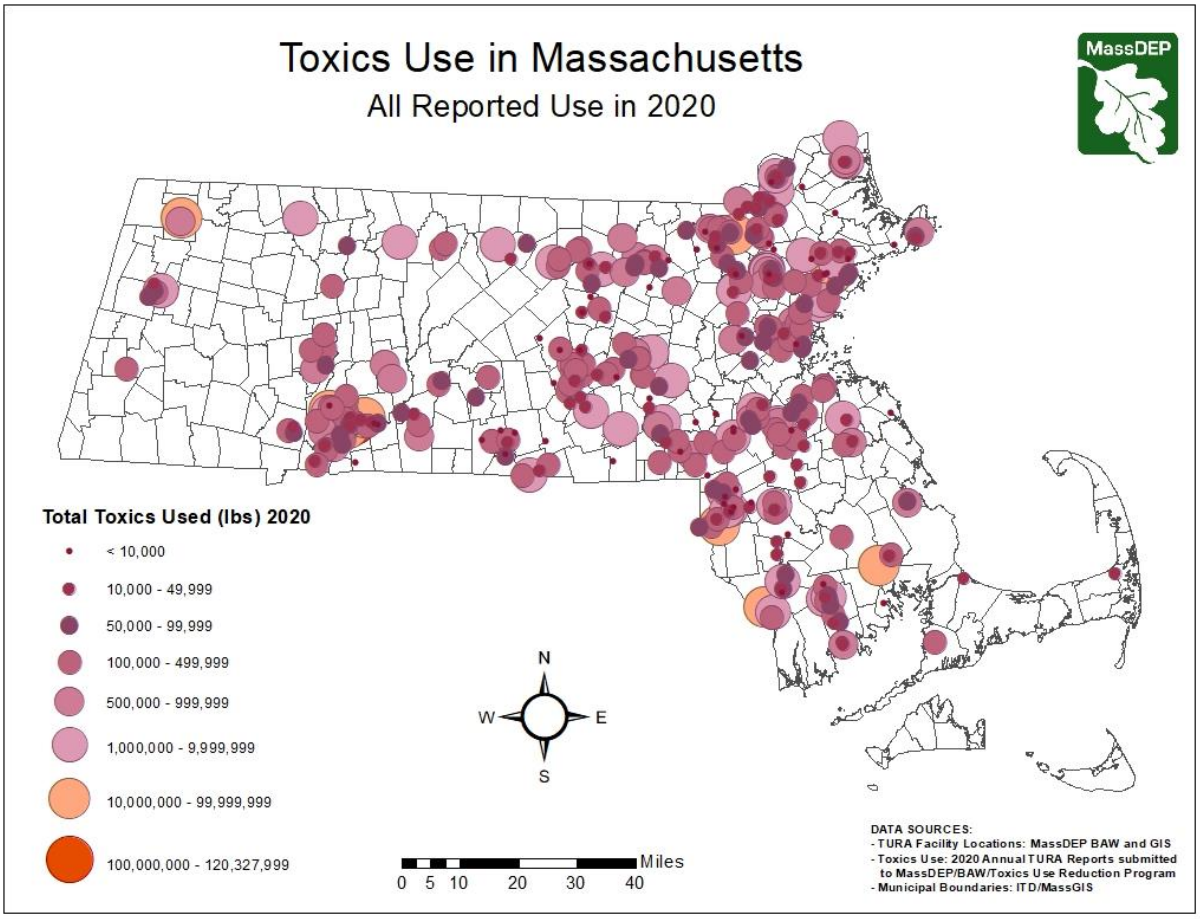
Reporting Year 2020
Toxics Use Reduction
Information Release



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

June 2022

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Executive Summary

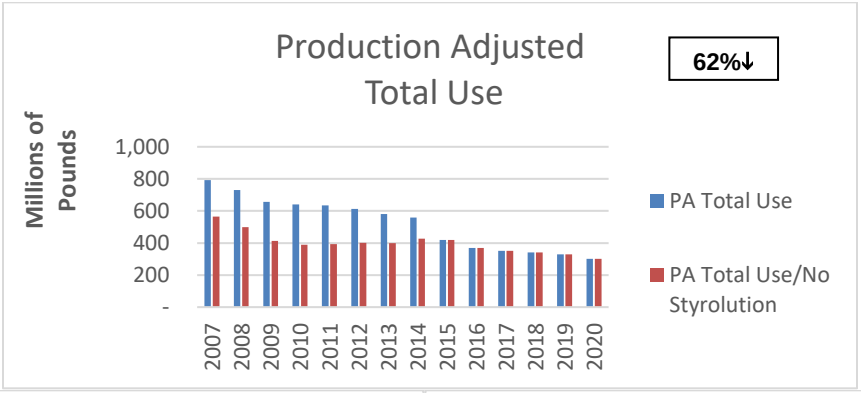
In 1989, the Toxics Use Reduction Act (TURA) (Chapter 21I of the Massachusetts General Laws) was enacted, to protect public health and the environment by promoting reduction in the use of toxic chemicals. TURA established reporting and planning requirements that encourage facilities to use toxic chemicals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

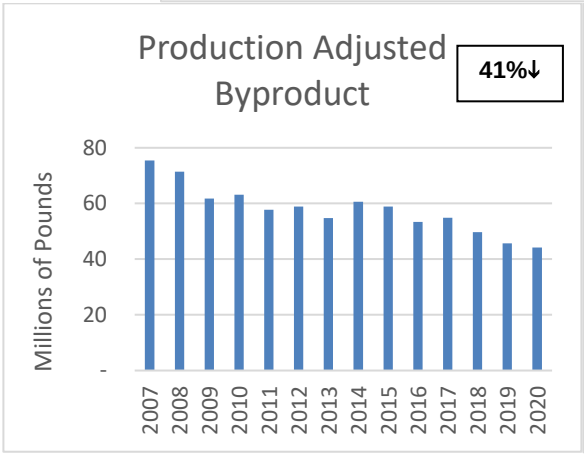
Four hundred and ten (410) facilities reported using 126 different chemicals in 2020. In total (including data submitted as trade secret data – as defined on page 4), from 1990 to 2020, the following reductions were observed:

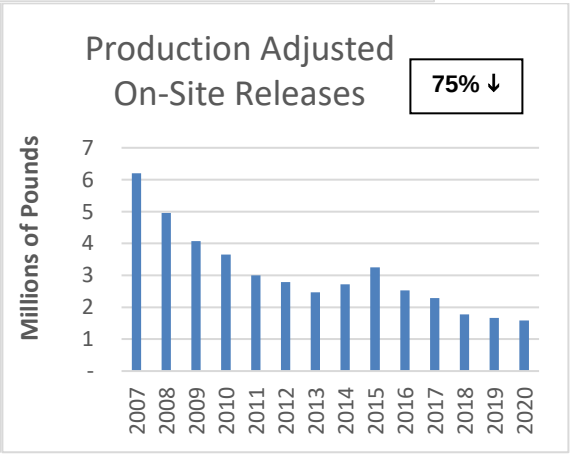
- Chemical Use - from 1.2 to 0.6 billion pounds
- Byproduct Generation - from 127 to 65 million pounds
- Shipped in Product - from 434 to 327 million pounds
- On-Site Releases - from 21 to 2.4 million pounds
- Transfers Off-Site - from 46 to 29 million pounds

As shown in Figure 3, between 2007 and 2020 when adjusted for the reported 38% increase in production, 2007 Core Group (as defined on page 4) facilities reduced:

- toxic chemical use by 62%
- toxic byproducts by 41%
- toxics shipped in product by 42%
- on-site releases of toxics to the environment by 75%
- transfers of toxics off-site for further waste management by 25%.







This report includes the following six sections:

Section I: **Introduction**

Section II: **Key TURA Terms**

Section III: **2020 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: **2020 Chemical Data** summarizes the reported information on chemical use in calendar year 2020 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: **2020 Chemicals of Particular Concern** presents current and historical information on particularly toxic chemicals, on chemicals that promote asthma, and on carcinogens.

Section VI: **2020 Significant Industrial Sectors** describes the relative contributions of different industrial sectors to chemical use, waste, and release.

Section VII: **2020 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 2020 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 2020, 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

This report describes toxic chemical use in Massachusetts in 2020 and progress in toxics use reduction (TUR) under the Toxics Use Reduction Act (TURA). TURA was enacted in 1989 to reduce the risks to the public, workers, and the environment from exposure to toxic chemicals. Rather than taking the then traditional "command and control" approach to pollution control and worker health and safety, TURA created a process to encourage Massachusetts facilities to reduce the amount of toxics used and wasted in their production processes. TURA requires Large Quantity Toxics Users (LQTUs, hereinafter referred to as filers) to submit annual reports to the Massachusetts Department of Environmental Protection (MassDEP). These reports detail the quantity of the listed chemicals they use, ship in or as product, generate as byproduct (waste -- neither shipped in product nor converted to another chemical during the production process), release to the environment as pollution, and ship offsite for waste treatment and disposal. Facilities are filers if they meet the following criteria:

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

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

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

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

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

Office of Technical Assistance (OTA)

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

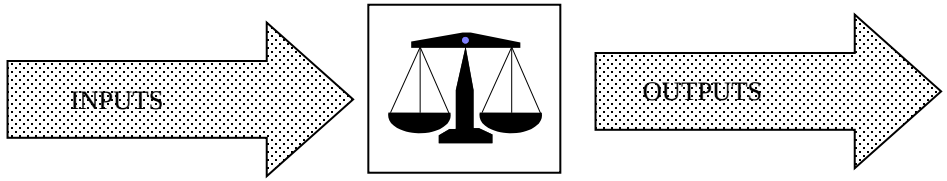
Toxics Use Reduction Institute (TURI)

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

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 brought into the facility and 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 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 as a result use is calculated differently than byproduct. For metal compounds, use is calculated as the total amount of the compound while byproduct is calculated as only the amount of the parent metal in the compound.



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

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

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

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

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

III. 2020 Toxics Use Reduction Progress

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

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

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

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

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

As shown in Figure 1, 126 of the over 1,500 TURA listed substances were reported in 2020. 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, 2020 TURA Chemical Data). The number of filers has declined from 456 in 2019 to 410 in 2020, in part as a reflection of the decline in business in 2020 due to the COVID pandemic. Regulated facilities submit one Form S for each substance reported. The number of individual substance reports submitted has followed a similar trend, decreasing from a high of 2,666 in 1994, to 1,388 in 2019, and 1,294 in 2020, 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 0.6 billion pounds in 2020. Byproduct generation decreased from 127 million pounds in 1990 to 65 million pounds in 2020.

Figure 1
# of TURA Filers, Individual Chemical Reports, and Different Chemicals Reported (1990-2020)
(Including Trade Secret Data)

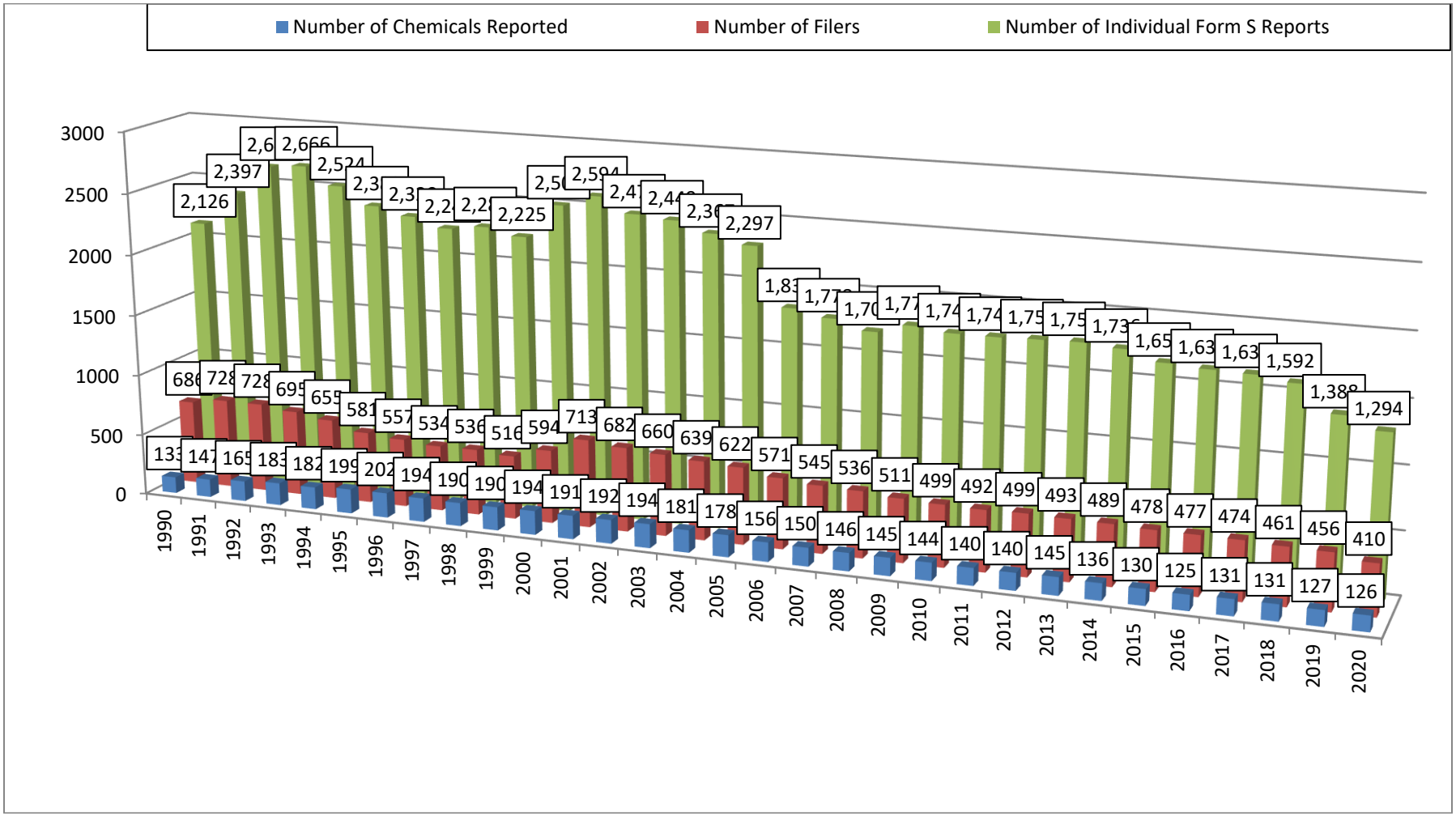
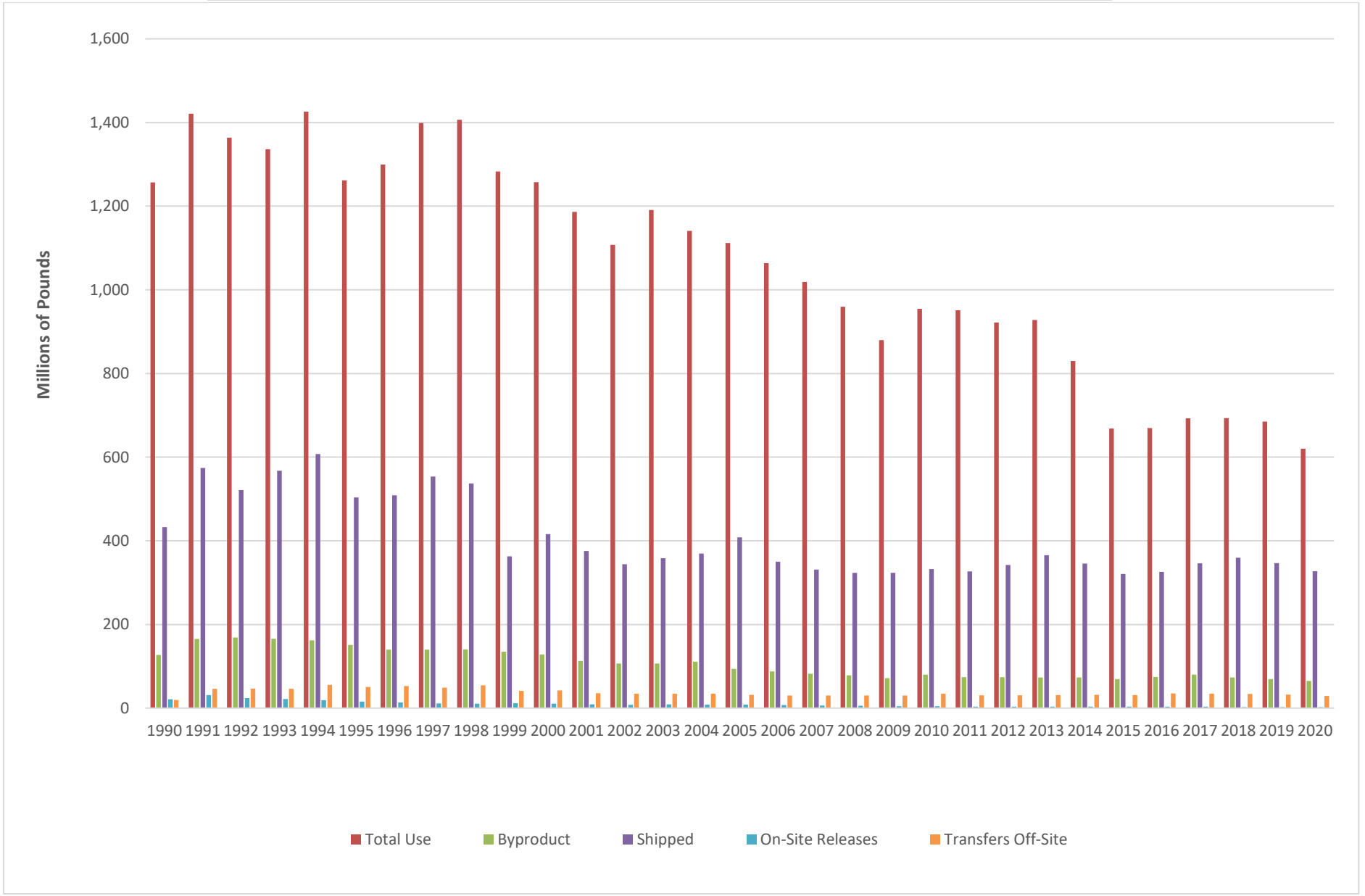


Figure 2
Raw Reported Data on the Pounds of Total Use, Generated as Byproduct, Shipped in or as Product, Released On-Site and Transferred Off-Site for Treatment or Disposal
Reporting Years 1990-2020 (includes trade secret data)



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

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

The "2007 Core Group" is made up of chemicals and industrial categories that were subject to reporting in 2007 and that remain subject to reporting, at the same reporting thresholds in 2020. The 2007 Core Group covered 100% of the reported data in 2007. It currently covers 94% of the total 419 million pounds of toxic chemicals reported in 2020 (excluding trade secret data). The "2000 Core Group" includes all industry categories and chemicals that were subject to TURA reporting in 2000 and remained subject to reporting in 2020 at the same reporting threshold. The 2000 Core Group is used to measure progress from 2000. The 2000 Core Group includes 349 filers, which represents 85% of the 2020 TURA filers (excluding trade secret data).

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

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

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

Progress in Toxics Use Reduction: 2007 Core Group

The 2007 Core Group includes all industry categories and chemicals that were subject to TURA reporting in 2007 and remained subject to reporting in 2020 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 384 filers, which represents 94% of the 2020 TURA filers. Table 1 and Figures 3 and 4 below summarize TURA data from 2007 to 2020, excluding trade secret data.

2007 Core Group Progress: Adjusting for Production

Table 1 below summarizes TURA data from 2007 to 2020, showing reported and production adjusted quantities. For the 2007 Core Group, the activity index shows an increase in production of 41 percent from 2007 to 2020. As shown below in Table 1 and Figure 3, when adjusted for production, as of 2020, the 2007 Core Group facilities have reduced**:**

- toxic chemical use by 62%
- toxic byproducts by 41%
- toxics shipped in product by 42%
- on-site releases of toxics to the environment by 75%
- transfers of toxics off-site for further waste management by 25%.

2007 Core Group Progress without Adjusting for Production

The actual quantities reported by the 2007 Core Group over the period 2007 to 2020 are shown in Figure 4. These quantities have not been adjusted for changes in production. From 2007 to 2020, Core Group facilities:

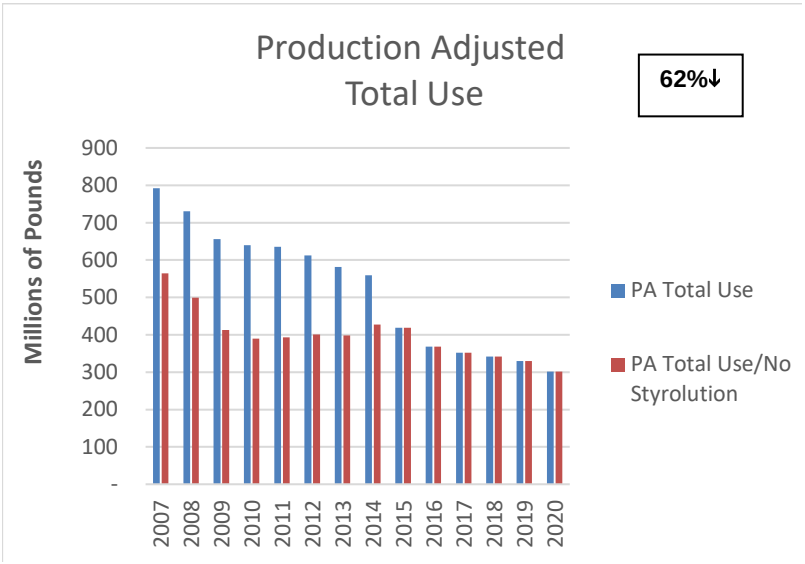
- reduced toxic chemical use by 47% (from 792 million to 417 million pounds between 2007 and 2020)
- reduced toxic byproducts by 19% (from 75 million to 61 million pounds between 2007 and 2020)
- reduced toxics shipped in product by 20% (from 271 million to 217 million pounds between 2007 and 2020)
- reduced on-site releases of toxics to the environment by 65% (from 6 million to 2 million pounds between 2007 and 2020)
- increased transfers of toxics off-site for further waste management by 4% (from 25 to 26 million pounds between 2007 and 2020).

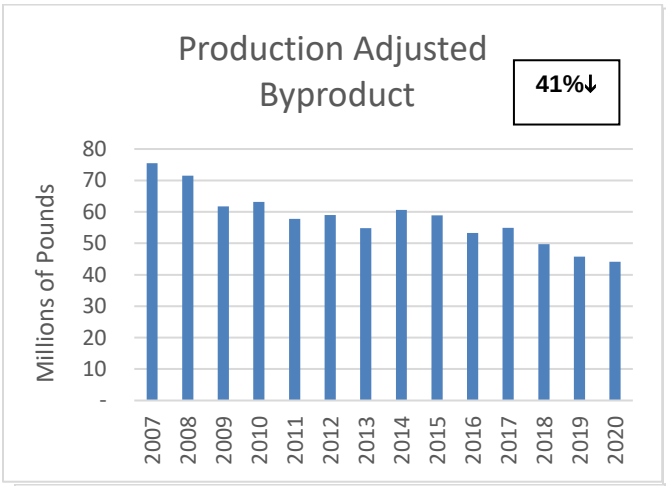
Table 1
2007 CORE GROUP DATA: 2007 - 2020 TREND SUMMARY
(Quantities are in millions of pounds and do not include trade secret quantities.
Shaded columns show quantities adjusted by cumulative production ratio)

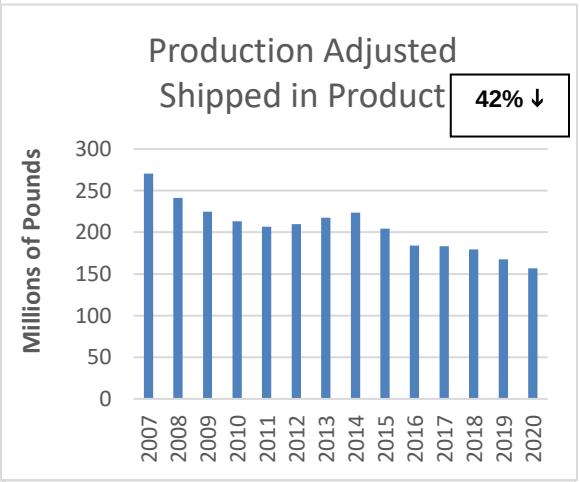
Year	Total Use		Byproduct		Shipped in Product		On-Site Releases		Transfers Off-Site		Production Ratio	
											Year to Year	Cumulative from 2007
2007	792.07	792.07	75.44	75.44	270.58	270.58	6.20	6.20	24.93	24.93	1	
2008	774.30	730.47	75.76	71.47	255.91	241.42	5.25	4.95	27.62	26.06	1.06	1.06
2009	708.85	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
Percent Change 2007-2020	47% Reduction	62% Reduction	19% Reduction	41% Reduction	20% Reduction	42% Reduction	65% Reduction	75% Reduction	4% Increase	25% Reduction		38% Increase

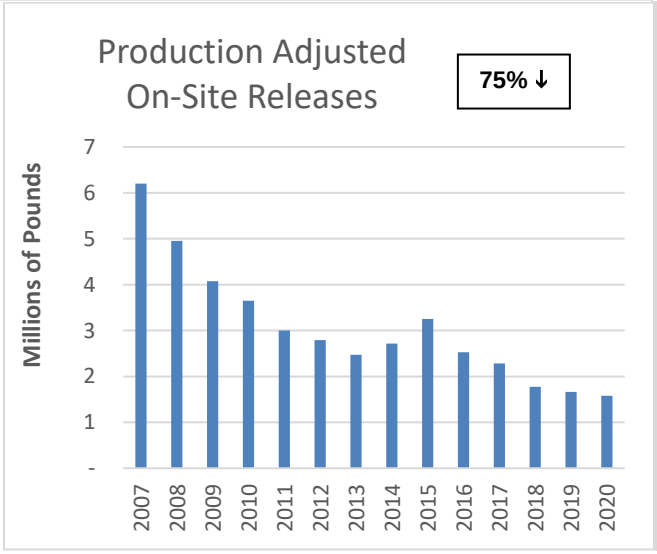
* Styrolution, which used over a quarter of the total reported use (excluding trade secret data) in 2007, ceased operations in Massachusetts in 2014.

Figure 3 – 2007 Core Group Toxics Use Reduction Progress 2007-2020
Production Adjusted
(Excludes Trade Secret Data)









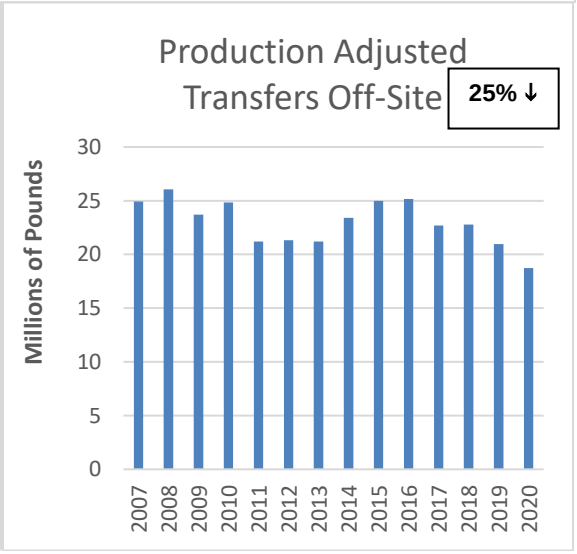
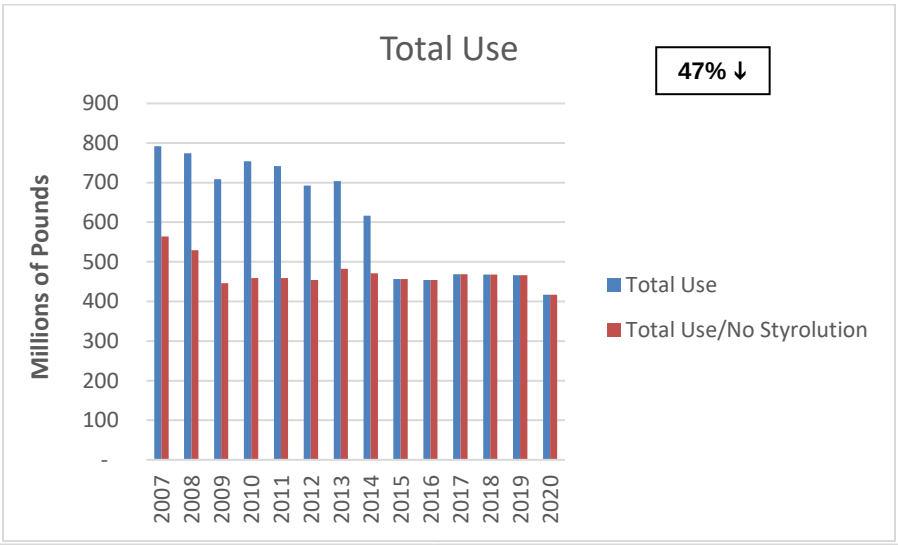
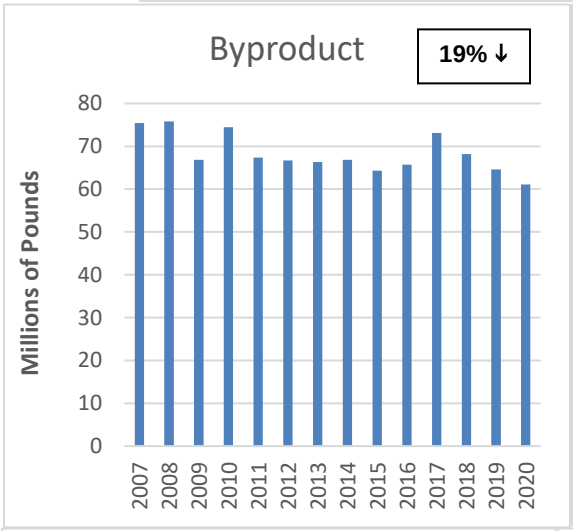
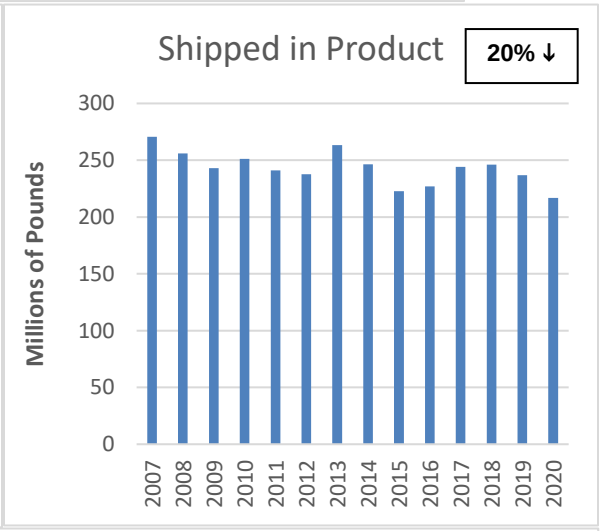
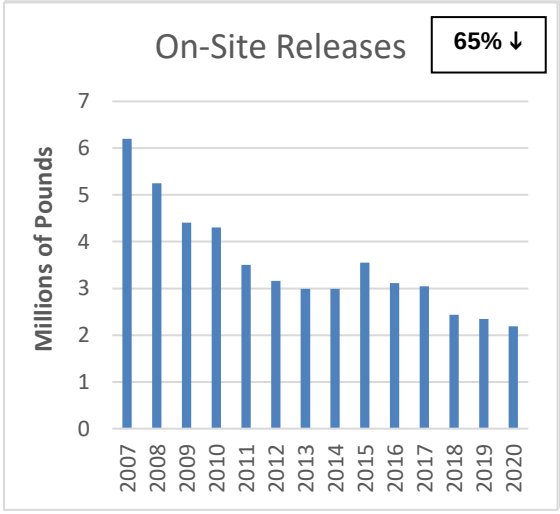


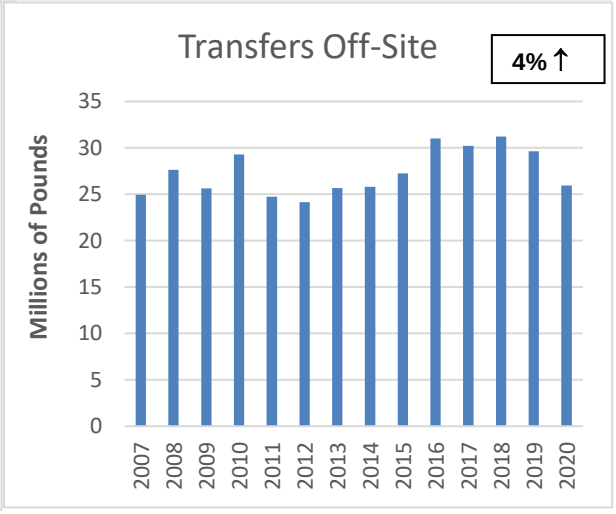
Figure 4 – 2007 Core Group Toxics Use Reduction Progress 2007-2020
Not Production Adjusted
(Excludes Trade Secret Data)











Progress in Toxics Use Reduction: 2000 Core Group

The 2000 Core Group includes all industry categories and chemicals that were subject to TURA reporting in 2000 and remained subject to reporting in 2020 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. The 2000 Core Group includes 349 filers, which represents 85% of the 2020 TURA filers. Table 2 and Figures 5 and 6 below summarize TURA data from 2000 to 2020, excluding trade secret data. In addition to the filers excluded from the 2007 Core Group, the 2000 Core Group excludes reports discontinued when the TURA reporting threshold was raised for certain manufactured and processed chemicals to match the EPA TRI threshold, and also lead and lead compound reports due to the lowered 2001 PBT thresholds.

2000 Core Group Progress: Adjusting for Production

Table 2 below summarizes TURA data from 2000 to 2020, showing reported and production adjusted quantities. For the 2000 Core Group, the activity index shows an increase in production of 40 percent from 2000 to 2020. As shown below in Table 2 and Figure 5, when adjusted for production, as of 2020, the 2000 Core Group facilities have reduced**:**

- toxic chemical use by 75%
- toxic byproducts by 67%
- toxics shipped in product by 58%
- on-site releases of toxics to the environment by 91%
- transfers of toxics off-site for further waste management by 53%.

2000 Core Group Progress without Adjusting for Production

The actual quantities reported by the 2000 Core Group over the period 2000 to 2020 are shown in Figure 6. These quantities have not been adjusted for changes in production. From 2000 to 2020, Core Group facilities:

- reduced toxic chemical use by 64% (from 1,038 million to 370 million pounds between 2000 and 2020)
- reduced toxic byproducts by 54% (from 116 million to 53 million pounds between 2000 and 2020)
- reduced toxics shipped in product by 41% (from 359 million to 211 million pounds between 2000 and 2020)
- reduced on-site releases of toxics to the environment by 88% (from 11 million to 1 million pounds between 2000 and 2020)
- reduced transfers of toxics off-site for further waste management by 35% (from 27 to 18 million pounds between 2000 and 2020).

Table 2
2000 CORE GROUP DATA: 2000 - 2020 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	341.70	248.29	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
2000-2020	64% Reduction	75% Reduction	54% Reduction	67% Reduction	41% Reduction	58% Reduction	88% Reduction	91% Reduction	35% Reduction	53% Reduction		40% Increase

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

Figure 5 – 2000 Core Group Toxics Use Reduction Progress 2000-2020
Production Adjusted
(Excludes Trade Secret Data)

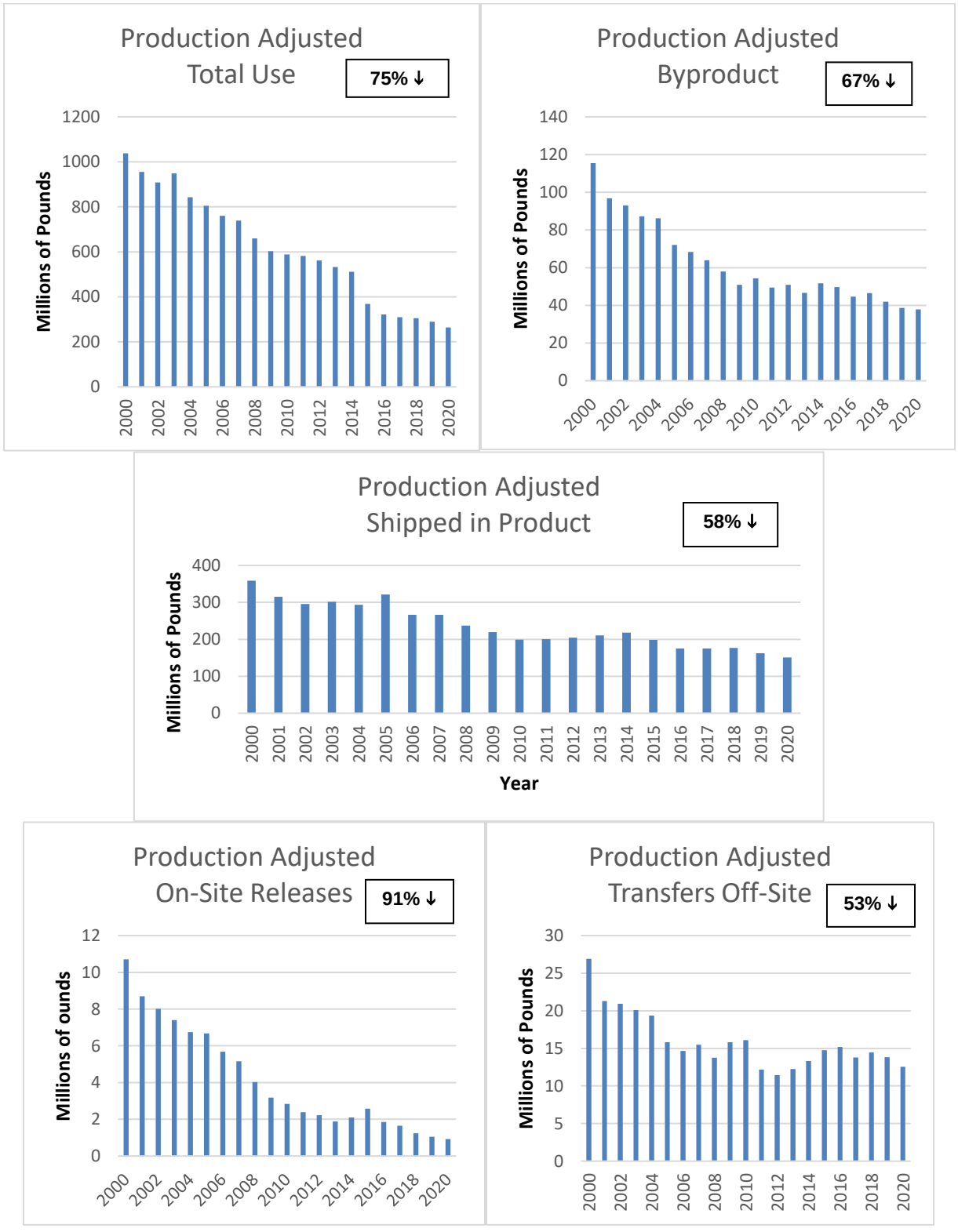
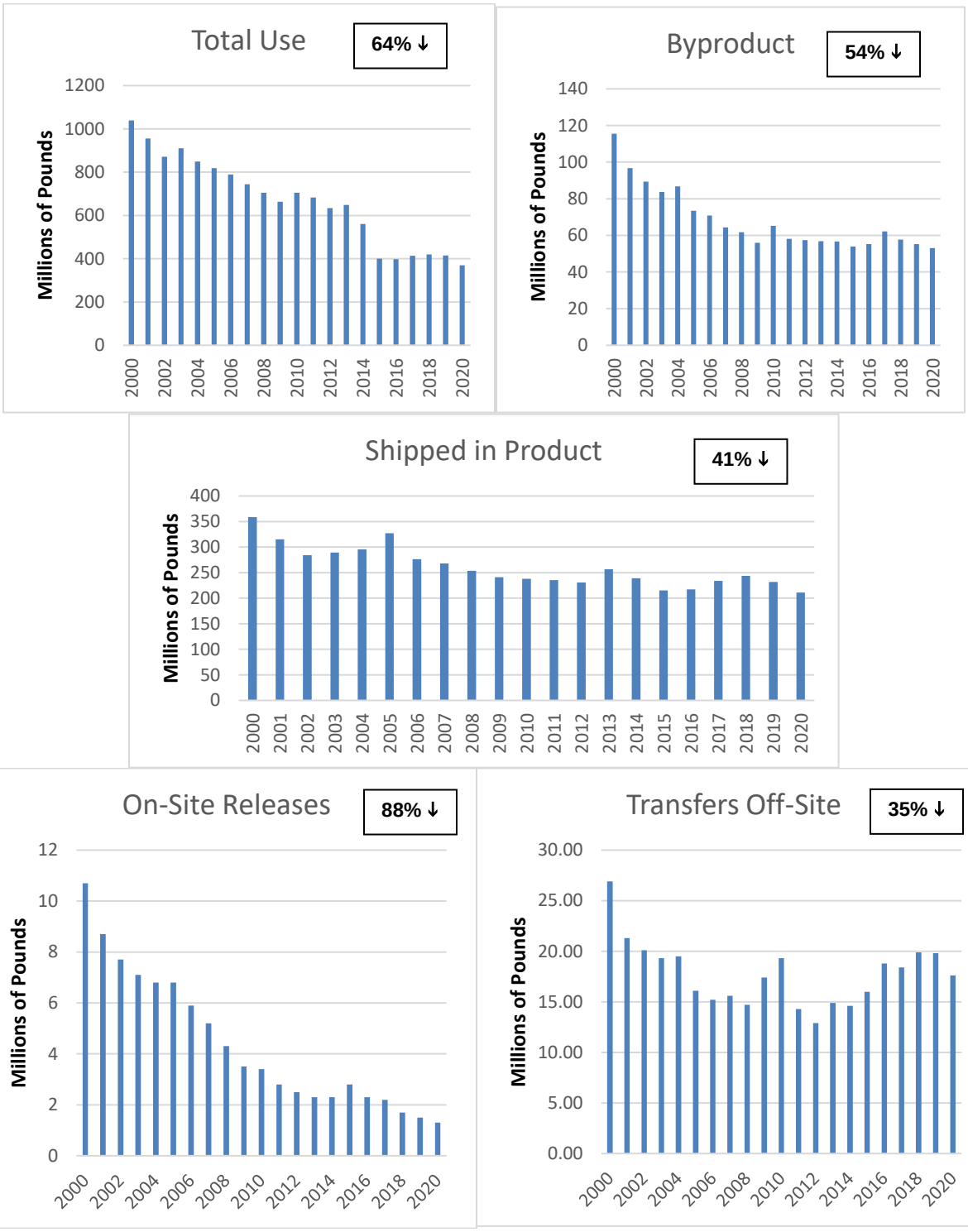


Figure 6 – 2000 Core Group Toxics Use Reduction Progress 2000-2020
Not Production Adjusted
(Excludes Trade Secret Data)



IV. 2020 TURA Chemical Data

Table 3 All Reported Chemical Data 2020 (Rounded to millions of pounds) (Includes Trade Secret Data)		
TOTAL USE	620,000,000	
SHIPPED IN PRODUCT	327,000,000	53% of total chemical use
GENERATED AS BYPRODUCT (total waste prior to treatment or disposal)	65,000,000	11% of total chemical use
ON-SITE RELEASES (to air, water or land disposal)	2,400,000	0.4% of total chemical use 4% of total byproduct
TRANSFERS OFF-SITE (to a wastewater treatment plant, recycling or waste management facility for treatment or disposal)	29,000,000	5% of total chemical use 44% of total byproduct

Trade Secret

Under certain circumstances facilities have the right to claim that the amount of chemical used and generated as byproduct is a trade secret. Provided that the regulatory standards for making such a claim are met and the Commissioner has not made a determination that the information is not a trade secret, MassDEP may not share that information. In 2020, nine facilities made trade secret claims on a combined total of:

- 201 million pounds of chemical use
- 3.5 million pounds of byproduct generation
- 109 million pounds shipped in product.

Chemical Use by Use Category

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

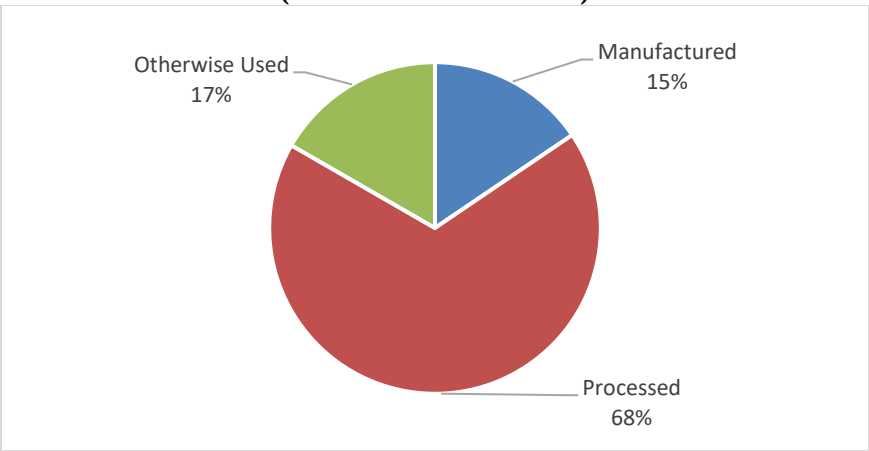
Manufacture is defined in TURA, in part, as "to produce, prepare, import or compound a toxic or hazardous substance". For example, the intentional manufacture of a chemical substance such as formaldehyde or the "coincidental" (unintentional) manufacture of chemicals such as the creation of sulfuric acid from fuel combustion for power generation and the production of nitrate compounds as a result of using nitric acid to treat wastewater. Chemicals that are imported are also counted as "manufactured". Manufacturing represented 15% of total chemical use in 2020.

Process is defined in TURA, in part, as "the preparation of a toxic or hazardous substance, after its manufacture, for distribution in commerce". Most chemical use in Massachusetts is processed. Chemicals processed accounted for 68% of 2020 total chemical use.

Otherwise Use is defined in the TURA regulations (310 CMR 50.10), in part, as "any use of a toxic substance that is not covered by the terms "manufacture" or "process". These substances are neither chemically converted nor incorporated directly into a product. Examples include chemicals used to clean parts prior to plating for finishing, chemical solvents used to carry a coating that evaporates off the product as the coating dries, catalysts, chemicals contained in fuels that are combusted, and chemicals used in waste treatment operations. Chemicals "otherwise used" accounted for 17% of 2020 total chemical use.

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

Figure 7
2020 Total Use by Category
(620 Million Pounds)
(includes trade secret data)



Top 20 Chemicals

In 2020, filers reported using 126 out of the over 1,500 TURA-listed substances in amounts above the reporting threshold. The data was analyzed by chemical to identify the top 20 chemicals in each of the following amounts: used, generated as byproduct, shipped in product, released on-site as pollution, and shipped off-site for treatment or disposal.

Chemical Use

As shown in Table 4 below, the top 20 chemicals used in 2020 accounted for 84%, (351 million pounds) of the total reported (trade secret data was excluded to protect confidentiality claims). The top four chemicals, Sodium Hydroxide (15% of total use, 142 facilities, 65 million pounds), Hydrochloric Acid (14% of total use, 40 facilities, 61 million pounds), Sodium Hypochlorite (9% of total use, 26 facilities, 39 million pounds), and Methanol (9% of total use, 28 facilities, 37 million pounds), and accounted for over half of the total reported use (excluding trade secret data) in the state.

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

- 90% of the total reported byproducts (including trade secret data)
- 89% of the total reported shipped in product (excluding trade secret data)
- 93% of the total on-site releases (including trade secret data)
- 93% of the total off-site transfers (including trade secret data).

Hydrochloric Acid was the top chemical for on-site releases, accounting 19% of the statewide total of on-site releases (almost 464,000 pounds). Ninety-four (94) percent of hydrochloric acid releases were from municipal waste combustors. Lead was the second top chemical for on-site releases. Eighty-three (83) 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.

Nitrate compounds were the top chemicals for transfers offsite, accounting for 14% of the statewide total transfers off-site (6 million pounds). Nitrate compounds were primarily coincidentally manufactured during neutralization of nitric acid in wastewater treatment and were discharged to Publicly Owned Wastewater Treatment Plants. Ninety-two (92) percent of total transfers off-site of lead, the fifth chemical on the list, was attributed to four municipal waste combustors that transferred lead in ash to off-site lined landfills.

Table 4 – 2020 Top 20 Chemicals: Total Use *These quantities do not include Trade Secret Data*		
Chemical Name (CAS #)	**CAS #**	**Total Use (Lbs.)**
Sodium Hydroxide	1310732	64,675,105
Hydrochloric Acid	7647010	60,584,808
Sodium Hypochlorite	7681529	39,163,532
Methanol	**67561**	37,418,830
Sulfuric Acid	7664939	19,934,427
Potassium Hydroxide	1310583	16,833,658
Ammonia	7664417	12,462,776
Toluene	**108883**	11,268,960
Diisocyanates	1050	10,992,957
Acetone	**67641**	10,799,764
Nitrate Compounds	1090	10,507,179
Phosphoric Acid	7664382	8,294,686
Ethyl Acetate	141786	7,856,251
Methyl Ethyl Ketone	**78933**	7,521,770
Zinc Compounds	1039	7,445,037
Ethylene Glycol	107211	5,891,677
Ferric Chloride	7705080	5,219,968
Nitric Acid	7697372	5,184,250
Epichlorohydrin	106898	4,861,814
Chlorine	7782505	4,565,218

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

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

Table 5 – 2020 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	8,938,979	Sodium Hydroxide	1310732	38,470,384
Sodium Hydroxide	1310732	7,584,377	Sodium Hypochlorite	7681529	36,547,798
Sulfuric Acid	7664939	5,811,947	**Methanol**	**67561**	34,869,051
Nitrate Compounds	1090	4,602,762	Potassium Hydroxide	1310583	14,177,330
Acetone	**67641**	4,499,702	Ammonia	7664417	9,101,279
Toluene	**108883**	4,066,587	**Toluene**	**108883**	7,063,145
Ethylene Glycol	107211	2,960,608	Phosphoric Acid	7664382	6,852,023
Methanol	**67561**	2,782,906	Sulfuric Acid	7664939	6,738,597
Hydrochloric Acid	7647010	2,505,102	**Acetone**	**67641**	6,136,826
Lead	7439921	2,481,954	**Methyl Ethyl Ketone**	**78933**	5,194,599
Methyl Ethyl Ketone	**78933**	2,225,828	Ferric Chloride	7705080	4,530,110
1-Methyl-2-Pyrrolidone	872504	1,791,148	Zinc Compounds	1039	4,449,979
Formaldehyde	50000	1,625,935	Toluene Diisocyanate	26471625	4,267,209
Aluminum Sulfate	10043013	1,541,114	Glycol Ethers	1022	2,341,174
Acetonitrile	75058	1,387,712	Antimony Compounds	1000	2,321,965
Dimethylformamide	68122	1,214,175	Methyl Methacrylate	80626	2,134,965
Potassium Hydroxide	1310583	1,003,983	Nitrate Compounds	1090	2,126,489
Nitric Acid	7697372	659,294	Dimethylformamide	68122	2,112,647
Dichloromethane	75092	545,110	Copper Compounds	1015	1,939,703
Zinc Compounds	1039	461,297	Ethylene Glycol	107211	1,861,789

NOTE: Bolded chemicals are on the Top 20 Chemicals for Total Use, Byproduct Generation, Shipped in Product, On-Site Releases, and Transfers Off-Site.
Ethyl Acetate, Hydrochloric Acid and Sodium Bisulfite would appear in the Top 20 Chemicals Shipped in Product list if trade secret quantities were included.

Table 6 – 2020 Top 20 Chemicals:
Reported On-Site Releases and Transfers Off-Site

On-Site Releases *These quantities include Trade Secret Data*			Transfers Off-Site *These quantities include Trade Secret Data*		
Chemical Name	**(CAS #)**	**On-Site Releases (Lbs.)**	**Chemical Name**	**(CAS #)**	**Transfers Off-Site (Lbs.)**
Hydrochloric Acid	7647010	463,545	Nitrate Compounds	1090	4,049,763
Lead	7439921	454,537	**Acetone**	**67641**	3,841,497
Acetone	**67641**	317,554	Ethylene Glycol	107211	2,972,372
Ethyl Acetate	141786	199,201	**Methanol**	**67561**	2,220,179
Ammonia	7664417	187,552	Lead	7439921	2,123,472
Toluene	**108883**	165,479	1-Methyl-2-Pyrrolidone	872504	1,697,185
Formaldehyde	50000	73,322	**Toluene**	**108883**	1,660,013
Methyl Ethyl Ketone	**78933**	47,917	Formaldehyde	50000	1,485,732
Methanol	**67561**	47,112	Acetonitrile	75058	1,384,098
Trichloroethylene	79016	41,515	**Methyl Ethyl Ketone**	**78933**	955,946
Butyl Acetate-T	540885	34,204	Zinc Compounds	1039	734,965
Xylene Mixed Isomer	1330207	32,534	Sodium Hydroxide	1310732	723,001
Dichloromethane	75092	31,491	Dichloromethane	75092	510,479
1-Methyl-2-Pyrrolidone	872504	28,884	Ethyl Acetate	141786	458,718
N Propyl Bromide	106945	23,713	Dimethylformamide	68122	366,662
Butyraldehyde	123728	22,810	Diethylhexyl Phthalate	117817	348,457
Hexane (N-Hexane)	110543	18,901	Copper Compounds	1015	327,257
Butyl Acetate	123864	16,564	Ferric Chloride	7705080	326,286
Butyl Alcohol	71363	16,518	Furan, Tetrahydro-	109999	300,095
Glycol Ethers	1022	15,890	Lead Compounds	1026	206,966

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. 2020 Chemicals of Particular Interest

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

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

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

Persistent Bioaccumulative Toxic (PBT) Chemicals

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

Table 7 below shows the 2020 reported data and the number of filers for each PBT (excluding trade secret data). Nine PBTs are reported in Massachusetts. Five of these (dioxin, polycyclic aromatic compounds, benzoperylene and mercury and mercury compounds) are chiefly associated with combustion at resource recovery facilities, power plants, and the manufacture of concrete and asphalt paving.

Table 8 below shows each PBT's chemical use since the year before it was designated as a PBT. The chemical use increased from zero to hundreds of pounds when the PBT designation occurred. The pounds of these combustion related chemicals increased again in 2002 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. Eighty-two (82) percent of the use of lead was released as a result of combustion of fuel by power plants and the combustion of waste by municipal waste combustors.

Lowering the reporting threshold to 100 pounds in 2001 resulted in an increase in the number of facilities reporting lead from 15 in reporting year 2000, to 152 in 2001, and an increase in the number of facilities reporting lead compounds from 33 in 2000, to 129 in 2001. However, in 2020 the number of lead and lead compounds filers had decreased to 61 and 39, respectively.

Table 7 2020 Persistent Bioaccumulative Toxic (PBT) Chemicals Summary (Excludes Trade Secret Data)							
Substance	Threshold (lbs or grams for dioxin)	# Filers in 2020	Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-Site
Benzo[ghi]-perylene	10	16	2,312	746	1,304	0	746
Dioxin and Dioxin Compounds	0.1 Gr	7	2,114	2,114	0	195	1,926
Lead	100	61	2,949,336	2,481,954	497,549	454,537	2,123,472
Lead Compounds	100	39	307,433	205,278	93,478	390	205,329
Mercury	10	15	11,447	2,394	3,317	351	865
Mercury Compounds	10	1	615	5	802	0	5
Polychlorinated Biphenyls	10	2	22,356	22,356	0	0	22,357
Polycyclic Aromatic Compounds	100	17	82,299	6,366	50,351	102	6,213
Tetrabromo-Bisphenol	10	1	337	17	320	0	17

Table 8
Pounds of PBTs Reported Use and Number of Facilities Reporting 2000 – 2020
(Excludes Trade Secret Data)

	Benzo[ghi]-perylene (191242)		Dioxin and Dioxin Compounds (1060)		Mercury (7439976)		Mercury Compounds (1028)		Poly-Chlorinated Biphenyls (1336363)		Polycyclic Aromatic Compounds (1040)		Tetra-bromo-bisphenolA (79947)		Lead (7439921)		Lead Compounds (1026)	
	Lbs Use	#	Grams Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#
1999	0	0	0	0	0		0	0	0	0	37,539,261	6	0	0				
2000	146,531	120	12	8	4,973	11	90,009	6	118,160	2	14,171,986	158	332	1	1,261,842	15	9,855,146	33
2001	180,326	127	12	8	9,315	13	676	5	83,890	2	13,849,697	151	115	1	1,284,199	152	7,290,727	129
2002	123,429	122	13	8	5,922	13	1,765	5	64,981	2	11,148,250	149	19,057	1	912,922	143	5,146,270	114
2003	125,099	119	11,827	17	11,476	20	1,212	6	37,325	2	11,486,388	136	152	1	3,394,134	140	5,982,308	117
2004	128,874	114	3,033	16	12,629	20	966	7	46,879	2	11,796,370	133	0	0	3,651,671	109	5,279,027	126
2005	128,809	109	6,696	17	10,444	22	1,031	6	21,741	2	11,128,163	127	0	0	3,763,242	114	3,689,910	126
2006	49,376	27	761	15	13,351	19	1,011	6	22,042	2	3,735,104	31	0	0	4,811,219	102	2,279,105	111
2007	49,412	28	1,155	13	13,733	19	1,101	5	110,303	3	5,051,904	29	0	0	4,172,982	90	1,406,092	104
2008	33,393	25	1,523	13	12,231	20	3,421	6	156,170	3	3,275,212	30	0	0	3,799,929	90	1,241,717	93
2009	12,403	24	1,951	11	10,515	17	1,610	5	42,757	3	1,168,637	28	4,596	1	4,130,556	73	971,451	84
2010	4,275	21	1,980	9	11,434	16	1,161	4	71,091	2	382,534	26	4,875	2	3,208,423	75	736,262	73
2011	3,177	23	2,811	9	15,826	17	1,307	5	72,654	2	283,498	27	7,235	3	3,080,576	75	569,666	66
2012	2,712	23	2,650	9	7,795	16	157	2	83,372	2	206,532	26	7,242	3	3,289,441	79	654,024	63
2013	4,832	22	1,847	9	6,619	17	639	4	126,857	3	523,396	26	5,881	2	3,531,726	76	754,176	61
2014	10,570	21	1,841	10	4,451	17	653	3	88,354	2	1,055,061	24	3,015	2	3,653,822	69	835,041	55
2015	10,692	21	1,762	8	6,867	17	1,000	2	59,887	1	1,398,282	24	4,466	2	3,427,441	62	956,565	53
2016	7,318	21	2,094	8	8,479	16	1,365	2	45,621	1	576,833	23	3,418	2	3,213,445	65	730,746	54
2017	5,229	21	2,012	8	8,392	18	703	2	39,383	1	347,984	23	2,760	2	3,180,516	65	709,517	48
2018	6,597	20	1,622	7	7,627	14	694	1	31,933	1	478,357	23	179	1	3,343,195	59	579,158	49
2019	3,304	19	2,571	7	8,261	16	590	1	11,999	1	177,093	22	239	1	3,072,221	58	478,676	43
2020	2,312	16	2,114	7	11,447	15	615	1	22,356	2	82,299	17	337	1	2,949,336	61	307,433	39

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

Higher Hazard Substances (HHS)

Other higher hazard chemicals, beyond PBTs covered above, are also reported under TURA. The 2006 amendments to TURA directed the Council to categorize the TURA list of chemicals into higher or lower hazard substances, or to leave them uncategorized and lowered the reporting threshold for higher hazard substances (HHS) to 1,000 pounds for all uses. Table 9 below shows the pounds of each HHS reported and the number of facilities reporting it from the year before it was designated as a HHS to 2020.

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 2020 the number of trichloroethylene and tetrachloroethylene filers decreased to 10 and 4, respectively.

Table 10 below shows the fourteen HHS chemicals reported in 2020, including the number of filers, byproduct generation, shipped in product, on-site releases, and transfers off-site.

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

NAME	Toluene -2,4- diisocya -nate	Toluene -2,6- diisocya -nate	Toluene diisocya- nate (mixed isomers)	Hydro- gen fluoride	N- Propyl Bromide	Dimethyl- forma- mide	Cyanide Com- pounds	Methyl- ene Chloride (Dichloro- methane)	Formal- dehyde	Hexa- valent Chrom- ium	Tetra- chloro- ethylene	Cadmium	Cadmium Compounds	Tri- chloro- ethyl- ene
CAS	584849	91087	26471625	7664393	106945	68122	1016	75092	50000	1216	127184	7440439	1004	79016
HHS Start Year	**2017**	**2017**	**2017**	**2016**	**2016**	**2016**	**2016**	**2014**	**2012**	**2012**	**2009**	**2008**	**2008**	**2008**
				POUNDS OF USE (NON-TRADE SECRET)										
2007													184,400	604,671
2008											230,345	**29,429**	**167,355**	**536,073**
2009											**176,186**	28,969	145,324	556,457
2010											151,918	23,970	242,702	294,836
2011									4,027,226	*	163,773	26,878	180,654	303,076
2012									**4,119,146**	**121,504**	89,216	29,805	181,666	354,351
2013								3,496,421	4,011,427	113,466	110,550	20,447	210,550	176,891
2014								**3,031,438**	3,276,305	103,595	164,606	16,655	217,235	262,811
2015				365,928	30,295	3,518,824	71,695	2,629,094	3,017,674	92,490	320,950	20,312	128,953	243,143
2016	456,803	114,201	5,669,556	**483,633**	**102,998**	**3,845,720**	**118,955**	2,628,375	3,157,440	77,657	909,566	17,707	155,687	239,983
2017	**510,809**	**127,702**	**5,392,008**	237,428	90,008	3,871,715	142,450	2,781,125	3,070,622	89,696	346,348	16,991	153,463	224,882
2018	403,297	100,824	5,126,282	209,972	93,218	3,611,244	146,777	2,500,120	3,370,832	77,103	73,318	20,162	142,058	274,876
2019	511,236	97,970	4,317,010	289,620	60,812	3,700,160	130,347	1,683,395	2,793,325	70,409	71,100	19,403	119,549	172,080
2020	339,901	70,322	4,354,197	183,254	44,829	3,430,060	113,506	1,390,043	1,993,394	75,821	33,747	22,215	100,364	180,097
	Number of TURA Filers													
2007													1	9
2008											4	**5**	**6**	**27**
2009											**23**	4	7	23
2010											18	4	7	16
2011									9	*	19	4	5	17
2012									**25**	**16**	16	6	5	14
2013								11	27	16	18	6	6	15
2014								**24**	25	15	16	4	6	14
2015				6	2	9	3	25	23	14	11	3	6	13
2016	1	1	3	**25**	**23**	**13**	**14**	20	22	14	12	3	6	15
2017	**1**	**1**	**5**	27	22	12	15	20	23	14	12	3	5	13
2018	1	1	4	24	19	12	14	18	23	13	9	4	7	13
2019	2	1	4	22	17	13	14	18	23	12	7	3	5	11
2020	2	1	5	22	12	10	14	15	22	13	4	3	4	10

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

Table 10 2020 Higher Hazard Substances (HHS) Summary (Excludes Trade Secret Data)						
Substance and Year Designated as HHS	# Filers in 2020	Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-Site
Cadmium/2008	3	22,215	1,957	19,809	0	1,957
Cadmium Compounds/2008	4	100,364	7,421	14,575	12	7,408
Trichloroethylene/2008	10	180,097	67,812	66,438	41,515	16,542
Tetrachloroethylene/2009	4	33,747	6,080	7,194	5,449	48
Formaldehyde/2012	22	1,993,394	348,299	85,931	72,226	209,191
Hexavalent Chromium Compounds/2012	13	75,821	34,895	38,684	135	13,461
Methylene Chloride/ Dichloromethane/2014	15	1,390,043	545,110	801,601	31,491	510,479
Cyanide Compounds/2016	14	113,506	73,637	1,212	56	32,122
Dimethylformamide/2016	10	3,430,060	1,214,175	2,112,647	14,996	366,662
Hydrogen Fluoride/2016	22	183,254	137,121	35,719	1,149	8,524
N-Propyl Bromide/2016	12	44,829	44,829	0	23,713	17,872
Toluene-2,4-diisocyanate/2017	1	70,322	84	0	0	0
Toluene-2,6-diisocyanate/2017	2	339,901	568	0	0	0
Toluene diisocyanate (mixed isomers)/2017	5	4,354,197	537	4,267,209	128	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 11 below summarizes 2020 data on some of the chemicals identified in the LCSP report that were reported under TURA. In 2020, 16 chemicals identified as asthmagens by the Association of Occupational and Environmental Clinics (AOEC) were reported under TURA. In 2020, Sulfuric Acid was reported as having the largest usage while Formaldehyde was reported as having the largest amount of on-site releases.

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

Chemical Name (Number of Facilities)	Use	On-Site Releases
Acetic Acid (13)	1,408,923	1,868
Aluminum (1)	64,260	20
Chlorine (3)	4,565,218	297
Chromium (3)	194,096	19
Diethanolamine(1)	753,700	7
Ethylene Oxide (1)	244,507	255
Formaldehyde (22)	1,993,394	72,226
Hydrazine (3)	283,826	7
Maleic Anhydride (1)	311,485	517
Methyl Methacrylate (4)	4,328,837	2,086
Nickel (4)	518,763	47
Nickel Compounds (5)	729,826	2,395
Phthalic Anhydride (1)	207,233	52
Styrene Monomer (4)	3,729,520	5,363
Sulfuric Acid (92)	19,934,427	5,268
Toluene Diisocyanate (8)*	4,764,420	128

* 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 2020, eight IARC Group 1 carcinogens were reported under TURA (see Table 12). The largest amount of use was reported for Formaldehyde and Nickel Compounds. Formaldehyde was reported as having the largest amount of releases and these releases were reported by the most facilities. Releases were primarily air releases; however, there were also releases to water and land.

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

Chemical Name (Number of Facilities)	Use	On-Site Releases
Cadmium (3)	22.215	0
Dioxin (7)*	2114.10	194.75
Ethylene Oxide (1)	244,507	255
Formaldehyde (22)	1,993,394	72,226
Hexavalent Chromium Compounds (13)	75,821	135
Polychlorinated Biphenyls (2)	22,356	0
Nickel Compounds (5)	729,826	2,395
Trichloroethylene (10)	180,097	41,516

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

VI. 2020 Significant Industrial Sectors

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

Figures 8 through 11 present, by sector, the 2020 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 21% (Figure 8). The chemical manufacturing sector also had the greatest percentage of chemical use at 60% (Figure 9), the largest percentage of byproduct at 42% (Figure 10), and the second largest percentage, along with utilities, of on-site releases at 19% (Figure 11). This sector is a diverse group of industries and includes facilities that "manufacture" chemicals according to the TURA definition as well as facilities that "process" chemicals to formulate adhesives, paints, pharmaceuticals, and plastic materials and resins. The chemical manufacturing sector is broken into further sectors in Figure 9.

Chemical distributors at (Figure 9) 21% were the second largest contributor to use but had virtually no impact on byproduct and releases. Paper manufacturing, waste management and remediation services, fabricated metal processors, and utilities were other sectors with substantial contributions to byproduct and releases. The paper manufacturing sector, which accounted for 2% of total statewide use (Figure 7), accounted for 16% of total byproduct generated (Figure 10). Likewise, waste management and remediation services, which accounted for 4% of total statewide use (Figure 9), had the highest contribution of on-site releases at 31% (Figure 11).

Figure 8 –2020 Number of Facilities by Industrial Sector
Total Number of Facilities = 410
(Includes Trade Secret Data)

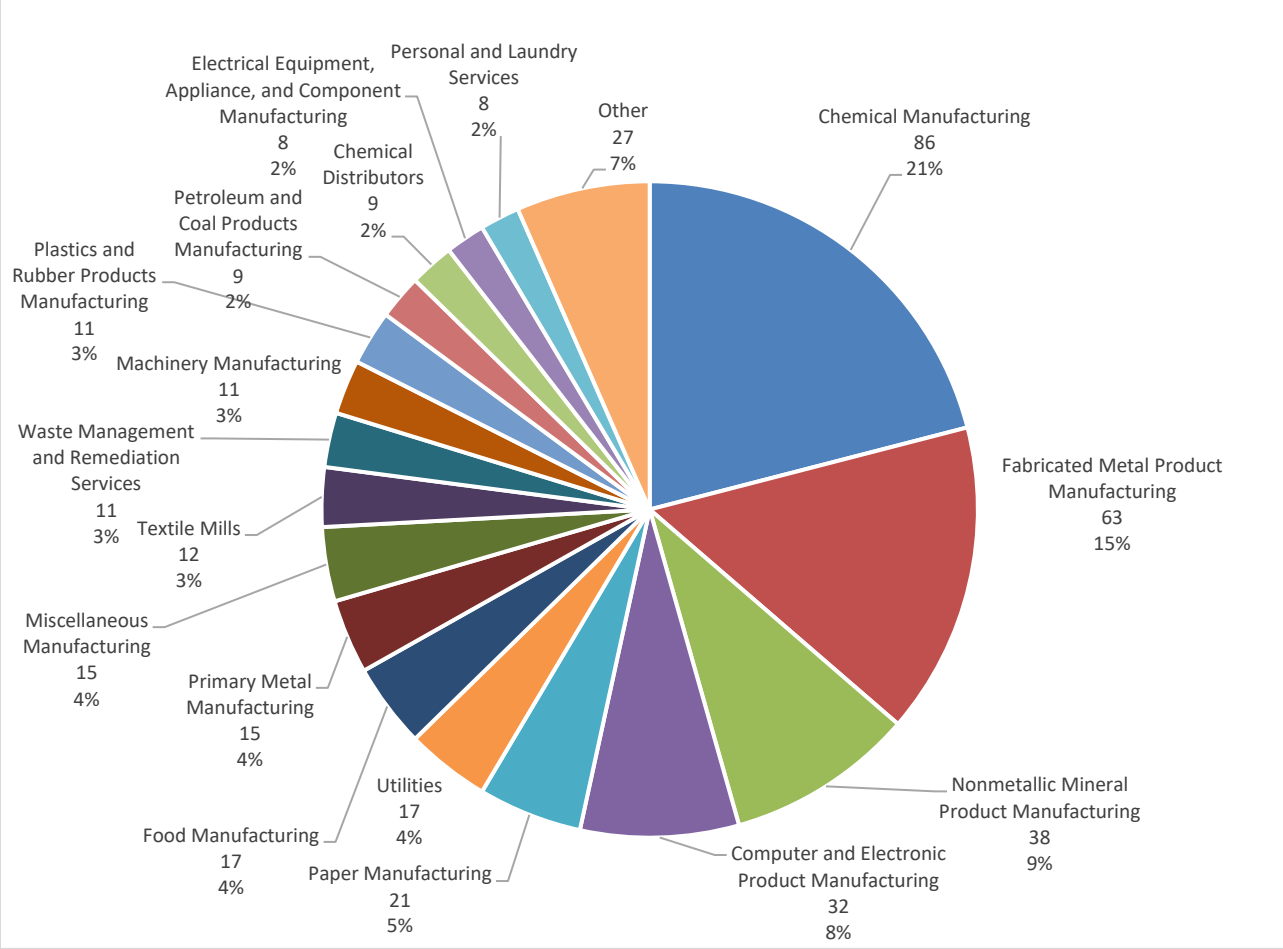


Figure 9 – All Reported Data: 2020 Chemical Use by Industrial Sector
Total Use = 620,000,000 Pounds
(Includes Trade Secret Data)

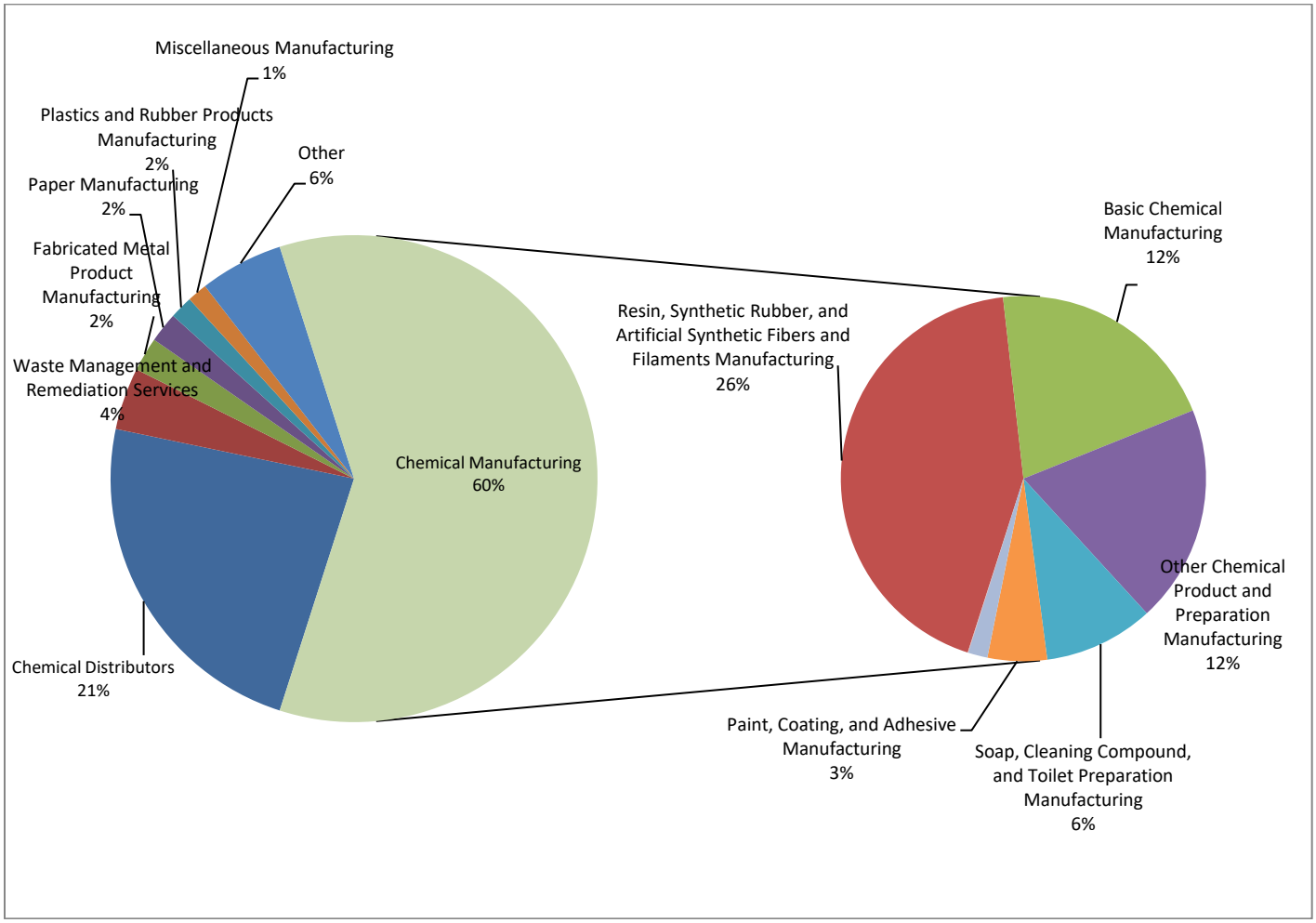


Figure 10 – All Reported Data: 2020 Byproduct Generation by Industrial Sector
Total Byproduct = 65,000,000 Pounds
(Includes Trade Secret Data)

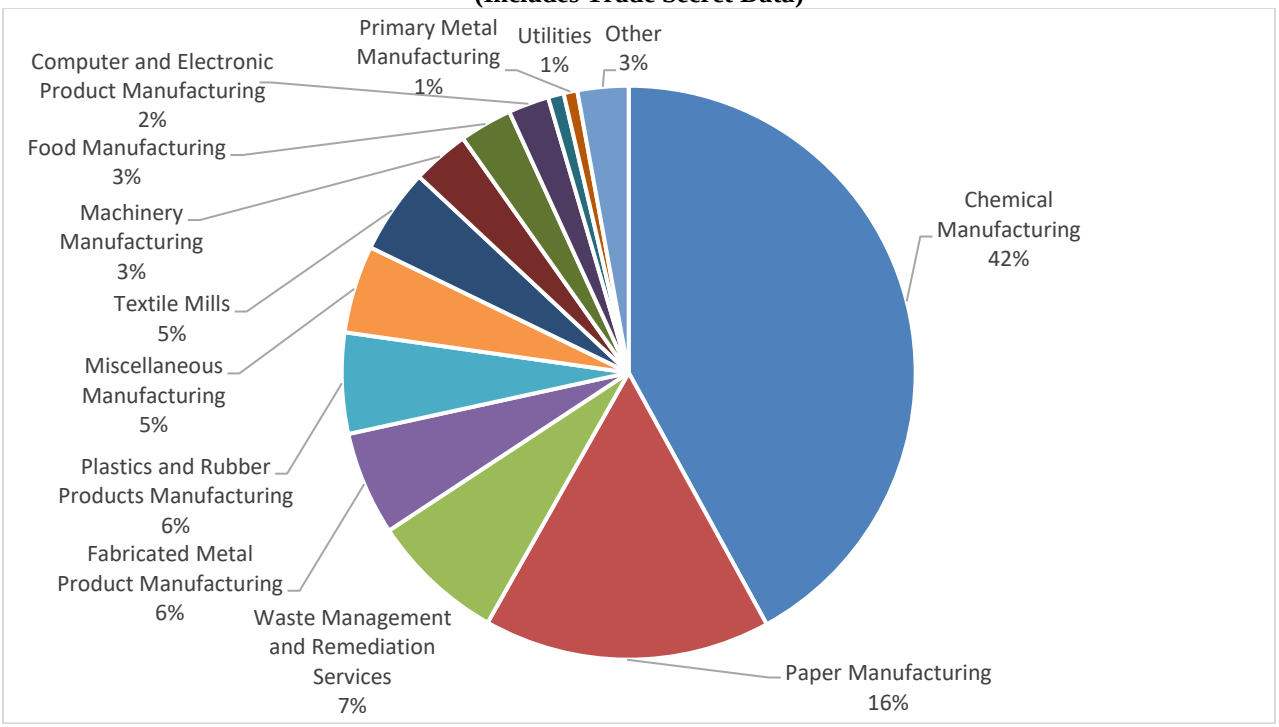
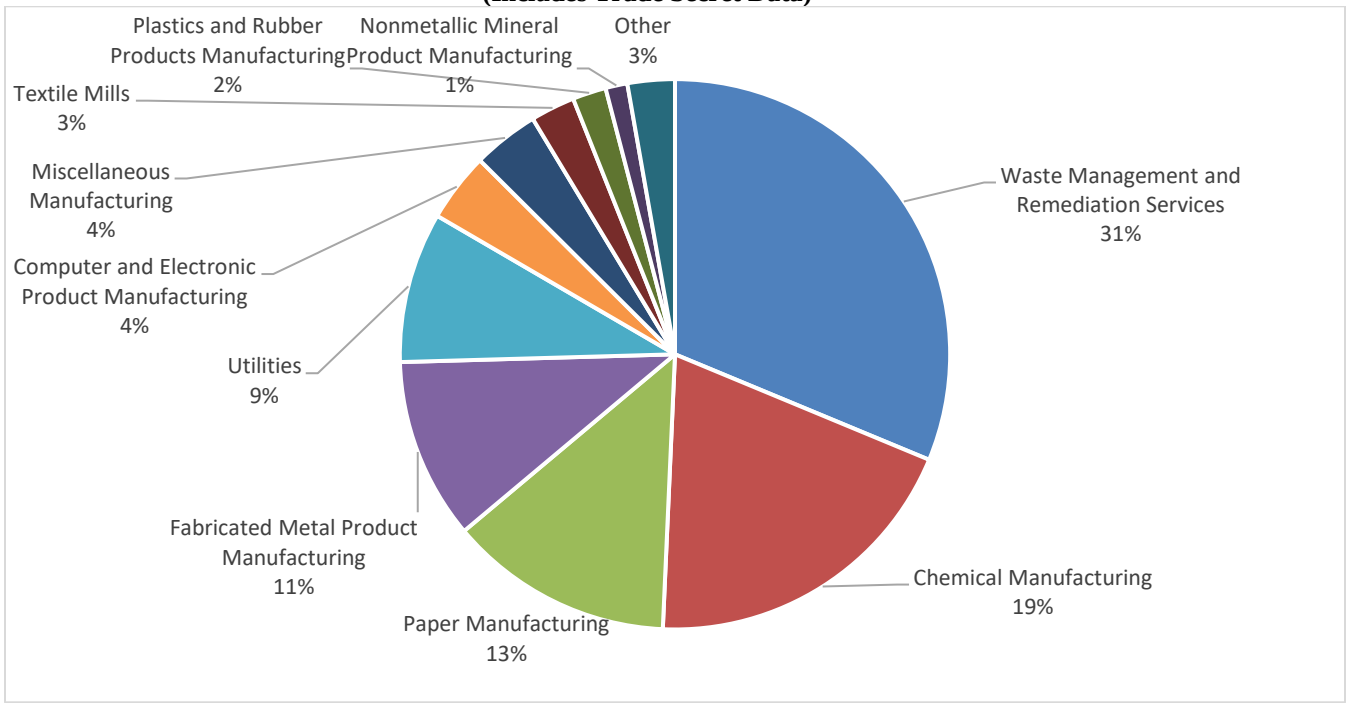


Figure 11 – All Reported Data: 2020 On-Site Releases by Industrial Sector
Total On-Site Releases = 2,400,000 Pounds
(Includes Trade Secret Data)



VII. 2020 Major TURA Facilities

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

- Table 13 lists the 20 facilities that reported the largest total quantity of TURA chemicals used. These 20 facilities used 484 million pounds, or 78% of total statewide use.

- Table 14 lists the 20 facilities that generated the largest reported quantity of byproduct generated and shipped in product. These facilities generated 40 million pounds of byproduct or 62% of the statewide total. The 20 facilities with the largest quantity shipped in product, shipped 300 million pounds in product, or 92% of the statewide total.
- Table 15 lists the 20 facilities that reported the largest quantity of on-site releases and the 20 facilities that had the largest quantity of transfers off-site. These facilities released 1.6 million pounds, or 66% 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 almost 813,000 pounds of on-site releases reported by these MWCs, 54% was due to the coincidental manufacture of hydrochloric acid during combustion, and 46% was due to lead in ash disposed in an on-site lined landfill at one facility. The 20 facilities with the largest reported quantity of transfers off-site transferred over 20 million pounds, or 71% of the total statewide transfers off-site.

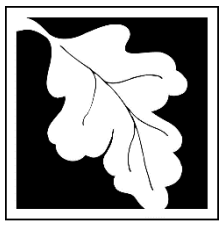
Table 13 2020 Top 20 Facilities: Reported Total Use (Includes trade secret data)		
Facility Name	Town	Total Use (Lbs.)
Solutia Inc	Springfield	106,606,287
Borden and Remington Corp	Fall River	74,229,502
Holland Company Inc	Adams	72,481,261
Astro Chemicals Inc	Springfield	43,637,363
Rousselot Peabody Inc	Peabody	37,402,381
Prefere Melamines LLC	Springfield	25,713,801
James Austin Co	Ludlow	22,024,646
Highline Aftermarket Acquisition LLC	Leominster	16,509,923
Univar Solutions USA Inc	Tewksbury	10,963,884
Semass Partnership	Rochester	10,311,735
Roberts Chemical Co Inc	Attleboro	10,058,512
Omnova Solutions Inc	Fitchburg	7,442,151
Covestro Coating Resins Inc	Wilmington	6,522,577
Wheelabrator North Andover Inc	North Andover	6,313,186
Webco Chemical Corp	Dudley	6,115,404
Metalor Technologies USA	Attleboro	5,920,088
Covanta Haverhill Inc	Haverhill	5,909,490
Wheelabrator Millbury Inc	Millbury	5,843,680
Solenis LLC	Chicopee	5,547,833
FXI Inc	Newburyport	4,263,804

Table 14
2020 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	5,594,614	Holland Company Inc	Adams	72,481,261
Rousselot Peabody Inc	Peabody	5,247,916	Borden and Remington Corp	Fall River	64,983,470
3M	Rockland	3,655,702	Astro Chemicals Inc	Springfield	39,818,618
Flexcon Company Inc	Spencer	3,076,463	Solutia Inc	Springfield	32,356,392
AR Metallizing Ltd	Franklin	2,940,118	James Austin Co	Ludlow	21,908,751
Prefere Melamines LLC	Springfield	2,310,547	Highline Aftermarket Acquisition LLC	Leominster	16,506,470
Covestro Coating Resins Inc	Wilmington	2,165,218	Univar Solutions USA Inc	Tewksbury	10,914,312
Munters Corp	Amesbury	1,832,520	Roberts Chemical Co Inc	Attleboro	10,058,512
Nitto Denko Avecia Inc	Milford	1,664,305	Webco Chemical Corp	Dudley	6,114,257
Safety Kleen Systems Inc	Marlborough	1,492,244	FXI Inc	Newburyport	4,263,676
Thermo Fisher Scientific	Bedford	1,438,590	Houghton Chemical Corporation	Allston	3,405,267
Koch Separation Solutions	Wilmington	1,346,456	Alpha Chemical Services Inc	Stoughton	2,412,541
Crane & Co Inc Pioneer Mill	Dalton	1,327,002	Mexichem Specialty Compounds Inc	Leominster	2,400,872
Waters Corp	Taunton	1,055,195	ITW Performance Polymers	Danvers	2,233,993
Bostik Inc	Middleton	998,298	Savogran Company	Norwood	1,948,464
Semass Partnership	Rochester	926,320	Callahan Company	Walpole	1,914,672
ITW Foils	Newburyport	891,925	Advance Coatings Co	Westminster	1,736,621
Adhesive Applications Inc	Easthampton	774,943	Bostik Inc	Middleton	1,724,226
Haartz Corporation	Acton	766,994	ITW Polymers Sealants North America	Rockland	1,625,479
Community Eco Springfield LLC	Agawam	744,444	Nyacol Products Inc	Ashland	1,606,262

Table 15
2020 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	445,861	Solutia Inc	Springfield	2,961,231
Ideal Tape Company	Lowell	133,978	Covestro Coating Resins Inc	Wilmington	2,154,634
Wheelabrator Millbury Inc	Millbury	131,694	Prefere Melamines LLC	Springfield	1,950,351
Wheelabrator North Andover Inc	North Andover	103,410	Nitto Denko Avecia Inc	Milford	1,661,562
Solutia Inc	Springfield	94,794	Safety Kleen Systems Inc	Marlborough	1,492,221
Semass Partnership	Rochester	79,971	Thermo Fisher Scientific	Bedford	1,424,036
Flexcon Industries	Randolph	60,182	Koch Separation Solutions	Wilmington	1,296,050
Community Eco Springfield LLC	Agawam	56,544	Waters Corp	Taunton	1,041,010
3M	Rockland	53,529	Bostik Inc	Middleton	973,706
Wheelabrator Saugus Inc	Saugus	52,056	Semass Partnership	Rochester	846,349
Hazen Paper Co	Holyoke	50,905	Johnson Matthey Pharma Services	Devens	564,629
Jen Mfg Inc	Millbury	45,359	Ideal Tape Company	Lowell	549,225
Millennium Power Company LLC	Charlton	43,535	PCI Synthesis Inc	Newburyport	546,232
AR Metallizing Ltd	Franklin	41,234	Metalor Technologies USA	North Attleborough	449,925
Community Eco Pittsfield LLC	Pittsfield	40,283	Entegris Inc	Bedford	443,433
Raytheon Company	Andover	34,254	Brittany Global Technologies Corp	New Bedford	433,922
Smith & Wesson Inc	Springfield	34,214	Skyworks Solutions Inc	Woburn	428,541
Fore River Energy Center	Weymouth	32,672	Johnson Matthey Pharma Services Inc	North Andover	420,824
Flexcon Company Inc	Spencer	32,192	Wheelabrator Millbury Inc	Millbury	411,647
Nylco Divison Worthen Industries Inc	Clinton	28,282	Callaway Golf Ball Operations Inc	Chicopee	401,958



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