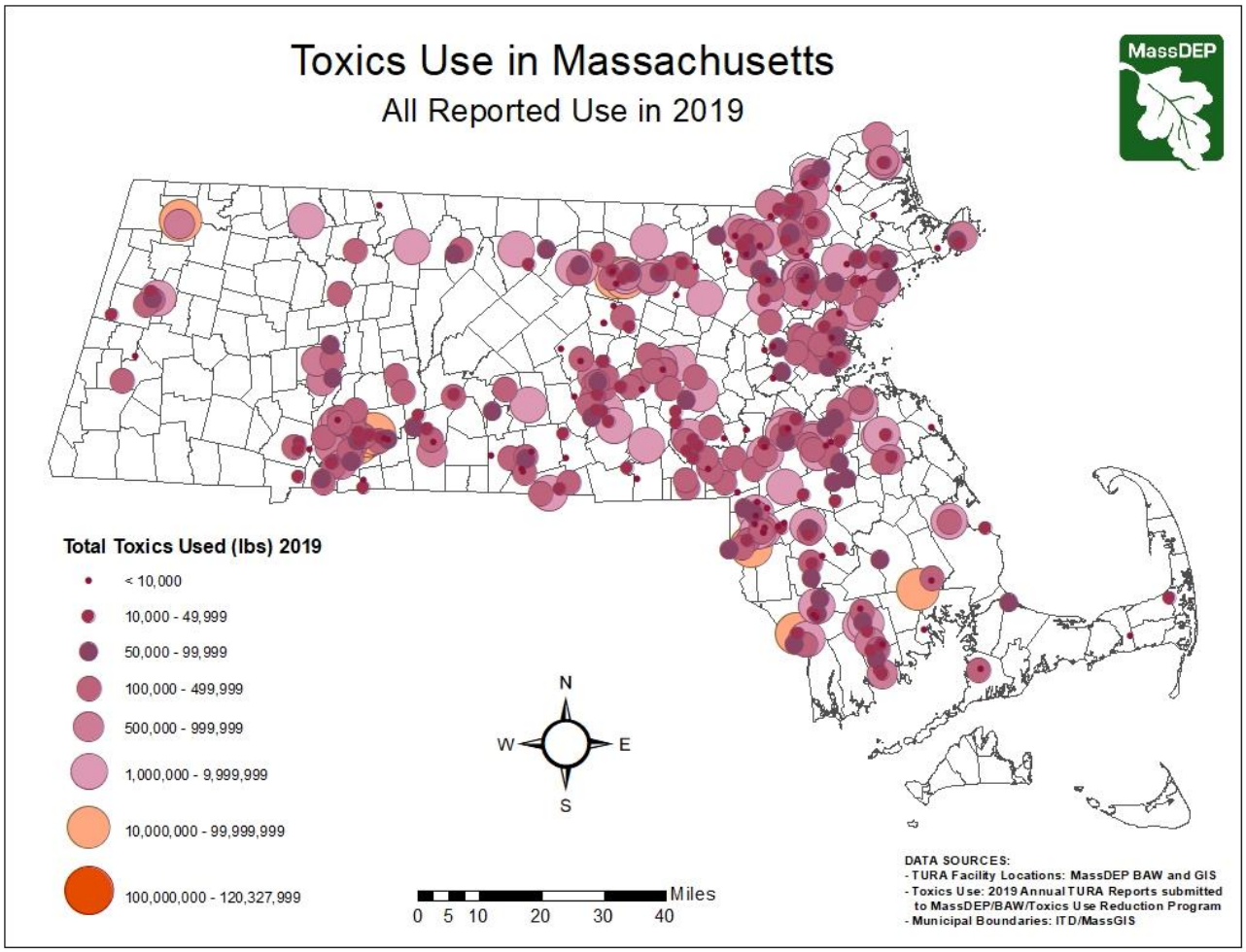
Reporting Year 2019
Toxics Use Reduction
Information Release



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

September 2021

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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.

449 facilities reported using 127 different chemicals in 2019. In total (including data submitted as trade secret data – as defined on page 4), from 1990 to 2019, the following reductions were observed:

- Chemical Use - from 1.2 to 0.7 billion pounds
- Byproduct Generation - from 127 to 70 million pounds
- Shipped in Product - from 434 to 346 million pounds
- On-Site Releases - from 21 to 3 million pounds
- Transfers Off-Site - from 46 to 33 million pounds

As shown in Figure 3, between 2007 and 2019 when adjusted for the reported 41% increase in production, 2007 Core Group (as defined on page 4) facilities reduced:

- toxic chemical use by 59%
- toxic byproducts by 40%
- toxics shipped in product by 39%
- on-site releases of toxics to the environment by 73%
- transfers of toxics off-site for further waste management by 17%.

This report includes the following six sections:

Section I: **Introduction**

Section II: **Key TURA Terms**

Section III: **2019 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: **2019 Chemical Data** summarizes the reported information on chemical use in calendar year 2019 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: **2019 Chemicals of Particular Concern** presents current and historical information on particularly toxic chemicals, on chemicals that promote asthma, and on carcinogens.

Section VI: **2019 Significant Industrial Sectors** describes the relative contributions of different industrial sectors to chemical use, waste and release.

Section VII: **2019 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 2019 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 2019, can be found at MassDEP Toxics Use Reduction Act (TURA) Data & Results | Mass.gov. The data extracts include all reported TURA data, with the exception of trade secret data, in an Excel format.

I. Introduction

This report describes toxic chemical use in Massachusetts in 2019 and progress in toxics use reduction (TUR) under the Toxics Use Reduction Act (TURA). TURA was enacted in 1989 in order 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 they use and the number of workers they employ, and must develop biennial TUR plans. TUR Plans identify techniques that the facility could adopt that could 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, materials found in solid waste 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 by the 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.

Massachusetts Department of Environmental Protection Toxics Use Reduction Program: 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

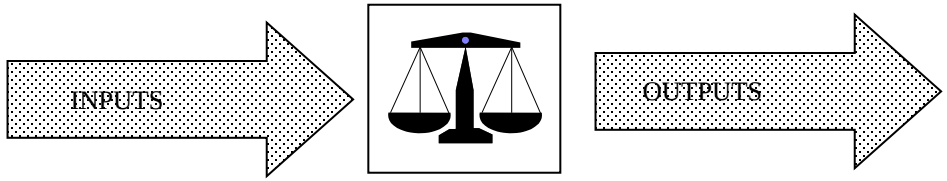
Toxics Use Reduction Institute (TURI)

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.

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. 2019 Toxics Use Reduction Progress

In order 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.

TURA 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, out of the over 1,500 substances listed under TURA, 127 were reported in 2019. 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, 2019 TURA Chemical Data). The number of filers has since declined to 449 in 2019. The number of individual substance reports submitted (facilities file one Form S for each substance reported) has followed a similar trend, decreasing from a high of 2,666 in 1994, to 1,378 in 2019, 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 0.7 billion pounds in 2019. Byproduct generation decreased from 127 million pounds in 1990 to 70 million pounds in 2019.

Figure 1
# of TURA Filers, Individual Chemical Reports, and Different Chemicals Reported (1990-2019)
(Including Trade Secret Data)

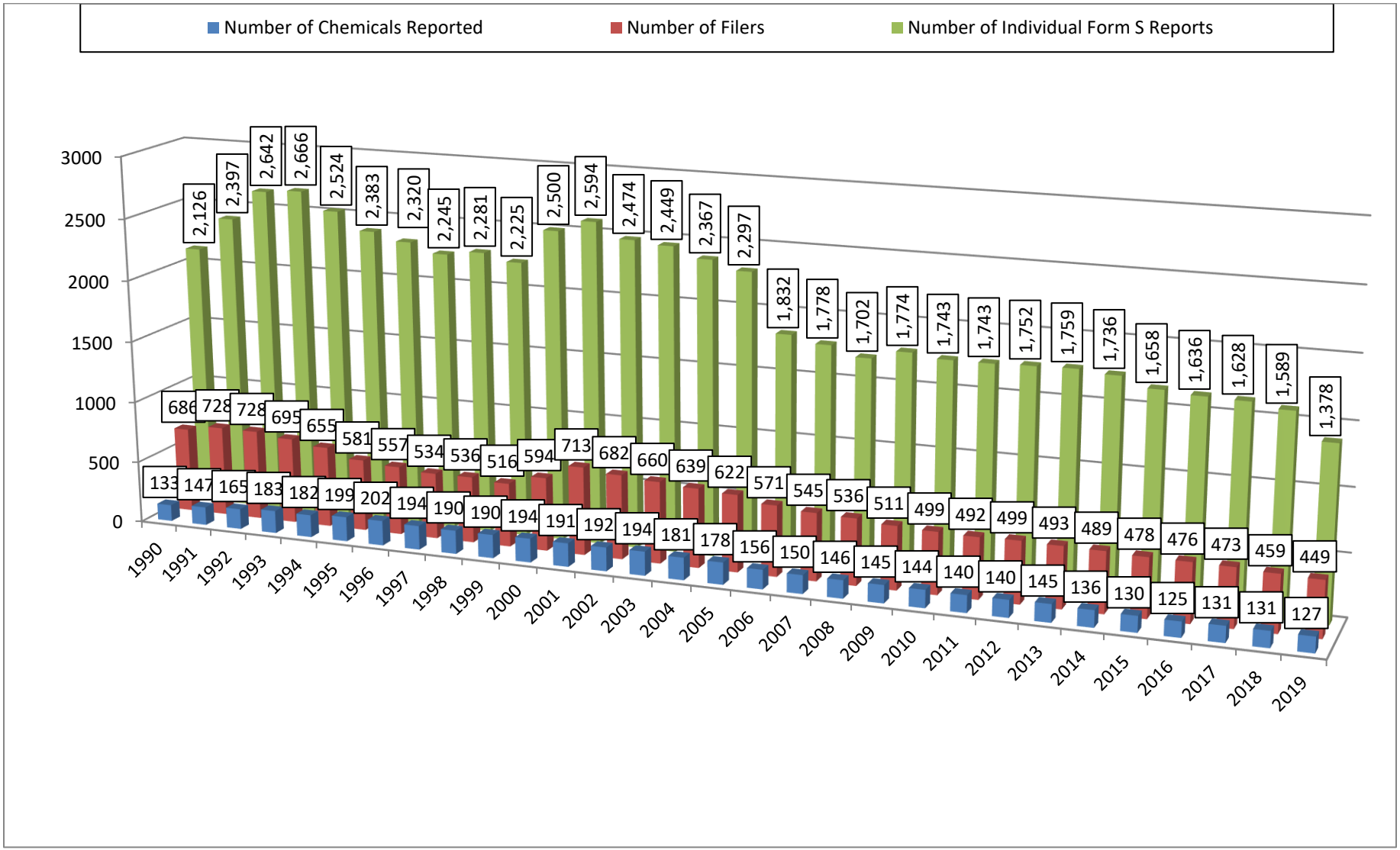
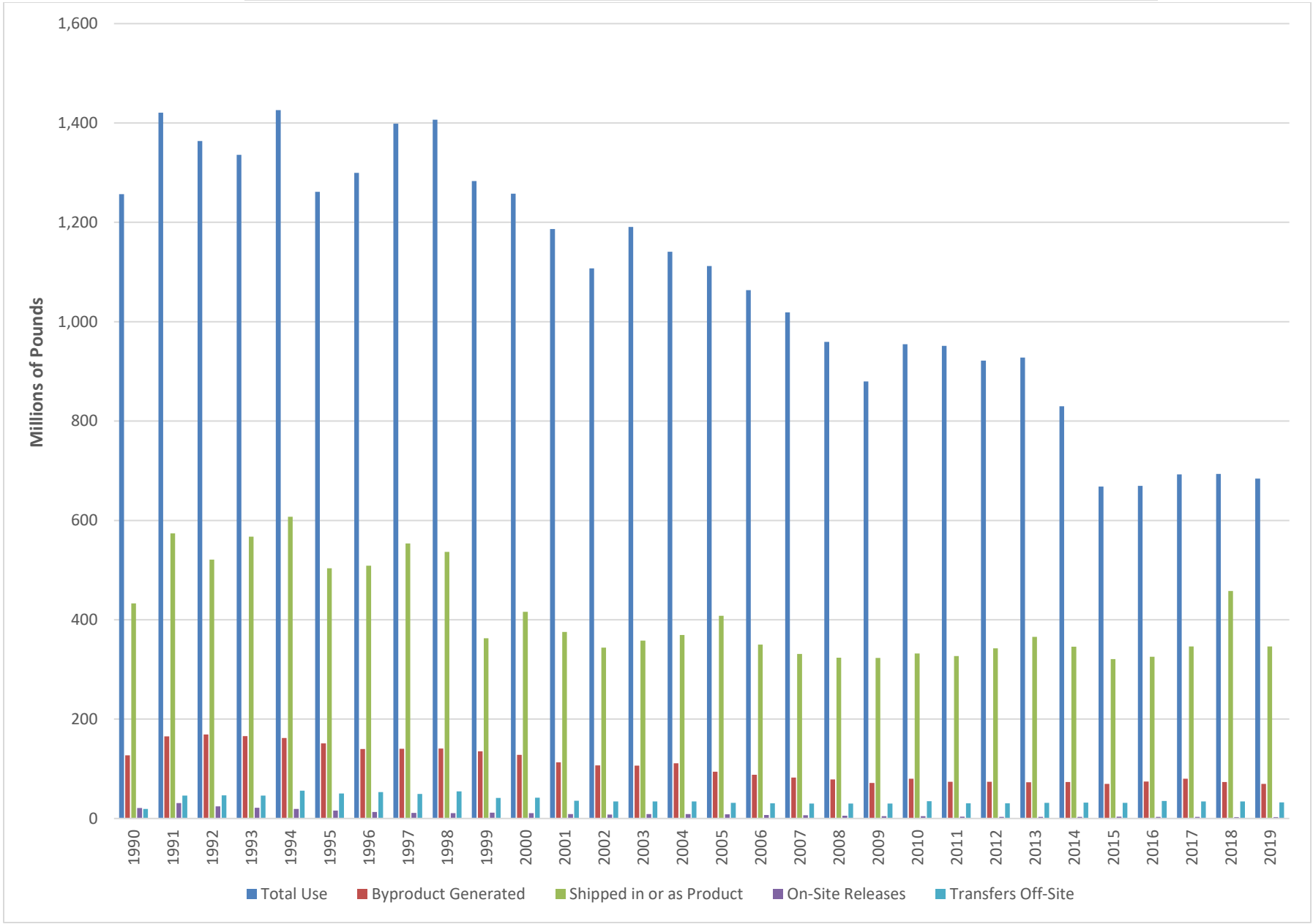


Figure 2
Raw Reported Data on the Pounds of Total Use, Generated as Byproduct, Shipped in or as Product, Released On-Site and Transferred Off-Site for Treatment or Disposal
Reporting Years 1990-2019 (includes trade secret data)



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

While the raw reported data paints 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 2019. The 2007 Core Group covered 100% of the reported data in 2007. It currently covers 99% of the total 467 million pounds of toxic chemicals reported in 2019 (excluding trade secret data).

Raw reported data also needs 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 2019 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 424 filers, which represents 94% of the 2019 TURA filers. Table 1 and Figures 3 and 4 below summarize TURA data from 2007 to 2019, excluding trade secret data.

2007 Core Group Progress: Adjusting for Production

Table 1 below summarizes TURA data from 2007 to 2019, 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 2019. As shown below in Table 1 and Figure 4, when adjusted for production, as of 2019, the 2007 Core Group facilities have reduced**:**

- toxic chemical use by 59%
- toxic byproducts by 40%
- toxics shipped in product by 39%
- on-site releases of toxics to the environment by 73%
- transfers of toxics off-site for further waste management by 17%.

2007 Core Group Progress without Adjusting for Production

The actual quantities reported by the 2007 Core Group over the period 2007 to 2019 are shown in Figure 5. These quantities have not been adjusted for changes in production. From 2007 to 2019, Core Group facilities:

- reduced toxic chemical use by 41% (from 792 million to 466 million pounds between 2007 and 2019)
- reduced toxic byproducts by 14% (from 75 million to 65 million pounds between 2007 and 2019)
- reduced toxics shipped in product by 13% (from 271 million to 237 million pounds between 2007 and 2019)
- reduced on-site releases of toxics to the environment by 62% (from 6 million to 2 million pounds between 2007 and 2019)
- increased transfers of toxics off-site for further waste management by 19% (from 25 to 30 million pounds between 2007 and 2019).

Table 1
2007 CORE GROUP DATA: 2007 - 2019 TREND SUMMARY
(Quantities are in millions of pounds and do not include trade secret quantities.
Total Use
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	723.64	75.76	70.80	255.91	239.17	5.25	4.91	27.62	25.82	1.06	1.06
2009	708.85	649.49	66.79	61.20	243.14	222.77	4.41	4.04	25.64	23.49	1.02	1.08
2010	753.99	633.81	74.45	62.58	251.14	211.11	4.30	3.62	29.28	24.61	1.09	1.18
2011	741.50	629.60	67.37	57.20	241.05	204.67	3.51	2.98	24.73	21.00	0.99	1.17
2012	692.67	606.33	66.71	58.40	237.55	207.94	3.16	2.77	24.15	21.14	0.97	1.13
2013	704.21	576.10	66.33	54.26	263.38	215.47	3.00	2.45	25.67	21.00	1.07	1.21
2014	616.68	554.39	66.85	60.10	246.32	221.44	3.00	2.70	25.78	23.18	0.91*	1.10
2015	456.68	414.70	64.27	58.36	222.87	202.39	3.55	3.23	27.26	24.76	0.99	1.09
2016	453.85	364.72	65.74	52.83	226.94	182.37	3.12	2.50	31.02	24.93	1.13	1.23
2017	468.63	348.70	73.13	54.42	244.13	181.65	3.04	2.26	30.22	22.49	1.08	1.33
2018	468.28	338.29	68.19	49.26	246.25	177.89	2.43	1.76	31.22	22.56	1.03	1.37
2019	466.23	327.00	64.58	45.30	236.75	166.05	2.35	1.65	29.62	20.78	1.03	1.41
Percent Change 2007-2019	41% Reduction	59% Reduction	14% Reduction	40% Reduction	13% Reduction	39% Reduction	62% Reduction	73% Reduction	19% Increase	17% Reduction		41% 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 2007-2019
Production Adjusted
(Excludes Trade Secret Data)

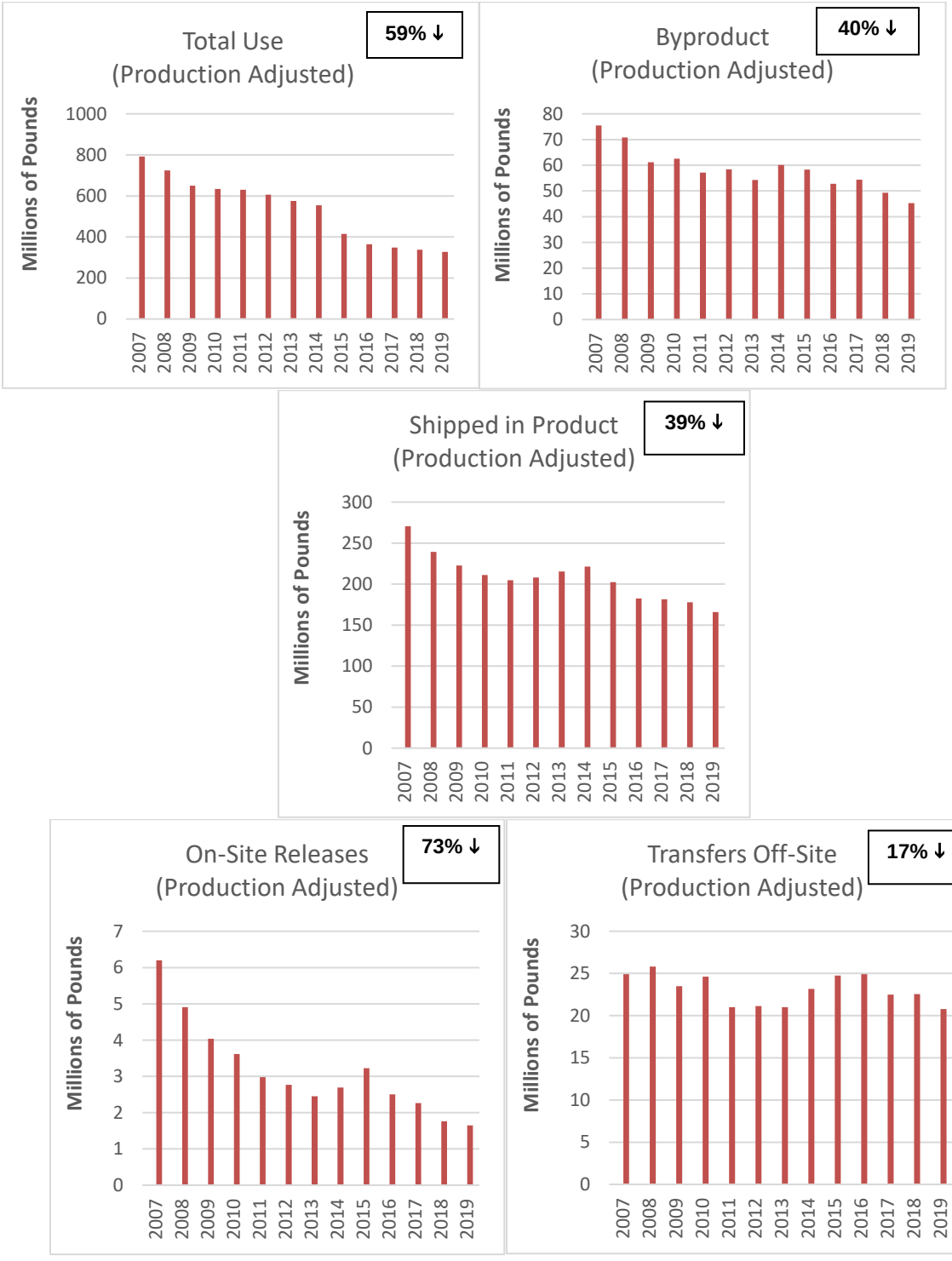
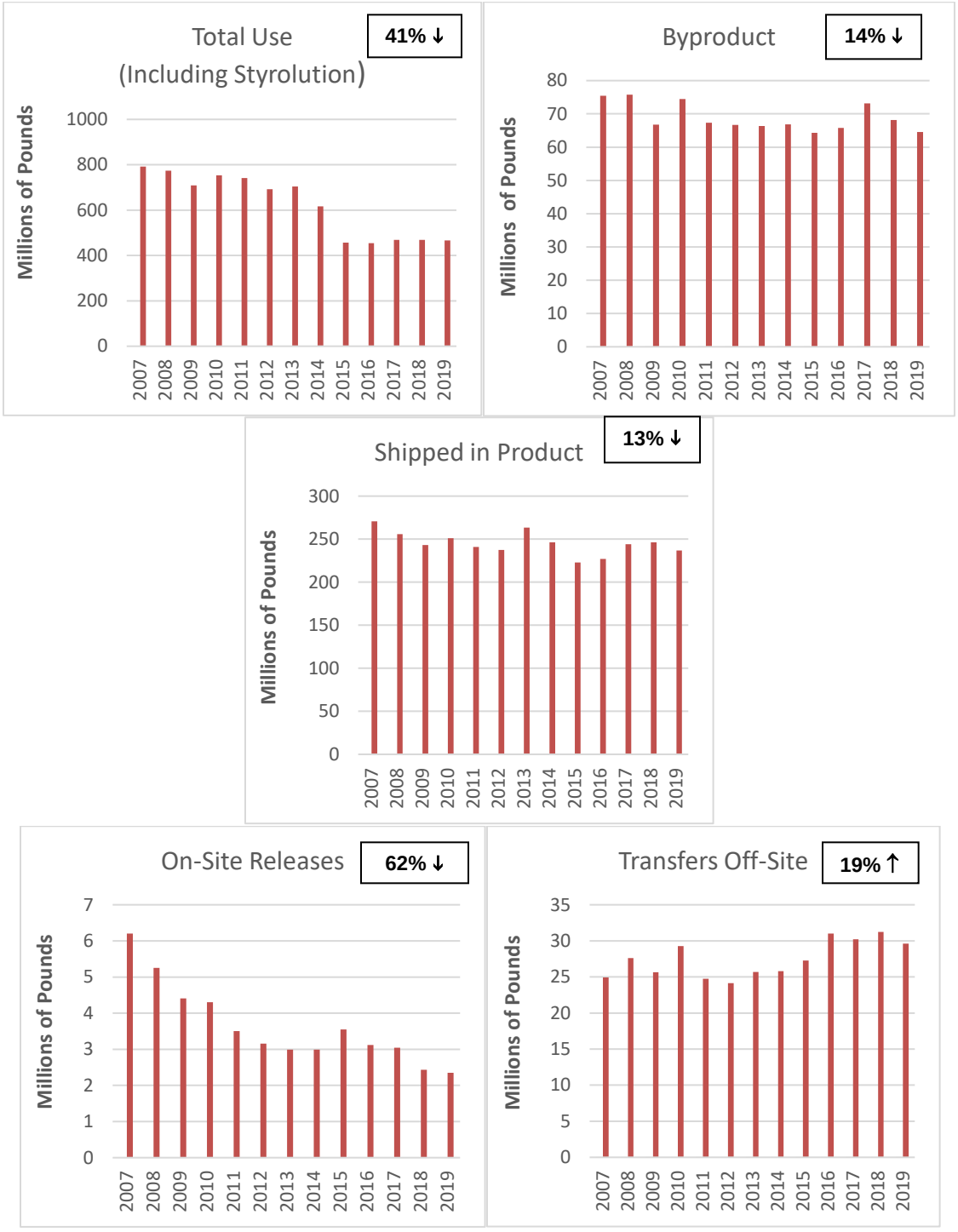


Figure 4 – 2007 Core Group Toxics Use Reduction Progress 2007-2019
Not Production Adjusted
(Excludes Trade Secret Data)



IV. 2019 TURA Chemical Data

Table 2 All Reported Chemical Data 2019 (rounded to millions of pounds) (Includes Trade Secret Data)		
TOTAL USE	684,000,000	
SHIPPED IN PRODUCT	346,000,000	51% of total chemical use
GENERATED AS BYPRODUCT (total waste prior to treatment or disposal)	70,000,000	10% of total chemical use
ON-SITE RELEASES (to air, water or land disposal)	3,000,000	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)	33,000,000	5% of total chemical use 47% of total byproduct

Trade Secret

Under certain circumstances facilities have the right to claim that the amount of chemical they use and generate as byproduct is a trade secret. As long as 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 2019, nine facilities made trade secret claims on a combined total of:

- 217 million pounds of chemical use
- 5 million pounds of byproduct generation
- 109 million pounds shipped in product.

Chemical Use by Use Category

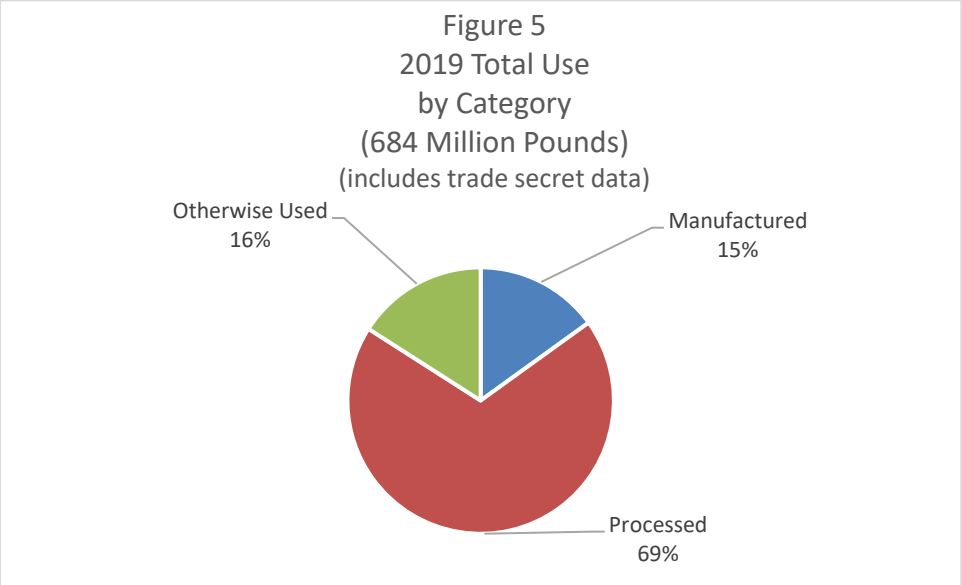
TURA requires that facilities report chemical use in one of three use categories, identified by the Federal Toxics Release Inventory (TRI) program.

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 2019.

Process is defined in TURA, in part, as "the preparation of a toxic or hazardous substance, after its manufacture, for distribution in commerce". Most chemical use in Massachusetts is processed. Chemicals processed accounted for 69% of 2019 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 16% of 2019 total chemical use.

Figure 5 below shows the proportion of use for the three use categories:



Top 20 Chemicals

In 2019, filers reported using 127 out of the over 1,500 TURA-listed substances in amounts above the reporting threshold. The data was analyzed by chemical to identify the top 20 chemicals in each of the following amounts: used, generated as byproduct, shipped in product, released on-site as pollution, and shipped off-site for treatment or disposal.

Chemical Use

As shown in Table 3 below, the 2019 top 20 chemicals accounted for 85%, (395 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, 153 facilities, 71 million pounds), Hydrochloric Acid (13% of total use, 40 facilities, 62 million pounds), Methanol (13% of total use, 30 facilities, 61 million pounds), and Sodium Hypochlorite (8% of total use, 30 facilities, 37 million pounds), 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 3): The top 20 chemicals comprised:

- 89% of the total reported byproducts (including trade secret data)
- 90% of the total reported shipped in product (excluding trade secret data)
- 92% of the total on-site releases (including trade secret data)
- 92% of the total off-site transfers (including trade secret data).

Hydrochloric Acid was the top chemical for on-site releases, accounting 18% of the statewide total of on-site releases (almost 465,000 pounds). Ninety-five (95) 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 was the top chemical for transfers offsite, accounting for 17% 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-four (94) percent of total transfers off-site of lead, the sixth chemical on the list, was attributed to four municipal waste combustors that transferred lead in ash to off-site lined landfills.

Table 3 – 2019 Top 20 Chemicals: Total Use *These quantities do not include Trade Secret Data*		
Chemical Name (CAS #)	**CAS #**	**Total Use (Lbs.)**
Sodium Hydroxide	1310732	70,777,560
Hydrochloric Acid	7647010	62,441,244
Methanol	**67561**	60,778,258
Sodium Hypochlorite	7681529	37,118,890
Sulfuric Acid	7664939	20,425,739
Potassium Hydroxide	1310583	16,874,385
Diisocyanates	1050	16,021,001
Ammonia	7664417	12,205,835
Toluene	**108883**	11,675,989
Nitrate Compounds	1090	11,080,496
Acetone	**67641**	10,204,599
Ethylene Glycol	107211	8,851,747
Methyl Ethyl Ketone	**78933**	8,548,618
Phosphoric Acid	7664382	7,960,765
Zinc Compounds	1039	7,855,482
Ethyl Acetate	**141786**	7,829,253
Nitric Acid	7697372	7,436,889
Ferric Chloride	7705080	6,751,153
Epichlorohydrin	106898	5,181,431
Styrene Monomer	100425	5,103,618

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 – 2019 Top 20 Chemicals:
Byproduct Generation and Shipped in Product

Byproduct Generation *These quantities include Trade Secret Data*			Shipped in Product *These quantities do not include Trade Secret Data*		
Chemical Name	**CAS #**	**Byproduct Generation (Lbs.)**	**Chemical Name**	**CAS #**	**Shipped in Product (Lbs.)**
Ethyl Acetate	**141786**	9,612,665	**Methanol**	**67561**	58,036,270
Sodium Hydroxide	1310732	7,048,829	Sodium Hydroxide	1310732	42,556,353
Nitrate Compounds	1090	6,527,666	Sodium Hypochlorite	7681529	34,272,136
Sulfuric Acid	7664939	5,097,623	Potassium Hydroxide	1310583	13,876,386
Toluene	**108883**	4,750,119	Sulfuric Acid	7664939	6,977,059
Acetone	**67641**	4,476,996	**Toluene**	**108883**	6,644,575
Ethylene Glycol	107211	4,044,773	Phosphoric Acid	7664382	6,568,732
Methanol	**67561**	3,024,182	**Methyl Ethyl Ketone**	**78933**	5,695,231
Methyl Ethyl Ketone	**78933**	2,799,862	Ferric Chloride	7705080	5,579,711
Lead	7439921	2,575,468	**Acetone**	**67641**	5,459,317
Hydrochloric Acid	7647010	2,153,033	Zinc Compounds	1039	4,289,448
Formaldehyde	50000	1,830,801	Toluene Diisocyanate	26471625	4,194,632
1-Methyl-2-Pyrrolidone	872504	1,739,990	Ethylene Glycol	107211	3,686,953
Dimethylformamide	68122	1,513,248	Methyl Methacrylate	80626	2,997,694
Ferric Chloride	7705080	1,044,268	Xylene Mixed Isomer	1330207	2,586,091
Acetonitrile	75058	858,222	Glycol Ethers	1022	2,436,672
Potassium Hydroxide	1310583	833,252	Antimony Compounds	1000	2,261,096
Dichloromethane	75092	681,255	Dimethylformamide	68122	2,196,630
Nitric Acid	7697372	679,076	Nitric Acid	7697372	1,739,698
Butyraldehyde	123728	597,170	**Ethyl Acetate**	**141786**	1,587,397

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

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

Table 5 – 2019 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	464,519	Nitrate Compounds	1090	5,580,466
Lead	7439921	442,272	**Acetone**	**67641**	3,781,618
Acetone	**67641**	400,722	Ethylene Glycol	107211	3,701,202
Ethyl Acetate	**141786**	204,778	**Toluene**	**108883**	2,282,743
Ammonia	7664417	199,900	**Methanol**	**67561**	2,186,994
Toluene	**108883**	156,457	Lead	7439921	2,137,875
Formaldehyde	50000	86,670	1-Methyl-2-Pyrrolidone	872504	1,666,581
Methyl Ethyl Ketone	**78933**	74,936	Formaldehyde	50000	1,655,762
Methanol	**67561**	53,979	**Methyl Ethyl Ketone**	**78933**	1,196,481
Trichloroethylene	79016	43,350	Acetonitrile	75058	856,422
N Propyl Bromide	106945	33,315	Zinc Compounds	1039	719,590
Xylene Mixed Isomer	1330207	31,463	Sodium Hydroxide	1310732	667,651
Butyraldehyde	123728	30,899	**Ethyl Acetate**	**141786**	617,406
Dichloromethane	75092	30,285	Dichloromethane	75092	555,539
Butyl Acetate-T	540885	28,419	Copper Compounds	1015	483,947
1-Methyl-2-Pyrrolidone	872504	24,853	Dimethylformamide	68122	410,661
Hexane (N-Hexane)	110543	22,603	Ferric Chloride	7705080	385,884
Glycol Ethers	1022	19,414	Lead Compounds	1026	347,702
Dimethylformamide	68122	17,735	Furan, Tetrahydro-	109999	303,626
Butyl Acetate	123864	17,204	Diethylhexyl Phthalate	117817	252,354

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. 2019 Chemicals of Particular Interest

Certain toxic chemicals are of particular concern because of their higher potential for harm to 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, with the exception of lead and lead compounds (starting reporting year 2001).

Table 6 below shows the 2019 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 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 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. Seventy-seven (77) percent of the use of lead is from the 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 2019 the number of lead and lead compounds filers had decreased to 57 and 42, respectively.

Table 6 2019 Persistent Bioaccumulative Toxic (PBT) Chemicals Summary (Excludes Trade Secret Data)							
Substance	Threshold (lbs or grams for dioxin)	# Filers in 2019	Use	Byproduct	Shipped in Product	lbs On-Site Releases	Lbs Transfers Off-Site
Benzo[ghi]-perylene	10	19	3,304	597	1,538	0	597
Dioxin and Dioxin Compounds	0.1 Gr	7	2,571	2,571	0	547	2,024
Lead	100	57	3,070,709	2,575,468	476,117	442,272	2,137,875
Lead Compounds	100	42	474,416	346,204	111,138	605	345,868
Mercury	10	16	8,261	2,317	4,417	586	1,744
Mercury Compounds	10	1	590	7	789	0	7
Polychlorinated Biphenyls	10	1	11,999	12,547	0	0	12,547
Polycyclic Aromatic Compounds	100	22	177,093	5,373	63,629	60	5,544
Tetrabromo-Bisphenol	10	1	239	7	231	0	7

Table 7
Pounds of PBTs Reported Use and Number of Facilities Reporting 2000 – 2019
(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	575,113	48
2019	3,304	19	2,571	7	8,261	16	590	1	11,999	1	177,093	22	239	1	3,070,709	57	474,416	42

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

Higher Hazard Substances (HHS)

Other higher hazard chemicals 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 8 below shows the pounds of each HHS reported and the number of facilities reporting it from the year before it was designated as an HHS to 2019.

The data shows 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, respectively: from 9 in 2007 to 27 in 2008 reporting trichloroethylene, and 4 in 2008 to 23 in 2009 reporting tetrachloroethylene. However, in 2019 the number of trichloroethylene and tetrachloroethylene filers decreased to 10 and 7, respectively.

Table 9 below shows the fourteen HHS chemicals reported in 2019, 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 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	236,683
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	221,582
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	271,576
2019	511,236	97,970	4,317,010	289,620	60,812	3,700,160	130,347	1,676,104	2,792,528	70,409	71,100	19,403	119,549	168,780
							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	14
2017	**1**	**1**	**5**	27	22	12	15	20	23	14	12	3	5	12
2018	1	1	4	24	19	12	14	18	23	13	9	4	7	12
2019	2	1	4	22	17	13	14	17	23	12	7	3	5	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 9 2019 Higher Hazard Substances (HHS) Summary (Excludes Trade Secret Data)						
Substance and Year Designated as HHS	# Filers in 2019	Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-Site
Cadmium/2008	3	19,403	1,614	17,780	0	1,619
Cadmium Compounds/2008	5	119,549	12,435	15,973	15	12,425
Trichloroethylene/2008	10	168,780	78,209	64,111	43,350	24,111
Tetrachloroethylene/2009	7	71,100	25,102	38,503	7,932	17,120
Formaldehyde/2012	23	2,792,528	410,980	80,619	85,569	237,042
Hexavalent Chromium Compounds/2012	12	70,409	16,639	48,046	138	8,013
Methylene Chloride/ Dichloromethane/2014	17	1,676,104	681,255	904,294	30,285	555,539
Cyanide Compounds/2016	14	130,347	50,901	1,308	82	23,400
Dimethylformamide/2016	13	3,700,160	1,513,248	2,196,630	17,735	410,661
Hydrogen Fluoride/2016	22	289,620	155,066	23,994	1,189	9,717
N-Propyl Bromide/2016	17	60,812	61,507	0	33,315	24,933
Toluene-2,4-diisocyanate/2017	2	511,236	478	0	0	0
Toluene-2,6-diisocyanate/2017	1	97,970	11	0	0	0
Toluene diisocyanate (mixed isomers)/2017	4	4,317,010	2,183	4,194,632	126	1,637

Asthmagens

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

The TURA program has begun working to better understand the uses of these chemicals in relation to potential exposures and toxics use reduction opportunities. Table 10 below summarizes 2019 data on some of the chemicals identified in the LCSP report that were reported under TURA. In 2019, 16 chemicals identified as asthmagens by the Association of Occupational and Environmental Clinics (AOEC) were reported under TURA. In 2019, sulfuric acid was reported with the largest amount of use.

Table 10 Asthma-Related Toxics (in pounds) (Excludes Trade Secret Data)		
Chemical Name (Number of Facilities)	**Use**	**On-Site Releases**
Acetic Acid (13)	1,494,115	1,881
Aluminum (1)	75,805	31
Chlorine (3)	2,900,127	204
Chromium (3)	242,938	20
Diethanolamine(1)	770,522	7
Ethylene Oxide (1)	168,400	176
Formaldehyde (23)	2,792,528	85,569
Hydrazine (2)	505,930	0
Maleic Anhydride (1)	354,420	588
Methyl Methacrylate (5)	5,083,780	4,912
Nickel (4)	435,086	51
Nickel Compounds (5)	1,170,490	2,029
Phthalic Anhydride (1)	274,580	69
Styrene Monomer (8)	5,103,618	12,896
Sulfuric Acid (92)	20,425,739	9,218
Toluene Diisocyanate (7)*	4,926,216	126

* 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 2019, eight IARC Group 1 carcinogens were reported under TURA (see Table 11). Formaldehyde and nickel compounds were reported with the largest amounts of use. Formaldehyde was reported with the largest amount of releases and was reported by the most facilities. Releases were primarily air releases; however, there were also releases to water and land.

Table 11 IARC Group 1 Carcinogens (in pounds unless otherwise noted) (Excludes Trade Secret Data)		
Chemical Name (Number of Facilities)	**Use**	**On-Site Releases**
Cadmium (3)	19,403	0
Dioxin (7)*	2,570.83	546.56
Ethylene Oxide (1)	168,400	176
Formaldehyde (23)	2,792,528	85,569
Hexavalent Chromium Compounds (12)	70,409	136
Polychlorinated Biphenyls (1)	11,999	0
Nickel Compounds (5)	1,170,490	2,029
Trichloroethylene (10)	168,780	43,350

* 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. 2019 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 2019 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 (Figure 6) 19%. The chemical manufacturing sector also had the greatest percentage of use at 61% (Figure 7), the largest percentage of byproduct at 41% (Figure 8), and the second largest percentage, along with utilities, of on-site releases at 19% (Figure 9). 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 7.

Chemical distributors at (Figure 7) 21% were the second largest contributor to use, but had virtually no impact on byproduct and releases. Paper manufacturing, waste management and remediation services, utilities, 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 17% of total byproduct generated (Figure 8). Likewise, waste management and remediation services, which accounted for 5% of total statewide use (Figure 7), had the highest contribution of on-site releases at 29% (Figure 9).

Figure 6 –2019 Number of Facilities by Industrial Sector
Total Number of Facilities = 449
(Includes Trade Secret Data)

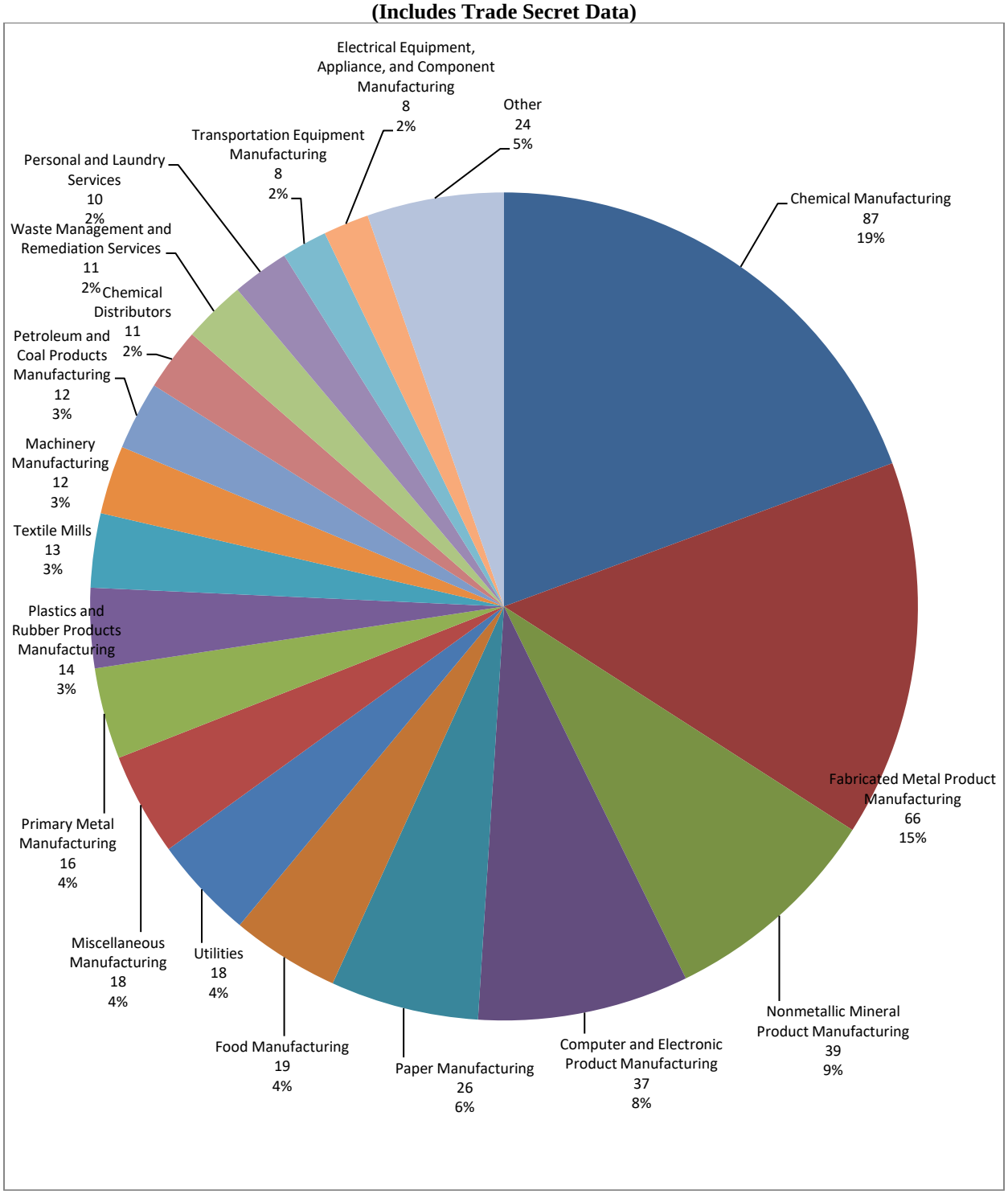


Figure 7 – All Reported Data: 2019 Chemical Use by Industrial Sector
Total Use = 684,000,000 Pounds
(Includes Trade Secret Data)

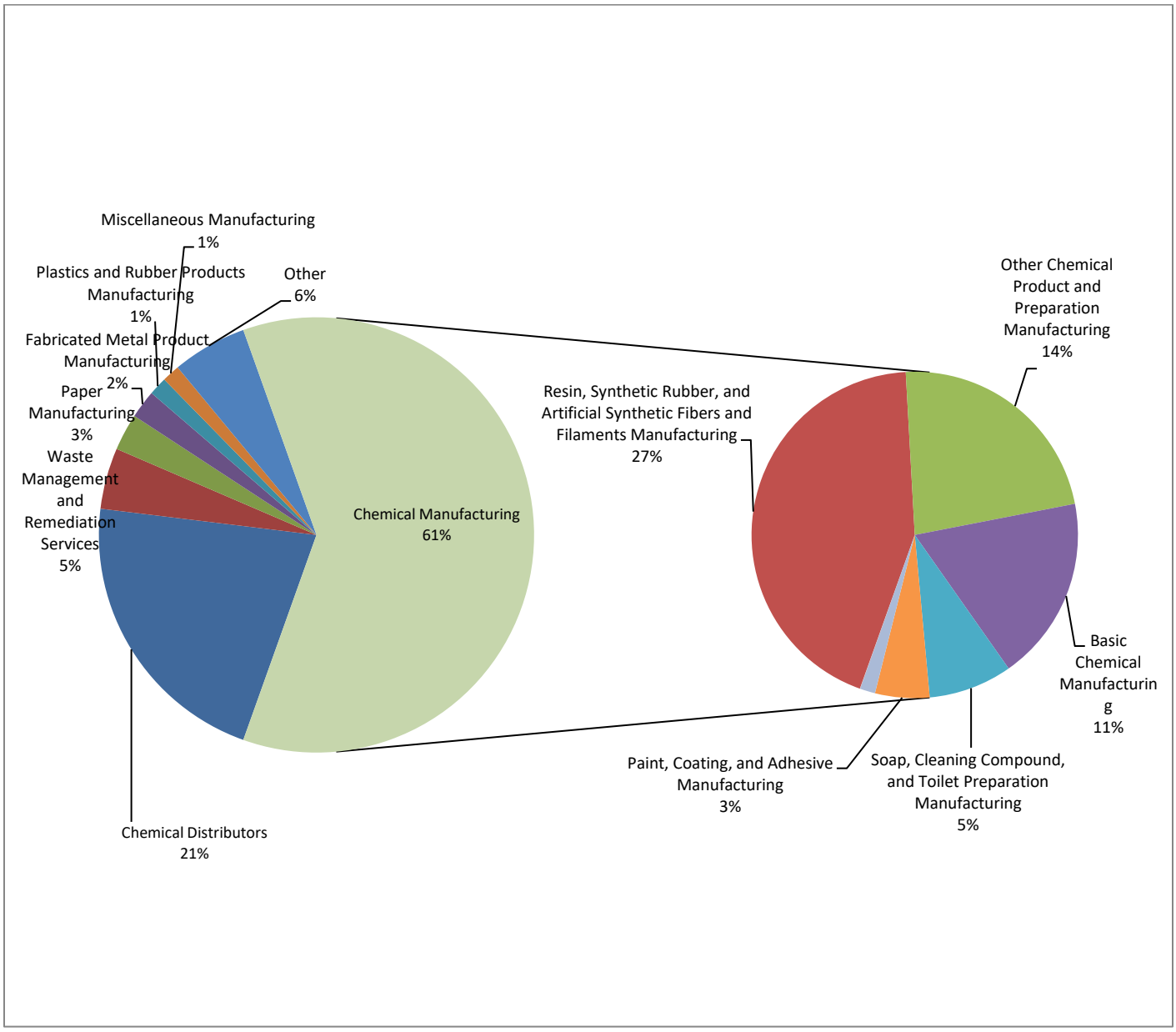


Figure 8 – All Reported Data: 2019 Byproduct Generation by Industrial Sector
Total Byproduct = 70,000,000 Pounds
(Includes Trade Secret Data)

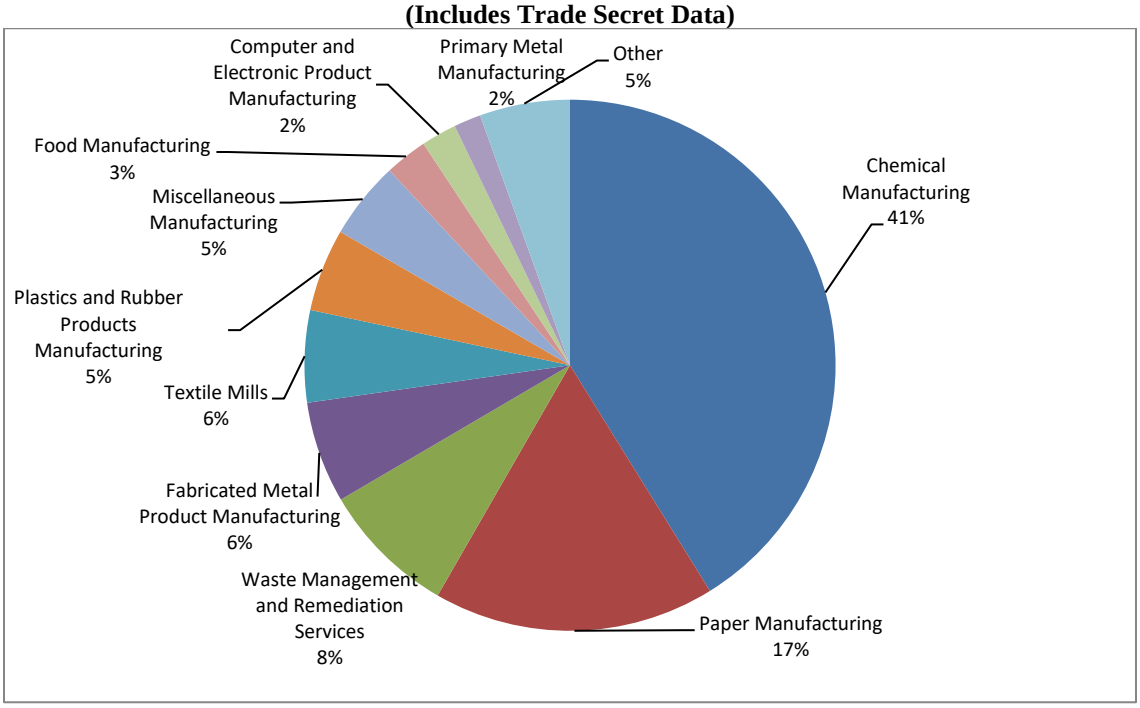
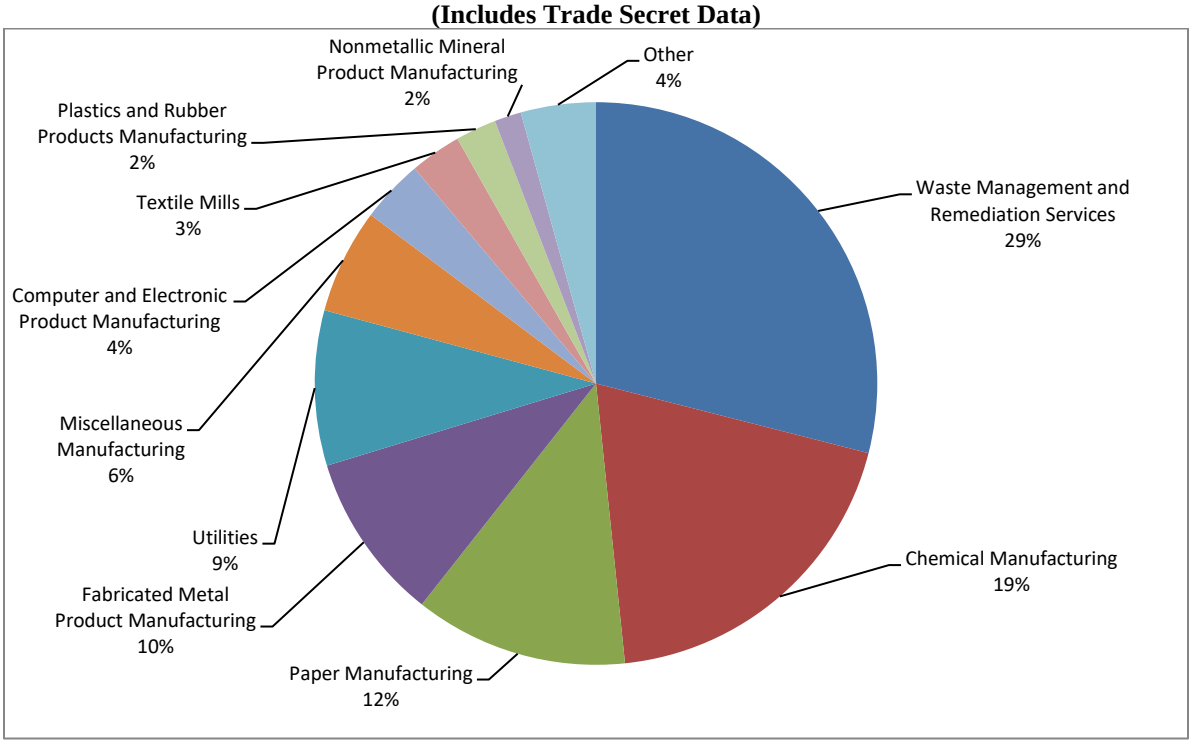


Figure 9 – All Reported Data: 2019 On-Site Releases by Industrial Sector
Total On-Site Releases = 3,000,000 Pounds
(Includes Trade Secret Data)



VII. 2019 Major TURA Facilities

Tables 12 through 14 show the top 20 facilities for the 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 518 million pounds, or 76% of total statewide use.

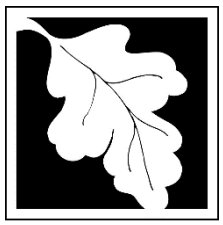
- Table 13 lists the 20 facilities that generated the largest reported quantity of byproduct generated and shipped in product. These facilities generated 42 million pounds of byproduct or 60% of the statewide total. The 20 facilities with the largest quantity shipped in product, shipped 316 million pounds in product, or 91% 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 almost 2 million pounds, or 64% of total releases statewide. Four of the Top 20 facilities of reported on-site releases were municipal waste combustors (MWCs) that also reported combustion-related emissions. Of the almost 800,000 pounds of on-site releases reported by these MWCs, 53% 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 24 million pounds, or 73% of the total statewide transfers off-site.

Table 12 2019 Top 20 Facilities: Reported Total Use (Includes trade secret data)		
Facility Name	Town	Total Use (Lbs.)
Solutia Inc	Springfield	120,327,055
Borden And Remington Corp	Fall River	72,779,143
Holland Company Inc	Adams	72,432,374
Astro Chemicals Inc	Springfield	44,623,412
Rousselot Peabody Inc	Peabody	35,037,059
Prefere Melamines LLC	Springfield	29,551,512
Southwin Ltd	Leominster	22,832,734
James Austin Co	Ludlow	18,311,244
Highline Aftermarket Acquisition LLC	Leominster	17,491,028
Roberts Chemical Co Inc	Attleboro	12,101,339
Semass Partnership	Rochester	10,946,867
Omnova Solutions Inc	Fitchburg	9,155,316
Univar Solutions USA Inc	Tewksbury	8,053,592
Covanta Haverhill Inc	Haverhill	7,957,062
Metalor Technologies USA	North Attleborough	6,892,082
DSM Coating Resins Inc	Wilmington	6,742,260
Webco Chemical Corp	Dudley	6,162,642
Solenis LLC	Chicopee	5,921,441
Wheelabrator North Andover Inc	North Andover	5,766,332
Wheelabrator Millbury Inc	Millbury	5,403,004

Table 13 2019 Top 20 Facilities: Reported Byproduct and Shipped in Product (Includes trade secret data)					
Byproduct			**Shipped in Product**		
Facility Name	Town	Byproduct Generation (Lbs.)	Facility Name	Town	Shipped in Product (Lbs.)
Solutia Inc	Springfield	6,768,587	Holland Company Inc	Adams	72,432,374
Rousselot Peabody Inc	Peabody	4,246,698	Borden & Remington Corp	Fall River	59,077,019
AR Metallizing Ltd	Franklin	3,522,694	Astro Chemicals Inc	Springfield	40,568,796
3M	Rockland	3,441,442	Solutia Inc	Springfield	33,004,465
Flexcon Company Inc	Spencer	2,987,688	Southwin Ltd	Leominster	22,826,686
Safety Kleen Systems Inc	Marlborough	2,913,924	James Austin Co	Ludlow	18,206,755
Prefere Melamines LLC	Springfield	2,465,748	Highline Aftermarket Acquisition LLC	Leominster	17,487,602
DSM Coating Resins Inc	Wilmington	2,292,866	Roberts Chemical Co Inc	Attleboro	12,101,339
Koch Membrane Systems Inc	Wilmington	1,385,470	Univar Solutions USA Inc	Tewksbury	7,995,546
Crane & Co Inc Pioneer Mill	Dalton	1,329,150	Webco Chemical Corp	Dudley	6,161,314
Thermo Fisher Scientific	Bedford	1,300,349	FXI Inc	Newburyport	4,192,206
Bostik Inc	Middleton	1,188,219	Houghton Chemical Corporation	Boston	4,008,170
Waters Corp	Taunton	1,144,575	ITW Performance Polymers	Danvers	3,065,700
Nitto Denko Avecia Inc	Milford	1,082,500	Alpha Chemical Services Inc	Stoughton	2,700,113
Semass Partnership	Rochester	998,526	Univar Solutions USA Inc	Salem	2,378,098
Haartz Corporation	Acton	986,304	Bostik Inc	Middleton	2,102,819
Ideal Tape Company	Lowell	960,203	Nyacol Products Inc	Ashland	1,929,684
ITW Foils	Newburyport	877,383	Callahan Company	Walpole	1,912,118
Hollingsworth & Vose Company	Groton	867,320	Advance Coatings Co	Westminster	1,823,264
Adhesive Applications Inc	Easthampton	863,336	Clean Harbors of Braintree Inc	Braintree	1,791,330

Table 14
2019 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	448,616	Solutia Inc	Springfield	4,313,987
Semass Partnership	Rochester	132,642	Safety Kleen Systems Inc	Marlborough	2,913,924
Wheelabrator North Andover Inc	North Andover	129,515	DSM Coating Resins Inc	Wilmington	2,276,280
Ideal Tape Company	Lowell	106,954	Prefere Melamines LLC	Springfield	2,122,436
Solutia Inc	Springfield	105,372	Koch Membrane Systems Inc	Wilmington	1,299,674
AR Metallizing Ltd	Franklin	82,577	Thermo Fisher Scientific	Bedford	1,287,682
Wheelabrator Millbury Inc	Millbury	76,225	Bostik Inc	Middleton	1,150,423
Community Eco Springfield LLC	Agawam	65,878	Waters Corp	Taunton	1,116,667
Callaway Golf Ball Operations Inc	Chicopee	61,923	Nitto Denko Avecia Inc	Milford	1,080,212
Flexcon Industries	Randolph	52,847	Semass Partnership	Rochester	865,884
Hazen Paper Co	Holyoke	51,572	Ideal Tape Company	Lowell	812,928
Jen Mfg Inc	Millbury	45,233	Johnson Matthey Pharma Services	Devens	740,630
Fore River Energy Center	Weymouth	44,126	PCI Synthesis Inc	Newburyport	601,100
Millennium Power Company LLC	Charlton	40,718	Johnson Matthey Pharma Services Inc	North Andover	592,091
Bostik Inc	Middleton	37,942	Metalor Technologies USA	North Attleborough	468,024
Nylco Divison Worthen Industries Inc	Clinton	35,113	Skyworks Solutions Inc	Woburn	416,366
Saint Gobain Abrasives Inc	Worcester	33,661	Wheelabrator Millbury Inc	Millbury	411,582
3M	Rockland	32,470	Electronic Recyclers International	Holliston	409,836
Smith & Wesson Inc	Springfield	32,442	Genzyme Corporation	Framingham	401,438
Flexcon Company Inc	Spencer	31,953	Wheelabrator Saugus Inc	Saugus	397,151



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