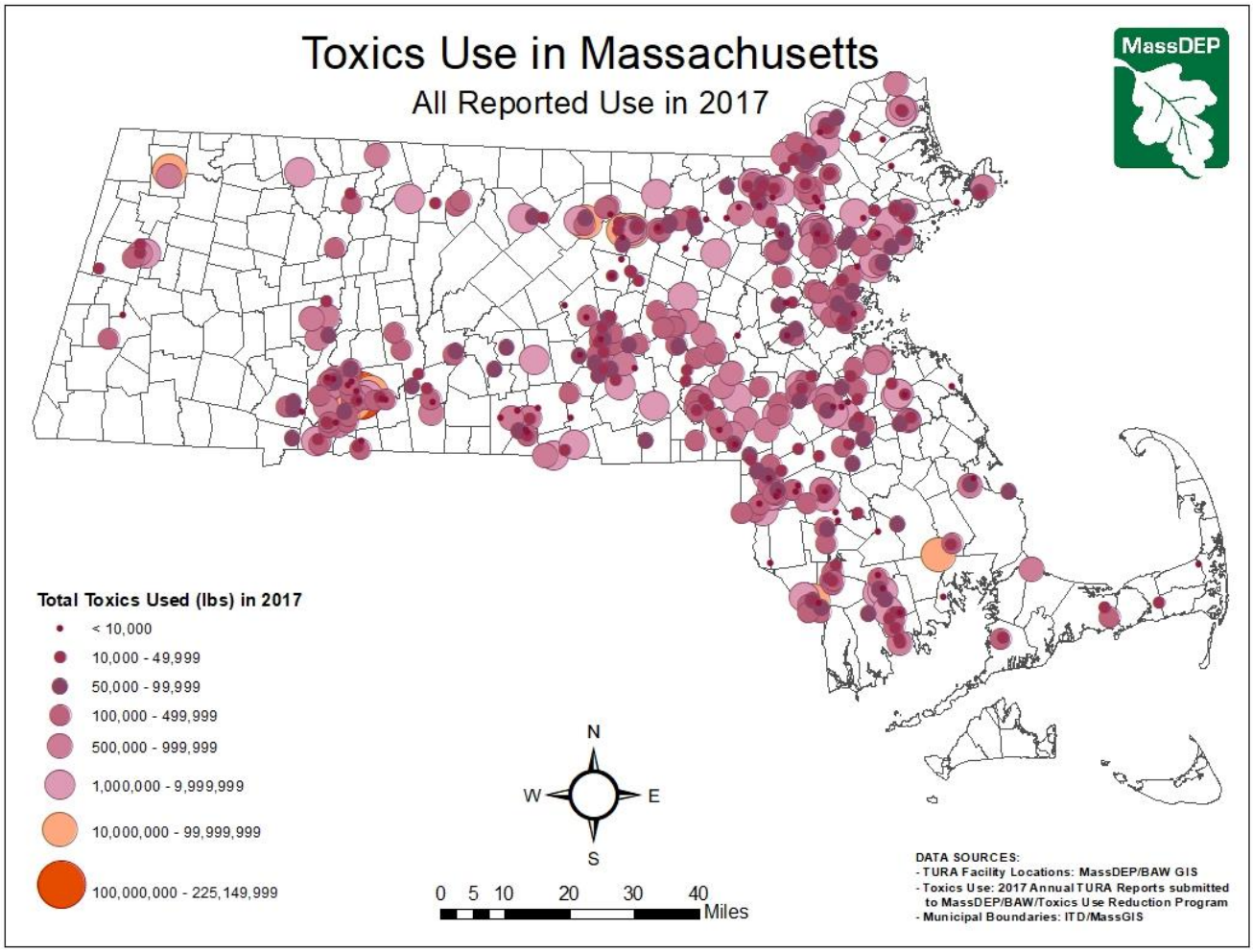
Reporting Year 2017
Toxics Use Reduction
Information Release



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

May 2020

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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 the efficient use of toxic chemicals. TURA established incentives that encourage facilities to use toxic chemicals (hereinafter referred to as chemicals, toxics, or toxic chemicals) only when necessary to make a product 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.

468 facilities subject to the Act reported using 131 different chemicals in 2017. In total (including data submitted as trade secret), from 1990 to 2017, the following reductions were observed:

- Chemical Use (from 1.2 to 0.7 billion pounds)
- Byproduct Generation (from 127 to 78 million pounds)
- Shipped in Product (from 434 to 348 million pounds)
- On-Site Releases (from 21 to 3 million pounds)
- Transfers Off-Site (from 46 to 34 million pounds)

From 2007 to 2017, 2007 Core Group (as defined on page 4) facilities:

- reduced toxic chemical use by 41% (from 792 to 468 million pounds)
- reduced toxic byproducts by 3% (from 75 to 73 million pounds)
- reduced toxics shipped in product by 10% (from 272 to 244 million pounds)
- reduced on-site releases of toxics to the environment by 51% (from 6 to 3 million pounds)
- increased transfers of toxics off-site for further waste management by 21% (from 25 to 30 million pounds).

This report includes the following six sections:

Section I: **Introduction**

Section II: **Key TURA Terms**

Section III: **2017 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: **2017 Chemical Data** summarizes the reported information on chemical use in calendar year 2017 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: **2017 Chemicals of Particular Concern** presents current and historical information on particularly toxic chemicals, on chemicals that promote asthma, and on carcinogens.

Section VI: **2017 Significant Industrial Sectors** describes the relative contributions of different industrial sectors to chemical use, waste and release.

Section VII: **2017 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 2017 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 2017, can be found at http://www.mass.gov/eea/agencies/massdep/toxics/reports/tura-data-and-results.html. 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 2017 and progress in toxics use reduction 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 incentives for Massachusetts companies 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 product, "generate as byproduct" (waste -- neither shipped in product nor convert to another chemical during the production process), release to the environment as pollution, and ship offsite for waste treatment and disposal. Companies 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 Toxics Use Reduction (TUR) plans. TUR Plans identify techniques that the company 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 companies 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. After several toxics use reduction planning efforts, companies have the option of developing reduction plans for energy use, water use, solid waste disposal or use of other chemicals instead of their 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 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/environmental-assistance-services-for-businesses

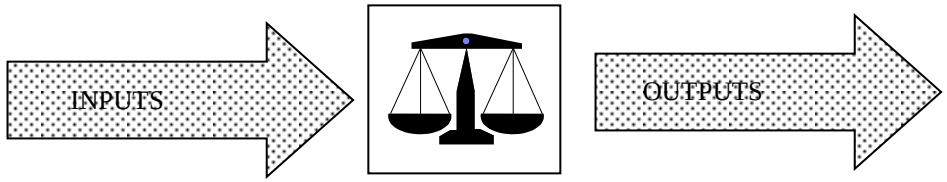
Toxics Use Reduction Institute (TURI)

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; and operates a laboratory for testing non-toxic or less-toxic cleaning alternatives. TURI also makes TURA data available on its website (http://turadata.turi.org/) in a user-friendly way that is searchable by community, chemical or company.

II. Key TURA Terms

TURA – Massachusetts Toxics Use Reduction Act of 1989 (MGL c. 21I)
TRI – federal EPA Toxics Release Inventory
TRADE SECRET – the information identified as confidential by TURA filers. To protect confidentiality claims by Trade Secret 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 companies are brought into the facility and are manufactured, processed or otherwise used. As a result of using these chemicals, a company 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.



INPUTS

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

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

PROCESS – TURA defines "process", in part, as: "the preparation of a toxic or hazardous substance, including without limitation, a toxic substance contained in a mixture or trade name product, 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. 2017 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 incentives that encourage facilities to implement toxics use reduction techniques that result in:

1) the use of toxic chemicals only when necessary to make a product, and
2) the smallest possible amount of toxic chemicals are wasted in the production process.

TURA has been a resounding success. TURA's initial goal of a 50% reduction in the quantity of toxic chemicals "generated as byproduct" (wasted – neither shipped in product nor converted into another chemical during production) was met by 1997, and the program has continued to make progress in toxics use reduction in the ensuing years. This section of the report describes the trends in absolute chemical use by filers as well as their progress in implementing toxics use reduction.

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 offsite for treatment and disposal has declined in the twenty-four years since 1990.

As shown in Figure 1, out of 1,416 chemicals listed under TURA, 131 were reported in 2017, down from 133 in 1990. The number of filers rose 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, 2017 TURA Chemical Data). The number of filers has since declined to 468 in 2017. The number of individual chemicals reports submitted (facilities file one Form S for each chemical reported) has followed a similar trend, decreasing from a high of 2,666 in 1994, to 1,602 in 2017, 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 chemicals 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 2017. Byproduct generation decreased from 127 million pounds in 1990 to 78 million pounds in 2017.

Figure 1
# of TURA Filers, Individual Chemical Reports, and Different Chemicals Reported (1990-2017)
(Including Trade Secret Data)

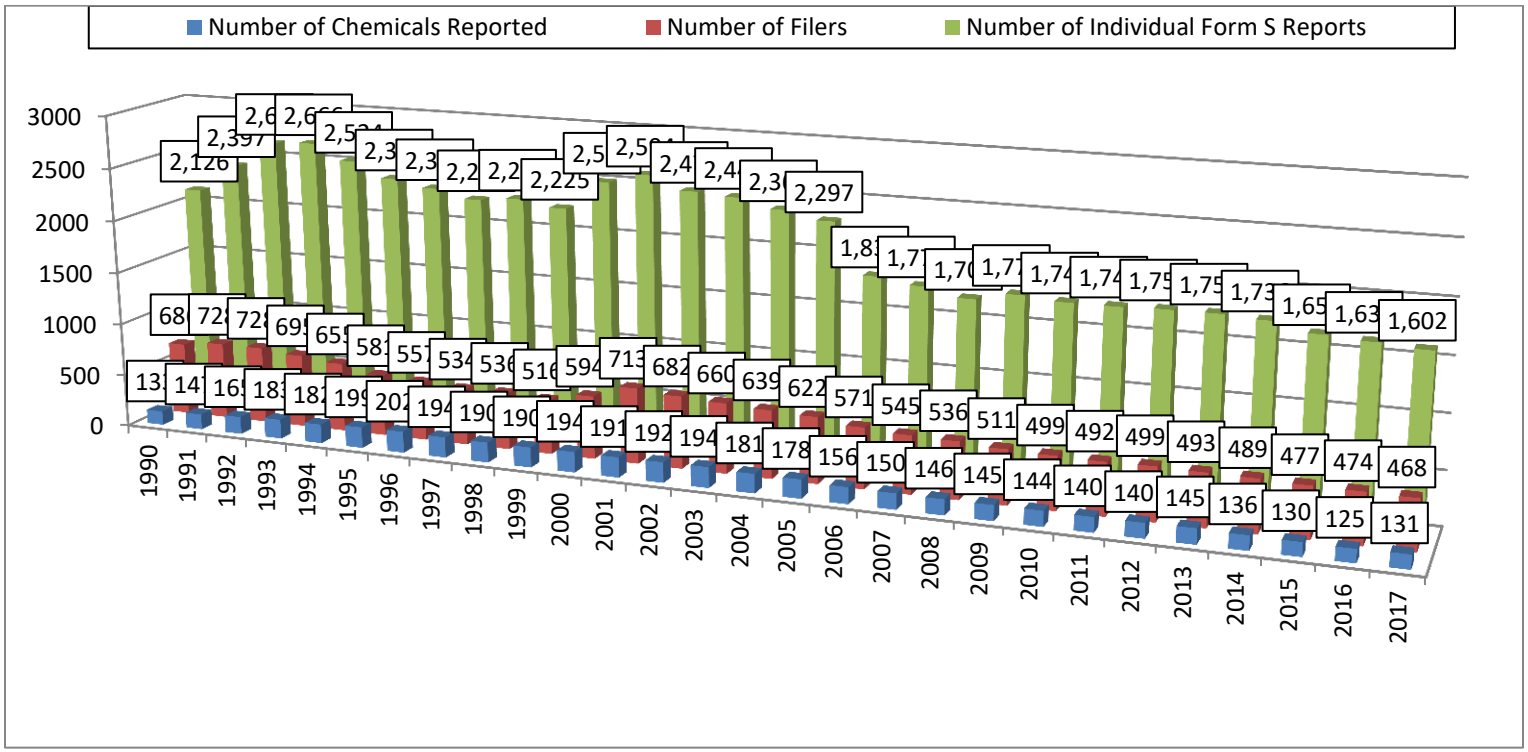
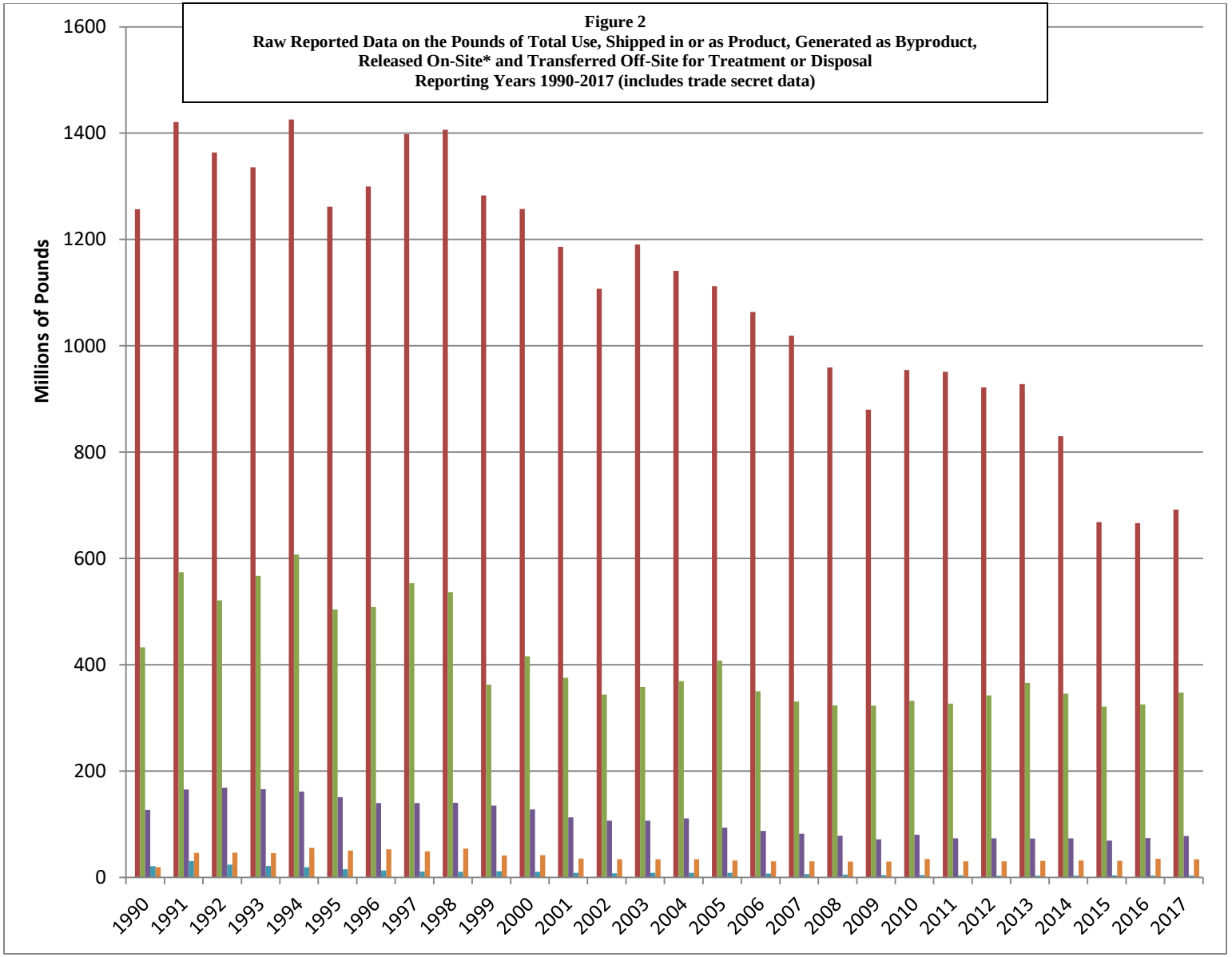


Figure 2
Raw Reported Data on the Pounds of Total Use, Shipped in or as Product, Generated as Byproduct, Released On-Site* and Transferred Off-Site for Treatment or Disposal
Reporting Years 1990-2017 (includes trade secret data)



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 2017 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 2007 Core Group includes 433 filers, which represents 93% of the 2017 TURA filers.

Table 1 and Figure 3 below summarize TURA data from 2007 to 2017, excluding trade secret data. The quantities reported by the 2007 Core Group over the period 2007 to 2017 are shown in Table 1. From 2007 to 2017, 2007 Core Group facilities:

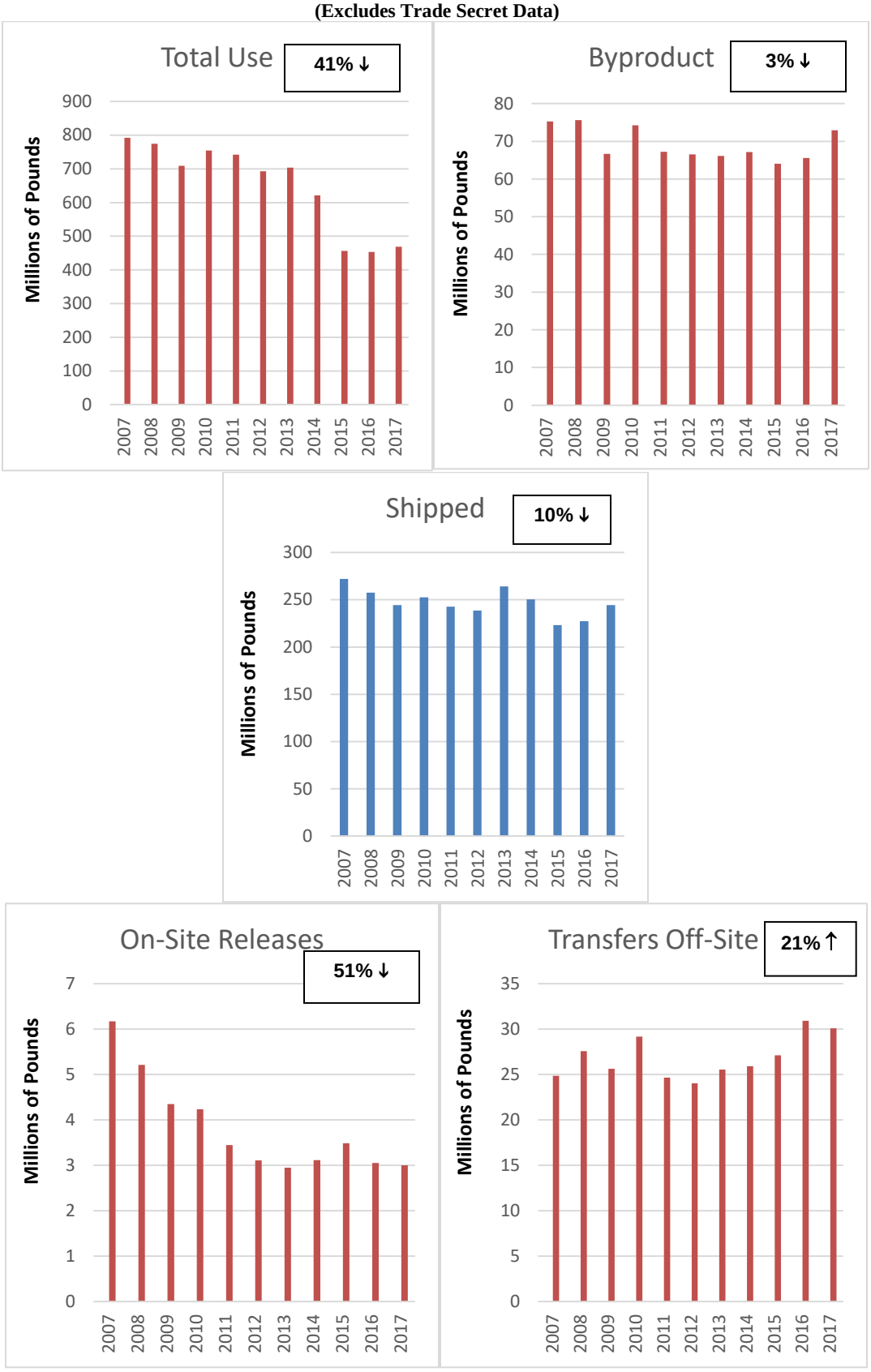
- reduced toxic chemical use by 41% (from 792 to 468 million pounds)
- reduced toxic byproducts by 3% (from 75 to 73 million pounds)
- reduced toxic chemicals shipped in product by 10% (from 272 to 244 million pounds)
- reduced on-site releases of toxic chemicals to the environment by 51% (from 6 to 3 million pounds)
- increased transfers of toxic chemicals off-site for further waste management by 21% (from 25 to 30 million pounds).

Table 1
2007 CORE GROUP DATA: 2007-2017 TREND SUMMARY
(Quantities are in millions of pounds and do not include trade secret quantities)

Year	Total Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-Site
2007	792.35	75.30	271.92	6.17	24.85
2008	774.75	75.64	257.38	5.21	27.57
2009	708.84	66.69	244.25	4.35	25.63
2010	754.15	74.24	252.55	4.23	29.17
2011	742.17	67.20	242.66	3.44	24.66
2012	693.00	66.51	238.63	3.11	24.03
2013	703.99	66.11	264.04	2.95	25.53
2014	621.58	67.13	250.47	3.11	25.92
2015	456.21	64.03	223.18	3.49	27.12
2016	453.48	65.55	227.24	3.05	30.91
2017	468.36	72.93	244.33	3.00	30.09
Percent Change 2007-2017	41% Reduction	3% Reduction*	10% Reduction	51% Reduction	21% Increase

* The increase in byproduct from 2015 to 2017 can primarily be attributed to one company changing the way it calculated byproduct (so a change in calculation, not an actual change in chemical use, byproduct, or operations). Without this change in reporting, byproduct reduction from 2007-2017 would be 10%.

Figure 3 – 2007 Core Group Toxics Use Reduction Progress 2007-2017
(Excludes Trade Secret Data)



IV. 2017 TURA Chemical Data

Table 2 All Reported Chemical Data 2017 (rounded to millions of pounds) (Includes Trade Secret Data)		
TOTAL USE	692,000,000	
SHIPPED IN PRODUCT	348,000,000	50% of total chemical use
GENERATED AS BYPRODUCT (total waste prior to treatment or disposal)	78,000,000	11% 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)	34,000,000	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 they use and generate as byproduct is a trade secret. As long as the regulatory standards for making such a claim are met, MassDEP may not share that information, or information that could be used to back calculate trade secret reports. In 2017, nine companies made trade secret claims on a combined total of:

- 224 million pounds of chemical use
- 5 million pounds of byproduct generation (2% of trade secret total use)
- 103.5 million pounds shipped in product.

Chemical Use by Use Category

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

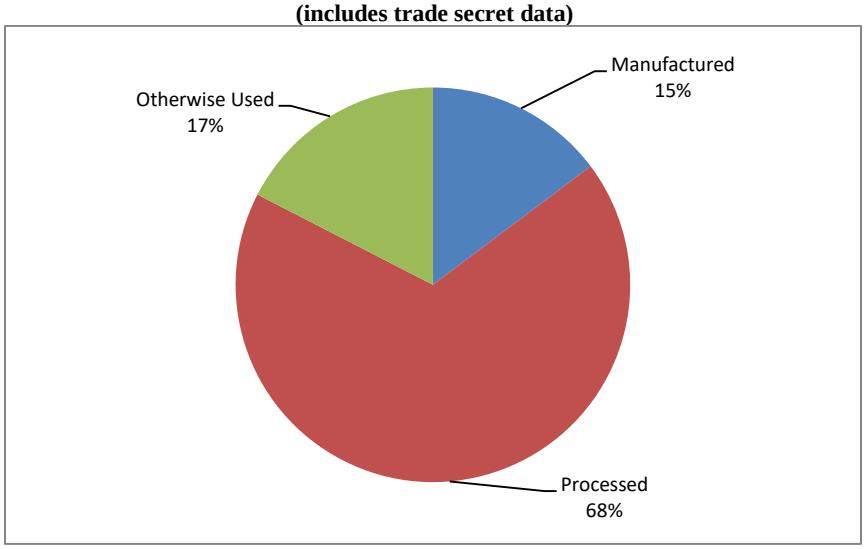
Manufacture is defined in TURA, in part, as "to produce, prepare, import or compound a toxic or hazardous substance". For example, the intentional manufacture of a chemical substance such as formaldehyde or the "coincidental" (unintentional) manufacture of chemicals such as the creation of sulfuric acid 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 2017.

Process is defined in TURA, in part, as "the preparation of a toxic or hazardous substance, including without limitation, a toxic substance contained in a mixture or trade name product, after its manufacture, for distribution in commerce". Most chemical use in Massachusetts is processed. Chemicals processed accounted for 68% of 2017 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 evaporate 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 2017 total chemical use.

Figure 4 below shows the proportion of use for the three use categories:

Figure 4
2017 Total Use by Category
(692 Million Pounds)
(includes trade secret data)



Top 20 Chemicals

In 2017, filers reported using 131 out of the 1,416 TURA-listed chemicals in amounts above the reporting threshold. The company reported data was analyzed by chemical to identify the top 20 chemicals in each of the following reported amounts: used, generated as a byproduct, shipped in product, released onsite as pollution, and shipped offsite for treatment or disposal.

Chemical Use

As shown in Table 3 below, the 2017 top 20 chemicals in total use accounted for 84%, (392 million pounds) of the total reported statewide use (trade secret data was excluded to protect confidentiality claims). The top four chemicals, Sodium Hydroxide (13% of total use, 157 facilities, 63 million pounds), Hydrochloric Acid (13% of total use, 45 facilities, 61 million pounds), Methanol (over 12% of total use, 29 facilities, 59 million pounds), and Sodium Hypochlorite (7% of total use, 34 facilities, 35 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 twenty chemicals represent a significant proportion of the total amount reported (Table 1): The top twenty chemicals comprised:

- 89% of the total reported byproducts (including trade secret data)
- 88% of the total reported shipped in product (excluding trade secret data)
- 93% of the total onsite releases (including trade secret data)
- 91% of the total offsite transfers (including trade secret data).

Hydrochloric acid was the top chemical for on-site releases, accounting for 16% of the statewide total of on-site releases (3 million pounds). Ninety-four (94) percent of hydrochloric acid releases were from municipal waste combustors. Over 99% 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 19% of the statewide total transfers off-site (34 million pounds). Nitrate compounds were primarily coincidentally manufactured during neutralization of nitric acid in wastewater treatment, and were discharged to Publically Owned Wastewater Treatment Plants. Ninety-one (91) percent of total transfers off-site of lead, the fourth chemical on the list, was attributed to four municipal waste combustors that transferred lead in ash to off-site lined landfills.

Table 3 – 2017 Top 20 Chemicals: Total Use *These quantities do not include Trade Secret*		
Chemical Name (CAS #)	**CAS #**	**Total Use (Lbs.)**
Sodium Hydroxide	1310732	62,565,138
Hydrochloric Acid	7647010	61,183,922
Methanol	**67561**	59,313,820
Sodium Hypochlorite	7681529	34,949,253
Sulfuric Acid	7664939	25,027,822
Acetone	**67641**	16,190,391
Ammonia	7664417	15,272,818
Potassium Hydroxide	1310583	13,383,554
Toluene	**108883**	12,805,715
Methyl Ethyl Ketone	**78933**	11,368,017
Nitrate Compounds	1090	11,144,598
Ethyl Acetate	**141786**	9,982,489
Ethylene Glycol	107211	9,465,448
Diisocyanates	1050	8,956,871
Phosphoric Acid	7664382	8,770,060
Zinc Compounds	1039	8,212,109
Nitric Acid	7697372	7,635,656
Methyl Methacrylate	80626	5,703,104
Toluene Diisocyanate	26471625	5,392,008
Epichlorohydrin	106898	4,720,880

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 – 2017 Top 20 Chemicals:
Byproduct Generation and Shipped in Product

Byproduct Generation *These quantities include Trade Secret*			**Shipped in Product** *These quantities do not include Trade Secret*		
Chemical Name	**CAS #**	**Byproduct Generation (Lbs.)**	**Chemical Name**	**CAS #**	**Shipped in Product (Lbs.)**
Ethyl Acetate	**141786**	13,075,506	**Methanol**	**67561**	56,520,106
Sodium Hydroxide	1310732	9,443,149	Sodium Hydroxide	1310732	36,951,294
Nitrate Compounds	1090	7,092,537	Sodium Hypochlorite	7681529	32,394,008
Ethylene Glycol	107211	5,607,932	**Acetone**	**67641**	12,421,658
Sulfuric Acid	7664939	5,487,599	Potassium Hydroxide	1310583	10,926,387
Toluene	**108883**	4,911,798	Sulfuric Acid	7664939	10,307,600
Methyl Ethyl Ketone	**78933**	3,694,210	**Toluene**	**108883**	7,708,531
Acetone	**67641**	3,444,329	**Methyl Ethyl Ketone**	**78933**	7,583,558
Methanol	**67561**	3,151,458	Phosphoric Acid	7664382	7,151,986
Hydrochloric Acid	7647010	2,744,776	Toluene Diisocyanate	26471625	5,098,409
Lead	7439921	2,644,812	Zinc Compounds	1039	3,856,158
Formaldehyde	50000	2,013,952	Ethylene Glycol	107211	3,194,532
1-Methyl-2-Pyrrolidone	872504	1,667,768	Glycol Ethers	1022	2,964,009
Dimethylformamide	68122	1,311,683	Methyl Methacrylate	80626	2,869,069
Acetonitrile	75058	1,304,892	Ferric Chloride	7705080	2,623,867
Nitric Acid	7697372	971,813	Dimethylformamide	68122	2,529,829
Aluminum Sulfate	10043013	770,294	Antimony Compounds	1000	2,524,080
Butyraldehyde	123728	691,502	**Ethyl Acetate**	**141786**	2,057,040
Dichloromethane	75092	677,954	Dichloromethane	75092	2,044,505
Potassium Hydroxide	1310583	639,169	Zinc	7440666	1,957,274

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 – 2017 Top 20 Chemicals:
Reported On-Site Releases and Transfers Off-Site

On-Site Releases *These quantities include Trade Secret*			Transfers Off-Site *These quantities include Trade Secret*		
Chemical Name	**(CAS #)**	**On-Site Releases (Lbs.)**	**Chemical Name**	**(CAS #)**	**Transfers Off-Site (Lbs.)**
Hydrochloric Acid	7647010	534,949	Nitrate Compounds	1090	6,654,526
Acetone	**67641**	526,322	Ethylene Glycol	107211	4,030,829
Lead	7439921	328,127	**Acetone**	**67641**	2,544,504
Ethyl Acetate	**141786**	300,445	Lead	7439921	2,350,067
Ammonia	7664417	294,350	**Methanol**	**67561**	2,316,312
Glycol Ethers	1022	219,285	**Toluene**	**108883**	1,992,116
Butyl Alcohol	71363	200,402	Formaldehyde	50000	1,832,658
Toluene	**108883**	174,077	1-Methyl-2-Pyrrolidone	872504	1,596,929
Formaldehyde	50000	113,838	**Methyl Ethyl Ketone**	**78933**	1,421,542
Methyl Ethyl Ketone	**78933**	100,285	Acetonitrile	75058	1,302,408
Methanol	**67561**	84,511	Sodium Hydroxide	1310732	813,357
Dichloromethane	75092	45,921	**Ethyl Acetate**	**141786**	763,870
Trichloroethylene	79016	43,518	Butyraldehyde	123728	629,515
N Propyl Bromide	106945	42,021	Dichloromethane	75092	625,196
Butyraldehyde	123728	36,954	Zinc Compounds	1039	595,719
Butyl Acetate	540885	26,454	Lead Compounds	1026	531,940
Tetrachloroethylene	127184	22,433	Dimethylformamide	68122	376,178
Xylene Mixed Isomer	1330207	21,848	Butyl Alcohol	71363	321,381
Hexane (N-Hexane)	110543	21,070	Furan, Tetrahydro-	109999	305,268
Nitrogen Dioxide	10102440	20,835	Ferric Chloride	7705080	280,563

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. 2017 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 2017 reported data and the number of filers for each PBT (excluding trade secret data). Nine PBTs are reported in Massachusetts. Five of these (dioxin, pacs, 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, companies 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 (80) percent of the use of lead is from the combustion of fuel by power plants and the combustion of waste by Municipal Waste Combusters.

Lowering the reporting threshold to 100 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 2017 the number of lead and lead compounds filers had decreased to 65 and 48, respectively.

Table 6 2017 Persistent Bioaccumulative Toxic (PBT) Chemicals Summary (Excludes Trade Secret Data)							
Substance	Threshold (lbs or grams for dioxin)	# Filers in 2017	Use	Byproduct	Shipped in Product	lbs On-Site Releases	Lbs Transfers Off-Site
Benzo[Ghi]Perylene	10	21	5,229	737	1,574	0	738
Dioxin And Dioxin Compounds	0.1 Gr	8	2,012	2,012	0	243	1,770
Lead	100	65	3,201,627	2,644,812	556,149	328,127	2,350,067
Lead Compounds	100	48	709,517	529,730	166,522	2,204	528,141
Mercury	10	18	8,392	2,538	2,558	405	2,159
Mercury Compounds	10	2	703	35	1,974	2	54
Polychlorinated Biphenyls	10	1	39,383	35,923	0	0	35,922
Polycyclic Aromatic Compounds	100	23	347,984	6,484	72,205	26	6,666
Tetrabromo-Bisphenol	10	2	2,760	48	2,711	0	48

Table 7
Pounds of PBTs Reported Use and Number of Facilities Reporting 2000 – 2017
(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-bisphenol A (79947)		Lead (7439921)		Lead Compounds (1026)	
	Lbs Use	#	Grams Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#
1999	0	0	0	0	0		0	0	0	0	37,539,261	6	0	0				
2000	146,531	120	12	8	4973	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	1,397,277	23	4,466	2	3,450,622	63	956,404	51
2016	7,267	19	2,094	8	8,479	16	1,365	2	45,621	1	575,477	21	3,418	2	3,237,671	65	726,719	51
2017	5,229	21	2,012	8	8,392	18	703	2	39,383	1	347,984	23	2,760	2	3,201,627	65	709,517	48

NOTE: The numbers below the dark lines indicate the first year that these chemicals were designated as a PBT 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 2017. Toluene-2,4-diisocyanate, Toluene-2,6-diisocyanate, and Toluene diisocyanate (mixed isomers) were designated as HHS in 2017.

The data shows a similar trend for trichloroethylene and tetrachloroethylene, as that seen with PBTs: a gradual decline in use from 2007, the year before the substance was designated as an HHS, an initial increase in the number of facilities reporting, and the pounds of chemical reported after designation as an HHS, followed by a drop in both measures.

Table 9 below shows the fourteen HHS chemicals reported in 2017, 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 Non-Trade Secret Use And # Filers Before and After HHS Designation

NAME	Toluene -2,4- diisocya -nate	Toluene -2,6- diisocya -nate	Toluene diisocya- nate (mixed isomers)	Hydrogen 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	Cad-mium Com-pounds	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	164,605	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	3,154,185	77,657	909,566	17,707	155,687	236,683
2017	**510,809**	**127,702**	**5,392,008**	235,995	90,008	3,871,715	142,450	2,781,125	3,066,368	89,696	346,348	16,991	153,463	221,582
				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	1	9	3	25	23	14	11	3	6	13
2016	1	1	3	**25**	**23**	**13**	**14**	20	21	14	12	3	6	14
2017	**1**	**1**	**5**	27	22	12	15	20	22	14	12	3	5	12

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

Table 9 2017 Higher Hazard Substances (HHS) Summary (Excludes Trade Secret Data)						
Substance and Year Designated as HHS	# Filers in 2017	Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-Site
Cadmium/2008	3	16,991	1,547	17,270	12	1,516
Cadmium Compounds/2008	5	153,463	12,743	17,372	18	12,728
Trichloroethylene/2008	12	221,582	113,620	143,071	43,518	18,318
Tetrachloroethylene/2009	12	346,348	31,598	286,494	22,433	9,350
Formaldehyde/2012	22	3,066,368	446,784	159,289	109,788	269,540
Hexavalent Chromium Compounds/2012	14	89,696	21,651	60,542	136	14,295
Methylene Chloride/ Dichloromethane/2014	20	3,871,715	1,311,683	2,529,829	8,770	376,178
Cyanide Compounds/2016	15	142,450	52,658	10,520	91	25,815
Dimethylformamide/2016	12	3,871,715	1,311,683	2,529,829	8,770	376,178
Hydrogen Fluoride/2016	26	234,150	194,673	34,678	5,063	57,834
N-Propyl Bromide/2016	21	88,584	79,167	11,703	41,479	35,371
Toluene-2,4- diisocya-nate/2017	1	510,809	11,786	0	0	11,785
Toluene-2,6- diisocya-nate/2017	1	127,702	2,946	0	2	2,944
Toluene diisocyaate/2017	5	5,392,008	5,955	5,098,409	184	6,290

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 Toxics Use Reduction Act (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 2017 data on some of the chemicals identified in the LCSP report that were reported under TURA. In 2017, 15 chemicals identified as asthmagens by the Association of Occupational and Environmental Clinics (AOEC) were reported under TURA. In 2017, formaldehyde, styrene monomer, and sulfuric acid were reported with the largest amount of releases. 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 (16)	1,492,828	3,387
Aluminum (1)	49,429	12
Chlorine (5)	3,776,525	100
Chromium (2)	94,056	16
Ethylene Oxide (1)	194,776	203
Formaldehyde (22)	3,066,368	109,788
Hydrazine (3)	228,588	10
Maleic Anhydride (1)	484,420	413
Methyl Methacrylate (6)	5,703,104	13,115
Nickel (3)	293,565	43
Nickel Compounds (4)	823,115	2,799
Phthalic Anhydride (1)	142,968	29
Styrene Monomer (9)	4,389,989	20,776
Sulfuric Acid (92)	25,027,822	20,658
Toluene Diisocyanate (7)*	6,030,519	186

* 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 2017, six 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. Of these chemicals, formaldehyde 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)	16,991	12
Dioxin (8)*	2,012 grams	243 grams
Ethylene Oxide (1)	194,776	203
Formaldehyde (22)	3,066,368	109,788
Hexavalent Chromium Compounds (14)	89,696	136
Nickel Compounds (4)	823,115	2,799

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

VI. 2017 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 1 through 4 present, by sector, the 2017 numbers of companies 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 5) 18%, by far the greatest percentage of use (Figure 6) 57%, the largest percentage of byproduct (Figure 7) 38%, and the third largest percentage of on-site releases (Figure 8) 14%. This sector is a diverse group of industries, and includes companies that "manufacture" chemicals according to the TURA definition as well as companies that "process" chemicals to formulate adhesives, paints, pharmaceuticals, and plastic materials and resins. The chemical manufacturing sector is broken into further sectors in Figure 6.

Chemical distributors at (Figure 6) 16% were the second largest contributor to use, but had virtually no impact on byproduct and releases. Paper manufacturing, waste management and remediation services, and fabricated metal processors, were other sectors with substantial contributions to byproduct and releases. The paper manufacturing sector, which accounted for (Figure 6) 2% of total statewide use, accounted for (Figure 7) 20% of total byproduct generated. Likewise, waste management and remediation services, which accounted for (Figure 6) 6% of total statewide use, had the highest contribution of on-site releases (Figure 8) 25%.

Figure 5 –2017 Number of Facilities by Industrial Sector
Total Number of Facilities = 468
(Includes Trade Secret Data)

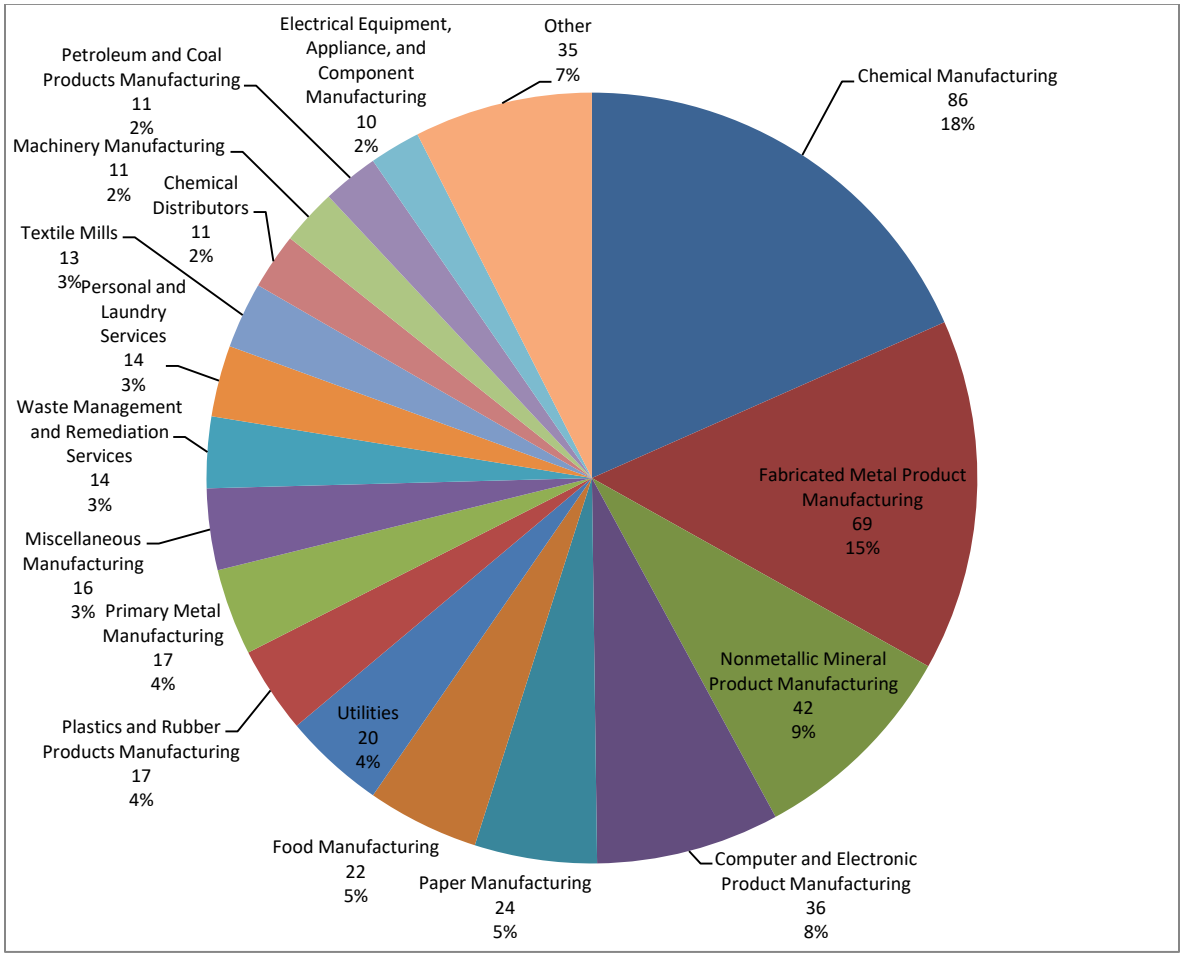


Figure 6 – All Reported Data: 2017 Chemical Use by Industrial Sector
Total Use = 692,000,000 Pounds
(Including Trade Secret)

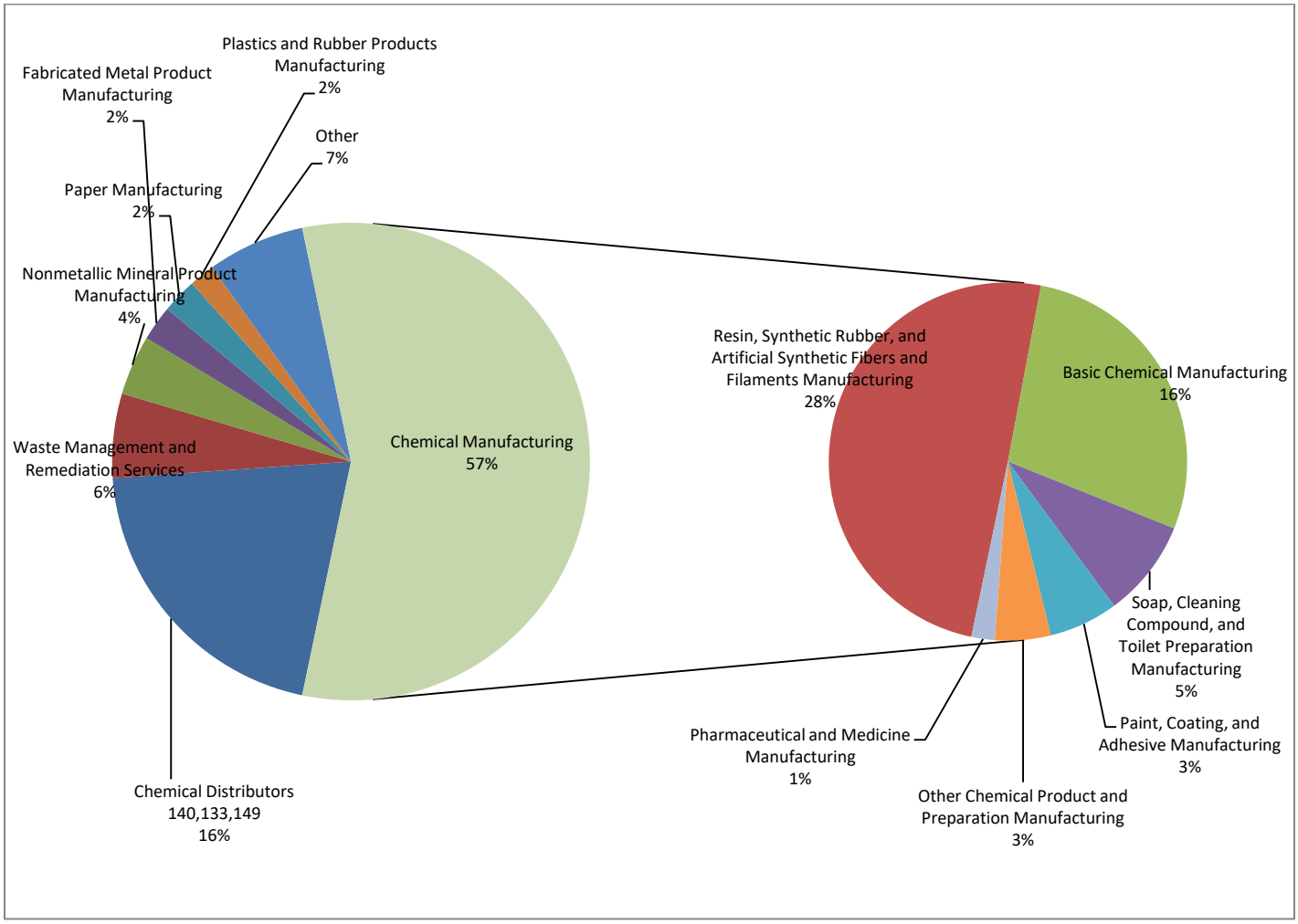


Figure 7 – All Reported Data: 2017 Byproduct Generation by Industrial Sector Total Byproduct = 78,000,000 Pounds
(Includes Trade Secret)

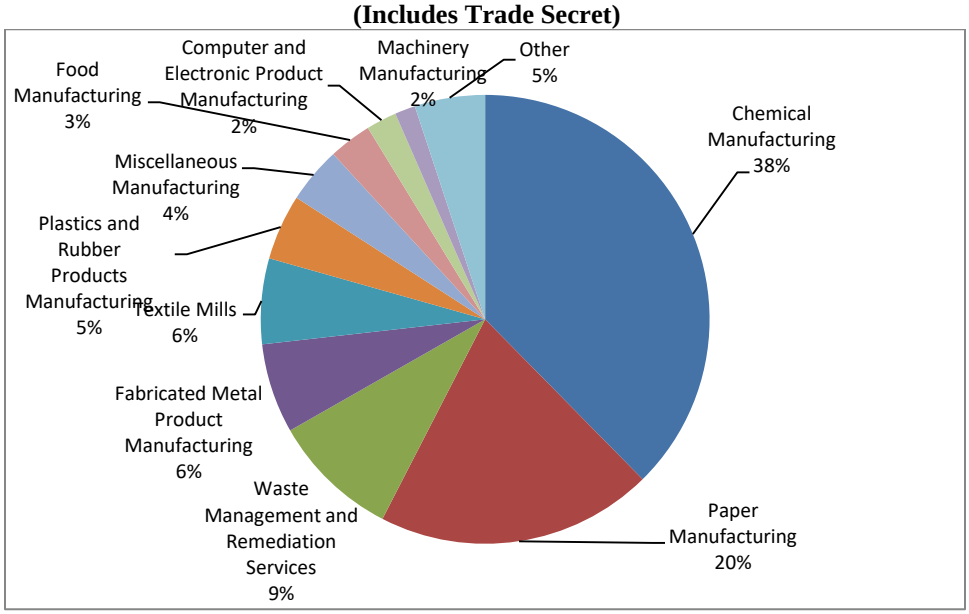
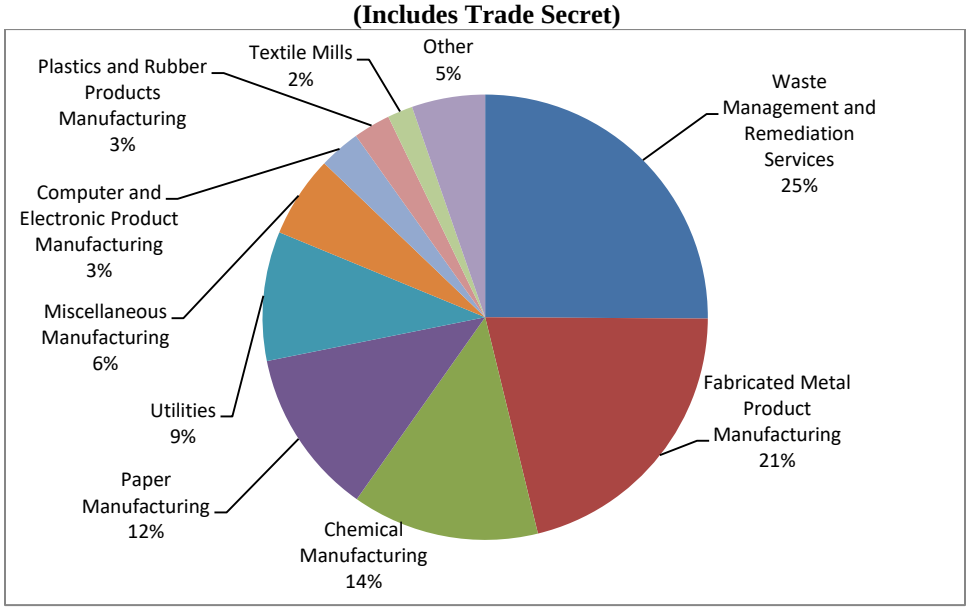


Figure 8 – All Reported Data: 2017 On-Site Releases by Industrial Sector Total On-Site Releases = 3,000,000 Pounds
(Includes Trade Secret)



VII. 2017 Major TURA Facilities

Tables 12 through 14 show the top 20 facilities for the quantities of reported chemical use, generated as byproduct, shipped in or as product, on-site releases, and transfer off-site.

- Table 12 lists the 20 facilities that reported the largest total quantity of TURA chemicals used. These 20 facilities used 511 million pounds, or 74% 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 47 million pounds of byproduct or 60% of the statewide total. The 20 facilities with the largest quantity shipped in product, shipped 309 million pounds in product, or 89% of the statewide total.

- Table 14 lists the 20 facilities that reported the largest quantity of on-site releases and the 20 facilities that had the largest quantity of transfers off-site. These facilities released 2 million pounds, or 63% 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 829,000 pounds of on-site releases reported by these MWCs, 60% was due to the coincidental manufacture of hydrochloric acid during combustion, and 39% 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 25 million pounds, or 73% of the total statewide transfers off-site.

Table 12 2017 Top 20 Facilities: Reported Total Use (Includes trade secret data)		
Facility Name	Town	Total Use (Lbs.)
Solutia Inc	Springfield	129,066,630
Borden & Remington	Fall River	71,354,188
Holland Company Inc	Adams	66,110,300
Astro Chemicals Inc	Springfield	36,624,054
Prefere Melamines	Springfield	34,761,149
Rousselot Peabody Inc	Peabody	34,680,000
Southwin Ltd	Leominster	24,269,726
James Austin Co	Ludlow	17,000,372
Camco Manufacturing Inc	Leominster	15,081,700
Semass Partnership	Rochester	10,018,916
Roberts Chemical Co Inc	Attleboro	9,431,918
Omnova Solutions Inc	Fitchburg	9,191,065
Houghton Chemical Corporation	Boston	8,588,637
Webco Chemical Corp	Dudley	6,679,772
Wheelabrator North Andover Inc	North Andover	6,571,599
Metalor Technologies USA	North Attleborough	6,482,142
Univar Solutions USA - Salem Branch	Salem	6,453,469
Univar Solutions USA Inc	Tewksbury	6,394,186
Metalor Technologies USA	Attleboro	6,299,053
Covanta Haverhill Inc	Haverhill	5,878,688

Table 13 2017 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	7,224,081	Holland Company Inc	Adams	66,110,300
AR Metallizing Ltd	Franklin	5,068,340	Borden & Remington	Fall River	54,654,680
3M	Rockland	4,784,517	Solutia Inc	Springfield	34,523,221
Rousselot Peabody Inc	Peabody	4,778,323	Astro Chemicals Inc	Springfield	34,202,091
Flexcon Company Inc	Spencer	3,391,459	Southwin Ltd	Leominster	24,263,299
Prefere Melamines	Springfield	2,827,597	James Austin Co	Ludlow	16,794,723
Safety Kleen Systems Inc	Marlborough	2,134,193	Camco Manufacturing Inc	Leominster	15,082,937
Clean Harbors Of Braintree Inc	Braintree	1,831,125	Roberts Chemical Co Inc	Attleboro	9,431,918
Nitto Denko Avecia Inc	Milford	1,683,461	Houghton Chemical Corporation	Boston	8,552,478
ITW Foils	Newburyport	1,658,347	Webco Chemical Corp	Dudley	6,677,047
Crane & Co Inc Pioneer Mill	Dalton	1,450,735	Univar Solutions USA - Salem Branch	Salem	6,441,015
Thermo Fisher Scientific	Bedford	1,272,413	Univar Solutions USA Inc	Tewksbury	6,363,578
Haartz Corporation	Acton	1,195,298	ITW Polymers Sealants North America	Rockland	5,236,533
Koch Membrane Systems Inc	Wilmington	1,142,726	Innocor Foam Technologies Newburyport	Newburyport	5,093,807
DSM Coating Resins Inc	Wilmington	1,126,646	ITW Polymers Adhesives North America	Danvers	2,894,467
Waters Corp	Taunton	1,105,076	Savogran Company	Norwood	2,878,800
PCI Synthesis Inc	Newburyport	1,102,267	Alpha Chemical Services Inc	Stoughton	2,513,873
Semass Partnership	Rochester	1,102,172	Callahan Company	Walpole	2,510,260
Munters Corp	Amesbury	975,154	Commonwealth Soap & Toiletries	Fall River	2,265,011
Barnhardt Manufacturing Co	Colrain	939,226	Bostik Inc	Middleton	2,205,364

Table 14
2017 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	446,806	Solutia Inc	Springfield	5,970,723
Crown Beverage Packaging USA	Lawrence	385,718	Prefere Melamines	Springfield	2,456,450
Semass Partnership	Rochester	163,176	Safety Kleen Systems Inc	Marlborough	2,134,160
Solutia Inc	Springfield	149,191	Nitto Denko Avecia Inc	Milford	1,682,304
Ideal Tape Company	Lowell	110,558	Thermo Fisher Scientific	Bedford	1,259,321
AR Metallizing Ltd	Franklin	102,605	PCI Synthesis Inc	Newburyport	1,091,171
Wheelabrator Millbury Inc	Millbury	87,381	DSM Coating Resins Inc	Wilmington	1,063,798
Mystic Station	Everett	86,886	Koch Membrane Systems Inc	Wilmington	1,037,648
Callaway Golf Ball Operations Inc	Chicopee	76,815	Waters Corp	Taunton	955,531
Wheelabrator Saugus Inc	Saugus	73,168	Semass Partnership	Rochester	938,996
Waters Corp	Taunton	62,177	Bostik Inc	Middleton	898,008
Wheelabrator North Andover Inc	North Andover	58,203	Genzyme A Sanofi Company	Allston	801,202
Metalor Technologies USA	Attleboro	55,012	Ideal Tape Company	Lowell	789,954
Jen Mfg Inc	Millbury	52,494	Johnson Matthey Pharma Services	Devens	776,343
3M	Rockland	45,114	Genzyme Corporation	Framingham	731,485
Millennium Power Partners LP	Charlton	40,633	Skyworks Solutions Inc	Woburn	604,836
Hollingsworth & Vose Company	West Groton	39,854	Johnson Matthey Pharma Services Inc	North Andover	599,979
Hazen Paper Co	Holyoke	36,406	Smith & Wesson Inc	Springfield	438,817
Flexcon Company Inc	Spencer	36,045	Haartz Corporation	Acton	431,698
Bostik Inc	Middleton	34,307	Wheelabrator Millbury Inc	Millbury	423,854

Massachusetts Department of
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Executive Office of Energy and Environmental Affairs
Kathleen A. Theoharides, Secretary

Department of Environmental Protection
Martin Suuberg, Commissioner