls. Under this definition, waste management activities, including recycling, treatment, and disposal or other releases, are not considered forms of source reduction. The term also does not include any practice which alters the physical, chemical, biological characteristics or the volume of a hazardous substance, pollutant or contaminant through a process or activity which itself is not integral to and necessary for the production of a product or the providing of a service.

## Making Year-to-Year Comparisons

Users of TRI information making year-to-year comparisons should be careful to consider only data that were reported under consistent requirements. Using comparable data will ensure that any changes in the data over time are driven by actual changes in toxic chemical use, release or management and do not simply reflect modifications in reporting requirements.

Since TRI data were first collected in Reporting Year (RY) 1987, EPA has made a number of changes to the TRI Program, such as expanding the list of industrial sectors required to report, adding and removing chemicals for which facilities must report, introducing new reporting forms and revising the data elements facilities must fill out on those forms.

### Industry Sectors

Since RY 1987, EPA has expanded the list of industries required to report to TRI (Table 2).

For RY 2006, EPA switched the industry classification system used to determine whether facilities fall into reportable sectors from the Standard Industrial Classification (SIC) to the North American Industry Classification System (NAICS). To make sector-based trend analysis possible, many TRI data tools include NAICS codes that were assigned to pre-RY 2006 TRI records, based on the SIC code for that record.

Apparent increases and decreases among industries can also result when facilities change the industry they report from one year to another, reflecting new or discontinued facility operations or indicating a different understanding of how industry classification codes relate to the facility's business.

**Table 2: Industry Expansions**

| Reporting Year | Industry Expansion |
|---|---|
| RY 1994 | • Federally owned or operated facilities were required to report regardless of industrial sector. |
| RY 1998 | • Seven new industry sectors were required to report to TRI:<br>o Metal mining,<br>o Coal mining,<br>o Electric utilities,<br>o Chemical wholesale distributors,<br>o Petroleum bulk storage/terminals,<br>o Hazardous waste management facilities and<br>o Solvent recovery facilities. |

## Chemicals

Since RY 1987, EPA has added many chemicals to the TRI chemical list and has lowered the reporting thresholds for persistent bioaccumulative toxic (PBT) chemicals (Table 3). EPA has also deleted and modified several chemicals on the TRI chemical list. For precise details on changes to the TRI list of toxic chemicals, see the full list of TRI Chemical List Changes posted on www.epa.gov/tri/tri-listed-chemicals.

**Table 3: Chemical Additions and Changes to Reporting Thresholds**

| Reporting Year | Changes Made to the List of TRI Reportable Chemicals |
|---|---|
| RY 1990 | • Nine chemicals were added to the list. |
| RY 1991 | • Seven chemicals were added to the list. |
| RY 1994 | • 34 chemicals and chemical categories were added to TRI |
| RY 1995 | • Close to 300 chemicals were added to TRI under EPA's chemical expansion initiative. |
| RY 2000 | • The reporting thresholds for most PBT chemicals were lowered.<br>• New PBT chemicals were added to the list.<br>• Vanadium compounds were added to the list. |
| RY 2001 | • The reporting thresholds for two additional PBT chemicals, lead and lead compounds, were lowered. |
| RY 2011 | • EPA added 16 chemicals reasonably anticipated to be human carcinogens to the TRI list of reportable chemicals, including 12 individually listed chemicals and 4 chemicals that fall within the Polycyclic Aromatic Compounds (PACs) category. |
| RY 2012 | • EPA reinstated TRI reporting requirements for hydrogen sulfide. |
| RY 2014 | • EPA added o-Nitrotoluene to the list. |
| RY 2015 | • A Nonylphenol chemical category was added to the list, composed of six |

| | |
|---|---|
| | chemicals. |
| RY 2016 | • 1-Bromopropane was added to the list. |
| RY 2017 | • A Hexabromocyclododecane chemical category was added to the list, composed of two chemicals. |
| RY 2019 | • A Nonylphenol Ethoxylates chemical category was added to the list, composed of 13 chemicals. |

Several TRI data tools have options for selecting core chemical groups for trends analysis. Using core chemical groups ensures that there were consistent reporting requirements for chemicals in the analysis across all reporting years; core chemical groups exclude any chemicals that were added to or removed from the TRI list during a specified time period.

### Reporting Forms

EPA has added, deleted and modified the data elements on TRI reporting forms over the history of the TRI Program. Changes affecting the collection of release and waste management data are outlined in Table 4.

**Table 4: Changes to TRI Form R Affecting Release and Waste Management Data**

| Reporting Year | Data Elements Changes |
|---|---|
| **RY 1991** | • Waste management information was added to TRI under the Pollution Prevention Act of 1990. Data elements added include sections<br>o 8.1 Quantity released,<br>o 8.2 Quantity used for energy recovery onsite,<br>o 8.3 Quantity used for energy recovery offsite,<br>o 8.4 Quantity recycled onsite,<br>o 8.5 Quantity recycled offsite,<br>o 8.6 Quantity treated onsite,<br>o 8.7 Quantity treated offsite,<br>o 8.8 Quantity released to the environment as a result of remedial actions, catastrophic events or one-time events not associated with production processes (pounds/year),<br>o 8.9 Production ratio or activity index,<br>o 8.10 Source reduction activities and<br>o 8.11 Additional optional information on source reduction, recycling or pollution control activities.<br>• Waste transfer code M91, Transfer to Waste Broker, was replaced by<br>o M92, Transfer to Waste Broker-Energy Recovery,<br>o M93, Transfer to Waste Broker-Recycling,<br>o M94, Transfer to Waste Broker-Disposal and<br>o M95, Transfer to Waste Broker-Waste Treatment.<br>• Five waste transfer codes were added<br>o M24, Metals Recovery,<br>o M26, Other Reuse or Recovery,<br>o M28, Acid Regeneration, |

| | |
|---|---|
| | o M54, Incineration/Insignificant Fuel Value and<br>o M56, Energy Recovery. |
| **RY 1996** | • Section 5.4, Underground Injection onsite, was split into sections<br>o 5.4.1, Underground Injection onsite to Class I wells and<br>o 5.4.2, Underground Injection onsite to Class II-V Wells<br>• Section 5.5.1, Landfills, was split into sections<br>o 5.5.1a, RCRA Subtitle C landfills and<br>o 5.5.1b, Other landfills. |
| **Reporting Year** | **Data Elements Changes** |
| RY 1997 | • Two waste transfer codes were added<br>o M41, Solidification/Stabilization-Metals and Metal Compounds only and<br>o M62, Wastewater Treatment (Excluding POTW)-Metals and Metal Compounds only. |
| RY 2002 | • Waste transfer code M72, Landfill/Disposal Surface Impoundment, was replaced by<br>o M64, Other Landfills,<br>o M65, RCRA Subtitle C Landfills and<br>o M63, Surface Impoundment. |
| RY 2003 | • Section 5.5.3, Surface Impoundments was split into sections<br>o 5.5.3A, RCRA Subtitle C surface impoundments and<br>o 5.5.3B, Other surface impoundments.<br>• Section 8.1, Quantity Released, was split into sections<br>o 8.1a Total on-site disposal to Class I, Underground Injection Wells, RCRA Subtitle C landfills and other landfills,<br>o 8.1b, Total other on-site disposal or other releases,<br>o 8.1c, Total off-site disposal to Class I Underground Injection Wells, RCRA Subtitle C landfills and other landfills, and<br>o 8.1d, Total other off-site disposal or other releases.<br>• Waste transfer code M63, Surface Impoundment, was replaced by<br>o M66, RCRA Subtitle C Surface Impoundment and<br>o M67, Other Surface Impoundment.<br>• Waste transfer code M71, Underground Injection, was replaced by<br>o M81, Underground Injection to Class I Wells and<br>o M82, Underground Injection to Class II-V Wells. |
| RY 2005 | • Section 8.11 was modified so reporters can use an optional text box to submit information on source reduction, recycling, or pollution control activities. |
| RY 2011 | • Section 9.1 was added to the Form R to provide a free-text option for miscellaneous information not related to pollution prevention.<br>• The form now clearly states that TRI reporters should only report on newly implemented source reduction activities in section 8.10.<br>• Separate fields for the quantity of a toxic chemical transferred to each POTW added to section 6.1. |

| Reporting Year | Data Elements Changes |
|---|---|
| RY 2012 | • Six source reduction codes were added to more closely represent green chemistry practices implemented at TRI facilities:<br>o W15, Introduced in-line product quality monitoring or other process analysis system,<br>o W43, Substituted a feedstock or reagent chemical with a different chemical,<br>o W50, Optimized reaction conditions or otherwise increased efficiency of synthesis,<br>o W56, Reduced or eliminated use of an organic solvent,<br>o W57, Used biotechnology in manufacturing process, and<br>o W84, Developed a new chemical product to replace a previous chemical product. |
| RY 2014 | • Quantities transferred to POTWs that a facility indicated were ultimately released off-site (e.g., to surface water) are now counted in off-site releases and in total releases for nonmetals as well as metals<br>• Facilities reporting water releases may now enter the reach code of the receiving stream or water body. A reach code is a unique identifier for a continuous stretch of surface water. |
| RY 2017 | • If a facility files one combined report for a parent metal and compounds of that same metal, a facility must now indicate that it is filing a combined report.<br>• Part II, Sections 3.2 and 3.2 were modified to now require a facility to indicate more specific subcategories for certain processing and otherwise use activities.<br>• Part II, Section 3.2 now lists "Recycling" as an option under "Process the toxic chemical."<br>• Part II, Section 5.5 now allows a facility to indicate whether its reported Section 5.5 quantities were managed in "waste rock piles" and to indicate the quantities managed in such a way.<br>• Part II, Section 6.1 now requires the use of waste management codes for transfers of waste to POTWs.<br>• Part II, Section 9.2 was added to the Form A Certification Statement to allow a facility to provide optional information on each chemical listed. |

The addition of an alternate TRI reporting form also has affected the collection of release and waste management data under TRI. Starting in RY 1995, facilities with very low releases and disposal quantities were able to choose between reporting using TRI Form R and the abbreviated Form A. For RY 2006, the Form A reporting criteria were changed to allow more facilities to use the Form A in place of the Form R. For RY 2008, the Form A reporting criteria reverted to the original RY 1995 criteria and fewer facilities were able to use the Form A in place of the Form R. These changes affected both counts of Form As filed and totals of release and waste management quantities across facilities; no release, transfer, waste management,

source reduction and recycling information is required to be reported on the Form A.

### Changes in Facility Amounts Reported

Box 10 provides reasons that a facility's reported amounts may change from one year to another. Explanations for changes in reported amounts include actual source reduction projects undertaken to reduce a facility's generation of waste of a particular chemical, increases or decreases in production levels, changes in a facility's methods of estimating or calculating reportable amounts (which does not indicate a corresponding change in actual disposal or other releases and waste management), reporting errors in previous years for which the facility has not filed a revised submission and others.

**Box 10. Reasons Facility Reported Amounts May Change**

Some reported increases and decreases are real—that is, they reflect changes in the amounts of TRI chemicals actually disposed of or released or otherwise managed in waste. Other reported increases and decreases are accounting or "paper" changes that do not reflect change in disposal or releases or other waste management. Some examples follow.

**Real Changes**

Source reduction activities, such as process changes, elimination of spills and leaks, inventory control, improved maintenance, chemical substitution, and alternative methods of cleaning and degreasing can eliminate or reduce the generation of chemical waste so that there is no need to manage the waste in the first place. Though the installation of pollution control equipment does not reduce the amount of waste generated, it may lead to real reductions in TRI chemicals disposed of or released.

Production changes can cause real changes in the quantities of TRI chemicals disposed of or released or otherwise managed as waste by facilities. Production-related waste is likely to increase when production increases and decrease when production decreases, although the relationship is not necessarily linear.

One-time events unrelated to normal production processes, such as accidental releases or clean-up operations, can cause a real but anomalous increase in the reporting year in which they occur and then a decrease from that abnormally high level the following year.

**"Paper" Changes**

Changes in estimation or calculation techniques can cause a change in the amount reported without a corresponding change in actual quantities of the chemical disposed of or released or otherwise managed as waste.

Clarifications of reporting instructions or changes in the way a facility interprets those instructions may cause a change in reported amounts without an actual change in quantities of the chemical disposed of or released or otherwise managed as waste.

Changes in the reporting definition of a particular chemical may cause a change in the reported amounts without an actual change in quantities disposed of or released or otherwise managed as waste. For example, revising the definitions of sulfuric acid and hydrochloric acid to include only aerosol forms, as occurred in reporting years 1994 and 1995, resulted in lower reports of releases, when non-aerosol forms were no longer reported.

Similarly, a reported decrease without an actual reduction in disposal or releases may result from a facility switching from reporting with the Form R to reporting with the Form A. This change would affect the facility's reported release and waste management quantities; no release, transfer, waste management, source reduction and recycling information is required to be reported on the Form A.

Apparent increases or decreases can occur if a facility makes a reporting error one year and does not submit a revision for that year, but does not repeat the error the following year.

Apparent increases or decreases can occur due to facilities' eligibility to use regulatory exemptions when reporting to TRI. For example, a facility may be eligible to apply the de minimis exemption one year but not the next as the concentration of TRI chemicals changes in its raw materials. If a non-PBT chemical in raw materials meets the de minimis exemption requirements, releases and other waste management activities associated with the chemical in that that raw material may be exempt from reporting to TRI.