2003 Toxics Use Reduction Information Release



Commonwealth of Massachusetts
Department of Environmental Protection

Developed in collaboration with:
Office of Technical Assistance for Toxics Use Reduction
Toxics Use Reduction Institute
Executive Office of Environmental Affairs

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Executive Summary

The Toxics Use Reduction Act (TURA) Program now has 14 years of toxics use information in Massachusetts. This information shows that manufacturers and other businesses statewide have reduced their reliance on toxic chemicals dramatically, making Massachusetts the national leader in demonstrable reductions in toxic chemical use and providing clear evidence that the state has made tremendous progress in pollution prevention. Through toxics use reduction, Massachusetts businesses have reduced chemical transportation risks, workplace hazards, reduced toxics in products, reduced waste, and saved money.

In 2003, 647 facilities reported the use of 193 listed toxic substances. These facilities fell within certain standard industrial classification (SIC) codes, had ten or more full-time employees, and used listed toxic substances at or above reporting thresholds. In total, these facilities reported:

- 1.2 billion pounds of toxic substances used (up from 1.1 billion pounds in 2002) ,
- 107 million pounds of toxic byproduct (or waste) generated (up from 106 million pounds in 2002),
- 359 million pounds of toxics shipped in or as products (up from 343 million pounds in 2002),
- 9 million pounds of toxics released to the environment (up from 8 million pounds in 2002), and
- 35 million pounds of toxics transferred off-site for further waste management (up from 34 million pounds in 2002).

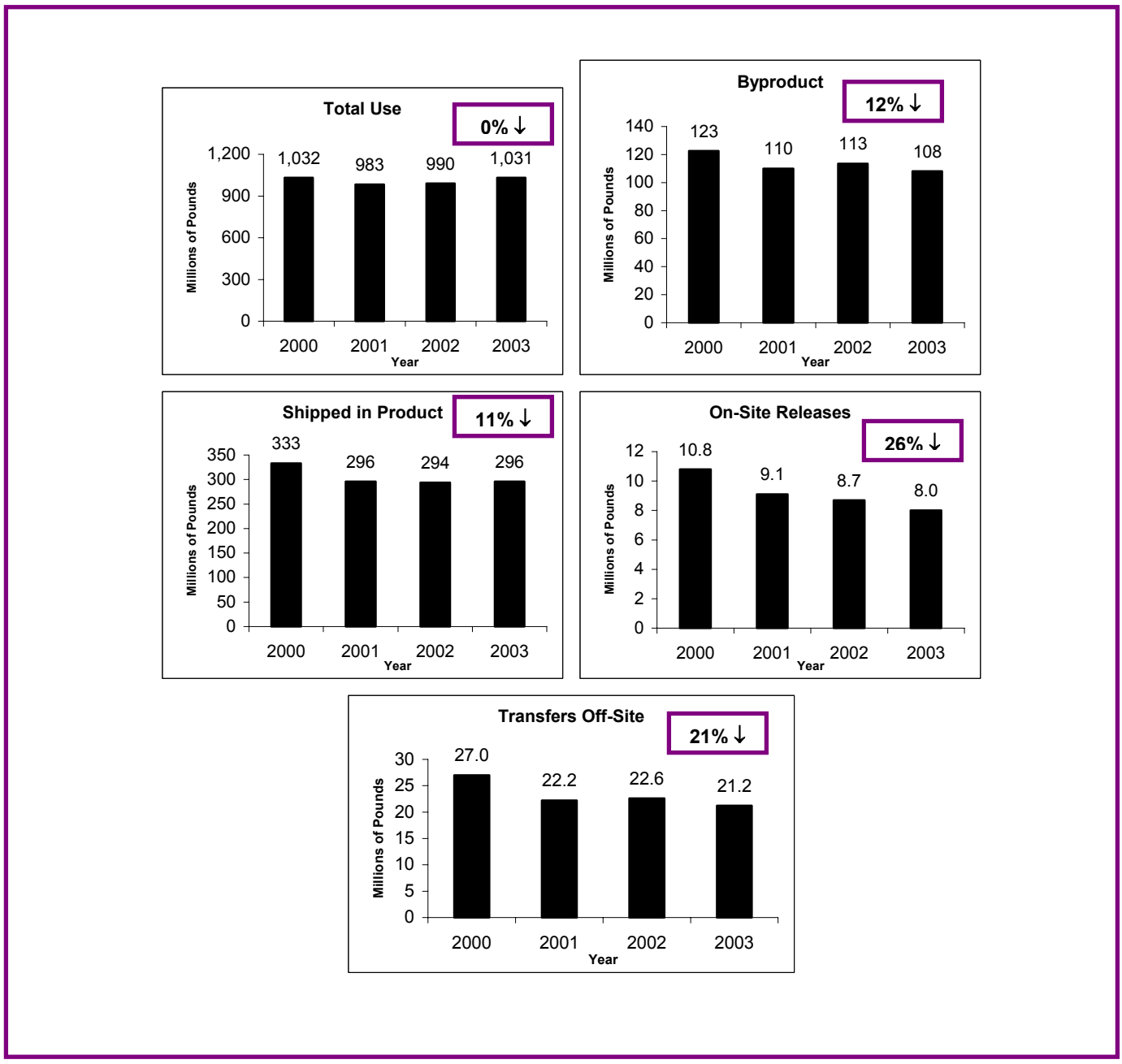
The increases from 2002 to 2003 in byproduct, releases to the environment, and transfers off-site for futher waste management are due to the inclusion of combustion-related emissions reported by municipal waste combustors for the first time for 2003. If this new reporting were not included, the data would show decreases in these categories from 2002 to 2003.

TURA progress is measured 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").

In 2003, the **2000 Core Group**, which includes industry categories and chemicals subject to reporting in 2000 and 2003, used 918 million pounds, or 93% of the toxic chemicals reported (i.e., 985 million pounds excluding trade secret data). Adjusting the data to account for an 11% decrease in production from 2000 to 2003, over that three-year period (see Figure 1), toxic chemical use among 2000 Core Group facilities remained level. However, the 2000 Core Group facilities reduced:

- toxic byproducts by 12%,
- toxics shipped in product by 11%,
- on-site releases of toxics to the environment by 26%, and
- transfers of toxics off-site for further waste management by 21%.

Figure 1 – 2000 Core Group Toxics Use Reduction Progress From 2000 to 2003 (Production Adjusted)



When data are not adjusted for changes in production from 2000 to 2003, the **2000 Core Group** facilities reduced:

- toxic chemical use by 11% (from 1,032 million pounds in 2000 to 918 million pounds in 2003),
- toxic byproducts by 22% (from 123 million pounds in 2000 to 96 million pounds in 2003),
- toxics shipped in product by 21% (from 333 million pounds in 2000 to 263 million pounds in 2003),
- on-site releases of toxics to the environment by 34% (from 11 million pounds in 2000 to 7 million pounds in 2003), and
- transfers of toxics off-site for further waste management by 30% (from 27 million pounds in 2000 to 19 million pounds in 2003).

In 2003, the **1990 Core Group**, which includes industry categories and chemicals subject to reporting in 1990 and 2003, used 573 million pounds, or 58% of the toxic chemicals reported (i.e., 985 million pounds excluding trade secret data). Adjusting the data to account for a 21% increase in production from 1990 to 2003, over that thirteen-year period the 1990 Core Group facilities reduced:

- toxic chemical use by 38%,
- toxic byproducts by 68%,
- toxics shipped in product by 61%,
- on-site releases of toxics to the environment by 92%, and
- transfers of toxics off-site for further waste management by 58%.

When 1990 Core Group data are not adjusted for changes in production from 1990 to 2003, the **1990 Core Group** facilities reduced:

- toxic chemical use by 24% (from 759 million pounds in 1990 to 573 million pounds in 2003),
- toxic byproducts by 62% (from 100 million pounds in 1990 to 38 million pounds in 2003),
- toxics shipped in product by 53% (from 164 million pounds in 1990 to 77 million pounds in 2003),
- on-site releases of toxics to the environment by 90% (from 21 million pounds in 1990 to 2 million pounds in 2003), and
- transfers of toxics off-site for further waste management by 49% (from 20 million pounds in 1991[1] to 10 million pounds in 2003).

2003 was the fourth year TURA facilities reported on chemicals now classified as persistent bioaccumulative toxic (PBT) chemicals by the U.S. Environmental Protection Agency (EPA) under the Toxics Release Inventory (TRI) Program (see Table 1). PBT chemicals are of special concern because they are highly toxic, remain in the environment for long periods of time, are not readily destroyed, and build up in the food chain. In 2003, the PBT hexachlorobenzene was reported for the first time.

2003 was the first year municipal waste combustors (MWCs) reported combustion-related emissions under TURA, including dioxin and dioxin-like compounds, lead, and mercury (all PBT chemicals), and hydrochloric acid. The increased amounts reported by MWCs represent a larger universe of sources reporting under TURA rather than new toxics use, byproduct, releases and transfers.

[1] Trends are measured from 1991 due to a change in the definition of Transfers Off-Site that year.

Table 1 2003 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.	135	11,482,522	6,482	104,508	875	11,078
Benzo (g,h,i)-perylene	10 lbs.	118	125,073	83	2,042	12	70
Mercury	10 lbs.	20	11,476	6,222	3,732	1,730	23,580
Mercury Compounds	10 lbs.	6	1,212	336	266	204	124
Poly-chlorinated biphenyls (PCBs)	10 lbs.	2	37,325	37,303	22	0	37,303
Tetrabromo -Bisphenol A	100 lbs.	1	152	7	145	0	7
Hexachloro-benzene	10 lbs.	1	12	0	0	0	0
Dioxin and Dioxin-like Compounds	0.1 Grams	17	11,826.55 Grams	11,825.98 Grams	0.04 Grams	2,208.11 Grams	9,617.72 Grams
Lead	100 lbs.	137	3,354,819	2,812,230	556,405	833,850	1,993,868
Lead Compounds	100 lbs.	115	5,953,930	882,652	3,885,343	6,731	1,476,681

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.

The first decade of TURA was considered a success when TURA filers met the goal of reducing toxic byproduct generation by 50%. The continued progress of the 2000 Core Group shows that new toxics use reduction challenges and opportunities continue to emerge for Massachusetts companies.

I. Introduction

The Toxics Use Reduction Act (TURA) requires Massachusetts facilities that fall within certain standard industrial classification (SIC) codes, have ten or more full-time employees, and use listed toxic substances at or above reporting thresholds to report their chemical use annually to the Department of Environmental Protection (DEP) and pay an annual toxics use fee. TURA also 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 DEP-certified toxics use reduction planner.

In addition to DEP's administration of reporting and planning requirements, the TURA program is supported by the Office of Technical Assistance 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 2003 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 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:

Department of Environmental Protection,
Toxics Use Reduction Program: www.mass.gov/dep/bwp/dhm/tura/turhome.htm

Office of Technical Assistance for Toxcis Use Reduction: www.mass.gov/ota

Toxics Use Reduction Institute: www.turi.org

II. TURA Progress 1990-2003

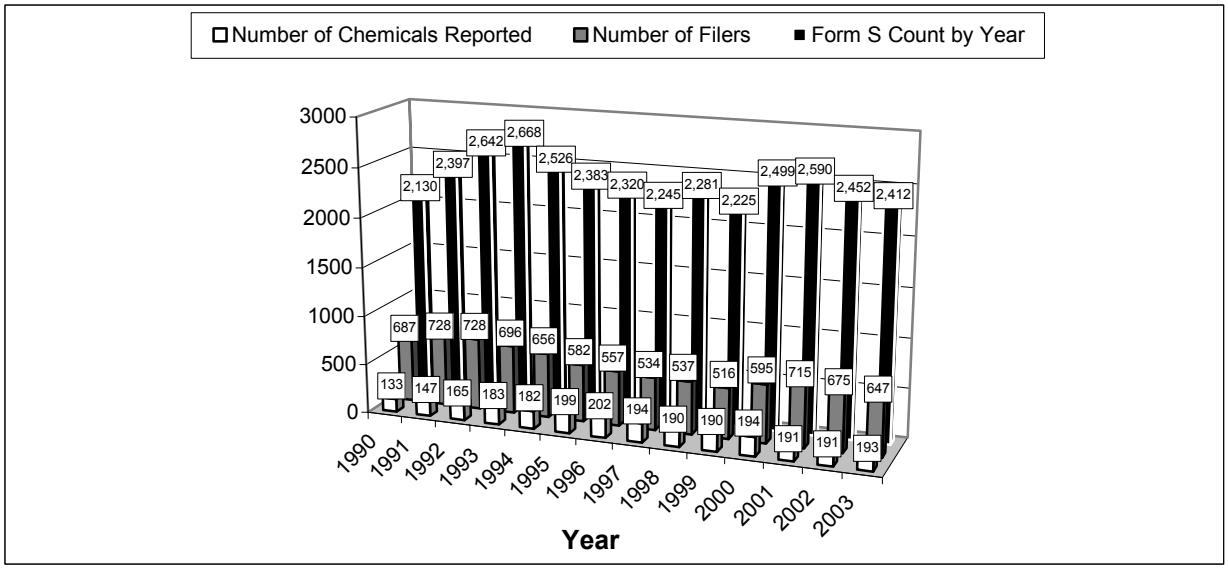
Since 1990, when the TURA program began, Massachusetts TURA filers have made substantial progress in reducing their use of toxic substances and their generation of toxic byproducts. In measuring this progress, a number of changes in the TURA reporting universe must be taken into account.

In 1990, only manufacturing firms were required to report to the TURA program. Then, in accordance with TURA's phase-in schedule, the reporting universe was expanded to include industries beyond the manufacturing sector. The list of chemicals subject to reporting also was expanded in reporting years 1991, 1992, 1993, 2000, and 2002, further enlarging the universe of companies reporting. In addition, over the years, certain chemicals have been delisted. For example, effective reporting year 1999, the Administrative Council on Toxics Use Reduction delisted pure copper in solid or molten metal form.

Figure 2 illustrates TURA filing trends over the past fourteen years. Out of 1,422 chemicals listed under TURA, only 193 were reported in 2003. The number of facilities reporting under TURA generally declined during the 1990s, from a high of 728 facilities in 1991 and 1992, to 516 in 1999. The number of reporting facilities increased to 595 in 2000 due in part to the new requirement to report PBTs at lower thresholds, and further increased to 715 in 2001 due to the new requirement to report lead and lead compounds (both PBTs) at lower 100 pound thresholds. The number of filers decreased to 675 in 2002 and to 647 in 2003, which in part may be due to facilities closing or reducing production due to the economic slowdown.

The number of individual Form Ss[2] declined from a high of 2,668 in 1993, to 2,225 in 1999, increased to 2,499 in 2000, again due partly to the reporting of PBTs, and increased to 2,590 in 2001 due to the new reporting requirement for lead and lead compounds. The number of Form Ss decreased both in 2002 and 2003.

Figure 2 - TURA Filer Trends 1990 – 2003



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

2000 Core Group Progress – Without Adjusting for Production

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").

To measure recent progress, the TURA program has defined a 2000 Core Group that includes facility categories and chemicals that were subject to reporting in 2000 and that remained subject to reporting in 2003[3]. In 2003, the 2000 Core Group used 918 million pounds, or 93% of the toxic chemicals reported (i.e., 985 million pounds excluding trade secret data).

The changes in reported Core Group quantities over the period 2000 to 2003 are shown in Figure 3. These quantities have not been adjusted for changes in production. From 2000 to 2003, Core Group filers reduced:

- toxic chemical use by 11% (from 1,032 million pounds in 2000 to 918 million pounds in 2003),
- toxic byproducts by 22% (from 123 million pounds in 2000 to 96 million pounds in 2003),
- toxics shipped in product by 21% (from 333 million pounds in 2000 to 263 million pounds in 2003),
- on-site releases of toxics to the environment by 34% (from 11 million pounds in 2000 to 7 million pounds in 2003), and
- transfers of toxics off-site for further waste management by 30% (from 27 million pounds in 2000 to 19 million pounds in 2003).

2000 Core Group Progress – Production Adjusted Data

From 2000 to 2003, 2000 Core Group filers reported an 11% decrease in production. 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%.

From 2000 to 2003 (see Figure 4), production-adjusted toxic chemical use among 2000 Core Group facilities remained level. However, the 2000 Core Group facilities reduced:

- toxic byproducts by 12%,
- toxics shipped in product by 11%,
- on-site releases of toxics to the environment by 26%, and
- transfers of toxics off-site for further waste management by 21%.

[3] The 2000 Core Group includes all SIC codes and all chemical use except 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, newly reported municipal waste combustor combustion-related emissions, and use of any chemical covered by a trade secret claim.

Figure 3 – 2000 Core Group Toxics Use Reduction Progress From 2000 to 2003 (Not Production Adjusted)

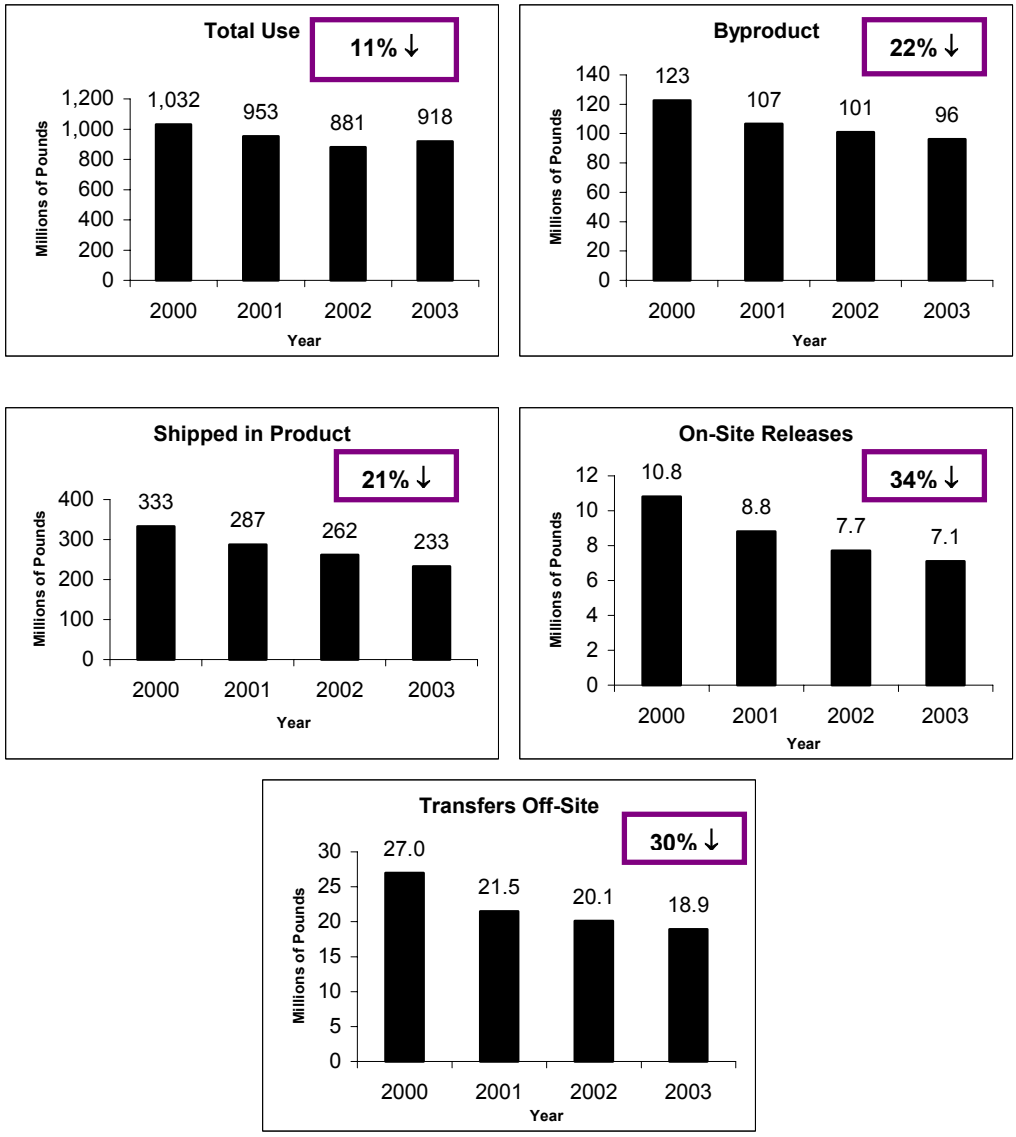
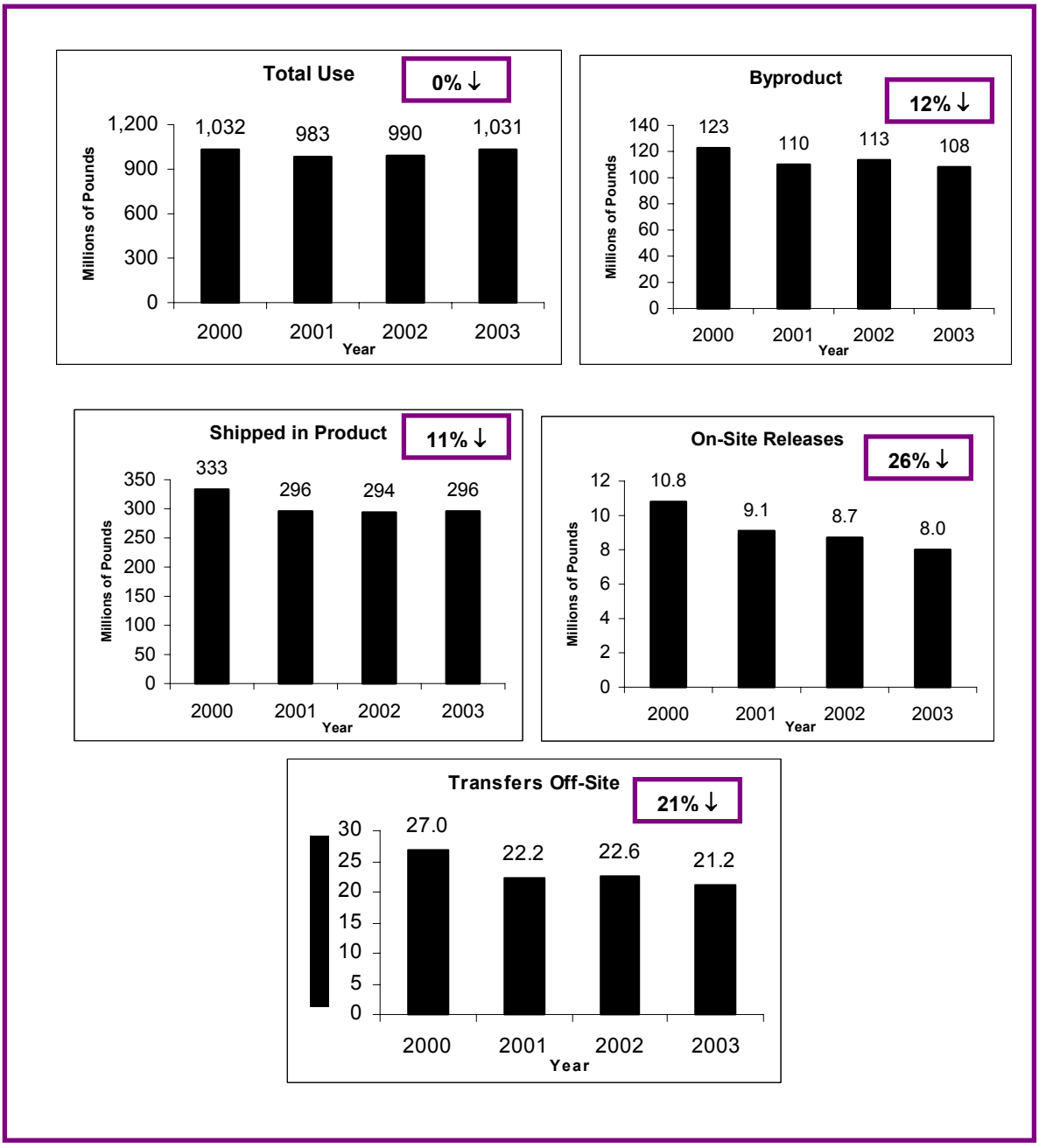


Figure 4 – 2000 Core Group Toxics Use Reduction Progress From 2000 to 2003
(Production Adjusted)



1990 Core Group Progress – Without Adjusting for Production

To measure progress since the start of the TURA program, the program uses a 1990 Core Group that currently represents just over half of the total toxics use. In 2003, the 1990 Core Group used 573 million pounds, or 58% of the toxic chemicals reported (i.e., 985 million pounds excluding trade secret data).

The changes in reported 1990 Core Group quantities over the period 1990 to 2003 are shown in Figure 5. These quantities have not been adjusted for changes in production. From 1990 to 2003, 1990 Core Group filers reduced:

- toxic chemical use by 24% (from 759 million pounds in 1990 to 573 million pounds in 2003),
- toxic byproducts by 62% (from 100 million pounds in 1990 to 38 million pounds in 2003),
- toxics shipped in product by 53% (from 164 million pounds in 1990 to 77 million pounds in 2003),
- on-site releases of toxics to the environment by 90% (from 21 million pounds in 1990 to 2 million pounds in 2003), and
- transfers of toxics off-site for further waste management by 49% (from 20 million pounds in 1991[4] to 10 million pounds in 2003).

1990 Core Group Progress - Production Adjusted Data

From 1990 and 2003, 1990 Core Group filers reported a 21% increase in production. When the Core Group data are adjusted to account for changes in production since 1990 (see Figure 6), Core Group filers reduced:

- toxic chemical use by 38%,
- toxic byproducts by 68%,
- toxics shipped in product by 61%,
- on-site releases of toxics to the environment by 92%, and
- transfers of toxics off-site for further waste management by 58%.

[4] Trends are measured from 1991 due to a change in the definition of Transfers Off-Site that year.

Figure 5 – 1990 Core Group Toxics Use Reduction Progress From 1990 to 2003 (Not Production Adjusted)

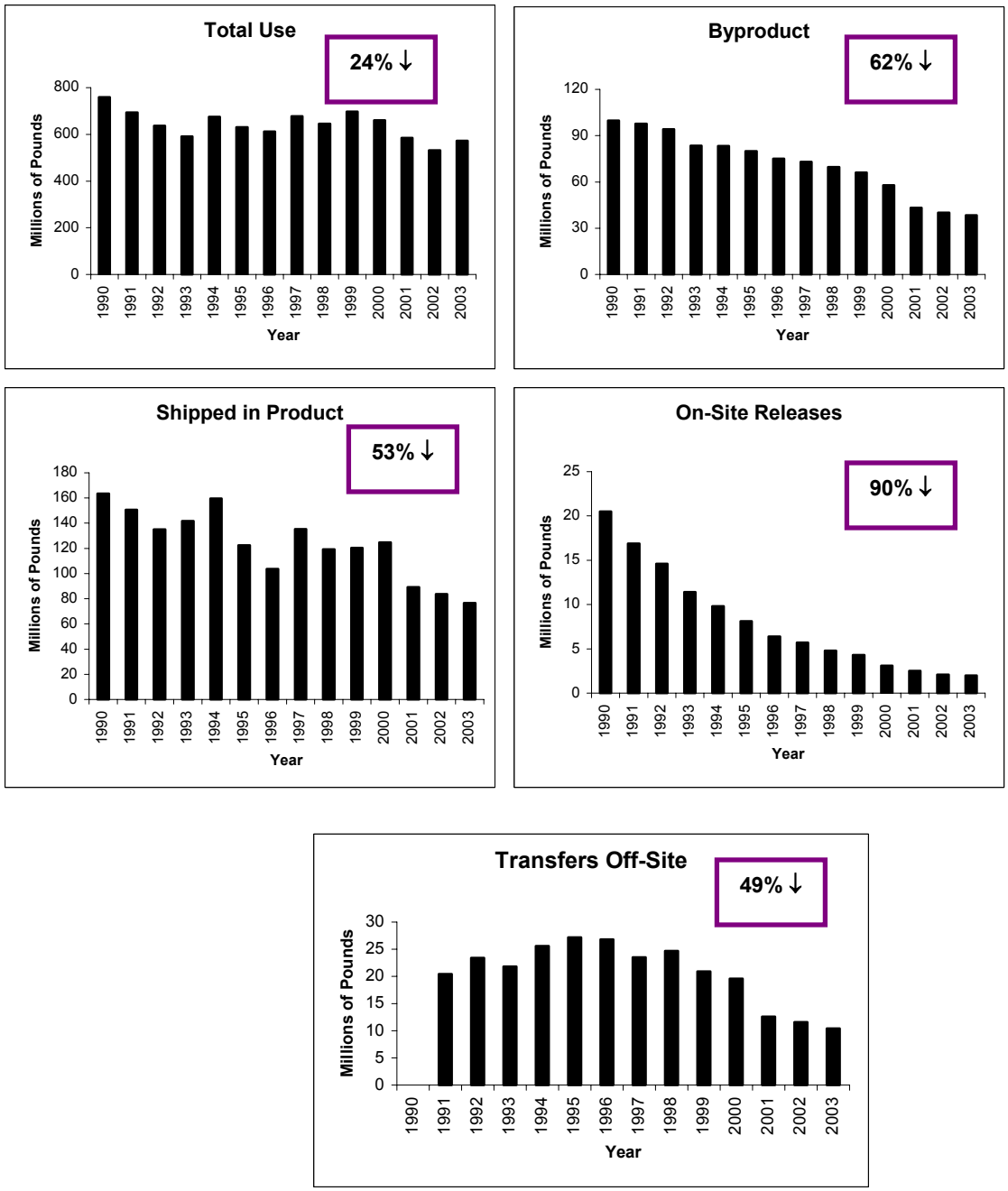


Figure 6 – 1990 Core Group Toxics Use Reduction Progress From 1990 to 2003 (Production Adjusted)

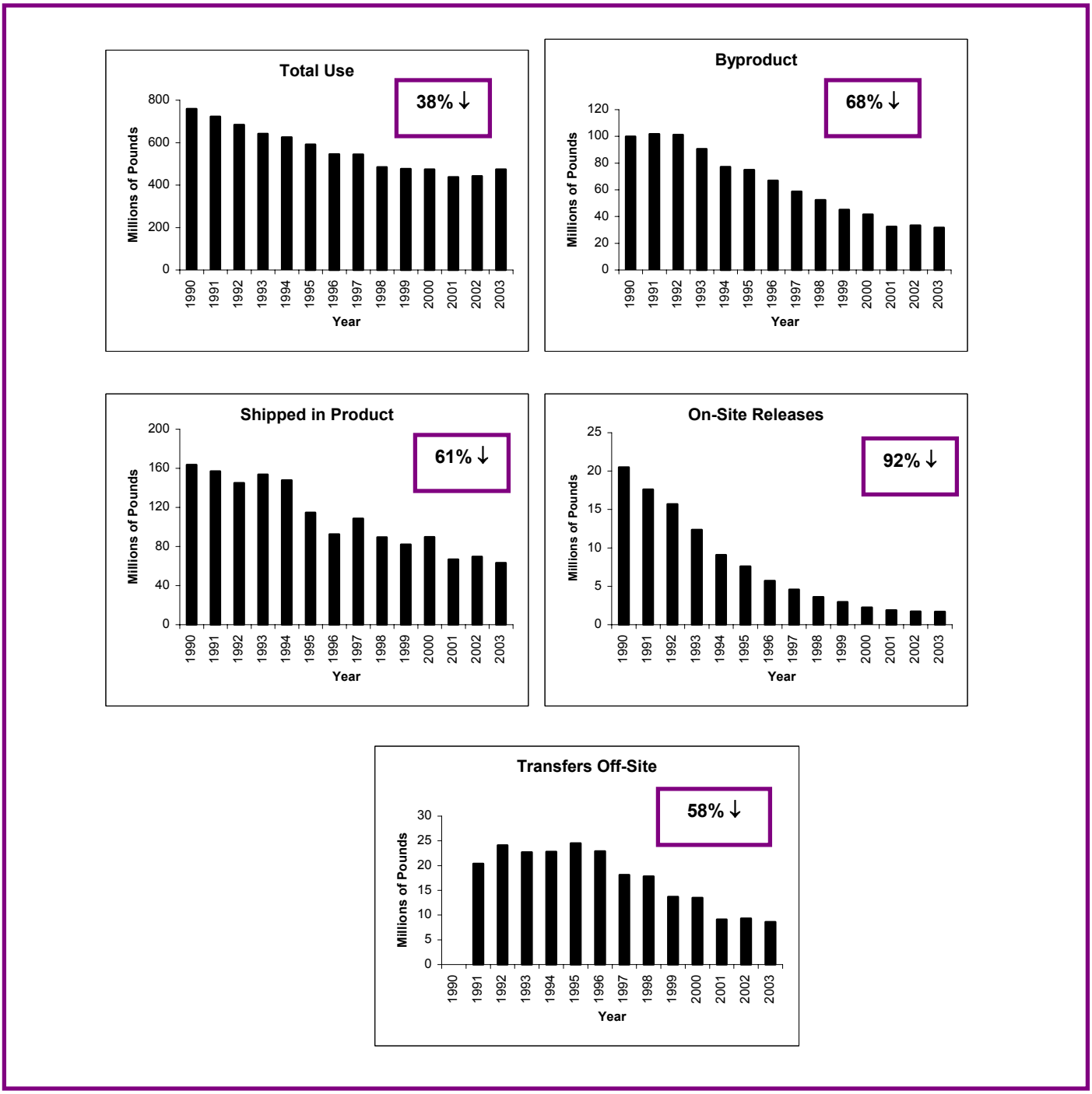


Table 2 and Table 3 summarize TURA data from 2000 to 2003, and from 1990 to 2003, respectively, showing both **reported** and **production adjusted** quantities. For each category, each year's production adjusted quantity is normalized to the base year production level, thus providing a comparison of 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 TRI Production Ratio/Activity Index.

Table 2
2000 CORE GROUP DATA: 2000 - 2003 TREND SUMMARY
(Quantities are in millions of pounds, does 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
2000	1,031.5	1,031.5	122.6	122.6	333.1	333.1	10.8	10.8	27.0	27.0	NA
2001	953.2	982.7	106.7	110.0	287.1	296.0	8.8	9.1	21.5	22.2	0.97
2002	881.2	990.1	100.9	113.4	261.7	294.0	7.7	8.7	20.1	22.6	0.92
2003	917.5	1030.9	96.2	108.1	263.4	296.0	7.1	8.0	18.9	21.2	1.00
Percent Change 2000-2003	11% Reduction	.1% Reduction	22% Reduction	12% Reduction	21% Reduction	11% Reduction	34% Reduction	26% Reduction	30% Reduction	21% Reduction	11% Decrease

Table 3
1990 CORE GROUP DATA: 1990 - 2003 TREND SUMMARY
(Quantities are in millions of pounds, does not include trade secret quantities. Shaded columns show production-adjusted quantities.)

	TOTAL USE		BYPRODUCT		SHIPPED IN PRODUCT		ON-SITE RELEASES		TRANSFERS OFF-SITE[5]		ACTIVITY INDEX
1990	759.0	759.0	99.8	99.8	163.6	163.6	20.5	20.5			NA
1991	694.1	723.0	97.7	101.8	150.6	156.9	16.9	17.6	20.4	20.4	0.96
1992	636.3	683.3	94.2	101.2	135.0	145.0	14.6	15.7	23.4	24.1	0.97
1993	591.2	641.3	83.5	90.6	141.7	153.7	11.4	12.4	21.8	22.7	0.99
1994	675.0	625.8	83.3	77.2	159.5	147.9	9.8	9.1	25.6	22.8	1.17
1995	631.1	591.0	79.9	74.8	122.4	114.6	8.1	7.6	27.2	24.5	0.99
1996	611.8	545.7	75.0	66.9	103.7	92.5	6.4	5.7	26.8	22.9	1.05
1997	677.0	544.0	73.1	58.7	135.2	108.6	5.7	4.6	23.5	18.1	1.11
1998	645.1	484.4	69.7	52.3	119.2	89.5	4.8	3.6	24.7	17.8	1.07
1999	697.6	476.2	66.1	45.1	120.3	82.1	4.3	2.9	20.9	13.7	1.10
2000	659.7	474.1	57.8	41.5	124.7	89.6	3.1	2.2	19.6	13.5	0.95
2001	584.3	437.4	43.3	32.4	89.3	66.8	2.5	1.9	12.6	9.1	0.96
2002	531.8	442.3	40.0	33.3	83.6	69.5	2.1	1.7	11.6	9.3	0.90
2003	573.1	473.6	38.3	31.7	76.6	63.3	2.0	1.7	10.4	8.6	1.01
Percent Change 1990-2003	24% Reduction	38% Reduction	62% Reduction	68% Reduction	53% Reduction	61% Reduction	90% Reduction	92% Reduction	49% Reduction	58% Reduction	21% Increase

[5] Trends are measured from 1991 due to a change in the definition of Transfers Off-Site that year.

III. 2003 TURA Chemical Data

Table 4 summarizes the 2003 data for all TURA filers, including trade secret data. These companies reported using 1.2 billion pounds of chemicals and generating 107 million pounds of byproduct.

Table 4 - 2003 Data for All TURA Filers (in Pounds)	
Total Use	1,192,000,000
Generated as Byproduct	107,000,000
Shipped in Product	359,000,000
On-Site Releases	9,000,000
Transfers Off-Site	35,000,000

The 1.2 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).

Manufactured Chemicals

Figure 7 shows that relatively little manufacturing of TURA chemicals occurs in Massachusetts. Chemicals reported as "manufactured" accounted for almost 9% of the total use statewide (or 90 million pounds, up from 65 million pounds in 2002). 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.

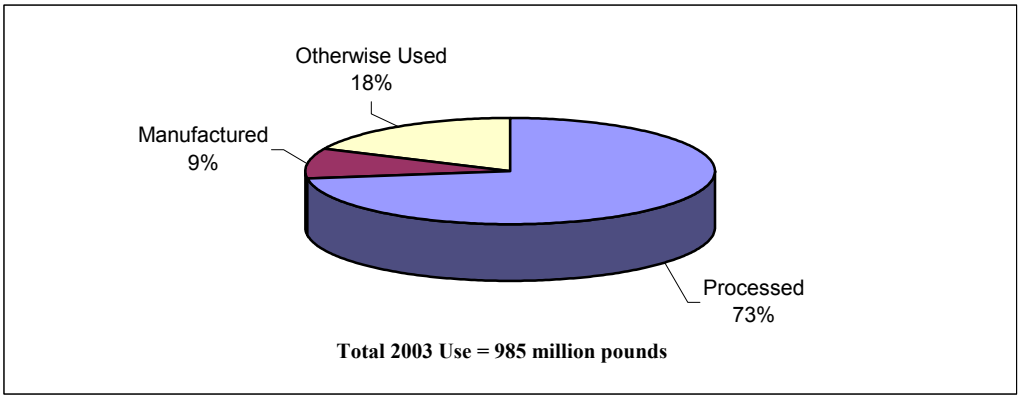
Processed Chemicals

In Massachusetts, the predominant chemical use is "processing," which includes incorporating a listed chemical into a product. Processing of chemicals accounted for 73% of total use (or 718 million pounds, up from 657 million pounds in 2002). Styrene, which is used in the production of plastics, accounted for 49% (or 353 million pounds) of total chemicals processed.

Otherwise Used Chemicals

Chemicals "otherwise used" accounted for 18% of total use (or 178 million pounds, down from 185 million pounds in 2002). Chemicals otherwise used include activities such as parts cleaning, waste treatment, and the combustion of fuel oil containing listed chemicals such as polycyclic aromatic compounds and benzo(g,h,i)perylene.

Figure 7 – 2003 Chemical Use (does not include trade secret data) *



* 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 7 is 985 million pounds, rather than 1.2 billion pounds (which includes trade secret data).

Top 20 Chemicals

In 2003, 193 chemicals were reported out of 1,422 TURA-listed chemicals. Of the 193, 20 chemicals accounted for 85%, or 838 million pounds (not including trade secret information) of the total use reported statewide (see Table 5). Styrene monomer was the chemical with the largest quantity reported in 2003, accounting for 36% of total use reported (or 353 million pounds, up from 297 million pounds in 2002). Styrene monomer is the building block for various plastics.

Sodium hydroxide was the second highest used chemical with 196 facilities (or 30%) reporting its use, representing 9% of total reported use (or 88 million pounds, up from 85 million pounds in 2002). 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 68 facilities (or 11%) reporting its use, representing 7% of total reported use (or 71 million pounds, up from 46 million pounds in 2002 due primarily to new reporting by municipal waste combustors). 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 5 - 2003 Top 20 Chemicals: Total Use

Total Use ***These quantities do not include Trade Secret***	
Chemical Name (CAS #)	**Total Use (Lbs.)**
Styrene Monomer (100425)	353,483,223
Sodium Hydroxide (1310732)	88,370,957
Hydrochloric Acid (7647010)	70,855,951
Methanol (67561)	70,607,025
Sulfuric Acid (7664939)	36,065,145
Nitrate Compounds (1090)	30,913,902
Toluene (108883)	27,564,378
Ammonia (7664417)	24,853,980
Sodium Hypochlorite (7681529)	17,558,469
Potassium Hydroxide (1310583)	14,057,125
Zinc Compounds (1039)	13,984,566
Methyl Methacrylate (80626)	13,809,841
Methyl Ethyl Ketone (78933)	13,361,161
Polycyclic Aromatic Compounds (1040)	11,482,522
Ethyl Acetate (141786)	11,056,239
Acetone (67641)	9,331,741
Toluene Diisocyanate (26471625)	8,002,681
Phosphoric Acid (7664382)	7,835,725
Ethylene Glycol (107211)	7,739,162
Phthalic Anhydride (85449)	6,571,589

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

Table 6 shows the Top 20 chemicals generated as byproduct in 2003, which accounted for 86% of the total byproduct generated statewide (or 93 million pounds). Lead was included in the Top 20 list due to new reporting by municipal waste combustors (see Table 15).

Table 6 also shows the top 20 chemicals shipped in product in 2003, which accounted for 81% of the total shipped in product (or 240 million pounds).

Table 6 - 2003 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.)**
Nitrate Compounds (1090)	13,916,330	Methanol (67561)	64,901,788
Sodium Hydroxide (1310732)	10,998,551	Sodium Hydroxide (1310732)	51,180,104
Sulfuric Acid (7664939)	10,933,264	Toluene (108883)	17,423,550
Toluene (108883)	9,747,807	Sodium Hypochlorite (7681529)	14,003,336
Ethyl Acetate (141786)	9,330,245	Potassium Hydroxide (1310583)	11,667,797
Hydrochloric Acid (7647010)	5,256,404	Methyl Ethyl Ketone (78933)	9,125,412
Methanol (67561)	4,673,681	Ammonia (7664417)	7,855,219
Ammonia (7664417)	4,236,751	Zinc Compounds (1039)	7,245,628
Methyl Ethyl Ketone (78933)	3,875,647	Sulfuric Acid (7664939)	7,002,695
Lead (7439921)	2,812,230	Acetone (67641)	6,539,796
Acetone (67641)	2,715,939	Glycol Ethers (1022)	5,297,504
Formaldehyde (50000)	2,661,326	Dichloromethane (75092)	4,848,950
Nitric Acid (7697372)	2,475,509	N-Methyl-2-Pyrrolidone (872504)	4,820,266
Ethylene Glycol (107211)	1,882,381	Formaldehyde (50000)	4,572,626
Dimethylformamide (68122)	1,541,972	Ethylene Glycol (107211)	4,461,921
Phosphoric Acid (7664382)	1,463,327	Antimony Compounds (1000)	4,132,318
N-Methyl-2-Pyrrolidone (872504)	1,367,812	Lead Compounds (1026)	3,904,862
Lead Compounds (1026)	889,809	Phosphoric Acid (7664382)	3,810,330
Acetic Acid (64197)	821,826	Xylene Mixed Isomer (1330207)	3,638,760
Copper Compounds (1015)	809,481	Hexane (110543)	3,340,955
		The following chemicals would appear in the Top 20 Chemicals Shipped in Product list if trade secret quantities were included: Ethyl Acetate, Sodium Bisulfite, Vinyl Acetate.	

Table 7 shows the Top 20 chemicals reported as on-site releases in 2003, which totaled 92% of the total on-site releases (or 8 million pounds). Hydrochloric acid had the highest amount of on-site releases

reported statewide, accounting for 34% of total on-site releases (or 3 million pounds, up from 2.6 million pounds in 2002 primarily due to new reporting by municipal waste combustors). Almost 2.4 million pounds of hydrochloric acid, or about 77% of total on-site releases of hydrochloric acid, was attributed to power plants. Lead was included in the list of Top 20 on-site releases due to new reporting by municipal waste combustors of lead disposed in ash in on-site landfills (see Table 15). Table 7 also shows the Top 20 chemicals reported as transfers off-site in 2003, which totaled 80%, or 28 million pounds, of the total transfers off-site. Nitrate compounds had the highest transfers off-site reported statewide, accounting for 14% of total transfers off-site. Nitrate compounds were primarily coincidentally manufactured during neutralization of nitric acid in wastewater treatment. Lead was included in the Top 20 transfers off-site due to new reporting by municipal waste combustors of lead disposed in ash in off-site landfills (see Table 15). Lead compounds was included in the Top 20 list due to handling by a hazardous waste treatment, storage and disposal facility (see Table 16).

Table 7 - 2003 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)	3,044,056	Nitrate Compounds (1090)	5,059,287
Lead (7439921)	833,855	Toluene (108883)	2,578,114
Ammonia (7664417)	787,493	Formaldehyde (50000)	2,530,747
Sulfuric Acid (7664939)	657,862	Lead (7439921)	1,993,868
Acetone (67641)	487,903	Ethyl Acetate (141786)	1,848,068
Toluene (108883)	401,914	Ethylene Glycol (107211)	1,799,426
Ethyl Acetate (141786)	349,116	Methanol (67561)	1,630,150
Glycol Ethers (1022)	298,078	Lead Compounds (1026)	1,489,763
Butyl Alcohol (71363)	259,231	Acetone (67641)	1,353,215
Hydrogen Fluoride (7664393)	215,425	N-Methyl-2-Pyrrolidone (872504)	1,234,556
Methanol (67561)	183,784	Sodium Hydroxide (1310732)	1,051,488
Methyl Ethyl Ketone (78933)	182,233	Zinc Compounds (1039)	922,029
Nitrate Compounds (1090)	117,309	Methyl Ethyl Ketone (78933)	921,447
Vanadium Compounds (1065)	94,244	Copper Compounds (1015)	920,526
Trichloroethylene (79016)	93,917	Dichloromethane (75092)	528,422
Methyl Isobutyl Ketone (108101)	74,804	Sulfuric Acid (7664939)	521,583
Formaldehyde (50000)	65,223	Acetonitrile (75058)	486,844
Dimethylformamide (68122)	57,326	Nickel (7440020)	468,989
Dichloromethane (75092)	52,203	Phenol (108952)	444,411
Hexane (110543)	47,674	Chromium (7440473)	410,634

Municipal Waste Combustor Reporting of Combustion-Related Emissions

For the 2003 reporting year, MassDEP rescinded a 1993 policy that had exempted municipal waste combustors (MWCs) from reporting combustion-related emissions under TURA. Therefore, in 2003 MWCs reported combustion-related chemical emissions for the first time, which included dioxin and dioxin-like compounds, lead, mercury, and hydrochloric acid. These chemicals are either coincidentally created through the combustion process (for example, the creation of hydrochloric acid) or are contained in the waste that is combusted and end up in combustion ash or air emissions (for example, lead from lead soldering in discarded electronics). While MWCs do not intentionally "use" these chemicals, MWCs now report in the same way as other combustion facilities, such as power plants, that otherwise use or coincidentally create chemicals through combustion. Each MWC in Massachusetts has an air permit that sets emission limits based on federal Maximum Achievable Control Technology or a more stringent state limit established by MassDEP and must dispose of combustion ash in a lined landfill designed to prevent releases to the environment.

Persistent Bioaccumulative Toxic (PBT) Chemicals

2003 was the fourth year TURA facilities reported on chemicals classified as persistent bioaccumulative toxic (PBT) chemicals by the U.S. Environmental Protection Agency (EPA) under the Toxics Release Inventory (TRI) Program.

PBT chemicals 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 2003, Massachusetts facilities reported the use of 10 PBT chemicals/chemical categories (see Table 8). Hexachlorobenzene was reported for the first time in 2003. 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 do 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. These data also do not capture the use of toxic chemicals in consumer products that are not manufactured in Massachusetts.

As noted above, 2003 was the first year MWCs reported combustion-related chemical emissions under TURA, including dioxins, lead, and mercury, which are PBT chemicals. This additional reporting by MWCs primarily accounted for the differences between 2002 and 2003 amounts of these chemicals reported.

Table 8 2003 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.	135	11,482,522	6,482	104,508	875	11,078
Benzo (g,h,i)-perylene	10 lbs.	118	125,073	83	2,042	12	70
Mercury	10 lbs.	20	11,476	6,222	3,732	1,730	23,580
Mercury Compounds	10 lbs.	6	1,212	336	266	204	124
Poly-chlorinated biphenyls (PCBs)	10 lbs.	2	37,325	37,303	22	0	37,303
Tetrabromo -Bisphenol A	100 lbs.	1	152	7	145	0	7
Hexachloro - benzene	10 lbs.	1	12	0	0	0	0
Dioxin and Dioxin-like Compounds	0.1 Grams	17	11,826.55 Grams	11,825.98 Grams	0.04 Grams	2,208.11 Grams	9,617.72 Grams
Lead	100 lbs.	137	3,354,819	2,812,230	556,405	833,850	1,993,868
Lead Compounds	100 lbs.	115	5,953,930	882,652	3,885,343	6,731	1,476,681

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

In 2003, the primary activity that triggered reporting of polycyclic aromatic compounds (PACs) and benzo(g,h,i)perylene was the combustion of #6 and #4 fuel oils, and to a lesser extent #2 fuel oil. These fuel oils 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). A total of 135 facilities reported on PACs and 118 reported on benzo(g,h,i)perylene.

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 9 shows a breakdown of PACs use and Table 10 shows a breakdown of benzo(g,h,i)perylene use. **Note:** The numbers in all the PBT tables have been

rounded to the nearest pound (to the nearest 0.01 gram for dioxin). As a consequence, the sum of the numbers in the columns may be slightly greater or lesser than the totals.

The 9 power plants that reported PACs and the 10 that reported benzo(g,h,i)perylene accounted for 82% of total PACs and benzo(g,h,i)perylene use (9,380,246 pounds and 102,340 pounds, respectively). The other facilities that reported due to fuel combustion accounted for about 17% (1,957,053 pounds) of PAC use and 17% (21,422 pounds) of benzo(g,h,i)perylene use. The majority of facilities reported zero byproduct generation, on-site releases, and transfers off-site for these chemicals. This is because most PACs and benzo(g,h,i)perylene are destroyed in the combustion process.

Asphalt manufacturers reported total use of 114,907 pounds of PACs and 1,003 pounds of benzo(g,h,i)perylene. Nineteen asphalt manufacturers reported PACs; 14 reported benzo(g,h,i)perylene. Three waste oil processors reported 30,710 pounds of PACs and one waste oil processor reported 308 pounds of benzo(g,h,i)perylene.

Table 9
2003 PACs Summary
(in pounds)
(Data in parentheses are subtotals)

Activity / Facility Type	Number of Facilities	Total Use	Byproduct	Shipped in Product	On-site Releases	Transfers Off-site
Fuel Combustion	113[6]	11,337,299[7]	240	182	25	471
(Power plants)	(9)	(9,380,246)	(96)	(0)	(10)	(362)
(Other Facilities)	(104)	(1,957,053)	(144)	(183)	(15)	(109)
Waste Oil Processors	3	30,316	5,819	25,297	0	10,357
Asphalt Manufacturers	19	114,907	423	79,028	850	250
Total	135	11,482,522	6,482	104,508	875	11,078

[6] The majority of reporting facilities included information identifying fuel combustion as the reason for reporting PACs and benzo(g,h,i)perylene; however, some facilities lacked this information but are assumed to be reporting due to fuel combustion. The fuel combustion facilities have been sub-categorized into power plants and other facilities. The numbers shown in parentheses reflect this sub-categorization and should not be added to the totals.

[7] Reported use for PACs and benzo(g,h,i)perylene was significantly lower in 2003 than originally reported in 2002. One power plant that had reported a very high amount of use in 2002 subsequently revised its report, so that the published 2002 use figures were much higher as a result of this reporting error.

Table 10 2003 Benzo(g,h,i)perylene Summary (in pounds) (Data in parentheses are subtotals)						
Activity / Facility Type	**Number of Facilities**	**Total Use**	**Byproduct**	**Shipped in Product**	**On-site Releases**	**Transfers Off-site**
Fuel Combustion	103	123,762	45	933	2	33
(Power Plants)	(10)	(102,340)	(1)	(0)	(1)	(1)
(Other Facilities)	(93)	(21,422)	(43)	(933)	(1)	(32)
Waste Oil Processors	1	308	37	271	0	37
Asphalt Manufacturers	14	1,003	1	838	11	1
Total	118	125,073	83	2,043	12	70

Mercury and Mercury Compounds

Twenty facilities reported the use of mercury, and six facilities reported the use of mercury compounds. Table 11 shows a breakdown of mercury use by activity. 47% of mercury use was from MWCs due to mercury-containing products (for example, button batteries, thermostats) contained in waste that is combusted. Of the 1,726 pounds of mercury reported by MWCs as on-site releases, 329 pounds were air emissions and 1,397 pounds were in ash disposed in on-site landfills designed to prevent the ash and landfill leachate from entering the environment. The 3,580 pounds of mercury reported as transferred off-site were in ash disposed in off-site lined landfills. Over the last several years, MWCs have significantly reduced mercury air emissions in response to MassDEP regulations that set stringent mercury air emission standards and required MWCs to establish programs for collecting mercury-containing products prior to disposal. The 329 pounds of mercury air emissions MWCs reported for 2003 represent a 95% reduction from the estimated 6,000 pounds of mercury air emissions from MWCs in the mid-1990's.

Table 11
2003 Mercury Summary
(in pounds)

Activity / Facility Type	Number of Facilities	Total Use	Byproduct	Shipped in Product	On-Site Releases	Transfers Off-site
Lamp / Ballast Recycler	1	3,618	12	3,606	2	11
Manufacturers: incorporated mercury into products	4	1,821	254	64	1	992
Municipal Waste Combustors: combustion of waste with mercury-containing products	7	5,368	5,368	0	1,726	3,580
Concrete manufacturers & Sand and gravel companies: mercury occurs naturally in Portland cement, and is also in coal combustion fly ash that is mixed with concrete.	4	57	0	57	0	0
Manufacturer: used mercury in analytical lab	2	100	80	0	0	80
Power Generation at Manufacturer	1	22	18	5	2	14
Hazardous Waste Facility	1	490	490	0	0	18,904
Total	20	11,476	6,222	3,732	1,730	23,580

Table 12 shows a breakdown of mercury compounds use. The total use of mercury compounds in reporting year 2003 was 1,212 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 are also coincidentally manufactured during combustion. The 266 pounds of mercury compounds shipped in product represents the amount contained in fly ash sold by two utilities.

Table 12
2003 Mercury Compounds Summary
(in pounds)

Activity / Facility Type	Number of Facilities	Total Use	Byproduct	Shipped in Product	On-site Releases	Transfers Off-Site
Power plants: mercury coincidentally generated via combustion	6	1,212	336	266	204	124

Polychlorinated Biphenyls (PCBs)

For 2003, 2 facilities reported the use of polychlorinated biphenyls (PCBs). Table 13 shows the breakdown of PCB use. Nearly 100% of total use of PCBs was attributed to one facility that recycled fluorescent light fixture ballasts and other equipment. This facility also accounted for nearly all of the byproduct and of transfers off-site of PCBs. The other facility reported the coincidental generation of PCBs in the manufacture of organic pigments, in accordance with EPA's guidance for reporting PCBs.

Table 13
2003 PCBs Summary
(in pounds)

Activity / Facility Type	Number of Facilities	Total Use	Byproduct	Shipped in Product	On-site Releases	Transfers Off-site
Recycler: Lamp / ballast recycling	1	37,303	37,303	0	0	37,303
Manufacturer: coincidentally generates PCBs in manufacture of organic pigments	1	22	0	22	0	0
Total	2	37,325	37,303	22	0	64,963

Tetrabromobisphenol A

One facility reported the use of tetrabromobisphenol A. The facility incorporated tetrabromobisphenol A into their products, which are flame-retardant compounds. The facility's total use was 152 pounds; byproduct was 7 pounds; shipped in product was 145 pounds; on-site releases were 0 pounds; and off-site transfers were 7 pounds.

In 2002, this facility's total use was 19,057 pounds; byproduct was 532 pounds; shipped in product was 18,526 pounds; on-site releases were 15 pounds; and off-site transfers were 517 pounds. However, based on the facility's activity index, production associated with this chemical decreased by 90 percent.

Hexachlorobenzene

Hexachlorobenzene was reported for the first time in 2003 by a plasticizer manufacturer. The facility's total use was 12 pounds; byproduct was 0 pounds; shipped in product was 0 pounds; on-site releases were 0 pounds; and off-site transfers were 0 pounds. The hexachlorobenzene was destroyed in processing so that there were no byproduct, releases or transfers.

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 2003, 17 facilities reported the use of dioxin and dioxin-like compounds, seven of which were MWCs and six of which were power plants. For MWCs and power plants, dioxin is a byproduct of combustion. Of the 2,197.67 grams of dioxin reported by MWCs as on-site releases, 17.04 grams were air emissions and 2,180.63 grams were in ash disposed in on-site landfills. The 9,616.71 grams of dioxins reported as transferred off-site were in ash disposed in off-site landfills. Two pulp and paper manufacturers also reported dioxin. Table 14 shows the breakdown of dioxin and dioxin-like compounds use.

Table 14
2003 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
Municipal Waste Combustors	7	11,814.38	11,817.38	0	2,197.67	9,616.71
Power Plants: dioxin coincidentally generated	6	10.51	10.21	0	10.31	0
Pulp and Paper Manufacturer: dioxin coincidentally generated via paper bleaching	2	1.20	1.20	0	0 .06	0.99
Miscellaneous Manufacturers	2	0.56	0.19	0.04	0.17	0.02
Total	17	11,826.65	11,825.98	0.04	2,208.11	9,617.71

Lead and Lead Compounds

For 2003, 137 facilities reported the use of lead and 115 reported the use of lead compounds. The largest use of lead was reported by MWCs (2,642,987 pounds or 79% of total lead use), due to lead in the trash that MWCs combust. Nearly 100% of this lead becomes chemically and physically bound in ash that is disposed in lined on-site or off-site landfills. (Note that of the 819,467 pounds of on-site releases of lead, 818,534 pounds were in ash and 933 pounds were released as air emissions.) The 1,823,519 pounds of lead reported as transferred off site was in ash disposed in off-site landfills.

The second largest use was in the fabricated metals sector (363,406 pounds or 11% of the total reported use), where the metal is used to create cans, drums, plumbing fixtures and other metal objects.

The electronic equipment industry (i.e., printed circuit boards, semiconductors) represented the largest number of filers (37) as a distinct group. This sector reported a total use of 119,651 pounds or 4% of the total reported. Typically, facilities in this sector use lead in soldering operations. Table 15 shows the breakdown of lead use.

Table 15
2003 Lead Summary
(in pounds)

Activity / Facility Type	Number of Facilities	Total Use	Byproduct	Shipped in Product	On-site Releases	Transfers Off-site
Municipal Waste Combustors	7	2,642,987	2,642,987	0	819,467	1,823,519
Fabricated Metals Manufacturers	22	363,406	109,027	273,370	594	110,074
Primary Metals Manufacturers	8	157,742	8,862	148,862	38	8,850
Electronic Equipment Manufacturers	37	119,651	43,919	86,868	39	45,806
Other Industries	63	48,310	7,434	47,305	13,711	5,619
Total	137	3,354,819	2,812,230	556,405	833,850	1,993,868

The largest reported use of lead compounds was in the wire and cable sector (2,622,713 pounds or 40% of total lead compounds use). In this sector, lead compounds are mostly used as heat stabilizers in wire insulation.

Together, the 10 facilities in the rubber and plastics accounted for 28% (or 1,856,941 pounds) of the total lead compounds use. In this sector, lead compounds are mostly compounded into resins and used as heat stabilizers to protect plastic and rubber polymers from degrading during heat processing.

One hazardous waste treatment, storage and disposal facility (TSDF) accounted for 1,372,798 pounds of lead compounds use or 21% of total use. The annual amounts processed by this facility can vary greatly from year to year. Table 16 shows the breakdown of lead compounds use.

Table 16
2003 Lead Compounds Summary
(in pounds)

Activity / Facility Type	Number of Facilities	Total Use	Byproduct	Shipped in Product	On-site Releases	Transfers Off-site
Rubber and Plastics Manufacturers	10	1,856,941	7,424	1,842,281	222	4,642
Wire & Cable Manufacturers	21	2,622,713	129,567	1,553,235	70	128,536
Chemicals & Allied Products	12	304,619	973	189,465	538	435
Hazardous Waste Facility	1	714,118	652,125	0	0	1,253,624
Other Industries	71	455,141	92,563	299,975	5,912	89,313
Total	115	5,953,532	882,652	3,885,343	6,731	1,476,681

IV. 2003 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, must report their chemical use if they exceed certain thresholds.

Figure 8 shows the number of TURA reporting facilities in each industry sector. The Chemicals and Allied Products sector represents approximately 15% (99 facilities) of the number of TURA reporting facilities, and uses 77% of the reportable TURA chemicals (see Figure 9). This sector is a diverse group of industries, and includes companies that manufacture or formulate adhesives, paints, pharmaceuticals, and plastic materials and resins. Approximately 38% 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 8 - 2003 Number of Facilities By Industrial Sector
Total Number of Facilities = 647

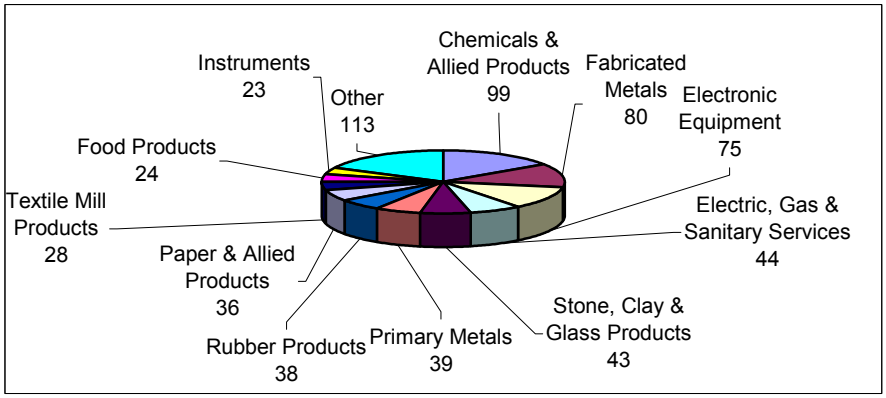
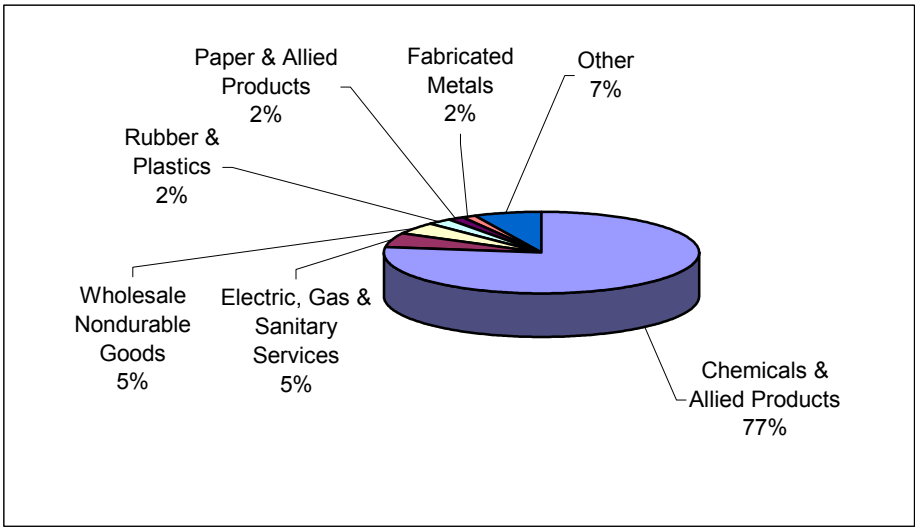


Figure 9 - 2003 Chemical Use By Industrial Sector
Total Use = 1,192,000,000 Pounds



The Electric, Gas and Sanitary Services and the Wholesale Nondurable Goods sectors, the second largest chemical users, each accounted for 5% of total statewide use. The 44 facilities reporting in the Electric, Gas and Sanitary Services sector are primarily involved in the production of electricity. The activities of the Wholesale Nondurable Goods sector involve repackaging of chemicals for sale to other sectors. The Rubber and Plastics, Paper and Allied Products and Fabricated Metals sectors each accounted for 2% of chemical use, leaving the balance of statewide use (7%) to a variety of sectors.

Figure 10 shows byproduct generation by industrial sector. While the Chemical and Allied Products sector accounted for 77% of total statewide use, this sector produced 33% of the total byproduct generated in 2003. In contrast, the Paper and Allied Products sector, which accounted for 2% of total statewide chemical use, accounted for 9% of the byproduct generated.

The Electric, Gas and Sanitary Services sector accounted for 12% of total byproduct generated. The Textile Mill Products and the Paper and Allied Products sectors each accounted for 9% of the byproduct generated. Other major industries that generated byproduct include the Rubber and Plastics and Fabricated Metals sectors, each accounting for 8% of the byproduct generated. The Electronic Equipment sector accounted for 6% of the byproduct generated. The remaining 15% of byproduct was attributed to a variety of sectors.

Figure 10 - 2003 Byproduct Generation By Industrial Sector
Total Byproduct = 108,000,000 Pounds

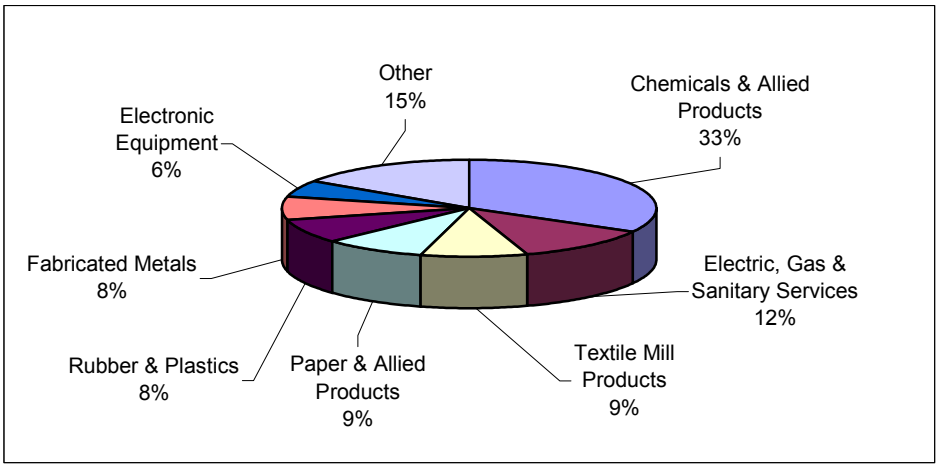


Figure 11 shows on-site releases to the environment by industrial sector. The Electric, Gas and Sanitary Services sector, which represented 5% of total statewide use, was the largest source of on-site releases, accounting for 58% of all on-site releases. This sector provides power for Massachusetts businesses and citizens. Fifty-three percent of on-site releases in this sector were attributed to the coincidental manufacture of hydrochloric acid during combustion. The Chemicals and Allied Products sector accounted for 77% of total chemical use and only 9% of total on-site releases to the environment. The other major sectors producing on-site releases were the Fabricated Metals sector (7% of total on-site releases), and the Paper and Allied Products sector (5% of total on-site releases), and the Textile Mill Products sector (4% of total on-site releases).

Figure 11 - 2003 On-Site Releases By Industrial Sector
Total On-Site Releases = 9,000,000 Pounds

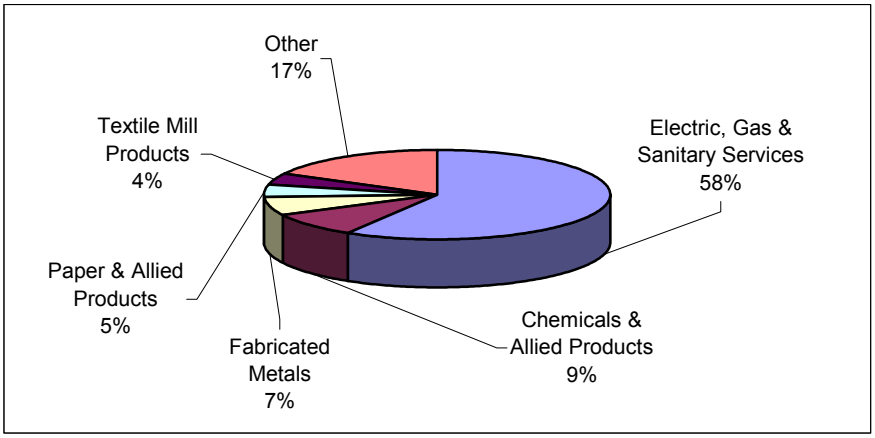
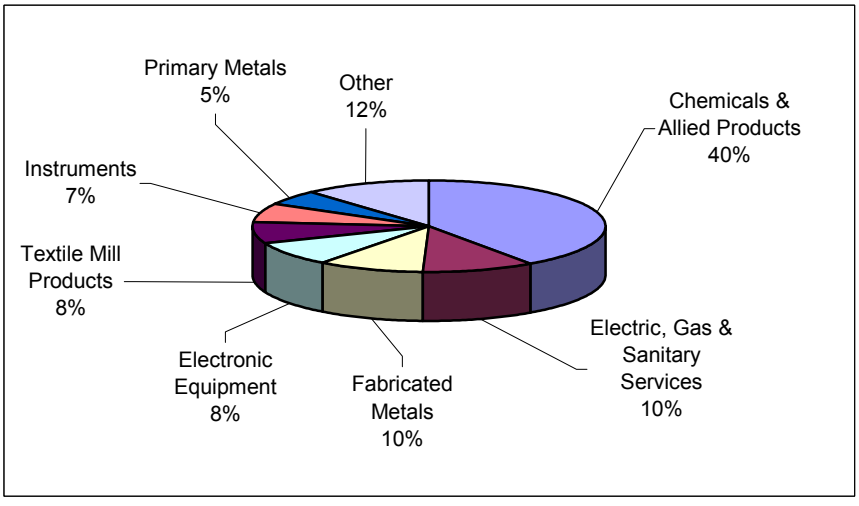


Figure 12 shows transfers off-site by industrial sector. The Chemicals and Allied Products sector accounted for 40%, and the Electric, Gas and Sanitary Services and Fabricated Metals sectors each accounted for 10% of transfers off-site. The third largest sectors in this category, the Electronic Equipment and Textile Mill Products sectors, each accounted for 8% of transfers off-site. The other major sectors accounting for transfers off-site were the Instruments sector (7% of total transfers off-site), and the Primary Metals sector (5% of total transfers off-site).

Figure 12 - Transfers Off-Site By Industrial Sector
Total Transfers Off-Site = 35,000,000 Pounds



V. 2003 Major TURA Facilities

Top 5 Facilities with the Largest Reduction in Byproduct Generation from 2002 to 2003 While Implementing Toxics Use Reduction

Table 17 lists the 5 facilities that showed the largest byproduct reductions from 2002 to 2003 attributed to toxics use reduction. While individual changes in production varied, these facilities either reported increased production or reported substantially more byproduct reduction than could be attributed to reduced manufacturing activity. Overall, this group of facilities showed an increase in production levels over 2002. Specific descriptions of toxics use reduction efforts are found below.

Table 17
Facilities with the Top Reductions in Byproduct Generation While Implementing Toxics Use Reduction (2002-2003)

Company	Reduction in Byproduct (Lbs.)	Toxics Use Reduction Techniques Used
1. Bostik Findley, Inc. (Middleton)	1,033,920 (33% decrease)	Product Reformulation
2. Ideal Tape Company, Inc. (Lowell)	471,516 (28% decrease)	Byproduct as Product
3. InteliCoat Technologies, LLC (South Hadley)	298,963 (12% decrease)	Product Reformulation
4. The Gillette Company (Boston)	145,123 (70% decrease)	Production Unit Modernization
5. Crown Cork & Seal Company (Lawrence)	135,914 (18% decrease)	Improved Operation & Maintenance of Production Unit Equipment and Methods; Recycling, Reuse, or Extended Use of Toxics

Bostik Findley, Inc.

Bostik Findley, Inc. (now known as Bostik, Inc.) is a manufacturer of adhesives and sealants. Its products are used in the flooring, automotive, aircraft, and textile industries, as well as many other industries.

Bostik Findley's corporate policy is to use clean technologies, "whenever possible, in particular with regard to the reduction at source of emissions and byproducts." It also has numerous projects in place to replace solvent-based adhesives in order to minimize volatile organic compound (VOC) emissions. In 2003, Bostik Findley's Middleton, Massachusetts facility introduced several new low-VOC products and achieved a 33% reduction in their tetrahydrofuran use and byproduct.

Ideal Tape Company, Inc.

Ideal Tape Company, Inc. manufactures a variety of pressure-sensitive adhesive tapes for uses ranging from thermal and electrical insulation to shoe manufacturing. This is the second year in a row that Ideal Tape appears on this "Top 5" list.

Ideal Tape uses a number of solvents in their production process. As part of the company's effort to reduce solvent use and waste, it organized a toxics use reduction team and changed its production schedule to minimize equipment and feedstock changeovers. The company has continued its work, started in 2002, with another company that is able to use the recovered solvent as paint thinner, (i.e., byproduct as a product) as a method to not only benefit Ideal Tape economically, but also to significantly reduce the amount of toluene byproduct.

InteliCoat Technologies, LLC

InteliCoat Technologies develops and manufactures precision-coated specialty materials for the imaging, electronics, and medical device industries. In addition to providing custom coating and laminating services, it also develops and markets a number of branded products.

Specific reductions of byproduct in 2003 are particularly attributed to developing an ISO14001 compliant environmental management system during that year and efforts by the Research and Development Department. R & D is encouraged to develop water-based instead of solvent-based formulations, and due to an increasing demand for water-based products, this strategy also contributed to an increase in production in 2003.

The Gillette Company

The Gillette Company's South Boston Manufacturing Center (SBMC) is the largest[8] blade and razor manufacturing facility in the world, and employs approximately 2,000 people. Its manufacturing operations include plastic injection molding; plastic extrusion; metal stamping, forming, and fabrication; heat treating; and aqueous cleaning.

The SBMC has made significant reductions in waste generation, water usage, material usage, and increases in employee environmental awareness over the past several years. Most recently, in 2003, the SBMC facilities department proposed replacing the deionized water system with a reverse osmosis system for supplying water to its co-generation plant for steam production. The result was that the SBMC eliminated its need for sodium hydroxide and sulfuric acid during the summer of 2003 as these chemicals were no longer needed for regenerating the deionized water system resins.

Crown Cork & Seal Company

Crown Cork & Seal Company manufactures 12-ounce aluminum beverage cans. Crown's byproduct reduction has been primarily driven by cost. Sulfuric acid byproduct has been significantly reduced through water conservation efforts and the installation of coalescers to remove oil from this water. Because of these efforts, less sulfuric acid is required to maintain the necessary pH and Crown is able to reuse more water. More efficient use of coatings has further reduced the overall amount of byproduct at this facility.

[8] The Gillette Company, South Boston Manufacturing Center, Background Information Fact Sheet, Revised 6/28/05.

Top 20 Facility Lists

Table 18 lists the 20 facilities that used the largest quantity of TURA chemicals. These 20 facilities used 892 million pounds, or 75% of total statewide use.

Table 18 – 2003 Top 20 Facilities
(Largest Quantity of Total Use)

Total Use *These quantities include Trade Secret*		
Facility Name	**Town**	**Total Use (Lbs.)**
Nova Chemicals Inc.	Springfield	274,449,103
Solutia Inc. - Indian Orchard Plant	Springfield	96,108,962
American Polymers	Oxford	80,397,294
Borden & Remington	Fall River	75,481,038
Eastman Gelatine Corporation	Peabody	65,677,326
Surface Specialties Inc.	Springfield	56,728,496
Holland Company Inc.	Adams	41,039,700
Elite Consumer Products	Ludlow	31,471,289
Northwin LTD	Leominster	26,375,388
Astro Chemicals Inc.	Springfield	25,335,298
Fox Packaging Co.	Ayer	18,652,636
Ashland Distribution Co.	Tewksbury	16,791,908
Houghton Chemical Corp.	Boston	15,172,180
Omnova Solutions Inc.	Fitchburg	14,383,570
SEMASS Partnership	Rochester	11,458,121
Mirant New England Inc.	Sandwich	10,060,903
Hercules Inc.	Chicopee	8,903,969
Medical Area Total Energy Plant LLC	Boston	8,330,752
Leggett & Platt Inc.	Newburyport	7,733,489
Callahan Company	Walpole	7,663,381

Table 19 lists the 20 facilities that generated the largest quantity of byproduct. These facilities generated 60 million pounds of byproduct, or 55% of total statewide byproduct.

Table 19 also lists the 20 facilities with the largest quantity shipped in product. These facilities shipped 292 million pounds in product, or 81% of total shipped in product statewide.

Table 19 - 2003 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 Corporation	Peabody	16,160,066	Borden & Remington	Fall River	75,369,986
Flexcon Co. Inc. Plant 2	Spencer	5,884,985	Solutia Inc. Indian Orchard Plant	Springfield	32,007,216
Surface Specialties Inc.	Springfield	5,035,800	Northwin LTD	Leominster	26,366,876
Solutia Inc. Indian Orchard Plant	Springfield	3,459,709	Elite Consumer Products	Ludlow	24,781,592
Venture Tape	Rockland	3,328,837	Astro Chemicals Inc.	Springfield	23,837,537
Precision Lithograining Corp.	South Hadley	2,533,381	Fox Packaging Co.	Ayer	18,649,468
Mirant New England Inc.	Sandwich	2,437,496	Ashland Distribution Co.	Tewksbury	16,377,077
Polaroid Corp.	Waltham	2,197,101	Houghton Chemical Corp.	Boston	15,152,169
Intelicoat Technologies Inc.	South Hadley	2,153,623	Callahan Company	Walpole	7,587,123
Bostik Findley Inc.	Middleton	2,088,670	Holland Company Inc.	Adams	7,287,000
Intel Corp.	Hudson	1,948,611	ITW TACC	Rockland	7,270,412
Allegheny Rodney Strip Division	New Bedford	1,757,556	Surface Specialties Inc.	Springfield	6,477,603
USGen New England Inc. Brayton Point	Somerset	1,515,088	Rohm & Haas Electronic Materials LLC	Marlborough	5,529,810
Cranston Print Works	Webster	1,398,229	Webco Chemical Corp.	Dudley	5,285,996
BBA Nonwovens	Colrain	1,384,418	Surface Coatings Inc.	Wilmington	3,988,451
Clean Harbors Environmental Services Inc.	Braintree	1,305,435	Univar USA Inc.	Salem	3,412,428
Bradford Industries	Lowell	1,292,001	Savogran Company	Norwood	3,213,311
Holyoke Water Power Co.	Holyoke	1,283,136	Bostik Findley Inc.	Middleton	3,163,489
Madico Inc.	Woburn	1,241,546	Stahl USA Inc.	Peabody	3,004,245
Sanmina-SCI Corp.	Wilmington	1,232,159	Perstorp Compounds Inc.	Florence	2,790,640

Table 20 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 6 million pounds, or 70% of total releases statewide. Eight of these facilities were power plants, accounting for almost 4 million pounds, or 42% of total on-site releases. Over 2 million pounds, or 62% of the 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: sulfuric acid (13%), ammonia (13%), hydrogen fluoride (6%), and metal compounds (5%). Four of the Top 20 facilities were municipal waste combustors (MWCs) that reported combustion-related emissions for the first time in 2003. Of the 1.4 million pounds of on-site releases reported by MWCs, 36% of the releases was due to the coincidental manufacture of hydrochloric acid during combustion and 63% was due to lead in ash disposed in on-site lined landfills at two of the facilities.

The 20 facilities with the largest quantity of transfers off-site transferred 22 million pounds, or 62% of the total transfers off-site statewide.

Table 20 – 2003 Top 20 Facilities
(Largest Quantity of On-Site Releases and Transfers Off-Site)

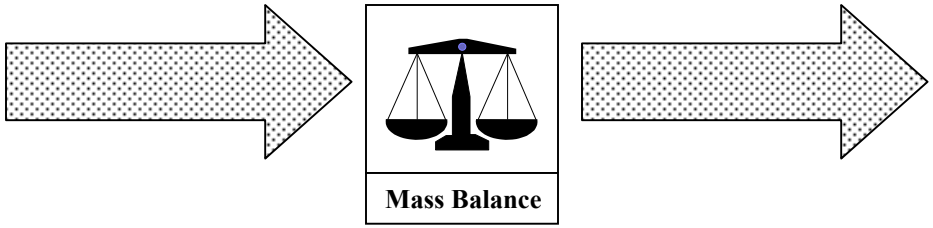
On-Site Releases *These quantities include Trade Secret*			**Transfers Off-Site** *These quantities include Trade Secret*		
Facility Name	**Town**	**On-Site Releases (Lbs.)**	**Facility Name**	**Town**	**Transfers Off-Site (Lbs.)**
USGen New England Inc. Brayton Point	Somerset	1,193,565	Surface Specialties Inc.	Springfield	4,468,464
Holyoke Water Power Co.	Holyoke	993,151	Solutia Inc. Indian Orchard Plant	Springfield	2,229,710
Wheelabrator Saugus JV	Saugus	482,737	Polaroid Corp.	Waltham	1,781,486
Mirant New England Inc.	Sandwich	482,633	Clean Harbors Environmental Services Inc.	Braintree	1,600,032
USGen New England Inc.	Salem	415,168	Intel Corp.	Hudson	1,056,761
Covanta Haverhill Inc.	Haverhill	412,385	Chemdesign Corp.	Fitchburg	1,001,594
Crown Beverage Packaging USA	Lawrence	368,000	Genzyme Corp.	Boston	960,652
SEMASS Partnership	Rochester	338,298	Lewcott Corporation	Millbury	933,259
Boston Generating Mystic LLC	Everett	307,978	Engineered Materials Solutions Inc.	Attleboro	925,950
Somerset Power LLC	Somerset	216,861	Allegheny Rodney Strip Division	New Bedford	844,635
Solutia Inc. Indian Orchard Plant	Springfield	194,546	Sanmina-SCI Corp.	Wilmington	816,209
Ideal Tape Company	Lowell	145,202	Ideal Tape Company	Lowell	753,032
Hollingsworth & Vose Company	West Groton	113,914	SEMASS Partnership	Rochester	728, 511
Alliance Leather Inc.	Peabody	90,352	Borregaard Synthesis Inc.	Newburyport	715,245
Trigen Boston Energy Corporation	Boston	88,579	Waters Corp.	Taunton	619,359
Masspower Inc.	Springfield	86,090	Flexcon Co. Inc. Plant 2	Spencer	569,888
Proma Technologies Inc.	Franklin	83,563	Brittany Dyeing & Printing Corp.	New Bedford	531,502
Saint Gobain Abrasives Inc.	Worcester	82,103	Avecia Biotechnology Inc.	Milford	488,321
JG MacLellan Concrete Co. Inc.	Wakefield	78,686	Duncan Galvanizing Corporation	Everett	458,887
Wheelabrator Millbury Inc.	Millbury	69,838	Precision Lithograining Corp.	South Hadley	429,964

VI. Key TURA Terms

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 TURA filers and chemicals that were subject to TURA reporting in 2000 and remained subject to reporting in 2003. The 2000 Core Group was created for the first time in the 2002 Information Release to more accurately represent TURA progress from a 2000 baseline year.
1990 CORE GROUP - includes all TURA filers and chemicals that were subject to TURA reporting in 1990 and remained subject to reporting in 2003. The 1990 Core Group was used to measure progress from 1990 to 2003 and is being shown in the 2003 Information Release for comparison with previous years' data.

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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