2007 Toxics Use Reduction Information Release



Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Department of Environmental Protection

Developed in collaboration with:
Office of Technical Assistance and Technology
Toxics Use Reduction Institute

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Executive Summary

Massachusetts manufacturers and other businesses subject to the Toxics Use Reduction Act (TURA) have dramatically reduced their reliance on toxic chemicals, making Massachusetts a national leader in pollution prevention. Through toxics use reduction, Massachusetts businesses have reduced chemical transportation risks, workplace hazards, toxics in products and waste, and have saved money.

In 2007, 538 facilities reported the use of 150 listed toxic substances to the Massachusetts Department of Environmental Protection (MassDEP). These facilities fell within certain industry sectors, had ten or more full-time employee equivalents, and used listed toxic substances at or above reporting thresholds. In total (including trade secret data), these facilities reported:

- 1 billion pounds of toxic substances used (the same as 1 billion pounds in 2006),
- 81 million pounds of toxic byproduct (or waste) generated (down from 87 million pounds in 2006),
- 334 million pounds of toxics shipped in or as products (down from 342 million pounds in 2006),
- 6 million pounds of toxics released to the environment (down from 7 million pounds in 2006), and
- 30 million pounds of toxics transferred off-site for further waste management (the same as 30 million pounds in 2006).

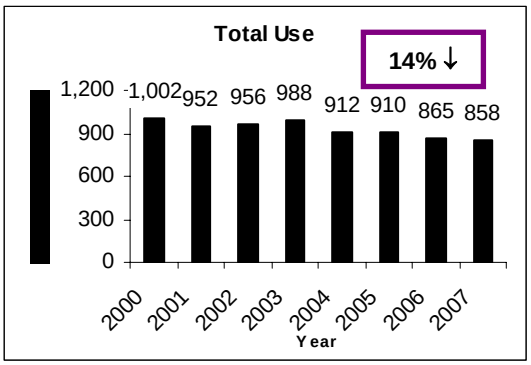
Year to year comparisons of raw TURA data do not always show actual progress in toxics use reduction since production levels and reporting requirements change over time. To account for these changes, the TURA program measures progress by using reported data (excluding trade secret data) normalized for changes in production and using a consistent set of chemicals and industries subject to reporting over a given period of time (referred to as a "Core Group"). This report highlights progress of a 2000 Core Group from 2000 to 2007.

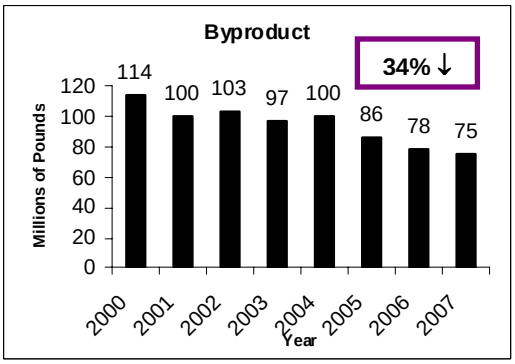
The 2000 Core Group includes only those industry categories and chemicals subject to reporting in 2000 and 2007. From 2000 to 2007, the Core Group reported a 19% decrease in production. Adjusting the data to account for this decrease, over that seven-year period (see Figure 1), the 2000 Core Group facilities reduced:

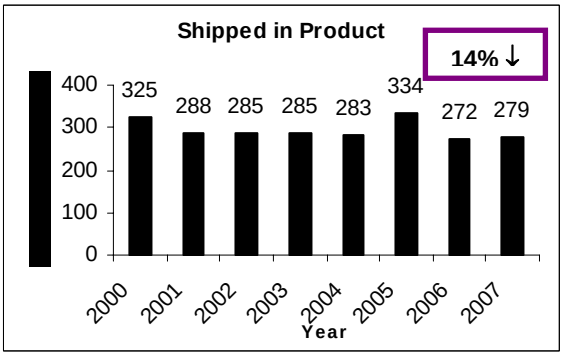
- toxic chemical use by 14%,
- toxic byproducts by 34%,
- toxics shipped in product by 14%,
- on-site releases of toxics to the environment by 44%, and
- transfers of toxics off-site for further waste management by 39%.

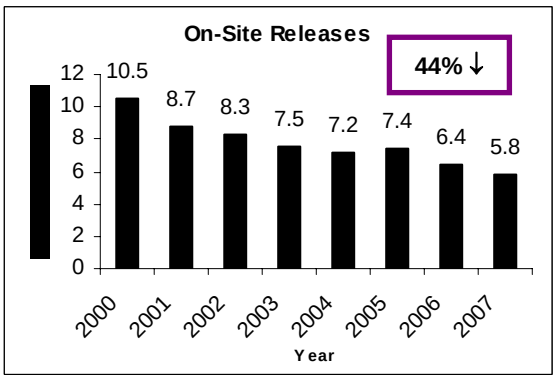
The TURA program has achieved its sustained success through the efforts of Massachusetts industry working with state government to implement the goals of the TURA program. Massachusetts facilities have reduced significant amounts of waste by implementing toxics use reduction techniques, including input substitution, production unit modernization, production unit redesign, improved operation and maintenance, and recycling and reuse of chemicals in their production processes. They have demonstrated that toxics use reduction not only reduces toxic chemical use and waste, but also saves businesses money over the long-term.

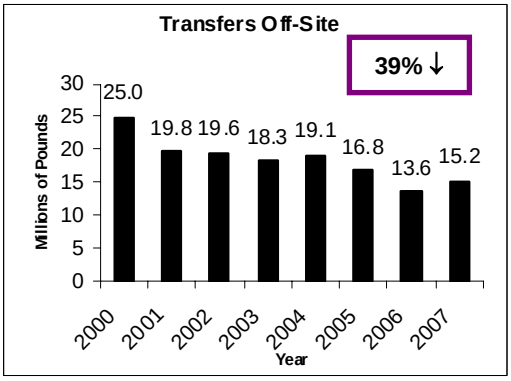
Figure 1 – 2000 Core Group Toxics Use Reduction Progress From 2000 to 2007 (Production Adjusted)











I. Introduction

The Toxics Use Reduction Act (TURA) requires Massachusetts companies that fall within certain industry sectors, have ten or more full-time employee equivalents, and use listed toxic substances at or above reporting thresholds to report their chemical use annually to the Massachusetts Department of Environmental Protection (MassDEP) and pay an annual toxics use fee. TURA requires reporting facilities to develop toxics use reduction plans that identify and evaluate opportunities to reduce the use of toxics and the generation of toxic byproducts. These plans must be updated every two years and approved by a MassDEP-certified toxics use reduction planner. After several toxics use reduction planning efforts, companies have the option of developing resource conservation plans (addressing energy, water, or materials use) or implementing an environmental management system that integrates toxics use reduction planning. In planning year 2008, 26 facilities developed a total of 32 resource conservation plans and 13 facilities implemented environmental management systems under TURA.

In addition to MassDEP's administration of reporting and planning requirements, the TURA program is supported by the Office of Technical Assistance and Technology (OTA) and the Toxics Use Reduction Institute (TURI). 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. TURI 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 in a user-friendly way that is searchable by community, chemical or company. See www.turi.org/turadata.

This 2007 Toxics Use Reduction Information Release contains important 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 of the public to reported chemicals.

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

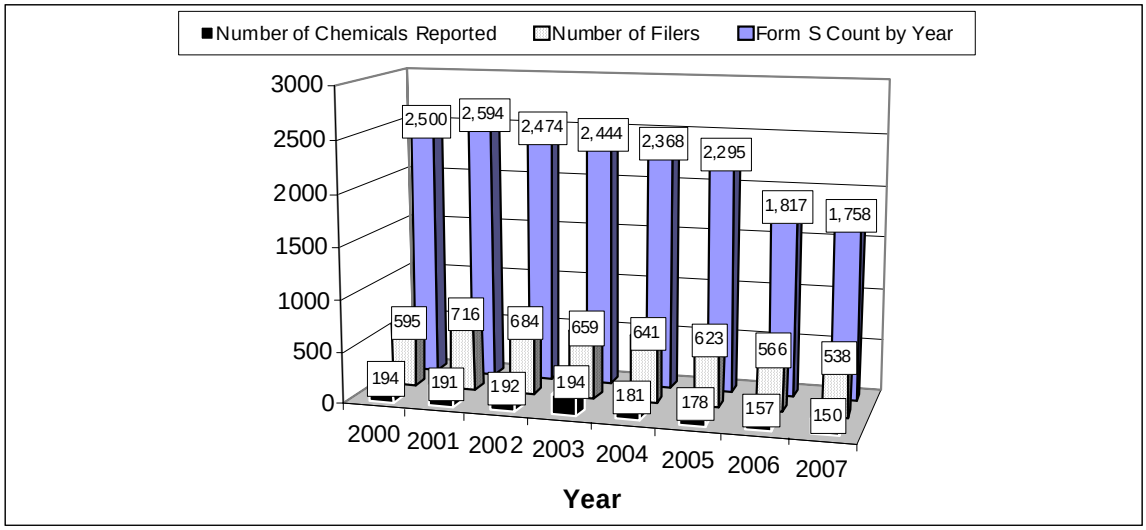
Office of Technical Assistance and Technology: www.mass.gov/envir/ota

Toxics Use Reduction Institute: www.turi.org

II. TURA Progress 2000-2007

Figure 2 illustrates TURA filing trends since 2000. Out of 1,422 chemicals listed under TURA, 150 were reported in 2007, down from 194 in 2000. From 2000 to 2001 the number of facilities reporting under TURA rose to 716 due to new requirements to report lead and lead compounds at lower thresholds applicable to persistent bio-accumulative and toxic (PBT) chemicals, but has since declined to 538 in 2007, due to a combination of reduced chemical use, facilities closing, reduced production due to economic conditions, and 2006 statutory changes to TURA reporting requirements. Similarly, the number of individual Form Ss[1] filed followed a similar trend, decreasing from a high of 2,594 in 2001 to 1,758 in 2007, consistent with the decline in the number of TURA filers.

Figure 2 - TURA Filer Trends 2000 – 2007



2000 Core Group Progress – Production Adjusted Data

Since TURA reporting requirements have changed over time, TURA progress is best measured by using a consistent set of chemicals and industries subject to reporting over a given period of time (referred to as a "Core Group"). In order to more accurately measure progress, the TURA data are adjusted or normalized to eliminate the effects of changes in production using production ratios reported by the Core Group facilities.

The following example illustrates how data are adjusted to reflect 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% less machine parts (900). Therefore, the production ratio is .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%.

[1] A separate Form S is required for each chemical reported by a facility; the Form S is the form used to report chemical use information.

The 2000 Core Group includes facility categories and chemicals that were subject to reporting in 2000 and that remained subject to reporting in 2007[2]. In 2007, the 2000 Core Group used 691 million pounds, or 86% of the toxic chemicals reported (which is 801 million pounds excluding trade secret data).

From 2000 to 2007, 2000 Core Group filers reported a 19 percent decrease in production. From 2000 to 2007 (see Figure 3), when adjusted for production, the 2000 Core Group facilities reduced:

- toxic chemical use by 14%,
- toxic byproducts by 34%,
- toxics shipped in product by 14%,
- on-site releases of toxics to the environment by 44%, and
- transfers of toxics off-site for further waste management by 39%.

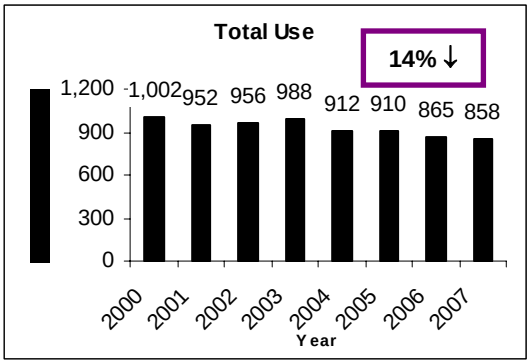
2000 Core Group Progress – Without Adjusting for Production

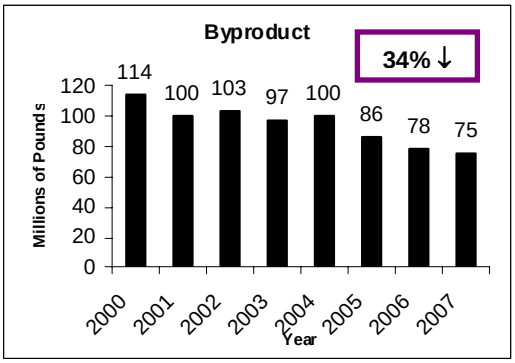
The actual quantities reported by the 2000 Core Group over the period 2000 to 2007 are shown in Figure 4. These quantities have not been adjusted for changes in production. From 2000 to 2007, Core Group facilities reduced:

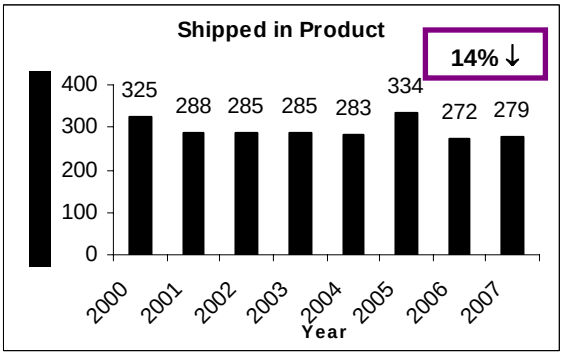
- toxic chemical use by 31% (from 1,002 million pounds in 2000 to 691 million pounds in 2007),
- toxic byproducts by 47% (from 114 million pounds in 2000 to 61 million pounds in 2007),
- toxics shipped in product by 31% (from 325 million pounds in 2000 to 225 million pounds in 2007),
- on-site releases of toxics to the environment by 55% (from 10 million pounds in 2000 to 5 million pounds in 2007), and
- transfers of toxics off-site for further waste management by 51% (from 25 million pounds in 2000 to 12 million pounds in 2007).

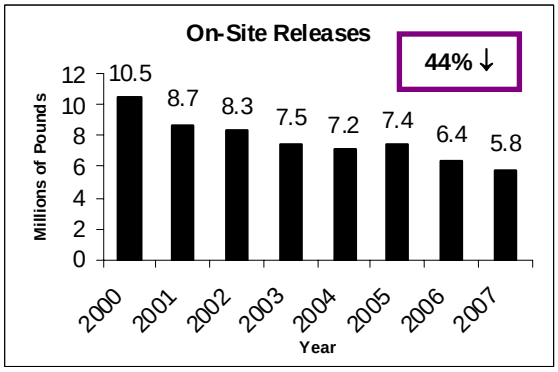
[2] The 2000 Core Group includes all industry sectors and all chemical use except for the following: use of respirable crystalline silica (which was first reportable in 2001), use of lead and lead compounds due only to the lower 100-pound thresholds for lead and lead compounds that took effect in 2001, municipal waste combustor combustion-related emissions first reportable in 2003, and use of any chemical covered by a trade secret claim.

Figure 3 – 2000 Core Group Toxics Use Reduction Progress From 2000 to 2007 (Production Adjusted)









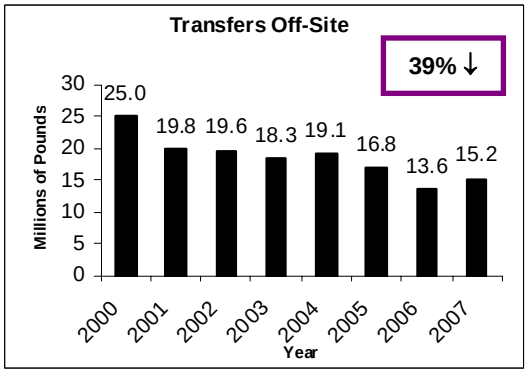
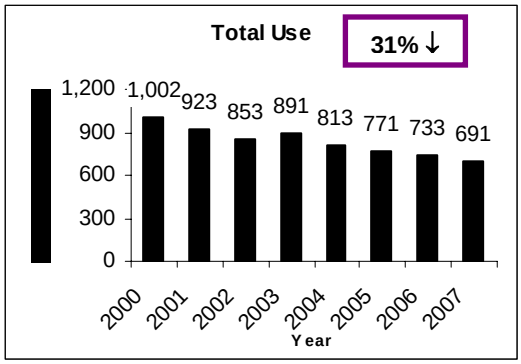
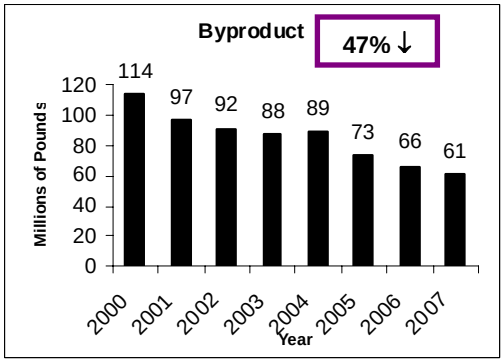
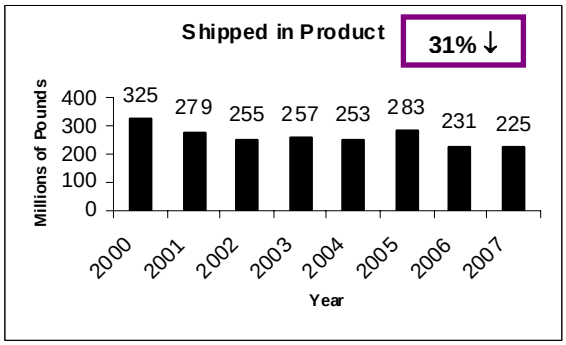
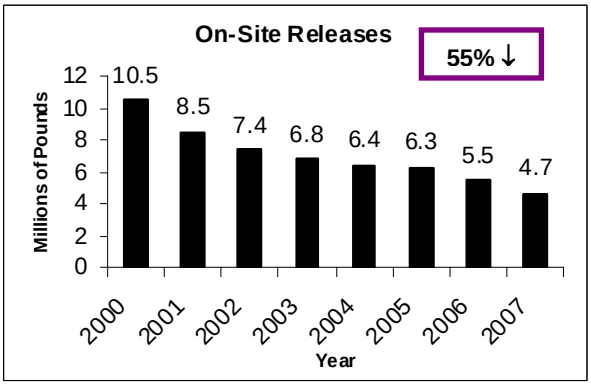


Figure 4 – 2000 Core Group Toxics Use Reduction Progress From 2000 to 2007 (Not Production Adjusted)









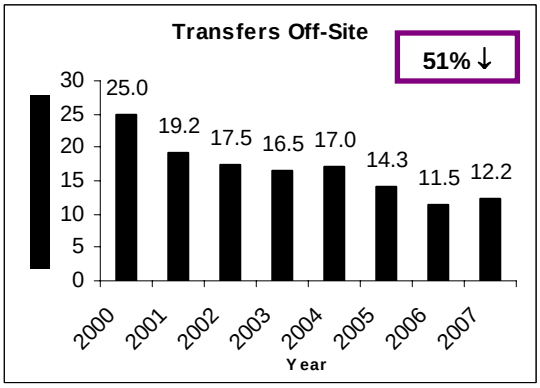


Table 1 summarizes TURA data from 2000 to 2007, showing both **reported** and **production adjusted** quantities. For each category, each year's production adjusted quantity is normalized to the base year production level, thus providing a comparison of production-adjusted quantities to base year quantities. Quantities in shaded boxes are adjusted for changes in manufacturing activity (level of production) using the facility-reported Production Ratio/Activity Index. For the 2000 Core Group, the activity index shows a decrease in production of 19 percent from 2000 to 2007.

Table 1
2000 CORE GROUP DATA: 2000 - 2007 TREND SUMMARY

(Quantities are in millions of pounds and do not include trade secret quantities.
Shaded columns show production-adjusted quantities.)

	TOTAL USE		BYPRODUCT		SHIPPED IN PRODUCT		ON-SITE RELEASES		TRANSFERS OFF-SITE		ACTIVITY INDEX[3]
2000	1001.99	1001.99	113.69	113.69	325.20	325.20	10.49	10.49	24.96	24.96	
2001	923.10	951.65	97.24	100.25	279.15	287.78	8.48	8.74	19.17	19.76	0.97
2002	853.16	956.03	91.78	102.85	254.56	285.25	7.41	8.30	17.45	19.55	0.92
2003	890.50	987.99	87.70	97.30	257.17	285.32	6.78	7.52	16.45	18.25	1.01
2004	813.45	911.62	89.46	100.26	252.53	283.01	6.42	7.19	17.04	19.10	0.99
2005	771.34	909.93	73.11	86.25	282.76	333.56	6.30	7.43	14.25	16.81	0.95
2006	732.86	864.53	66.23	78.13	230.79	272.26	5.45	6.43	11.51	13.58	1.00
2007	690.75	857.74	60.55	75.19	225.00	279.40	4.70	5.84	12.20	15.15	0.95
Percent Change 2000-2007	31% Reduction	14% Reduction	47% Reduction	34% Reduction	31% Reduction	14% Reduction	55% Reduction	44% Reduction	51% Reduction	39% Reduction	19% Decrease

3 The Production Ratio/Activity Index reported by each facility measures the change in production from the previous reporting year to the current reporting year.

III. 2007 TURA Chemical Data

Table 2 summarizes the 2007 data for all TURA filers, including trade secret data, rounded to the nearest million pounds. These companies reported using over 1 billion pounds of chemicals and generating 81 million pounds of byproduct.

Table 2 - 2007 Data for All TURA Filers (in pounds; includes trade secret data)	
Total Use	1,020,000,000
Generated as Byproduct	81,000,000
Shipped in Product	334,000,000
On-Site Releases	6,000,000
Transfers Off-Site	30,000,000

The 1 billion pounds of chemical use occurred in three categories: manufactured, processed, or otherwise used. In TURA, these terms are defined as follows:

Manufacture – "to produce, prepare, import or compound a toxic or hazardous substance" (e.g., intentional manufacture of a metal compound or the unintentional manufacture of acid gases during combustion of fossil fuels).

Process – "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., in the formulation of paints or coatings, any listed toxics are "processed;" in the manufacture of polystyrene, the styrene monomer is "processed").

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" (e.g., chemicals used to clean parts, chemicals contained in fuels that are combusted).

In this Report, when total use is broken down by type of use (i.e., manufactured, processed, or otherwise used), trade secret data are not included. Thus, the total use in Figure 5 is 801 million pounds, rather than 1 billion pounds (which includes trade secret data).

Manufactured Chemicals

Figure 5 shows that relatively little manufacturing of TURA chemicals occurs in Massachusetts. Chemicals reported as "manufactured" accounted for 8% of the total use statewide (or 61 million pounds, down from 63 million pounds in 2006). A significant amount of the chemicals reported as manufactured are not manufactured intentionally, but are coincidentally manufactured as a result of some other activity. Examples include the creation of acid gases from fuel combustion for power generation and the production of nitrate compounds as a result of wastewater treatment.

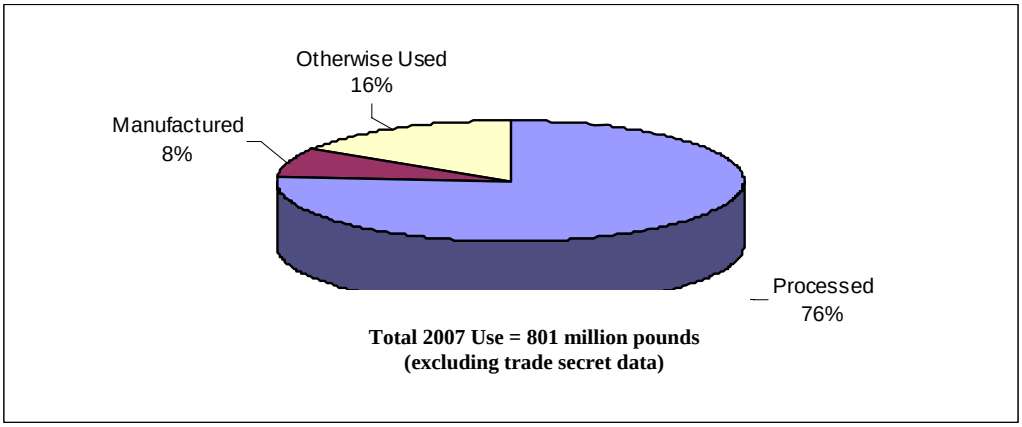
Processed Chemicals

In Massachusetts, the predominant category of chemical use is "processing," which includes incorporating a listed chemical into a product. Processing of chemicals accounted for 76% of total use (or 610 million pounds, down from 639 million pounds in 2006). Styrene, which is used in the production of plastics, accounted for 47% (or 284 million pounds) of total chemicals processed.

Otherwise Used Chemicals

Chemicals "otherwise used" accounted for 16% of total use (or 131 million pounds, down from 134 million pounds in 2006). Chemicals otherwise used include activities such as parts cleaning and waste treatment.

Figure 5 – 2007 Chemical Use (does not include trade secret data)



Top 20 Chemicals

In 2007, 150 chemicals out of 1,422 TURA-listed chemicals were reported. Of the 150, 20 chemicals accounted for 85%, or 682 million pounds (not including trade secret information), of total use reported statewide (see Table 3). Styrene monomer was the chemical with the largest quantity reported with 14 facilities (or 3%) reporting its use, representing 35% of total use reported (or 284 million pounds, down from 315 million pounds in 2006). Styrene monomer is the building block for various plastics.

Sodium hydroxide was the second highest used chemical with 175 facilities (or 32%) reporting its use, representing 9% of total use reported (or 73 million pounds, down from 75 million pounds in 2006). Sodium hydroxide is used to treat wastewater, neutralize acids, make sodium salts, rayon, plastics, paper and cellophane, and manufacture laundering, bleaching, and dishwashing materials.

Hydrochloric acid was the third highest used chemical with 61 facilities (or 11%) reporting its use, representing 7% of total use reported (or 59 million pounds, down from 62 million pounds in 2006). Hydrochloric acid is a byproduct of combustion, is used in chloride production, in electroplating, for cleaning metal products, in removing scale from boilers, and in neutralizing basic systems.

Table 3 - 2007 Top 20 Chemicals: Total Use

Total Use ***These quantities do not include Trade Secret***	
Chemical Name (CAS #)	**Total Use (Lbs.)**
Styrene Monomer (100425)	283,707,423
Sodium Hydroxide (1310732)	72,545,027
Hydrochloric Acid (7647010)	59,118,194
Methanol (67561)	54,362,446
Sulfuric Acid (7664939)	25,742,804
Toluene (108883)	24,277,889
Sodium Hypochlorite (7681529)	22,600,715
Potassium Hydroxide (1310583)	17,292,667
Ammonia (7664417)	16,726,289
Zinc Compounds (1039)	12,479,443
Chlorine (7782505)	12,044,229
Nitrate Compounds (1090)	11,275,056
Methyl Ethyl Ketone (78933)	10,588,346
Ethyl Acetate (141786)	10,361,085
Acetone (67641)	10,187,820
Toluene Diisocyanate (26471625)	8,370,513
Ethylene Glycol (107211)	7,963,838
Copper Compounds (1015)	7,695,373
Adipic Acid (124049)	7,373,125
Dimethylformamide (68122)	7,174,590

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

Table 4 shows the Top 20 chemicals generated as byproduct in 2007, which accounted for 86% (or 70 million pounds) of total byproduct generated statewide. Table 4 also shows the Top 20 chemicals shipped in product in 2007, which accounted for 84% (or 229 million pounds) of total shipped in product (excluding trade secret data).

Table 4 - 2007 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)	8,714,232	Methanol (67561)	50,260,598
Nitrate Compounds (1090)	8,666,826	Sodium Hydroxide (1310732)	45,979,321
Ethyl Acetate (141786)	8,505,871	Sodium Hypochlorite (7681529)	18,393,594
Toluene (108883)	7,663,875	Toluene (108883)	14,648,769
Sulfuric Acid (7664939)	5,189,789	Potassium Hydroxide (1310583)	14,407,053
Methanol (67561)	4,741,528	Chlorine (7782505)	11,951,429
Methyl Ethyl Ketone (78933)	4,150,359	Ammonia (7664417)	11,491,010
Hydrochloric Acid (7647010)	3,761,606	Zinc Compounds (1039)	7,347,651
Formaldehyde (50000)	2,805,706	Methyl Ethyl Ketone (78933)	6,386,393
Acetone (67641)	2,750,092	Acetone (67641)	6,277,575
Lead (7439921)	2,434,565	Copper Compounds (1015)	5,962,718
Copper Compounds (1015)	1,831,854	Ethylene Glycol (107211)	5,364,170
N-Methyl-2-Pyrrolidone (872504)	1,380,606	Sulfuric Acid (7664939)	4,275,117
Nitric Acid (7697372)	1,279,398	Glycol Ethers (1022)	4,138,750
Ethylene Glycol (107211)	1,261,348	N-Methyl-2-Pyrrolidone (872504)	3,905,665
Dimethylformamide (68122)	1,060,284	Xylene Mixed Isomer (1330207)	3,835,788
Butyraldehyde (123728)	930,000	Phosphoric Acid (7664382)	3,613,598
Tetrahydrofuran (109999)	856,074	Dichloromethane (75092)	3,524,268
Ammonia (7664417)	834,798	Methyl Methacrylate (80626)	3,417,110
Potassium Hydroxide (1310583)	773,267	Antimony Compounds (1000)	3,337,360
		The following chemicals would appear in the Top 20 Chemicals Shipped in Product list if trade secret quantities were included: Ethyl Acetate and Sodium Bisulfite.	

Table 5 shows the Top 20 chemicals reported as on-site releases in 2007, which totaled 92% (or 6 million pounds) of total on-site releases reported. Hydrochloric acid had the highest amount of on-site releases reported statewide, accounting for 37% (or 2.4 million pounds) of total on-site releases. About 1.6 million pounds of hydrochloric acid, or 67% of total on-site releases of hydrochloric acid, were attributed to power plants. Table 5 also shows the Top 20 chemicals reported as transfers off-site in 2007, which totaled 87% (or 26 million pounds) of total transfers off-site. Nitrate compounds had the highest transfers off-site reported statewide, accounting for 18% of total transfers off-site. Nitrate compounds were primarily coincidentally manufactured during neutralization of nitric acid in wastewater treatment.

Table 5 - 2007 Top 20 Chemicals: 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)	2,385,914	Nitrate Compounds (1090)	5,323,478
Ammonia (7664417)	517,377	Formaldehyde (50000)	2,615,582
Acetone (67641)	507,795	Methanol (67561)	2,593,854
Lead (7439921)	395,848	Lead (7439921)	2,020,700
Sulfuric Acid (7664939)	354,106	Toluene (108883)	1,947,192
Ethyl Acetate (141786)	340,956	Copper Compounds (1015)	1,878,458
Toluene (108883)	246,962	Sodium Hydroxide (1310732)	1,285,466
Butyl Alcohol (71363)	194,193	Ethyl Acetate (141786)	1,284,486
Glycol Ethers (1022)	188,192	Acetone (67641)	1,202,245
Methanol (67561)	173,609	N-Methyl-2-Pyrrolidone (872504)	1,158,109
Hydrogen Fluoride (7664393)	151,733	Methyl Ethyl Ketone (78933)	1,129,550
Barium Compounds (1002)	112,768	Ethylene Glycol (107211)	900,055
Methyl Ethyl Ketone (78933)	94,310	Zinc Compounds (1039)	648,781
Formaldehyde (50000)	62,243	Sulfuric Acid (7664939)	374,724
Xylene Mixed Isomer (1330207)	47,259	Dichloromethane (75092)	368,360
Styrene Monomer (100425)	41,314	Nitric Acid (7697372)	342,857
Vinyl Acetate (108054)	40,670	Lead Compounds (1026)	321,987
Vanadium Compounds (1065)	38,274	Di(2-ethylhexyl)phthalate (117817)	302,668
Nitrogen Dioxide (10102440)	32,424	Acetonitrile (75058)	274,376
Trichloroethylene (79016)	32,091	Phosphoric Acid (7664382)	269,953

Persistent Bioaccumulative Toxic (PBT) Chemicals

Chemicals classified as persistent bio-accumulative toxic (PBT) chemicals by the U.S. Environmental Protection Agency (EPA) under the Toxics Release Inventory (TRI) Program are of particular concern because they are highly toxic, remain in the environment for long periods of time, are not readily destroyed, and build up or accumulate in body tissue. 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 efforts to reduce their use and release.

For 2007, Massachusetts facilities reported the use of eight PBT chemicals/chemical categories (see Table 6).[4] It should be noted that TURA data are collected only from facilities within certain industrial sectors that have 10 or more full-time employees, and therefore it does not provide a complete picture of the use and emissions of chemicals, whether PBT or non-PBT chemicals. For instance, TURA data do not include emissions from cars and trucks, or emissions from the majority of releases of pesticides, volatile organic compounds, fertilizers, and many other non-industrial sources. They also do not capture the use of toxic chemicals in consumer products that are not manufactured in Massachusetts.

Table 6
2007 PBT Summary
(in pounds unless otherwise noted)

PBT Chemical/ Chemical Category	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.	29	5,051,297	3,077	54,505	483	3,069
Benzo(g,h,i) perylene	10 lbs.	28	49,364	97	1,454	14	115
Mercury	10 lbs.	19	13,733	8,332	3,788	906	7,469
Mercury Compounds	10 lbs.	5	1,101	434	356	210	217
Poly-chlorinated biphenyls (PCBs)	10 lbs.	3	110,303	110,288	15	0	110,301
Dioxin and Dioxin-like Compounds	0.1 Grams	13	1,154.645 Grams	1,154.645 Grams	0.000 Grams	140.485 Grams	1,013.901 Grams
Lead	100 lbs.	89	4,170,095	2,434,565	1,631,375	395,848	2,020,700
Lead Compounds	100 lbs.	105	1,336,594	321,322	908,761	10,530	314,927

[4] The amounts in all the PBT tables have been rounded to the nearest pound (to the nearest 0.001 gram for dioxin). As a consequence, the sum of the amounts in the individual chemical tables may be slightly more or less than the totals as reported in Table 6.

Polycyclic Aromatic Compounds (PACs) and Benzo(g,h,i)perylene

In 2007, 29 facilities reported on PACs and 28 reported on benzo(g,h,i)perylene. The primary activity that triggered reporting of these chemicals was combustion of fossil fuels. These fuels contain PACs and benzo(g,h,i)perylene (i.e., they are already in the fuel that enters a facility's boiler to be combusted to generate heat or steam). Benzo(g,h,i)perylene is an especially toxic polycyclic aromatic compound, and therefore is reported separately from the PACs category and has a lower reporting threshold of 10 pounds (versus a 100 pound reporting threshold for the PACs category).

Table 7 shows a breakdown of PACs use and Table 8 shows a breakdown of benzo(g,h,i)perylene use. The majority of PACs and benzo(g,h,i)perylene were reported by power plants due to fuel combustion. While these toxics in fuel oil combusted were exempted from TURA reporting beginning in 2006, this exemption does not apply to power plants or facilities that incorporate these chemicals in their products. Note that the petroleum and coal products manufacturing sector includes facilities that make asphalt or asphalt-based products.

Table 7
2007 PACs Summary
(in pounds)

Activity / Facility Type	Number of Facilities	Total Use	Byproduct	Shipped in Product	On-site Releases	Transfers Off-site
Utilities (e.g, Power Plants)	9	4,979,584	2,418	0	142	2,464
Petroleum and Coal Products	20	71,713	659	54,505	342	605
Total	**29**	**5,051,297**	**3,077**	**54,505**	**484**	**3,069**

Table 8
2007 Benzo(g,h,i)perylene Summary
(in pounds)

Activity / Facility Type	Number of Facilities	Total Use	Byproduct	Shipped in Product	On-site Releases	Transfers Off-site
Utilities (e.g., Power Plants)	9	47,274	6	0	1	39
Petroleum and Coal Products	19	2,090	91	1,455	13	76
Total	**28**	**49,364**	**97**	**1,455**	**14**	**115**

Mercury and Mercury Compounds

Nineteen facilities reported the use of mercury, and five facilities reported the use of mercury compounds. Table 9 shows a breakdown of mercury use by activity. Total use of mercury in 2007 was 13,733 pounds.

Solid waste combustors reported on-site mercury releases of 855 pounds, which included 155 pounds in air emissions and 700 pounds in ash disposed in lined on-site landfills. The 2,491 pounds of mercury reported as transferred off-site were in ash disposed in lined off-site landfills.

Table 9
2007 Mercury Summary
(in pounds)

Activity / Facility Type	Number of Facilities	Total Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-site
Solid Waste Combustors	7	3,345	3,345	0	855	2,491
Nonmetallic Mineral Product Manufacturing (e.g., concrete products)	6	618	51	616	50	48
Lamp/Ballast Recyclers	2	4,592	7	3,092	1	7
Computer and Electronic, Electrical Equipment	2	386	303	80	0	307
Chemical Manufacturing, Transportation Equipment	2	4,792	4,626	0	0	4,617
Total	**19**	**13,733**	**8,332**	**3,788**	**906**	**7,470**

Table 10 shows a breakdown of mercury compounds use. Total mercury compounds use in 2007 was 1,101 pounds. All of the use was due to fuel combustion at power plants. Mercury compounds are found in fuel that is otherwise used to produce power. Mercury compounds also are coincidentally manufactured during combustion. The 356 pounds of mercury compounds shipped in product represents the amount contained in fly ash sold by four power plants. Typically, this ash is sold to concrete makers.

Table 10 2007 Mercury Compounds Summary (in pounds)						
Activity / Facility Type	**Number of Facilities**	**Total Use**	**Byproduct**	**Shipped in Product**	**On-site Releases**	**Transfers Off-Site**
Utilities (e.g., Power Plants)	5	1,101	434	356	211	217

Polychlorinated Biphenyls (PCBs)

For 2007, three facilities reported the use of polychlorinated biphenyls (PCBs). Table 11 shows the breakdown of PCB use. The hazardous waste treatment and disposal facility accounted for 68% of total PCB use, byproduct and transfers off-site. Thirty-two percent of the total use, byproduct, and transfers off-site was attributed to one facility that recycled fluorescent light fixture ballasts and other equipment. The third facility reported the coincidental generation of PCBs in the manufacture of organic pigments, in accordance with EPA's Toxics Release Inventory guidance for reporting PCBs.

Table 11 2007 PCBs Summary (in pounds)						
Activity / Facility Type	**Number of Facilities**	**Total Use**	**Byproduct**	**Shipped in Product**	**On-site Releases**	**Transfers Off-site**
Lamp/Ballast Recycling	1	35,443	35,443	0	0	35,446
Chemical Manufacturing	1	15	0	15	0	0
Hazardous Waste Treatment and Disposal	1	74,845	74,845	0	0	74,855
Total	**3**	**110,303**	**110,288**	**15**	**0**	**110,301**

Dioxin and Dioxin-like Compounds

Dioxins are byproducts of chemical and combustion processes, often involving chlorine. Dioxins have poor solubility in water and thus accumulate in body fat and concentrate in the food chain. Because dioxin is considered extremely toxic, EPA established a very low reporting threshold of 0.1 gram.

For 2007, 13 facilities reported the use (i.e., coincidental generation) of dioxin and dioxin-like compounds, including seven solid waste combustors, five power plants, and one facility within the paper manufacturing sector. The solid waste combustors accounted for 99% of total use. The combustors reported 131.609 grams of on-site releases of dioxin. Of these releases, 34.609 grams were air emissions and 97 grams were in ash disposed in on-site landfills. The 1,013.525 grams of dioxins reported as transferred off-site were in ash disposed in off-site landfills. One paper manufacturer also reported dioxin, which was coincidentally generated via paper bleaching. Table 12 shows the breakdown of dioxin and dioxin-like compounds use.

Table 12 2007 Dioxin and Dioxin-like Compounds Summary (in grams)						
Activity / Facility Type	**Number of Facilities**	**Total Use**	**Byproduct**	**Shipped in Product**	**On-site Releases**	**Transfers Off-site**
Solid Waste Combustors	7	1,145.434	1,145.434	0.000	131.609	1,013.525
Utilities (e.g., Power Plants)	5	8.666	8.666	0.000	8.716	0.000
Paper Manufacturing	1	0.545	0.545	0.000	0.160	0.376
Total	**13**	**1,154.645**	**1,154.645**	**0.000**	**140.485**	**1,013.901**

Lead and Lead Compounds

For 2007, 89 facilities reported the use of lead and 105 reported the use of lead compounds. The largest use of lead was reported by seven solid waste combustors, which accounted for 2,349,565 pounds or 56% of total lead use, in which case the lead results from combustion of trash and is primarily disposed of as part of ash in lined landfills.

The second largest use of lead was reported by sixteen facilities, the fabricated metal products manufacturing sector, (1,465,576 pounds or 35% of total lead use), where the metal is used in a variety of applications. This sector processes a variety of ferrous and nonferrous products, such as tools and hardware.

The largest reported use of lead compounds was reported by fifteen facilities in the chemical manufacturing sector (341,381 pounds or 26% of total lead compounds use). In this sector, manufacturers mix lead compounds to produce chemical and plastics products.

The second largest use of lead compounds was by a hazardous waste treatment and disposal facility. That facility reported 180,376 pounds of lead compounds or 14% of total use. The computer and electronic and electrical equipment sectors reported the third largest use of lead compounds (168,112 pounds or 13% of total lead compounds use). In these sectors, lead compounds are mostly used as heat stabilizers in wire insulation.

Table 13 2007 Lead Summary (in pounds)						
Activity / Facility Type	**Number of Facilities**	**Total Use**	**Byproduct**	**Shipped in Product**	**On-site Releases**	**Transfers Off-site**
Solid Waste Combustors	7	2,349,565	2,349,565	0	395,505	1,954,059
Fabricated Metal Products	16	1,465,576	36,512	1,421,462	265	36,425
Computer and Electronic, Electrical Equipment	14	147,827	34,196	15,656	7	15,167
Primary Metal Manufacturing	4	74,882	1,060	73,822	23	1,037
Other Sectors	48	132,246	13,232	120,438	49	14,011
Total	**89**	**4,170,096**	**2,434,565**	**1,631,379**	**395,848**	**2,020,699**

Table 14 2007 Lead Compounds Summary (in pounds)						
Activity / Facility Type	**Number of Facilities**	**Total Use**	**Byproduct**	**Shipped in Product**	**On-site Releases**	**Transfers Off-site**
Chemical Manufacturing	15	341,381	2,856	302,846	647	1,779
Hazardous Waste Treatment and Disposal	1	180,376	180,376	0	0	180,386
Computer and Electronic, Electrical Equipment	5	168,112	9,391	158,706	0	9,373
Primary Metal Manufacturing	7	147,907	11,785	92,399	1,249	9,634
Other Sectors	77	498,818	116,914	354,811	8,364	113,755
Total	**105**	**1,336,594**	**321,322**	**908,761**	**10,530**	**314,927**

IV. 2007 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 exceed certain thresholds.

Figure 6 shows the number of TURA reporting facilities in each industry sector. The Chemical Manufacturing sector represents approximately 18% (99 facilities) of the number of TURA reporting facilities, and uses 63% of the reportable TURA chemicals (see Figure 7). This sector is a diverse group of industries, and includes companies that manufacture or formulate adhesives, paints, pharmaceuticals, and plastic materials and resins. Approximately 44% 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 - 2007 Number of Facilities By Industrial Sector
Total Number of Facilities = 538

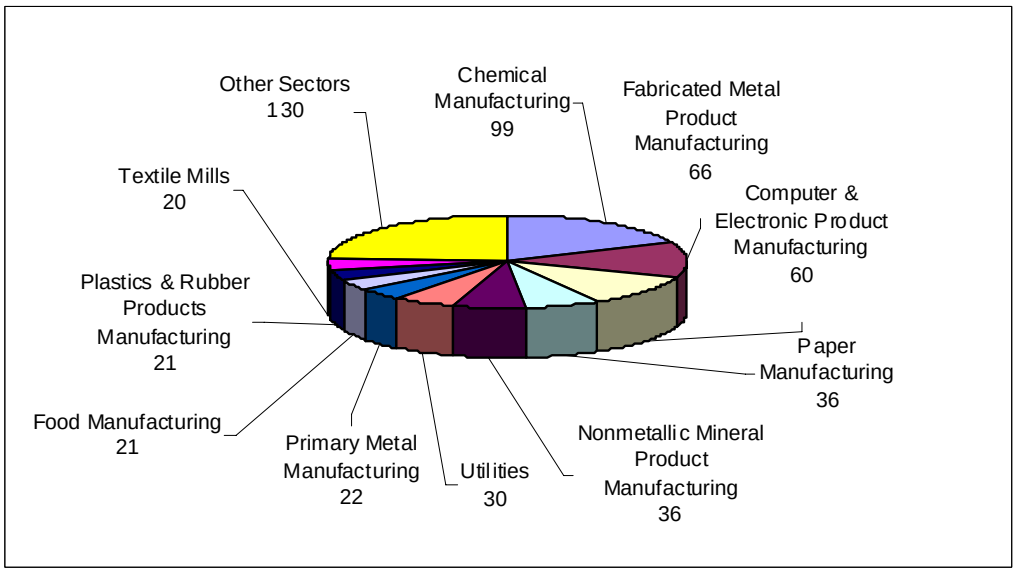
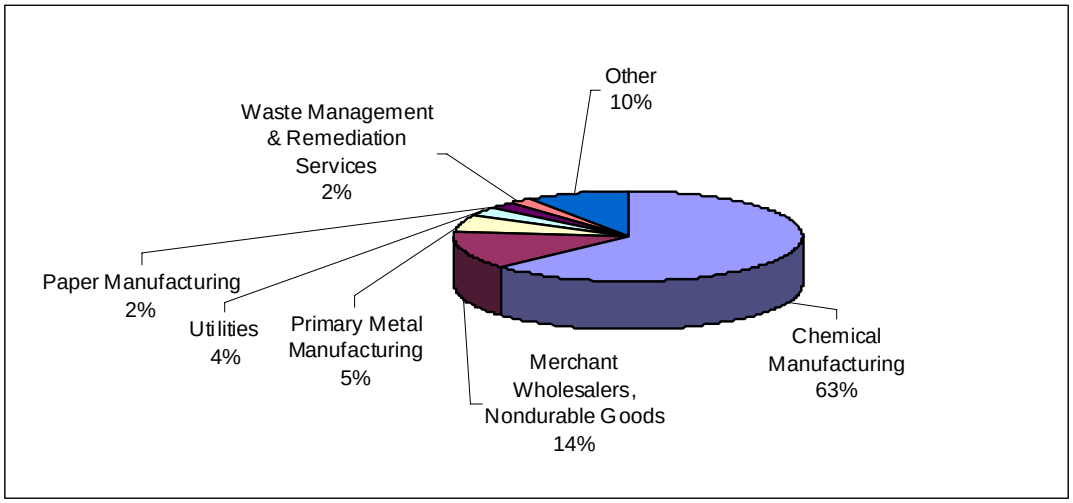


Figure 7 - 2007 Chemical Use By Industrial Sector
Total Use = 1,020,000,000 Pounds



The second largest sector, Merchant Wholesalers, Nondurable Goods accounted for 14% of total statewide use. The activities of this sector involve repackaging of chemicals for sale to other sectors. The third largest sector, Primary Metal Manufacturing, accounted for 5% of chemical use, the Utilities sector accounted for 4%, and Paper Manufacturing and Waste Management and Remediation services each accounted for 2% of total statewide use, leaving the balance of statewide use (10%) to a variety of sectors.

Figure 8 shows byproduct generation by industrial sector. While the Chemical Manufacturing sector accounted for 63% of total statewide use, this sector produced 32% of the total byproduct generated in 2007. In contrast, the Paper Manufacturing sector, which accounted for 2% of total statewide chemical use, accounted for 17% of the byproduct generated.

The Utilities sector accounted for 8%, and the Textile Mills sector accounted for 7% of total byproduct generated. The Plastics & Rubber Products Manufacturing and Fabricated Metal Product Manufacturing sectors each accounted for 7% of the total byproduct generated, and the Computer & Electronic Product Manufacturing sector accounted for 5% of the total byproduct generated. The remaining 17% of byproduct was attributed to a variety of sectors.

Figure 8 - 2007 Byproduct Generation By Industrial Sector
Total Byproduct = 81,000,000 Pounds

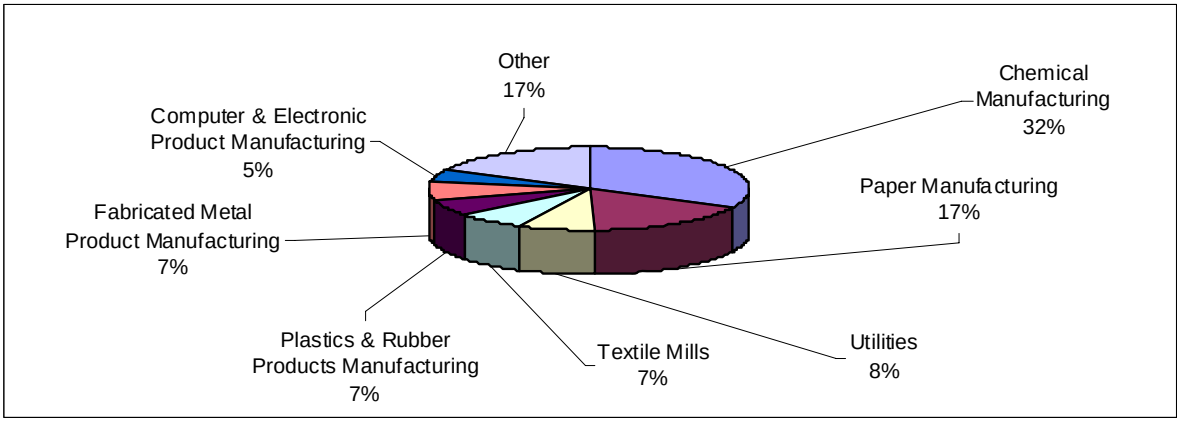


Figure 9 shows on-site releases to the environment by industrial sector. The Utilities sector, which represented 4% of total statewide use, was the largest source of on-site releases, accounting for 47% of all on-site releases. This sector provides power for Massachusetts businesses and citizens. Sixty-three percent of on-site releases in this sector were attributed to the coincidental manufacture of hydrochloric acid during combustion. The Chemical Manufacturing sector accounted for 63% of total chemical use and only 11% of total on-site releases to the environment. The Waste Management and Remediation Services sector accounted for 10% of total on-site releases; the Paper Manufacturing sector accounted for 9% of total on-site releases; and the Fabricated Metal Product Manufacturing sector accounted for 8% of total on-site releases. The remaining 15% of total on-site releases was attributed to a variety of sectors.

Figure 9 - 2007 On-Site Releases By Industrial Sector
Total On-Site Releases = 6,000,000 Pounds

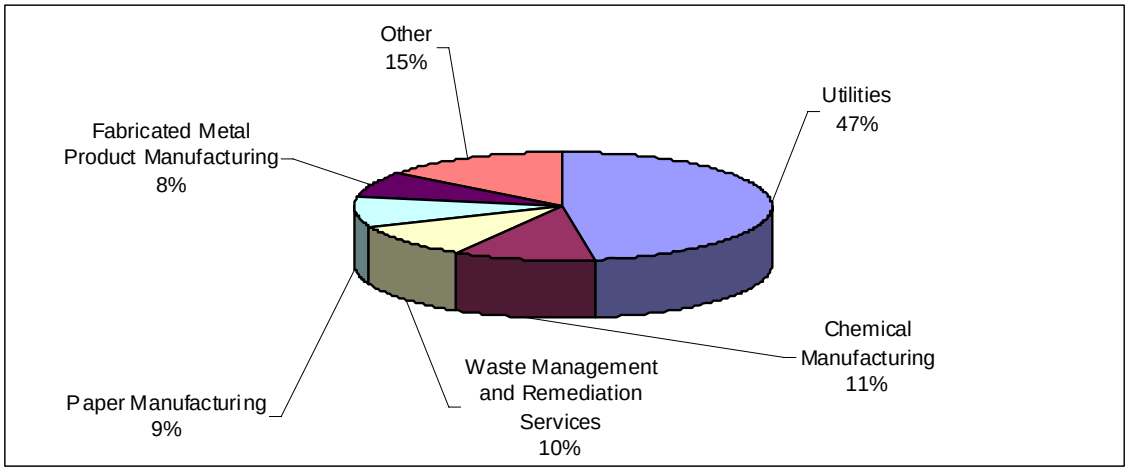
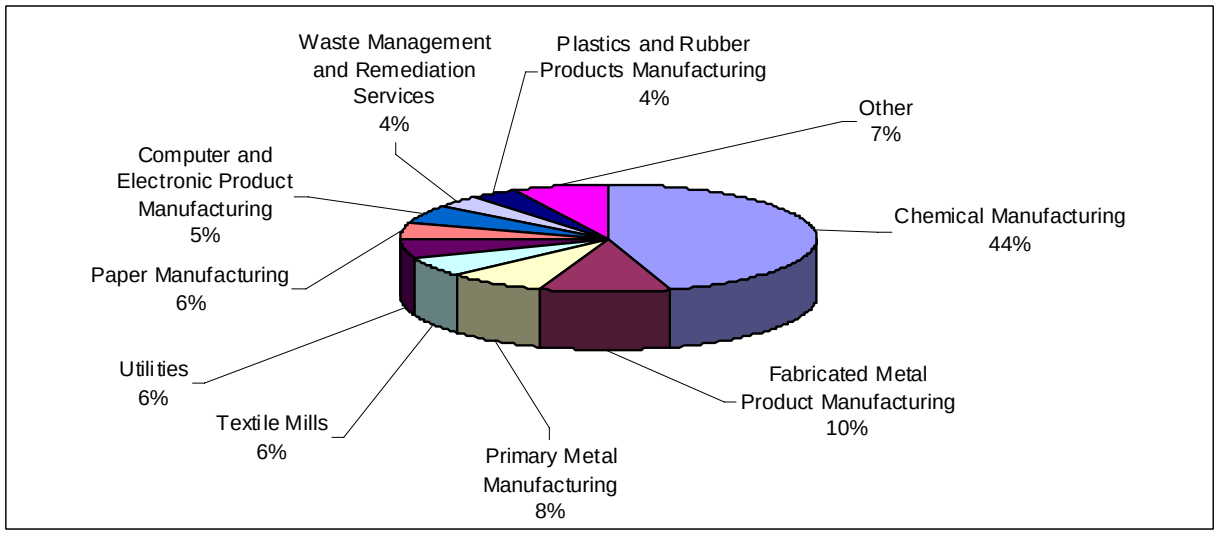


Figure 10 shows transfers off-site by industrial sector. The Chemical Manufacturing sector accounted for 44% of transfers off-site. The second largest sector in this category, the Fabricated Metal Product Manufacturing sector, accounted for 10% of total transfers off-site. The third largest sector in this category was the Primary Metal Manufacturing sector, accounting for 8% of total transfers off-site. The fourth largest sectors, each accounting for 6% of total transfers off-site, were the Textile Mills sector, the Utilities sector, and the Paper Manufacturing sector. The Computer and Electronic Product Manufacturing sector accounted for 5% of total transfers off-site; and the Waste Management and Remediation Services and Plastics and Rubber Products Manufacturing sectors each accounted for 4% of total transfers off-site. The remaining 7% of total transfers off-site was attributed to a variety of sectors.

Figure 10 – 2007 Transfers Off-Site By Industrial Sector
Total Transfers Off-Site = 30,000,000 Pounds



V. 2007 Major TURA Facilities

Top 20 Facility Lists

Table 15 lists the 20 facilities that used the largest quantity of TURA chemicals. These 20 facilities used 771 million pounds, or 76% of total statewide use.

Table 15 – 2007 Top 20 Facilities
(Largest Quantity of Total Use)

Total Use *These quantities include Trade Secret*		
Facility Name	**Town**	**Total Use (Lbs.)**
Ineos Nova LLC	Springfield	227,633,640
Solutia Inc. - Indian Orchard Plant	Springfield	113,372,967
Borden & Remington	Fall River	86,786,407
American Polymers Inc.	Oxford	49,704,577
Ineos Melamines	Springfield	43,633,560
Holland Company Inc.	Adams	42,697,200
Eastman Gelatine Corp.	Peabody	28,540,000
Astro Chemicals Inc.	Springfield	28,145,617
North Win Ltd.	Leominster	20,942,660
Ashland Distribution Co.	Tewksbury	18,478,912
James Austin Co.	Ludlow	16,211,888
Semass Partnership	Rochester	14,365,447
Cytec Surface Specialties Inc.	Springfield	14,120,016
Camco Manufacturing Inc.	Leominster	12,466,183
ITW TACC	Rockland	10,789,212
Ashland Hercules Water Technologies	Chicopee	10,167,970
Omnova Solutions Inc.	Fitchburg	9,710,466
Advanced Urethane Technologies Inc.	Newburyport	8,244,908
Houghton Chemical Corp.	Boston	8,032,699
Bostik Inc.	Middleton	7,424,180

Table 16 lists the 20 facilities that generated the largest quantity of byproduct. These facilities generated 45 million pounds of byproduct, or 56% of total statewide byproduct. Table 16 also lists the 20 facilities with the largest quantity shipped in product. These facilities shipped 274 million pounds in product, or 82% of total shipped in product statewide.

Table 16 - 2007 Top 20 Facilities
(Largest Quantity of 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.)**
Eastman Gelatine Corp.	Peabody	5,548,000	Borden & Remington	Fall River	86,749,622
Solutia Inc. Indian Orchard Plant	Springfield	5,365,019	Solutia Inc. Indian Orchard Plant	Springfield	34,015,101
3M Venture Tape Corp.	Rockland	4,510,177	North Win LTD	Leominster	20,937,086
Flexcon Co. Inc. Plant 2	Spencer	4,294,975	Astro Chemicals Inc.	Springfield	18,637,266
Ineos Melamines	Springfield	4,240,000	Ashland Distribution Co.	Tewksbury	18,478,912
Intelicoat Technologies Inc.	South Hadley	2,195,431	James Austin Co.	Ludlow	15,989,072
Bostik Inc.	Middleton	2,002,914	Camco Manufacturing Inc.	Leominster	12,464,282
Intel Massachusetts Inc.	Hudson	1,905,873	ITW TACC	Rockland	10,645,030
Madico Inc.	Woburn	1,826,159	Holland Company Inc.	Adams	10,226,000
Crane & Co. Inc. Pioneer Mill	Dalton	1,665,730	Houghton Chemical Corp.	Boston	8,016,843
Dominion Energy Brayton Point LLC	Somerset	1,569,656	Cytec Surface Specialties Inc.	Springfield	6,740,564
Belden CDT Networking Inc. DBA Mohawk CDT	Leominster	1,406,256	Webco Chemical Corp.	Dudley	5,654,869
ITW Foilmark Inc.	Newburyport	1,277,319	Rohm & Haas Electronics Materials LLC	Marlborough	4,486,720
Lewcott Corp.	Millbury	1,219,442	ITW Devcon Plexus	Danvers	3,543,550
Barnhardt Manufacturing Co.	Colrain	1,198,698	Allcoat Technology Inc.	Wilmington	3,318,610
MCC DEC Tech LLC	Framingham	1,047,783	Callahan Co.	Walpole	3,200,917
Brittany Dyeing & Printing Corp.	New Bedford	1,020,813	Advance Coatings Co.	Westminster	3,132,568
Semass Partnership	Rochester	995,794	Bostik Inc.	Middleton	2,962,545
Ideal Tape Co.	Lowell	976,418	Belden CDT Networking Inc. DBA Mohawk CDT	Leominster	2,634,534
Mirant Canal LLC	Sandwich	923,724	Callaway Golf Ball Operations Inc.	Chicopee	2,481,863

Table 17 lists the 20 facilities that had the largest quantity of on-site releases and also lists the 20 facilities that had the largest quantity of transfers off-site. The 20 facilities with the largest quantity of on-site releases released almost 5 million pounds, or 73% of total releases statewide. Six of these facilities were power plants, accounting for 2.6 million pounds, or 40% of total on-site releases. Over 1.6 million pounds, or 63% of these power plants' on-site releases, were due to the coincidental manufacture of hydrochloric acid during combustion. The remainder of the power plants' on-site releases was due to the coincidental manufacture of the following chemicals during combustion: ammonia (12%), sulfuric acid (10%), metal compounds (10%), and hydrogen fluoride (6%). Five of the Top 20 facilities were municipal waste combustors (MWCs) that reported combustion-related emissions. Of the .9 million pounds of on-site releases reported by these MWCs, 57% of the releases was due to the coincidental

manufacture of hydrochloric acid during combustion and 42% was 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 almost 19 million pounds, or 61% of the total transfers off-site statewide.

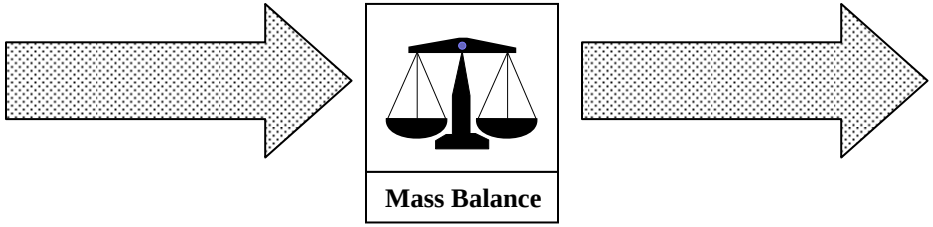
Table 17 – 2007 Top 20 Facilities
(Largest Quantity of On-Site Releases and Transfers Off-Site)

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	1,560,217	Ineos Melamines	Springfield	3,892,750
Covanta Haverhill Inc.	Haverhill	434,255	Solutia Inc. Indian Orchard Plant	Springfield	3,375,401
Solutia Inc. Indian Orchard Plant	Springfield	365,510	Belden CDT Networking Inc. DBA Mohawk CDT	Leominster	1,406,257
Mt. Tom Generating Co. LLC	Holyoke	353,803	Brittany Dyeing & Printing Corp.	New Bedford	1,020,813
Crown Beverage Packaging USA	Lawrence	259,439	Intel Massachusetts Inc.	Hudson	841,400
Dominion Energy Salem Harbor LLC	Salem	249,548	Semass Partnership	Rochester	773,798
Semass Partnership	Rochester	221,995	Waters Corp.	Taunton	764,981
Mirant Canal LLC	Sandwich	194,736	Metalor Technologies USA	Attleboro	680,740
Somerset Power LLC	Somerset	128,716	Cytec Surface Specialties Inc.	Springfield	620,957
Ideal Tape Co.	Lowell	116,253	Johnson Matthey Pharmaceutical Materials Inc.	Devens	612,289
Wheelabrator Saugus Inc.	Saugus	101,156	Intelicoat Technologies Inc.	South Hadley	573,153
Wheelabrator Millbury Inc.	Millbury	94,412	Johnson Matthey Pharmaceutical Materials Inc.	North Andover	506,514
Hollingsworth & Vose Co.	West Groton	92,720	Polaroid Corp. DBA	Waltham	495,640
Boston Generating Mystic LLC	Everett	90,935	Ideal Tape Co.	Lowell	490,499
3M Venture Tape Corp.	Rockland	89,702	Koch Membrane Systems Inc.	Wilmington	479,523
Vacumet Corp.	Franklin	89,540	PCI Synthesis Inc.	Newburyport	426,146
Wheelabrator North Andover Inc.	North Andover	80,015	Genzyme Corp.	Boston	407,884
Alliance Leather Inc.	Peabody	78,438	Wheelabrator Millbury Inc.	Millbury	407,654
Jen Mfg. Inc.	Millbury	75,088	Flexcon Co. Inc. Plant 2	Spencer	401,782
Intelicoat Technologies Inc.	South Hadley	55,053	Haartz Corp.	Acton	372,381

This section contains definitions of 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 2007. The 2000 Core Group is used to measure progress from 2000 to 2007.

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 byproduct or waste. The calculation of use and waste of chemicals is known as 'mass balance.' Generally the inputs equal the outputs, but there are circumstances where a chemical is used in ways that result in an imbalance between inputs and outputs. These circumstances are most often the result of: 1) chemicals are recycled on-site, 2) the product was held in inventory, 3) chemical is consumed or transformed, or 4) the chemical is a 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.

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.

PROCESS – 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: 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 part of an article containing the toxic or hazardous substance.

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– all byproducts that are released to the air, discharged to surface waters, released to land and underground injection wells.

TRANSFERS OFF-SITE – byproducts that are transferred off-site for energy recovery, recycling, treatment and disposal.

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Deval L. Patrick, Governor

Executive Office of Energy and Environmental Affairs
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