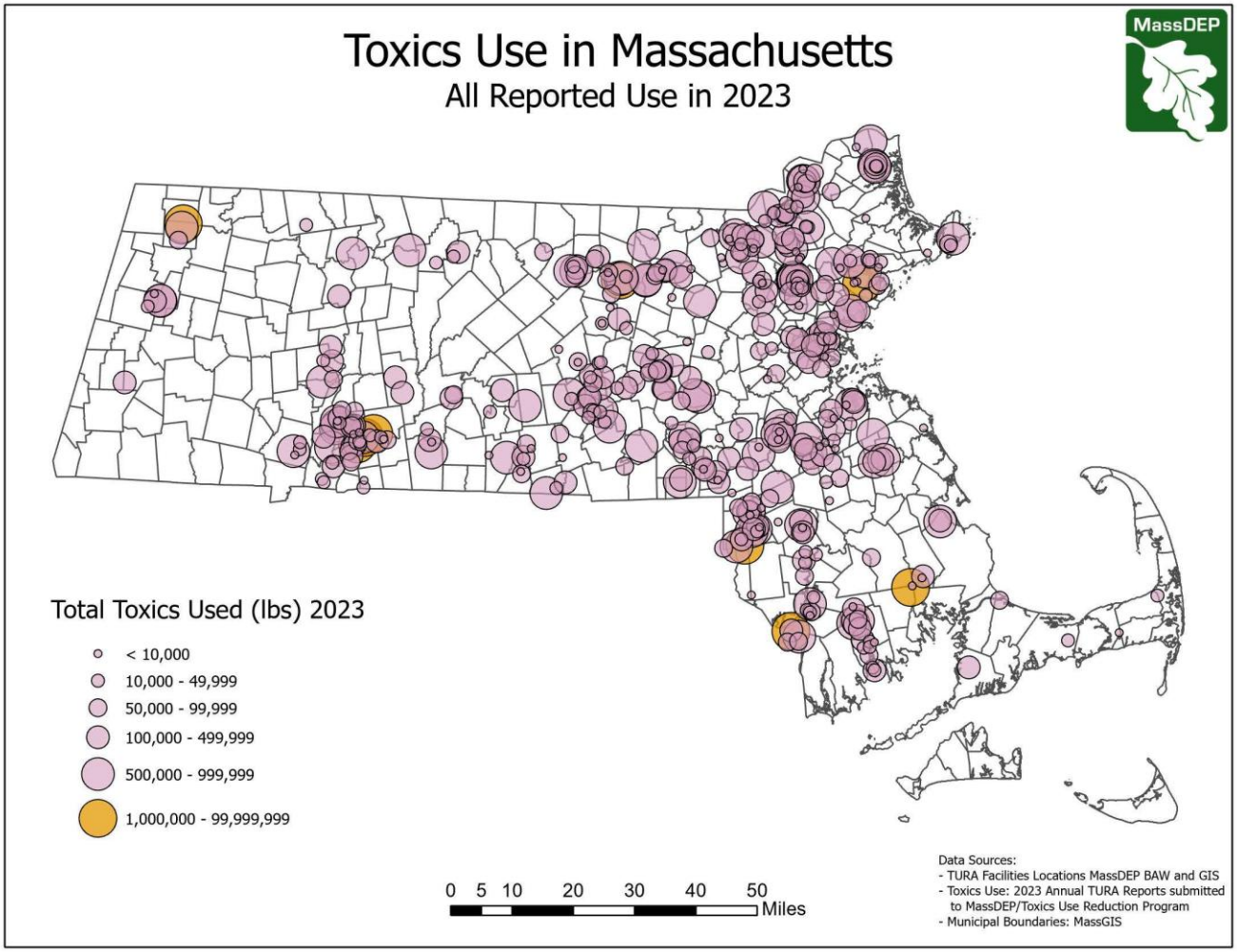
Reporting Year 2023
Toxics Use Reduction
Information Release



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

April 2025

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Executive Summary

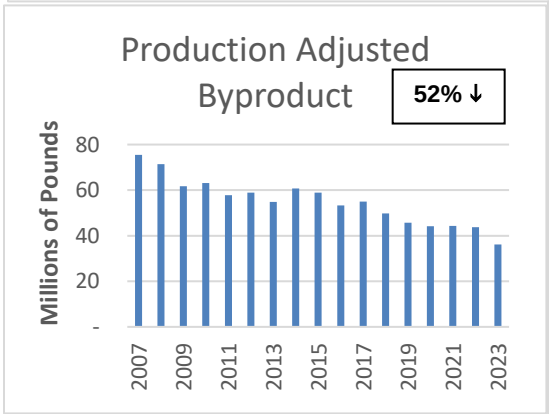
In 1989, the Toxics Use Reduction Act (TURA) (Chapter 21I of the Massachusetts General Laws) was enacted, to protect public health and the environment by promoting reduction in the use of toxic chemicals. TURA established reporting and planning requirements that encourage facilities to use toxic chemicals (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.

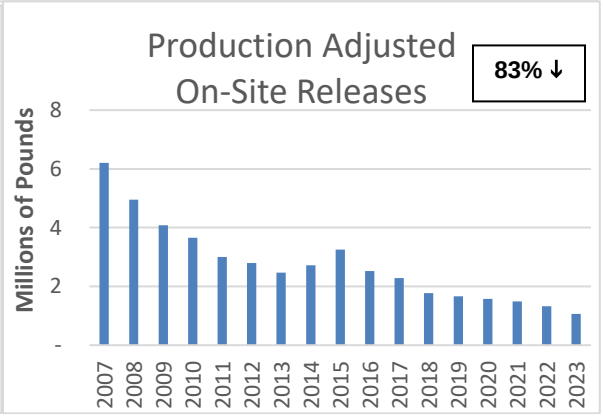
Four hundred thirty (430) facilities reported using 128 different chemicals in 2023. In total (including data submitted as trade secret data – as defined on page 4), from 1990 to 2023 (with exception of transfers off-site, which is from 1991), the following reductions were observed:

- Chemical Use - from 1.2 billion to 564 million pounds
- Byproduct Generation - from 127 to 63 million pounds
- Shipped in Product - from 433 to 238 million pounds
- On-Site Releases - from 21 to 1.9 million pounds
- Transfers Off-Site - from 46 to 32 million pounds

As shown below, between 2007 and 2023 when adjusted for the reported 54% increase in production, 2007 Core Group (as defined on page 4) facilities reduced:

- toxic chemical use by 69% (Styrolution is explained on page 9)
- toxic byproducts by 52%
- toxics shipped in product by 54%
- on-site releases of toxics to the environment by 83%
- transfers of toxics off-site for further waste management by 28%.





This report includes the following six sections:

Section I: **Introduction.**

Section II: **Key TURA Terms.**

Section III: **2023 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: **2023 Chemical Data** summarizes the reported information on chemical use in calendar year 2023 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: **2023 Chemicals of Particular Concern** presents current and historical information on particularly toxic chemicals, on chemicals that promote asthma, and on carcinogens.

Section VI: **2023 Significant Industrial Sectors** describes the relative contributions of different industrial sectors to chemical use, waste, and release.

Section VII: **2023 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 2023 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 2023, 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 2023 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. 2023 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-three years since 1990.

As shown in Figure 1, 128 of the over 1,500 TURA listed substances were reported in 2023. 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, 2023 TURA Chemical Data). The number of filers has decreased from 454 in 2022 to 430 in 2023. 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 1,467 in 2023, 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.

Filers Entering and Leaving the TURA Reporting Universe

From 2022 to 2023, 31 facilities left, and 11 facilities entered the TURA reporting universe. The reasons for 31 facilities not reporting in 2023 were:

- 10 closed
- 18 reduced use below the reporting threshold
- 1 reduced staffing below the FTE threshold
- 2 are under enforcement for failure to report

As shown in Figure 2, chemical use decreased from 1.2 billion pounds in 1990 to 564 million pounds in 2023. Byproduct generation decreased from 127 million pounds in 1990 to 63 million pounds in 2023.

Figure 1
# of TURA Filers, Individual Chemical Reports, and Different Chemicals Reported (1990-2023)
(Including Trade Secret Data)

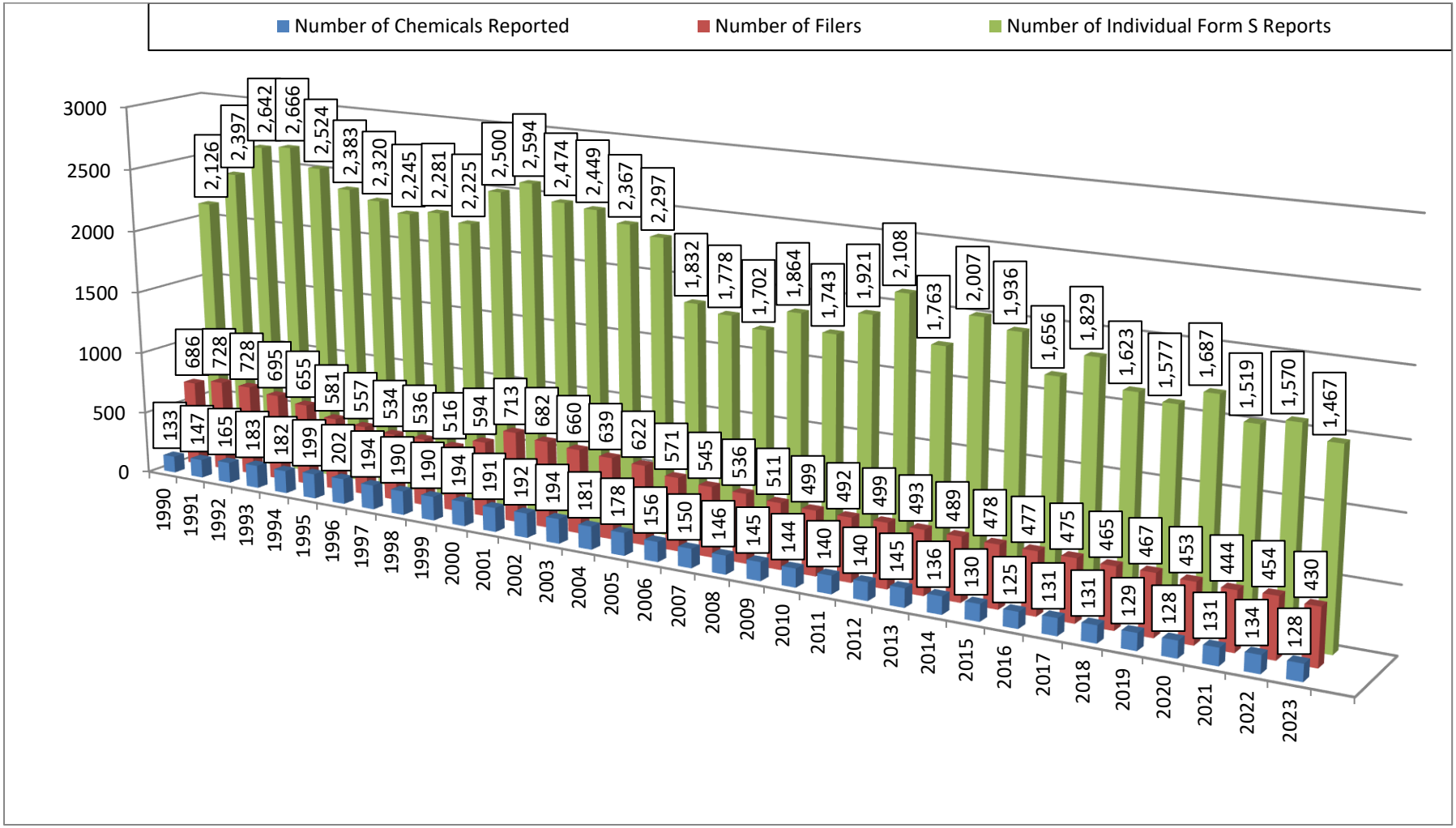
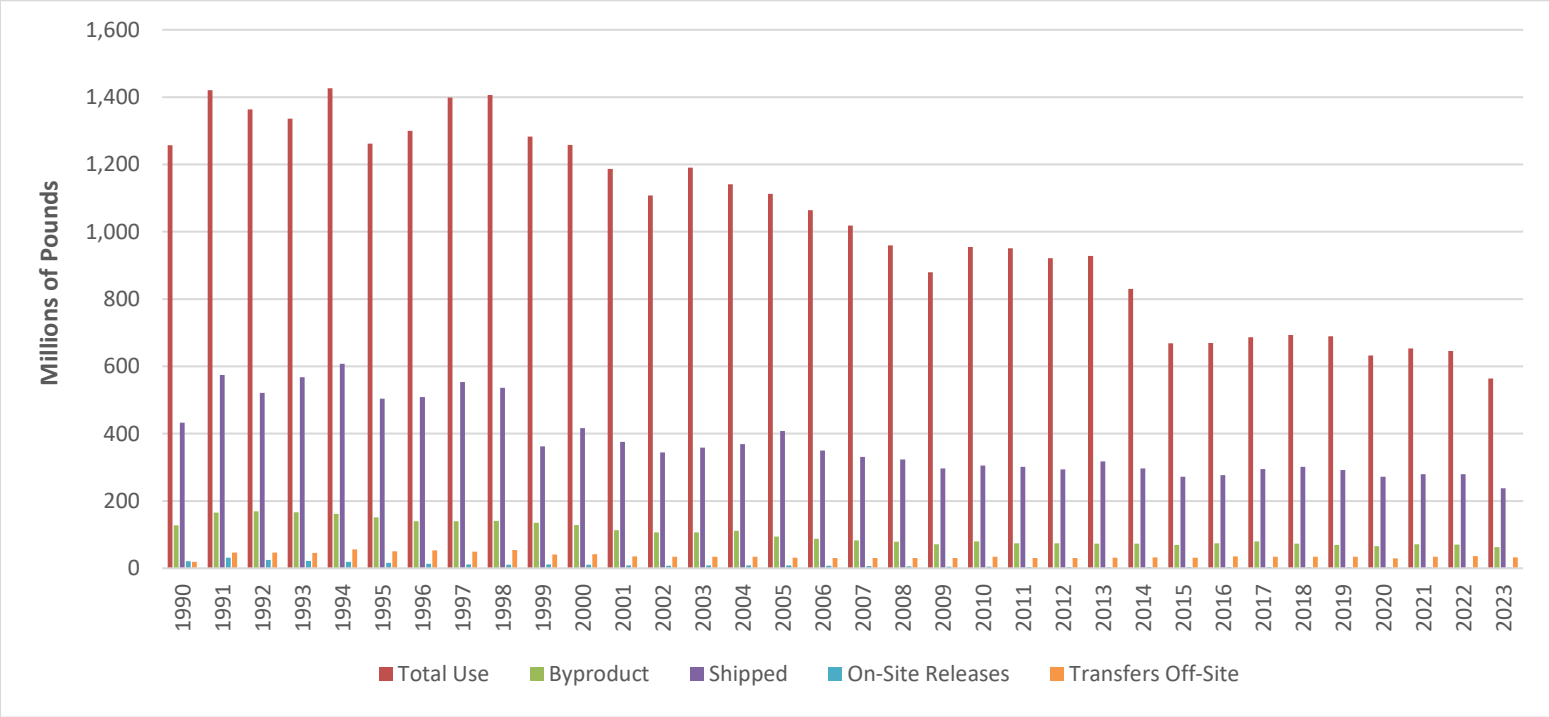


Figure 2
Raw Reported Data on the Pounds of Total Use, Generated as Byproduct, Shipped in or as Product, Released On-Site and Transferred Off-Site for Treatment or Disposal
Reporting Years 1990-2023 (includes trade secret data)



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 96% of the total 397 million pounds of toxic chemicals reported in 2023 (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 2023. 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 2023 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.) Table 1 and Figures 3 and 4 below summarize TURA data from 2007 to 2023, excluding trade secret data.

2007 Core Group Progress: Adjusting for Production

Table 1 below summarizes TURA data from 2007 to 2023, showing reported and production adjusted quantities. For the 2007 Core Group, the activity index shows an increase in production of 54 percent from 2007 to 2023. As shown below in Table 1 and Figure 3, when adjusted for production, as of 2023, the 2007 Core Group facilities have reduced**:**

- toxic chemical use by 69%
- toxic byproducts by 52%
- toxics shipped in product by 54%
- on-site releases of toxics to the environment by 83%
- transfers of toxics off-site for further waste management by 28%.

Table 1
2007 CORE GROUP DATA: 2007 - 2023 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
2023	382.48	248.27	55.68	36.14	194.51	126.26	1.65	1.07	27.34	17.75	1.05	1.54
Percent Change 2007-2023	52% Reduction	69% Reduction	25% Reduction	52% Reduction	28% Reduction	54% Reduction	73% Reduction	83% Reduction	9% Increase	28% Reduction		54% Increase

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

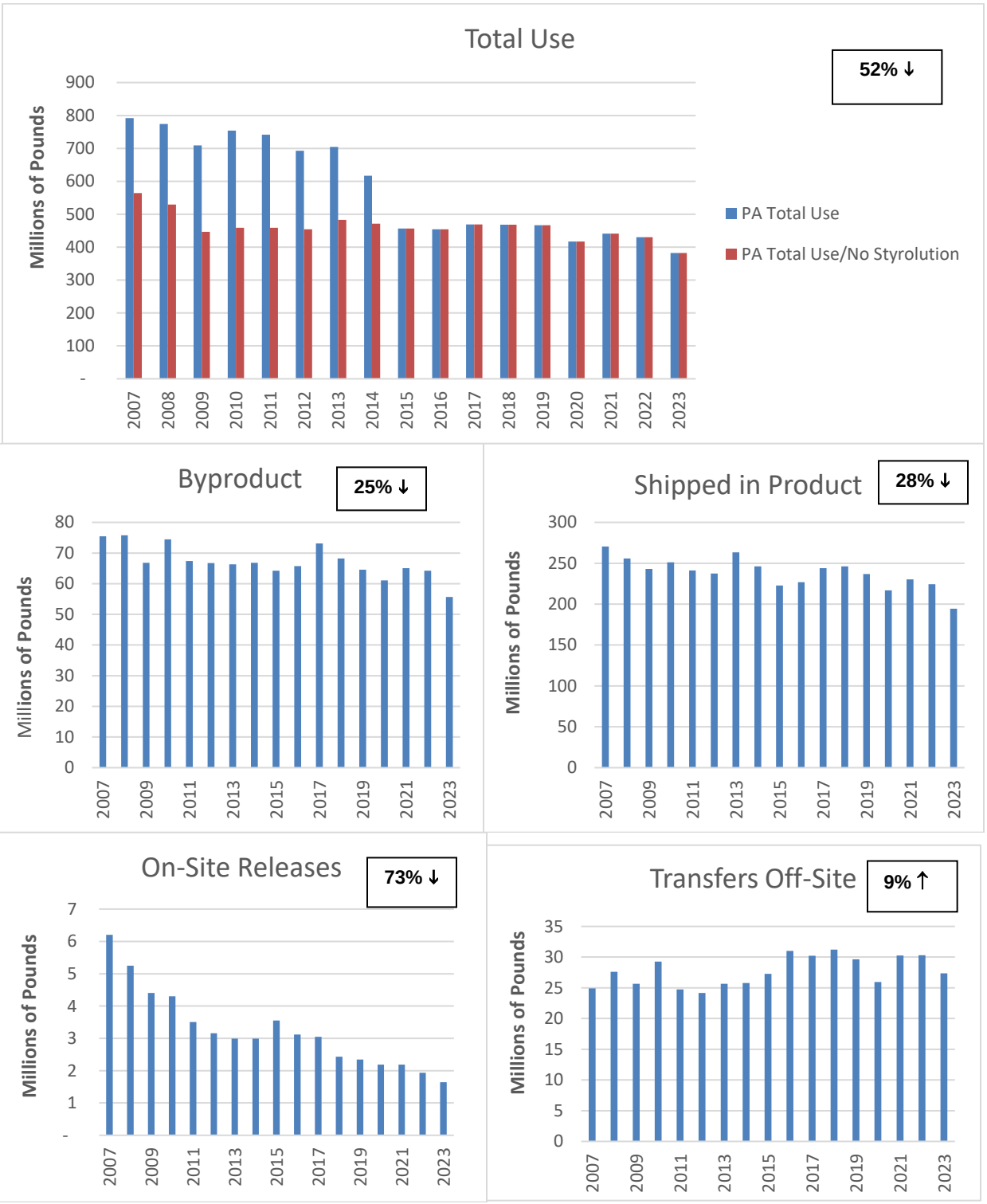
2007 Core Group Progress without Adjusting for Production

The actual quantities reported by the 2007 Core Group over the period 2007 to 2023 are shown in Figure 4. These quantities have not been adjusted for changes in production. From 2007 to 2023, Core Group facilities:

- reduced toxic chemical use by 52% (from 792 million to 382 million pounds between 2007 and 2023)
- reduced toxic byproducts by 25% (from 75 million to 56 million pounds between 2007 and 2023)
- reduced toxics shipped in product by 28% (from 271 million to 195 million pounds between 2007 and 2023)
- reduced on-site releases of toxics to the environment by 73% (from 6 million to 1.7 million pounds between 2007 and 2023)
- increased transfers of toxics off-site for further waste management by 9% (from 25 to 27 million pounds between 2007 and 2023).

Figure 3 – 2007 Core Group Toxics Use Reduction Progress 2007-2023
Production Adjusted
(Excludes Trade Secret Data)

Figure 4 – 2007 Core Group Toxics Use Reduction Progress 2007-2023
Not Production Adjusted
(Excludes Trade Secret Data)



IV. 2023 TURA Chemical Data

Table 2 All Reported Chemical Data 2023 (Rounded to millions of pounds) (Includes Trade Secret Data)		
TOTAL USE	564,000,000	
SHIPPED IN PRODUCT	238,000,000	42% of total chemical use
GENERATED AS BYPRODUCT (total waste prior to treatment or disposal)	63,000,000	11% of total chemical use
ON-SITE RELEASES (to air, water or land disposal)	1,900,000	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)	32,000,000	6% of total chemical use 51% 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 2023, eight facilities made trade secret claims on a combined total of:

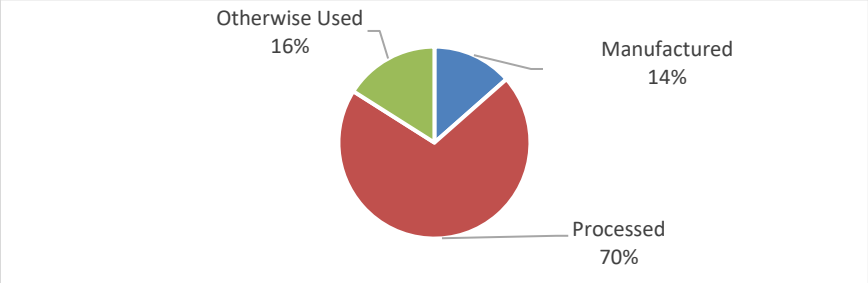
- 167 million pounds of chemical use
- 4 million pounds of byproduct generation
- 39 million pounds shipped in product.

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 2023 chemical use for the three categories:

- Chemicals manufactured accounted for 14% of total chemical use.
- Chemicals processed accounted for 70% of total chemical use.
- Chemicals otherwise used accounted for 16% of total chemical use.

Figure 5
2023 Total Use by Category
(564 Million Pounds)
(includes trade secret data)



Top 20 Chemicals

In 2023, filers reported using 128 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 2023 accounted for 84% (333 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, 149 facilities, 55 million pounds), Methanol (12% of total use, 25 facilities, 49 million pounds), Hydrochloric Acid (11% of total use, 38 facilities, 42 million pounds), and Sodium Hypochlorite (10% of total use, 32 facilities, 38 million pounds), and accounted for almost 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:

- 87% of the total reported byproducts (including trade secret data)
- 90% of the total reported shipped in product (excluding trade secret data)
- 94% of the total on-site releases (including trade secret data)
- 91% of the total off-site transfers (including trade secret data).

Hydrochloric Acid was the second top chemical for on-site releases, accounting for 14% of the statewide total of on-site releases (270,000 pounds). Ninety-seven (97) percent of hydrochloric acid releases were from municipal waste combustors.

The Nitrate Compounds chemical category was the top chemical for transfers offsite, accounting for 17% of the statewide total transfers off-site (almost 5.5 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-six (96) percent of total transfers off-site of lead, the fourth chemical on the list, was attributed to five municipal waste combustors that transferred lead in ash to off-site lined landfills.

Table 3 – 2023 Top 20 Chemicals: Total Use *These quantities do not include Trade Secret Data*		
Chemical Name (CAS #)	**CAS #**	**Total Use (Lbs.)**
Sodium Hydroxide	1310732	55,038,812
Methanol	67561	49,029,691
Hydrochloric Acid	7647010	42,270,859
Sodium Hypochlorite	7681529	38,149,797
Sulfuric Acid	7664939	18,247,278
Potassium Hydroxide	1310583	15,971,592
Acetone	67641	12,129,658
Toluene	108883	11,476,253
Ammonia	7664417	11,299,189
Nitrate Compounds	1090	10,390,892
Zinc Compounds	1039	9,407,071
Phosphoric Acid	7664382	9,370,739
Ethyl Acetate	141786	7,608,568
Methyl Ethyl Ketone	78933	7,486,079
Diisocyanates	1050	7,480,845
Nitric Acid	7697372	6,420,971
Methyl Methacrylate	80626	5,823,917
Ferric Chloride	7705080	5,361,289
Epichlorohydrin	106898	5,164,077
Toluene Diisocyanate	26471625	5,024,068

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 – 2023 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.)**
Sodium Hydroxide	1310732	7,385,346	**Methanol**	67561	45,428,470
Ethyl Acetate	141786	6,844,713	Sodium Hypochlorite	7681529	35,491,463
Nitrate Compounds	1090	6,323,621	Sodium Hydroxide	1310732	17,667,945
Acetone	67641	4,900,113	Potassium Hydroxide	1310583	14,398,223
Sulfuric Acid	7664939	4,488,617	Phosphoric Acid	7664382	7,751,909
Methanol	67561	4,129,555	**Toluene**	108883	7,319,924
Toluene	108883	4,039,476	Sulfuric Acid	7664939	7,045,528
Lead	7439921	2,402,045	**Acetone**	67641	6,976,397
Methyl Ethyl Ketone	78933	2,318,327	Zinc Compounds	1039	5,308,190
Ethylene Glycol	107211	1,857,029	**Methyl Ethyl Ketone**	78933	5,091,187
1-Methyl-2-Pyrrolidone	872504	1,831,813	Ferric Chloride	7705080	4,763,524
Formaldehyde	50000	1,741,145	Glycol Ethers	1022	3,719,788
Acetonitrile	75058	1,105,975	Methyl Methacrylate	80626	3,719,727
Dimethylformamide	68122	1,070,253	Certain PFAS NOL	1300	3,371,693
Hydrochloric Acid	7647010	1,012,739	Antimony Compounds	1000	2,225,022
Aluminum Sulfate	10043013	991,936	**Ethyl Acetate**	141786	1,883,890
Dichloromethane	75092	722,555	Diisocyanates	1050	1,603,218
Nitric Acid	7697372	596,447	Nitrate Compounds	1090	1,544,778
Potassium Hydroxide	1310583	578,762	Styrene Monomer	100425	1,414,002
Zinc Compounds	1039	539,553	Copper	7440508	1,382,640

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 and Copper Compounds would appear in the Top 20 Chemicals Shipped in Product list if trade secret quantities were included.

Table 5 – 2023 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	481,837	Nitrate Compounds	1090	5,437,945
Hydrochloric Acid	7647010	269,922	**Acetone**	67641	4,074,732
Toluene	108883	179,221	**Methanol**	67561	2,749,755
Ammonia	7664417	178,780	Lead	7439921	2,421,000
Ethyl Acetate	141786	167,777	**Toluene**	108883	1,842,791
Formaldehyde	50000	71,895	1-Methyl-2-Pyrrolidone	872504	1,689,838
Methanol	67561	64,887	Ethylene Glycol	107211	1,635,699
Methyl Ethyl Ketone	78933	54,696	Formaldehyde	50000	1,602,666
Glycol Ethers	1022	45,262	**Methyl Ethyl Ketone**	78933	1,318,766
Butyl Acetate-T	540885	33,772	Acetonitrile	75058	1,103,524
Xylene Mixed Isomer	1330207	31,529	Zinc Compounds	1039	923,600
Hexane (N-Hexane)	110543	30,301	Sodium Hydroxide	1310732	777,602
Styrene Monomer	100425	29,456	Dichloromethane	75092	691,913
Trichloroethylene	79016	27,978	**Ethyl Acetate**	141786	549,627
Dichloromethane	75092	27,968	Furan, Tetrahydro-	109999	520,862
Butyraldehyde	123728	24,898	Butyraldehyde	123728	489,364
N Propyl Bromide	106945	19,195	Diethyl Hexyl Phthalate	117817	401,769
1-Methyl-2-Pyrrolidone	872504	18,736	Ferric Chloride	7705080	311,532
Butylacetate	123864	16,644	Lead Compounds	1026	294,103
Phenol	108952	10,024	Dimethyl Formamide	68122	291,865

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. 2023 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 2023 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 2023 the number of lead and lead compounds filers had decreased to 62 and 41, respectively.

Table 6 2023 Persistent Bioaccumulative Toxic (PBT) Chemicals Summary (Excludes Trade Secret Data)							
Substance	Threshold (lbs or grams for dioxin)	# Filers in 2023	Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-Site
Benzo[ghi]-perylene	10	18	3,066	1,360	1,268	0	1,295
Dioxin and Dioxin Compounds	0.1 Gr	5	739	739	0	10	730
Lead	100	62	2,892,477	2,402,045	477,771	195	2,421,000
Lead Compounds	100	41	395,433	293,284	95,519	1,425	292,361
Mercury	10	13	7,560	3,649	4,785	21	3,627
Mercury Compounds	10	1	959	1	1,470	0	1
Polychlorinated Biphenyls	10	1	2,884	2,844	0	0	2,844
Polycyclic Aromatic Compounds	100	21	147,303	48,554	58,197	49	47,155
Tetrabromo-Bisphenol A	10	1	1,713	130	1,712	0	1

Table 7
Pounds of PBTs Reported Use and Number of Facilities Reporting 2000 – 2023 (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	1,841	2	2,641,404	65	289,957	42
2022	6,966	17	1,547	5	6,645	13	871	1	2,138	1	506,417	20	3,421	1	2,764,490	65	224,239	42
2023	3,066	18	739	5	7,560	13	959	1	2,884	1	147,303	21	1,713	1	2,892,477	62	395,433	41

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 2023.

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 2023 the number of trichloroethylene and tetrachloroethylene filers decreased to 6 and 2, respectively.

Table 9 below shows the fourteen HHS chemicals reported in 2023, 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)	95,527(20)	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)
2023	144,197(1)	36,049(1)	5,024,068(3)	359,392(19)	51,251(15)	2,479,488(10)	93,182(15)	1,385,813(14)	1,862,980(22)	55,705(13)	6,078(2)	19,453(2)	91,097(3)	56,058(6)

*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 2023 Higher Hazard Substances (HHS) Summary (Excludes Trade Secret Data)						
Substance and Year Designated as HHS	# Filers in 2023	Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-Site
Cadmium/2008	2	9,453	13,415	11,124	0	3,415
Cadmium Compounds/2008	3	91,097	8,205	10,824	8	8,203
Trichloroethylene/2008	6	56,058	46,302	11,481	27,978	7,651
Tetrachloroethylene/2009	2	6,078	2,103	4,562	2,101	2
Formaldehyde/2012	22	1,862,980	369,676	61,741	71,019	232,134
Hexavalent Chromium Compounds/2012	13	55,705	27,528	21,531	121	18,217
Methylene Chloride/ Dichloromethane/2014	14	1,385,813	722,555	574,666	27,968	691,913
Cyanide Compounds/2016	15	93,182	69,968	2,737	3,649	27,450
Dimethylformamide/2016	10	2,479,488	1,070,253	1,355,980	8,640	291,865
Hydrogen Fluoride/2016	19	359,392	159,847	71,369	2,164	19,119
N-Propyl Bromide/2016	15	51,251	44,494	6,405	19,195	20,993
Toluene-2,4-diisocyanate/2017	1	144,197	4,114	0	1	4,113
Toluene-2,6-diisocyanate/2017	1	36,049	97	0	0	0
Toluene diisocyanate (mixed isomers)/2017	4	5,024,068	251	0	82	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 where 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 2023 data on some of the chemicals identified in the LCSP report that were reported under TURA. In 2023, 16 chemicals identified as asthmagens by the Association of Occupational and Environmental Clinics (AOEC) were reported under TURA. In 2023, Sulfuric Acid was again reported as having the largest usage while Formaldehyde was again 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 (16)	1,160,980	2,212
Chlorine (2)	166,135	9
Chromium (2)	118,557	0
Diethanolamine(1)	46,644	0
Ethylene Oxide (1)	142,777	53
Formaldehyde (22)	1,862,980	71,019
Hydrazine (1)	92,906	0
Maleic Anhydride (1)	470,428	3,814
Methylenebisphenyl (2)	884,635	0
Methyl Methacrylate (4)	5,823,917	3,179
Nickel (3)	316,403	42
Nickel Compounds (3)	280,821	672
Phthalic Anhydride (1)	309,129	209
Styrene Monomer (6)	2,579,320	29,456
Sulfuric Acid (89)	18,247,278	4,861
Toluene Diisocyanate (5)*	5,204,314	82

* 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 2023, 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 (2)	19,453	0
Dioxin (5)*	739	9.734
Ethylene Oxide (1)	142,777	53
Formaldehyde (22)	1,862,980	71,019
Hexavalent Chromium Compounds (13)	55,705	121
Polychlorinated Biphenyls (1)	2,884	0
Nickel Compounds (3)	280,821	672
Trichloroethylene (6)	56,057	27,978

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

VI. 2023 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 2023 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 6). The chemical manufacturing sector also had the greatest percentage of chemical use at 60% (Figure 7), the largest percentage of byproduct at 46% (Figure 8), and the largest percentage of on-site releases at 22%, with the paper manufacturing and waste management and remediation services sectors at 17% and 12%, 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) 22% were the second largest contributor to use but had virtually no impact on byproduct and releases. Waste management and remediation services, paper manufacturing, 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 14% of total byproduct generated (Figure 8). Likewise, waste management and remediation services, which accounted for 4% of total statewide use (Figure 7), accounted for 12% of total on-site releases (Figure 9).

Figure 6 –2023 Number of Facilities by Industrial Sector
Total Number of Facilities = 430
(Includes Trade Secret Data)

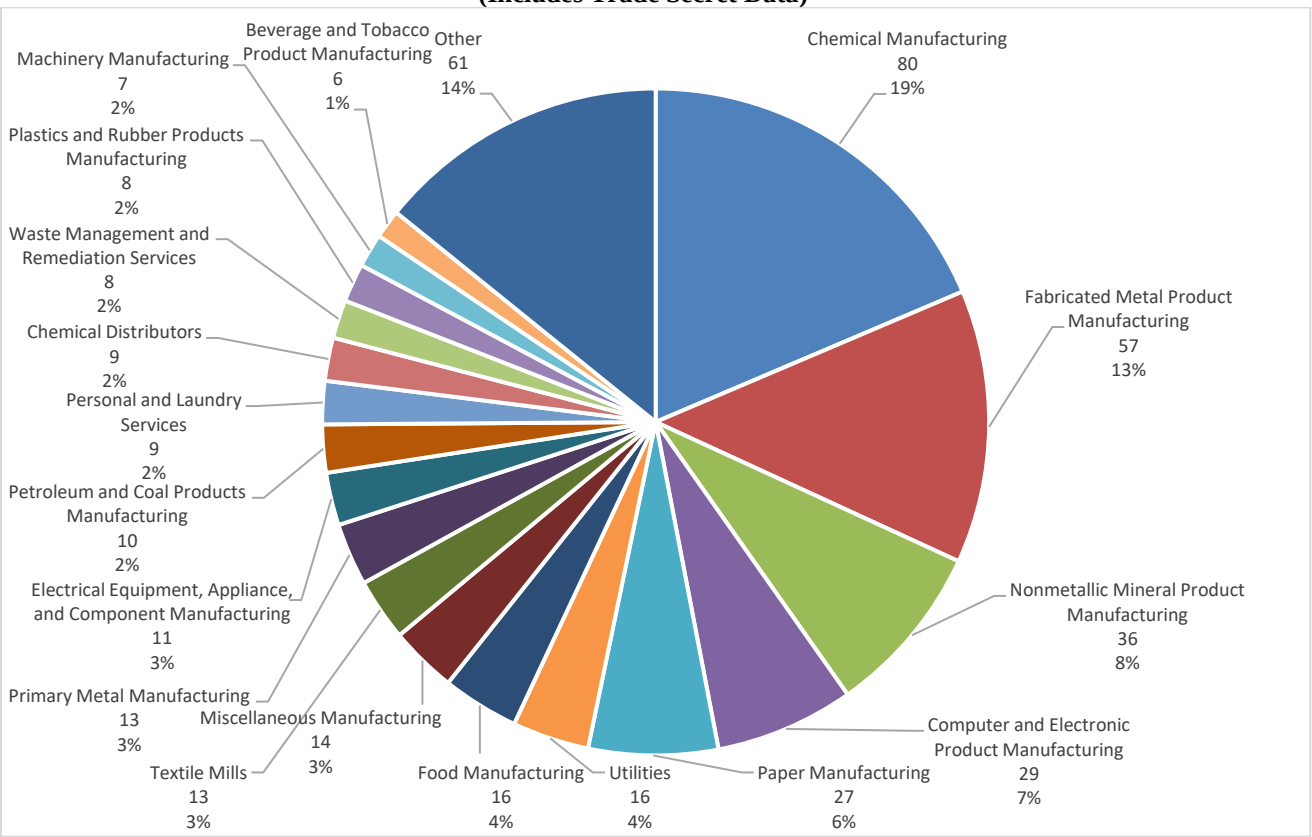


Figure 7 – All Reported Data: 2023 Chemical Use by Industrial Sector
Total Use = 564,000,000 Pounds
(Includes Trade Secret Data)

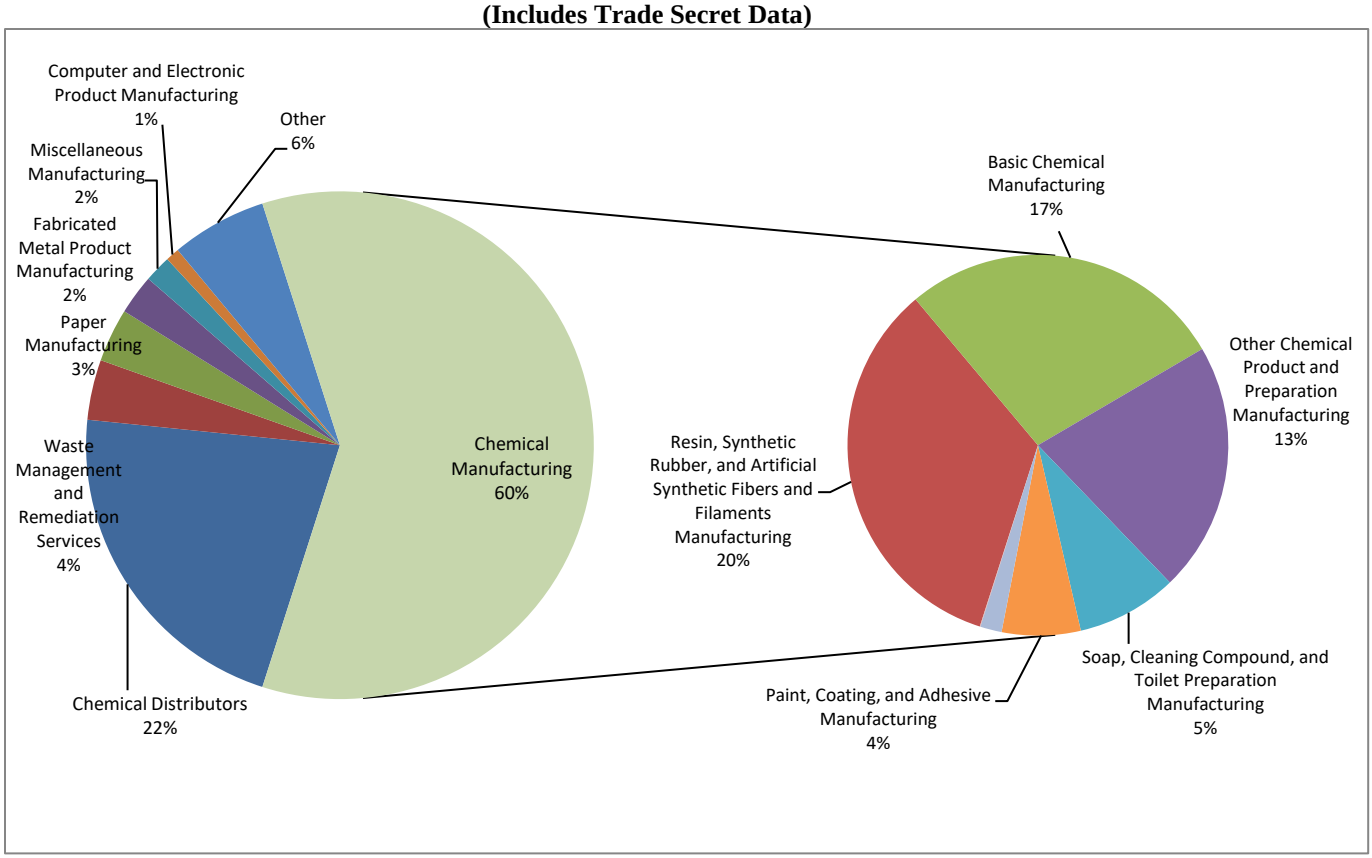


Figure 8 – All Reported Data: 2023 Byproduct Generation by Industrial Sector
Total Byproduct = 63,000,000 Pounds
(Includes Trade Secret Data)

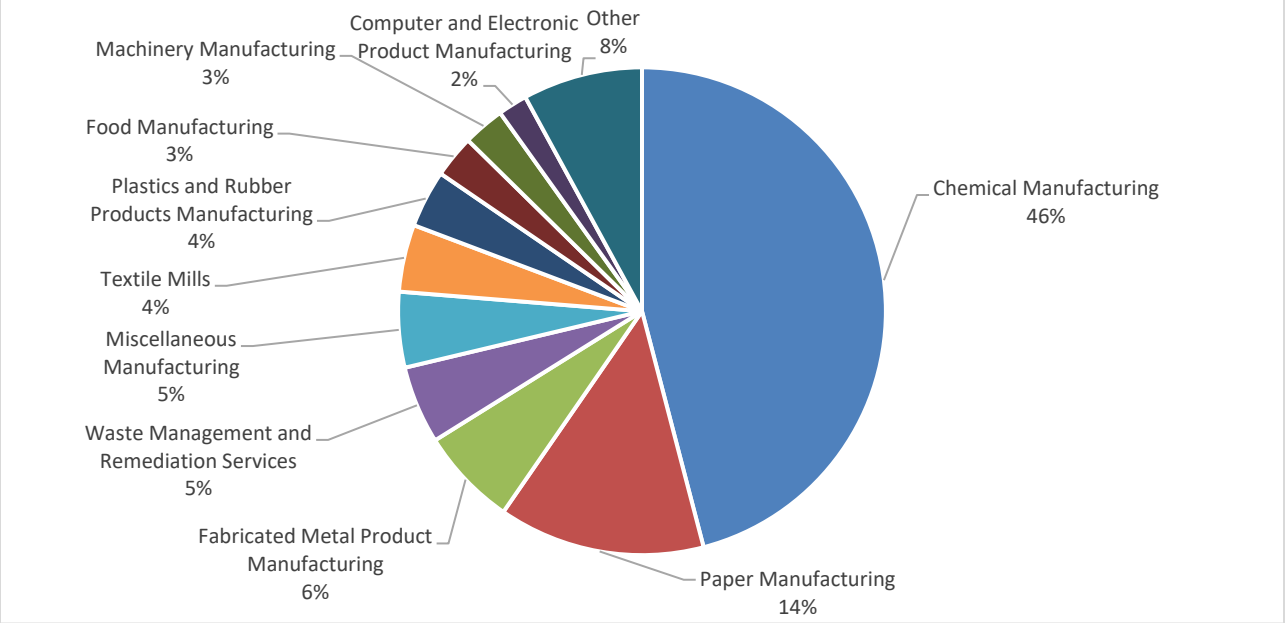
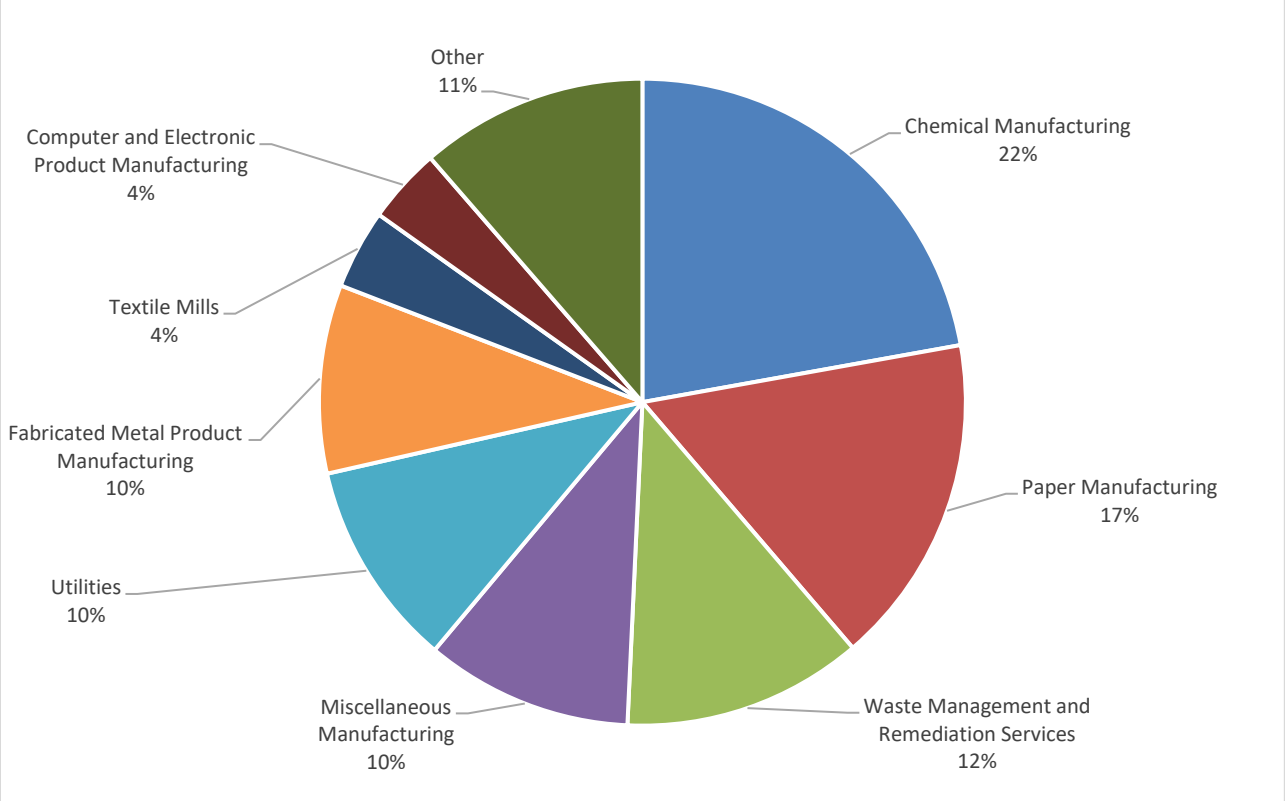


Figure 9 – All Reported Data: 2023 On-Site Releases by Industrial Sector
Total On-Site Releases = 1,900,000 Pounds
(Includes Trade Secret Data)



VII. 2023 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 426 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 37 million pounds of byproduct or 59% of the statewide total. The 20 facilities with the largest quantity shipped in product, shipped 212 million pounds in product, or 89% 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 1.1 million pounds, or 59% of total releases statewide. Four of the Top 20 on-site releases were municipal waste combustors (MWCs), which reported over 252,000 pounds of Hydrochloric Acid, that was coincidentally manufactured during combustion. The 20 facilities with the largest reported quantity of transfers off-site transferred 23 million pounds, or 71% of the total statewide transfers off-site.

Table 12 2023 Top 20 Facilities: Reported Total Use (Includes trade secret data)		
Facility Name	Town	Total Use (Lbs.)
Holland Company Inc	Adams	85,850,930
Borden and Remington Corp	Fall River	58,755,521
Solutia Inc	Springfield	58,119,613
Astro Chemicals Inc	Springfield	39,752,567
Highline Warren LLC	Leominster	34,402,382
Prefere Melamines LLC	Springfield	29,183,214
Rousselot Peabody Inc	Peabody	22,801,817
James Austin Co	Ludlow	16,356,328
Roberts Chemical Co Inc	Attleboro	11,376,958
Semass Partnership	Rochester	10,949,623
Univar Solutions USA LLC	Tewksbury	8,457,440
Webco Chemical Corp	Dudley	6,546,853
Holcim Solutions and Products US LLC	Rockland	6,246,332
Solenis LLC	Chicopee	5,846,309
Synthomer Inc	Fitchburg	5,682,747
Metalor Technologies USA	Attleboro	5,546,595
Future Foam	Mansfield	5,391,991
ISP Freetown Fine Chemicals Inc	Assonet	4,909,207
Covestro LLC	Wilmington	4,801,090
Wheelabrator Millbury Inc	Millbury	4,708,980

Table 13 2023 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	5,800,135	Astro Chemicals Inc	Springfield	35,574,771
Rousselot Peabody Inc	Peabody	4,639,096	Borden and Remington Corp	Fall River	34,827,785
3M Company	Rockland	4,306,926	Highline Warren LLC	Leominster	34,389,944
Thermo Fisher Scientific	Bedford	2,734,549	Holland Company Inc	Adams	26,156,000
Prefere Melamines LLC	Springfield	2,600,434	James Austin Co	Ludlow	16,213,544
Flexcon Company Inc	Spencer	1,989,505	Roberts Chemical Co Inc	Attleboro	11,376,958
Covestro LLC	Wilmington	1,648,819	Solutia Inc	Springfield	9,354,854
Munters Corp	Amesbury	1,558,524	Univar Solutions USA LLC	Tewksbury	8,440,029
Waters Corporation	Taunton	1,219,149	Webco Chemical Corp	Dudley	6,535,648
Veranova LP	Devens	1,196,400	Holcim Solutions and Products US LLC	Rockland	5,855,634
Nitto Denko Avecia Inc	Milford	1,145,213	ISP Freetown Fine Chemicals Inc	Assonet	4,046,681
Nissha Metallizing Solutions Ltd	Franklin	1,128,048	ITW Performance Polymers	Danvers	3,825,582
Kovalus Separation Solutions Inc	Wilmington	1,109,628	Alpha Chemical Services Inc	Stoughton	2,739,964
Metalor Technologies USA	Attleboro	1,066,357	Kidde Fenwal Inc	Ashland	2,424,796
Semass Partnership	Rochester	925,380	Advance Coatings Co	Westminster	2,133,116
Cedars Mediterranean Foods Inc	Haverhill	844,274	Callahan Chemical Company LLC	Walpole	2,034,157
Trelleborg Monson	Monson	791,766	Bostik Inc	Middleton	1,849,812
Barrday Corporation	Millbury	788,749	Mexichem Specialty Compounds Inc	Leominster	1,447,984
Bostik Inc	Middleton	779,576	Nyacol Nano Technologies Inc.	Ashland	1,325,341
Ideal Tape Company	Lowell	764,706	Tricab USA Inc	Worcester	1,256,829

Table 14
2023 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.)
Ideal Tape Company	Lowell	132,596	Solutia Inc	Springfield	4,718,172
Callaway Golf Ball Operations Inc	Chicopee	128,976	Thermo Fisher Scientific	Bedford	2,663,343
Semass Partnership	Rochester	100,103	Prefere Melamines LLC	Springfield	2,100,795
Solutia Inc	Springfield	73,923	Covestro LLC	Wilmington	1,620,510
Nissha Metallizing Solutions Ltd	Franklin	68,247	Waters Corporation	Taunton	1,194,508
Wheelabrator Millbury Inc	Millbury	67,898	Veranova LP	Devens	1,190,469
Covanta Haverhill Inc	Haverhill	60,935	Nitto Denko Avecia Inc	Milford	1,133,957
Jain Americas Inc Nucedar Mills	Chicopee	60,142	Kovalus Separation Solutions Inc	Wilmington	1,078,812
Flexcon Industries	Randolph	55,996	Semass Partnership	Rochester	825,277
Nylco Division Worthen Industries Inc	Clinton	38,783	Bostik Inc	Middleton	748,427
Hazen Paper Co	Holyoke	38,116	Thermo Fisher Scientific	Chelmsford	725,815
Holcim Solutions and Products US LLC	Rockland	36,308	Rousselot Peabody Inc	Peabody	674,999
Smith and Wesson Inc	Springfield	35,530	Ideal Tape Company	Lowell	632,111
Central Metal Finishing Inc	North Andover	35,292	Clean Harbors of Braintree Inc	Braintree	583,352
3M Company	Rockland	35,027	Callaway Golf Ball Operations Inc	Chicopee	532,981
Raytheon Company	Andover	34,172	Veranova LP	North Andover	529,463
Masspower LLC	Indian Orchard	33,303	Genzyme Corporation	Framingham	476,530
Bostik Inc	Middleton	31,151	Entegris Inc	Bedford	460,724
Blackstone Power Generation LLC	Blackstone	29,539	Wheelabrator Saugus Inc	Saugus	452,843
Fore River Energy Center	Weymouth	28,429	Murphys Waste Oil Services Inc	Woburn	434,570

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 2023 at the same reporting threshold. The 2000 Core Group is used to measure progress from 2000. The 2000 Core Group currently covers 86% of the total 397 million pounds of toxic chemicals reported in 2023 (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 2023 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. Table A-1 and Figures A-1 and A-2 below summarize 2000 Core Group TURA data from 2000 to 2023, 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 lowered 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 2023, showing reported and production adjusted quantities. For the 2000 Core Group, the activity index shows an increase in production of 51 percent from 2000 to 2023. As shown below in Table A-1 and Figure A-1, when adjusted for production, as of 2023, the 2000 Core Group facilities have reduced**:**

- toxic chemical use by 78%
- toxic byproducts by 73%
- toxics shipped in product by 65%
- on-site releases of toxics to the environment by 91%
- transfers of toxics off-site for further waste management by 57%.

2000 Core Group Progress without Adjusting for Production

The actual quantities reported by the 2000 Core Group over the period 2000 to 2023 are shown in Figure A-2. These quantities have <u>not</u> been adjusted for changes in production. From 2000 to 2023, Core Group facilities:

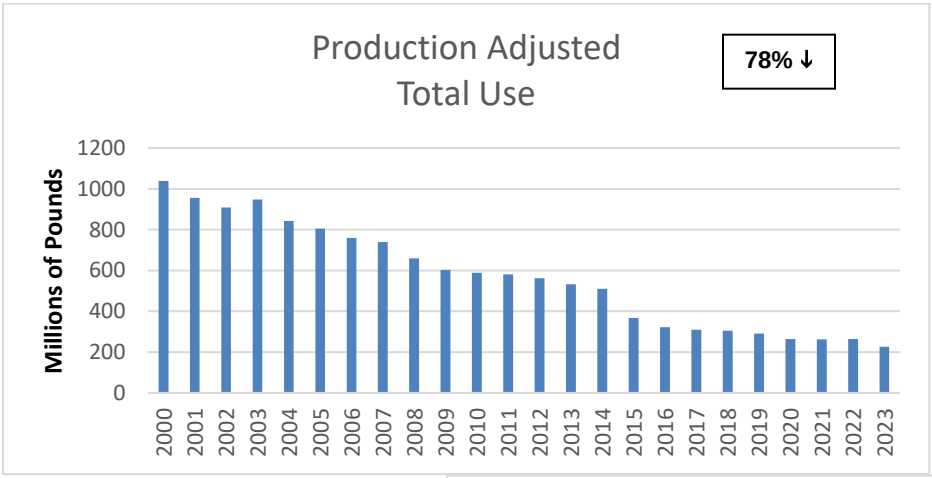
- reduced toxic chemical use by 67% (from 1,038 million to 342 million pounds between 2000 and 2023)
- reduced toxic byproducts by 59% (from 116 million to 48 million pounds between 2000 and 2023)
- reduced toxics shipped in product by 47% (from 359 million to 191 million pounds between 2000 and 2023)
- reduced on-site releases of toxics to the environment by 87% (from 11 million to 1.4 million pounds between 2000 and 2023)
- reduced transfers of toxics off-site for further waste management by 34% (from 27 to 18 million pounds between 2000 and 2023).

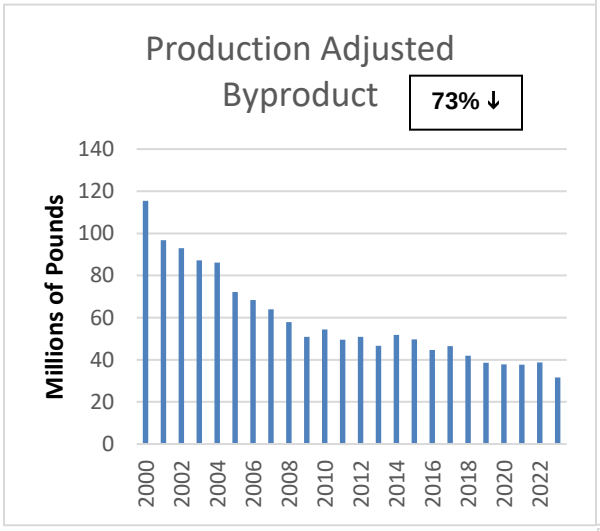
Table A-1
2000 CORE GROUP DATA: 2000 - 2023 TREND SUMMARY
(Quantities are in millions of pounds and do not include trade secret quantities.
Shaded columns show quantities adjusted by cumulative production ratio)

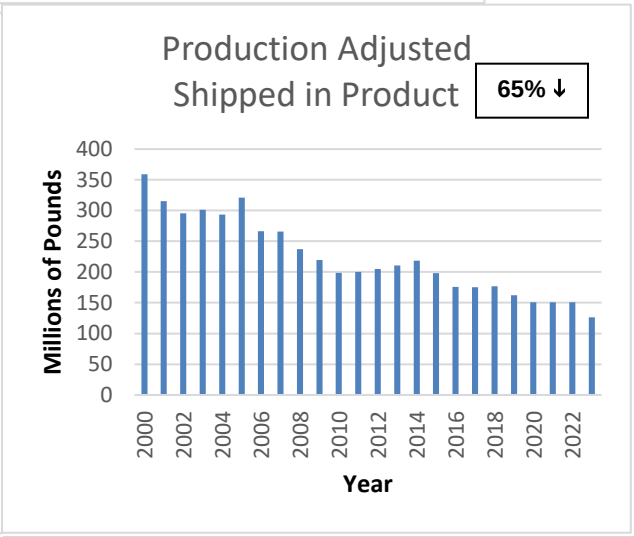
Year	Total Use		Byproduct		Shipped in Product		On-Site Releases		Transfers Off-Site		Production Ratio	
											Year to Year	Cumulative from 2000
2000	1038.40	1038.40	115.50	115.50	358.80	358.80	10.70	10.70	26.90	26.90		
2001	955.40	955.40	96.80	96.80	315.30	315.30	8.70	8.70	21.30	21.30	1.00	1.00
2002	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	56.06	37.71	223.86	150.56	1.53	1.03	20.63	13.88	1.06	1.49
2022	381.35	264.42	55.94	38.79	217.18	150.59	1.46	1.01	21.33	14.79	0.97	1.44
2023	341.92	225.79	47.91	31.64	191.23	126.28	1.40	0.92	17.67	11.67	1.05	1.51
Percent Change 2000-2023	67%	78%	59%	73%	47%	65%	87%	91%	34%	57%		51% Increase

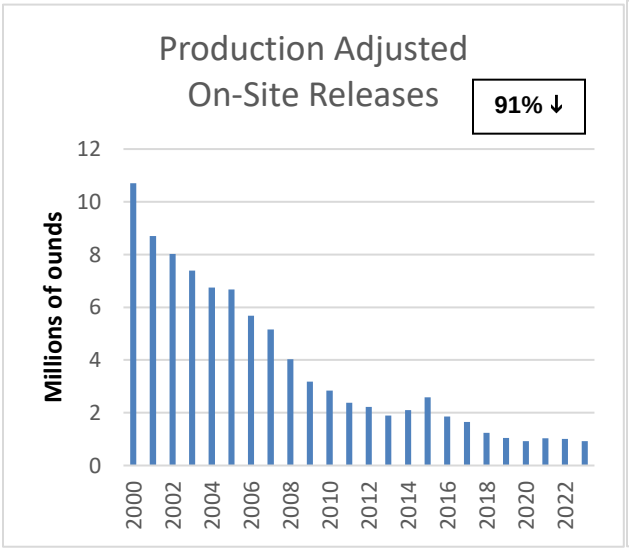
* Styrolution, which used over a quarter of the total reported use (excluding trade secret data) in 2000, ceased operations in Massachusetts in 2014.

Figure A-1 - 2000 Core Group Toxics Use Reduction Progress 2000-2023
Production Adjusted
(Excludes Trade Secret Data)









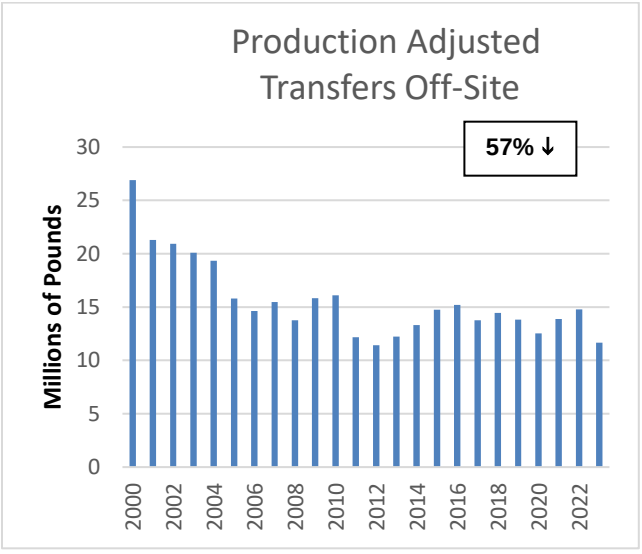
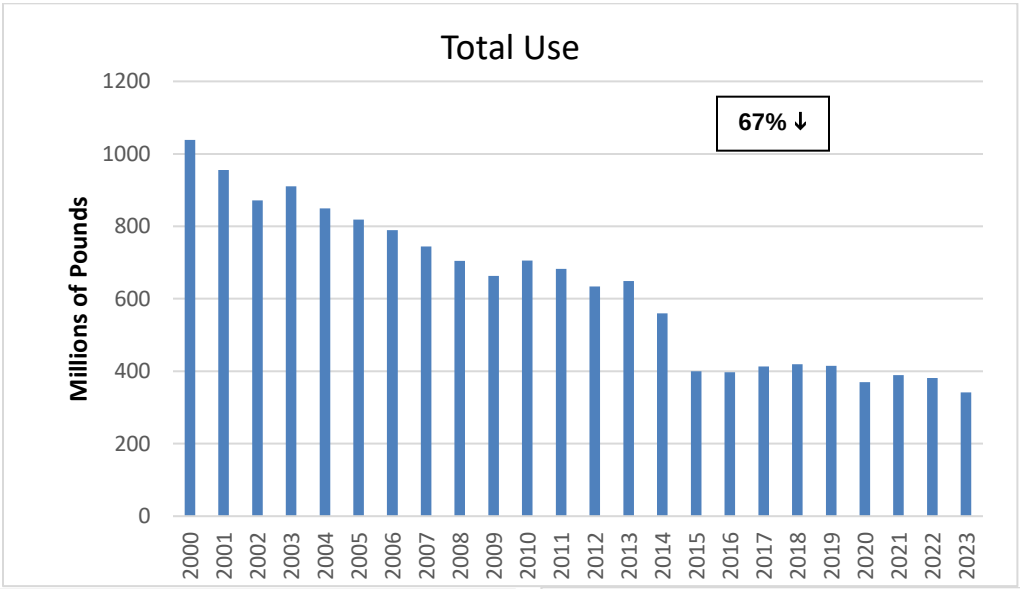
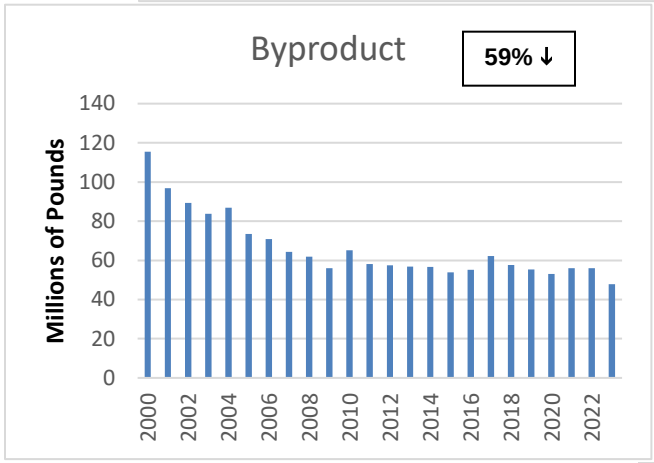
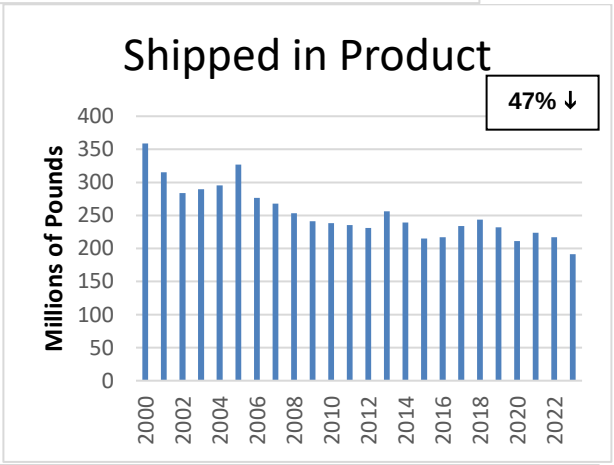
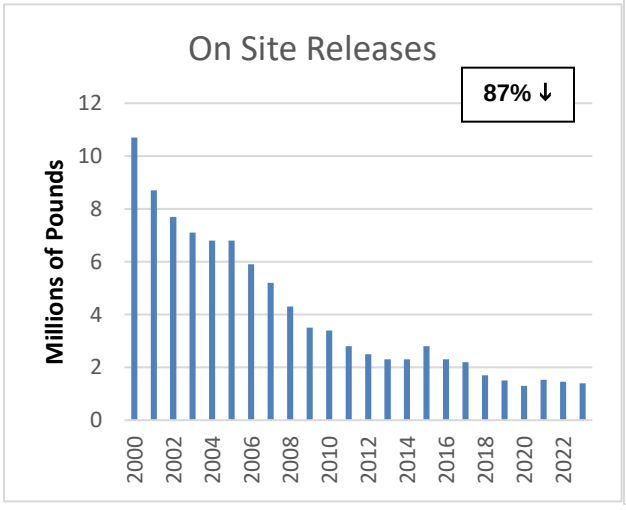


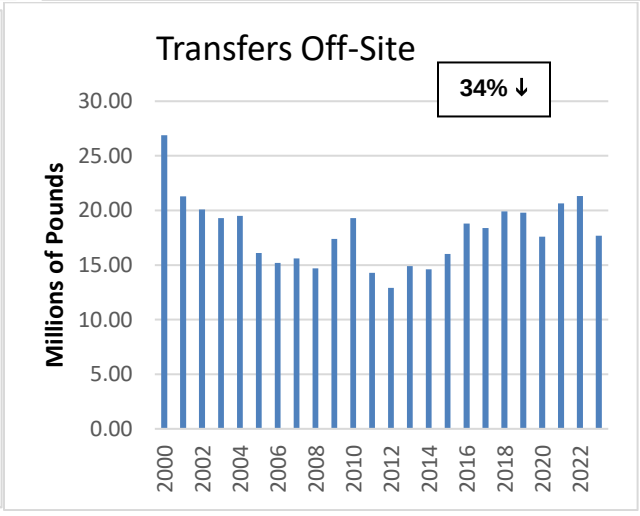
Figure A-2 - 2000 Core Group Toxics Use Reduction Progress 2000-2023
Not Production Adjusted
(Excludes Trade Secret Data)











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