2010 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

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Executive Summary

The Toxics Use Reduction Act (TURA) (Chapter 21I of the Massachusetts General Laws) was enacted in 1989 and amended in 2006 to protect public health and the environment by promoting the efficient use of toxic chemicals. The Act established incentives that encourage facilities to use toxic chemicals only when necessary to make a product and waste as little as possible in the production process. TURA has been successful. Massachusetts manufacturers and other businesses subject to the Act 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.

TURA requires companies in specific industrial sectors[1] that employ the equivalent of 10 or more full-time employees to file annual reports with the Massachusetts Department of Environmental Protection (MassDEP) on the use of certain toxic chemicals in their manufacturing processes. These facilities pay an annual toxics chemical fee, and, every other year prepare "Toxic Use Reduction Plans" that evaluate whether there are cost effective ways to minimize the use or waste (and release to the environment as pollution) of those chemicals. Through this law many companies have reduced their use of those toxic chemicals, or stopped using them altogether. This report summarizes the reports filed by manufacturers and other businesses in 2011 that covered toxic use in calendar year 2010.

486 facilities reported using 142 different listed toxic substances in 2010. In total (including trade secret data), the facilities reported that in 2010:

- 955 million pounds of toxic substances were used in production, an increase from 881 million pounds in 2009,
- 84 million pounds of the toxic substances used in production were "generated as byproduct" (wasted: neither chemically converted to nor incorporated into a product), an increase from 71 million pounds in 2009,
- 334 million pounds of the toxics substances used in production were shipped in or as products, up from 324 million pounds in 2009,
- 5 million pounds of toxics substances generated as byproduct were released to the environment as pollution from the facility, the same as in 2009, and
- 34 million pounds of toxic substances generated as byproduct were transferred off-site for further waste management, a 4 million pound increase from 2009.

The original goal of the Act was to achieve a 50% reduction in the amount of byproduct generation by 1997. This goal was met, and progress has continued, as reflected by the data reported by the 2000 Core Group -- the industrial sectors and chemicals that have been covered by the Act since 2000 -- normalized for production levels. These two adjustments are made to the raw data to ensure that the analysis reflects actual changes in the way chemicals are used in production processes rather than changes in the amount of products produced or which types of facilities and chemicals are included in the reporting requirements.

As shown in Figure 1 between 2000 and 2010 when adjusted for the reported 16% decrease in production, 2000 Core Group facilities reduced:

- toxic chemical use by 22%,
- toxic byproducts by 33%,
- toxics shipped in product by 27%,
- on-site releases of toxics to the environment by 65%, and
- transfers of toxics off-site for further waste management by 18%.

[1] 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

Figure 1 – 2000 Core Group Toxics Use Reduction Progress from 2000 to 2010
(adjusted for changes in production levels)

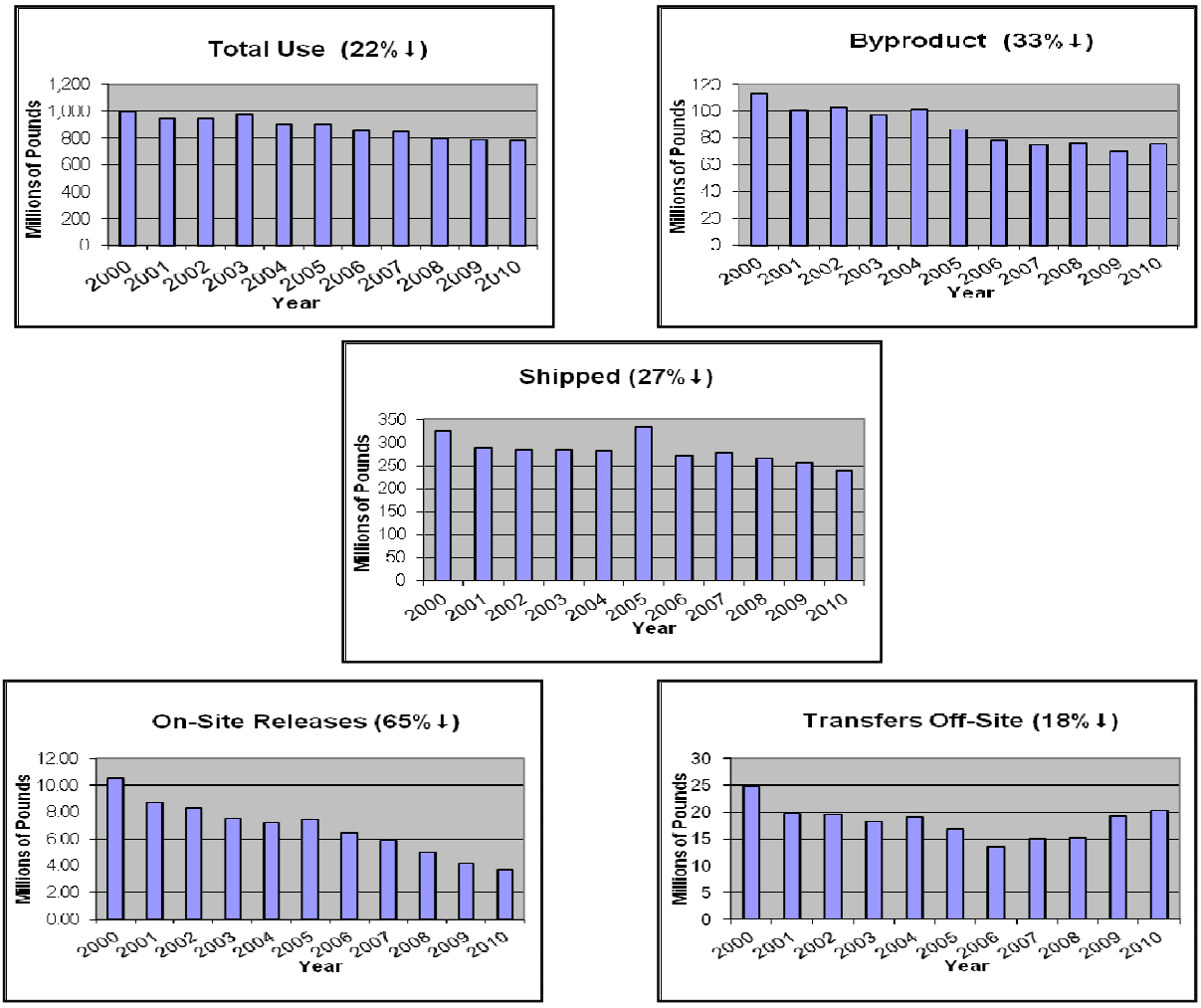


Figure 1 shows that when adjusted for production while toxic chemical use by the 2000 Core Group declined between 2009 and 2010, there was an increase in byproduct generation, reflecting an increase in the amount of chemicals wasted during production. However, byproduct is still lower than it was in 200 and despite some year to year fluctuation the overall trend for the past ten years shows continuous progress in toxics use reduction.

I. Introduction

This report describes toxic chemical use in Massachusetts in 2010 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) to submit annual reports to 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 LQTUs 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 code,
- have ten or more full-time employee equivalents, and
- use listed toxic substances at or above reporting thresholds

LQTUs 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 these plans are not submitted to MassDEP for review and approval, 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 for their toxic chemical use.

TURA also promotes toxics use reduction through the establishment of two agencies that provide toxics use reduction education and assistance:

- 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 market-based incentives to reduce toxics use for qualifying TURA filers.
- 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 www.turi.org/turadata in a user-friendly way that is searchable by community, chemical or company.

The work of MassDEP, OTA and TURI is supported by the fees paid by the LQTUs and coordinated by the Toxics Use Reduction Administrative 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.

For more information about the TURA program, please visit the following web sites:

- Massachusetts Department of Environmental Protection Toxics Use Reduction Program: www.mass.gov/dep/toxics/toxicsus.htm
- Office of Technical Assistance and Technology: www.mass.gov/envir/ota

- Toxics Use Reduction Institute: www.turi.org

This document is organized into six sections.

- **Toxics Use Reduction Progress 2000 - 2010** describes changes in toxic chemical use over the stated time period and documents progress toward the Act's overall toxic use reduction goal

- **2010 Chemical Data** summarizes the reported information on chemical use in calendar year 2010 including detailed information on the top twenty chemicals used, generated as byproduct, shipped in product, released onsite as air or water pollution onsite, and shipped offsite for treatment and disposal.

- **Chemicals of Particular Concern** presents current and historical information on particularly toxic chemicals, on chemicals that promote asthma, and on carcinogens

- **2010 Significant Industrial Sectors** describes the relative contributions of different industrial sectors to chemical use, waste and release

- **2010 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

- **Key TURA Terms** explains important TURA terms and concepts

This 2010 Toxics Use Reduction Information Release contains a wealth of chemical information that is useful to the public, government, and industry. However, it is important to note that because the data in this report are collected only from facilities within certain industrial sectors that have ten or more full-time employees and that use certain chemicals above established reporting thresholds, this report does not provide a complete picture of the use and release of all chemicals. In addition, this report does not contain information about exposures to the public or to workers of reported chemicals

II. Toxics Use Reduction Progress 2000-2010

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 absolutely 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. The Act'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) had been met by 1998, 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 Large Quantity Toxics Users (LQTUs) as well as their progress in implementing toxics use reduction.

Trends in the Numbers of Filers and Reported Chemical Use, Byproduct, Onsite Release, and Offsite Transfer for Treatment or Disposal

As shown in Figures 2 and 3, the number of different TURA-listed chemicals used in the Commonwealth at reportable levels, the number of facilities using those chemicals, the number of chemicals used by those facilities, and the total amount of those chemicals used, generated as byproduct, released to the environment, and shipped offsite for treatment and disposal has continued to decline in the ten years since 2000.

Figure 2 – TURA Filer Trends 2000-2010

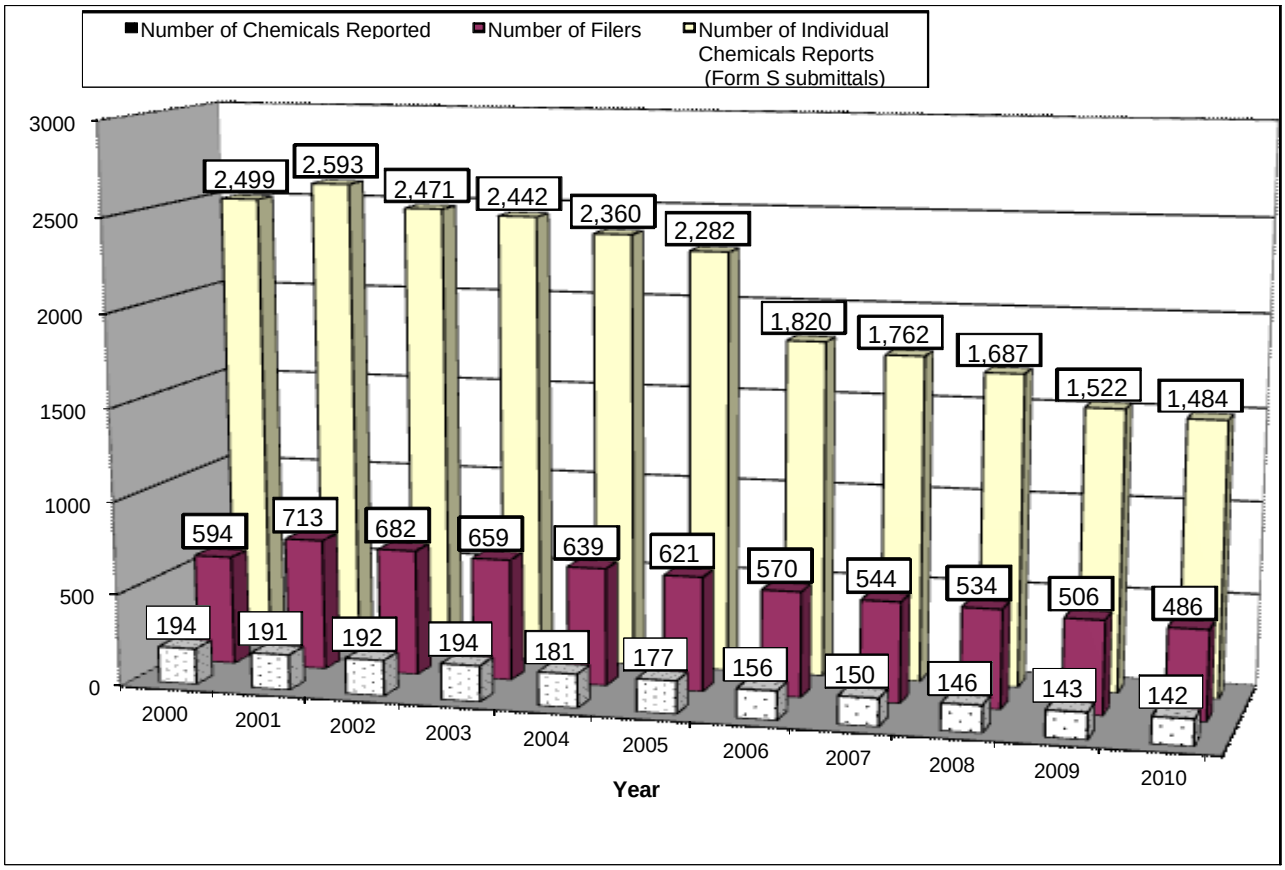
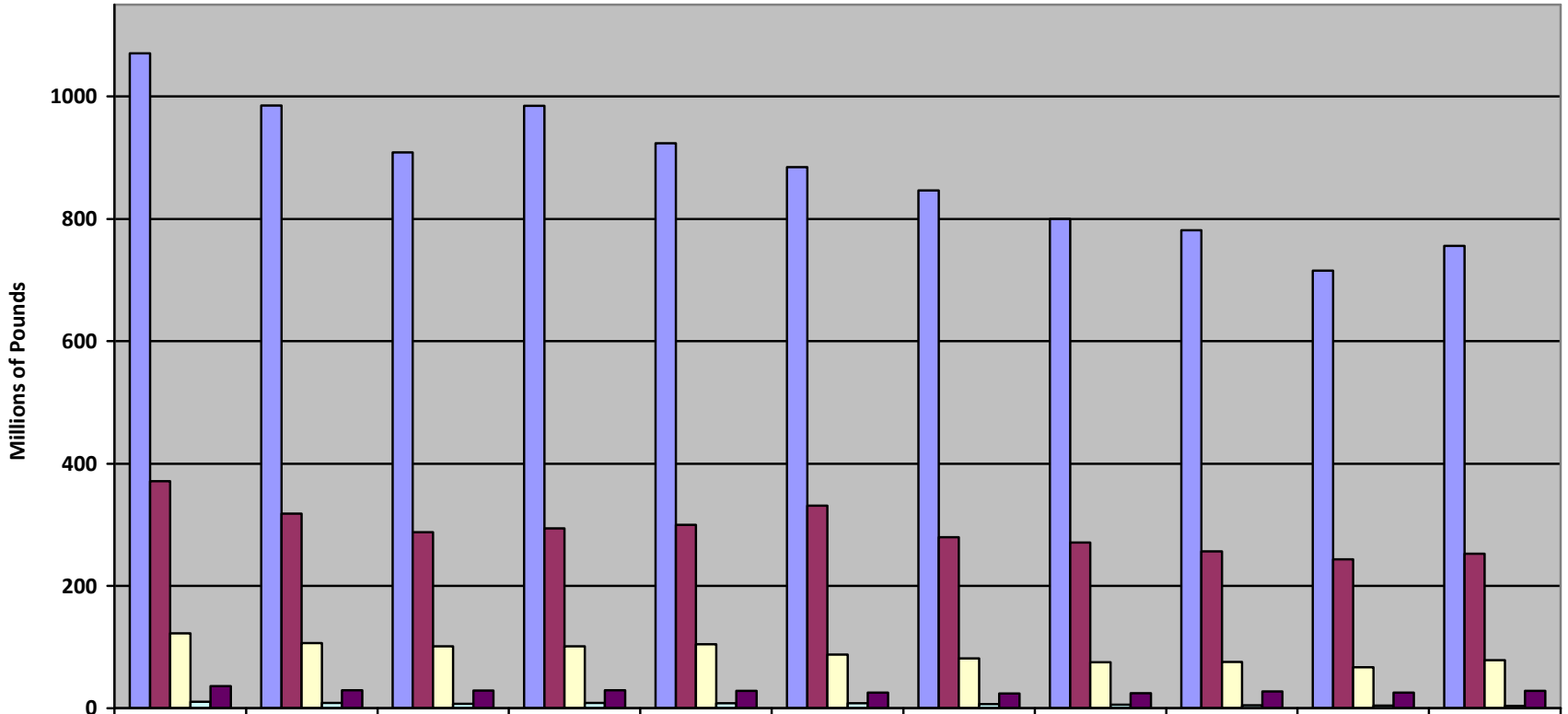


Figure 3 -- Raw Reported Data on the Pounds of Toxic Chemical Use, Shipment as Product, Generated as Byproduct, Released Onsite as Pollution, and Transferred Offsite for Treatment or Disposal
Reporting Years 2000-2010
(excludes trade secret data)



	RY 2000	RY 2001	RY 2002	RY 2003	RY 2004	RY 2005	RY 2006	RY 2007	RY 2008	RY 2009	RY 2010
USE	1,070,227,289	985,495,501	908,603,281	984,371,390	923,636,035	884,593,068	845,992,567	799,838,164	781,304,931	715,578,548	755,677,461
SHIPPED IN PRODUCT	371,394,748	318,540,566	287,773,842	294,478,448	299,965,454	331,630,376	280,074,798	270,948,160	256,314,265	243,550,563	252,734,312
BYPRODUCT	122,672,837	106,935,736	101,413,991	101,222,198	105,061,580	87,937,927	81,564,140	75,500,273	75,860,099	66,961,124	78,903,336
ONSITE RELEASE	10,743,472	8,718,472	7,661,495	8,769,644	8,414,838	8,400,297	7,018,496	6,206,759	5,287,714	4,463,180	4,363,215
OFFSITE TRANSFER	36,767,054	29,624,719	29,244,211	29,312,382	28,769,356	25,974,863	24,441,685	24,961,594	27,669,763	25,718,629	28,475,861

As was shown in Figure 2, out of 1,416 chemicals listed under TURA, 142 were reported in 2010, down from 194 in 2000. From 2000 to 2001, the number of facilities reporting under TURA rose to 713, largely due to the promulgation of a lower reporting threshold for lead and for lead compounds. The number of LQTUs has since declined to 486 in 2010. 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 2,593 in 2001 to 1,484 in 2010, consistent with the decline in the number of TURA filers.

The reduction in reported chemical use is attributable to a combination of factors. These include reduced chemical use through toxics use reduction, 2006 statutory and other regulatory changes to TURA reporting requirements which eliminated certain chemicals and industrial sectors, reduced production levels due to economic conditions, and facilities closing. In 2010 for example, 45 facilities left and 25 facilities entered the TURA reporting universe, for a net decrease of 20 facilities. The 45 facilities did not report in 2010 because:

- 17 closed
- 17 reduced use below the reporting threshold
- 3 reduced staffing below the FTE threshold
- 1 had mistakenly filed in 2009 and was not obligated to file in 2010
- 1 facility's only reportable chemical was delisted, effective reporting year 2010
- 6 are being investigated for potential enforcement for failure to report.

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

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

The "2000 Core Group" is made up of chemicals and industrial categories that were subject to reporting in 2000 and that remain subject to reporting, at the same reporting thresholds in 2010.[2] The 2000 Core Group covered 100% of the reported data in 2000. It currently covers 86% of the total 755 million pounds of toxic chemicals reported in 2010 (excluding trade secret data).

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

[2] The 2000 Core Group includes all industry sectors except for 1) uses related to the combustion of fuel for heat and power at facilities whose primary business is NOT power generation (excluded as of 2006 reports by the 2006 TURA Amendments); 2) municipal waste combustor combustion-related emissions (first reportable in 2003). The Core Group includes the use of all chemicals except: 1) Respirable Crystalline Silica (first reportable in 2001); 2) N-Propyl Bromide (first reportable in 2010); 3) Lead and Lead Compounds due only to the lower 100-pound thresholds for Lead and Lead Compounds (that took effect in 2001);4) the use of higher hazard substances due only to the lower 1,000-pound threshold (Trichloroethylene, Cadmium, Cadmium Compounds, Tetrachloroethylene); 5) Adipic Acid, Ammonium Bicarbonate, Ammonium Chloride, Ammonium Sulfamate, Amyl Acetate, Fumaric Acid, and Maleic Acid (all no longer reportable, effective reporting year 2010); 6) the use of the CERCLA chemicals delisted as of 2010 reports per the 2006 TURA Amendments; 7) the use of any chemical covered by a trade secret claim because the Core Group Analysis is developed by TURI, and trade secret data cannot be shared outside of the MassDEP TURA program.

The following example illustrates how data are adjusted to reflect changes in production.

ADJUSTING RAW DATA FOR YEAR TO YEAR CHANGES IN PRODUCTION

- In year 1, a facility produces 1,000 machine parts, and generates 100 lbs. of byproduct.
- In year 2, the facility produces 10% fewer machine parts (900). Therefore, the production ratio is 0.90. However, the facility only generates 80 lbs. of byproduct.
- The production adjusted byproduct for year 2 is 80 lbs./.90 = 89 lbs.
- The production adjusted percent change from year 1 to year 2 is [100-89]/100 = .11, or an 11% reduction, while its actual byproduct reduction is 20%.
-

Progress in Toxics Use Reduction: 2000 Core Group Adjusted for Production

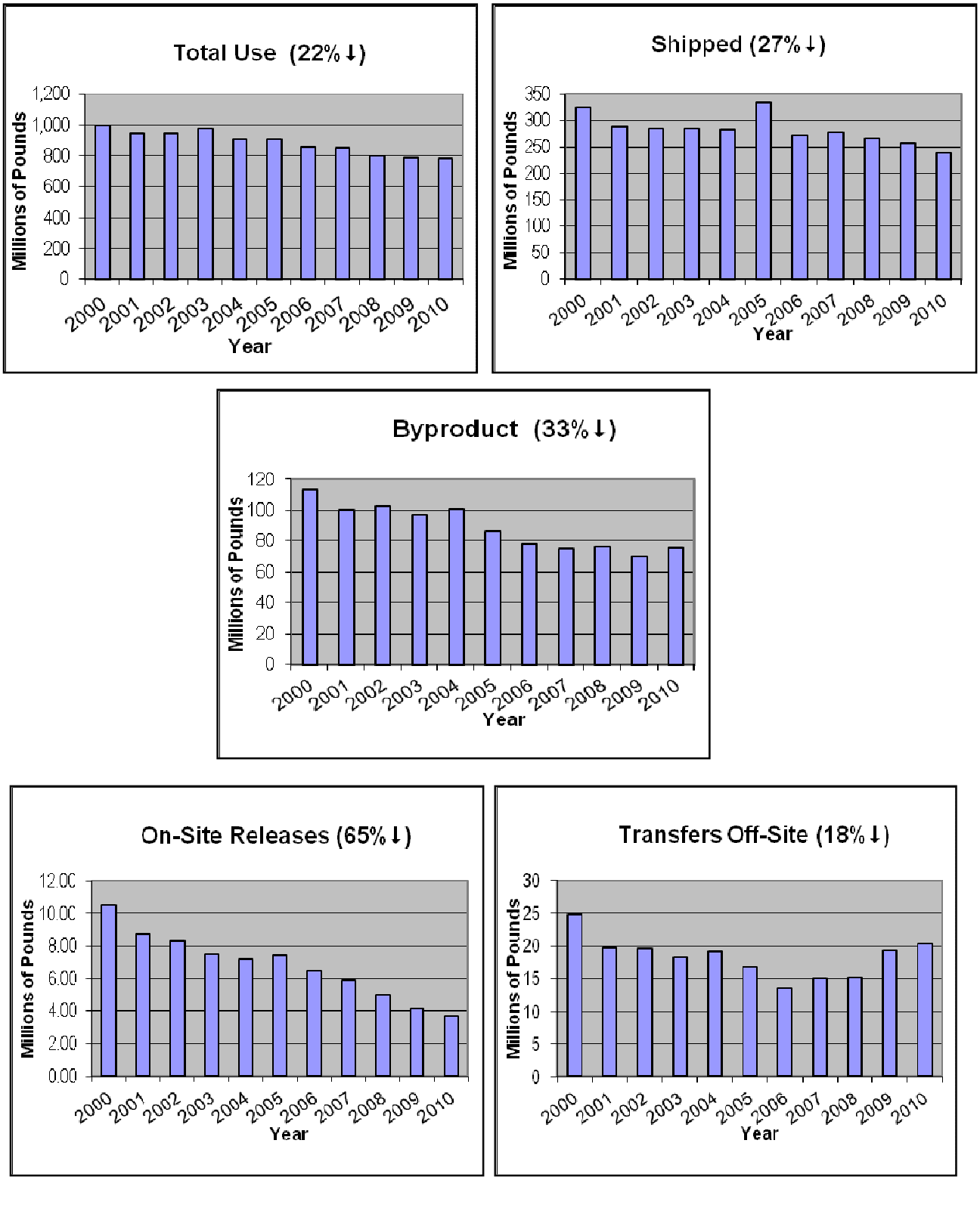
Table 1 below summarizes TURA data from 2000 to 2010, showing both reported and production adjusted quantities. For the 2000 Core Group, the activity index shows a decrease in production of 16 percent from 2000 to 2010. As shown below in Table 1 and Figure 3, when adjusted for production, as of 2010 the 2000 Core Group facilities have reduced**:**

- toxic chemical use by 22%,
- toxic byproducts by 33%,
- toxics shipped in product by 27%,
- on-site releases of toxics to the environment by 65%, and
- transfers of toxics off-site for further waste management by 18%.

Table 1
2000 CORE GROUP DATA: 2000 - 2010 TREND SUMMARY
(Quantities are in millions of pounds and do not include trade secret quantities.
Shaded columns show quantities adjusted by cumulative production ratio)

	Total Use		Byproduct		Shipped in Product		On-Site Releases		Transfers Off-Site		Production Ratio	
											Year to Year	Cumulative from 2000
2000	995.40	995.40	113.58	113.58	324.64	324.64	10.49	10.49	24.90	24.90		
2001	916.58	944.93	97.14	100.14	278.70	287.32	8.48	8.74	19.13	19.72	0.97	0.97
2002	845.60	947.56	91.71	102.77	253.86	284.47	7.41	8.30	17.43	19.53	0.92	0.89
2003	883.51	980.24	87.63	97.22	256.48	284.56	6.79	7.53	16.43	18.23	1.01	0.90
2004	807.60	905.07	90.02	100.88	252.14	282.57	6.44	7.22	17.04	19.10	0.99	0.89
2005	764.28	901.60	73.20	86.35	282.49	333.24	6.33	7.47	14.28	16.85	0.95	0.85
2006	724.65	854.85	66.39	78.32	230.61	272.04	5.47	6.45	11.50	13.57	1.00	0.85
2007	682.58	847.60	60.58	75.23	223.48	277.51	4.73	5.87	12.07	14.99	0.95	0.81
2008	628.90	796.88	60.33	76.44	210.41	266.61	3.98	5.04	11.93	15.12	0.98	0.79
2009	609.01	787.42	54.33	70.25	198.79	257.03	3.24	4.19	14.89	19.25	0.98	0.77
2010	652.06	780.64	63.21	75.67	198.89	238.11	3.09	3.70	16.98	20.33	1.08	0.84
Percent Change 2000-2010	34% Reduction	22% Reduction	44% Reduction	33% Reduction	39% Reduction	27% Reduction	71% Reduction	65% Reduction	32% Reduction	18% Reduction		16% Decrease

Figure 3 – 2000 Core Group Toxics Use Reduction Progress from 2000 to 2010 (Production Adjusted)



As Table 1 shows, between 2009 and 2010 byproduct generation by the 2000 Core Group increased by 5.4 million pounds (8%).while toxics use went down 6.8 million pounds (0.03%) when adjusted for production levels. The fact that the total quantity of chemicals wasted increased while the total quantity used decreased indicates that the overall efficiency of chemical use declined between the two years. As was shown in Table 1 and Figure 3 however, such year to year fluctuations are not uncommon and have not historically affected the overall trend of continued toxics use reduction. Total 2010 byproduct is still lower than the amount generated in 2008.

As shown below in Table 2, the increase in byproduct generation was concentrated in a small number of chemicals. Seven chemicals accounted for 5.1 of the 5.4 million pound increase. The increase in byproduct was also concentrated in a few facilities: six companies reported a combined increase of 5.4 million pounds of byproduct.

Table 2
Production Adjusted Increase in Byproduct 2009 -2010

Chemical	Increase in Byproduct (Lbs.)	% Change
NITRATE COMPOUNDS	2,008,508	35%
ETHYLENEGLYCOL	611,777	35%
DIMETHYLFORMAMIDE	603,850	81%
ETHYLACETATE	598,449	10%
ALUMINUMSULFATE	435,892	85%
METHANOL	423,177	18%
SODIUM HYDROXIDE	406,793	35%

Two million pounds of the adjusted increase in byproduct was largely due the nitrate compounds at one facility. Nitrate compounds are coincidentally manufactured when nitric acid is used to neutralize water, and the one facility reported an increase in the use of nitric acid. In addition EPA has in the past few years been educating facilities about the need to report the coincidental manufacture of nitrate compounds as a result of neutralization activities, so some of this increase may be due to improved reporting accuracy..

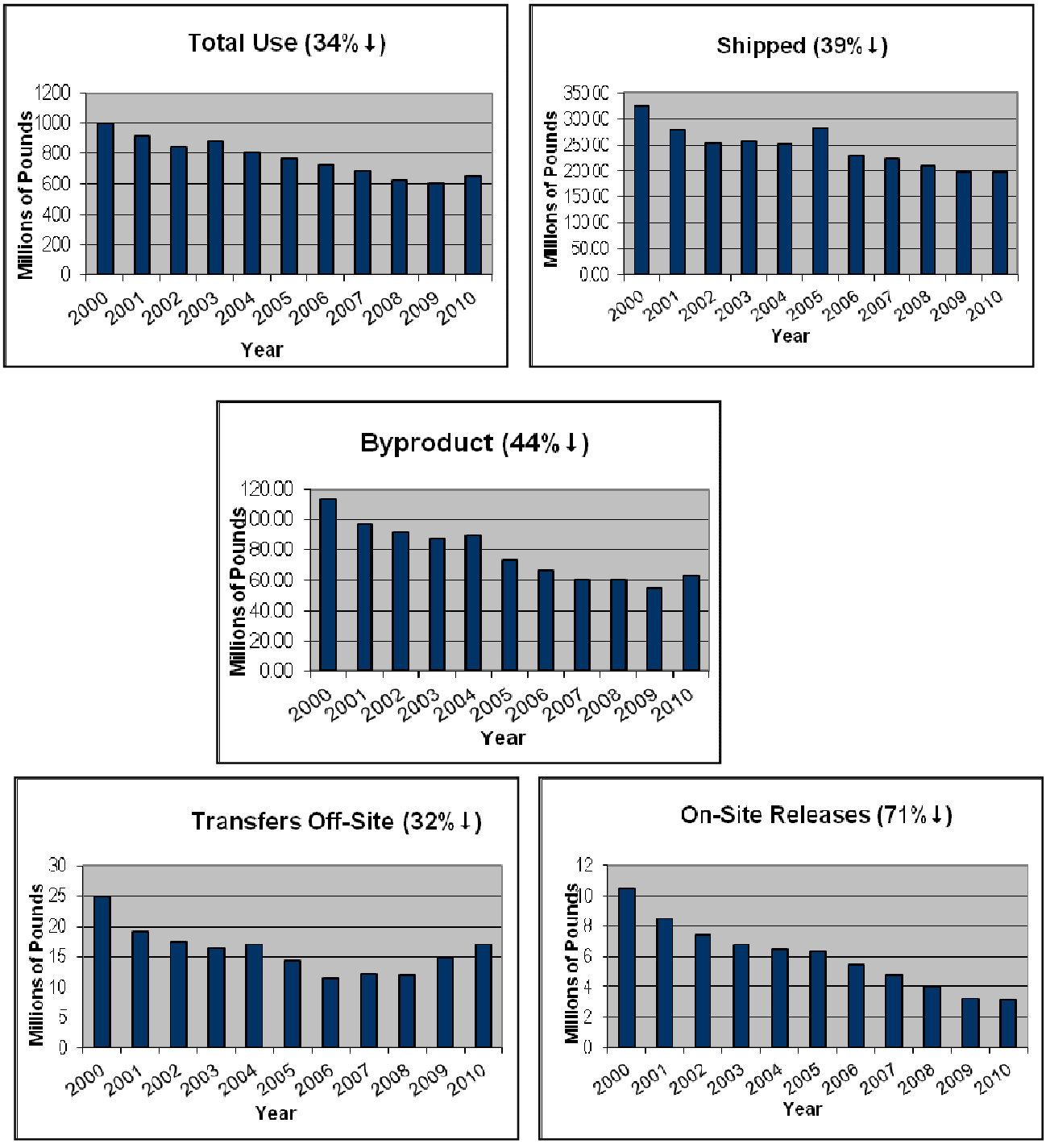
Most of the increase in ethylene glycol byproduct was also due to one facility. However, because the facility "otherwise used" the chemical, this result could be an artifact of the analytical method. Chemicals that are otherwise used – neither incorporated into a product nor converted into a different chemical that is sold – end up entirely as byproduct. Furthermore the amount used is not necessarily directly proportional to the amount of the product produced. In this instance the raw quantity of byproduct generated declined between 2009 and 2010. However because the facility reported a 40% decline in business between the two years the production byproduct generation of the substance was inflated by the adjustment for production.

2000 Core Group Progress without Adjusting for Production

The actual quantities reported by the 2000 Core Group over the period 2000 to 2010 are shown in Figure 4. These quantities have <u>not</u> been adjusted for changes in production. From 2000 to 2010, Core Group facilities reduced:

- toxic chemical use by 34% (from 995 million to 652 million pounds between 2000 and 2010),
- toxic byproducts by 44% (from 114 million to 63 million pounds between 2000 and 2010),
- toxics shipped in product by 39% (from 325 million 199 million pounds between 2000 and),
- on-site releases of toxics to the environment by 71% (from 10 million pounds in 2000 to 3 million 2010), and
- transfers of toxics off-site for further waste management by 32% (from 25 to 17 million pounds between 2000 and 2010).

Figure 4 – 2000 Core Group Toxics Use Reduction Progress from 2000 to 2010 (Not Production Adjusted)



III. 2010 TURA Chemical Data

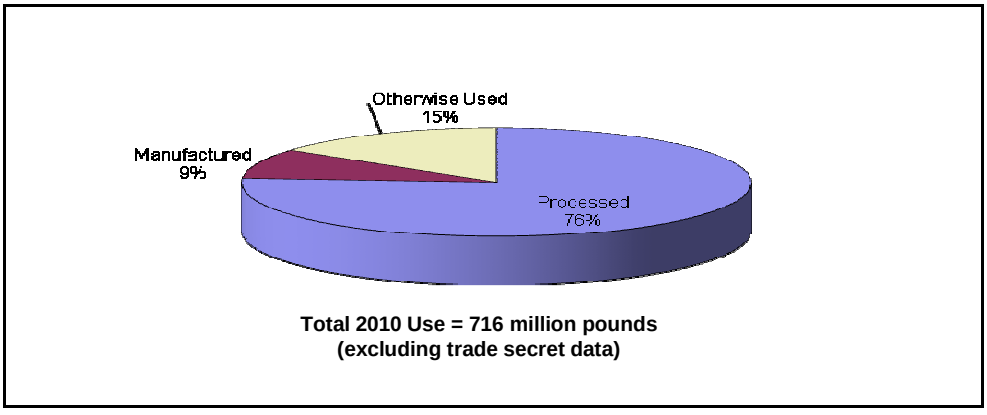
Table 3 summarizes the 2010 data for all TURA filers, including trade secret data, rounded to the nearest million pounds. These LQTUs reported using 955 million pounds of chemicals and generating 84 million pounds of byproduct.

Table 3 - 2010 Data for All TURA Filers (in pounds; includes trade secret data)		
Total Use	955,000,000	
Generated as Byproduct	84,000,000	-9% of total chemical use
Shipped in Product	334,000,000	-35% of total chemical use -the remaining 56% of total use is "consumed" or transformed into another chemical in the production process
On-Site Releases (to air or water)	5,000,000	-0.5% of total chemical use -6% of total byproduct -the remaining 94% of byproduct was destroyed through treatment on-site (54%) or shipped off-site for treatment or disposal (see below)
Transfers Off-Site for treatment or disposal	34,000,000	-4% of total chemical use -40% of total byproduct

Chemical Use by Use Category

The 955 million pounds of chemical use is reported in three categories: manufactured, processed, or otherwise used. When total use is broken down by type of use (i.e., manufactured, processed, or otherwise used), trade secret data are not included in order to product the confidentiality of trade secret claims. . Thus, the total use in Figure 5 is 755 million pounds, rather than 955 million pounds (which includes trade secret data).

Figure 5 – 2010 Chemical Use (does not include trade secret data)



Manufactured Chemicals

The Toxics Use Reduction Act (TURA) defines "manufacturing" as: "to produce, prepare, import or compound a toxic or hazardous substance" e.g., intentional manufacture of a chemical substance such as formaldehyde or the "coincidental" (unintentional) manufacture of acid gases such as hydrochloric acid during combustion of fossil fuels.

Figure 5[3] shows that relatively little manufacturing of TURA chemicals occurs in Massachusetts. Chemicals reported as "manufactured" accounted for 9% (67 million pounds) of the total use statewide. A significant amount of these chemicals are coincidentally manufactured as a result of some other activity rather than manufactured intentionally. Examples include 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.

Processed Chemicals

TURA defines "processing" 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" e.g., 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 processing. At 575 million pounds, it accounted for 76% of total 2010 chemical use. Styrene monomer accounted for 51% (292 million pounds) of the total amount of chemicals processed.

Otherwise Used Chemicals

TURA defines "otherwise use" 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" (.g., chemicals used to clean parts prior to plating, chemicals contained in fuels that are combusted, chemicals used as catalysts in production, or chemicals used to carry a coating but that evaporate off as the coating dries.

Chemicals "otherwise used" accounted for 15% (113 million pounds) of total use.

Top 20 Chemicals

In 2010, LQTUs reported using 142 out of the 1,416 TURA-listed chemicals in amounts above the reporting threshold. The raw data was analyzed by chemical to identify the top 20 chemicals used, generated as byproduct, shipped in product, released onsite as pollution, or shipped offsite for treatment or disposal. The following six chemicals appear on all five Top 20 chemical lists and are shown in bold on the lists:

- Acetone
- Ethyl Acetate
- Methanol
- Methyl Ethyl Ketone
- Sulfuric Acid
- Toluene

Information reported as trade secret was excluded from the use, shipped in product and byproduct generation data in order to protect confidentiality claims.

[3] The total use in Figure 5 is 755 million pounds, rather than 955 million pounds because in order to protect confidentiality, the analysis does not include trade secret data when total use is broken down by type of use.

Use

As shown in Table 4, the top 20 chemicals accounted for 90%, (677 million pounds) of the total reported statewide use. Styrene monomer was the chemical with greatest reported use. Eleven facilities (2 % of the total number of LQTUs) reported using 292 million pounds of styrene monomer to make plastic. This represented 39% of total reported use and a 29 million pound increase from the prior year.

Table 4
2010 Top 20 Chemicals: Total Use
These quantities do not include Trade Secret

Chemical Name (CAS #)	Total Use (Lbs.)
Styrene Monomer (100425)	291,850,666
Sodium Hydroxide (1310732)	67,079,902
Hydrochloric Acid (7647010)	54,848,969
Methanol (67561)	**54,571,161**
Sulfuric Acid (7664939)	**27,938,964**
Sodium Hypochlorite (7681529)	26,275,186
Toluene (108883)	**18,793,776**
Methyl Methacrylate (80626)	16,057,819
Ammonia (7664417)	14,947,136
Chlorine (7782505)	13,116,505
Potassium Hydroxide (1310583)	12,960,251
Nitrate Compounds (1090)	12,698,461
Methyl Ethyl Ketone (78933)	**11,019,817**
Zinc Compounds (1039)	10,279,267
Ethyl Acetate (141786)	**9,869,857**
Acetone (67641)	**9,464,080**
Diisocyanates (1050)	7,057,460
Toluene Diisoycyanate (26471625)	6,161,920
Ethylene Glycol (107211)	6,017,939
Nitric Acid (7697372)	5,527,145

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

Sodium hydroxide was the second most highly used chemical. At 67 million pounds it accounted for 9% of total reported use. Two million fewer pounds were used in 2010 than in 2009. 157 facilities (32% of the LQTUs) reported using Sodium hydroxide to treat wastewater, neutralize acids, make sodium salts, rayon, plastics, paper and cellophane, or to manufacture laundering, bleaching, and dishwashing materials.

Hydrochloric acid ranked third on the list. 51 facilities (10% of the LQTUs) reported using 55 million pounds -- 7% of total reported use. The amount used was unchanged from the last reporting year. Hydrochloric acid is a byproduct of combustion, and is used in chloride production, in electroplating, to clean metal products, to remove scale from boilers, and to neutralize basic waste streams.

Byproduct and Shipped in Product

Table 5 shows the Top 20 chemicals generated as byproduct and shipped in product in 2010. The top 20 chemicals generated as byproduct accounted for 89% (or 75 million pounds) of the statewide total. The top twenty chemicals shipped in product statewide accounted for 88% (or 224 million pounds) of total statewide shipments in product.

Table 5
2010 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.)**
Sulfuric Acid (7664939)	**12,149,501**	**Methanol (67561)**	**51,816,682**
Nitrate Compounds (1090)	11,093,866	Sodium Hydroxide (1310732)	43,288,303
Sodium Hydroxide (1310732)	8,935,052	Sodium Hypochlorite (7681529)	22,717,421
Ethyl Acetate (141786)	**8,329,766**	Chlorine (7782505)	13,090,430
Toluene (108883)	**6,660,270**	**Toluene (108883)**	**11,524,135**
Hydrochloric Acid (7647010)	4,465,057	Ethylene Glycol (107211)	11,342,142
Methyl Ethyl Ketone (78933)	**3,298,494**	Ammonia (7664417)	10,578,602
Methanol (67561)	**2,925,659**	Potassium Hydroxide (1310583)	10,370,571
Lead (7439921)	2,719,880	**Acetone (67641)**	**7,771,882**
Formaldehyde (50000)	2,004,840	**Methyl Ethyl Ketone (78933)**	**7,733,147**
Ethylene Glycol (107211)	1,981,870	Zinc Compounds (1039)	6,018,660
Dimethylformamide (68122)	1,950,868	**Sulfuric Acid (7664939)**	**3,811,249**
1-Methyl-2-Pyrrolidone (872504)	1,507,003	Dichloromethane (75092)	3,287,499
Acetone (67641)	**1,457,238**	1-Methyl-2-Pyrrolidone (872504)	3,143,774
Nitric Acid (7697372)	1,259,901	Phosphoric Acid (7664382)	3,136,637
Sodium Hypochlorite (7681529)	1,009,669	Copper Compounds (1015)	3,050,368
Aluminum Sulfate (10043013)	981,774	Antimony Compounds (1000)	2,872,019
Ammonia (7664417)	815,242	Xylene Mixed Isomer (1330207)	2,817,597
Phosphoric Acid (7664382)	746,726	**Ethyl Acetate (141786)**	**2,584,699**
Hydrogen Fluoride (7664393)	723,925	Methyl Methacrylate (80626)	2,545,668
		Sodium Bisulfite would appear in the Top 20 Chemicals Shipped in Product list if trade secret quantities were included	

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

Onsite Releases as Pollution

As shown in Table 6 the Top 20 chemicals reported as released on site in 2010 totaled 4 million pounds, 95% of the total reported releases. Hydrochloric acid was the top chemical, accounting for 39% (approximately 2 million pounds) of the statewide total. One million pounds (61%) of total on-site were

from power plants. Over 99% of total on-site releases of lead was attributed to lead in ash disposed by one municipal waste combustor in an on-site lined landfill.

Table 6
2010 Top 20 Chemicals: On-Site Releases as Pollution and Transfers Off-site for Treatment or Disposal

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)	1,770,900	**Sulfuric Acid (7664939)**	**7,078,978**
Ammonia (7664417)	535,656	Nitrate Compounds (1090)	5,625,093
Lead (7439921)	344,892	Lead (7439921)	2,386,264
Acetone (67641)	**330,054**	Formaldehyde (50000)	1,907,451
Ethyl Acetate (141786)	**280,826**	**Toluene (108883)**	**1,835,109**
Butyl Alcohol (71363)	171,438	**Methanol (67561)**	**1,710,834**
Toluene (108883)	**169,982**	Ethylene Glycol (107211)	1,368,624
Glycol Ethers (1022)	136,719	**Ethyl Acetate (141786)**	**1,357,014**
Methanol (67561)	**91,993**	1-Methyl-2-Pyrrolidone (872504)	1,174,826
Methyl Ethyl Ketone (78933)	**90,053**	Zinc Compounds (1039)	884,358
Sulfuric Acid (7664939)	**67,293**	**Acetone (67641)**	**878,510**
Hydrogen Fluoride (7664393)	66,489	**Methyl Ethyl Ketone (78933)**	**829,407**
Trichloroethylene (79016)	50,555	Sodium Hydroxide (1310732)	803,753
Xylene Mixed Isomer (1330207)	46,255	Butyraldehyde (123728)	566,314
Butyraldehyde (123728)	26,750	Copper Compounds (1015)	531,580
Nitrogen Dioxide (10102440)	26,076	Nitric Acid (7697372)	405,197
N-Propyl Bromide (106945)	25,961	Hydrogen Fluoride (7664393)	340,474
1-Methyl-2-Pyrrolidone (872504)	25,886	Dimethylformamide (68122)	308,796
Dichloromethane (75092)	24,087	Phosphoric Acid (7664382)	295,933
Styrene Monomer (100425)	20,976	Acetonitrile (75058)	258,357

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

Offsite Transfers for Treatment or Disposal

Table 6 also shows the Top 20 chemicals reported as transfers off-site in 2010, which totaled 90% (or almost 31 million pounds) of total transfers for waste treatment or disposal. At 21% of total transfers,

Sulfuric acid was the top chemical. Over 95% of the total transfers of this chemical was attributed to one facility that transferred almost 7 million pounds for neutralization.

Nitrate compounds had the second highest reported amount of transfers off-site, accounting for 17% of the total. Nitrate compounds were primarily coincidentally manufactured during neutralization of nitric acid in wastewater treatment, and were discharged to Publically Owned Wastewater Treatment Plants.

Over 96% of total transfers off-site of lead, the third chemical on the list was attributed to seven municipal waste combustors that transferred lead in ash to off-site lined landfills.

2010 Chemicals Delisted and Newly Listed

In 2010, seven chemicals were delisted from the TURA reportable chemical list:

CAS	**Chemical Name**
124049	Adipic Acid
1066337	Ammonium Bicarbonate
12125029	Ammonium Chloride
7773060	Ammonium Sulfamate
628637	Amyl Acetate
110178	Fumaric Acid
110167	Maleic Acid

In 2009 eight facilities had reported using a combined total of 7 million pounds of five these chemicals. (Neither maleic acid nor ammonium chloride was reported in 2009.). All seven substances were reported in 2008. Since 1990, 38 different facilities have reported using at least one of these chemicals. One facility ceased being an LQTU and dropped out of the TURA reporting universe in 2010 because adipic acid was the only chemical that it used above the threshold.

N-Propyl Bromide (CAS 106945) was added to the chemical list in 2010. Three facilities reported using a total of 47,000 pounds of this chemical, generating a total of 39,000 pounds of byproduct, and releasing approximately 26,000 pounds onsite as pollution. 26,000 pounds placed N-Propyl Bromide in the top twenty chemicals for 2010 onsite releases..

IV. 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 High Hazard by the TURA Administrative Council
- Chemicals known to promote asthma (Asthmagens)
- Carcinogens.

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

Persistent Bioaccumulative Toxic (PBT) Chemical Trends

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 human and environmental health threats and, therefore, the use and release of these chemicals, even in relatively small amounts, warrant public reporting as well as toxic use reduction efforts Because of these concerns, the threshold for PBTs, was lowered from 25,000 pounds if the substance is manufactured or processed and 10,000 pounds if the substance is otherwise used, to between .1 grams and 100 pounds depending on the chemical, for all uses. The threshold was lowered for all PBTs except lead and lead compounds .as of reporting year 2000. The lower threshold for lead and lead compounds took effect the following year in 2001.

Table 7 below shows the 2010 reporting data on PBT chemicals. For 2010, Massachusetts facilities reported the use of eight PBT chemicals/chemical categories.

Table 7
2010 Persistent Bioaccumulative Toxic (PBT) Chemicals Summary
(in pounds unless otherwise noted)

Substance	Reporting Threshold	Number of Facilities	Total Use	Generated as Byproduct	Shipped in Product	On-Site Releases	Transfers Off-Site
Polycyclic Aromatic Compounds (PACs)	100 lbs.	26	382,534	1,216	54,895	649	571
Benzo(g,h,i Perylene	10 lbs.	21	4,275	3	1,110	0	3
Mercury	10 lbs.	16	11,100	7,178	4,412	952	6,132
Mercury Compounds	10 lbs.	4	1,161	115	930	55	57
Poly-chlorinated biphenyls (PCBs)	10 lbs.	2	71,091	71,091	0	0	71,090
Dioxin & Dioxin-like Compounds	0.1 grams	9	1,979.94 grams	1,980.86 grams	0.00 grams	16.17 grams	1,964.68 grams
Lead	100 lbs.	71	3,180,818	2,719,880	468,118	344,892	2,386,264
Lead Compounds	100 lbs.	72	730,111	207,127	461,439	2,212	209,562
Tetrabromo-bisphenol A	10 lbs.	1	743	124	619	0	124

Table 8 below shows the 2010 reporting data on PBT chemicals reported and the numbers of facilities reporting PBTs 1999 or 2000 to the present. The data show a fairly common trend. Typically lowering the reporting threshold for these chemicals lead to an initial increase in the number of facilities reporting

Table 8
Pounds of PBTs Reported and Number of Facilities Reporting 2000 - 2010

	Benzo[ghi]-perylene (191242)		Dioxin and Dioxin Compounds (1060)		Lead (7439921)		Lead Compounds (1026)		Mercury (7439976)		Mercury Compounds (1028)		Poly-Chlorinated Biphenyls (1336363)		Polycyclic Aromatic Compounds (1040)		Tetra-bromo-bisphenol A (79947)	
	Lbs Use	#	Grams Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#	Lbs Use	#
1999	0	0	0	0	723,675	15	9,287,998	31	0		0	0	0	0	37,539,261	6	0	0
2000	**146,531**	**120**	**12.05**	**8**	1,261,842	15	9,855,146	33	**4973**	**11**	**90,009**	**6**	**118,160**	**2**	**14,171,986**	**158**	**332**	**1**
2001	180,326	127	12.11	8	**1,284,199**	**152**	**7,290,727**	**129**	9,315	13	676	5	83,890	2	13,849,697	151	115	1
2002	123,429	122	12.78	8	912,922	143	5,146,270	114	5,922	13	1,765	5	64,981	2	11,148,250	149	19,057	1
2003	*125,099*	*119*	*11,827*	*17*	*3,394,134*	*140*	*5,982,308*	*117*	*11,476*	*20*	*1,212*	*6*	*37,325*	*2*	*11,486,388*	*136*	*152*	*1*
2004	128,874	114	3,033	16	3,651,671	109	5,279,269	127	12,629	20	966	7	46,879	2	11,796,370	133	0	0
2005	128,809	109	6,696	17	3,763,518	115	3,689,910	126	10,444	22	1,031	6	21,741	2	11,128,163	127	0	0
2006	49,376	27	761	15	4,811,219	102	2,279,105	111	13,351	19	1,011	6	22,042	2	3,735,104	31	0	0
2007	49,412	28	1,155	13	4,172,982	90	1,406,092	104	13,733	19	1,101	5	110,303	3	5,051,904	29	0	0
2008	33,393	25	1,523	13	3,799,158	89	1,241,869	94	12,231	20	3,421	6	156,170	3	3,275,212	30	0	0
2009	12,403	24	1,951	11	4,106,217	71	965,173	82	10,515	17	1,610	5	42,757	3	1,168,637	28	0	0
2010	4,275	21	1,980	9	3,180,818	71	730,111	72	11,100	16	1,161	4	71,091	2	382,534	26	743	1

NOTE: Bolded numbers indicate the first year that a chemical was designated as a PBT and the reporting threshold lowered.
2003 was the first year that municipal waste combustors were required to report

the chemical, indicating there had been a relatively large number of facilities that had reduced their use to below the original threshold. Over time, however, the numbers trend back downward, apparently as facilities adopt TUR options in response to the reporting and planning requirements. .

This trend is shown most clearly with lead and lead compounds. Lowering the reporting threshold in 2001 for lead and lead compounds 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. By reporting year 2010, the number of facilities reporting lead had decreased to 71, and the number of facilities reporting lead compounds had decreased to 72.

The number of facilities reporting mercury and mercury compounds rose from 0 for both chemicals in 1999, to 11 and 6, respectively in 2000. When municipal waste combustors emissions were first reported in 2003, the number of facilities reporting mercury jumped to 20, and use increased from 4,973 to 11,476 pounds. As of 2010 reported Mercury use has declined to 16 facilities and 11,100 pounds.

The number of facilities reporting mercury compounds decreased from six in 2000 to four in 2010. Total use was at its peak in 2000, at 90,009 pounds, dropped to 676 pounds in 2001, and has since remained around 1200 pounds, with occasional spikes. 89,000 of the 90,000 pounds reported in 2000 were due to a one time shipment of waste from a hazardous waste transfer facility.

Dioxin use followed a similar pattern to mercury. The number of filers and amounts reported increased substantially when municipal waste combustion emissions were brought into the TURA program in 2003, and then the number of filers dropped down to primarily the municipal waste combustors. Since 2003, dioxin use has increased 40%, however this may be due to facilities changing the way in which they calculate the coincidental manufacture of the substance. Coincidental manufacture may have been under reported initially.

For benzo[ghi]perylene and polycyclic aromatic compounds (PACs), there was a dramatic drop in the number of facilities reporting. For benzo[ghi]perylene, the number of facilities reporting dropped from 120 in 2000 to 21 in 2010. For PACs, the number of facilities reporting went from 158 in 2000 to 26 in 2010. The major reason for the change was a statutory change in 2006 that limited reporting on materials in fuel used for space heating and power to facilities whose primary business in power production (e.g. electric utilities).

There has been a substantial decline in the use of many of these substances since 2008. Since these quantities are not adjusted for production levels, the decline in reported use of these chemicals could possibly be attributed to the economic recession that began in 2008

Higher Hazard Substances (HHS) Trends

The 2006 amendments to TURA directed the Administrative 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 HHS to 1,000 pounds for all uses. Effective reporting year 2008, the Council designated cadmium, cadmium compounds, and trichloroethylene as HHS. Effective reporting year 2009, the Council designated tetrachloroethylene as a HHS

Table 9 shows the summary HHS data for 2010. Massachusetts facilities reported the use of all four higher hazard chemicals/chemical categories in 2010

Table 9 **2010 Higher Hazard Substances (HHS) Summary**							
Substance	**Reporting Threshold**	**Number of Facilities**	**Total Use (lbs)**	**Generated as Byproduct (lbs)**	**Shipped in Product (lbs)**	**On-Site Releases (lbs)**	**Transfers Off-Site (lbs)**
Cadmium	1,000 lbs.	4	23,970	426	21,344	0	427
Cadmium Compounds	1,000 lbs.	7	242,702	6,530	30,840	70	6,462
Trichloroethylene	1,000 lbs.	16	294,836	103,278	209,754	50,555	23,025
Tetrachloroethylene	1,000 lbs.	17	144,218	50,676	74,244	13,194	37,794

Table 10 below shows the pounds of HHS chemicals reported and the numbers of facilities reporting HHSs from 2000 to the present. The data show a similar trend as that seen with PBTs: a gradual decline in use between 2000 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 HHS, followed by a drop both measures.

Table 10 **Pounds of High Hazard Chemicals Reported and Number of Facilities Reporting 2000-2010**								
Reporting Year	**Cadmium / # Facilities (HHS as of 2008)**		**Cadmium Compounds / # Facilities (HHS as of 2008)**		**Trichloroethylene / # Facilities (HHS as of 2008)**		**Tetrachloroethylene / # Facilities (HHS as of 2009)**	
	Lbs	*#*	*Lbs*	*#*	*Lbs*	*#*	*Lbs*	*#*
2000	43,658	2	16,605	2	1,742,305	25	832,910	10
2001	35,614	2	30,472	2	1,393,981	17	615,308	9
2002	48,125	2	38,127	2	1,234,011	17	302,870	9
2003	21,686	1	11,025	1	1,052,806	15	304,217	6
2004	25,058	1	172,435	2	1,085,571	14	263,769	6
2005	21,960	1	208,035	3	834,462	9	268,505	4
2006	0	0	248,470	1	770,538	11	210,473	4
2007	0	0	184,400	1	604,671	9	228,456	4
2008	**29,429**	**5**	**167,355**	**6**	**536,073**	**27**	230,345	4
2009	28,969	4	145,324	7	556,457	23	**172,281**	**23**
2010	23,970	4	242,702	7	294,836	16	144,218	17
NOTE: **Bolded** numbers indicate the first year that these chemicals were designated as an HHS and the reporting threshold lowered								

This pattern held true for all except for Cadmium Compounds. Cadmium compound use declined between 2007 and 2008 when it was classified as an HHS, although the number of filers jumped from 1 to 6 in the year it was designated. Use declined in 2009 and then increased in 2010 to levels just under those seen in 2006. Some of these changes could have been due to changes in economic activity, since the HHS data presented have not been normalized for production.

The more typical trend is shown with trichloroethylene. The number of facilities reporting this chemical dropped from 25 in reporting year 2000 to 9 in reporting year 2007. It jumped to 27 when the reporting threshold was dropped in 2008, and has since declined to 16 in 2010. Use dropped dramatically between 2000 and 2010: from 1,742,305 pounds in 2000, to 536,073 pounds in 2008, to 294,836 pounds in 2010.

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 LQTUs. The report identified 335 chemicals that can cause or exacerbate asthma, 68 of which are reportable under TURA and 41 of which were reported by at least one year by at least one facility between 1990 and 2005.

The TURA Program has begun working to better understand the uses of these chemicals in relation to potential exposures and toxics use reduction opportunities. Table 11 summarizes the 2010 reported data on the 17 chemicals identified as asthmagens by the Association of Occupational and Environmental Clinics (AOEC) identified in the LCSP report.

Table 11
2010 Asthma-Related Toxics
(in pounds)

Chemical Name (Number of facilities)	Total Use	On-Site Releases	On-Site Releases as a % of Total Use ***
Acetic Acid (16)	1,315,939	3,478	0.26%
Aluminum (3)	127,856	294	0.23%
Chlorine (3)	13,116,505	167	0.001%
Chromium (2)	87,137	63	0.07%
Chromium Compounds (6)*	346,896	394	0.11%
Ethylenediamine (2)	200,947	17	0.008%
Ethylene Oxide (1)	286,993	429	0.15%
Formaldehyde (7)	2,517,014	16,100	0.64%
Hydrazine (1)	174,404	0	0.00%
Maleic Anhydride (1)	449,140	507	0.11%
Methylmethacrylate (6)	16,057,819	2,495	0.02%
Nickel (3)	487,314	61	0.01%
Nickel Compounds (7)	661,211	1,318	0.20%
Phthalic Anhydride (1)	297,308	177	0.06%
Styrene Monomer (11)	291,850,681	20,976	0.01%
Sulfuric Acid (96)	21,593,926	67,293	0.31%
Toluene Diisocyanate (4)**	6,741,872	192	0.003%

* Chromium is considered an asthmagen by AOEC but chromium compounds are not.
** Toluene Diisocyanate includes CAS numbers 91087, 584849, and 26471625.
.

Styrene monomer, sulfuric acid, methylmethacrylate, and chlorine were the asthmagens with the greatest reported use.

- Styrene monomer (292 million pounds) had the largest amount of use. Although styrene was reported by 11 facilities, 97% of its use was attributed to one facility. All reported releases of styrene were air releases.

- Sulfuric acid (22 million pounds), the second largest amount of use, was used by 96 facilities. Power plants had the largest amount of releases, which were all to air.

- Methylmethacrylate (16 million pounds), the third largest amount of use, was used by 6 facilities

- Chlorine (13 million pounds), the fourth largest amount of use, was used by 3 facilities, with over 99% of its use attributed to one facility.

For each of these chemicals, the quantity released onsite of pollution ranged from 0.001% to0.64% of the total amount used.

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 2010, seven IARC Group 1 carcinogens were reported under TURA (see Table 11). Formaldehyde, nickel compounds and chromium compounds had the largest amounts of reported uses. Formaldehyde, nickel compounds, and ethylene oxide had the largest amounts of reported releases. Of these chemicals, dioxin was reported by the most facilities. Releases were primarily air releases; however, there also were releases to water and land. As with asthmagens onsite releases represented a small fraction of total use.

Table 121
2010 IARC Group 1 Carcinogens
(in pounds unless otherwise noted)

Chemical Name	Number of Facilities	Use	On-Site Releases	Onsite Release as a % of Use
Cadmium	4	23,970	0	0%
Chromium Compounds *	6	346,896	394	0.114%
Crystalline Silica	1	93,120	9	0.010%
Dioxin*	9	1979.94 grams	16.17 grams	0.817%
Ethylene Oxide	1	286,993	429	0.149%
Formaldehyde	7	2,517,014	16,100	0.640%
Nickel Compounds	7	661,211	1,318	0.199%

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

V. 2010 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.

Figure 6 shows the number of TURA reporting facilities in each industry sector. The Chemical Manufacturing sector represents approximately 18% (88 facilities) of the number of TURA reporting facilities, and, as shown in Figure 7 uses 64% of the reportable TURA chemicals. This sector is a diverse group of industries, and includes companies that "manufacture" chemicals according to the TURA definition and companies that "process" chemicals to formulate adhesives, paints, pharmaceuticals, and plastic materials and resins. Approximately 47% of the total chemical use for this sector was attributable to the use of styrene monomer, which is used in the manufacture of polystyrene and other plastics.

Figure 6 - 2010 Number of Facilities by Industrial Sector
Total Number of Facilities = 486

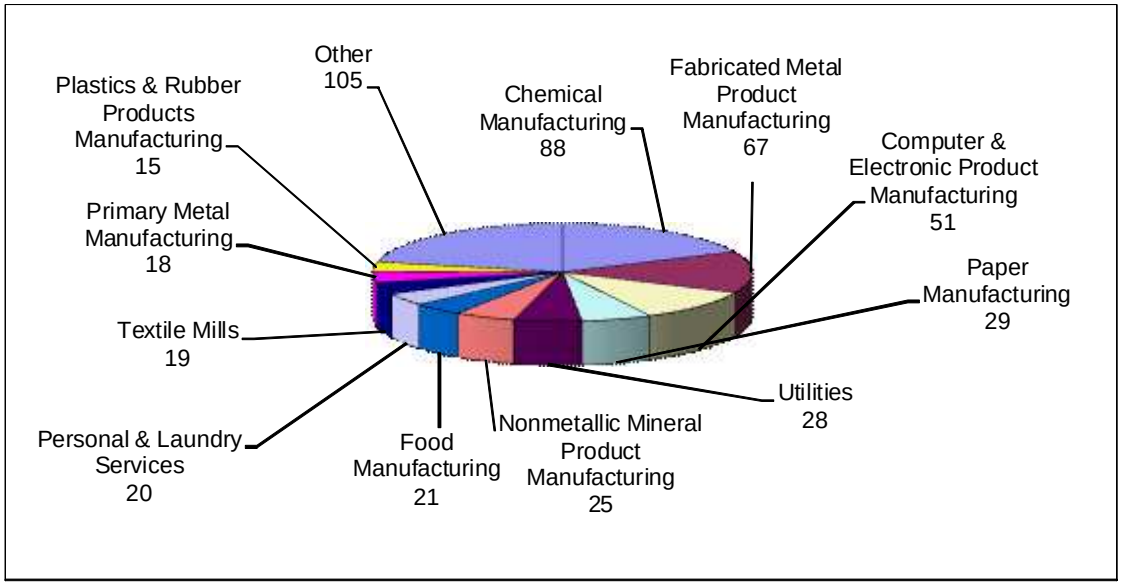
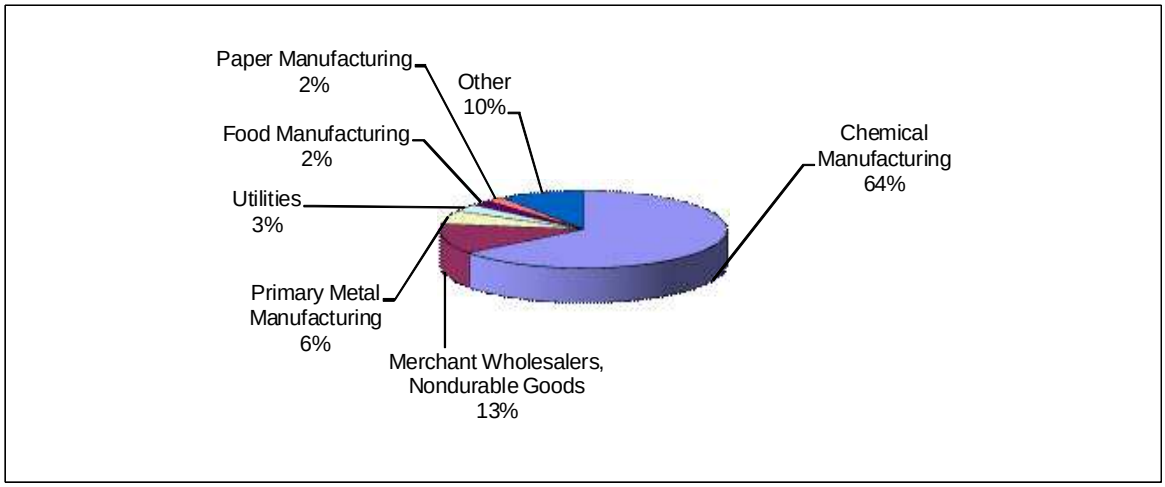


Figure 7 - 2010 Chemical Use by Industrial Sector
Total Use = 955,000,000 Pounds



The second largest sector, Merchant Wholesalers, Nondurable Goods, accounted for 13% of total statewide use. The third largest sector, Primary Metal Manufacturing, accounted for 6% of chemical use. Utilities accounted for 3% of chemical use, and the Food Manufacturing and Paper Manufacturing sectors each accounted for 2% of chemical use. The remaining 10% of statewide chemical use was attributed to a variety of sectors.

Figure 8 shows byproduct generation by industrial sector. While the Chemical Manufacturing sector accounted for 64% of total statewide use, this sector produced 32% of the total byproduct generated in 2010. In contrast, the Paper Manufacturing sector, which accounted for 2% of total statewide chemical use, accounted for 15% of the byproduct generated, along with the Computer & Electronic Product Manufacturing sector, which also accounted for 15% of the total byproduct generated.

Figure 8 - 2010 Byproduct Generation by Industrial Sector
Total Byproduct = 84,000,000 Pounds

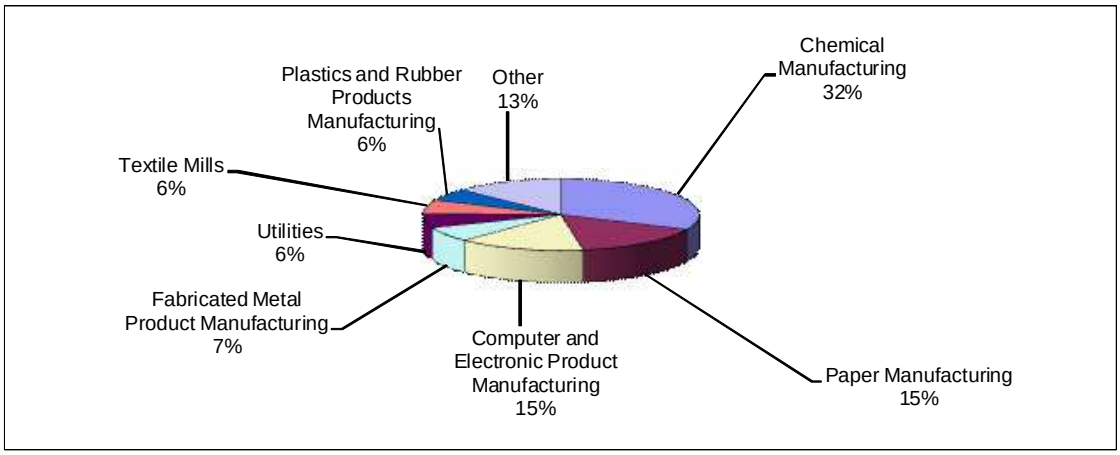
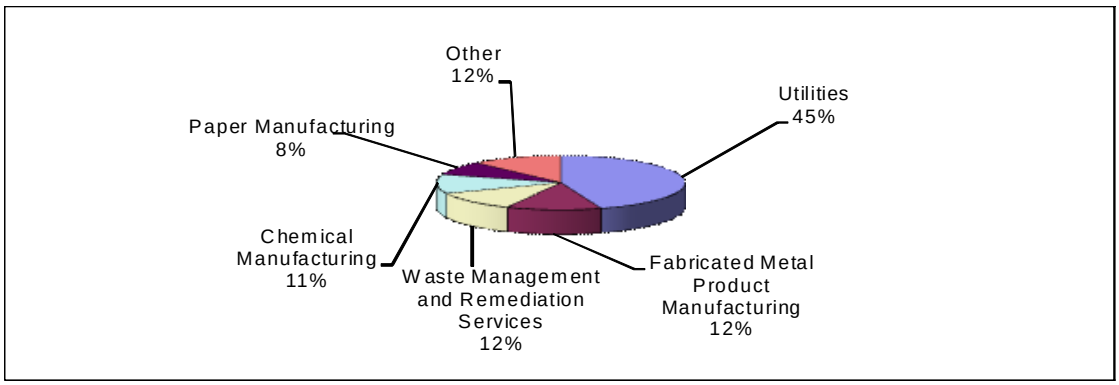


Figure 9 shows on-site releases to the environment by industrial sector. The Utilities sector, which represented 3% of total statewide use, was the largest source of on-site releases, accounting for 45% of all on-site releases. This sector provides power for Massachusetts businesses and citizens. Seventy-one percent of on-site releases in this sector can be attributed to the coincidental manufacture of hydrochloric acid during combustion. The Fabricated Metal Product Manufacturing and Waste Management and Remediation Services sectors each accounted for 12% of total on-site releases. The Chemical Manufacturing sector (which accounted for 64% of total chemicals use) accounted for 11% of total on-site releases. The Paper Manufacturing sector accounted for 8% of total on-site releases. The remaining 12% of total on-site releases was attributed to a variety of sectors.

Figure 9 - 2010 On-Site Releases by Industrial Sector
Total On-Site Releases = 5,000,000 Pounds



VI. 2010 Major TURA Facilities

Tables 13 – 15 show the top 20 facilities for the quantities of chemical used, generated as byproduct, shipped in or as product, released onsite as pollution, and transferred offsite for waste treatment or disposal.

Top 20 Facilities: Reported Chemical Use

Table 13 lists the 20 facilities that reported used the largest total quantity of TURA chemicals. These 20 facilities used 756 million pounds, or 79% of total statewide use.

Table 13
2010 Top 20 Facilities: Total Use
These quantities include Trade Secret

Facility Name	Town	Total Use (Lbs.)
Styrolution America LLC Indian Orchard	Springfield	295,220,273
Solutia Inc. Indian Orchard Plant	Springfield	105,456,130
Borden & Remington	Fall River	91,000,800
Holland Company Inc	Adams	43,027,600
Ineos Melamines LLC	Springfield	39,302,883
Rousselot Peabody Inc.	Peabody	29,884,032
Southwin Ltd.	Leominster	18,318,348
Camco Manufacturing Inc.	Leominster	18,225,092
James Austin Co.	Ludlow	16,053,148
Omnova Solutions Inc.	Fitchburg	14,181,688
Cytec Industries Inc.	Springfield	12,421,876
Semass Partnership	Rochester	11,939,073
Nexeo Solutions LLC	Tewksbury	11,788,804
Astro Chemicals Inc.	Springfield	9,014,558
Evergreen Solar Inc.	Devens	7,840,186
Metalor Technologies USA	North Attleborough	6,635,193
Metalor Technologies USA	Attleboro	6,616,122
Wheelabrator Millbury Inc.	Millbury	6,466,980
ITW TACC	Rockland	6,415,225
Covanta Haverhill Inc.	Haverhill	6,395,306

Top 20 Facilities: Reported Byproduct Generation and Shipped in Product

Table 14 lists the 20 facilities that generated the largest quantity of byproduct. These facilities generated 53 million pounds or 64% of total statewide byproduct. Table 15 also lists the 20 facilities with the largest quantity shipped in product. These facilities shipped 288 million pounds in product, or 86% of the statewide total.

Table 14
2010 Top 20 Facilities: Byproduct Generation and Shipped in Product

Byproduct Generation *These quantities include Trade Secret*			Shipped in Product *These quantities include Trade Secret*		
Facility Name	**Town**	**Byproduct Generation (Lbs.)**	**Facility Name**	**Town**	**Shipped in Product (Lbs.)**
Rousselot Peabody Inc.	Peabody	8,129,533	Borden & Remington	Fall River	90,963,911
Evergreen Solar Inc.	Devens	7,684,707	Holland Co. Inc.	Adams	43,027,600
Solutia Inc. Indian Orchard Plant	Springfield	6,506,033	Solutia Inc. Indian Orchard Plant	Springfield	29,028,529
3M	Rockland	4,936,261	Southwin Ltd.	Leominster	18,313,484
Flexcon Company Inc.	South Spencer	4,235,468	Camco Manufacturing Inc.	Leominster	18,223,163
Ineos Melamines LLC	Springfield	2,762,299	James Austin Co.	Ludlow	16,007,762
Crane & Co Inc. Pioneer Mill	Dalton	2,253,651	Nexeo Solutions LLC	Tewksbury	11,788,804
Madico Inc.	Woburn	2,214,439	Houghton Chemical Corp.	Boston	11,649,453
Intel Massachusetts Inc.	Hudson	2,011,834	Astro Chemicals Inc.	Springfield	8,390,422
Bostik Inc.	Middleton	1,648,835	ITW TACC	Rockland	6,352,009
Barnhardt Manufacturing Co.	Colrain	1,606,546	Webco Chemical Corp.	Dudley	6,039,863
Bradford Industries	Lowell	1,431,923	Cytec Industries Inc.	Springfield	5,733,557
ITW Foilmark Inc.	Newburyport	1,281,604	Univar USA Inc.	Salem	4,059,267
Dominion Energy Brayton Point LLC	Somerset	1,108,820	Callahan Co.	Walpole	3,442,631
SEMASS Partnership	Rochester	969,080	Rohm & Haas Electronics Materials LLC	Marlborough	3,276,065
Cytec Industries Inc.	Springfield	965,632	Savogran Co.	Norwood	3,268,202
Covanta Springfield LLC	Agawam	953,418	Allcoat Technology Inc.	Wilmington	2,894,521
Metalor Technologies USA	Attleboro	952,294	Bostik Inc.	Middleton	2,838,444
Genzyme Corp.	Boston	912,455	ITW Devcon Plexus	Danvers	2,615,366
Ideal Tape Co.	Lowell	840,846	Alphagary Corp.	Leominster	2,119,189

Table 15 lists the 20 facilities that had the largest quantity of on-site releases and the 20 facilities that had the largest quantity of transfers off-site. These facilities released 3.3 million pounds, or 74% of total releases statewide. Six of these facilities were power plants, accounting for 1.5 million pounds of releases, all due to the coincidental manufacture of the following products of combustion:

- hydrochloric acid (71% of 1.5 million pounds)
- ammonia (23% of 1.5 million pounds),

- hydrogen fluoride (4% of 1.5 million pounds),
- sulfuric acid (2 of 1.5 million pounds,
- metal compounds (1% of 1.5 million pounds)

Five of the Top 20 facilities were municipal waste combustors (MWCs) that also reported combustion-related emissions. Of the 0.9 million pounds of on-site releases reported by these MWCs, 60% were due to the coincidental manufacture of hydrochloric acid during combustion, and 39% were due to lead in ash disposed in an on-site lined landfill at one facility.

The 20 facilities with the largest quantity of transfers off-site transferred over 24 million pounds, or 72% of the total transfers off-site statewide.

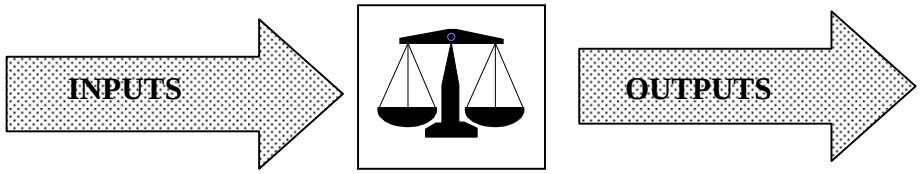
Table 15
2010 Top 20 Facilities: On-Site Releases and Transfers Off-Site

On-Site Releases *These quantities include Trade Secret*			**Transfers Off-Site** *These quantities include Trade Secret*		
Facility Name	**Town**	**On-Site Releases (Lbs.)**	**Facility Name**	**Town**	**Transfers Off-Site (Lbs.)**
Dominion Energy Brayton Point LLC	Somerset	1,082,490	Evergreen Solar Inc.	Devens	7,376,058
Covanta Haverhill Inc.	Haverhill	374,370	Solutia Inc.Indian Orchard Plant	Springfield	4,137,586
Crown Beverage Packaging USA	Lawrence	269,797	Ineos Melamines LLC	Springfield	2,531,577
Solutia Inc. Indian Orchard Plant	Springfield	249,265	Intel Massachusetts Inc.	Hudson	948,230
Wheelabrator Millbury Inc.	Millbury	206,692	Metalor Technologies USA	Attleboro	891,576
Dominion Energy Salem Harbor LLC	Salem	176,108	Cytec Industries Inc.	Springfield	843,568
SEMASS Partnership	Rochester	144,157	Genzyme Corp.	Boston	831,048
Vacumet Corp.	Franklin	131,226	SEMASS Partnership	Rochester	825,010
Ideal Tape Co.	Lowell	81,873	Waters Corp.	Taunton	797,342
Wheelabrator Saugus Inc.	Saugus	81,317	Koch Membrane Systems Inc.	Wilmington	655,711
Mystic Station	Everett	75,979	Ideal Tape Co.	Lowell	626,611
Wheelabrator North Andover Inc.	North Andover	66,658	Brittany Dyeing & Printing Corp.	New Bedford	513,474
Mt Tom Generating Company LLC	Holyoke	65,896	PCI Synthesis Inc.	Newburyport	485,864
Millennium Power	Charlton	62,231	Flexcon Company Inc.	South Spencer	485,776
Berkshire Power Company LLC	Agawam	61,996	Wheelabrator Millbury Inc.	Millbury	448,979
Jen Mfg. Inc.	Millbury	54,597	Wheelabrator Saugus Inc.	Saugus	430,605
Flexcon Company Inc.	South Spencer	43,492	The Duncan Group	Everett	426,077
3M	Rockland	38,354	EMD Millipore Corp.	Bedford	420,297
Metalor Technologies USA	Attleboro	36,951	Metalor Technologies USA	North Attleborough	403,455
Hazen Paper Co.	Holyoke	35,868	Wheelabrator North Andover Inc.	North Andover	387,495

VII. Key TURA Terms

TURA – Massachusetts Toxics Use Reduction Act of 1989 (MGL 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.
2000 CORE GROUP – includes all industry categories and chemicals that were subject to TURA reporting in 2000 and remained subject to reporting in 2010 at the same reporting threshold. The 2000 Core Group is used to measure progress from 2000 to 2010.

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.



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

MANUFACTURE – to produce, prepare, import or compound a toxic or hazardous substance. Manufacture shall also mean to produce a toxic or hazardous substance coincidentally during the manufacture, processing, use, or disposal of another substance or mixture or substances, including a toxic substance that remains in that other substance or mixture of substances as an impurity

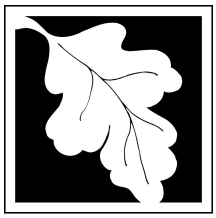
PROCESS – the preparation of a toxic or hazardous substance, after its manufacture, for distribution in commerce: (a) in the same form or physical state, or in a different form or physical state from that in which it was received by the toxics user so preparing such substance; or (b) as a part of an article contain the toxic or hazardous substance

OTHERWISE USE – 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.



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