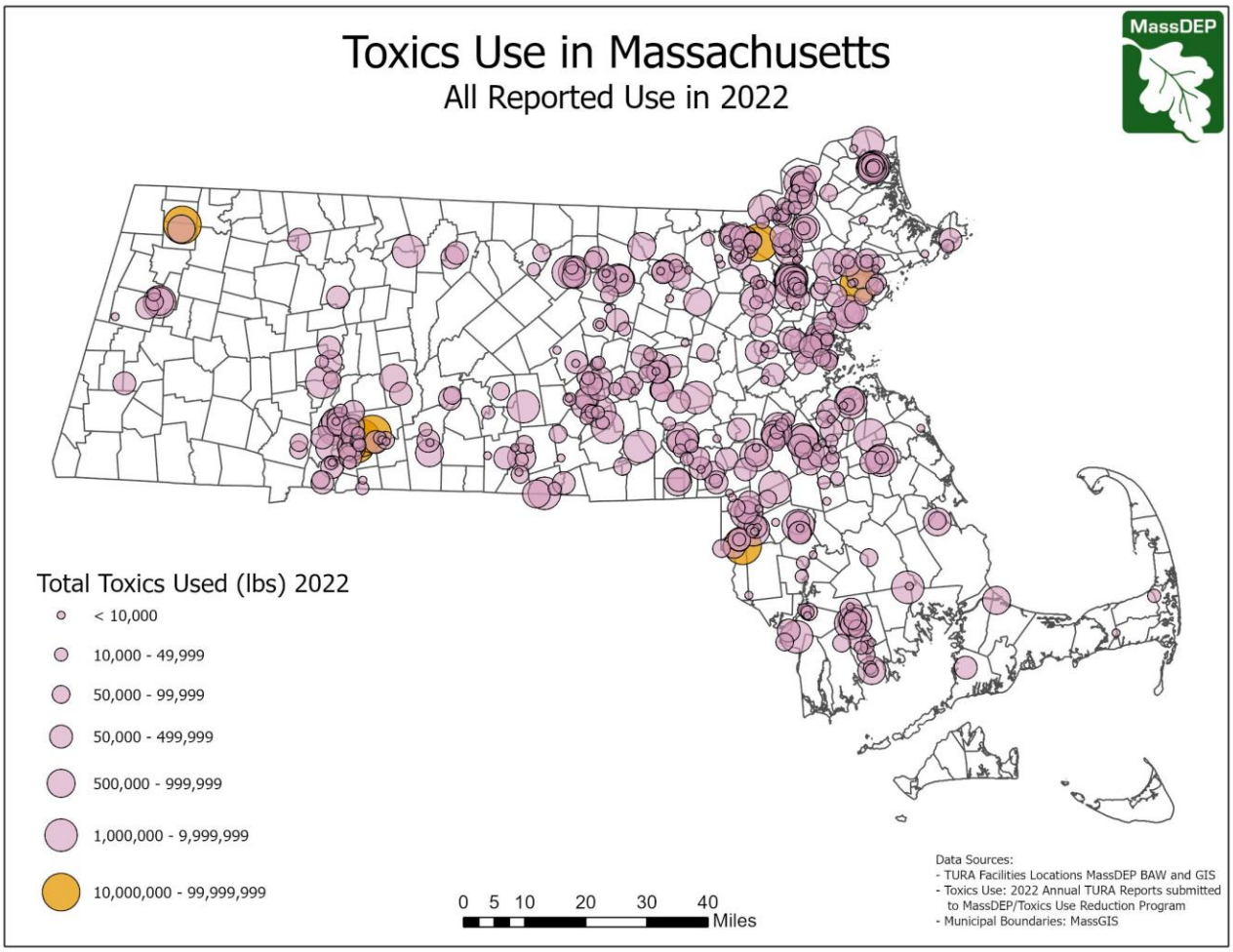
Reporting Year 2022
Toxics Use Reduction
Information Release



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

February 2024

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Executive Summary

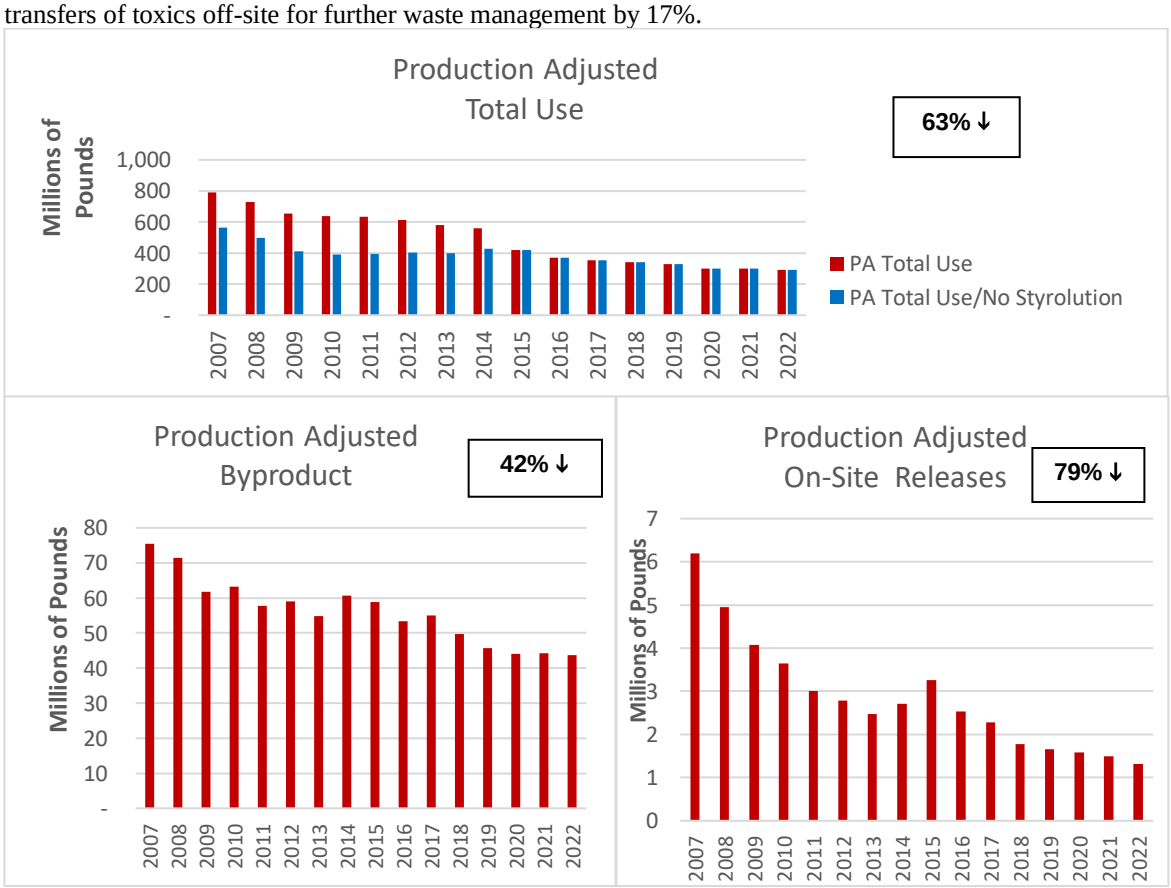
In 1989, the Toxics Use Reduction Act (TURA) (Chapter 21I of the Massachusetts General Laws) was enacted, to protect public health and the environment by promoting reduction in the use of toxic chemicals. TURA established reporting and planning requirements that encourage facilities to use toxic chemicals (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 forty-nine (449) facilities reported using 132 different chemicals in 2022. In total (including data submitted as trade secret data – as defined on page 4), from 1990 to 2022 (with exception of transfers off-site, which is from 1991), the following reductions were observed:

- Chemical Use - from 1.2 billion to 645 million pounds
- Byproduct Generation - from 127 to 70 million pounds
- Shipped in Product - from 433 to 279 million pounds
- On-Site Releases - from 21 to 2.2 million pounds
- Transfers Off-Site - from 46 to 33.5 million pounds

As shown below, between 2007 and 2022 when adjusted for the reported 47% increase in production, 2007 Core Group (as defined on page 4) facilities reduced:

- toxic chemical use by 63% (Styrolution is explained on page 9)
- toxic byproducts by 42%
- toxics shipped in product by 43%
- on-site releases of toxics to the environment by 79%
- 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: **2022 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: **2022 Chemical Data** summarizes the reported information on chemical use in calendar year 2022 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: **2022 Chemicals of Particular Concern** presents current and historical information on particularly toxic chemicals, on chemicals that promote asthma, and on carcinogens.

Section VI: **2022 Significant Industrial Sectors** describes the relative contributions of different industrial sectors to chemical use, waste, and release.

Section VII: **2022 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 2022 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 2022, 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 2022 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 quantity 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 the facilities used, shipped in or as product, generated as byproduct (waste -- neither shipped in product nor converted to another chemical during the production process), release to the environment as pollution, and shipped off-site for waste treatment and disposal. Facilities are filers if they meet the following criteria:

- the facilities 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); however, MassDEP audits several of these plans annually. 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.

TURA also promotes toxics use reduction through two agencies that provide toxics use reduction education and assistance: The Office of Technical Assistance (OTA) provides free, confidential, technical assistance to facilities seeking to reduce the use of toxics. The Toxics Use Reduction Institute (TURI) located at UMass 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.

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.

Inputs

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".

Outputs

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. 2022 Toxics Use Reduction Progress

To protect the environment, public, and workers from the adverse effects of toxic chemicals, TURA established processes that encourage facilities to implement 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 reported 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-two years since 1990.

As shown in Figure 1, 132 of the over 1,500 TURA listed substances were reported in 2022. 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, 2022 TURA Chemical Data). The number of filers has increased from 442 in 2021 to 449 in 2022. Regulated facilities submit one report for each reportable substance. The number of individual substance reports submitted has followed a similar trend, decreasing from a high of 2,666 in 1993, to 1,362 in 2022, 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 645 million pounds in 2022. Byproduct generation decreased from 127 million pounds in 1990 to 70 million pounds in 2022.

Figure 1
# of TURA Filers, Individual Chemical Reports, and Different Chemicals Reported (1990-2022)
(Including Trade Secret Data)

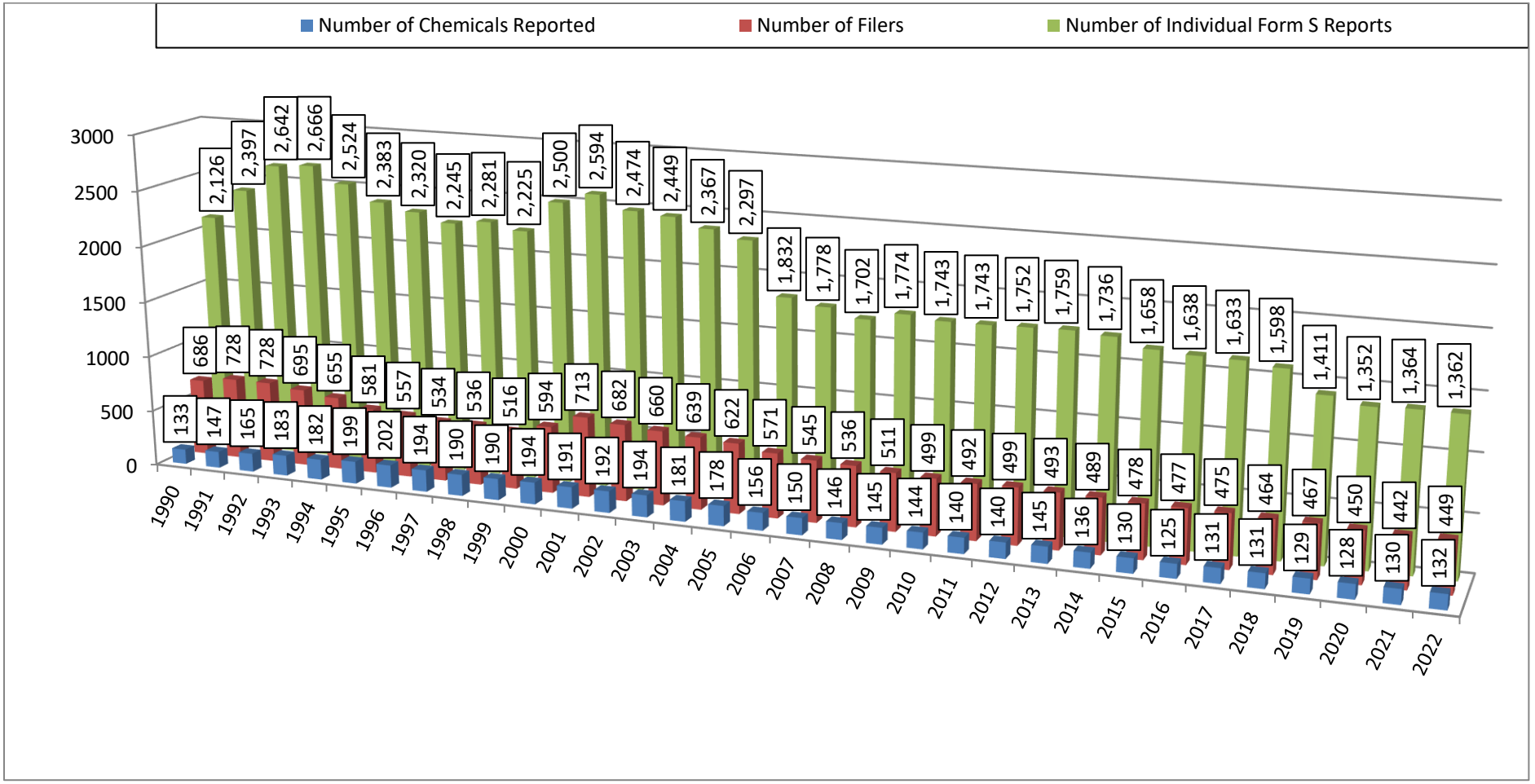
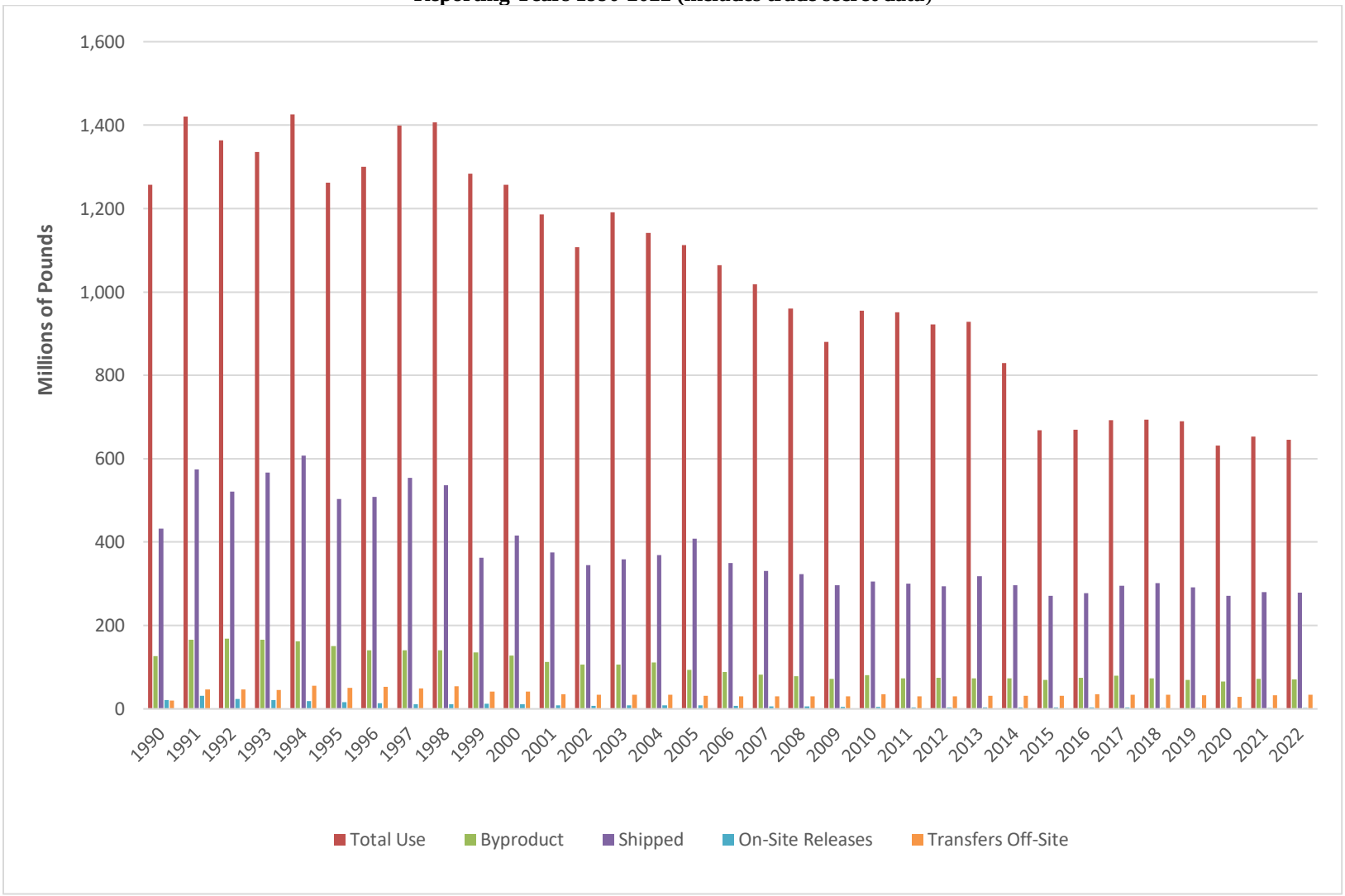


Figure 2
Raw Reported Data on the Pounds of Total Use, Generated as Byproduct, Shipped in or as Product, Released On-Site and Transferred Off-Site for Treatment or Disposal
Reporting Years 1990-2022 (includes trade secret data)



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.

In past iterations of this report, two core groups were discussed: 2000 Core Group and 2007 Core Group. Although information and progress towards chemical reductions are still significant for the 2000 Core group, the following discussion will focus on the 2007 Core Group because it currently covers 98% of the total 451 million pounds of toxic chemicals reported in 2022 (excluding trade secret data). 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 2022. The 2007 Core Group covered 100% of the reported data in 2007. Discussion on the "2000 Core Group" Progress is presented in Appendix A.

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 2022 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 408 filers, which represents 91% of the 2022 TURA filers. Table 1 and Figures 3 and 4 below summarize TURA data from 2007 to 2022, excluding trade secret data.

2007 Core Group Progress: Adjusting for Production

Table 1 below summarizes TURA data from 2007 to 2022, showing reported and production adjusted quantities. For the 2007 Core Group, the activity index shows an increase in production of 47 percent from 2007 to 2022. As shown below in Table 1 and Figure 3, when adjusted for production, as of 2022, the 2007 Core Group facilities have reduced**:**

- toxic chemical use by 63%
- toxic byproducts by 42%
- toxics shipped in product by 43%
- on-site releases of toxics to the environment by 79%
- transfers of toxics off-site for further waste management by 17%.

Table 1
2007 CORE GROUP DATA: 2007 - 2022 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	230.36	157.00	2.19	1.49	30.26	20.62	1.06	1.47
2022	430.59	293.47	64.20	43.76	224.31	152.88	1.94	1.32	30.31	20.66	1.00	1.47
Percent Change 2007-2022	46% Reduction	63% Reduction	15% Reduction	42% Reduction	17% Reduction	43% Reduction	69% Reduction	79% Reduction	22% Increase	17% Reduction		47% Increase

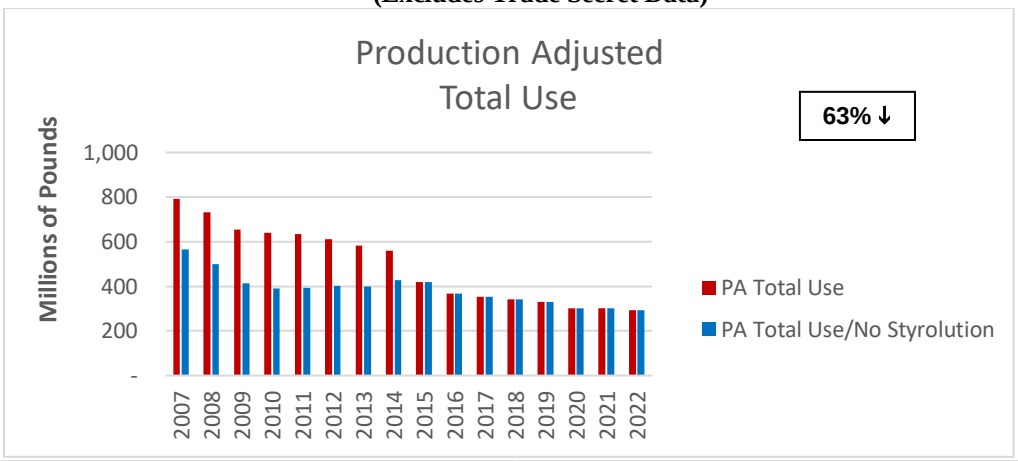
* Styrolution, which used over a quarter of the total reported use (excluding trade secret data) in 2007, ceased operations in Massachusetts in 2014.

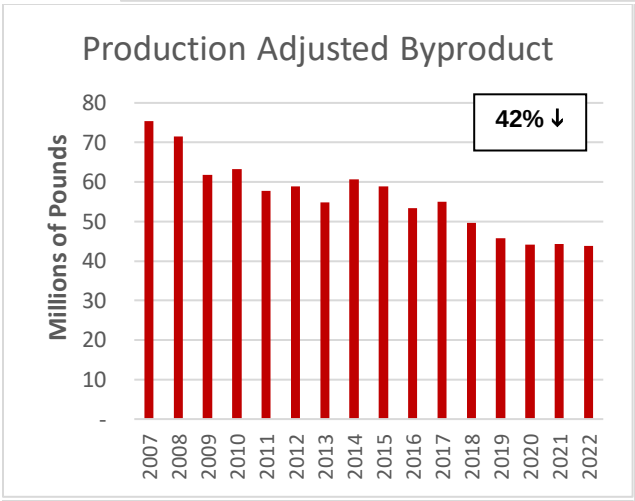
2007 Core Group Progress without Adjusting for Production

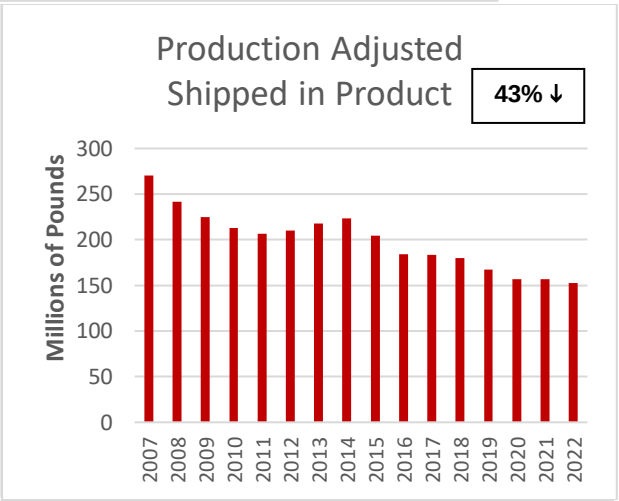
The actual quantities reported by the 2007 Core Group over the period 2007 to 2022 are shown in Figure 4. These quantities have not been adjusted for changes in production. From 2007 to 2022, Core Group facilities:

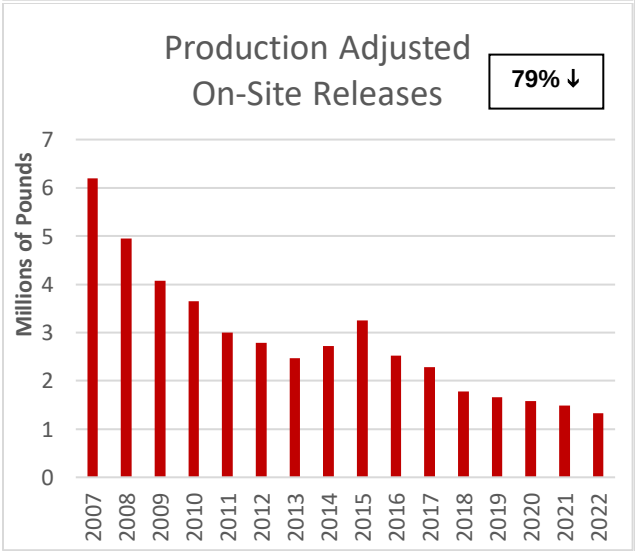
- reduced toxic chemical use by 46% (from 792 million to 431 million pounds between 2007 and 2022)
- reduced toxic byproducts by 15% (from 75 million to 64 million pounds between 2007 and 2022)
- reduced toxics shipped in product by 17% (from 271 million to 224 million pounds between 2007 and 2022)
- reduced on-site releases of toxics to the environment by 69% (from 6 million to 1.9 million pounds between 2007 and 2022)
- increased transfers of toxics off-site for further waste management by 22% (from 25 to 30 million pounds between 2007 and 2022).

Figure 3 – 2007 Core Group Toxics Use Reduction Progress 2007-2022
Production Adjusted
(Excludes Trade Secret Data)









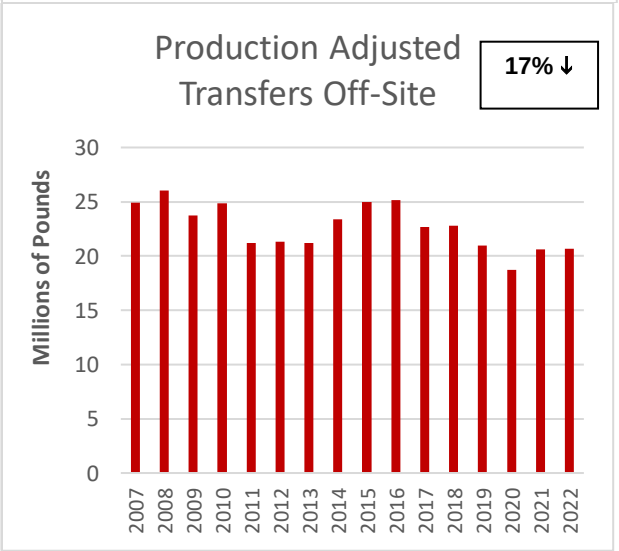
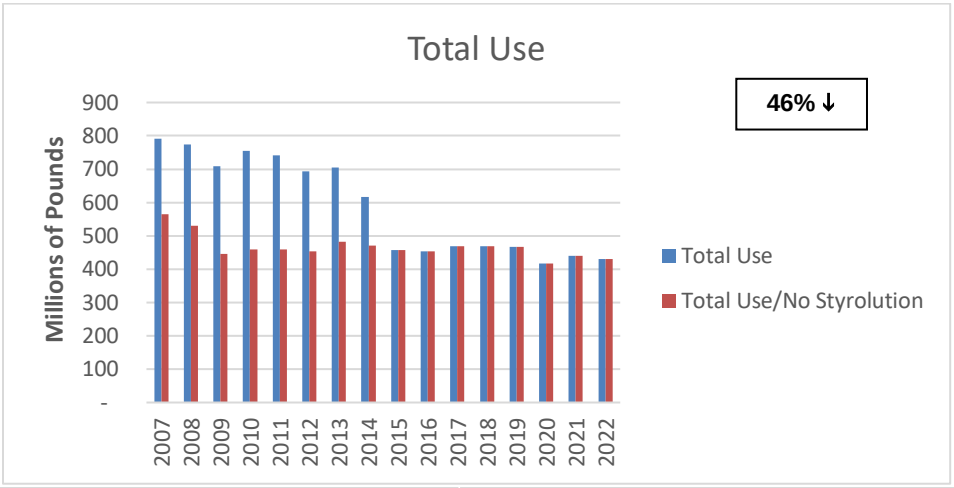
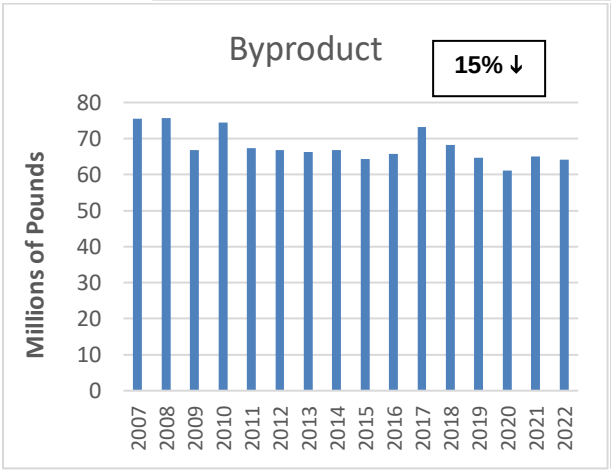
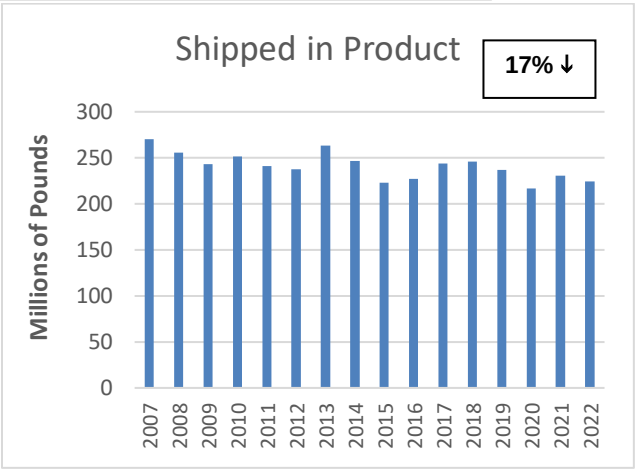
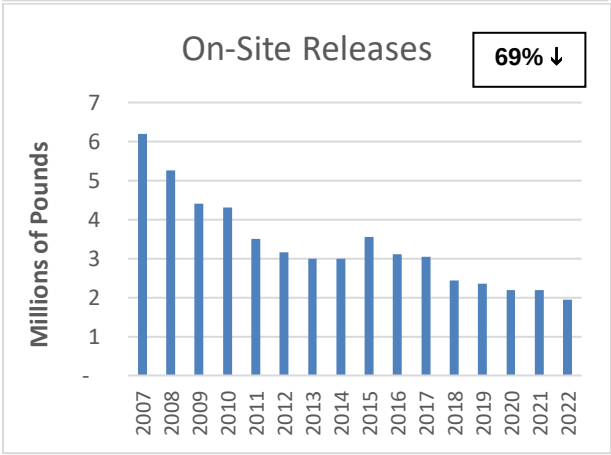


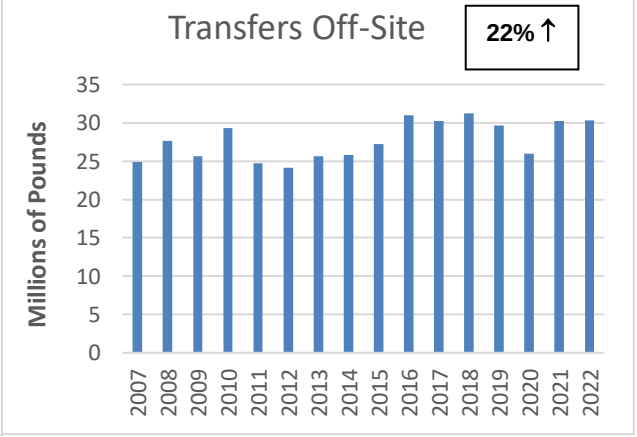
Figure 4 – 2007 Core Group Toxics Use Reduction Progress 2007-2022
Not Production Adjusted
(Excludes Trade Secret Data)











IV. 2022 TURA Chemical Data

Table 2 All Reported Chemical Data 2022 (Rounded to millions of pounds) (Includes Trade Secret Data)		
TOTAL USE	645,000,000	
SHIPPED IN PRODUCT	279,000,000	43% of total chemical use
GENERATED AS BYPRODUCT (total waste prior to treatment or disposal)	70,000,000	11% of total chemical use
ON-SITE RELEASES (to air, water or land disposal)	2,200,000	0.3% of total chemical use 3% of total byproduct
TRANSFERS OFF-SITE (to a wastewater treatment plant, recycling or waste management facility for treatment or disposal)	33,500,000	5% of total chemical use 48% 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 determined that the information is not a trade secret, MassDEP may not share that information. In 2022, nine facilities made trade secret claims on a combined total of:

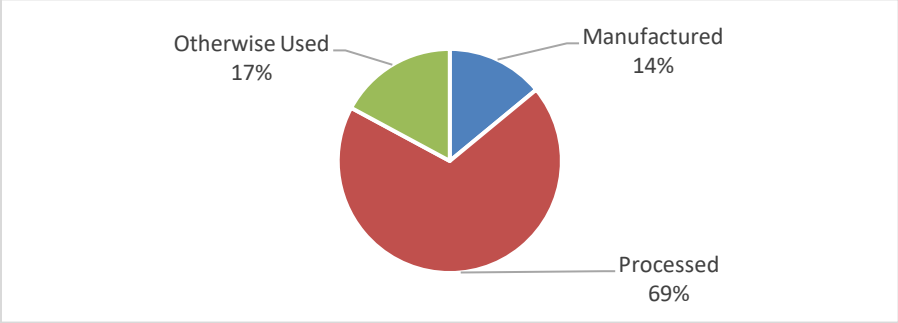
- 201 million pounds of chemical use
- 4 million pounds of byproduct generation
- 49 million pounds shipped in product.

Chemical Use by Use Category

TURA requires that facilities report chemical use in one of three chemical use categories: manufactured, processed, and otherwise used, identified by the Federal Toxics Release Inventory (TRI) program. Figure 5 below shows the proportion of 2022 chemical use for the three categories:

- Chemicals manufactured accounted for 14% of total chemical use.
- Chemicals processed accounted for 69% of total chemical use.
- Chemicals otherwise used accounted for 17% of total chemical use.

Figure 5
2022 Total Use by Category
(645 Million Pounds)
(includes trade secret data)



Top 20 Chemicals

In 2022, filers reported using 132 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 3 below, the top 20 chemicals used in 2022 accounted for 83% (367 million pounds) of the total use reported (trade secret data was excluded to protect confidentiality claims). The top four chemicals, Sodium Hydroxide (13% of total use, 152 facilities, 58 million pounds), Hydrochloric Acid (12% of total use, 35 facilities, 51 million pounds), Methanol (10% of total use, 26 facilities, 42 million pounds), and Sodium Hypochlorite (9% of total use, 31 facilities, 40 million pounds), and accounted for over half of the total reported use (excluding trade secret data) in the state.

Tables 4 and 5 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 2). The top 20 chemicals comprised:

- 89% of the total reported byproducts (including trade secret data)
- 88% of the total reported shipped in product (excluding trade secret data)
- 93% of the total on-site releases (including trade secret data)
- 92% 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 (389,000 pounds). Ninety-eight (98) percent of hydrochloric acid releases were from municipal waste combustors. Lead was the sixth top chemical for on-site releases. Over ninety-nine (99) 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 15% 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-five (95) percent of total transfers off-site of lead, the sixth chemical on the list, was attributed to five municipal waste combustors that transferred lead in ash to off-site lined landfills.

Table 3 – 2022 Top 20 Chemicals: Total Use *These quantities do not include Trade Secret Data*		
Chemical Name (CAS #)	**CAS #**	**Total Use (Lbs.)**
Sodium Hydroxide	1310732	58,468,944
Hydrochloric Acid	7647010	51,168,063
Methanol	67561	42,478,155
Sodium Hypochlorite	7681529	40,050,468
Sulfuric Acid	7664939	21,137,429
Potassium Hydroxide	1310583	19,241,452
Acetone	67641	15,727,192
Nitrate Compounds	1090	14,124,756
Toluene	108883	13,743,714
Phosphoric Acid	7664382	11,806,738
Ammonia	7664417	11,591,427
Zinc Compounds	1039	10,105,355
Methyl Ethyl Ketone	78933	9,144,854
Ethyl Acetate	141786	8,345,471
Diisocyanates	1050	8,296,067
Toluene Diisocyanate	26471625	6,862,252
Methyl Methacrylate	80626	6,835,029
Nitric Acid	7697372	6,461,310
Ethylene Glycol	107211	6,413,997
Ferric Chloride	7705080	5,486,669

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 4 – 2022 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	8,695,375	**Methanol**	67561	38,562,165
Sodium Hydroxide	1310732	8,050,437	Sodium Hypochlorite	7681529	37,041,277
Nitrate Compounds	1090	6,275,992	Sodium Hydroxide	1310732	36,010,567
Sulfuric Acid	7664939	5,686,897	Potassium Hydroxide	1310583	16,621,426
Toluene	108883	5,481,663	Phosphoric Acid	7664382	10,168,217
Acetone	67641	5,188,478	**Toluene**	108883	8,131,311
Methanol	67561	4,025,616	Sulfuric Acid	7664939	7,881,136
Acetonitrile	75058	2,545,257	**Acetone**	67641	7,346,929
Methyl Ethyl Ketone	78933	2,392,936	**Methyl Ethyl Ketone**	78933	6,761,698
Lead	7439921	2,373,499	Zinc Compounds	1039	5,454,708
Formaldehyde	50000	1,973,229	Ferric Chloride	7705080	4,623,522
1-Methyl-2-Pyrrolidone	872504	1,752,360	Methyl Methacrylate	80626	4,622,736
Ethylene Glycol	107211	1,692,206	Certain PFAS NOL	1300	3,618,210
Hydrochloric Acid	7647010	1,330,839	Glycol Ethers	1022	3,431,253
Dimethylformamide	68122	1,170,011	Antimony Compounds	1000	2,713,154
Potassium Hydroxide	1310583	987,243	**Ethyl Acetate**	141786	2,177,707
Aluminum Sulfate	10043013	933,401	Dimethylformamide	68122	2,138,317
Dichloromethane	75092	800,083	Ethylene Glycol	107211	2,044,353
Nitric Acid	7697372	601,711	Copper Compounds	1015	1,878,234
Furan, Tetrahydro-	109999	566,272	Xylene Mixed Isomers	1330207	1,721,687

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 5 – 2022 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.)**
Acetone	67641	414,856	Nitrate Compounds	1090	5,106,748
Hydrochloric Acid	7647010	388,911	**Acetone**	67641	4,444,236
Ethyl Acetate	141786	209,655	**Methanol**	67561	2,635,278
Ammonia	7664417	194,650	Acetonitrile	75058	2,542,286
Toluene	108883	166,891	**Toluene**	108883	2,435,887
Lead	7439921	110,901	Lead	7439921	2,303,201
Formaldehyde	50000	87,382	Formaldehyde	50000	1,790,327
Methyl Ethyl Ketone	78933	63,160	1-Methyl-2-Pyrrolidone	872504	1,715,460
Methanol	67561	52,787	Ethylene Glycol	107211	1,670,965
Butyl Acetate-T	540885	40,718	**Methyl Ethyl Ketone**	78933	1,130,280
Butyraldehyde	123728	33,943	Sodium Hydroxide	1310732	926,321
Styrene Monomer	100425	29,505	Zinc Compounds	1039	785,812
Trichloroethylene	79016	29,114	Dichloromethane	75092	768,742
Dichloromethane	75092	29,102	**Ethyl Acetate**	141786	587,305
N Propyl Bromide	106945	29,073	Furan, Tetrahydro-	109999	560,691
1-Methyl-2-Pyrrolidone	872504	26,873	Diethyl Hexyl Phthalate	117817	378,027
Hexane (N-Hexane)	110543	26,471	Ferric Chloride	7705080	346,241
Xylene Mixed Isomers	1330207	23,702	Dimethyl Formamide	68122	337,819
Butyl Acetate	123864	19,323	Chromium	7440473	235,162
Glycol Ethers	1022	17,390	Certain PFAS NOL	1300	218,423

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. 2022 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 6 below shows the 2022 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, mercury and mercury compounds) are chiefly associated with combustion at resource recovery facilities, power plants, and the manufacture of concrete and asphalt paving.

Table 7 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. 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 2022 the number of lead and lead compounds filers had decreased to 65 and 42, respectively.

Tetrabromobisphenol A was not reported in 2022, for the first time since it was designated as a PBT in 2000. In the four years prior to 2022, only one facility had reported it.

Table 6 2022 Persistent Bioaccumulative Toxic (PBT) Chemicals Summary (Excludes Trade Secret Data)							
Substance	Threshold (lbs or grams for dioxin)	# Filers in 2022	Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-Site
Benzo[ghi]-perylene	10	17	6,966	811	1,366	0	693
Dioxin and Dioxin Compounds	0.1 Gr	5	1,567	1,567	0	20	1,547
Lead	100	65	3,003,173	2,373,499	614,520	110,901	2,303,201
Lead Compounds	100	42	224,217	140,334	67,437	1,444	139,460
Mercury	10	13	6,645	4,076	2,344	74	4,047
Mercury Compounds	10	1	871	11	1,473	0	11
Polychlorinated Biphenyls	10	1	2,138	2,138	0	0	2,138
Polycyclic Aromatic Compounds	100	20	506,417	10,764	47,905	114	8,641

Table 7
Pounds of PBTs Reported Use and Number of Facilities Reporting 2000 – 2022 (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)		Tetrabromo-bisphenol A (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	3,180,955	66	709,078	47
2018	6,597	20	1,622	7	7,627	14	694	1	31,933	1	478,357	23	179	1	3,344,065	61	578,872	48
2019	3,304	19	2,571	7	8,261	16	590	1	11,999	1	177,093	22	239	1	3,065,771	61	486,038	43
2020	2,326	17	2,114	7	11,447	15	615	1	22,356	2	82,518	18	337	1	2,959,713	67	308,947	41
2021	2,982	19	1,144	7	7,577	14	575	1	9,093	1	144,268	20	132	1	2,641,404	65	289,947	42
2022	6,966	17	1,567	5	6,645	13	871	1	2,138	1	506,417	20	0	0	3,003,173	65	224,217	42

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 lower the reporting threshold for higher hazard substances (HHS) to 1,000 pounds for all uses. Table 8 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 2022.

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 2022 the number of trichloroethylene and tetrachloroethylene filers decreased to 11 and 2, respectively.

Table 9 below shows the fourteen HHS chemicals reported in 2022, including the number of filers, byproduct generation, shipped in product, on-site releases, and transfers off-site.

Table 8
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 diisocyanate (mixed isomers)	Hydrogen fluoride	N- Propyl Bromide	Dimethyl-formamide	Cyanide Compounds	Methylene Chloride (Dichloro-methane)	Formaldehyde	Hexavalent Chromium	Tetrachloro-ethylene	Cadmium	Cadmium Compounds	Trichloro-ethylene
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**
				NON-TRADE SECRET POUNDS OF USE (Number of facilities)										
2007													184,400 (1)	604,671 (9)
2008											230,345 (4)	**29,429(5)**	**167,355(6)**	**536,073 (27)**
2009											**176,186(23)**	28,969(4)	145,324(7)	556,457(23)
2010											151,918 (18)	23,970 (4)	242,702 (7)	294,836 (16)
2011									4,027,226 (9)	*	163,773 (19)	26,878 (4)	180,654 (5)	303,076 (17)
2012									**4,119,146(25)**	**121,504(16)**	89,216(16)	29,805(6)	181,666(5)	354,351(14)
2013								3,496,421(11)	4,011,427(27)	113,466(16)	110,550(18)	20,447(6)	210,550(6)	176,891(15)
2014								**3,031,438(24)**	3,276,305(25)	103,595(15)	164,606(16)	16,655(4)	217,235(6)	262,811(14)
2015				365,928(6)	30,295(2)	3,518,824(9)	71,695(3)	2,629,094(25)	3,017,674(23)	92,490(14)	320,950(11)	20,312(3)	128,953(6)	243,143(13)
2016	456,803(1)	114,201(1)	5,669,556(3)	**483,633(25)**	**102,998(23)**	**3,845,720(13)**	**118,955(14)**	2,628,375(20)	3,157,440(22)	77,657(14)	909,566(12)	17,707(3)	155,687(6)	239,983(15)
2017	**510,809(1)**	**127,702**(1)	**5,392,008(5)**	238,065(28)	94,100(23)	3,871,715(12)	142,450(15)	2,781,125(20)	3,070,622(23)	89,696(14)	346,348(12)	16,991(3)	153,463(5)	224,882(13)
2018	403,297(1)	100,824(1)	5,126,282(4)	209,972(24)	93,218(19)	3,616,365(13)	146,777(14)	2,500,120(18)	3,370,832(23)	77,103(13)	73,318(9)	20,162(4)	142,058(7)	274,876(13)
2019	511,236(2)	97,970(1)	4,317,010(4)	289,620(22)	69,631(18)	3,705,786(14)	134,095(15)	1,683,395(18)	2,793,325(23)	72,283(13)	71,100(7)	19,403(3)	119,549(5)	172,080(11)
2020	339,901(2)	70,322(1)	9,989,005(6)	199,116(24)	58,588(17)	3,442,733(13)	116,042(15)	1,397,901(16)	2,036,787(23)	77,695(14)	33,747(4)	22,215(3)	100,364(4)	187,576(13)
2021	313,968(2)	59,374(1)	9,601,878(5)	215,886(23)	62,671(15)	3,553,791(12)	126,786(16)	1,901,471(14)	2,331,245(22)	62,170(16)	13,937(4)	17,652(3)	123,966(4)	114,885(13)
2022	122,437(1)	30,609(1)	6,862,252(4)	307,139(22)	53,372(15)	3,348,500(12)	85,723(15)	1,693,452(13)	2,311,435(23)	56,530(14)	3,828(2)	14,817(3)	122,776(4)	88,724(11)

*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 9 2022 Higher Hazard Substances (HHS) Summary (Excludes Trade Secret Data)						
Substance and Year Designated as HHS	# Filers in 2022	Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-Site
Cadmium/2008	3	14,817	2,988	11,676	0	2,989
Cadmium Compounds/2008	4	122,776	11,805	11,968	13	11,791
Trichloroethylene/2008	11	88,724	54,630	17,547	29,114	15,439
Tetrachloroethylene/2009	2	3,828	2,101	4,098	2,101	0
Formaldehyde/2012	23	2,311,435	426,530	64,464	86,188	257,433
Hexavalent Chromium Compounds/2012	14	56,530	24,902	28,067	129	14,595
Methylene Chloride/ Dichloromethane/2014	13	1,693,452	800,083	814,823	29,102	768,742
Cyanide Compounds/2016	15	85,723	57,291	5,552	18	31,234
Dimethylformamide/2016	12	3,348,500	1,170,011	2,138,317	10,765	337,819
Hydrogen Fluoride/2016	22	307,139	162,861	78,056	3,099	8,845
N-Propyl Bromide/2016	15	53,372	42,944	8,818	29,073	13,535
Toluene-2,4-diisocyanate/2017	1	122,437	5,435	0	1	5,434
Toluene-2,6-diisocyanate/2017	1	30,609	42	0	0	0
Toluene diisocyanate (mixed isomers)/2017	4	6,862,252	405	1,050,520	223	0

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 10 below summarizes 2022 data on some of the chemicals identified in the LCSP report that were reported under TURA. In 2022, 17 chemicals identified as asthmagens by the Association of Occupational and Environmental Clinics (AOEC) were reported under TURA. In 2022, Sulfuric Acid was reported as having the largest usage while Formaldehyde was reported as having the largest amount of on-site releases.

Table 10 Asthma-Related Toxics (in pounds) (Excludes Trade Secret Data)		
Chemical Name (Number of Facilities)	**Use**	**On-Site Releases**
Acetic Acid (18)	1,807,680	2,285
Aluminum (1)	67,952	47
Chlorine (2)	149,860	76
Chromium (3)	226,834	17
Diethanolamine(1)	306,079	2.8
Ethylene Oxide (1)	198,037	63
Formaldehyde (23)	2,311,435	86,188
Hydrazine (3)	151,702	81
Maleic Anhydride (2)	321,437	1,692
Methylenebisphenyl (1)	145,851	0
Methyl Methacrylate (5)	6,835,029	3,077
Nickel (6)	605,004	45
Nickel Compounds (4)	512,495	1,133
Phthalic Anhydride (1)	299,823	154
Styrene Monomer (8)	4,078,829	29,505
Sulfuric Acid (94)	21,137,429	15,218
Toluene Diisocyanate (6)*	7,015,298	224

* 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 2022, eight IARC Group 1 carcinogens were reported under TURA (see Table 11). 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 11 IARC Group 1 Carcinogens (in pounds unless otherwise noted) (Excludes Trade Secret Data)		
Chemical Name (Number of Facilities)	**Use**	**On-Site Releases**
Cadmium (3)	14,817	0
Dioxin (5)*	1567.2401	20.363
Ethylene Oxide (1)	198,037	63
Formaldehyde (23)	2,311,435	86,188
Hexavalent Chromium Compounds (16)	56,530	129
Polychlorinated Biphenyls (1)	2,138	0
Nickel Compounds (4)	512,495	1,133
Trichloroethylene (11)	88,724	29,114

* 2,3,7,8-Tetrachlorodibenzo-*para*-dioxin are the agents specifically listed as Group 1 by IARC (in grams).

VI. 2022 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 6 through 9 present, by sector, the 2022 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 20% (Figure 6). The chemical manufacturing sector also had the greatest percentage of chemical use at 60% (Figure 7), the largest percentage of byproduct at 48% (Figure 8), and the largest percentage of on-site releases at 22%, with waste management and remediation services and the paper manufacturing sectors at 17% and 16%, respectively (Figure 9). The chemical manufacturing 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 7.

Chemical distributors at (Figure 7) 21% were the second largest contributor to use but had virtually no impact on byproduct and releases. Paper manufacturing, waste management and remediation services, and fabricated metal processors were other sectors with substantial contributions to byproduct and releases. The paper manufacturing sector, which accounted for 3% of total statewide use (Figure 7), accounted for 16% of total byproduct generated (Figure 8). Likewise, waste management and remediation services, which accounted for 3% of total statewide use (Figure 7), accounted for 17% of total on-site releases (Figure 9).

Figure 6 –2022 Number of Facilities by Industrial Sector
Total Number of Facilities = 449
(Includes Trade Secret Data)

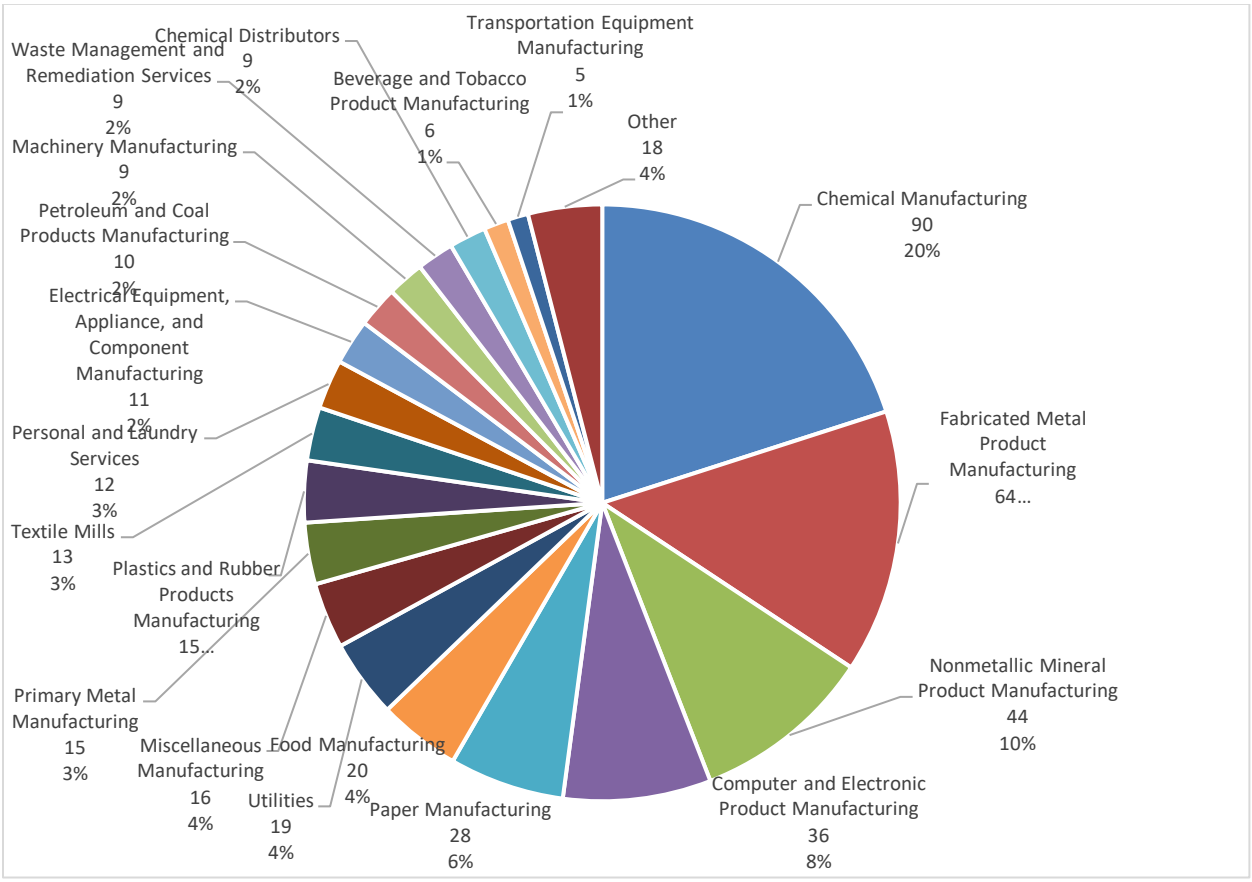


Figure 7 – All Reported Data: 2022 Chemical Use by Industrial Sector
Total Use = 645,000,000 Pounds
(Includes Trade Secret Data)

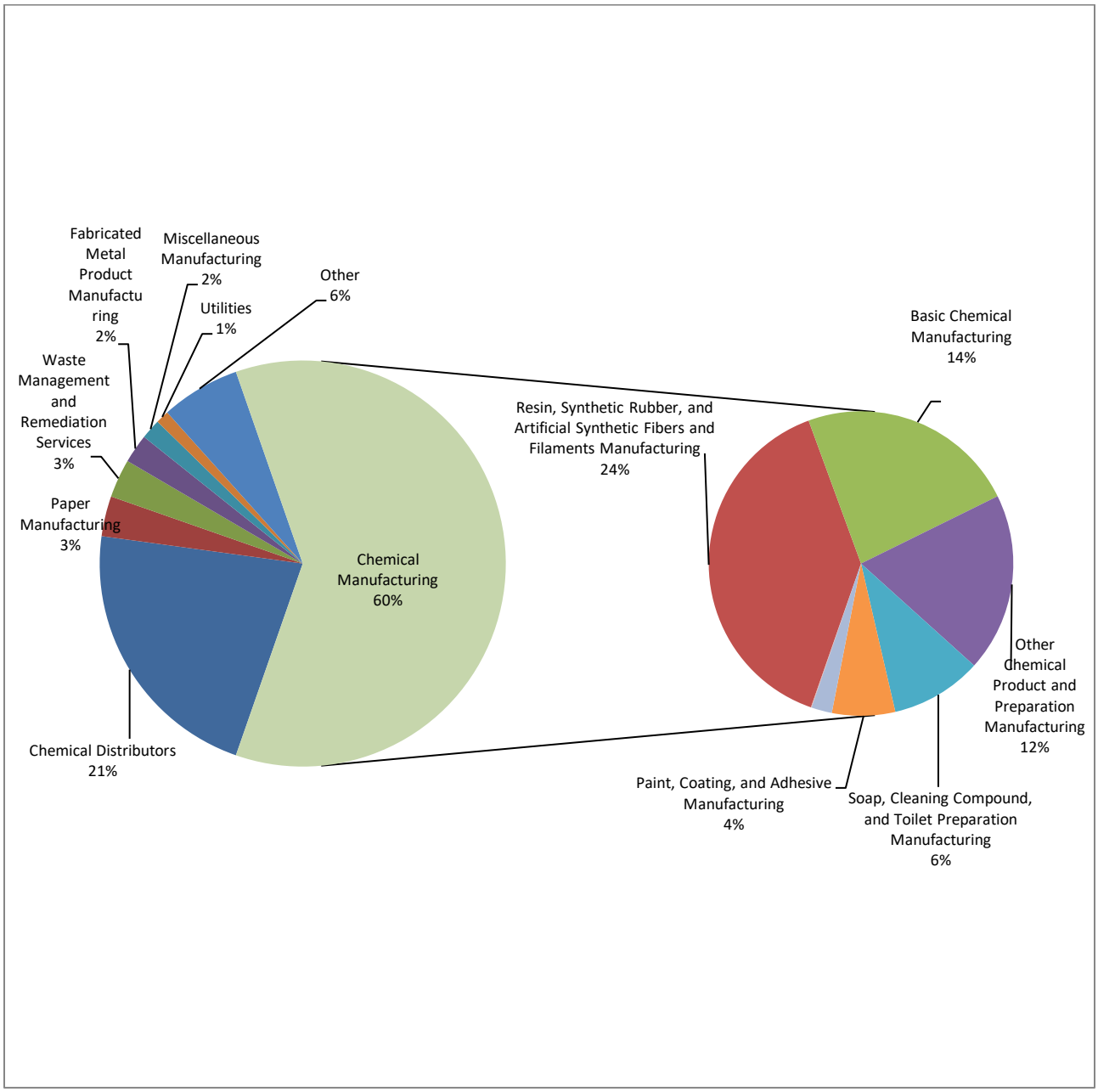


Figure 8 – All Reported Data: 2022 Byproduct Generation by Industrial Sector
Total Byproduct = 70,000,000 Pounds
(Includes Trade Secret Data)

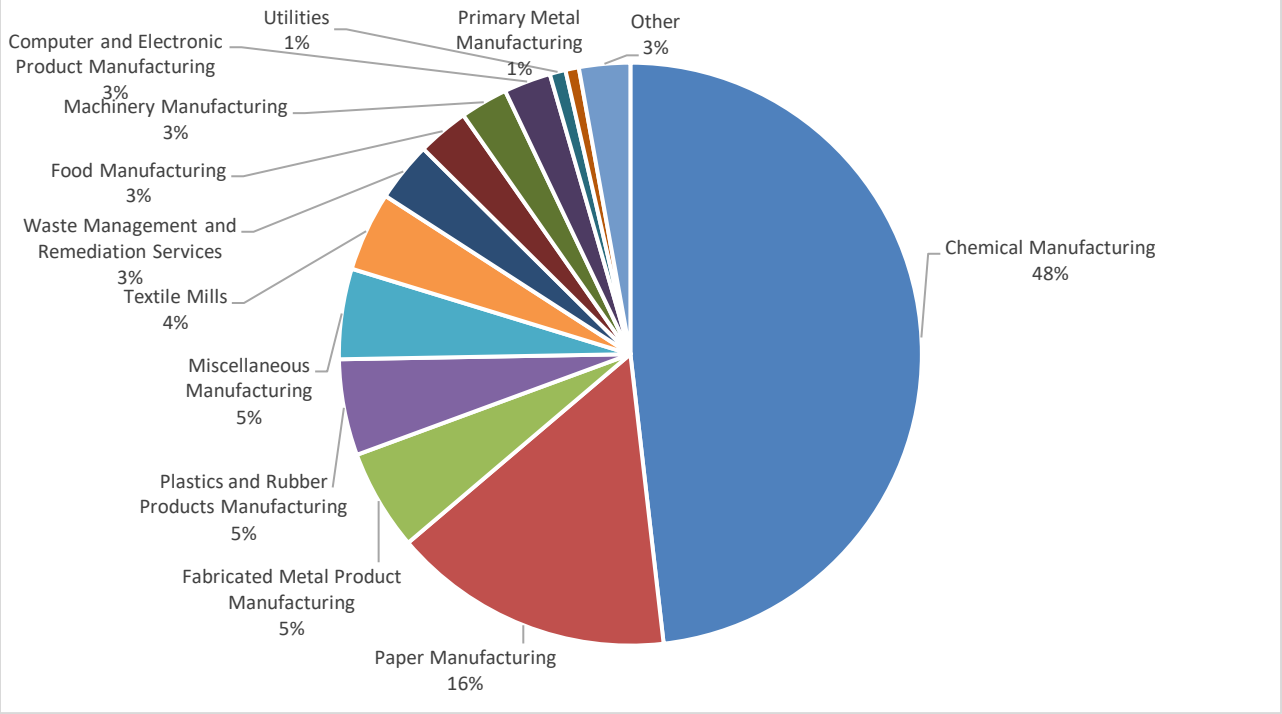
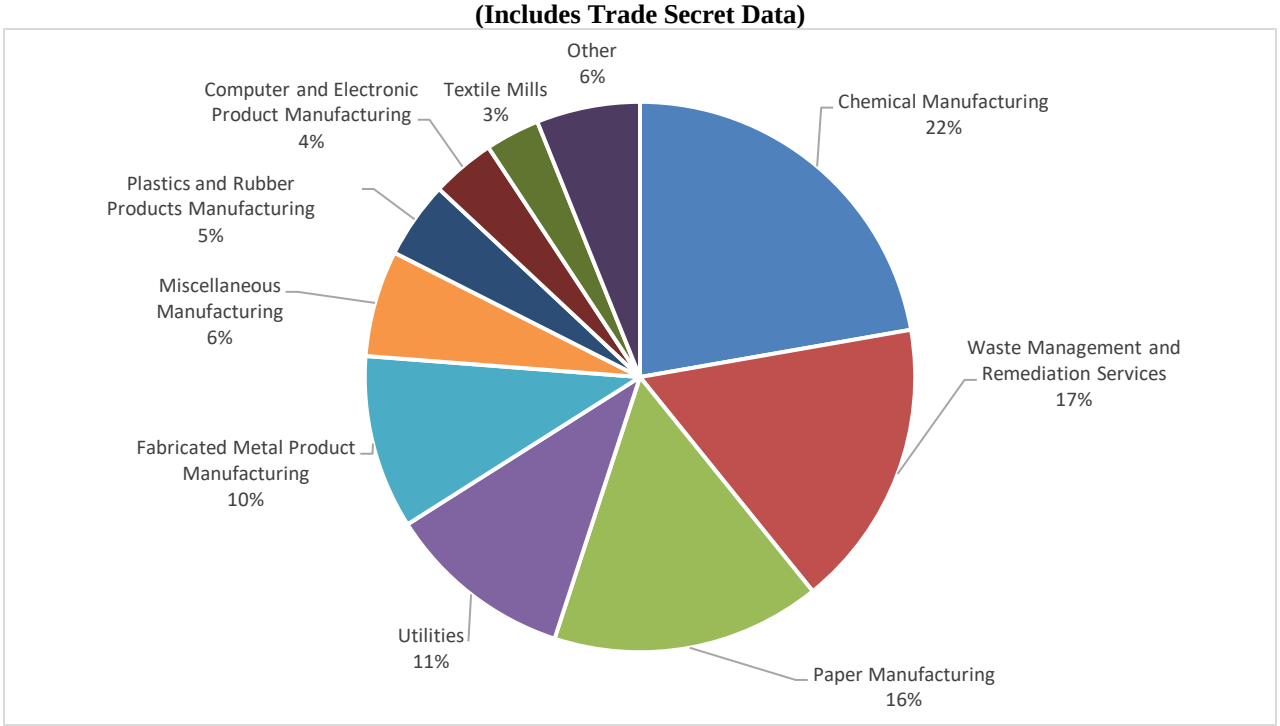


Figure 9 – All Reported Data: 2022 On-Site Releases by Industrial Sector
Total On-Site Releases = 2,200,000 Pounds
(Includes Trade Secret Data)



VII. 2022 Major TURA Facilities

Tables 12 through 14 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 12 lists the 20 facilities that reported the largest total quantity of TURA chemicals used. These 20 facilities used 485 million pounds, or 75% of total statewide use.

- Table 13 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 62% of the statewide total. The 20 facilities with the largest quantity shipped in product, shipped 250 million pounds in product, or 90% of the statewide total.

- Table 14 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 1.3 million pounds, or 60% of total releases statewide. Five of the Top 20 facilities of reported on-site releases were municipal waste combustors (MWCs) that also reported combustion-related emissions. Of the 491,000 pounds of on-site releases reported by these MWCs, 77% was due to the coincidental manufacture of hydrochloric acid during combustion, and 23% 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 almost 24 million pounds, or 71% of the total statewide transfers off-site.

Table 12 2022 Top 20 Facilities: Reported Total Use (Includes trade secret data)		
Facility Name	Town	Total Use (Lbs.)
Solutia Inc	Springfield	93,728,550
Holland Company Inc	Adams	82,374,326
Borden and Remington Corp	Fall River	62,909,280
Astro Chemicals Inc	Springfield	45,153,078
Rousselot Peabody Inc	Peabody	36,204,453
Prefere Melamines LLC	Springfield	32,445,289
James Austin Co	Ludlow	23,107,455
Highline Warren LLC	Leominster	20,490,725
Univar Solutions USA Inc	Tewksbury	12,930,219
Roberts Chemical Co Inc	Attleboro	12,445,662
Semass Partnership	Rochester	9,062,062
Omnova Solutions Inc	Fitchburg	7,372,720
Webco Chemical Corp	Dudley	7,159,546
Metalor Technologies USA	Attleboro	6,456,296
Covanta Haverhill Inc	Haverhill	6,309,390
Future Foam	Mansfield	6,157,910
Bostik Inc	Middleton	5,330,771
ISP Freetown Fine Chemicals Inc	Assonet	5,252,825
ITW Performance Polymers	Danvers	4,893,070
Covestro LLC	Wilmington	4,855,873

Table 13 2022 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	6,291,095	Borden and Remington Corp	Fall River	55,216,057
Rousselot Peabody Inc	Peabody	5,624,199	Astro Chemicals Inc	Springfield	41,667,658
3M Company	Rockland	3,729,386	Holland Company Inc	Adams	23,450,512
Nitto Denko Avecia Inc	Milford	3,706,775	James Austin Co	Ludlow	22,996,690
Thermo Fisher Scientific	Bedford	3,123,951	Solutia Inc	Springfield	22,923,397
Flexcon Company Inc	Spencer	2,989,350	Highline Warren LLC	Leominster	20,018,761
Prefere Melamines LLC	Springfield	2,868,059	Univar Solutions USA Inc	Tewksbury	12,912,009
Nissha Metallizing Solutions Ltd	Franklin	2,698,729	Roberts Chemical Co Inc	Attleboro	12,445,662
Covestro LLC	Wilmington	1,797,518	Webco Chemical Corp	Dudley	7,159,005
Munters Corp	Amesbury	1,493,944	ITW Performance Polymers	Danvers	4,791,235
Waters Corp	Taunton	1,239,578	ISP Freetown Fine Chemicals Inc	Assonet	3,836,320
Adhesive Applications Inc	Easthampton	1,112,042	Houghton Chemical Corporation	Allston	3,749,711
Koch Separation Solutions	Wilmington	1,049,094	Kidde Fenwal Inc	Ashland	3,105,434
ITW Shinemark	Newburyport	1,018,193	Alpha Chemical Services Inc	Stoughton	2,810,794
Bostik Inc	Middleton	1,012,328	Mexichem Specialty Compounds Inc	Leominster	2,752,074
Semass Partnership	Rochester	944,553	Bostik Inc	Middleton	2,453,709
Ideal Tape Company	Lowell	899,502	Advance Coatings Co	Westminster	2,057,027
Metalor Technologies USA	Attleboro	853,142	Callahan Chemical Company LLC	Walpole	2,024,010
Crane and Co Byron Weston Mill	Dalton	807,611	Nyacol Products Inc	Ashland	1,614,512
Crane and Co Pioneer Mill	Dalton	780,374	Riverdale Mills Corp	Northbridge	1,611,566

Table 14 2022 Top 20 Facilities: Reported On-Site Releases and Transfers Off-Site (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	184,579	Solutia Inc	Springfield	4,108,581
Ideal Tape Company	Lowell	128,622	Nitto Denko Avecia Inc	Milford	3,600,311
Semass Partnership	Rochester	116,239	Thermo Fisher Scientific	Bedford	2,943,341
Solutia Inc	Springfield	105,349	Prefere Melamines LLC	Springfield	2,296,977
Wheelabrator North Andover Inc	North Andover	90,359	Covestro LLC	Wilmington	1,780,053
Hazen Paper Co	Holyoke	72,513	Koch Separation Solutions	Wilmington	1,018,970
Nissha Metallizing Solutions Ltd	Franklin	71,860	Bostik Inc	Middleton	981,773
Flexcon Industries	Randolph	67,974	Semass Partnership	Rochester	828,314
Wheelabrator Millbury Inc	Millbury	64,605	Ideal Tape Company	Lowell	770,888
Callaway Golf Ball Operations Inc	Chicopee	62,478	Veranova LP	Devens	770,864
Fore River Energy Center	Weymouth	42,085	Skyworks Solutions Inc	Woburn	642,961
Smith and Wesson Inc	Springfield	39,850	Callaway Golf Ball Operations Inc	Chicopee	539,884
Wheelabrator Saugus Inc	Saugus	35,317	Veranova LP	North Andover	517,729
Millennium Power Company LLC	Charlton	33,799	Highline Warren LLC	Leominster	456,000
Skyline Composite Inc	Fall River	33,372	Entegris Inc	Bedford	444,330
Flexcon Company Inc	Spencer	31,990	PCI Synthesis Inc	Newburyport	420,361
Bostik Inc	Middleton	30,556	Wheelabrator Millbury Inc	Millbury	415,701
Nylco Division Worthen Industries Inc	Clinton	29,910	Wheelabrator Saugus Inc	Saugus	406,068
Blackstone Power Generation LLC	Blackstone	29,047	Brittany Global Technologies Corp	New Bedford	378,663
Raytheon Company	Andover	28,031	3M Company	Rockland	378,020

Appendix A - 2000 Core Group Progress

The "2000 Core Group" includes all industry categories and chemicals that were subject to TURA reporting in 2000 and remained subject to reporting in 2022 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 2022 TURA filers (excluding 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 2022 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 370 filers, which represents 82% of the 2022 TURA filers. Table A-1 and Figures A-1 and A-2 below summarize 2000 Core Group TURA data from 2000 to 2022, 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 for lead and lead compounds reports, due to the lowered 2001 PBT thresholds.

2000 Core Group Progress: Adjusting for Production

Table A-1 below summarizes TURA data from 2000 to 2022, showing reported and production adjusted quantities. For the 2000 Core Group, the activity index shows an increase in production of 44 percent from 2000 to 2022. As shown below in Table A-1 and Figure A-1, when adjusted for production, as of 2022, the 2000 Core Group facilities have reduced**:**

- toxic chemical use by 75%
- toxic byproducts by 66%
- toxics shipped in product by 58%
- on-site releases of toxics to the environment by 91%
- transfers of toxics off-site for further waste management by 47%.

2000 Core Group Progress without Adjusting for Production

The actual quantities reported by the 2000 Core Group over the period 2000 to 2022 are shown in Figure A-2. These quantities have <u>not</u> been adjusted for changes in production. From 2000 to 2022, Core Group facilities:

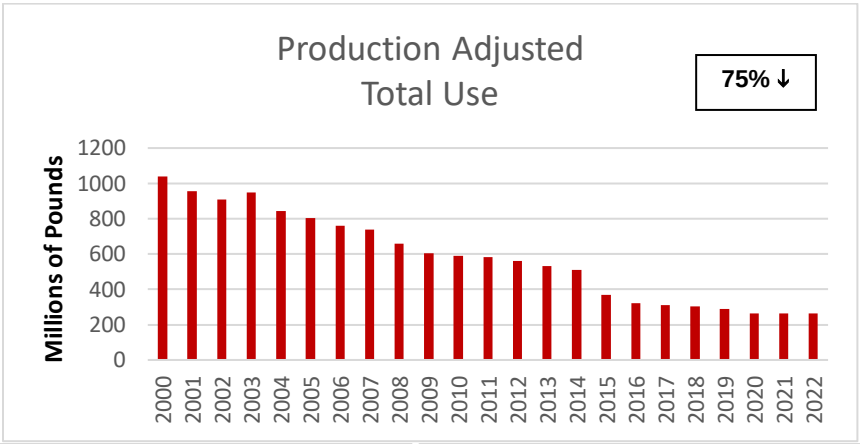
- reduced toxic chemical use by 63% (from 1,038 million to 382 million pounds between 2000 and 2022)
- reduced toxic byproducts by 51% (from 116 million to 56 million pounds between 2000 and 2022)
- reduced toxics shipped in product by 39% (from 359 million to 217 million pounds between 2000 and 2022)
- reduced on-site releases of toxics to the environment by 87% (from 11 million to 1.4 million pounds between 2000 and 2022)
- reduced transfers of toxics off-site for further waste management by 23% (from 27 to 21 million pounds between 2000 and 2022).

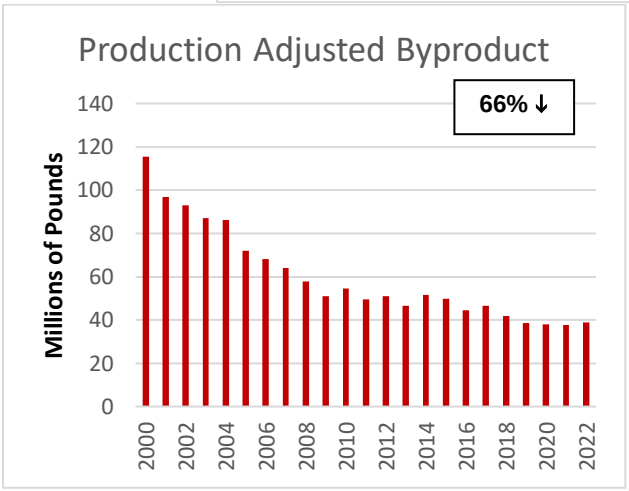
Table A-1
2000 CORE GROUP DATA: 2000 - 2022 TREND SUMMARY
(Quantities are in millions of pounds and do not include trade secret quantities.
Shaded columns show quantities adjusted by cumulative production ratio)

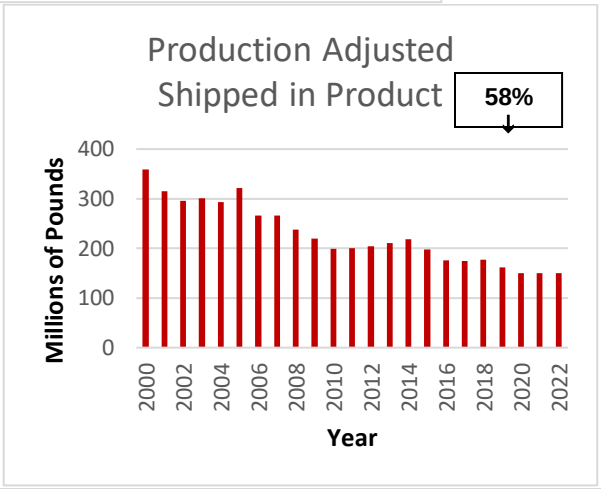
Year	Total Use		Byproduct		Shipped in Product		On-Site Releases		Transfers Off-Site		Production Ratio	
											Year to Year	Cumulative from 2000
2000	1038.40	1038.40	115.50	115.50	358.80	358.80	10.70	10.70	26.90	26.90		
2001	955.40	955.40	96.80	96.80	315.30	315.30	8.70	8.70	21.30	21.30	1.00	1.00
2002	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	243.44	176.89	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	223.9	150.56	1.53	1.03	20.6	13.86	1.06	1.49
2022	381.67	264.64	56.21	38.98	217.26	150.65	1.44	1.00	20.61	14.29	0.97	1.44
Percent Change 2000-2022	63%	75%	51%	66%	39%	58%	87%	91%	23%	47%		44% Increase

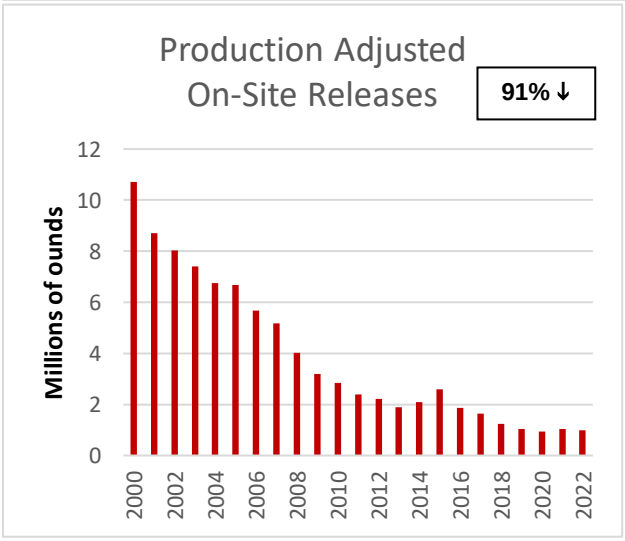
* Styrolution, which used over a quarter of the total reported use (excluding trade secret data) in 2000, ceased operations in Massachusetts in 2014.

Figure A-1 - 2000 Core Group Toxics Use Reduction Progress 2000-2022
Production Adjusted
(Excludes Trade Secret Data)









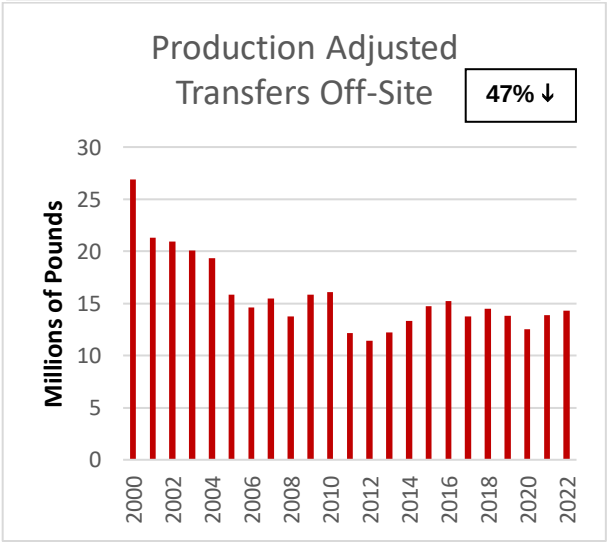
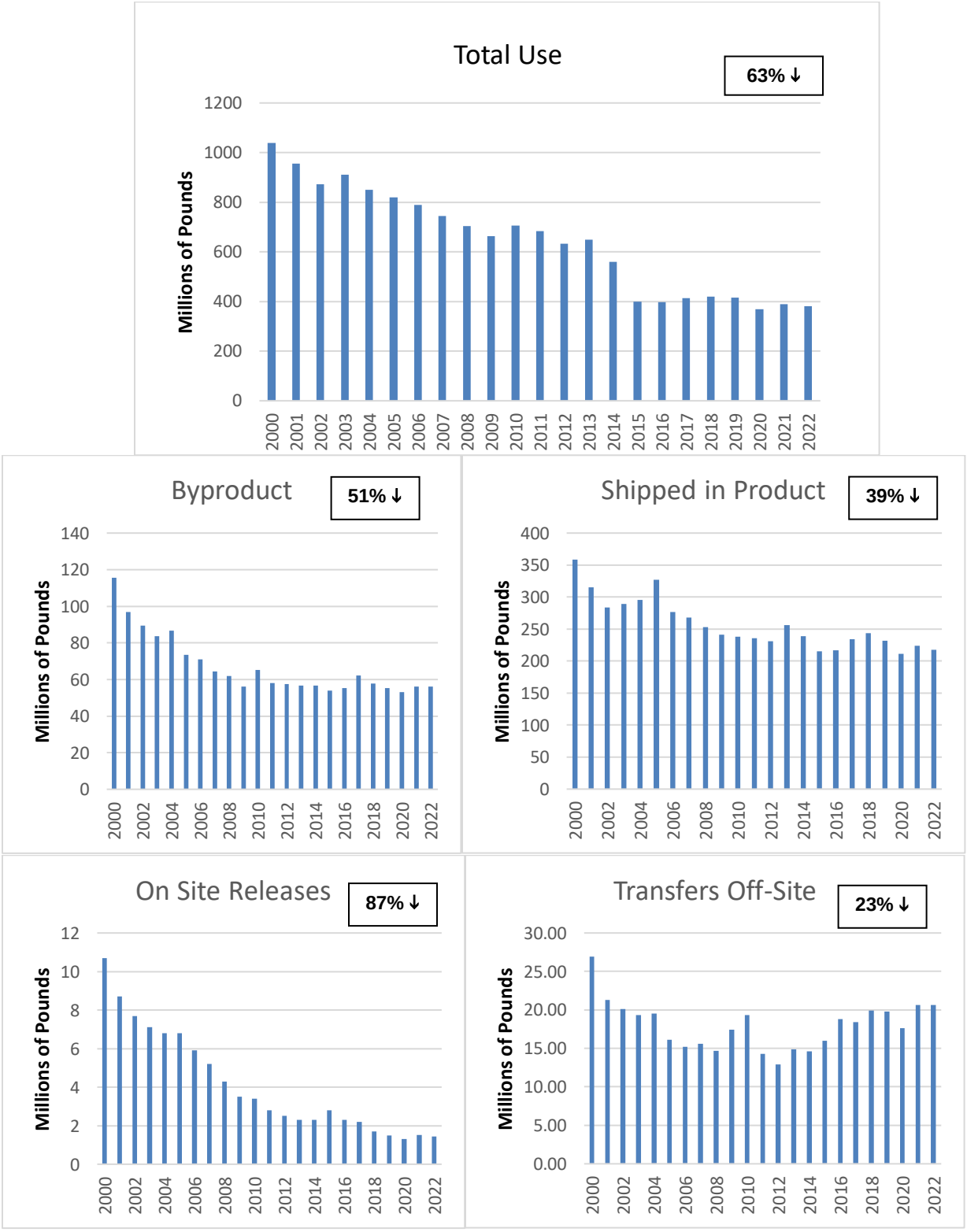


Figure A-2 - 2000 Core Group Toxics Use Reduction Progress 2000-2022
Not Production Adjusted
(Excludes Trade Secret Data)



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