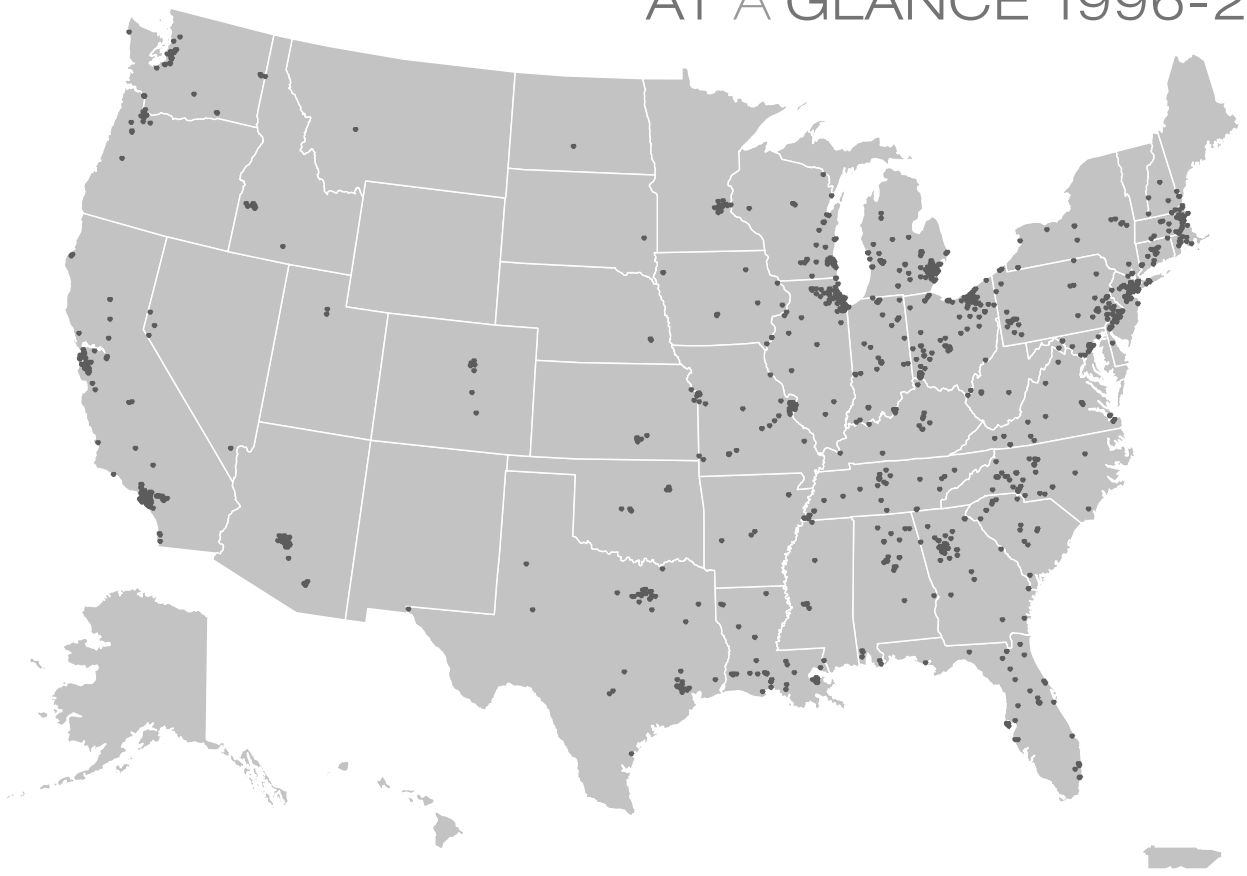
PAINT & COATINGS

AT A GLANCE 1996-2005[1]



Latest Environmental Statistics[2]

Emissions of Criteria Air Pollutants: 10,300 tons

Releases of Chemicals Reported to TRI: 5.3 million lbs.

Air Emissions: 4 million lbs.

Water Discharges: 9,900 lbs.

Waste Disposals: 1.3 million lbs.

Recycling, Energy Recovery, or Treatment: 116.3 million lbs.

Hazardous Waste Generated: 146,000 tons

Hazardous Waste Managed: 148,000 tons

The data discussed in this report are drawn from multiple public and private sources. See the Data Guide *and the* Data Sources, Methodologies, and Considerations *chapter for important information and qualifications about how data are generated, synthesized, and presented.*

Profile

The Paint & Coatings sector[3] manufactures a variety of products that preserve, protect, and beautify the objects to which they are applied. The main types of Paint & Coatings products include:

- **Architectural coatings**—interior and exterior paints, primers, sealers, and varnishes.
- **Industrial coatings**—factory-applied to manufactured goods during production.
- **Special-purpose coatings**—aerosol paints, marine paints, high-performance coatings, and automotive refinish paints.
- **Allied paint products**—putties, paint and varnish removers, paint thinners, pigment dispersions, paint brush cleaners, and frit (ground glass or glaze).

Energy Use

In 2002, the Paint & Coatings sector purchased about 1.6 billion kilowatt hours of electricity for heat and power, which represented well under 1% of the total quantity of electricity purchased for heat and power by U.S. manufacturers.[4] Data on fossil fuel consumption are not currently available.

Air Emissions

Air emissions from the sector include criteria air pollutants (CAPs), greenhouse gases (GHGs), and a number of chemicals reported to EPA's Toxics Release Inventory (TRI). In general, the "toxic chemicals" tracked by TRI are found in the raw materials used as formulation ingredients in the manufacturing process.

Air Emissions Reported to TRI

In 2005, 441 facilities in this sector reported 4 million lbs. of absolute air emissions to TRI. Between 1996 and 2005, absolute TRI-reported air emissions declined by about 57%, as shown in Figure 1a. When normalized by the value of shipments VOS over this period, air emissions declined by about the same amount, as seen in Figure 1b. The normalized and absolute data are similar because production remained relatively steady over the period.

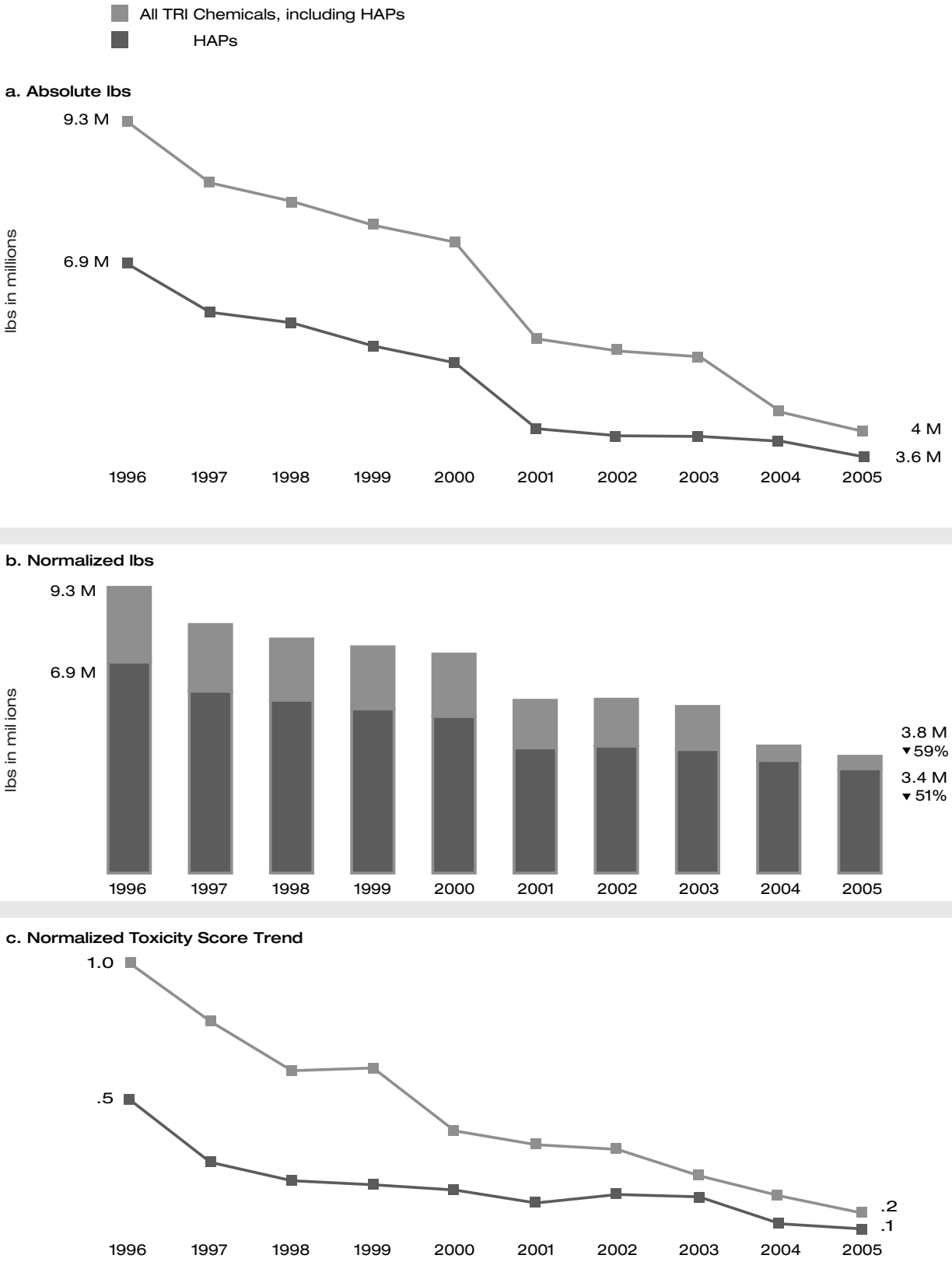
To consider toxicity of air emissions, EPA's Risk-Screening Environmental Indicators (RSEI) model assigns every TRI chemical a relative toxicity weight, then multiplies the pounds of media-specific releases (e.g., pounds of mercury released to air) by a chemical-specific toxicity weight to calculate a relative Toxicity Score. RSEI methodological considerations are discussed in greater detail in the Data Guide, which explains the underlying assumptions and important limitations of RSEI.

Data are not reported to TRI in sufficient detail to distinguish which forms of certain chemicals within a chemical category are being emitted. For chemical categories such as chromium, the toxicity model conservatively assumes that chemicals are emitted in the form with the highest toxicity weight (e.g., hexavalent chromium); thus, Toxicity Scores are overestimated for some chemical categories.

Summing the Toxicity Scores for all of the air emissions reported to TRI by the sector produces the trend illustrated

FIGURE 1

Air Emissions Reported to TRI 1996–2005



Note:
Normalized by annual value of shipments.

Sources: U.S. Environmental Protection Agency, U.S. Department of Commerce

in Figure 1c. The sector's total Toxicity Score, normalized by value of shipments, declined by more than 80% from 1996 to 2005.[5]

The TRI list of toxic chemicals includes all but six of the hazardous air pollutants (HAPs) regulated under the Clean Air Act. In absolute pounds, HAPs accounted for most (90%) of the sector's pounds of air emissions reported to TRI in 2005; therefore, trends in HAP emissions showed very similar declines to the trends in air emissions for all TRI chemicals when based on either pounds reported or the Toxicity Scores.[6]

Table 1 presents the top TRI-reported chemicals emitted to air by the sector based on three indicators. Each indicator provides data that environmental managers, trade associations, or government agencies might use in considering sector-based environmental management strategies.

1) Absolute Pounds Reported. Xylene and toluene, organic solvents used as carriers in paints, were the highest-ranking chemicals based on the pounds of each chemical emitted to air in 2005.
2) Percentage of Toxicity Score. The top chemicals based on Toxicity Scores included chromium, nickel, and 1,2,4-trimethylbenzene.
3) Number of Facilities Reporting. Xylene and toluene were also the most frequently reported chemicals, with approximately half of the TRI-reporting facilities in the sector reporting air emissions of each of these chemicals.

TABLE 1
Top TRI Air Emissions 2005

Chemical	Absolute Pounds Reported[1]	Percentage Toxicity Score	Number of Facilities Reporting[2]
1,2,4-Trimethylbenzene	142,000	14%[3]	113
Certain Glycol Ethers	232,000	7%	193
Chromium	860	24%[4]	29
Diisocyanates	140	8%[5]	10
Ethyl Benzene[6]	215,000	<1%	136
Methanol	408,000	<1%	68
Methyl Isobutyl Ketone	189,000	<1%	114
Nickel	1,400	16%	6
Toluene	859,000	<1%	216
Xylene (Mixed Isomers)	1,140,000	7%	275
Percentage of Sector Total	80%[7]	75%[8]	82%[9]

Notes:
1. Total sector air releases: 4 million lbs.
2. 441 total TRI reporters in the sector.
3. Red indicates that the chemical is one of the top five chemicals reported in the given category.
4. The toxicity score for chromium was based on the conservative assumption that all of the chromium air emissions by TRI reporting facilities in the Paint and Coatings sector are hexavalent chromium. EPA's National Emissions Inventory estimates that only 25% of the chromium emissions from this sector are hexavalent chromium, and the balance are trivalent chromium, which has a substantially lower toxicity weight.
5. The toxicity score for diisocyanates was based on the conservative assumption that all of the diisocyanates emitted to air by TRI reporting facilities in the Paint & Coatings sector are hexamethylene diisocyanate. Preliminary analysis indicates that methylene diphenyl diisocyanate, and other diisocyanate chemicals that have lower toxicity weights, may constitute the majority of the reported diisocyanate emissions from this sector.
6. *Italics* indicate a hazardous air pollutant under section 112 of Clean Air Act.
7. Chemicals in this list represent 80% of the sector's air emissions.
8. Chemicals in this list represent 75% of the sector's Toxicity Score.
9. 82% of facilities reported emitting one or more chemicals in this list.

Source: U.S. Environmental Protection Agency

Criteria Air Pollutants

Table 2 shows CAP and volatile organic compound (VOC) emissions from the sector for more than 340 manufacturers in 2002.[7] VOCs emitted during the production and use of the sector's products have the largest impact on ambient air quality of any of the pollutants listed in Table 2. VOC emissions result primarily from the use of organic solvents to formulate paint and coating products.

TABLE 2
Criteria Air Pollutant and VOC Emissions 2002

	Tons
SO_2	50
NO_X	400
PM_{10}	600
$PM_{2.5}$	400
CO	3,000
VOCs	6,000

Notes:
1. PM_{10} includes $PM_{2.5}$ emissions.
2. The majority of CO emissions in 2002 were reported by a single fac lity.

Source: U.S. Environmental Protection Agency

Recent regulatory developments and the continuing market trend toward water-based coatings, powder coatings, ultraviolet cure coatings, and other lower-emitting coating products have contributed to reductions in VOC emissions from production in recent years. Still, VOC emissions from the sector's production activities continue to be dwarfed by VOC emissions that occur at the point of use. In 2002, Paint & Coatings manufacturers emitted 6,000 tons of VOCs, while VOC emissions resulting from the use of paint and coating products was over 2 million tons.[8]

Water Use and Discharges

Water serves as a major formulation ingredient in many of the sector's products. Water-based products include many paints, aerosols, inks, and coatings. Additionally, many types of manufacturing cleanup processes require water. The sector's wastewater is usually discharged to Publicly

Owned Treatment Works, but may also be discharged directly to waterways, necessitating a National Pollutant Discharge Elimination System permit.

TRI tracks TRI chemicals discharged to water from those facilities in the sector subject to TRI reporting requirements. In 2005, 39 facilities in this sector reported water discharges of TRI chemicals totaling 9,900 lbs.[9] This quantity represents a decline of almost 50% between 1996 and 2005.[10] In 2000, EPA randomly surveyed 292 Paint & Coatings facilities to collect data for its Paint Production Waste Listing Determination.[11] EPA extrapolated from this survey to estimate that the quantity of wastewaters (both nonhazardous and hazardous) generated in 1998 from all facilities in the targeted paint manufacturing industry was approximately 15.6 million gallons.[12]

Waste Generation and Management

Wastes in the Paint & Coatings sector can be generated from process-related functions or from other activities, such as operation of pollution control devices or remediation of past contamination.

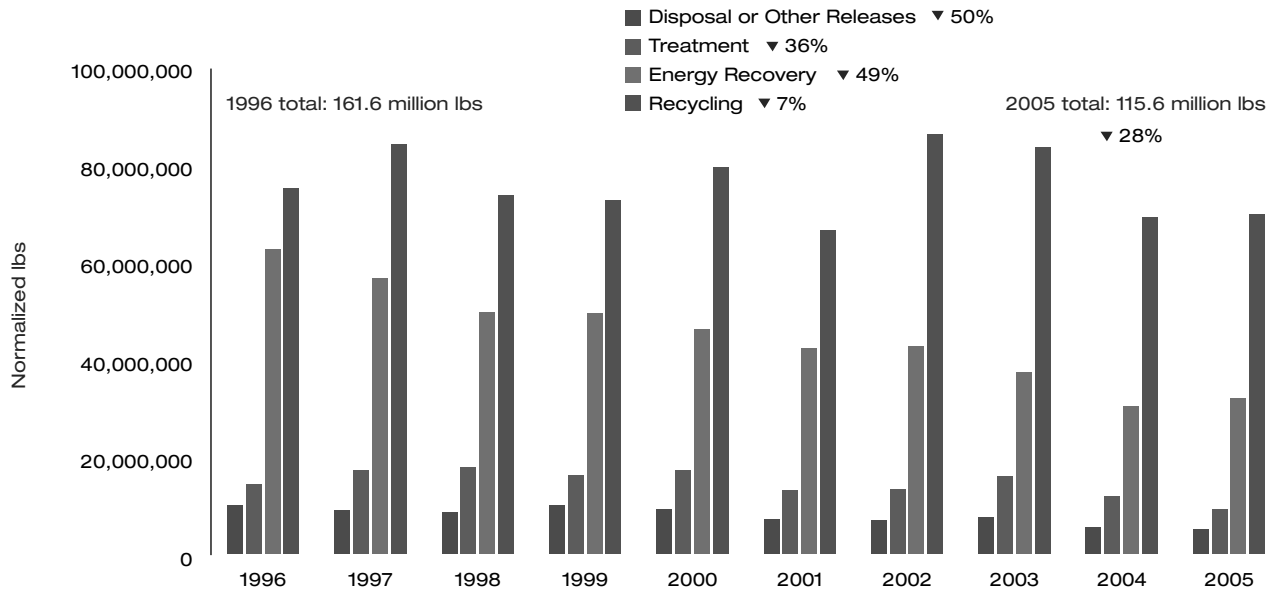
Hazardous Waste Management

In 2005, 396 Paint & Coatings manufacturers reported to EPA's *National Biennial RCRA Hazardous Waste Report* (BR) generating 146,000 tons of hazardous waste.[13] Cleaning out equipment (e.g., cleaning out mixing tanks between batches), solvent distillation, and discarding off-spec chemicals (e.g., off-spec or out-of-date products) accounted for approximately half of the industry's hazardous waste generation. A large portion of the remaining hazardous waste generation appears to be attributable to a small number of resin or other chemical manufacturing operations that are co-located within the sector's facilities.[14] The sector reported managing 148,000 tons of hazardous waste. Most of the sector's hazardous waste, regulated by the Resource Conservation and Recovery Act (RCRA), was managed through reclamation and recovery activities (predominantly fuel blending and solvents recovery), and treatment.[15]

Waste Management Reported to TRI

In 2005, facilities in the Paint & Coatings sector reported managing 121.5 million absolute lbs. of TRI chemicals in waste. As shown in Figure 2, when normalized by annual VOS, total waste managed declined 28% between 1996 and 2005. Figure 2 also shows how the sector has managed this waste over time.[16] In 2005, 4% of the absolute pounds of TRI-reported waste was released (to air or water) or disposed, while 8% was treated, 28% was recovered for energy use, and 60% was recycled, demonstrating the importance of recycling and fuel blending (a form of energy recovery) in the sector's waste management practices.

FIGURE 2
TRI Waste Management 1996–2005



Notes:
1. Normalized by annual value of shipments.
2. Disposal or other releases include air releases, water discharges, and land disposals.

Sources: U.S. Environmental Protection Agency, U.S. Department of Commerce