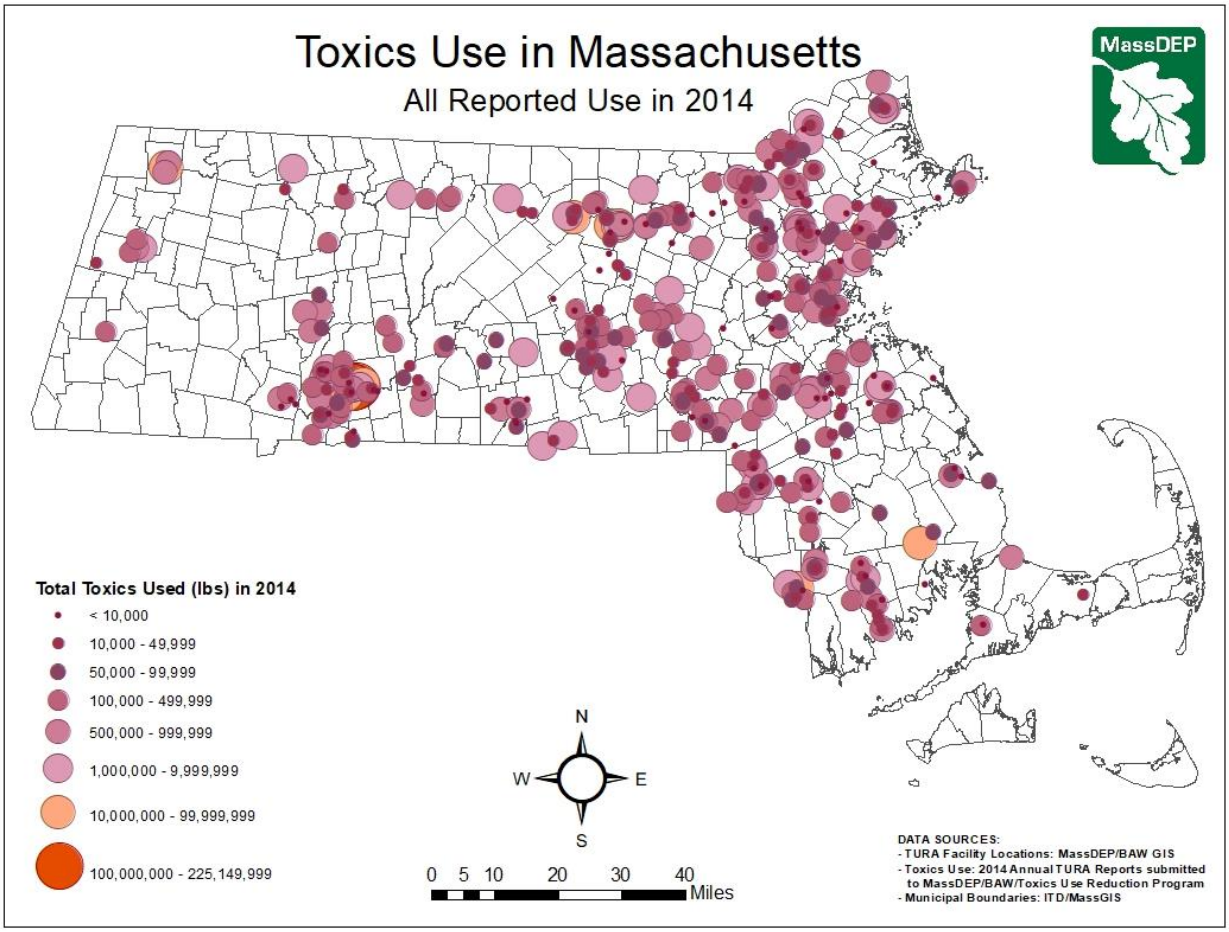
Reporting Year 2014
Toxics Use Reduction
Information Release



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

Table of Contents

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.

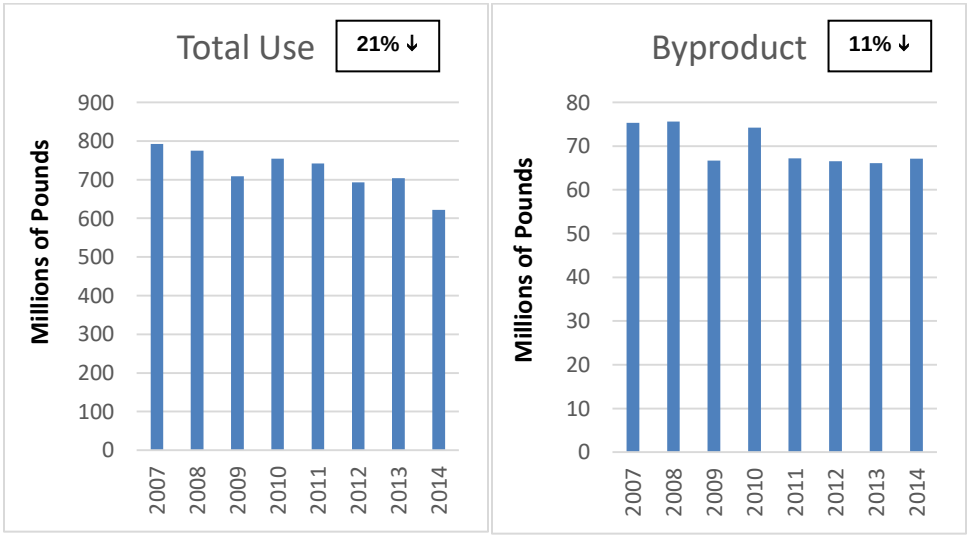
468 facilities subject to TURA reported using 137 different toxic chemicals in 2014. In total (including data submitted as trade secret), from 1990 to 2014, the following reductions were observed:

- Chemical Use (from 1.2 to 0.8 billion pounds)
- Byproduct Generation (from 127 to 74 million pounds)
- Shipped in Product (from 434 to 319 million pounds)
- On-Site Releases (from 21 to 3 million pounds)
- Transfers Off-Site (from 46 to 31 million pounds)

From 2007 to 2014, 2007 Core Group (as defined on page 4) facilities:

- reduced toxic chemical use by 21% (from 792 to 622 million pounds)
- reduced toxic chemical byproducts by 11% (from 75 to 67 million pounds)
- reduced toxic chemicals shipped in product by 8% (from 272 to 250 million pounds)
- reduced on-site releases of toxic chemicals to the environment by 50% (from 6 to 3 million pounds)
- increased transfers of toxic chemicals off-site for further waste management by 4% (from 25 to 26 million pounds).

Toxics Use Reduction Core Group Progress 2007-2014
(Excluding Trade Secret Data)



This report includes the following seven sections:

Section I: **Introduction**

Section II: **Key TURA Terms**

Section III: **2014 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: **2014 Chemical Data** summarizes the reported information on chemical use in calendar year 2014 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: **2014 Chemicals of Particular Concern** presents current and historical information on particularly toxic chemicals, on chemicals that promote asthma, and on carcinogens.

Section VI: **2014 Significant Industrial Sectors** describes the relative contributions of different industrial sectors to chemical use, waste and release.

Section VII: **2014 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 2014 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 2014, 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. All years of "TURA Data" is also available on the TURI Website at http://turadata.turi.org/. The purpose of this site is to make data available to the public about toxics use in their communities.

I. Introduction

This report describes toxic chemical use in Massachusetts in 2014 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 ship 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 toxic 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 filer 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

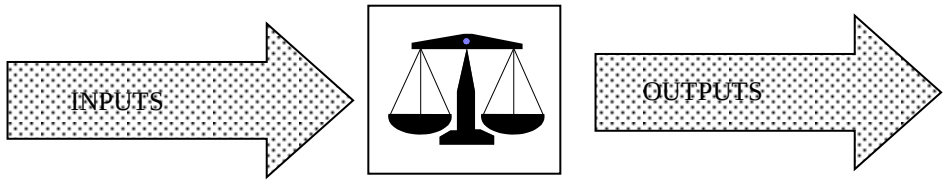
Toxics Use Reduction Institute (TURI)

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 (M.G.L. 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. 2014 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, 137 were reported in 2014, up from 133 in 1990, and down from 194 in 2000. 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 V, Chemicals of Particular Interest). The number of filers has since declined to 468 in 2014. 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 1,682 in 2014, 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 0.8 billion pounds in 2014. Byproduct generation decreased from 127 million pounds in 1990 to73 million pounds in 2014.

Figure 1
Number of TURA Filers, Individual Chemical Reports, and Different Chemicals Reported (1990-2014)
(including trade secret data)

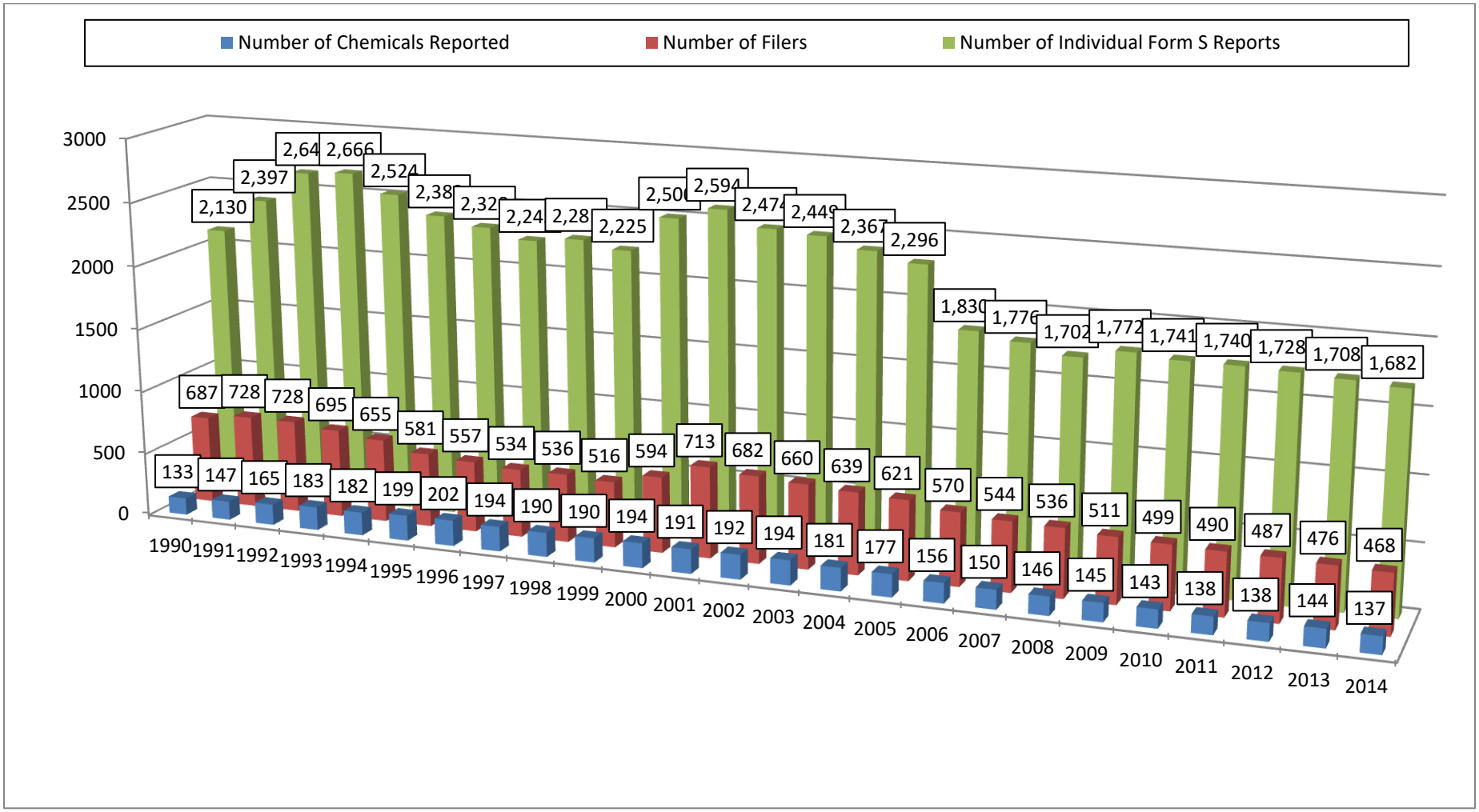
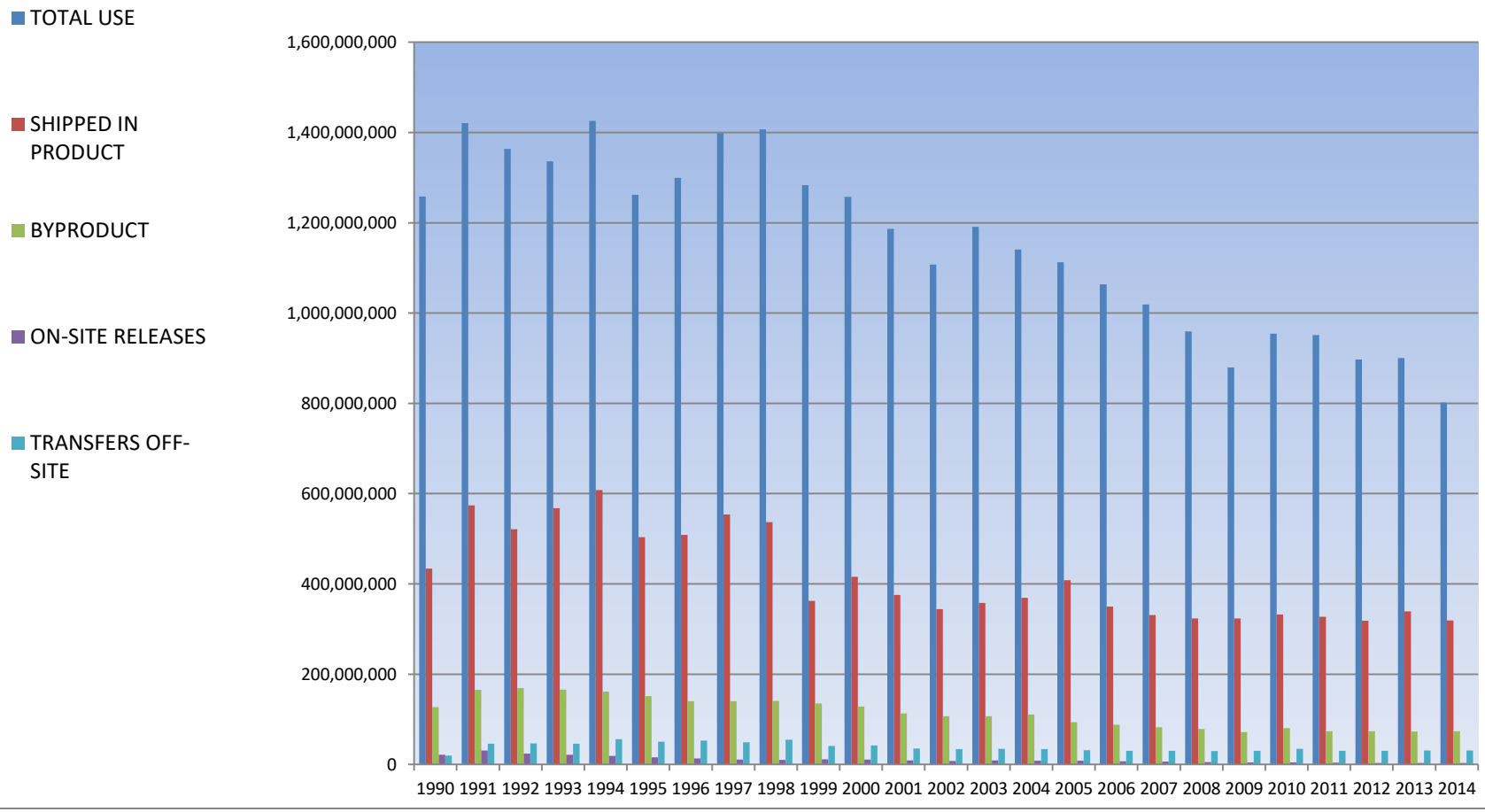


Figure 2
Raw Reported Data on the Pounds of Total Use, Shipped in or as Product, Generated as Byproduct, Released On-Site* and Transferred Off-Site for Treatment or Disposal
Reporting Years 2000-2014
(includes trade secret data)



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 2014 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 444 filers, which represents 94% of the 2014 TURA filers.

Table 1 and Figure 3 below summarize TURA data from 2007 to 2014, excluding trade secret data. The quantities reported by the 2007 Core Group over the period 2007 to 2014 are shown in Table 1. From 2007 to 2014, 2007 Core Group facilities:

- reduced toxic chemical use by 21% (from 792 to 622 million pounds)
- reduced toxic chemical byproducts by 11% (from 75 to 67 million pounds)
- reduced toxic chemicals shipped in product by 8% (from 272 to 250.5 million pounds)
- reduced on-site releases of toxic chemicals to the environment by 50% (from 6 to 3 million pounds)
- increased transfers of toxic chemicals off-site for further waste management by 4% (from 25 to 26 million pounds).

Table 1
2007 CORE GROUP DATA: 2007-2014 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	792.3	75.3	271.9	6.2	24.8
2008	774.8	75.6	257.4	5.2	27.6
2009	708.8	66.7	244.3	4.3	25.6
2010	754.1	74.2	252.6	4.2	29.2
2011	742.2	67.2	242.7	3.4	24.7
2012	693.0	66.5	238.6	3.1	24.0
2013	704.0	66.1	264.0	2.9	25.5
2014	621.6	67.1	250.5	3.1	25.9
Percent Change 2007-2014	21% Reduction	11% Reduction	8% Reduction	50% Reduction	4% Increase

Figure 3 – 2007 Core Group Toxics Use Reduction Progress 2007-2014
(Excludes Trade Secret Data)

IV. 2014 TURA Chemical Data

Table 2 summarizes the 2014 data for all TURA filers, including trade secret data, rounded to the nearest million pounds. These filers reported using 801 million pounds of chemicals and generating 74 million pounds of byproduct.

Table 2 All Reported Chemical Data 2014 (in pounds) (Includes Trade Secret Data)		
TOTAL USE	801,000,000	
SHIPPED IN PRODUCT	319,000,000	40% of total chemical use
(Consumed or transformed into another chemical in the production process – this is an estimate calculated as follows: TOTAL USE - (BYPRODUCT + SHIPPED IN PRODUCT)	*(409,000,000)*	*(51% of total chemical use)*
GENERATED AS BYPRODUCT (total waste prior to treatment or disposal)	74,000,000	9% 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)	31,000,000	4% of total chemical use 42% 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 2014, eight companies made trade secret claims on a combined total of:

- 179 million pounds of chemical use
- 6 million pounds of byproduct generation (3% of total use)
- 71 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

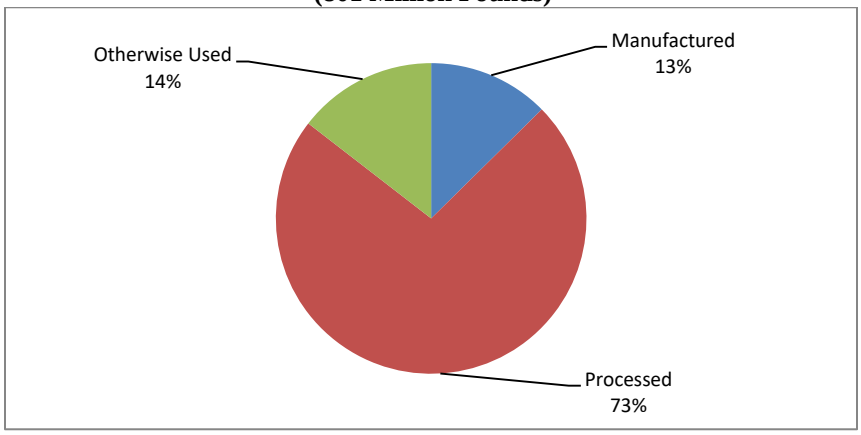
Manufacture is defined in TURA, in part, as "to produce, prepare, import or compound a toxic or hazardous substance". It includes the intentional manufacture of a chemical substance such as formaldehyde or the "coincidental" (unintentional) manufacture of chemicals such as the creation of sulfuric acid 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 13% (101 million pounds) of total chemical use in 2014.

Process is defined in TURA, in part, as "the preparation of a toxic or hazardous substance, after its manufacture, for distribution in commerce". For example, toxic chemicals added to the formulation of paints or coatings or conversion of styrene monomer to polystyrene to create plastic products. Most chemical use in Massachusetts is processed. At 584 million pounds chemicals processed accounted for 73% of 2014 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 14% (116 million pounds) of 2014 total chemical use.

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

Figure 4
2014 Total Use by Category
(includes trade secret data)
(801 Million Pounds)



Top 20 Chemicals

In 2014, filers reported using 137 out of the 1,416 TURA-listed chemicals in amounts above the reporting threshold. The 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 2014 top 20 chemicals in total use accounted for 85%, (681 million pounds) of the total reported statewide use (trade secret data was excluded to protect confidentiality claims). The top four chemicals, Styrene Monomer (24% of total use, 8 facilities, 145 million pounds), Methanol (12% of total use, 32 facilities, 71 million pounds), Sodium Hydroxide (10% of total use, 165 facilities, 63 million pounds), and Hydrochloric Acid (9% of total use, 49 facilities, 56 million pounds) accounted for about half of the total reported chemical use in the state.

Styrene is frequently used to make plastic; sodium hydroxide to treat wastewater, neutralize acids, or make sodium salts, paper, laundering, bleaching, and dishwashing materials; methanol is used as a solvent, to manufacture antifreeze and windshield washer fluid or paint stripper, aerosol spray paints, wall paints, carburetor cleaners; and hydrochloric acid was a byproduct of combustion, or used in electroplating, to clean metal parts, to remove scale from boilers, and to neutralize alkaline waste streams.

Tables 4-5 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: The top 20 chemicals comprised:

- 87% of the total reported byproducts
- 90% of the total reported shipments
- 96% of the total onsite releases
- 88% of the total offsite transfers.

Hydrochloric acid was the top "released" chemical, accounting for 18% of the statewide total of on-site releases. Seventy-eight percent of hydrochloric acid releases were from municipal waste combustors. Hydrochloric acid is no longer released from power plants, since all Massachusetts power plants have switched to natural gas.

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. Nitrate compounds were primarily coincidentally manufactured during neutralization of nitric acid in wastewater treatment, and were discharged to Publically Owned Wastewater Treatment Plants. Ninety-six (96) percent of total transfers off-site of lead, the second chemical on the list, were attributed to six municipal waste combustors that transferred lead in ash to off-site lined landfills.

Table 3 – 2014 Top 20 Chemicals: Total Use *These quantities do not include Trade Secret*		
Chemical Name (CAS #)	**CAS #**	**Total Use (Lbs.)**
Styrene Monomer	100425	145,339,321
Methanol	**67561**	**71,115,976**
Sodium Hydroxide	1310732	63,113,747
Hydrochloric Acid	7647010	55,591,017
Sodium Hypochlorite	7681529	27,926,847
Sulfuric Acid	7664939	25,874,271
Nitrate Compounds	1090	17,990,312
Toluene	**108883**	**17,959,559**
Ammonia	7664417	13,540,287
Methyl Methacrylate	80626	12,700,084
Potassium Hydroxide	1310583	11,229,520
Acetone	**67641**	**10,721,340**
Ethyl Acetate	**141786**	**10,021,921**
Zinc Compounds	1039	9,213,127
Methyl Ethyl Ketone	**78933**	**9,054,989**
Ethylene Glycol	107211	8,943,574
Diisocyanates	1050	8,605,824
Nitric Acid	7697372	6,874,991
Toluene Diisocyanate	26471625	5,927,804
Chlorine	7782505	5,667,684

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 – 2014 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.)**
Sodium Hydroxide	1310732	9,510,867	**Methanol**	**67561**	**69,107,197**
Ethyl Acetate	**141786**	**8,808,225**	Sodium Hydroxide	1310732	33,110,381
Toluene	**108883**	**6,714,255**	Sodium Hypochlorite	7681529	25,319,115
Nitrate Compounds	1090	6,484,242	**Toluene**	**108883**	**11,158,156**
Sulfuric Acid	7664939	6,116,473	Potassium Hydroxide	1310583	9,593,881
Lead	7439921	3,089,856	Ammonia	7664417	9,332,303
Hydrochloric Acid	7647010	2,974,241	**Acetone**	**67641**	**8,691,513**
Ethylene Glycol	107211	2,579,144	Sulfuric Acid	7664939	6,957,941
Methanol	**67561**	**2,524,391**	**Methyl Ethyl Ketone**	**78933**	**6,827,103**
Formaldehyde	50000	2,246,207	Zinc Compounds	1039	6,225,752
Methyl Ethyl Ketone	**78933**	**2,164,651**	Chlorine	7782505	5,567,178
Acetone	**67641**	**1,793,035**	Ethylene Glycol	107211	4,556,049
1-Methyl-2-Pyrrolidone	872504	1,586,626	Diisocyanates	1050	3,287,087
Dimethyl Formamide	68122	1,466,900	Phosphoric Acid	7664382	3,076,120
Zinc Compounds	1039	1,282,630	Methyl Methacrylate	80626	2,928,550
Nitric Acid	7697372	1,257,393	Ferric Chloride	7705080	2,846,606
Ammonia	7664417	856,075	Antimony Compounds	1000	2,743,234
Aluminum Sulfate	10043013	812,157	Zinc	7440666	2,669,315
Copper Compounds	1015	743,901	Glycol Ethers	1022	2,718,605
Dichloromethane	75092	684,800	Xylene Mixed Isomer	1330207	2,471,312

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 – 2014 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	601,684	Nitrate Compounds	1090	5,871,776
Acetone	**67641**	**357,820**	Lead	7439921	2,811,254
Ammonia	7664417	331,364	Ethylene Glycol	107211	2,526,730
Lead	7439921	300,340	**Methanol**	**67561**	**2,067,892**
Ethyl Acetate	**141786**	**265,542**	Formaldehyde	50000	2,037,527
Toluene	**108883**	**227,923**	**Toluene**	**108883**	**1,885,603**
Glycol Ethers	1022	199,384	**Ethyl Acetate**	**141786**	**1,394,184**
Butyl Alcohol	71363	184,324	1-Methyl-2-Pyrrolidone	872504	1,357,933
Formaldehyde	50000	155,167	Zinc Compounds	1039	1,297,231
Methyl Ethyl Ketone	**78933**	**82,804**	**Acetone**	**67641**	**1,047,574**
Methanol	**67561**	**79,544**	Sodium Hydroxide	1310732	842,915
Sulfuric Acid	7664939	57,091	**Methyl Ethyl Ketone**	**78933**	**745,055**
Dichloroethylene	156605	52,354	Dichloromethane	75092	601,119
Dichloromethane	75092	50,444	Copper Compounds	1015	548,103
Nitrogen Dioxide	10102440	47,055	Lead Compounds	1026	518,041
Trichloroethylene	79016	41,832	Butyraldehyde	123728	508,159
Tetrachloroethylene	127184	27,243	Nitric Acid	7697372	367,765
Butyraldehyde	123728	26,066	Butyl Alcohol	71363	345,565
Diethyl Hexyl Phthalate	117817	20,274	Dimethylformamide	68122	342,204
Xylene Mixed Isomer	1330207	20,190	Acetonitrile	75058	282,032

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. 2014 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 (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 (for reporting year 2001).

Table 6 below shows the 2014 reported data on each PBT chemical. 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 that the number of reporters of these substances and the amount reported increased from zero to hundreds 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. Over half of the use of lead (52%) is from the combustion of fuel by power plants and the combustion of waste by Municipal Waste Combustors.

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 130 in 2001. However, in 2014, the number of lead and lead compounds filers decreased to 69 and 55, respectively.

Table 6 2014 Persistent Bioaccumulative Toxic (PBT) Chemicals Summary (Excludes Trade Secret Data)							
Substance	Threshold (lbs or grams for dioxin)	# Filers in 2014	Use	Byproduct	Shipped in Product	lbs On-Site Releases	Lbs Transfers Off-Site
Polycyclic Aromatic Compounds (PACs)	100	24	1,055,061	4,202	52,109	555	3,706
Benzo[g,h,i]-perylene	10	21	10,570	436	1,175	0	436
Mercury	10	17	4,451	2,606	989	563	2,082
Mercury Compounds	10	3	653	67	615	6	38
Poly-chlorinated biphenyls PCBs	10	2	88,354	30,714	0	0	30,714
Dioxin & Dioxin-like Compounds	0.1 gr	10	1,841	1,841	0	131	1,711
Lead*	100	69	3,653,822	3,090,028	504,317	300,340	2,811,423
Lead Compounds*	100	55	835,041	503,761	311,985	2,660	506,103
Tetrabromo-bisphenol A	10	2	3,015	30	2,985	2	28

Table 7
Pounds of PBTs Reported and Number of Facilities Reporting 2000 – 2014
(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	7,296,183	130
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	5,152,078	115
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	5,989,183	118
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	5,284,597	127
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	3,694,150	127
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	2,282,694	112
2007	49,412	28	1,155	13	13,744	20	1,101	5	110,303	3	5,051,904	29	0	0	4,172,982	90	1,418,897	105
2008	33,393	25	1,523	13	12,243	21	3,421	6	156,170	3	3,275,212	30	0	0	3,799,929	90	1,251,744	94
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	988,660	85
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	751,297	74
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	584,689	67
2012	2,712	23	2,650	9	7,795	16	157	2	83,372	2	206,416	25	7,242	3	3,284,914	75	672,623	64
2013	4,832	22	1,847	9	6,619	17	639	4	126,857	3	523,396	26	5,881	2	3,481,671	69	775,893	62
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

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 shows the pounds of HHS chemicals reported and the number of facilities reporting HHS from 2007 to the present. 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 seven HHS chemicals reported in 2014, including the number of filers, byproduct generation, shipped in product, on-site releases, and transfers off-site.

Table 8
Pounds of High Hazard Chemicals Reported and Number of Facilities
(Excludes Trade Secret Data)

Reporting Year	Cadmium # Facilities (HHS as of 2008)		Cadmium Compounds # Facilities (HHS as of 2008)		Trichloroethylene # Facilities (HHS as of 2008)		Tetrachloro-ethylene # Facilities (HHS as of 2009)		Formaldehyde # Facilities (HHS as of 2012)		Hexavalent Chromium # Facilities (HHS as of 2012)		Methylene Chloride/ Dichloromethane # Facilities (HHS as of 2014)	
	Lbs	#	Lbs	#	Lbs	#	Lbs	#	Lbs	#	Lbs	#	Lbs	#
2007	0	0	184,400	1	604,671	9								
2008	29,429	5	167,355	6	536,073	27	230,345	4						
2009	28,969	4	145,324	7	556,457	23	176,186	23						
2010	23,970	4	242,702	7	294,836	16	151,918	18						
2011	26,878	4	180,654	5	303,076	17	163,773	19	4,027,226	9	0	0		
2012	29,805	6	181,666	5	350,184	14	89,216	16	4,119,146	25	121,504	16		
2013	20,447	6	210,550	6	176,891	15	110,550	18	4,011,427	27	113,466	16	3,496,421	11
2014	16,655	4	217,235	6	262,811	14	164,606	16	3,276,305	25	102,424	14	3,031,438	24

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

Table 9 2014 Higher Hazard Substances (HHS) Summary (Amounts in pounds) (Excludes Trade Secret Data)						
Substance/ First HHS Year	**# Filers**	**Total Use**	**Generated as Byproduct**	**Shipped in Product**	**On-Site Releases**	**Transfers Off-Site**
Cadmium /2008	4	16,655	747	11,891	0	522
Cadmium Compounds/2008	6	217,235	16,187	34,840	21	16,166
Trichloroethylene/ 2008	14	262,811	129,901	171,378	41,832	19,680
Tetrachloroethylene/ 2009	16	164,606	47,071	111,152	27,243	18,566
Formaldehyde/ 2012	25	3,276,305	492,666	143,505	153,120	285,976
Hexavalent Chromium Compounds/ 2012	14	102,424	27,282	69,159	85	17,453
Methylene Chloride/ Dichloromethane/ 2014	24	3,031,438	684,864	2,290,396	50,444	601,119

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 summarizes 2014 data on some of the chemicals identified in the LCSP report that were reported under TURA. In 2014, 15 chemicals identified as asthmagens by the Association of Occupational and Environmental Clinics (AOEC) were reported under TURA. Styrene monomer and sulfuric acid had the largest amount of uses. Formaldehyde and sulfuric acid had the largest amount of releases.

Styrene monomer was used by eight facilities, although the bulk of its use was by one facility. Use of styrene at this facility decreased significantly since 2014. Reported releases of styrene were primarily air releases. Sulfuric acid was used by 93 facilities. Power plants had the largest amount of releases, which were all to air.

Table 10 Asthma-Related Toxics (in pounds) (Excludes Trade Secret Data)		
Chemical Name (Number of facilities)	**Use**	**On-Site Releases**
Acetic Acid (19)	931,542	2,882
Aluminum (2)	133,716	420
Chlorine (4)	5,667,684	535
Chromium (4)	230,072	36
Ethylene Oxide (1)	251,150	322
Formaldehyde (25)	3,276,305	153,120
Hydrazine (3)	159,187	3.4
Maleic Anhydride (2)	529,025	422
Methylmethacrylate (7)	12,700,084	2,232
Nickel (2)	197,783	46
Nickel Compounds (4)	1,047,011	90
Phthalic Anhydride (1)	169,840	34
Styrene Monomer (8)	145,339,322	17,558
Sulfuric Acid (93)	25,874,271	57,091
Toluene Diisocyanate (5)*	6,555,777	146

* 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 2014, seven IARC Group 1 carcinogens were reported under TURA (see Table 11). Formaldehyde and nickel compounds had the largest amounts of reported uses. Formaldehyde had the largest amounts of reported releases. Of these chemicals, formaldehyde was reported by the most facilities. Releases were primarily air releases; however, there also were 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 (4)	16,655	0
Crystalline Silica (1)	201,856	20
Hexavalent Chromium Compounds (14)	102,424	85
Dioxin (10)*	1841.0831 grams	130.5121 grams
Ethylene Oxide (1)	251,150	322
Formaldehyde (25)	3,267,305	153,120
Nickel Compounds (4)	1,047,011	90

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

VI. 2014 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 5 through 8 present the 2014 numbers by industrial sector of number of companies reporting, reported statewide amount of use, byproduct, and releases on-site.

The charts demonstrate that the chemical manufacturing sector dominates chemical use in the Commonwealth. This sector had the greatest percentage of filers (20%), by far the greatest percentage of use (69%), the largest percentage of byproduct (39%) and the second largest percentage of on-site releases (18%). 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. Use of styrene monomer to make polystyrene resin is responsible for 45% of the resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing subsector of the chemical manufacturing sector in 2014.

Chemical distributors at 16% were the second largest contributor to use, but had virtually no impact on byproduct and releases. Paper manufacturing, fabricated metal processors, and textile manufacturing were the other sectors with substantial contributions to byproduct and releases. The paper manufacturing sector, which accounted for 2% of total statewide use, accounted for 15% of total byproduct generated. Likewise, waste management and remediation services, which accounted for 3% of total statewide use, had the highest contribution of on-site releases (20%).

Figure 5 – All 2014 Reported Data: Number of Facilities by Industrial Sector
Total Number of Facilities = 468
(Includes Trade Secret Data)

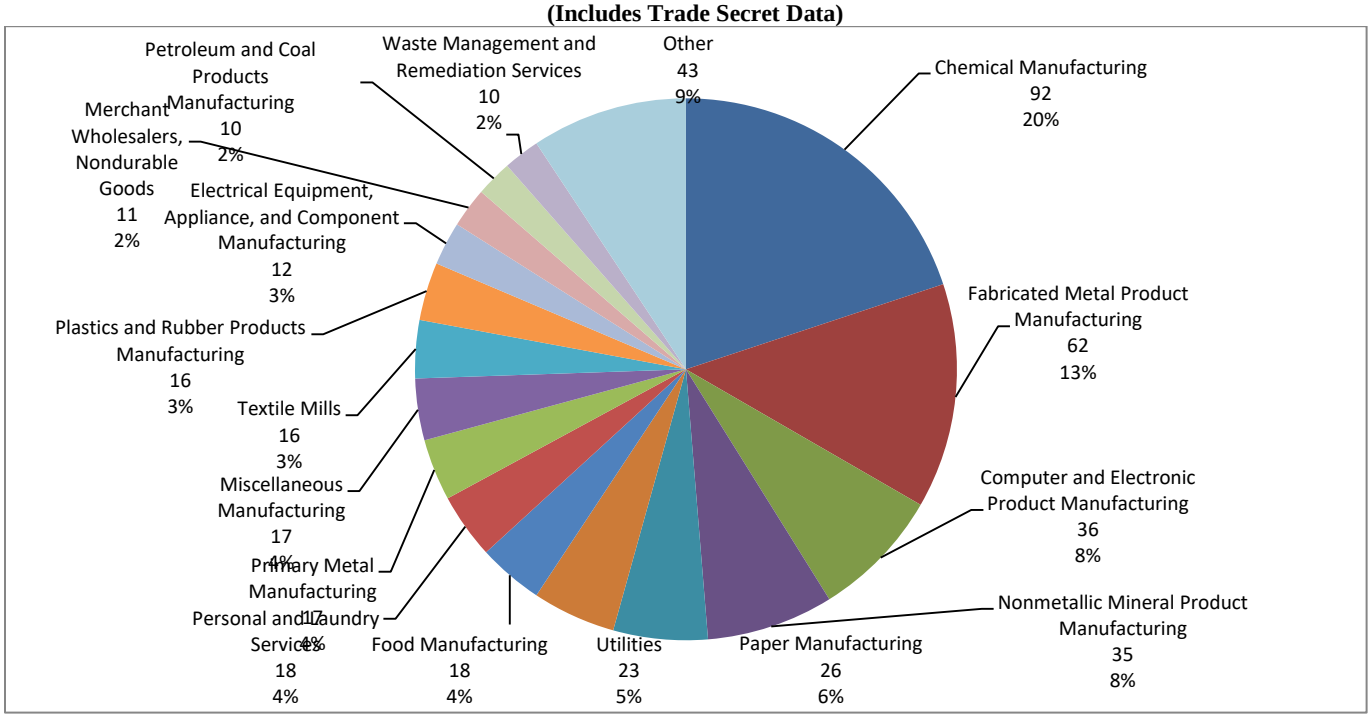


Figure 6 – All Reported Data: 2014 Chemical Use by Industrial Sector
Total Use = 801,000,000 Pounds
(Includes Trade Secret Data)

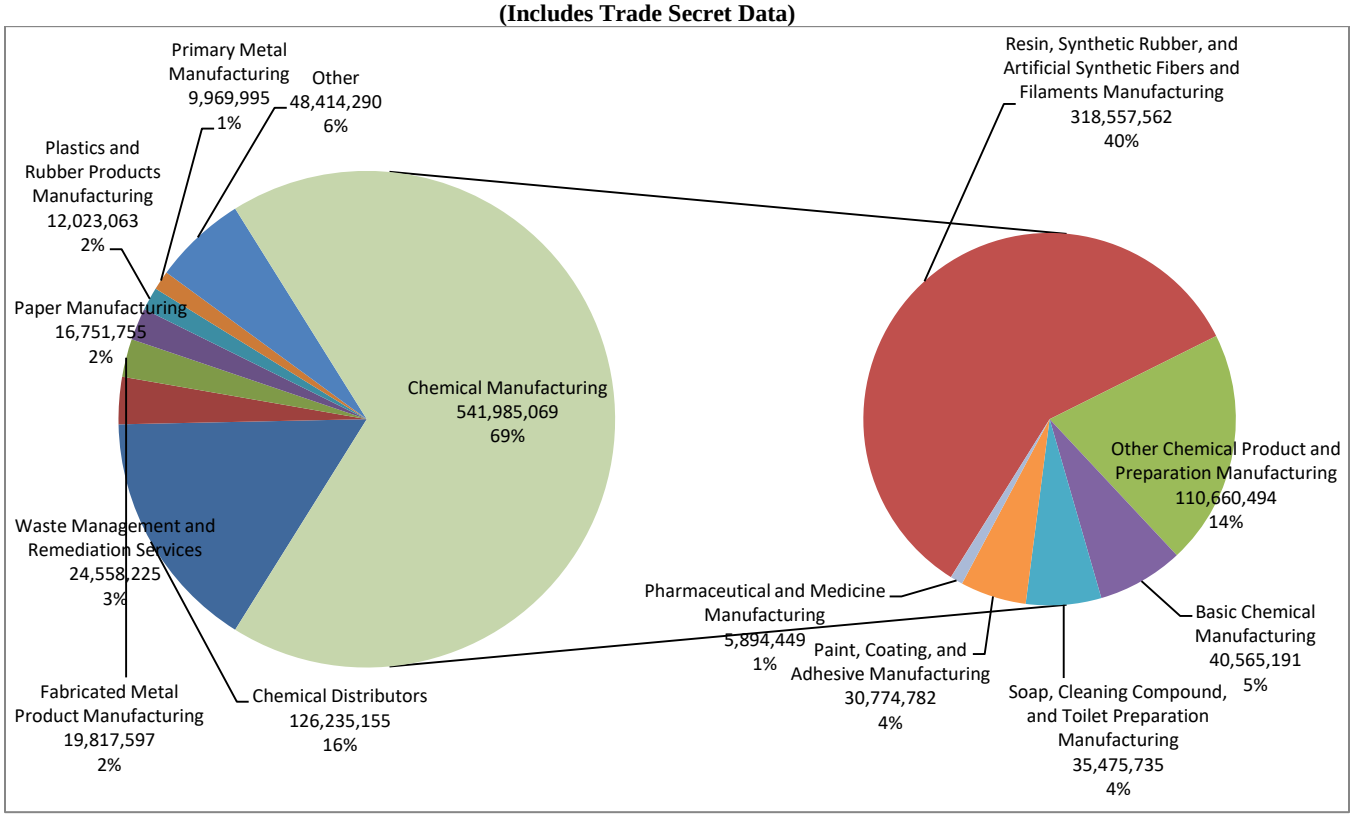


Figure 7 – All Reported Data: 2014 Byproduct Generation by Industrial Sector Total Byproduct = 74,000,000 Pounds

(Includes Trade Secret Data)

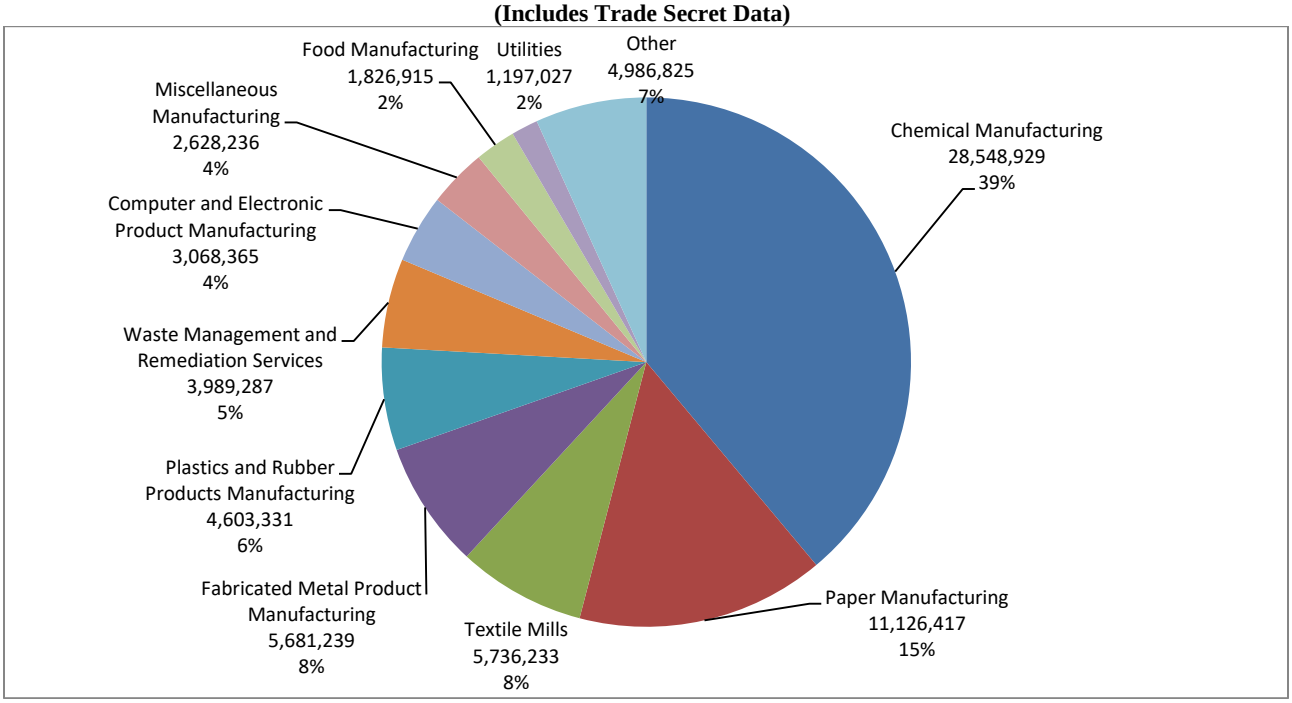
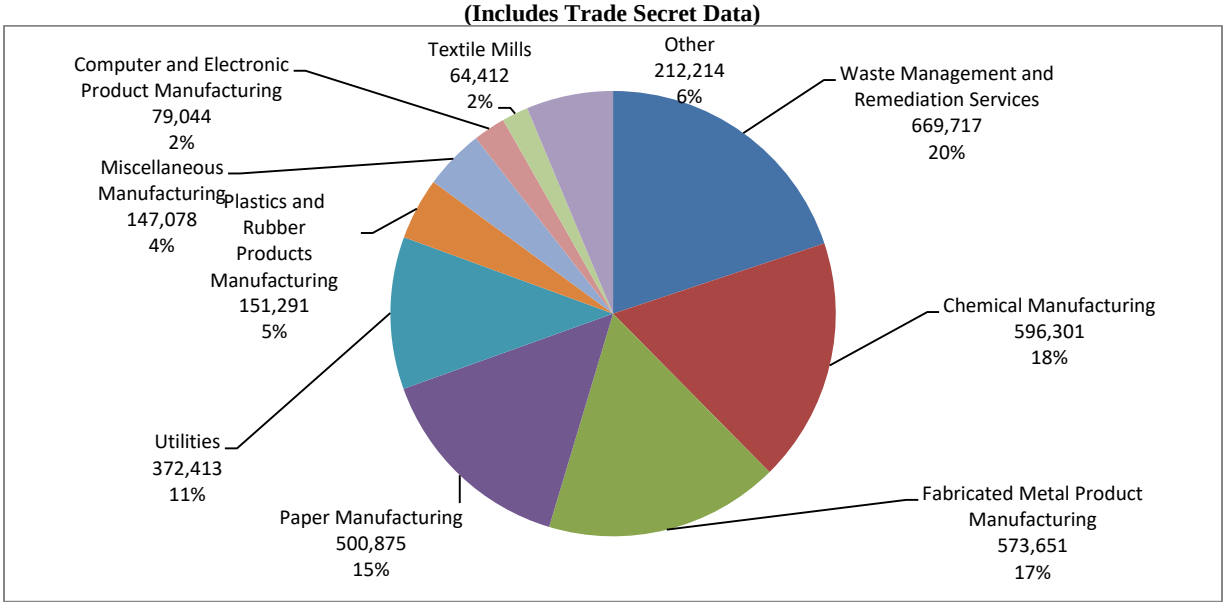


Figure 8 – All Reported Data: 2014 On-Site Releases by Industrial Sector Total On-Site Releases = 3,000,000 Pounds

(Includes Trade Secret Data)



VII. 2014 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 607 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 41 million pounds of byproduct or 56% of the statewide total. The 20 facilities with the largest quantity shipped in product, shipped 276 million pounds in product, or 87% 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. Four of the top 20 facilities of reported on-site releases were municipal waste combustors (MWCs) that also reported combustion-related emissions. Of the over one million pounds of on-site releases reported by these MWCs, 36% was due to the coincidental manufacture of hydrochloric acid during combustion, and 29% 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 21 million pounds, or 67% of the total statewide transfers off-site.

Table 12 2014 Top 20 Facilities: Reported Use (Includes trade secret data)		
Facility Name	Town	Total Use (Lbs.)
Styrolution America LLC Indian Orchard	Springfield	145,333,818
Solutia Inc - Indian Orchard Plant	Springfield	104,409,094
Borden & Remington	Fall River	78,871,617
Rousselot Peabody Inc.	Peabody	38,561,325
Holland Company Inc.	Adams	37,638,099
Ineos Melamines LLC	Springfield	37,473,169
Southwin Ltd.	Leominster	28,642,210
James Austin Co.	Ludlow	20,876,232
Camco Manufacturing Inc.	Leominster	17,873,360
Omnova Solutions Inc.	Fitchburg	13,600,384
Astro Chemicals Inc.	Springfield	10,982,327
Semass Partnership	Rochester	10,666,051
Roberts Chemical Co. Inc.	Attleboro	9,232,523
Univar USA Inc.	Salem	8,552,109
Metalor Technologies USA	North Attleborough	8,513,355
Nexeo Solutions LLC	Tewksbury	7,841,284
Nyacol Products Inc.	Ashland	7,617,635
Metalor Technologies USA	Attleboro	7,207,519
Webco Chemical Corp.	Dudley	6,614,200
Henkel Corp.	Springfield	6,253,424

Table 13
2014 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. - Indian Orchard Plant	Springfield	7,460,297	Borden & Remington	Fall River	72,361,875
Rousselot Peabody Inc.	Peabody	5,490,759	Holland Company Inc.	Adams	37,638,100
3M	Rockland	4,441,431	Southwin Ltd.	Leominster	28,634,614
Flexcon Company Inc.	Spencer	4,146,606	Solutia Inc - Indian Orchard Plant	Springfield	27,022,997
Ineos Melamines LLC	Springfield	3,151,087	James Austin Co.	Ludlow	20,706,759
Ideal Tape Company	Lowell	1,758,590	Camco Manufacturing Inc.	Leominster	17,871,431
ITW Foils	Newburyport	1,293,370	Astro Chemicals Inc.	Springfield	10,192,090
Semass Partnership	Rochester	1,217,534	Roberts Chemical Co. Inc.	Attleboro	9,232,523
Crane & Co. Inc. Pioneer Mill	Dalton	1,148,714	Univar USA Inc.	Salem	8,529,290
Genzyme A Sanofi Compan y	Allston	1,124,457	Nexeo Solutions LLC	Tewksbury	7,814,796
Madico Inc.	Woburn	1,091,746	Webco Chemical Corp.	Dudley	6,613,421
Barnhardt Manufacturing Co.	Colrain	1,080,070	Houghton Chemical Corporation	Boston	5,742,277
Henkel Corp.	Springfield	1,068,542	ITW Polymers Sealants North America	Rockland	4,416,358
Bostik Inc.	Middleton	981,355	Savogran Company	Norwood	3,017,191
Metalor Technologies USA	Attleboro	977,673	ITW Polymers Adhesives \ North America	Danvers	2,985,086
Thermo Fisher Scientific	Bedford	917,878	Callahan Company	Walpole	2,955,346
Analog Devices Inc.	Wilmington	905,745	Henkel Corp.	Springfield	2,755,621
Covanta Springfield LLC	Agawam	905,662	Allcoat Technology Inc.	Wilmington	2,661,501
Genzyme Corporation	Framingham	902,065	Bostik Inc.	Middleton	2,509,236
Koch Membrane Systems Inc.	Wilmington	771,869	Nyacol Products Inc.	Ashland	2,463,464

Table 14 2014 Top 20 Facilities: Reported On-Site Releases and Transfers Off-Site (Includes trade secret data)					
On-Site Releases			**Transfers Off-Site**		
Facility Name	Town	On-Site Releases (Lbs.)	Facility Name	Town	Transfers Off-Site (Lbs.)
Covanta Haverhill Inc.	Haverhill	342,172	Solutia Inc. Indian Orchard Plant	Springfield	5,793,282
Solutia Inc Indian Orchard Plant	Springfield	244,219	Ineos Melamines LLC	Springfield	2,714,648
Crown Beverage Packaging USA	Lawrence	237,333	Semass Partnership	Rochester	1,007,840
Semass Partnership	Rochester	209,694	Genzyme A Sanofi Company	Allston	1,001,382
Ideal Tape Company	Lowell	165,469	Henkel Corp.	Springfield	969,927
Wheelabrator Millbury Inc.	Millbury	89,244	Bostik Inc.	Middleton	957,505
AR Metallizing Ltd.	Franklin	83,925	Thermo Fisher Scientific	Bedford	810,932
Wheelabrator Saugus Inc.	Saugus	73,969	Waters Corp.	Taunton	783,772
Onyx Specialty Papers Inc. Willow Mill	South Lee	68,551	Ideal Tape Company	Lowell	759,842
Berkshire Power Company LLC	Agawam	56,592	Koch Membrane Systems Inc.	Wilmington	757,386
Mystic Station	Everett	54,379	Electronic Recyclers International	Holliston	719,313
Hazen Paper Co.	Holyoke	54,130	Genzyme Corporation	Framingham	648,263
Jen Mfg Inc.	Millbury	51,306	Johnson Matthey Pharma Services	Devens	590,562
Wyman Gordon Company	North Grafton	50,222	PCI Synthesis Inc.	Newburyport	550,748
Callaway Golf Ball Operations Inc.	Chicopee	47,803	Wheelabrator Saugus Inc.	Saugus	514,489
Flexcon Company Inc.	Spencer	45,962	Metalor Technologies USA	North Attleborough	487,433
Entegris Inc.	Bedford	44,158	Wyman Gordon Company	North Grafton	468,939
3M	Rockland	41,930	Wheelabrator Millbury Inc.	Millbury	454,728
Hollingsworth & Vose Company	West Groton	41,152	Flexcon Company Inc.	Spencer	432,937
Saint Gobain Abrasives Inc.	Worcester	34,800	Intel Massachusetts Inc.	Hudson	417,543

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Charles D. Baker, Governor

Executive Office of Energy and Environmental Affairs
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