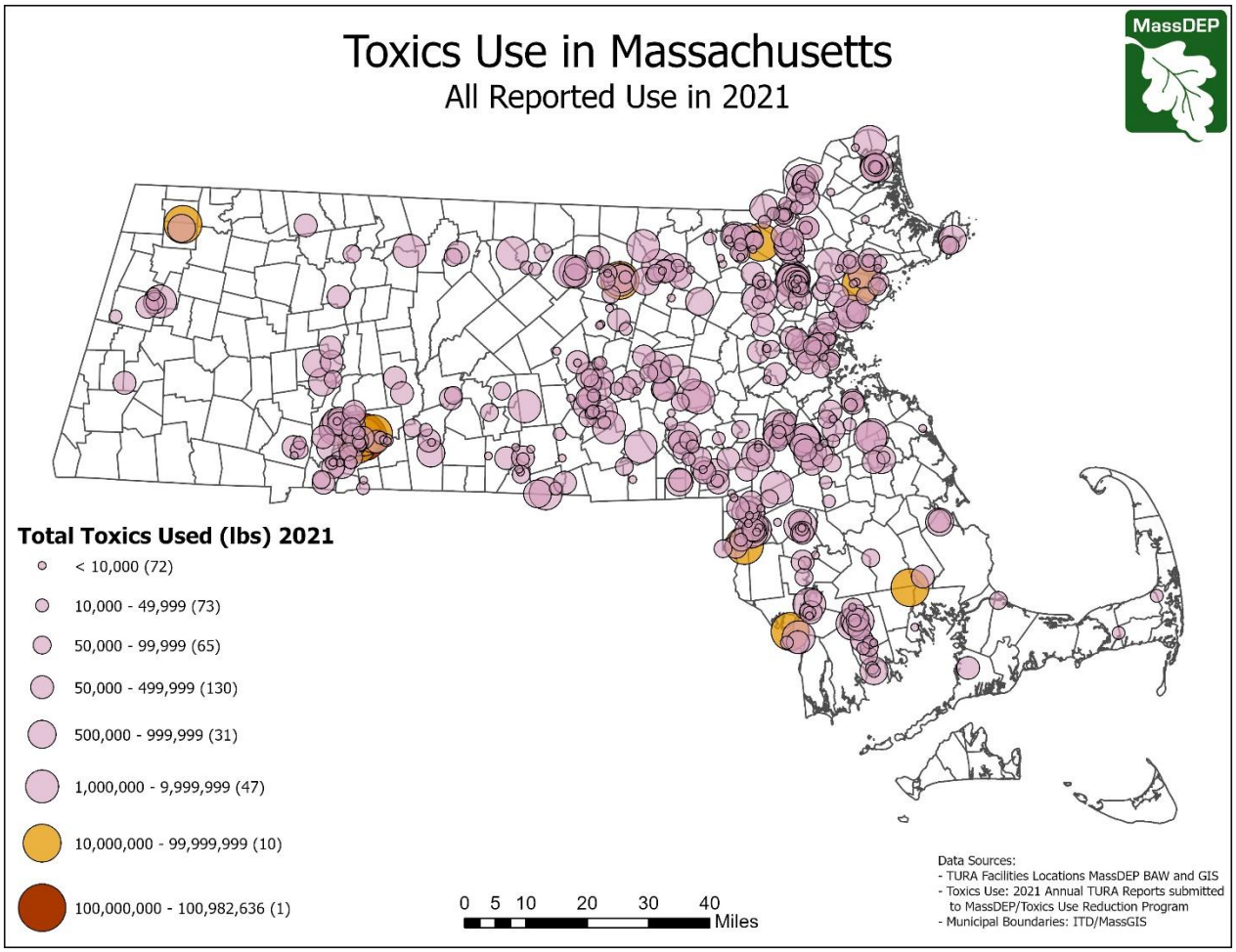
# Reporting Year 2021
# Toxics Use Reduction
# Information Release




Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Department of Environmental Protection

Developed in collaboration with:
Toxics Use Reduction Institute
Office of Technical Assistance and Technology

**July 2023**

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# Executive Summary

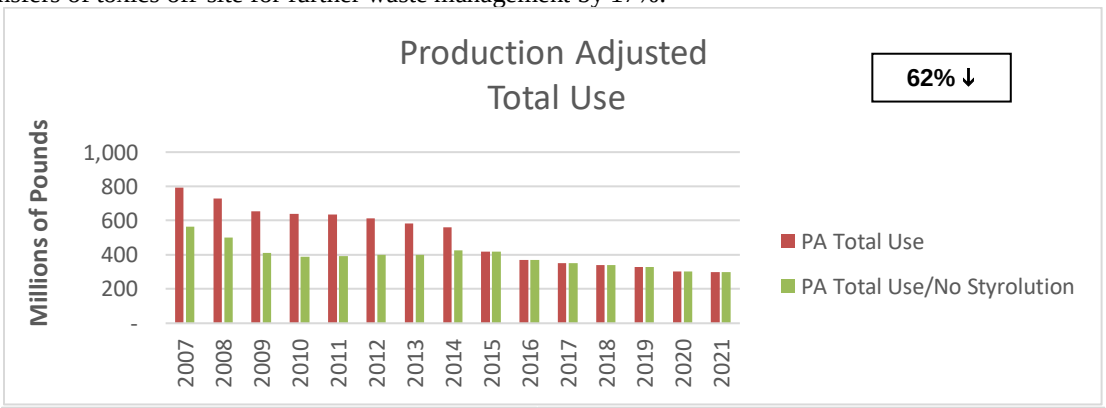
In 1989, the Toxics Use Reduction Act (TURA) (Chapter 21I of the Massachusetts General Laws) was enacted, to protect public health and the environment by promoting reduction in the use of toxic chemicals. TURA established reporting and planning requirements that encourage facilities to use toxic chemicals (hereinafter also referred to as chemicals, toxics, or toxic substances) only when necessary and to waste as little as possible in the production process. TURA has been successful. Massachusetts manufacturers and other businesses subject to TURA have dramatically reduced their reliance on toxic chemicals making Massachusetts a national leader in toxics use reduction. Through toxics use reduction, Massachusetts businesses have saved money while reducing pollution released to the environment, chemical transportation risks, workplace hazards, and toxics in products and waste.

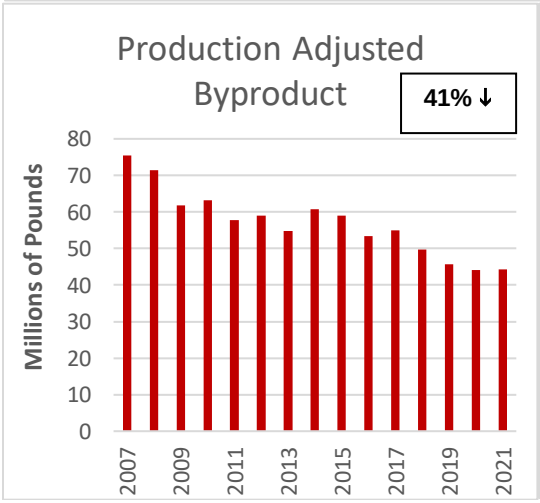
Four hundred thirty-two (432) facilities reported using 127 different chemicals in 2021. In total (including data submitted as trade secret data – as defined on page 4), from 1990 to 2021, the following reductions were observed:

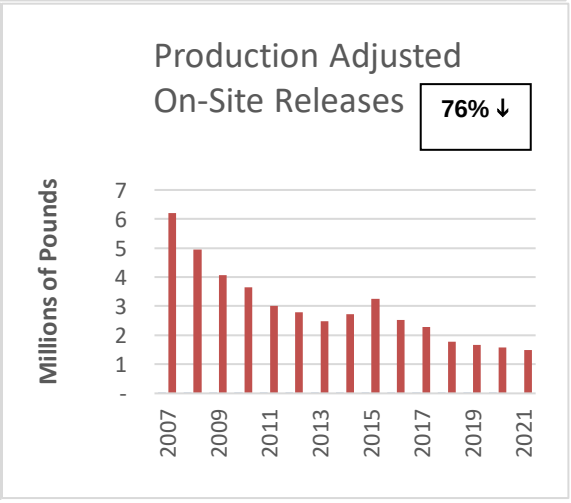
- Chemical Use - from 1.2 billion to 649 million pounds
- Byproduct Generation - from 127 to 71 million pounds
- Shipped in Product - from 433 to 279 million pounds
- On-Site Releases - from 21 to 2.5 million pounds
- Transfers Off-Site - from 46 to 33 million pounds

As shown in Figure 3, between 2007 and 2021 when adjusted for the reported 46% increase in production, 2007 Core Group (as defined on page 4) facilities reduced:

- toxic chemical use by 62%
- toxic byproducts by 41%
- toxics shipped in product by 42%
- on-site releases of toxics to the environment by 76%
- transfers of toxics off-site for further waste management by 17%.



This report includes the following six sections:

**Section I:** **Introduction**

**Section II:** **Key TURA Terms**

**Section III:** **2021 Toxics Use Reduction Progress** analyzes changes in reported chemical use and byproduct that can be attributed to the adoption of toxics use reduction by TURA filers, and associated reductions in pollution.

**Section IV:** **2021 Chemical Data** summarizes the reported information on chemical use in calendar year 2021 including detailed information on the top twenty chemicals used, generated as byproduct, shipped in product, released on-site as air or water pollution onsite, and shipped off-site for treatment and disposal.

**Section V:** **2021 Chemicals of Particular Concern** presents current and historical information on particularly toxic chemicals, on chemicals that promote asthma, and on carcinogens.

**Section VI:** **2021 Significant Industrial Sectors** describes the relative contributions of different industrial sectors to chemical use, waste, and release.

**Section VII:** **2021 Major TURA Facilities** presents the top 20 facilities for use, byproduct generation, shipped in product, released to the environment, and shipped offsite for treatment and disposal.

This 2021 Toxics Use Reduction Information Release contains chemical information useful to the public, government, and industry. However, because the data in this report is collected only from facilities within certain industrial sectors that have ten or more full-time employees, and use certain chemicals above established reporting thresholds, this report does not provide a complete picture of the use and release of all toxic chemicals in Massachusetts.

Downloadable data extracts, for reporting years 1990 through 2021, can be found at MassDEP Toxics Use Reduction Act (TURA) Data & Results | Mass.gov. The data extracts include all reported TURA data, except for trade secret data, in an Excel format.

# I. Introduction

The annual TURA information release is required under MGL Chapter 21I, Section 3(H): "The department annually shall compile, analyze and summarize the reports required by section 10, to the extent available, and shall submit a report to the council on the agency's findings regarding progress in toxics use reduction and emissions reduction in the commonwealth." This report describes toxic chemical use in Massachusetts in 2021 and progress in toxics use reduction (TUR) under the Toxics Use Reduction Act (TURA). TURA was enacted in 1989 to reduce the risks to the public, workers, and the environment from exposure to toxic chemicals. Rather than taking the then traditional "command and control" approach to pollution control and worker health and safety, TURA created a process to encourage Massachusetts facilities to reduce the amount of toxics used and wasted in their production processes. TURA requires Large Quantity Toxics Users (LQTUs, hereinafter referred to as filers) to submit annual reports to the Massachusetts Department of Environmental Protection (MassDEP). These reports detail the quantity of the listed chemicals they use, ship in or as product, generate as byproduct (waste -- neither shipped in product nor converted to another chemical during the production process), release to the environment as pollution, and ship offsite for waste treatment and disposal. Facilities are filers if they meet the following criteria:

- fall within Manufacturing Standard Industrial Classification SIC) codes (20-39 inclusive) and those in SIC codes 10-14, 40, 44-51, 72, 73, 75 and 76, or the corresponding NAICS codes,
- have ten or more full-time employee equivalents, and
- use listed toxic substances at or above reporting thresholds

Filers are also required to pay an annual fee based on the number of chemicals used and the number of workers employed and must develop biennial TUR plans. TUR Plans identify techniques that the facility could adopt to reduce the use and waste of toxic chemicals in their production processes and evaluate which of these TUR techniques would save the facility money if implemented. Although facilities are not required to implement identified TUR techniques, many do. The plans are not submitted to MassDEP for review and approval. Instead, they must be approved by a MassDEP-certified toxics use reduction planner (TURP). After several toxics use reduction planning efforts, facilities have the option of developing reduction plans for energy use, water use, solid waste disposal or use of other chemicals instead of the traditional TUR plan.

*Office of Technical Assistance and Technology (OTA)*

*The Office of Technical Assistance and Technology (OTA) provides free, confidential, non-regulatory technical assistance to facilities seeking to reduce the use of toxics, develops fact sheets and other technical guidance documents, supports the development of technology solutions by leveraging state and federal funding, and creates marked-based incentives to reduce toxics use for qualifying TURA filers.*
https://www.mass.gov/eea/ota

*Toxics Use Reduction Institute (TURI)*

*The Toxics Use Reduction Institute (TURI) at the University of Massachusetts, Lowell provides toxics use reduction education, training, and library services; supports research on cleaner materials and processes; provides toxics use reduction grants for businesses, industries and communities; and operates a laboratory for testing non-toxic or less-toxic cleaning alternatives. TURI also makes TURA data available in a user-friendly manner that is searchable by community, chemical or facility.*
https://www.turi.org

TURA also promotes toxics use reduction through two agencies that provide toxics use reduction education and assistance: The Office of Technical Assistance and Technology (OTA) and the Toxics Use Reduction Institute (TURI).

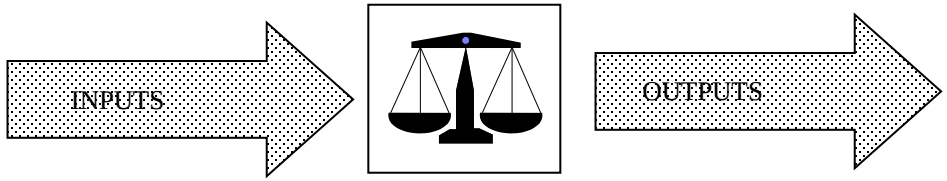
The work of MassDEP, OTA, and TURI is supported through fees paid by the filers and coordinated by the Toxics Use Reduction Administrative Council (Council). The Council is a governing body consisting of the Secretaries of Energy and Environmental Affairs, Economic Development, and Public Safety, the Commissioners of MassDEP and the Department of Public Health, and the Director of Labor and Workforce Development, and chaired by the Secretary of Energy and Environmental Affairs.

The Massachusetts Department of Environmental Protection Toxics Use Reduction Program website is: www.mass.gov/dep/toxics/toxicsus.htm.

## II. Key TURA Terms

**TURA** – Massachusetts Toxics Use Reduction Act of 1989 (MGL c. 21I)
**TRI** – federal EPA Toxics Release Inventory
**TRADE SECRET DATA**– the information identified as confidential by TURA filers and not determined to be otherwise by the Commissioner of MassDEP. To protect confidentiality claims by TURA filers, all trade secret data in this information release are presented in aggregated form. Aggregated data do not include the names and amounts of chemicals subject to claims of confidentiality.
**2007 CORE GROUP --** – includes all industry categories and chemicals that were subject to TURA reporting in 2007 and remained subject to reporting in the current reporting year at the same reporting threshold. The 2007 Core Group is used to measure progress from 2007, the first reporting year since the 2006 TURA Amendments became effective. The 2007 Core Group does not include trade secret quantities.
**2000 CORE GROUP --** – includes all industry categories and chemicals that were subject to TURA reporting in 2000 and remained subject to reporting in the current reporting year at the same reporting threshold. The 2000 Core Group is used to measure progress from 2000 and does not include trade secret quantities.

The terms and definitions below have been arranged in order of inputs and outputs. Chemicals that are used by facilities are manufactured, processed, or otherwise used. As a result of using these chemicals, a facility has outputs that can include a product that is created for sale, or a waste ("byproduct" as defined by TURA). The calculation of use and waste of chemicals is known as 'mass balance.' Generally, the inputs equal the outputs, but there are some circumstances in which there is an imbalance between inputs and outputs. These are most often the result of 1) chemicals being recycled on-site; 2) the product being held in inventory; 3) chemicals being consumed or transformed into another chemical during the production process; or 4) the chemical is a metal in a compound, and as a result use is calculated differently than byproduct. For metal compounds, use is calculated as the total amount of the compound while byproduct is calculated as only the amount of the parent metal in the compound.




**TOTAL USE** – the total quantity in pounds of TURA chemicals reported as manufactured, processed, and otherwise used.

**MANUFACTURE** – TURA defines "manufacture", in part, as: "to produce, prepare, import or compound a toxic or hazardous substance".

**PROCESS** – TURA defines "process", in part, as: "the preparation of a toxic or hazardous substance, after its manufacture, for distribution in commerce".

**OTHERWISE USE** – "Otherwise use" is defined in the TURA regulations (310 CMR 50.10), in part, as "any use of a toxic substance that is not covered by the terms "manufacture" or "process" and includes use of a toxic substance contained in a mixture or trade name product".

**PRODUCT** – a product, a family of products, an intermediate product, family of intermediate products, or a desired result or a family of results. "Product" also means a byproduct that is used as a raw material without treatment.
**SHIPPED IN PRODUCT** – the quantity in pounds of the chemical that leaves the facility as product.
**BYPRODUCT** – all non-product outputs of reportable substances generated by a production unit prior to handling, treatment, and release.
**ON-SITE RELEASES –** chemicals released to the air, land, surface, or groundwater at the facility
**TRANSFERS OFF-SITE** – chemicals shipped off-site to a wastewater treatment or waste management, or recycling facility

# III. 2021 Toxics Use Reduction Progress

To protect the environment, public, and workers from the adverse effects of toxic chemicals, the Toxics Use Reduction Act (TURA) established processes that encourage facilities to implement toxics use reduction (TUR) techniques that result in:

1) the use of toxic chemicals only when necessary, and
2) the smallest possible amount of waste generated.

The TURA program has been a resounding success. TURA's initial goal of a 50% reduction in the quantity of toxic chemicals generated as byproduct was met in the first decade of the program, and the TURA program has continued to make progress in toxics use reduction in the ensuing years. This section of the report describes the trends in chemical use by filers.

**Trends in the Numbers of Filers and Reported Chemical Use, Byproduct, On-site Releases, and Transfers Off-Site for Treatment or Disposal**

As shown in Figures 1 and 2 below, the number of different TURA-listed chemicals used in the Commonwealth at reportable levels, the number of facilities using those chemicals, and the total amount of those chemicals used, generated as byproduct, released to the environment, and shipped off-site for treatment and disposal has declined in the thirty-one years since 1990.

As shown in Figure 1, 127 of the over 1,500 TURA listed substances were reported in 2021. The number of filers rose from 686 in 1990 to 728 in 1991 and 1992, gradually declined, and then rose again to 713 in 2001, largely due to the promulgation of a lower reporting threshold for persistent bioaccumulative toxic (PBT) chemicals (see Section IV, 2021 TURA Chemical Data). The number of filers has declined from 462 in 2019 to 432 in 2021, in part as a reflection of the decline in business due to the COVID pandemic. Regulated facilities submit one Form S for each substance reported. The number of individual substance reports submitted has followed a similar trend, decreasing from a high of 2,666 in 1994, to 1,344 in 2021, consistent with the decline in the number of TURA filers.

These reported amounts are influenced by changes in regulatory requirements. For example, the number of individual substances reported reached a high of 202 in 1996 due to an expansion in the chemical list, and the number of TURA filers increased to a high of 713 in 2001, due to a drop in the reporting threshold for certain chemicals. The number of chemical reports dropped by approximately 25% in 2007 when the TURA reporting threshold was raised for certain manufactured and processed chemicals to match the EPA TRI threshold. Individual chemical reports have since declined as Massachusetts businesses reported using fewer chemicals.

As shown in Figure 2, chemical use decreased from 1.2 billion pounds in 1990 to 649 million pounds in 2021. Byproduct generation decreased from 127 million pounds in 1990 to 71 million pounds in 2021.

**Figure 1**
**# of TURA Filers, Individual Chemical Reports, and Different Chemicals Reported (1990-2021)**
**(Including Trade Secret Data)**

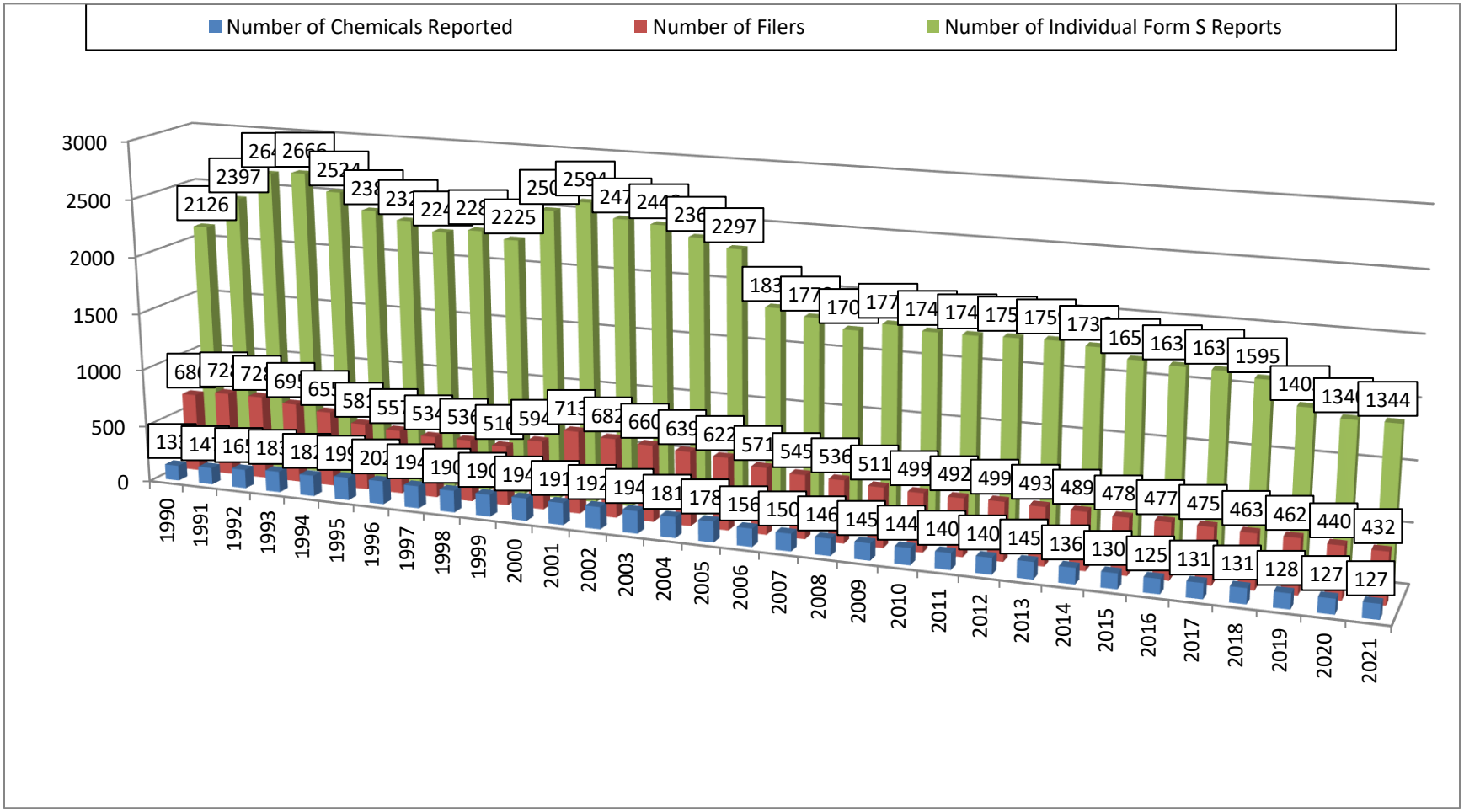
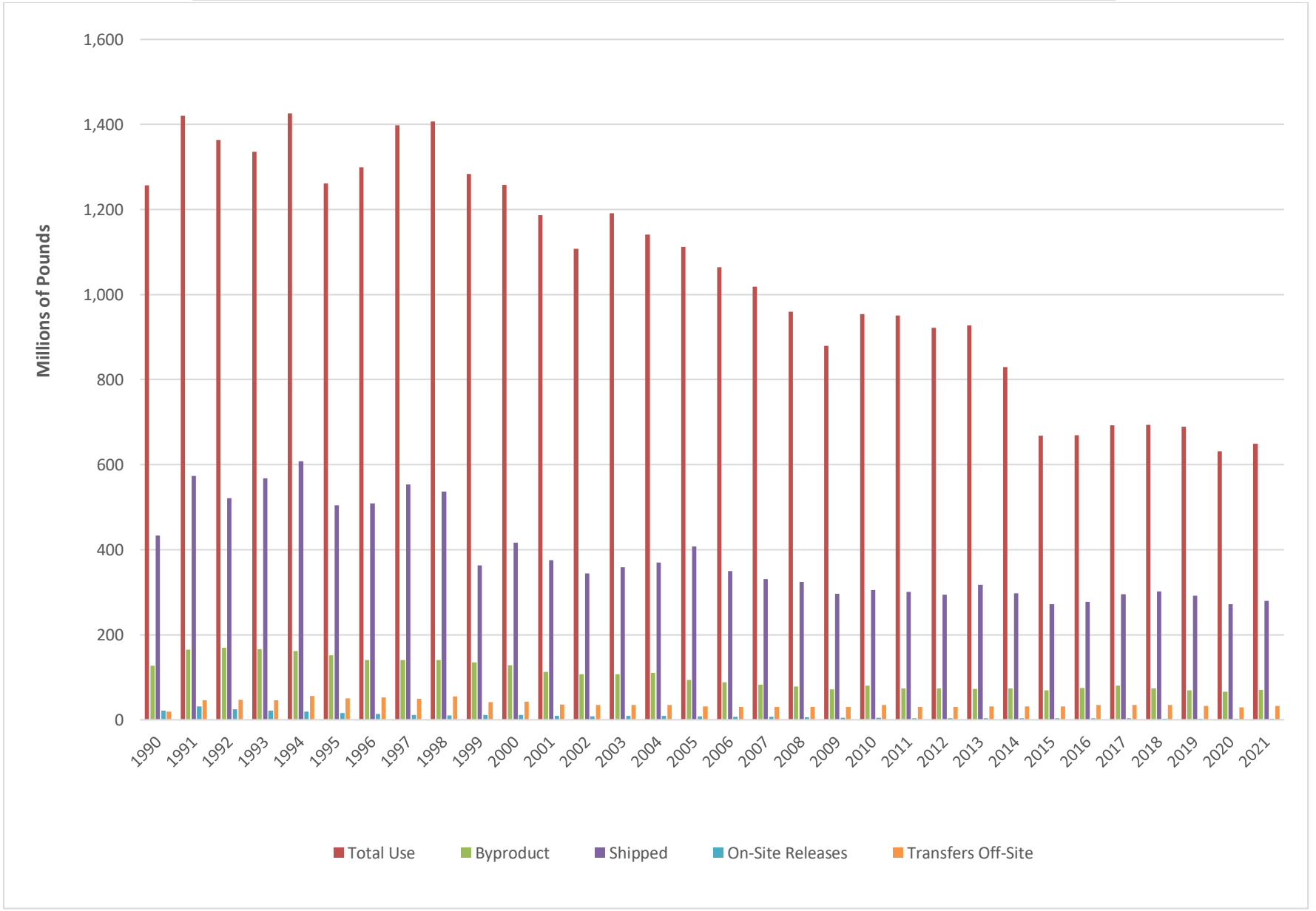


**Figure 2**
**Raw Reported Data on the Pounds of Total Use, Generated as Byproduct, Shipped in or as Product, Released On-Site and Transferred Off-Site for Treatment or Disposal**
**Reporting Years 1990-2021 (includes trade secret data)**



**Measuring Progress in Toxics Use Reduction: Adjusting the Reported Data for Consistent Year to Year Comparisons**:

While the raw reported data presents an overall picture of toxic chemical use and waste in the Commonwealth, it cannot be used to track progress in toxics use reduction. Because the types of facilities and the list of chemicals and chemical reporting thresholds change over time, progress in toxics use reduction is best measured by using a consistent set of chemicals and industries – a core group – subject to reporting. Without the use of a core group, changes in chemical use, byproducts, releases and shipments for treatment and disposal could be due to changes in the reporting requirements.

The "2007 Core Group" is made up of chemicals and industrial categories that were subject to reporting in 2007 and that remain subject to reporting, at the same reporting thresholds in 2021. The 2007 Core Group covered 100% of the reported data in 2007. It currently covers 98% of the total 451 million pounds of toxic chemicals reported in 2021 (excluding trade secret data). The "2000 Core Group" includes all industry categories and chemicals that were subject to TURA reporting in 2000 and remained subject to reporting in 2021 at the same reporting threshold. The 2000 Core Group is used to measure progress from 2000. The 2000 Core Group includes 341 filers, which represents 79% of the 2021 TURA filers (excluding trade secret data).

Raw reported data also need to be adjusted to account for changes in production levels. Because chemical use and byproduct generation generally increase as more products are produced, it is possible for a facility to report increases in use and byproduct while simultaneously implementing toxics use reduction. Filers are required to report the ratio of their production levels in the reporting year to their production levels in the prior year. The reported production ratios are used to normalize the data to eliminate the effects of changes in chemical use and waste that are due solely to changes in the amount of product produced. The following example illustrates how data are adjusted to reflect changes in production.

**ADJUSTING RAW DATA FOR YEAR-TO-YEAR CHANGES IN PRODUCTION**

- In year 1, a facility produces 1,000 machine parts, and generates 100 lbs. of byproduct.
- In year 2, the facility produces 10% fewer machine parts (900). Therefore, the production ratio is 0.90. However, the facility only generates 80 lbs. of byproduct.
- The production adjusted byproduct for year 2 is 80 lbs/0.90 = 89 lbs.
- The production adjusted percent change from year 1 to year 2 is [100-89]/100 = 0.11, or an 11% reduction, while its actual byproduct reduction is 20%.

**Progress in Toxics Use Reduction: 2007 Core Group**

The 2007 Core Group includes all industry categories and chemicals that were subject to TURA reporting in 2007 and remained subject to reporting in 2021 at the same reporting threshold. The 2007 Core Group is used to measure progress from 2007, the first reporting year after the 2006 TURA Amendments became effective. (The 2007 Core Group excludes trade secret chemicals and chemicals designated as higher hazard substances (HHS) that were filed under the lower 1,000-pound threshold after 2007. It also excludes N-Propyl Bromide, which was first listed in 2010 and designated as a HHS in 2016, and chemicals added through EPA TRI after 2007, such as Nonylphenol Ethoxylates.) The 2007 Core Group includes 389 filers, which represents 90% of the 2021 TURA filers. Table 1 and Figures 3 and 4 below summarize TURA data from 2007 to 2021, excluding trade secret data.

**2007 Core Group Progress: Adjusting for Production**

Table 1 below summarizes TURA data from 2007 to 2021, showing reported and production adjusted quantities. For the 2007 Core Group, the activity index shows an increase in production of 46 percent from 2007 to 2021. As shown below in Table 1 and Figure 3, when adjusted for production, as of 2021, the 2007 Core Group facilities have reduced**:**

- toxic chemical use by 62%
- toxic byproducts by 41%
- toxics shipped in product by 42%
- on-site releases of toxics to the environment by 76%
- transfers of toxics off-site for further waste management by 17%.

Table 1
**2007 CORE GROUP DATA: 2007 - 2021 TREND SUMMARY**
(Quantities are in millions of pounds and do not include trade secret quantities.
Shaded columns show quantities adjusted by cumulative production ratio)

| Year | Total Use | | Byproduct | | Shipped in Product | | On-Site Releases | | Transfers Off-Site | | Production Ratio | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Year to Year | Cumulative from 2007 |
| 2007 | 792.07 | 792.07 | 75.44 | 75.44 | 270.58 | 270.58 | 6.20 | 6.20 | 24.93 | 24.93 | 1 | |
| 2008 | 774.30 | 730.47 | 75.76 | 71.47 | 255.91 | 241.42 | 5.25 | 4.95 | 27.62 | 26.06 | 1.06 | 1.06 |
| 2009 | 708.85 | 655.62 | 66.79 | 61.78 | 243.14 | 224.88 | 4.41 | 4.08 | 25.64 | 23.72 | 1.02 | 1.08 |
| 2010 | 753.99 | 639.79 | 74.45 | 63.18 | 251.14 | 213.10 | 4.30 | 3.65 | 29.28 | 24.84 | 1.09 | 1.18 |
| 2011 | 741.50 | 635.54 | 67.37 | 57.74 | 241.05 | 206.60 | 3.51 | 3.00 | 24.73 | 21.20 | 0.99 | 1.17 |
| 2012 | 692.67 | 612.05 | 66.71 | 58.95 | 237.55 | 209.90 | 3.16 | 2.79 | 24.15 | 21.34 | 0.97 | 1.13 |
| 2013 | 704.21 | 581.54 | 66.33 | 54.78 | 263.38 | 217.50 | 3.00 | 2.47 | 25.67 | 21.20 | 1.07 | 1.21 |
| 2014 | 616.68 | 559.62 | 66.85 | 60.66 | 246.32 | 223.53 | 3.00 | 2.72 | 25.78 | 23.40 | 0.91* | 1.10 |
| 2015 | 456.68 | 418.61 | 64.27 | 58.91 | 222.87 | 204.30 | 3.55 | 3.26 | 27.26 | 24.99 | 0.99 | 1.09 |
| 2016 | 453.85 | 368.16 | 65.74 | 53.33 | 226.94 | 184.09 | 3.12 | 2.53 | 31.02 | 25.16 | 1.13 | 1.23 |
| 2017 | 468.63 | 351.99 | 73.13 | 54.93 | 244.13 | 183.36 | 3.04 | 2.29 | 30.22 | 22.70 | 1.08 | 1.33 |
| 2018 | 468.28 | 341.48 | 68.19 | 49.72 | 246.25 | 179.57 | 2.43 | 1.77 | 31.22 | 22.77 | 1.03 | 1.37 |
| 2019 | 466.23 | 330.08 | 64.58 | 45.72 | 236.75 | 167.62 | 2.35 | 1.66 | 29.62 | 20.97 | 1.03 | 1.41 |
| 2020 | 416.90 | 301.18 | 61.10 | 44.14 | 216.90 | 156.70 | 2.19 | 1.58 | 25.94 | 18.74 | 0.98 | 1.38 |
| 2021 | 440.77 | 300.40 | 65.03 | 44.32 | 230.35 | 156.99 | 2.19 | 1.49 | 30.25 | 20.62 | 1.06 | 1.46 |
| Percent Change 2007-2021 | 44% Reduction | 62% Reduction | 14% Reduction | 41% Reduction | 15% Reduction | 42% Reduction | 65% Reduction | 76% Reduction | 21% Increase | 17% Reduction | | 46% Increase |

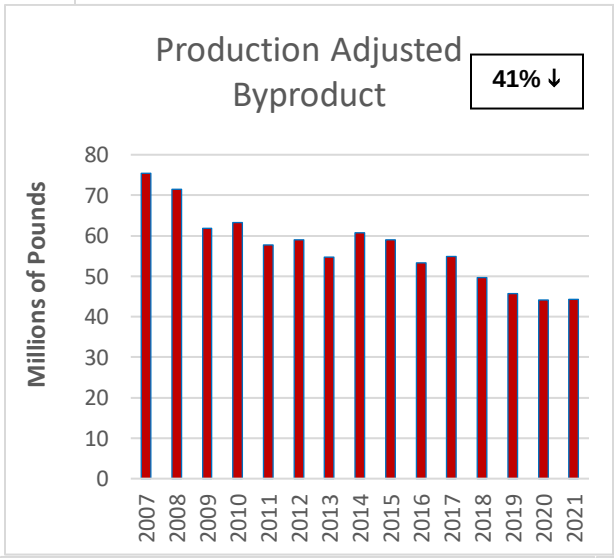
* Styrolution, which used over a quarter of the total reported use (excluding trade secret data) in 2007, ceased operations in Massachusetts in 2014.

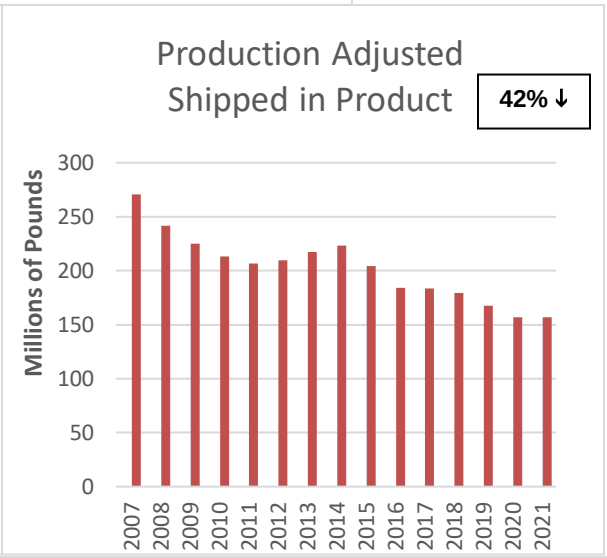
**2007 Core Group Progress without Adjusting for Production**

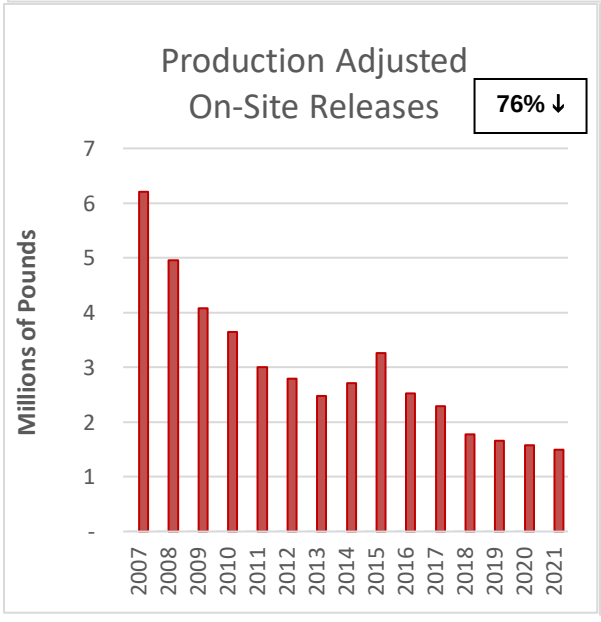
The actual quantities reported by the 2007 Core Group over the period 2007 to 2021 are shown in Figure 4. These quantities have not been adjusted for changes in production. From 2007 to 2021, Core Group facilities:

- reduced toxic chemical use by 44% (from 792 million to 441 million pounds between 2007 and 2021)
- reduced toxic byproducts by 14% (from 75 million to 65 million pounds between 2007 and 2021)
- reduced toxics shipped in product by 15% (from 271 million to 230 million pounds between 2007 and 2021)
- reduced on-site releases of toxics to the environment by 65% (from 6 million to 2 million pounds between 2007 and 2021)
- increased transfers of toxics off-site for further waste management by 21% (from 25 to 30 million pounds between 2007 and 2021).

**Figure 3 – 2007 Core Group Toxics Use Reduction Progress 2007-2021**
**Production Adjusted**
**(Excludes Trade Secret Data)**

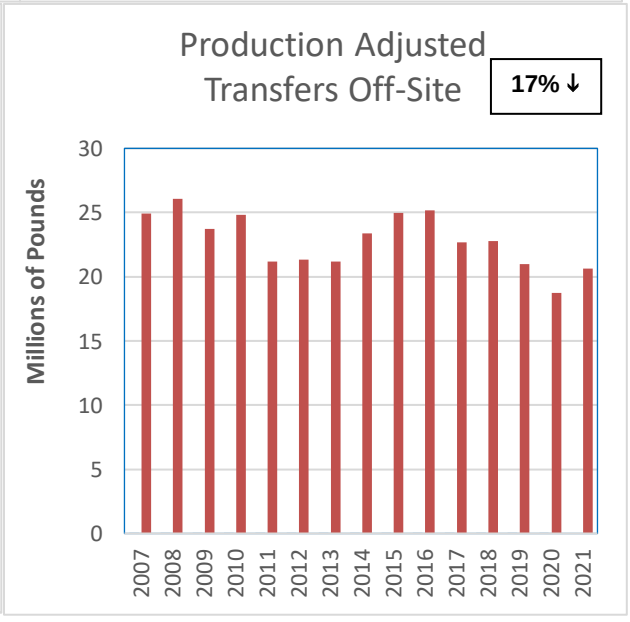
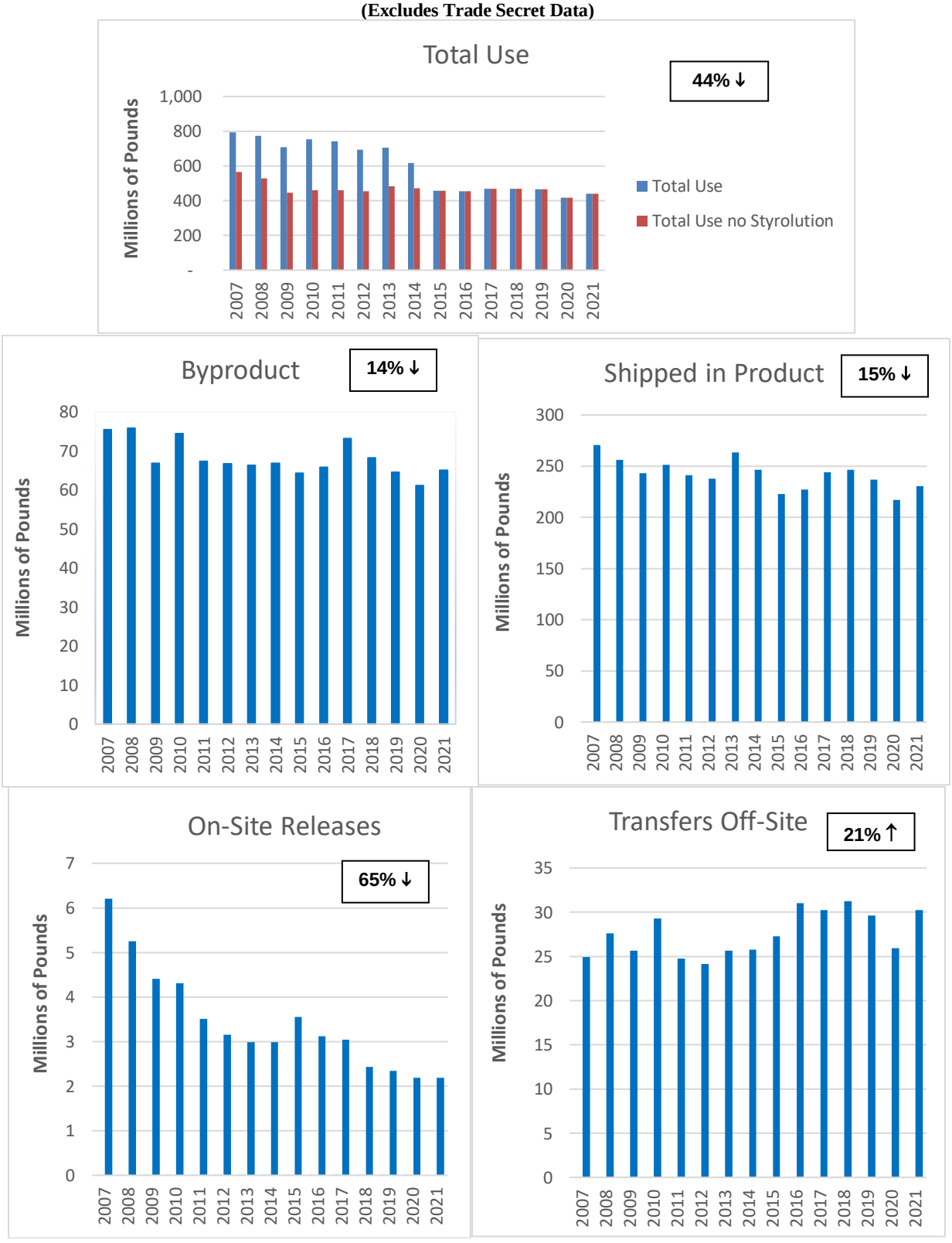



**Figure 4 – 2007 Core Group Toxics Use Reduction Progress 2007-2021**
**Not Production Adjusted**
**(Excludes Trade Secret Data)**



**Progress in Toxics Use Reduction: 2000 Core Group**

The 2000 Core Group includes all industry categories and chemicals that were subject to TURA reporting in 2000 and remained subject to reporting in 2021 at the same reporting threshold. The 2000 Core Group is used to measure progress from 2000 and provides a longer history of TURA chemical use, byproduct, and releases than the 2007 Core Group. The 2000 Core Group includes 341 filers, which represents 79% of the 2021 TURA filers. Table 2 and Figures 5 and 6 below summarize 2000 Core Group TURA data from 2000 to 2021, excluding trade secret data. In addition to the filers excluded from the 2007 Core Group, the 2000 Core Group excludes reports discontinued when the TURA reporting threshold was raised for certain manufactured and processed chemicals to match the EPA TRI threshold, and also lead and lead compound reports due to the lowered 2001 PBT thresholds.

**2000 Core Group Progress: Adjusting for Production**

Table 2 below summarizes TURA data from 2000 to 2021, showing reported and production adjusted quantities. For the 2000 Core Group, the activity index shows an increase in production of 49 percent from 2000 to 2021. As shown below in Table 2 and Figure 5, when adjusted for production, as of 2021, the 2000 Core Group facilities have reduced**:**

- toxic chemical use by 75%
- toxic byproducts by 67%
- toxics shipped in product by 58%
- on-site releases of toxics to the environment by 90%
- transfers of toxics off-site for further waste management by 48%.

**2000 Core Group Progress without Adjusting for Production**

The actual quantities reported by the 2000 Core Group over the period 2000 to 2021 are shown in Figure 6. These quantities have not been adjusted for changes in production. From 2000 to 2021, Core Group facilities:

- reduced toxic chemical use by 62% (from 1,038 million to 389 million pounds between 2000 and 2021)
- reduced toxic byproducts by 51% (from 116 million to 56 million pounds between 2000 and 2021)
- reduced toxics shipped in product by 38% (from 359 million to 224 million pounds between 2000 and 2021)
- reduced on-site releases of toxics to the environment by 86% (from 11 million to 1.5 million pounds between 2000 and 2021)
- reduced transfers of toxics off-site for further waste management by 23% (from 27 to 21 million pounds between 2000 and 2021).

Table 2
**2000 CORE GROUP DATA: 2000 - 2021 TREND SUMMARY**
(Quantities are in millions of pounds and do not include trade secret quantities.
Shaded columns show quantities adjusted by cumulative production ratio)

| Year | Total Use | | Byproduct | | Shipped in Product | | On-Site Releases | | Transfers Off-Site | | Production Ratio | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Year to Year | Cumulative from 2000 |
| 2000 | 1038.40 | 1038.40 | 115.50 | 115.50 | 358.80 | 358.80 | 10.70 | 10.70 | 26.90 | 26.90 | | |
| 2001 | 955.40 | 955.40 | 96.80 | 96.80 | 315.30 | 315.30 | 8.70 | 8.70 | 21.30 | 21.30 | 1.00 | 1.00 |
| 2002 | 871.70 | 908.02 | 89.30 | 93.02 | 283.90 | 295.73 | 7.70 | 8.02 | 20.10 | 20.94 | 0.96 | 0.96 |
| 2003 | 910.40 | 948.33 | 83.70 | 87.19 | 289.40 | 301.46 | 7.10 | 7.40 | 19.30 | 20.10 | 1.00 | 0.96 |
| 2004 | 849.10 | 842.36 | 86.80 | 86.11 | 295.50 | 293.15 | 6.80 | 6.75 | 19.50 | 19.35 | 1.05 | 1.01 |
| 2005 | **819.00** | 804.46 | 73.40 | 72.10 | 327.00 | 321.19 | 6.80 | 6.68 | 16.10 | 15.81 | 1.01 | 1.02 |
| 2006 | **789.20** | 759.98 | 70.90 | 68.28 | 276.50 | 266.26 | 5.90 | 5.68 | 15.20 | 14.64 | 1.02 | 1.04 |
| 2007 | **744.30** | 738.91 | 64.40 | 63.93 | 267.90 | 265.96 | 5.20 | 5.16 | 15.60 | 15.49 | 0.97 | 1.01 |
| 2008 | **704.30** | 659.63 | 61.80 | 57.88 | 253.30 | 237.23 | 4.30 | 4.03 | 14.70 | 13.77 | 1.06 | 1.07 |
| 2009 | **663.20** | 603.04 | 56.00 | 50.92 | 241.10 | 219.23 | 3.50 | 3.18 | 17.40 | 15.82 | 1.03 | 1.10 |
| 2010 | **705.40** | 588.45 | 65.20 | 54.39 | 238.20 | 198.71 | 3.40 | 2.84 | 19.30 | 16.10 | 1.09 | 1.20 |
| 2011 | **682.80** | 581.22 | 58.10 | 49.46 | 235.50 | 200.47 | 2.80 | 2.38 | 14.30 | 12.17 | 0.98 | 1.17 |
| 2012 | **633.80** | 561.99 | 57.40 | 50.90 | 230.80 | 204.65 | 2.50 | 2.22 | 12.90 | 11.44 | 0.96 | 1.13 |
| 2013 | **649.10** | 532.93 | 56.80 | 46.63 | 256.40 | 210.51 | 2.30 | 1.89 | 14.90 | 12.23 | 1.08 | 1.22 |
| 2014 | **560.10** | 510.95 | 56.70 | 51.72 | 239.20 | 218.21 | 2.30 | 2.10 | 14.60 | 13.32 | 0.90* | 1.10 |
| 2015 | **399.60** | 368.22 | 53.90 | 49.67 | 215.00 | 198.11 | 2.80 | 2.58 | 16.00 | 14.74 | 0.99 | 1.09 |
| 2016 | **397.70** | 321.46 | 55.20 | 44.62 | 217.20 | 175.56 | 2.30 | 1.86 | 18.80 | 15.20 | 1.14 | 1.24 |
| 2017 | **413.60** | 309.55 | 62.20 | 46.55 | 234.00 | 175.13 | 2.20 | 1.65 | 18.40 | 13.77 | 1.08 | 1.34 |
| 2018 | **419.80** | 305.04 | 57.70 | 41.93 | 243.4 | 176.4 | 1.70 | 1.24 | 19.90 | 14.46 | 1.03 | 1.38 |
| 2019 | **415.00** | 289.95 | 55.30 | 38.64 | 231.90 | 162.02 | 1.50 | 1.05 | 19.80 | 13.83 | 1.04 | 1.43 |
| 2020 | **369.70** | 263.57 | 53.10 | 37.86 | 211.20 | 150.57 | 1.30 | 0.93 | 17.60 | 12.55 | 0.98 | 1.40 |
| 2021 | 389.43 | 261.92 | 56.03 | 37.68 | 223.86 | 150.56 | 1.53 | 1.03 | 20.6 | 13.86 | 1.06 | 1.49 |
| 2000-2021 | 62% Reduction | 75% Reduction | 51% Reduction | 67% Reduction | 38% Reduction | 58% Reduction | 86% Reduction | 90% Reduction | 23% Reduction | 48% Reduction | | 49% Increase |

* Styrolution, which used over a quarter of the total reported use (excluding trade secret data) in 2000, ceased operations in Massachusetts in 2014.

**Figure 5 – 2000 Core Group Toxics Use Reduction Progress 2000-2021**
**Production Adjusted**
**(Excludes Trade Secret Data)**

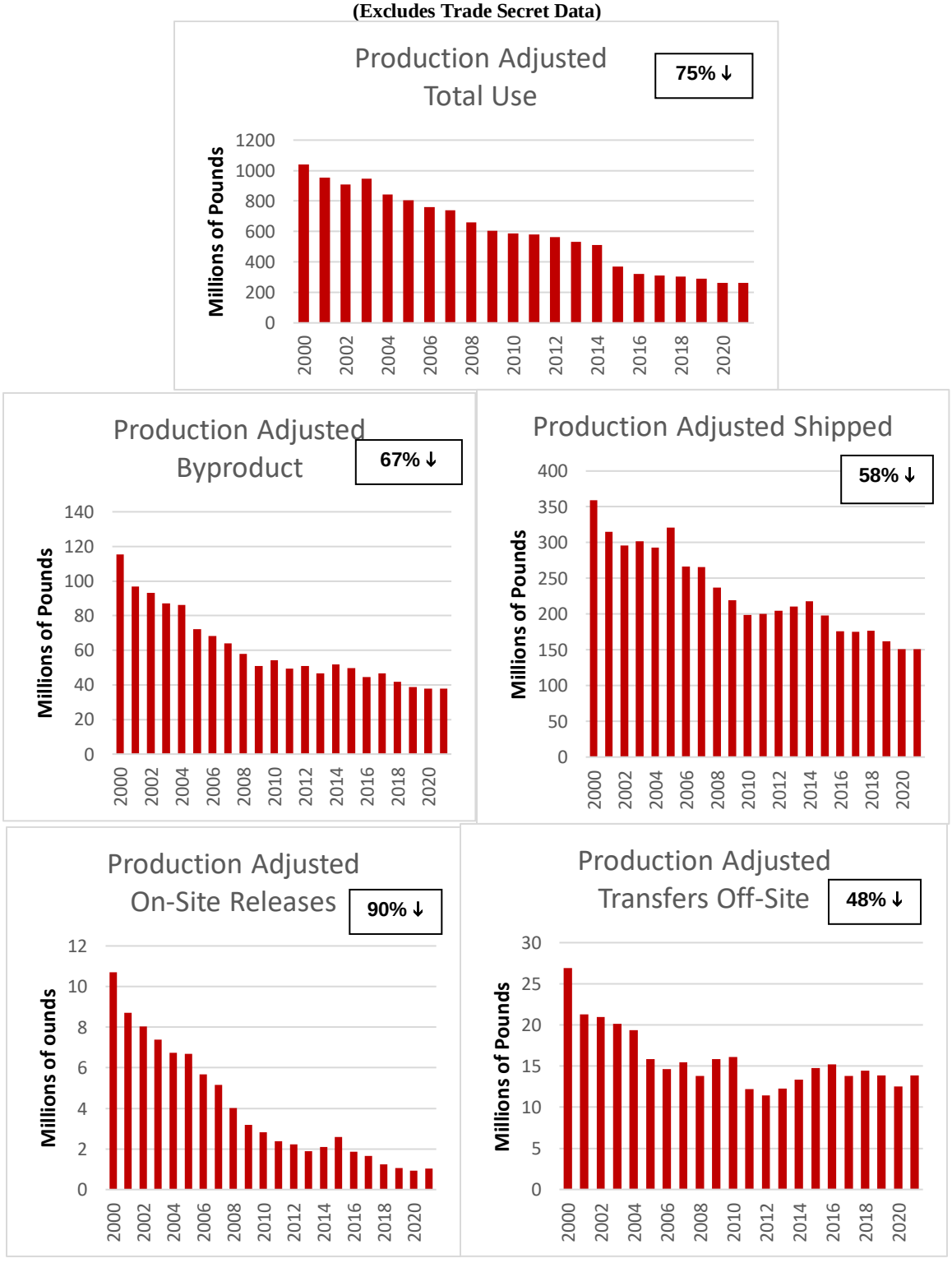
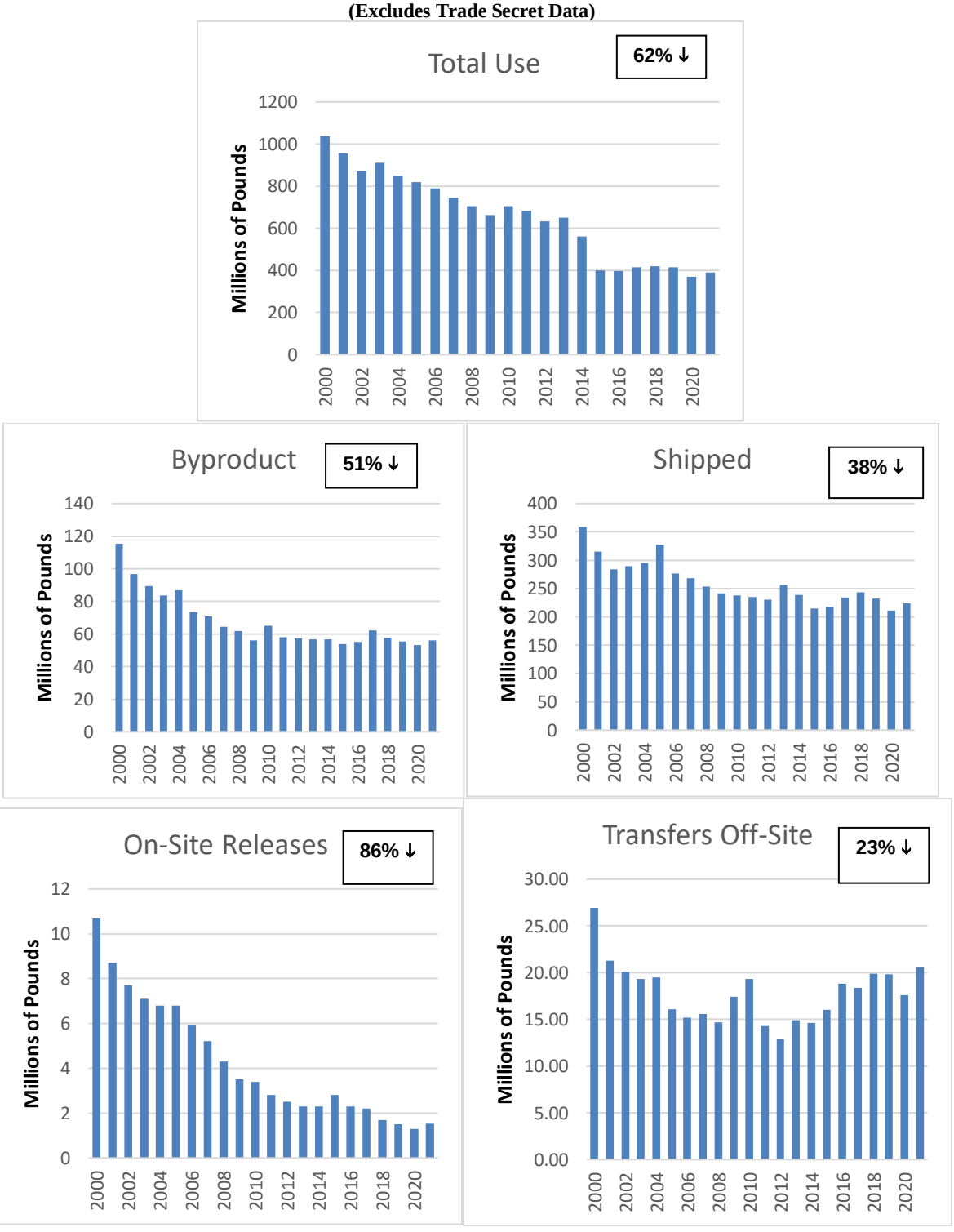


**Figure 6 – 2000 Core Group Toxics Use Reduction Progress 2000-2021**
**Not Production Adjusted**
**(Excludes Trade Secret Data)**



## IV. 2021 TURA Chemical Data

| Table 3<br>All Reported Chemical Data 2021<br>(Rounded to millions of pounds)<br>(Includes Trade Secret Data) | | |
|---|---|---|
| TOTAL USE | 649,000,000 | |
| SHIPPED IN PRODUCT | 279,000,000 | 43% of total chemical use |
| GENERATED AS BYPRODUCT<br>(total waste prior to treatment or disposal) | 71,000,000 | 11% of total chemical use |
| ON-SITE RELEASES<br>(to air, water or land disposal) | 2,500,000 | 0.4% of total chemical use<br>4% of total byproduct |
| TRANSFERS OFF-SITE<br>(to a wastewater treatment plant, recycling or waste management facility for treatment or disposal) | 33,000,000 | 5% of total chemical use<br>46% of total byproduct |

**Trade Secret**

Under certain circumstances facilities have the right to claim that the amount of chemical used and generated as byproduct is a trade secret. Provided that the regulatory standards for making such a claim are met and the Commissioner has not made a determination that the information is not a trade secret, MassDEP may not share that information. In 2021, nine facilities made trade secret claims on a combined total of:

- 197 million pounds of chemical use
- 4 million pounds of byproduct generation
- 46 million pounds shipped in product.

**Chemical Use by Use Category**

TURA requires that facilities report chemical use in one of three use categories, identified by the Federal Toxics Release Inventory (TRI) program.

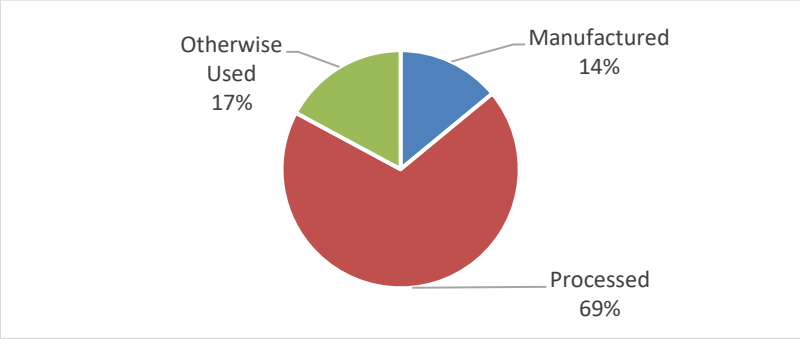
Manufacture is defined in TURA, in part, as "to produce, prepare, import or compound a toxic or hazardous substance". For example, the intentional manufacture of a chemical substance such as formaldehyde or the "coincidental" (unintentional) manufacture of chemicals such as the creation of sulfuric acid from fuel combustion for power generation and the production of nitrate compounds as a result of using nitric acid to treat wastewater. Chemicals that are imported are also counted as "manufactured". Manufacturing represented 14% of total chemical use in 2021.

Process is defined in TURA, in part, as "the preparation of a toxic or hazardous substance, after its manufacture, for distribution in commerce". Most chemical use in Massachusetts is processed. Chemicals processed accounted for 69% of 2021 total chemical use.

Otherwise Use is defined in the TURA regulations (310 CMR 50.10), in part, as "any use of a toxic substance that is not covered by the terms "manufacture" or "process". These substances are neither chemically converted nor incorporated directly into a product. Examples include chemicals used to clean parts prior to plating for finishing, chemical solvents used to carry a coating that evaporates off the product as the coating dries, catalysts, chemicals contained in fuels that are combusted, and chemicals used in waste treatment operations. Chemicals "otherwise used" accounted for 17% of 2021 total chemical use.

Figure 7 below shows the proportion of use for the three use categories:

**Figure 7**
**2021 Total Use by Category**
**(649 Million Pounds)**
**(includes trade secret data)**




**Top 20 Chemicals**

In 2021, filers reported using 127 out of the over 1,500 TURA-listed substances in amounts above the reporting threshold. The data was analyzed by chemical to identify the top 20 chemicals in each of the following amounts: used, generated as byproduct, shipped in product, released on-site as pollution, and shipped off-site for treatment or disposal.

Chemical Use
As shown in Table 4 below, the top 20 chemicals used in 2021 accounted for 84%, (381 million pounds) of the total use reported (trade secret data was excluded to protect confidentiality claims). The top four chemicals, Sodium Hydroxide (14% of total use, 150 facilities, 65 million pounds), Hydrochloric Acid (13% of total use, 41 facilities, 57 million pounds), Methanol (8% of total use, 28 facilities, 48 million pounds), and Sodium Hypochlorite (9% of total use, 29 facilities, 38 million pounds), and accounted for almost half of the total reported use (excluding trade secret data) in the state.

Tables 5 and 6 show the top 20 chemicals for the other reporting categories. As with use, the top 20 chemicals represent a significant proportion of the total amount reported (Table 3): The top 20 chemicals comprised:

- 89% of the total reported byproducts (including trade secret data)
- 89% of the total reported shipped in product (excluding trade secret data)
- 93% of the total on-site releases (including trade secret data)
- 93% of the total off-site transfers (including trade secret data).

Hydrochloric Acid was the top chemical for on-site releases, accounting for 18% of the statewide total of on-site releases (454,000 pounds). Ninety-one (91) percent of hydrochloric acid releases were from municipal waste combustors. Lead was the third top chemical for on-site releases. Eighty-seven (87) percent of total on-site releases of lead were attributed to lead in ash disposed by one municipal waste combustor in an on-site lined landfill.

The Nitrate Compounds chemical category was the top chemical for transfers offsite, accounting for 16% of the statewide total transfers off-site (over 5 million pounds). Nitrate compounds were primarily coincidentally manufactured during neutralization of nitric acid in wastewater treatment and were discharged to Publicly Owned Wastewater Treatment Plants. Ninety-two (92) percent of total transfers off-site of lead, the sixth chemical on the list, was attributed to four municipal waste combustors that transferred lead in ash to off-site lined landfills.

| Table 4 – 2021 Top 20 Chemicals: Total Use<br>*These quantities do not include Trade Secret Data* | | |
|---|---|---|
| **Chemical Name (CAS #)** | **CAS #** | **Total Use (Lbs.)** |
| Sodium Hydroxide | 1310732 | 65,629,182 |
| Hydrochloric Acid | 7647010 | 57,233,162 |
| **Methanol** | **67561** | 47,617,526 |
| Sodium Hypochlorite | 7681529 | 37,561,817 |
| Sulfuric Acid | 7664939 | 21,812,196 |
| Potassium Hydroxide | 1310583 | 18,673,339 |
| Nitrate Compounds | 1090 | 13,966,441 |
| **Acetone** | **67641** | 13,018,834 |
| Ammonia | 7664417 | 11,775,478 |
| **Toluene** | **108883** | 11,595,343 |
| Diisocyanates | 1050 | 9,826,458 |
| **Methyl Ethyl Ketone** | **78933** | 9,747,934 |
| Phosphoric Acid | 7664382 | 9,621,434 |
| Toluene Diisocyanate | 26471625 | 9,601,878 |
| **Ethyl Acetate** | **141786** | 9,330,466 |
| Zinc Compounds | 1039 | 9,302,814 |
| Nitric Acid | 7697372 | 6,887,841 |
| Methyl Methacrylate | 80626 | 6,396,916 |
| Ferric Chloride | 7705080 | 6,055,548 |
| Ethylene Glycol | 107211 | 5,754,254 |

NOTE: **Bolded** chemicals are on the Top 20 Chemicals for Total Use, Byproduct Generation, Shipped in Product, On-Site Releases, and Transfers Off-Site.

Butyraldehyde, Formaldehyde, Sodium Bisulfite, and Vinyl Acetate would appear in the Top 20 Chemicals Total Use list if trade secret quantities were included.

## Table 5 – 2021 Top 20 Chemicals:
Byproduct Generation and Shipped in Product

| Byproduct Generation *These quantities include Trade Secret Data* | | | Shipped in Product *These quantities do not include Trade Secret Data* | | |
|---|---|---|---|---|---|
| **Chemical Name** | **CAS #** | **Byproduct Generation (Lbs.)** | **Chemical Name** | **CAS #** | **Shipped in Product (Lbs.)** |
| **Ethyl Acetate** | **141786** | 9,740,219 | **Acetone** | **67641** | 7,387,034 |
| Sodium Hydroxide | 1310732 | 7,083,530 | Antimony Compounds | 1000 | 2,352,943 |
| Nitrate Compounds | 1090 | 6,613,387 | Copper Compounds | 1015 | 1,744,488 |
| **Acetone** | **67641** | 5,354,703 | Dimethylformamide | 68122 | 2,064,450 |
| Sulfuric Acid | 7664939 | 5,319,735 | **Ethyl Acetate** | **141786** | 2,180,446 |
| **Toluene** | **108883** | 5,223,667 | Ethylene Glycol | 107211 | 2,542,319 |
| **Methanol** | **67561** | 3,394,008 | Ferric Chloride | 7705080 | 5,021,302 |
| Acetonitrile | 75058 | 2,970,496 | Glycol Ethers | 1022 | 2,233,555 |
| **Methyl Ethyl Ketone** | **78933** | 2,512,455 | **Methanol** | **67561** | 44,487,389 |
| Hydrochloric Acid | 7647010 | 2,448,255 | **Methyl Ethyl Ketone** | **78933** | 7,163,786 |
| Lead | 7439921 | 2,204,269 | Methyl Methacrylate | 80626 | 3,874,414 |
| 1-Methyl-2-Pyrrolidone | 872504 | 1,909,492 | Nitrate Compounds | 1090 | 1,911,427 |
| Formaldehyde | 50000 | 1,656,158 | Phosphoric Acid | 7664382 | 8,050,813 |
| Dimethylformamide | 68122 | 1,353,061 | Potassium Hydroxide | 1310583 | 16,316,693 |
| Ethylene Glycol | 107211 | 1,291,907 | Sodium Hydroxide | 1310732 | 40,778,237 |
| Aluminum Sulfate | 10043013 | 1,115,343 | Sodium Hypochlorite | 7681529 | 34,751,828 |
| Ferric Chloride | 7705080 | 897,105 | Sulfuric Acid | 7664939 | 7,461,418 |
| Potassium Hydroxide | 1310583 | 761,516 | **Toluene** | **108883** | 6,239,790 |
| Nitric Acid | 7697372 | 718,398 | Toluene Diisocyanate | 26471625 | 3,785,646 |
| Dichloromethane | 75092 | 609,998 | Zinc Compounds | 1039 | 6,450,031 |

**NOTE: Bolded** chemicals are on the Top 20 Chemicals for Total Use, Byproduct Generation, Shipped in Product, On-Site Releases, and Transfers Off-Site.

Sodium Bisulfite would appear in the Top 20 Chemicals Shipped in Product list if trade secret quantities were included.

**Table 6 – 2021 Top 20 Chemicals:**
Reported On-Site Releases and Transfers Off-Site

| On-Site Releases *These quantities include Trade Secret Data* | | | Transfers Off-Site *These quantities include Trade Secret Data* | | |
|---|---|---|---|---|---|
| **Chemical Name** | **(CAS #)** | **On-Site Releases (Lbs.)** | **Chemical Name** | **(CAS #)** | **Transfers Off-Site (Lbs.)** |
| Hydrochloric Acid | 7647010 | 454,060 | Nitrate Compounds | 1090 | 5,364,484 |
| **Acetone** | **67641** | 374,626 | **Acetone** | **67641** | 4,574,025 |
| Lead | 7439921 | 279,853 | Acetonitrile | 75058 | 2,969,657 |
| **Ethyl Acetate** | **141786** | 234,737 | **Methanol** | **67561** | 2,588,784 |
| Ammonia | 7664417 | 178,928 | **Toluene** | **108883** | 2,444,528 |
| **Toluene** | **108883** | 172,224 | Lead | 7439921 | 1,945,482 |
| Barium Compounds | 1002 | 114,359 | Ethylene Glycol | 107211 | 1,839,206 |
| Formaldehyde | 50000 | 76,336 | 1-Methyl-2-Pyrrolidone | 872504 | 1,720,455 |
| **Methanol** | **67561** | 50,306 | Formaldehyde | 50000 | 1,469,420 |
| **Methyl Ethyl Ketone** | **78933** | 49,283 | **Methyl Ethyl Ketone** | **78933** | 1,024,922 |
| Trichloroethylene | 79016 | 47,559 | Zinc Compounds | 1039 | 888,152 |
| 1-Methyl-2-Pyrrolidone | 872504 | 37,011 | Dichloromethane | 75092 | 565,221 |
| Xylene Mixed Isomers | 1330207 | 35,566 | **Ethyl Acetate** | **141786** | 552,146 |
| Butyl Acetate-T | 540885 | 35,354 | Hydrochloric Acid | 7647010 | 511,999 |
| Butyraldehyde | 123728 | 32,165 | Furan, Tetrahydro- | 109999 | 461,522 |
| Dichloromethane | 75092 | 30,835 | Sodium Hydroxide | 1310732 | 378,708 |
| N-Propyl Bromide | 106945 | 23,833 | Dimethylformamide | 68122 | 352,687 |
| Hexane (N-Hexane) | 110543 | 23,099 | Ferric Chloride | 7705080 | 316,201 |
| Butyl Acetate | 123864 | 18,422 | Diethyl Hexyl Phthalate | 117817 | 307,240 |
| Glycol Ethers | 1022 | 17,606 | Lead Compounds | 1026 | 194,543 |

**NOTE: Bolded** chemicals are on the Top 20 Chemicals for Total Use, Byproduct Generation, Shipped in Product, On-Site Releases, and Transfers Off-Site.

# V. 2021 Chemicals of Particular Interest

Certain toxic chemicals are of particular concern because of their higher potential to harm the environment or public health. These include:

- Chemicals classified as persistent bioaccumulative toxic (PBT) chemicals by the U.S. Environmental Protection Agency (EPA) under the Toxics Release Inventory (TRI) Program
- Chemicals designated as Higher Hazard by the TURA Administrative Council
- Chemicals known to promote asthma (Asthmagens)
- Carcinogens

Trends in reported data for each of these groups of substances are discussed below.

**Persistent Bioaccumulative Toxic (PBT) Chemicals**

PBTs are highly toxic, remain in the environment for long periods of time, are not readily destroyed, and build up or accumulate in body tissue. As a result, relatively small releases of PBT chemicals can pose health and environmental threats and, therefore, the use and release of these chemicals, even in relatively small amounts, warrants public reporting as well as toxics use reduction efforts. Because of these concerns, the threshold for PBTs was lowered by USEPA from 25,000 pounds if the substance is manufactured or processed, and 10,000 pounds if the substance is otherwise used, to between 0.1 grams and 100 pounds, depending on the chemical, for all uses. The threshold was lowered for all PBTs, as of reporting year 2000, except for lead and lead compounds (starting reporting year 2001).

Table 7 below shows the 2021 reported data and the number of filers for each PBT (excluding trade secret data). Nine PBTs are reported in Massachusetts. Five of these (dioxin, polycyclic aromatic compounds, benzoperylene and mercury and mercury compounds) are chiefly associated with combustion at resource recovery facilities, power plants, and the manufacture of concrete and asphalt paving.

Table 8 below shows each PBT's chemical use since the year before it was designated as a PBT. The chemical use increased from zero to hundreds of pounds when the PBT designation occurred. The pounds of these combustion related chemicals increased again in 2003 when the municipal waste combustors were required to report. Despite being used primarily to produce power, facilities did eliminate some of these chemicals when they switched from coal and oil to natural gas, and the majority showed that they were using less of the chemical or generating less byproduct per unit of product since the substance was designated as a PBT. However, reporting dropped substantially in 2007 when amendments to the Act exempted facilities that burned fuel for their own use from reporting on chemicals in the fuel or coincidentally manufactured during combustion.

The use of lead and lead compounds stems from a combination of combustion, waste management, paving asphalt manufacture, and traditional manufacturing. Over ninety-nine (99) percent of the use of lead was released as a result of combustion of fuel by power plants and the combustion of waste by municipal waste combustors.

Lowering the reporting threshold to 100 pounds in 2001 resulted in an increase in the number of facilities reporting lead from 15 in reporting year 2000, to 152 in 2001, and an increase in the number of facilities reporting lead compounds from 33 in 2000, to 129 in 2001. However, in 2021 the number of lead and lead compounds filers had decreased to 62 and 43, respectively.

| Table 7<br>2021 Persistent Bioaccumulative Toxic (PBT) Chemicals Summary<br>(Excludes Trade Secret Data) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Substance | Threshold (lbs or grams for dioxin) | # Filers in 2021 | Use | Byproduct | Shipped in Product | On-Site Releases | Transfers Off-Site |
| Benzo[ghi]-perylene | 10 | 19 | 2,982 | 768 | 1,368 | 2 | 584 |
| Dioxin and Dioxin Compounds | 0.1 Gr | 7 | 1,144 | 1,144 | 0 | 49 | 1,095 |
| Lead | 100 | 62 | 2,640,773 | 2,204,269 | 424,727 | 279,853 | 1,945,482 |
| Lead Compounds | 100 | 43 | 285,404 | 191,642 | 76,918 | 498 | 193,267 |
| Mercury | 10 | 14 | 7,577 | 4,867 | 2,356 | 416 | 4,897 |
| Mercury Compounds | 10 | 1 | 575 | 9 | 1,032 | 0 | 9 |
| Polychlorinated Biphenyls | 10 | 1 | 9,093 | 9,093 | 0 | 0 | 9,093 |
| Polycyclic Aromatic Compounds | 100 | 20 | 144,268 | 10,888 | 54,749 | 76 | 8,063 |
| Tetrabromo-Bisphenol | 10 | 1 | 132 | 2 | 130 | 0 | 2 |

**Table 8**
**Pounds of PBTs Reported Use and Number of Facilities Reporting 2000 – 2021 (Excludes Trade Secret Data)**

| | Benzo[ghi]-perylene (191242) | | Dioxin and Dioxin Compounds (1060) | | Mercury (7439976) | | Mercury Compounds (1028) | | Poly-Chlorinated Biphenyls (1336363) | | Polycyclic Aromatic Compounds (1040) | | Tetra-bromo-bisphenolA (79947) | | Lead (7439921) | | Lead Compounds (1026) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Lbs Use | # | Grams Use | # | Lbs Use | # | Lbs Use | # | Lbs Use | # | Lbs Use | # | Lbs Use | # | Lbs Use | # | Lbs Use | # |
| 1999 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 37,539,261 | 6 | 0 | 0 | | | | |
| 2000 | 146,531 | 120 | 12 | 8 | 4,973 | 11 | 90,009 | 6 | 118,160 | 2 | 14,171,986 | 158 | 332 | 1 | 1,261,842 | 15 | 9,855,146 | 33 |
| 2001 | 180,326 | 127 | 12 | 8 | 9,315 | 13 | 676 | 5 | 83,890 | 2 | 13,849,697 | 151 | 115 | 1 | 1,284,199 | 152 | 7,290,727 | 129 |
| 2002 | 123,429 | 122 | 13 | 8 | 5,922 | 13 | 1,765 | 5 | 64,981 | 2 | 11,148,250 | 149 | 19,057 | 1 | 912,922 | 143 | 5,146,270 | 114 |
| 2003 | 125,099 | 119 | 11,827 | 17 | 11,476 | 20 | 1,212 | 6 | 37,325 | 2 | 11,486,388 | 136 | 152 | 1 | 3,394,134 | 140 | 5,982,308 | 117 |
| 2004 | 128,874 | 114 | 3,033 | 16 | 12,629 | 20 | 966 | 7 | 46,879 | 2 | 11,796,370 | 133 | 0 | 0 | 3,651,671 | 109 | 5,279,027 | 126 |
| 2005 | 128,809 | 109 | 6,696 | 17 | 10,444 | 22 | 1,031 | 6 | 21,741 | 2 | 11,128,163 | 127 | 0 | 0 | 3,763,242 | 114 | 3,689,910 | 126 |
| 2006 | 49,376 | 27 | 761 | 15 | 13,351 | 19 | 1,011 | 6 | 22,042 | 2 | 3,735,104 | 31 | 0 | 0 | 4,811,219 | 102 | 2,279,105 | 111 |
| 2007 | 49,412 | 28 | 1,155 | 13 | 13,733 | 19 | 1,101 | 5 | 110,303 | 3 | 5,051,904 | 29 | 0 | 0 | 4,172,982 | 90 | 1,406,092 | 104 |
| 2008 | 33,393 | 25 | 1,523 | 13 | 12,231 | 20 | 3,421 | 6 | 156,170 | 3 | 3,275,212 | 30 | 0 | 0 | 3,799,929 | 90 | 1,241,717 | 93 |
| 2009 | 12,403 | 24 | 1,951 | 11 | 10,515 | 17 | 1,610 | 5 | 42,757 | 3 | 1,168,637 | 28 | 4,596 | 1 | 4,130,556 | 73 | 971,451 | 84 |
| 2010 | 4,275 | 21 | 1,980 | 9 | 11,434 | 16 | 1,161 | 4 | 71,091 | 2 | 382,534 | 26 | 4,875 | 2 | 3,208,423 | 75 | 736,262 | 73 |
| 2011 | 3,177 | 23 | 2,811 | 9 | 15,826 | 17 | 1,307 | 5 | 72,654 | 2 | 283,498 | 27 | 7,235 | 3 | 3,080,576 | 75 | 569,666 | 66 |
| 2012 | 2,712 | 23 | 2,650 | 9 | 7,795 | 16 | 157 | 2 | 83,372 | 2 | 206,532 | 26 | 7,242 | 3 | 3,289,441 | 79 | 654,024 | 63 |
| 2013 | 4,832 | 22 | 1,847 | 9 | 6,619 | 17 | 639 | 4 | 126,857 | 3 | 523,396 | 26 | 5,881 | 2 | 3,531,726 | 76 | 754,176 | 61 |
| 2014 | 10,570 | 21 | 1,841 | 10 | 4,451 | 17 | 653 | 3 | 88,354 | 2 | 1,055,061 | 24 | 3,015 | 2 | 3,653,822 | 69 | 835,041 | 55 |
| 2015 | 10,692 | 21 | 1,762 | 8 | 6,867 | 17 | 1,000 | 2 | 59,887 | 1 | 1,398,282 | 24 | 4,466 | 2 | 3,427,441 | 62 | 956,565 | 53 |
| 2016 | 7,318 | 21 | 2,094 | 8 | 8,479 | 16 | 1,365 | 2 | 45,621 | 1 | 576,833 | 23 | 3,418 | 2 | 3,213,445 | 65 | 730,746 | 54 |
| 2017 | 5,229 | 21 | 2,012 | 8 | 8,392 | 18 | 703 | 2 | 39,383 | 1 | 347,984 | 23 | 2,760 | 2 | 3,180,516 | 65 | 709,517 | 48 |
| 2018 | 6,597 | 20 | 1,622 | 7 | 7,627 | 14 | 694 | 1 | 31,933 | 1 | 478,357 | 23 | 179 | 1 | 3,343,778 | 60 | 579,158 | 49 |
| 2019 | 3,304 | 19 | 2,571 | 7 | 8,261 | 16 | 590 | 1 | 11,999 | 1 | 177,093 | 22 | 239 | 1 | 3,065,166 | 58 | 486,318 | 44 |
| 2020 | 2,326 | 17 | 2,114 | 7 | 11,447 | 15 | 615 | 1 | 22,356 | 2 | 82,518 | 18 | 337 | 1 | 2,949,990 | 63 | 309,238 | 42 |
| 2021 | 2,982 | 19 | 1,144 | 7 | 7,577 | 14 | 575 | 1 | 9,093 | 1 | 144,268 | 20 | 132 | 1 | 2,640,773 | 62 | 285,404 | 43 |

NOTE: The numbers below the dark lines indicate the first year that these chemicals were designated as PBTs and the reporting threshold was lowered.

**Higher Hazard Substances (HHS)**

Other higher hazard chemicals, beyond PBTs covered above, are also reported under TURA. The 2006 amendments to TURA directed the Council to categorize the TURA list of chemicals into higher or lower hazard substances, or to leave them uncategorized and lowered the reporting threshold for higher hazard substances (HHS) to 1,000 pounds for all uses. Table 9 below shows the pounds of each HHS reported and the number of facilities reporting it from the year before it was designated as a HHS to 2021.

The data showed a similar trend for trichloroethylene and tetrachloroethylene as that seen with PBTs - an initial increase in the number of facilities reporting since these chemicals were designated as HHS in 2008 and 2009. The increases, respectively, were from 9 in 2007 to 27 in 2008 reporting trichloroethylene, and 4 in 2008 to 23 in 2009 reporting tetrachloroethylene. However, in 2021 the number of trichloroethylene and tetrachloroethylene filers decreased to 12 and 4, respectively.

Table 10 below shows the fourteen HHS chemicals reported in 2021, including the number of filers, byproduct generation, shipped in product, on-site releases, and transfers off-site.

## Table 9
## Higher Hazard Substances (HHS): Total Pounds of Use (Non-Trade Secret Data) and # Filers Before and After HHS Designation

| NAME | Toluene -2,4-diisocya-nate | Toluene -2,6-diisocya-nate | Toluene diisocya-nate (mixed isomers) | Hydro-gen fluoride | N-Propyl Bromide | Dimethyl-forma-mide | Cyanide Com-pounds | Methyl-ene Chloride (Dichloro-methane) | Formal-dehyde | Hexa-valent Chrom-ium | Tetra-chloro-ethylene | Cadmium | Cadmium Compounds | Tri-chloro-ethyl-ene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CAS** | 584849 | 91087 | 26471625 | 7664393 | 106945 | 68122 | 1016 | 75092 | 50000 | 1216 | 127184 | 7440439 | 1004 | 79016 |
| **HHS Start Year** | **2017** | **2017** | **2017** | **2016** | **2016** | **2016** | **2016** | **2014** | **2012** | **2012** | **2009** | **2008** | **2008** | **2008** |
| | | | | **POUNDS OF USE (NON-TRADE SECRET)** | | | | | | | | | | |
| 2007 | | | | | | | | | | | | | 184,400 | 604,671 |
| 2008 | | | | | | | | | | | 230,345 | **29,429** | **167,355** | **536,073** |
| 2009 | | | | | | | | | | | **176,186** | 28,969 | 145,324 | 556,457 |
| 2010 | | | | | | | | | | | 151,918 | 23,970 | 242,702 | 294,836 |
| 2011 | | | | | | | | | 4,027,226 | * | 163,773 | 26,878 | 180,654 | 303,076 |
| 2012 | | | | | | | | | **4,119,146** | **121,504** | 89,216 | 29,805 | 181,666 | 354,351 |
| 2013 | | | | | | | | 3,496,421 | 4,011,427 | 113,466 | 110,550 | 20,447 | 210,550 | 176,891 |
| 2014 | | | | | | | | **3,031,438** | 3,276,305 | 103,595 | 164,606 | 16,655 | 217,235 | 262,811 |
| 2015 | | | | 365,928 | 30,295 | 3,518,824 | 71,695 | 2,629,094 | 3,017,674 | 92,490 | 320,950 | 20,312 | 128,953 | 243,143 |
| 2016 | 456,803 | 114,201 | 5,669,556 | **483,633** | **102,998** | **3,845,720** | **118,955** | 2,628,375 | 3,157,440 | 77,657 | 909,566 | 17,707 | 155,687 | 239,983 |
| 2017 | **510,809** | **127,702** | **5,392,008** | 238,065 | 94,100 | 3,871,715 | 142,450 | 2,781,125 | 3,070,622 | 89,696 | 346,348 | 16,991 | 153,463 | 224,882 |
| 2018 | 403,297 | 100,824 | 5,126,282 | 209,972 | 93,218 | 3,611,244 | 146,777 | 2,500,120 | 3,370,832 | 77,103 | 73,318 | 20,162 | 142,058 | 274,876 |
| 2019 | 511,236 | 97,970 | 4,317,010 | 289,620 | 69,631 | 3,700,160 | 134,095 | 1,683,395 | 2,793,325 | 72,283 | 71,100 | 19,403 | 119,549 | 172,080 |
| 2020 | 339,901 | 70,322 | 9,989,005 | 198,444 | 57,340 | 3,440,228 | 116,042 | 1,397,901 | 2,036,787 | 77,695 | 33,747 | 22,215 | 100,364 | 186,263 |
| 2021 | 313,968 | 59,374 | 9,601,878 | 216,558 | 63,292 | 3,538,450 | 126,786 | 1,901,471 | 2,331,245 | 62,170 | 13,937 | 17,652 | 123,966 | 113,747 |
| | **Number of TURA Filers** | | | | | | | | | | | | | |
| 2007 | | | | | | | | | | | | | 1 | 9 |
| 2008 | | | | | | | | | | | 4 | **5** | **6** | **27** |
| 2009 | | | | | | | | | | | **23** | 4 | 7 | 23 |
| 2010 | | | | | | | | | | | 18 | 4 | 7 | 16 |
| 2011 | | | | | | | | | 9 | * | 19 | 4 | 5 | 17 |
| 2012 | | | | | | | | | **25** | **16** | 16 | 6 | 5 | 14 |
| 2013 | | | | | | | | 11 | 27 | 16 | 18 | 6 | 6 | 15 |
| 2014 | | | | | | | | **24** | 25 | 15 | 16 | 4 | 6 | 14 |
| 2015 | | | | 6 | 2 | 9 | 3 | 25 | 23 | 14 | 11 | 3 | 6 | 13 |
| 2016 | 1 | 1 | 3 | **25** | **23** | **13** | **14** | 20 | 22 | 14 | 12 | 3 | 6 | 15 |
| 2017 | **1** | **1** | **5** | 28 | 23 | 12 | 15 | 20 | 23 | 14 | 12 | 3 | 5 | 13 |
| 2018 | 1 | 1 | 4 | 24 | 19 | 12 | 14 | 18 | 23 | 13 | 9 | 4 | 7 | 13 |
| 2019 | 2 | 1 | 4 | 22 | 18 | 13 | 15 | 18 | 23 | 13 | 7 | 3 | 5 | 11 |
| 2020 | 2 | 1 | 6 | 23 | 16 | 12 | 15 | 16 | 23 | 14 | 4 | 3 | 4 | 12 |
| 2021 | 2 | 1 | 5 | 24 | 15 | 10 | 16 | 14 | 22 | 16 | 4 | 3 | 4 | 12 |

*Note: When hexavalent chromium was designated high hazard, the existing chromium compounds category was broken into two categories: hexavalent chromium and non-hexavalent chromium. As a result, there is no data for hexavalent chromium prior to 2012.

| Table 10<br>2021 Higher Hazard Substances (HHS) Summary<br>(Excludes Trade Secret Data) | | | | | | |
|---|---|---|---|---|---|---|
| Substance and Year Designated as HHS | # Filers in 2021 | Use | Byproduct | Shipped in Product | On-Site Releases | Transfers Off-Site |
| Cadmium/2008 | 3 | 17,652 | 3,777 | 13,853 | 0 | 3,779 |
| Cadmium Compounds/2008 | 4 | 123,966 | 9,297 | 18,212 | 13 | 9,284 |
| Trichloroethylene/2008 | 12 | 113,747 | 73,123 | 42,285 | 47,559 | 14,222 |
| Tetrachloroethylene/2009 | 4 | 13,937 | 4,441 | 7,874 | 3,866 | 575 |
| Formaldehyde/2012 | 22 | 2,331,245 | 402,470 | 78,689 | 75,243 | 216,825 |
| Hexavalent Chromium Compounds/2012 | 16 | 62,170 | 26,297 | 32,050 | 137 | 18,141 |
| Methylene Chloride/ Dichloromethane/2014 | 14 | 1,901,471 | 609,998 | 1,147,224 | 30,835 | 565,221 |
| Cyanide Compounds/2016 | 16 | 126,786 | 71,401 | 3,236 | 71 | 28,880 |
| Dimethylformamide/2016 | 10 | 3,538,450 | 1,353,061 | 2,064,450 | 16,483 | 352,687 |
| Hydrogen Fluoride/2016 | 24 | 216,558 | 148,272 | 30,940 | 2,051 | 11,623 |
| N-Propyl Bromide/2016 | 15 | 63,292 | 53,533 | 8,818 | 23,833 | 22,628 |
| Toluene-2,4-diisocyanate/2017 | 2 | 313,968 | 5,054 | 0 | 1 | 4,762 |
| Toluene-2,6-diisocyanate/2017 | 1 | 59,374 | 11 | 0 | 0 | 0 |
| Toluene diisocyanate (mixed isomers)/2017 | 5 | 9,601,878 | 6,500 | 3,785,646 | 374 | 5,891 |

**Asthmagens**

In 2009 the Lowell Center for Sustainable Production (LCSP) published *Asthma-Related Chemicals in Massachusetts: an Analysis of Toxics Use Reduction Data* (available on TURI's website www.turi.org). The purpose of this project was to understand the extent to which chemicals that can cause the initial onset of asthma or trigger subsequent asthma attacks are being used by Massachusetts industries who report under the TURA program (using 1990 to 2005 data). The report identified 335 chemicals that can cause or exacerbate asthma, of which 68 are reportable under TURA and of which 41 have been reported at some point during the program's history.

The TURA program has begun working to better understand the uses of these chemicals in relation to potential exposures and toxics use reduction opportunities. Table 11 below summarizes 2021 data on some of the chemicals identified in the LCSP report that were reported under TURA. In 2021, 16 chemicals identified as asthmagens by the Association of Occupational and Environmental Clinics (AOEC) were reported under TURA. In 2021, Sulfuric Acid was reported as having the largest usage while Formaldehyde was reported as having the largest amount of on-site releases.

**Table 11**
**Asthma-Related Toxics**
**(in pounds)**
**(Excludes Trade Secret Data)**

| Chemical Name (Number of Facilities) | Use | On-Site Releases |
|---|---|---|
| Acetic Acid (16) | 1,959,367 | 1,893 |
| Aluminum (1) | 9,0805 | 85 |
| Chlorine (3) | 1,772,390 | 114 |
| Chromium (3) | 217,319 | 16 |
| Diethanolamine(1) | 840,340 | 8 |
| Ethylene Oxide (1) | 212,315 | 164 |
| Formaldehyde (22) | 2,331,245 | 75,243 |
| Hydrazine (2) | 143,787 | 0 |
| Maleic Anhydride (1) | 490,548 | 2,001 |
| Methyl Methacrylate (4) | 6,396,916 | 2,608 |
| Nickel (4) | 342,369 | 44 |
| Nickel Compounds (5) | 664,338 | 1,327 |
| Phthalic Anhydride (1) | 288,986 | 120 |
| Styrene Monomer (7) | 4,025,831 | 11,857 |
| Sulfuric Acid (97) | 21,812,196 | 8,668 |
| Toluene Diisocyanate (8)* | 9,975,220 | 375 |

* Toluene Diisocyanate includes CAS numbers 91087, 584849, and 26471625.

**Carcinogens**

Several TURA chemicals are identified as Group 1 carcinogens (i.e., carcinogenic to humans) by the International Agency for Research on Cancer (IARC). In 2021, eight IARC Group 1 carcinogens were reported under TURA (see Table 12). The largest amount of use was reported for Formaldehyde. Formaldehyde was also reported as having the largest amount of releases, and these releases were reported by the most facilities. Releases were primarily air releases; however, there were also releases to water and land.

**Table 12**
**IARC Group 1 Carcinogens**
**(in pounds unless otherwise noted)**
**(Excludes Trade Secret Data)**

| Chemical Name (Number of Facilities) | Use | On-Site Releases |
|---|---|---|
| Cadmium (3) | 17,652 | 0 |
| Dioxin (7)* | 1144.17101 | 49.222 |
| Ethylene Oxide (1) | 212,315 | 164 |
| Formaldehyde (22) | 2,331,245 | 75,243 |
| Hexavalent Chromium Compounds (16) | 62,170 | 137 |
| Polychlorinated Biphenyls (2) | 9,093 | 0 |
| Nickel Compounds (5) | 664,338 | 1,327 |
| Trichloroethylene (12) | 113,747 | 47,559 |

* 2,3,7,8-Tetrachlorodibenzo-*para*-dioxin are the agents specifically listed as Group 1 by IARC (in grams). Note that Polychlorinated Biphenyls and Trichloroethylene have been upgraded to IARC 1.

# VI. 2021 Significant Industrial Sectors

Under TURA, facilities in the Manufacturing Standard Industrial Classification (SIC) codes 20-39 inclusive and those in SIC codes 10-14, 40, 44-51, 72, 73, 75 and 76, or the corresponding NAICS code must report their chemical use if they meet or exceed certain thresholds.

Figures 8 through 11 present, by sector, the 2021 numbers of facilities reporting, reported amount of use, byproduct, and releases on-site by industrial sector.

The charts demonstrate that the chemical manufacturing sector dominates chemical use in the Commonwealth. This sector had the greatest percentage of filers at 19% (Figure 8). The chemical manufacturing sector also had the greatest percentage of chemical use at 59% (Figure 9), the largest percentage of byproduct at 47% (Figure 10), and the third largest percentage, along with utilities, of on-site releases at 18% (Figure 11). This sector is a diverse group of industries and includes facilities that "manufacture" chemicals according to the TURA definition as well as facilities that "process" chemicals to formulate adhesives, paints, pharmaceuticals, and plastic materials and resins. The chemical manufacturing sector is broken into further sectors in Figure 9.

Chemical distributors at (Figure 9) 21% were the second largest contributor to use but had virtually no impact on byproduct and releases. Paper manufacturing, waste management and remediation services, fabricated metal processors, and utilities were other sectors with substantial contributions to byproduct and releases. The paper manufacturing sector, which accounted for 3% of total statewide use (Figure 9), accounted for 16% of total byproduct generated (Figure 10). Likewise, waste management and remediation services, which accounted for 4% of total statewide use (Figure 9), had the highest contribution of on-site releases at 26% (Figure 11).

**Figure 8 –2021 Number of Facilities by Industrial Sector**
**Total Number of Facilities = 432**
**(Includes Trade Secret Data)**

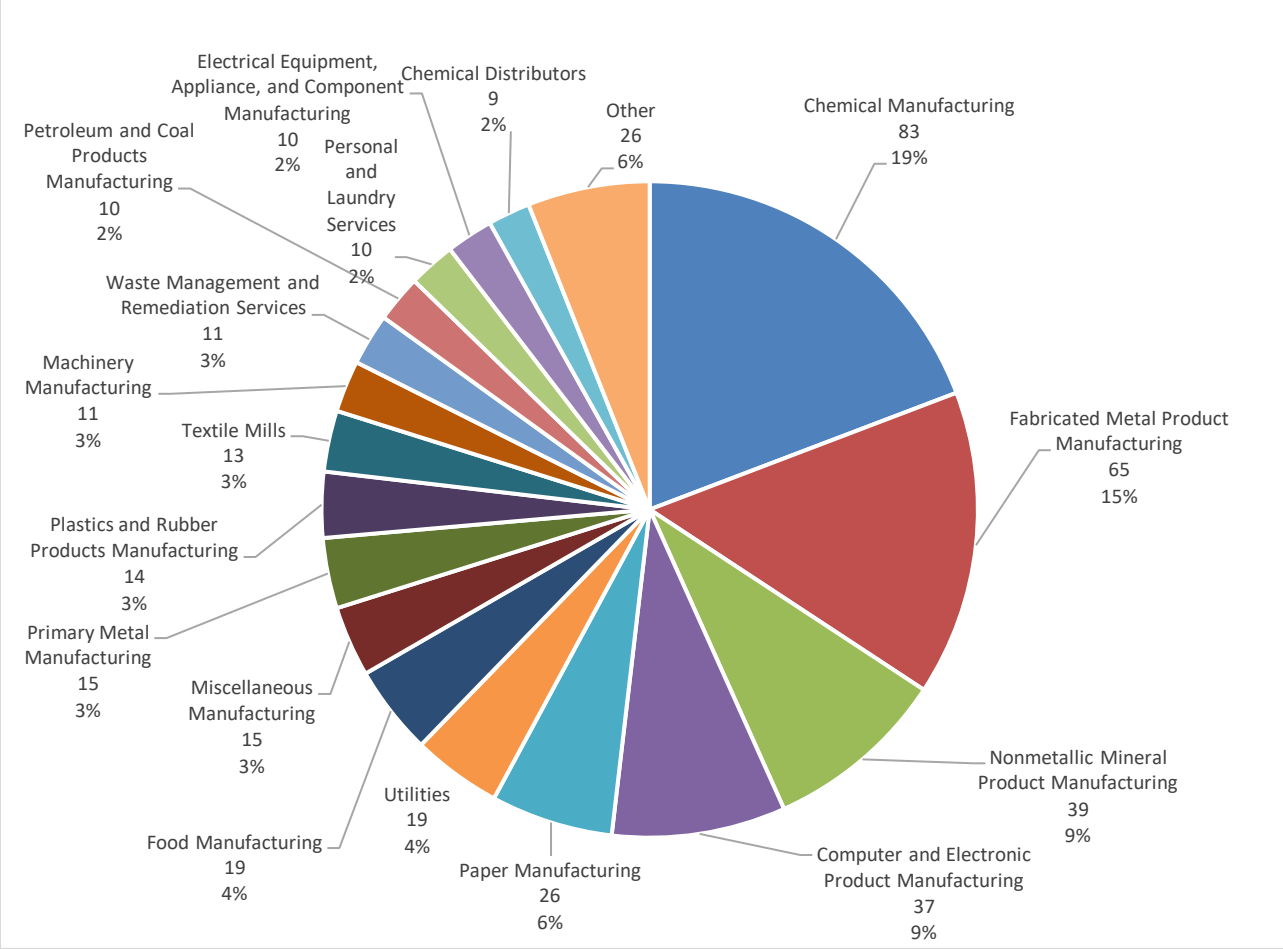


**Figure 9 – All Reported Data: 2021 Chemical Use by Industrial Sector**
**Total Use = 649,000,000 Pounds**
**(Includes Trade Secret Data)**

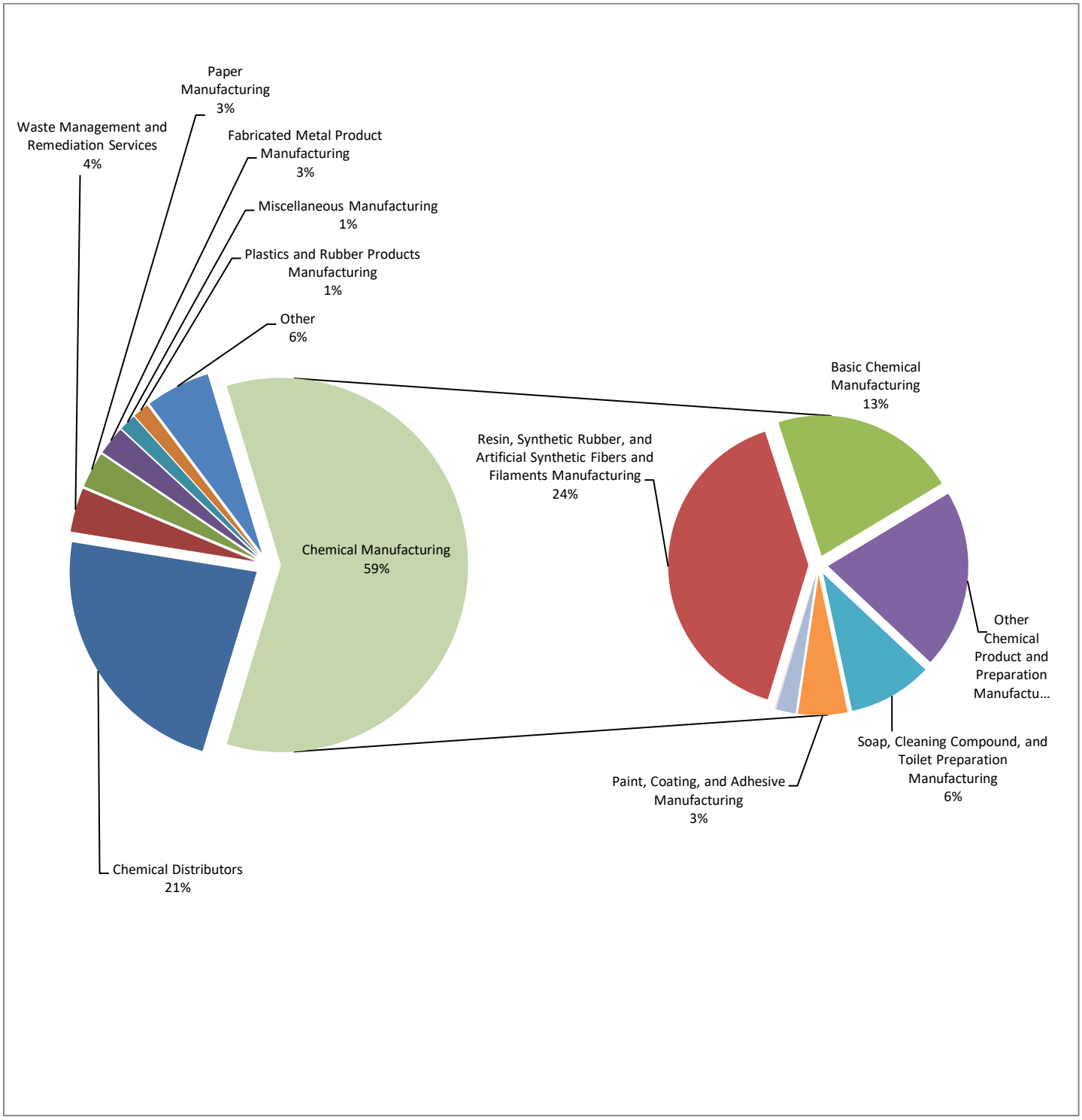


**Figure 10 – All Reported Data: 2021 Byproduct Generation by Industrial Sector**
**Total Byproduct = 71,000,000 Pounds**
**(Includes Trade Secret Data)**

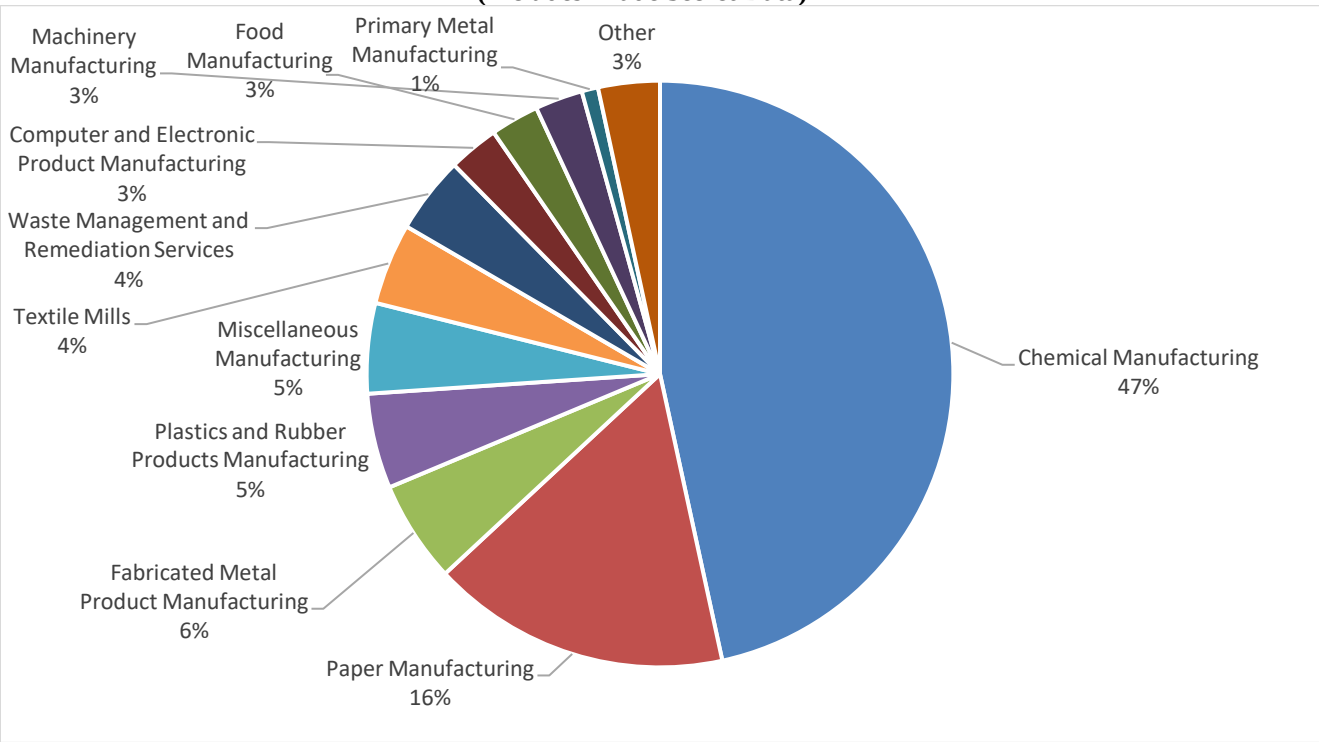
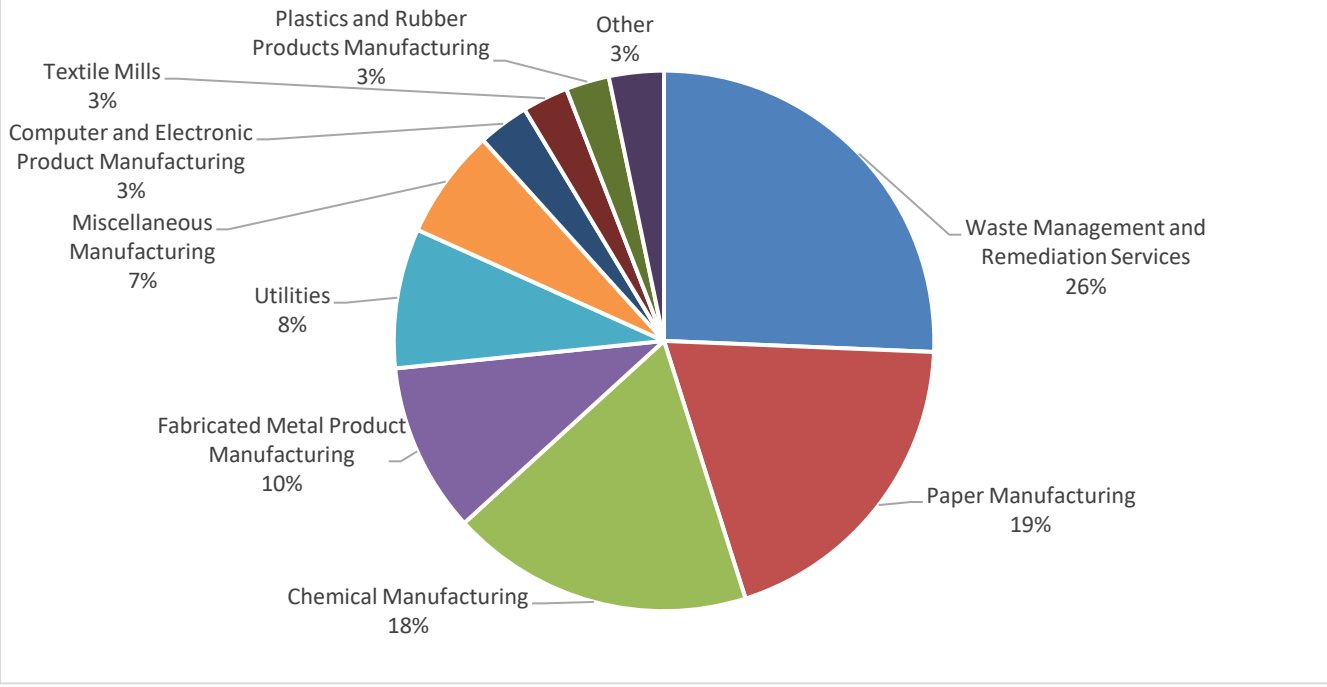



**Figure 11 – All Reported Data: 2021 On-Site Releases by Industrial Sector**
**Total On-Site Releases = 2,500,000 Pounds**
**(Includes Trade Secret Data)**



## VII. 2021 Major TURA Facilities

Tables 13 through 15 show the 20 facilities that report the highest quantities of reported chemical used, generated as byproduct, shipped in or as product, released on-site, and transferred off-site.

- Table 13 lists the 20 facilities that reported the largest total quantity of TURA chemicals used. These 20 facilities used 495 million pounds, or 76% of total statewide use.

- Table 14 lists the 20 facilities that generated the largest reported quantity of byproduct generated and shipped in product. These facilities generated 44 million pounds of byproduct or 63% of the statewide total. The 20 facilities with the largest quantity shipped in product, shipped 249 million pounds in product, or 89% of the statewide total.

- Table 15 lists the 20 facilities that reported the largest quantity of on-site releases and the 20 facilities that had the largest quantity of transfers off-site. These facilities released 1.6 million pounds, or 65% of total releases statewide. Four of the Top 20 facilities of reported on-site releases were municipal waste combustors (MWCs) that also reported combustion-related emissions. Of the over 640,000 pounds of on-site releases reported by these MWCs, 62% was due to the coincidental manufacture of hydrochloric acid during combustion, and 38% was due to lead in ash disposed in an on-site lined landfill at one facility. The 20 facilities with the largest reported quantity of transfers off-site transferred over 20 million pounds, or 74% of the total statewide transfers off-site.

| Table 13<br>2021 Top 20 Facilities: Reported Total Use<br>(Includes trade secret data) | | |
|---|---|---|
| Facility Name | Town | Total Use (Lbs.) |
| Solutia Inc | Springfield | 100,982,636 |
| Holland Company Inc | Adams | 82,328,060 |
| Borden and Remington Corp | Fall River | 68,265,393 |
| Astro Chemicals Inc | Springfield | 48,297,992 |
| Rousselot Peabody Inc | Peabody | 37,362,590 |
| Prefere Melamines LLC | Springfield | 26,303,733 |
| Highline Warren LLC | Leominster | 24,236,995 |
| James Austin Co | Ludlow | 23,413,194 |
| Univar Solutions USA Inc | Tewksbury | 11,534,244 |
| Roberts Chemical Co Inc | Attleboro | 11,050,198 |
| Semass Partnership | Rochester | 10,558,148 |
| Metalor Technologies USA | Attleboro | 7,437,355 |
| Omnova Solutions Inc | Fitchburg | 7,249,453 |
| Covestro LLC | Wilmington | 6,402,911 |
| Webco Chemical Corp | Dudley | 6,396,135 |
| Wheelabrator Millbury Inc | Millbury | 6,360,902 |
| Covanta Haverhill Inc | Haverhill | 6,049,601 |
| Future Foam | Mansfield | 6,041,388 |
| Wheelabrator North Andover Inc | North Andover | 5,403,976 |
| Houghton Chemical Corporation | Allston | 5,203,731 |

**Table 14**
**2021 Top 20 Facilities: Reported Byproduct And Shipped In Product**
**(Includes Trade Secret Data)**

| **Byproduct** | | | **Shipped In Product** | | |
|---|---|---|---|---|---|
| Facility Name | Town | Byproduct Generation (Lbs.) | Facility Name | Town | Shipped In Product (Lbs.) |
| Solutia Inc | Springfield | 6,237,537 | Borden and Remington Corp | Fall River | 56,904,799 |
| Rousselot Peabody Inc | Peabody | 5,680,421 | Astro Chemicals Inc | Springfield | 44,437,233 |
| 3M | Rockland | 4,028,470 | Solutia Inc | Springfield | 24,535,360 |
| Nitto Denko Avecia Inc | Milford | 3,785,810 | Highline Warren LLC | Leominster | 23,818,261 |
| Flexcon Company Inc | Spencer | 3,112,906 | James Austin Co | Ludlow | 23,299,895 |
| Nissha Metallizing Solutions Ltd | Franklin | 3,104,627 | Holland Company Inc | Adams | 17,799,808 |
| Covestro LLC | Wilmington | 2,572,819 | Univar Solutions USA Inc | Tewksbury | 11,450,898 |
| Prefere Melamines LLC | Springfield | 2,374,695 | Roberts Chemical Co Inc | Attleboro | 11,050,198 |
| Thermo Fisher Scientific | Bedford | 2,238,093 | Webco Chemical Corp | Dudley | 6,395,019 |
| Munters Corp | Amesbury | 1,486,220 | Houghton Chemical Corporation | Allston | 4,428,837 |
| Waters Corp | Taunton | 1,141,917 | ITW Performance Polymers | Danvers | 3,986,045 |
| Koch Separation Solutions | Wilmington | 1,126,163 | FXI Inc | Newburyport | 3,783,466 |
| Bostik Inc | Middleton | 1,069,121 | Callahan Chemical Company, LLC | Walpole | 2,949,039 |
| Adhesive Applications Inc | Easthampton | 998,140 | Mexichem Specialty Compounds Inc | Leominster | 2,671,933 |
| Metalor Technologies USA | Attleboro | 967,340 | Alpha Chemical Services Inc | Stoughton | 2,615,499 |
| ITW Shinemark | Newburyport | 914,723 | Advance Coatings Co | Westminster | 2,405,599 |
| Ideal Tape Company | Lowell | 907,006 | Callaway Golf Ball Operations Inc | Chicopee | 2,038,003 |
| Haartz Corporation | Acton | 900,495 | Riverdale Mills Corp | Northbridge | 1,680,847 |
| Semass Partnership | Rochester | 890,083 | Kidde Fenwal Inc | Ashland | 1,640,330 |
| Hollingsworth and Vose Company | West Groton | 870,899 | Savogran Company | Norwood | 1,471,007 |

| Table 15<br>2021 Top 20 Facilities: Reported On-Site Releases And Transfers Off-Site<br>(Includes Trade Secret Data) | | | | | |
|---|---|---|---|---|---|
| **On-Site Releases** | | | **Transfers Off-Site** | | |
| Facility Name | | On-Site Releases (Lbs.) | Facility Name | Town | Transfers Off-Site (Lbs.) |
| Covanta Haverhill Inc | Haverhill | 321,377 | Solutia Inc | Springfield | 4,399,354 |
| Semass Partnership | Rochester | 169,679 | Nitto Denko Avecia Inc | Milford | 3,784,864 |
| Ideal Tape Company | Lowell | 137,103 | Covestro LLC | Wilmington | 2,554,997 |
| Hollingsworth and Vose Company | West Groton | 117,389 | Thermo Fisher Scientific | Bedford | 2,095,934 |
| Solutia Inc | Springfield | 114,233 | Prefere Melamines LLC | Springfield | 1,898,969 |
| Wheelabrator North Andover Inc | North Andover | 79,925 | Waters Corp | Taunton | 1,098,732 |
| Nissha Metallizing Solutions Ltd | Franklin | 77,125 | Koch Separation Solutions | Wilmington | 1,084,664 |
| Wheelabrator Millbury Inc | Millbury | 69,724 | Bostik Inc | Middleton | 1,046,011 |
| Hazen Paper Co | Holyoke | 65,890 | Ideal Tape Company | Lowell | 769,884 |
| Callaway Golf Ball Operations Inc | Chicopee | 65,374 | Semass Partnership | Rochester | 720,402 |
| Community Eco Springfield LLC | Agawam | 64,865 | Clean Harbors of Braintree Inc | Braintree | 585,144 |
| Flexcon Industries | Randolph | 63,344 | Veranova LP | Devens | 561,296 |
| Jen Mfg Inc | Millbury | 40,916 | Callaway Golf Ball Operations Inc | Chicopee | 527,993 |
| Fore River Energy Center | Weymouth | 39,414 | Skyworks Solutions Inc | Woburn | 527,692 |
| Smith & Wesson Inc | Springfield | 38,632 | Veranova LP | North Andover | 478,207 |
| 3M | Rockland | 37,890 | PCI Synthesis Inc | Newburyport | 454,253 |
| Flexcon Company Inc | Spencer | 32,475 | Community Eco Pittsfield LLC | Pittsfield | 437,427 |
| The Duncan Group | Everett | 29,763 | Highline Warren LLC | Leominster | 414,236 |
| Raytheon Company | Andover | 27,958 | Wheelabrator Millbury Inc | Millbury | 402,945 |
| Nylco Divison Worthen Industries Inc | Clinton | 27,724 | Entegris Inc | Bedford | 386,378 |


Massachusetts Department of Environmental Protection
100 Cambridge Street
Suite 900
Boston, MA 02114

Commonwealth of Massachusetts
Maura T. Healey, Governor

Executive Office of Energy and Environmental Affairs
Rebecca L. Tepper, Secretary

Department of Environmental Protection
Bonnie Heiple, Commissioner