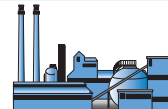


## **Chapter 5**

# **Toxics Release Inventory Data for Original Reporting Industries**

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## Chapter 5



# Toxics Release Inventory Data for Original Reporting Industries

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This chapter provides an overview of 1999 TRI data by industry sector for the 20 industries that have been required to report to TRI since the program began in 1987. Analyses of TRI reporting by the industries added in 1998 and federal facilities appear in Chapter 4.

The chapter summarizes release and other waste management data by industry for 1999 and for 1995 to 1999. Changes in on- and off-site releases are measured since 1988, and other waste management data are reviewed for 1991 to 1999. The discussion in **Making Year-to-Year Comparisons of TRI Data** in Chapter 1 is important for accurate interpretation of these data because of the significant changes in TRI over time.

Box 5-1 lists the original TRI industries by Standard Industrial Classification (SIC) code. Tables in this chapter also present data submitted on TRI chemical forms that report more than one SIC code in the manufacturing sector. Box 5-2 explains EPA's method for analyzing this "multiple-codes" group, as well as the "no-codes" group.

### TRI DATA BY INDUSTRY, 1999

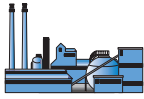
In 1999, a total of 20,698 facilities in the original TRI industries submitted 69,471 forms, as shown in Table 5-1. The chemical manufacturing industry submitted the

largest number of forms, 20,382. The fabricated metals industry ranked second, with 7,459 forms, followed by the primary metals industry, with 6,819 forms. Together, these three industries submitted nearly half (49.9 percent) of the forms for 1999 from the original industries covered by TRI.

### On- and Off-site Releases, 1999

On- and off-site releases by the original industries totaled 2.44 billion pounds in 1999, and two industries reported more than half of that total. As shown in Table 5-2, the primary metals industry reported 683.7 million pounds of total releases, and the chemical manufacturing industry reported 670.5 million pounds. These amounts represented 28.0 percent and 27.5 percent, respectively, of all on- and off-site releases reported by the original industries, as illustrated in Figure 5-1. The paper products industry ranked third for total on- and off-site releases, with 225.6 million pounds, or 9.2 percent of the total.

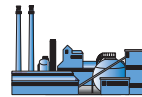
Four other industry groups reported more than 100 million pounds each. The "multiple-codes" group ranked fourth among original industries, with 129.1 million pounds, 5.3 percent of the total. Food industries ranked fifth, with 123.2 million pounds, followed by the transportation equipment industry, with 105.0 million pounds and plastics, with 103.6 million pounds. Each of these four groups account-



**Box 5-1. Standard Industrial Classification (SIC) Codes for the Original TRI Industries**

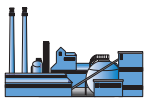
- 20 Food and kindred products**  
Manufacture or processing of foods and beverages for human consumption, and related products, such as manufactured ice, chewing gum, vegetable and animal fats and oils, and prepared feeds for animals and fowls.
- 21 Tobacco products**  
Manufacture of cigarettes, cigars, smoking and chewing tobacco, snuff, and reconstituted tobacco. Stemming and redrying of tobacco. Manufacture of non-tobacco cigarettes.
- 22 Textile mill products**  
Preparation of fiber and subsequent manufacture of yarn, thread, braids, twine, and cordage. Manufacture of broadwoven fabrics, narrow woven fabrics, knit fabrics, and carpets and rugs from yarn. Dyeing and finishing of fiber, yarn, fabrics, and knit apparel. Coating, waterproofing or otherwise treating fabrics. Integrated manufacture of knit apparel and other finished articles from yarn. Manufacture of felt goods, lace goods, nonwoven fabrics, and miscellaneous textiles.
- 23 Apparel and other finished products made from fabrics and similar materials**  
Production of clothing. Fabrication of products by cutting and sewing purchased woven or knit textile fabrics and related materials, such as leather, rubberized fabrics, plastics, and furs. Manufacture of clothing by cutting and joining (e.g., by adhesives) material such as paper and nonwoven textiles.
- 24 Lumber and wood products, except furniture**  
Cutting timber and pulpwood. Also, merchant sawmills, lath mills, shingle mills, cooperage stock mills, planing mills, and plywood mills and veneer mills engaged in producing lumber and wood basic materials. Manufacture of finished articles made entirely or mainly of wood or related materials.
- 25 Furniture and fixtures**  
Manufacture of household, office, public building, and restaurant furniture, and office and store fixtures.
- 26 Paper and allied products**  
Manufacture of pulps from wood and other cellulose fibers and from rags. Manufacture of paper and paperboard. Manufacture of paper and paperboard into converted products, such as paper coated off the paper machine, paper bags, paper boxes, and envelopes. Manufacture of bags from plastics film and sheet.
- 27 Printing, publishing, and allied industries**  
Printing by one or more common processes, such as letterpress, lithography (including offset), gravure, or screen. Bookbinding, platemaking, and other services performed for the printing trade. Publishing newspapers, books, and periodicals (whether or not the establishment also prints them).
- 28 Chemicals and allied products**  
Production of basic chemicals. Manufacture of products by predominantly chemical processes. (Three general classes of products: 1) basic chemicals, such as acids, alkalis, salts, and organic chemicals; 2) chemical products to be used in further manufacture, such as synthetic fibers, plastics materials, dry colors, and pigments; 3) finished chemical products to be used for ultimate consumption, such as drugs, cosmetics, and soaps, or to be used as materials or supplies in other industries, such as paints, fertilizers, and explosives.)
- 29 Petroleum refining and related industries**  
Production of gasoline, kerosene, distillate fuel oils, residual fuel oils, and lubricants, through fractionation or straight distillation of crude oil, redistillation of unfinished petroleum derivatives, cracking, or other processes. (Establishments also produce aliphatic and aromatic chemicals as byproducts.)
- 30 Rubber and miscellaneous plastics products**  
Manufacture of products, not elsewhere classified, from plastics resins and from natural, synthetic, or reclaimed rubber, gutta percha, balata, or gutta siak. Includes manufacture of tires.

*(continued)*

**Box 5-1. Standard Industrial Classification (SIC) Codes for the Original TRI Industries (continued)**

- 31 Leather and leather products**  
Tanning, currying, and finishing hides and skins. Converting leather. Manufacture of finished leather and artificial leather products and some similar products made of other materials.
- 32 Stone, clay, glass, and concrete products**  
Manufacture of flat glass and other glass products, cement, structural clay products, pottery, concrete and gypsum products, cut stone, abrasive and asbestos products, and other products from materials taken principally from the earth in the form of stone, clay, and sand. (May include mining and quarrying activities operated by manufacturing establishments in this group.)
- 33 Primary metal industries**  
Smelting and refining ferrous and nonferrous metals from ore, pig, or scrap. Rolling, drawing, and alloying metals. Manufacture of castings and other basic metal products. Manufacture of nails, spikes, and insulated wire and cable. Includes production of coke.
- 34 Fabricated metal products, except machinery and transportation equipment**  
Fabrication of ferrous and nonferrous metal products, such as metal cans, tinware, handtools, cutlery, general hardware, non-electric heating apparatus, fabricated structural metal products, metal forgings, metal stampings, ordnance (except vehicles and guided missiles), and a variety of metal and wire products, not elsewhere classified.
- 35 Industrial and commercial machinery and computer equipment**  
Manufacture of industrial and commercial machinery and equipment and computers. Manufacture of engines and turbines; farm and garden machinery; construction, mining, and oil field machinery; elevators and conveying equipment; hoists, cranes, monorails, and industrial trucks and tractors; metal working machinery; special industry machinery; general industrial machinery; computer and peripheral equipment and office machinery; and refrigeration and service industry machinery.
- 36 Electronic and other electrical equipment and components, except computer equipment**  
Manufacture of machinery, apparatus, and supplies for the generation, storage, transmission, transformation, and utilization of electrical energy. Manufacture of electricity distribution equipment, electrical industrial apparatus, household appliances, electrical lighting and wiring equipment, radio and television receiving equipment, communications equipment, electronic components and accessories, and other electrical equipment and supplies.
- 37 Transportation equipment**  
Manufacture of equipment for transportation of passengers and cargo by land, air, and water. Includes motor vehicles, aircraft, guided missiles and space vehicles, ships, boats, railroad equipment, and miscellaneous transportation equipment, such as motorcycles, bicycles, and snowmobiles.
- 38 Measuring, analyzing and controlling instruments, photographic, medical, and optical goods; watches and clocks**  
Manufacture of instruments (including professional and scientific) for measuring, testing, analyzing and controlling, and their associated sensors and accessories; optical instruments and lenses; surveying and drafting instruments; hydrological, hydrographic, meteorological, and geophysical equipment; search, detection, navigation, and guidance systems and equipment; surgical, medical, and dental instruments, equipment, and supplies; ophthalmic goods; photographic equipment and supplies; and watches and clocks.
- 39 Miscellaneous manufacturing industries**  
Manufacture of products not classified in any other major manufacturing group. Includes jewelry, silverware, and plated ware; musical instruments; dolls, toys, games, and sporting and athletic goods; pens, pencils, and artists' materials; buttons, costume novelties, and miscellaneous notions; brooms and brushes; caskets; and other miscellaneous products.

**Source:** Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual*, 1987.



**Box 5-2. Multiple SIC Codes and No SIC Codes**

**Multiple Codes 20-39.** TRI facilities may report up to six four-digit SIC codes that describe their operations. They submit one Form R or Form A certification statement for each chemical they are reporting. If all the processes or operations that are associated with a facility's releases or other waste management of a TRI chemical can be described by one SIC code, then only one SIC code is reported on the form. If several economic activities, designated by different SIC codes, describe the specific operations at a facility that are associated with releases or other waste management of a TRI chemical, then the facility will report those SIC codes (up to six) on the form it submits for that chemical.

Industrial facilities often conduct interrelated operations. They may, for example, manufacture distinct products using common or related feedstocks. Such products may be classified in similar but separate categories in the Standard Industrial Classification (SIC) system. Thus, many forms submitted to TRI contain more than one industrial classification. When TRI data are analyzed by industry—that is, by SIC code—forms that report more than one SIC code must be categorized separately because they do not fall into the individual industry groups.

The "multiple-codes" category represents forms that report in more than one two-digit SIC code within the manufacturing sector (SIC codes 20-39). For example, a facility may refine petroleum (SIC code 29) and then use that feedstock in the manufacture of chemicals (SIC code 28); it will report on its TRI forms SIC codes in both these industries—for example, SIC codes 2911, petroleum refining, and 2869, industrial organic chemicals. On forms with more than one SIC code, any SIC code that is not within manufacturing (that is, not within the SIC code range 20 to 39) is ignored when assigning a form to an industry category. For example, a form with SIC codes 2642 (manufacture of envelopes) and 5112 (wholesale trade—stationery and office supplies) would be included in SIC code 26.

Forms that have a SIC code within the manufacturing sector as well as a SIC code within the new industry sectors are included in the manufacturing sector SIC code if the facility reported to TRI before 1998. If the facility reported for the first time for 1998 with both original and new industry SIC codes, it is not included in the analyses in this chapter but is included in the analyses in Chapter 4 under the new industry code

**No codes 20-39.** Forms that report no SIC code within the manufacturing sector and have no SIC code belonging to a new industry group are included in these tables under the "No codes 20-39" category. Such forms may include, for example, submissions by federal facilities, all of which are required to report regardless of the SIC code covering their operations.

ed for approximately 4 to 5 percent of the total (see Figure 5-1).

Figure 5-2 displays on- and off-site releases for the industries with the largest total releases. Air emissions were the largest release type for all of these industries except primary metals. In the primary metals industry, off-site releases (transfers off-site to disposal) and on-site land releases outweighed other release types. For the food industry, surface water discharges were almost as large as air emissions, accounting for 50.2 million pounds, or

about 40 percent of total releases by that industry.

The primary metals, chemicals, and paper products industries, which reported the largest total on- and off-site releases in 1999, also reported the largest on-site releases, but in a different order.

The chemical manufacturing industry ranked first for on-site releases, with 609.3 million pounds. Chemical industry releases included 288.2 million pounds of air emissions, 77.1 million pounds of surface water discharges, and 195.4 million pounds of



Table 5-1. TRI Facilities and Forms, Original Industries, by Industry, 1999

| SIC Code | Industry              | Total Facilities Number | Total Forms Number | Forms Rs Number | Form As Number |
|----------|-----------------------|-------------------------|--------------------|-----------------|----------------|
| 20       | Food                  | 1,615                   | 3,066              | 1,913           | 1,153          |
| 21       | Tobacco               | 23                      | 67                 | 66              | 1              |
| 22       | Textiles              | 241                     | 485                | 430             | 55             |
| 23       | Apparel               | 15                      | 33                 | 31              | 2              |
| 24       | Lumber                | 830                     | 2,000              | 1,220           | 780            |
| 25       | Furniture             | 352                     | 781                | 706             | 75             |
| 26       | Paper                 | 438                     | 2,402              | 2,319           | 83             |
| 27       | Printing              | 213                     | 447                | 433             | 14             |
| 28       | Chemicals             | 3,759                   | 20,382             | 16,670          | 3,712          |
| 29       | Petroleum             | 410                     | 3,441              | 3,069           | 372            |
| 30       | Plastics              | 1,831                   | 3,731              | 3,122           | 609            |
| 31       | Leather               | 72                      | 183                | 163             | 20             |
| 32       | Stone/Clay/Glass      | 668                     | 1,919              | 1,648           | 271            |
| 33       | Primary Metals        | 1,912                   | 6,819              | 6,078           | 741            |
| 34       | Fabricated Metals     | 2,846                   | 7,459              | 6,651           | 808            |
| 35       | Machinery             | 1,100                   | 2,733              | 2,409           | 324            |
| 36       | Electrical Equip.     | 1,167                   | 2,926              | 2,763           | 163            |
| 37       | Transportation Equip. | 1,295                   | 4,502              | 4,166           | 336            |
| 38       | Measure/Photo.        | 240                     | 588                | 492             | 96             |
| 39       | Miscellaneous         | 307                     | 686                | 580             | 106            |
|          | Multiple codes 20-39  | 1,190                   | 4,280              | 3,862           | 418            |
|          | No codes 20-39        | 174                     | 541                | 474             | 67             |
|          | <b>Total</b>          | <b>20,698</b>           | <b>69,471</b>      | <b>59,265</b>   | <b>10,206</b>  |

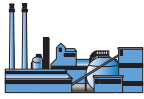
Note: Facilities/forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the “multiple codes” category. Facilities/forms with no 2-digit SIC code within the range 20-39 are assigned to the “no codes” category.

underground injection—the largest amounts in these categories. The primary metals industry ranked second for on-site releases, with 399.9 million pounds. Primary metals reported 229.6 million pounds of on-site land releases, more than any other industry. Most of the sector’s on-site land releases consisted of other disposal (130.4 million pounds). This sector also reported the largest off-site releases, 283.8 million pounds, 58.3 percent of all off-site releases.

### Top 20 Chemicals for On- and Off-site Releases

Table 5-3 lists the 20 TRI chemicals with the largest total releases in 1999 by the original industries. On- and off-site releases of these chemicals totaled 1.85 billion pounds, 76.0 percent of the total 2.44 billion pounds for all chemicals.

Zinc compounds led all TRI chemicals, with releases totaling 330.7 million pounds. Off-site releases (transfers to disposal) contributed almost 60 percent (194.3 million pounds) of this total. As explained in Box



**Table 5-2. TRI On-site and Off-site Releases, Original Industries, by Industry, 1999**

| SIC Code Industry        | Air  |  | Surface Water Discharges<br>Pounds | Underground Injection   |                            |
|--------------------------|--|--|------------------------------------|-------------------------|----------------------------|
|                          | Fugitive or Nonpoint Air Emissions<br>Pounds | Stack or Point Air Emissions<br>Pounds |                                    | Class I Wells<br>Pounds | Class II-V Wells<br>Pounds |
| 20 Food                  | 19,887,134                                   | 39,910,073                             | 50,225,853                         | 4,514                   | 0                          |
| 21 Tobacco               | 35,725                                       | 2,728,904                              | 162,296                            | 0                       | 0                          |
| 22 Textiles              | 1,722,640                                    | 6,748,425                              | 204,073                            | 0                       | 0                          |
| 23 Apparel               | 24,590                                       | 361,953                                | 0                                  | 0                       | 0                          |
| 24 Lumber                | 4,909,048                                    | 29,236,143                             | 109,085                            | 0                       | 0                          |
| 25 Furniture             | 2,098,901                                    | 13,093,100                             | 9                                  | 0                       | 0                          |
| 26 Paper                 | 13,663,381                                   | 172,304,976                            | 19,118,393                         | 0                       | 0                          |
| 27 Printing              | 9,104,599                                    | 11,396,535                             | 436                                | 0                       | 0                          |
| 28 Chemicals             | 75,405,717                                   | 212,746,746                            | 77,097,472                         | 195,332,322             | 108,858                    |
| 29 Petroleum             | 20,653,721                                   | 27,356,853                             | 15,655,884                         | 2,805,588               | 40,085                     |
| 30 Plastics              | 21,589,254                                   | 69,984,617                             | 36,453                             | 0                       | 0                          |
| 31 Leather               | 571,380                                      | 1,639,648                              | 65,880                             | 0                       | 0                          |
| 32 Stone/Clay/Glass      | 2,226,078                                    | 30,658,766                             | 123,132                            | 0                       | 0                          |
| 33 Primary Metals        | 23,932,051                                   | 82,677,214                             | 62,513,740                         | 1,186,718               | 15                         |
| 34 Fabricated Metals     | 19,495,949                                   | 37,824,949                             | 2,429,536                          | 48,843                  | 0                          |
| 35 Machinery             | 3,977,903                                    | 6,776,871                              | 140,051                            | 0                       | 0                          |
| 36 Electrical Equip.     | 3,957,494                                    | 12,975,247                             | 4,393,066                          | 250                     | 0                          |
| 37 Transportation Equip. | 18,174,725                                   | 73,554,187                             | 177,754                            | 0                       | 0                          |
| 38 Measure/Photo.        | 1,009,729                                    | 7,494,549                              | 1,320,125                          | 0                       | 0                          |
| 39 Miscellaneous         | 1,816,780                                    | 7,024,565                              | 26,183                             | 0                       | 0                          |
| Multiple codes 20-39     | 19,723,864                                   | 56,409,142                             | 19,559,032                         | 20,100                  | 5                          |
| No codes 20-39           | 6,784,810                                    | 1,385,996                              | 233,363                            | 0                       | 505                        |
| <b>Total</b>             | <b>270,765,473</b>                           | <b>904,289,459</b>                     | <b>253,591,816</b>                 | <b>199,398,335</b>      | <b>149,468</b>             |

**Note:** On-site Releases are from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.

Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, reporting in the "no codes" 20-39 category were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change off-site transfers to disposal amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising off-site transfers to disposal for manganese compounds from 5,584,900 pounds to below 500 pounds.



Table 5-2. TRI On-site and Off-site Releases, Original Industries, by Industry, 1999 (continued)

| Industry              | On-site Land Releases               |                           |                          |                                |                          | Total On-site Releases<br>Pounds | Off-site Releases                        | Total On- and Off-site Releases<br>Pounds |
|-----------------------|-------------------------------------|---------------------------|--------------------------|--------------------------------|--------------------------|----------------------------------|--|---|
|                       | RCRA Subtitle C Landfills<br>Pounds | Other Landfills<br>Pounds | Land Treatment<br>Pounds | Surface Impoundments<br>Pounds | Other Disposal<br>Pounds |                                  | Transfers Off-site to Disposal<br>Pounds |   |
| Food                  | 525                                 | 116,028                   | 5,708,331                | 311,931                        | 119,841                  | 116,284,230                      | 6,956,919                                | 123,241,149                               |
| Tobacco               | 0                                   | 0                         | 0                        | 0                              | 0                        | 2,926,925                        | 770,705                                  | 3,697,630                                 |
| Textiles              | 0                                   | 3,650                     | 234,799                  | 104,438                        | 112,700                  | 9,130,725                        | 682,024                                  | 9,812,749                                 |
| Apparel               | 0                                   | 0                         | 0                        | 0                              | 0                        | 386,543                          | 74,118                                   | 460,661                                   |
| Lumber                | 31,282                              | 68,556                    | 37,115                   | 32,611                         | 7,228                    | 34,431,068                       | 818,837                                  | 35,249,905                                |
| Furniture             | 0                                   | 2,666                     | 0                        | 0                              | 22,235                   | 15,216,911                       | 114,491                                  | 15,331,402                                |
| Paper                 | 235,499                             | 11,077,047                | 452,592                  | 3,195,138                      | 307,994                  | 220,355,020                      | 5,204,395                                | 225,559,415                               |
| Printing              | 0                                   | 36,000                    | 0                        | 0                              | 17,559                   | 20,555,129                       | 122,852                                  | 20,677,981                                |
| Chemicals             | 726,299                             | 12,987,685                | 1,571,580                | 29,117,374                     | 4,169,615                | 609,263,668                      | 61,265,769                               | 670,529,437                               |
| Petroleum             | 534                                 | 44,048                    | 79,008                   | 311,089                        | 51,969                   | 66,998,779                       | 3,542,150                                | 70,540,929                                |
| Plastics              | 9,195                               | 574,092                   | 0                        | 5,860                          | 33,436                   | 92,232,907                       | 11,394,450                               | 103,627,357                               |
| Leather               | 0                                   | 0                         | 0                        | 10,369                         | 255                      | 2,287,532                        | 2,092,878                                | 4,380,410                                 |
| Stone/Clay/Glass      | 6,500                               | 3,522,389                 | 260                      | 96,509                         | 71,154                   | 36,704,788                       | 6,274,400                                | 42,979,188                                |
| Primary Metals        | 10,790,474                          | 52,486,251                | 21,649                   | 35,935,746                     | 130,381,446              | 399,925,304                      | 283,807,288                              | 683,732,592                               |
| Fabricated Metals     | 125,093                             | 173,517                   | 8,016                    | 3,817                          | 341,357                  | 60,451,077                       | 21,778,616                               | 82,229,693                                |
| Machinery             | 80,915                              | 133,446                   | 4,309                    | 1,376                          | 244,740                  | 11,359,611                       | 4,158,522                                | 15,518,133                                |
| Electrical Equip.     | 150,717                             | 830,209                   | 255                      | 760                            | 17,895                   | 22,325,893                       | 18,799,534                               | 41,125,427                                |
| Transportation Equip. | 81,822                              | 367,898                   | 1,500                    | 3,662                          | 260,310                  | 92,621,858                       | 12,363,270                               | 104,985,128                               |
| Measure/Photo.        | 5,327                               | 16,000                    | 380                      | 6                              | 1,559                    | 9,847,675                        | 1,051,304                                | 10,898,979                                |
| Miscellaneous         | 27,896                              | 1,203                     | 0                        | 0                              | 23,631                   | 8,920,258                        | 1,308,864                                | 10,229,122                                |
| Multiple codes 20-39  | 27,504                              | 3,561,697                 | 290,450                  | 4,626,915                      | 4,684,660                | 108,903,369                      | 20,174,698                               | 129,078,067                               |
| No codes 20-39        | 140,773                             | 395                       | 550,978                  | 14,277                         | 1,622,035                | 10,733,132                       | 24,083,918                               | 34,817,050                                |
| <b>Total</b>          | <b>12,440,355</b>                   | <b>86,002,777</b>         | <b>8,961,222</b>         | <b>73,771,878</b>              | <b>142,491,619</b>       | <b>1,951,862,402</b>             | <b>486,840,002</b>                       | <b>2,438,702,404</b>                      |

Note: On-site Releases are from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the “multiple codes” category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the “no codes” category.

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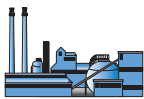
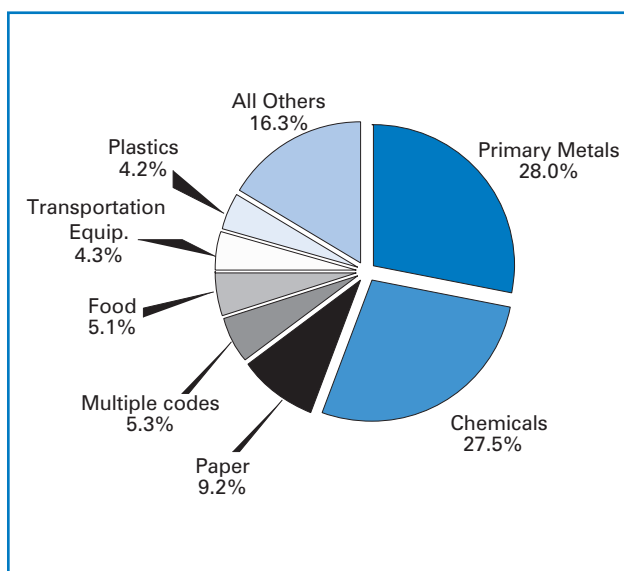


Figure 5–1. TRI On-site and Off-site Releases, Original Industries, by Industry, 1999



Note: On-site Releases are from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the “multiple codes” category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the “no codes” category.

1–5 in Chapter 1, off-site releases of metals and their compounds include transfers to solidification/stabilization and to wastewater treatment, including transfers to POTWs. Zinc compounds also had the largest on-site land releases, with 129.7 million pounds. This amount included 81.7 million pounds of other disposal and 32.0 million pounds in landfills other than RCRA subtitle C landfills.

Nitrate compounds ranked second in total releases, with 293.8 million pounds. More nitrate compounds were discharged to surface waters than any other chemical, 229.6 million pounds. TRI facilities in the original industries also injected 42.2 million pounds of nitrate compounds into underground wells on-site, the largest amount for that type of release.

Methanol releases amounted to 205.3 million pounds, the third-largest quantity of on- and off-site releases. Methanol ranked first for air emissions, with 183.9 million pounds, including 163.0 million pounds in stack or point source air emissions.

Ammonia ranked fourth overall, with 184.1 million pounds, and was second highest for air emissions (144.3 million pounds), surface water discharges (7.5 million pounds) and underground injection (25.6 million pounds). Manganese compounds had the second-highest on-site releases to land, 45.0 million pounds, followed closely by copper compounds, with 44.3 million pounds.

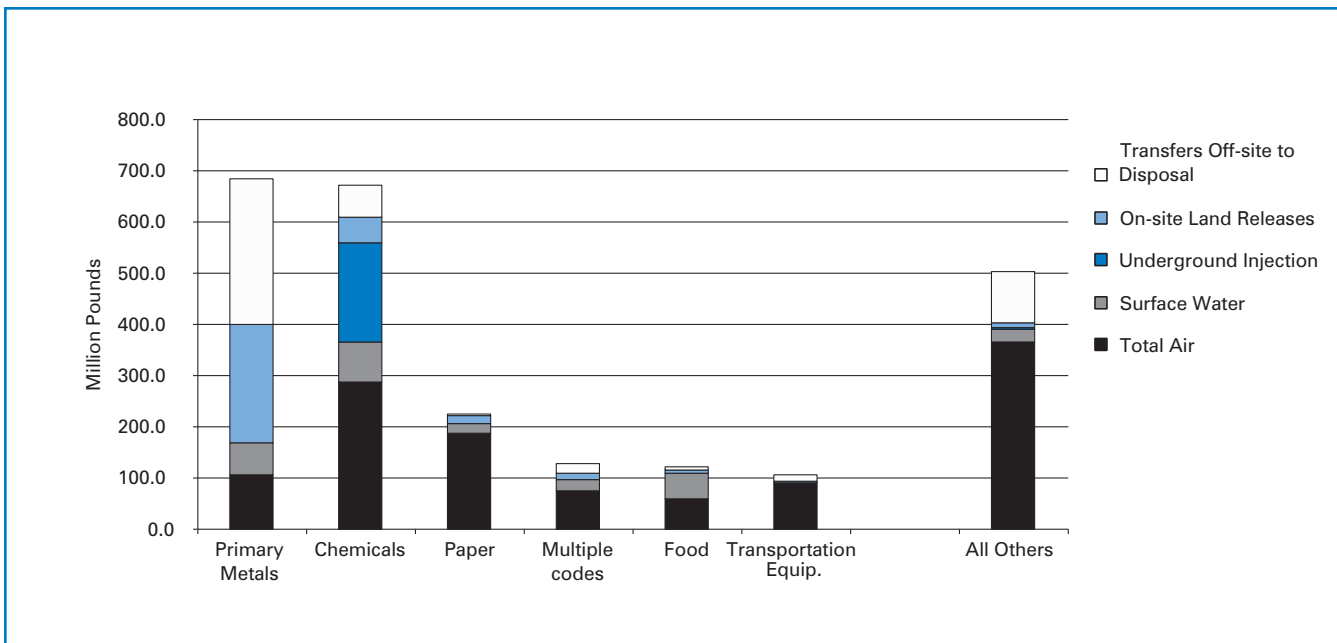
### Waste Management Data, 1999

Facilities in the original TRI industries reported managing a total of 23.10 billion pounds of TRI chemicals in production-related waste in 1999, as shown in Table 5–4. Figure 5–3 shows production-related waste reported by the industries with the largest totals. Generally, on-site recycling and on-site treatment were the most common waste management methods for the original industries.

The chemical manufacturing industry reported managing 11.14 billion pounds of total production-related waste in 1999, and it reported the largest quantities in all waste management categories except off-site recycling. Almost 40 percent of the chemical manufacturing industry’s production-related waste was recycled on-site (4.29 billion pounds). On-site treatment by this industry amounted to 3.91 billion pounds, and on-site energy recovery totaled 1.38 billion pounds. The chemicals industry reported 662.2 million pounds released on- and off-site. The industry sent



Figure 5–2. Distribution of TRI On-site and Off-site Releases, Original Industries with Largest Totals, 1999



Note: On-site Releases are from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the “multiple codes” category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the “no codes” category.

401.9 million pounds to off-site energy recovery and 309.1 million pounds to off-site treatment.

The primary metals industry ranked second among original industries for total production-related waste managed, with 3.52 billion pounds. On-site recycling accounted for the largest portion of this total, 1.55 billion pounds; the primary metals industry ranked second in this category. The industry reported the largest quantity of off-site recycling (754.6 million pounds) and the second-largest quantity released on- and off-site (660.9 million pounds, a little lower than the amount for chemical manufacturing).

The paper products industry reported the third-largest total production-related waste managed, 1.59 billion pounds. More than 62 percent of this amount, 988.2 million

pounds, was treated on-site, the second-largest quantity for on-site treatment.

Production-related waste exceeded 1 billion pounds in two other industry groups. The petroleum industry reported a total of 1.20 billion pounds, of which 530.6 million pounds were treated on-site and 408.8 million pounds went to on-site energy recycling. The petroleum industry ranked third in both on-site treatment (after the chemicals industry and the paper products industry) and on-site energy recovery (after the chemicals industry and the stone, clay, glass, and concrete products group). The “multiple-codes” group reported 1.05 billion pounds. The largest waste management categories for this group were on-site treatment, 362.9 million pounds, and on-site recycling, 277.7 million pounds.



Table 5-3. Top 20 Chemicals with Largest Total On-site and Off-site Releases, Original Industries, 1999

| CAS Number                         | Chemical               | Air  |  | Surface Water Discharges<br>Pounds | Underground Injection   |                            |
|------------------------------------|------------------------|--|--|------------------------------------|-------------------------|----------------------------|
|                                    |                        | Fugitive or Nonpoint Air Emissions<br>Pounds | Stack or Point Air Emissions<br>Pounds |                                    | Class I Wells<br>Pounds | Class II-V Wells<br>Pounds |
| —                                  | Zinc compounds         | 1,507,464                                    | 4,014,302                              | 1,002,707                          | 222,562                 | 5,500                      |
| —                                  | Nitrate compounds      | 1,818,184                                    | 211,738                                | 229,551,038                        | 42,176,095              | 250                        |
| 67-56-1                            | Methanol               | 20,898,502                                   | 162,975,985                            | 3,864,475                          | 14,083,936              | 106,103                    |
| 7664-41-7                          | Ammonia                | 31,279,310                                   | 112,955,136                            | 7,649,385                          | 25,611,167              | 24,618                     |
| —                                  | Manganese compounds    | 939,302                                      | 941,228                                | 4,853,311                          | 7,011,377               | 250                        |
| 108-88-3                           | Toluene                | 30,282,435                                   | 58,823,208                             | 29,670                             | 611,546                 | 1,350                      |
| 1330-20-7                          | Xylene (mixed isomers) | 15,070,850                                   | 51,060,704                             | 24,818                             | 49,229                  | 750                        |
| 100-42-5                           | Styrene                | 12,824,242                                   | 41,906,888                             | 3,168                              | 191,124                 | 0                          |
| —                                  | Copper compounds       | 1,031,390                                    | 521,204                                | 84,642                             | 247,755                 | 0                          |
| 110-54-3                           | n-Hexane               | 19,240,208                                   | 35,816,968                             | 11,114                             | 36,501                  | 10                         |
| 7647-01-0                          | Hydrochloric acid      | 2,486,305                                    | 48,219,840                             | 495                                | 36,795                  | 0                          |
| 7782-50-5                          | Chlorine               | 1,012,814                                    | 48,151,981                             | 328,493                            | 62,440                  | 0                          |
| —                                  | Lead compounds         | 215,924                                      | 655,684                                | 31,794                             | 182,869                 | 0                          |
| —                                  | Chromium compounds     | 209,702                                      | 257,369                                | 97,379                             | 816,717                 | 0                          |
| 78-93-3                            | Methyl ethyl ketone    | 15,494,361                                   | 22,724,308                             | 34,304                             | 426,247                 | 5                          |
| —                                  | Glycol ethers          | 8,656,597                                    | 27,392,902                             | 104,389                            | 716                     | 0                          |
| 75-15-0                            | Carbon disulfide       | 1,147,325                                    | 34,741,100                             | 6,548                              | 16,110                  | 0                          |
| 75-09-2                            | Dichloromethane        | 11,096,910                                   | 24,459,564                             | 12,056                             | 107,386                 | 0                          |
| 7697-37-2                          | Nitric acid            | 556,845                                      | 1,683,464                              | 60,181                             | 16,482,141              | 0                          |
| 7440-66-6                          | Zinc (fume or dust)    | 750,918                                      | 476,173                                | 15,306                             | 1                       | 0                          |
| <b>Subtotal (top 20 chemicals)</b> |                        | <b>176,519,588</b>                           | <b>677,989,746</b>                     | <b>247,765,273</b>                 | <b>108,372,714</b>      | <b>138,836</b>             |
| <b>Total (all chemicals)</b>       |                        | <b>270,765,473</b>                           | <b>904,289,459</b>                     | <b>253,591,816</b>                 | <b>199,398,335</b>      | <b>149,468</b>             |

**Note:** On-site Releases are from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change off-site transfers to disposal amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising off-site transfers to disposal for manganese compounds from 5,584,900 pounds to below 500 pounds.

Non-production-related waste is overstated in this report for all years. Those forms indicating NA for non-production-related waste were assigned one pound erroneously. The total amount overstated is about 4,500 pounds for each year.

### Economic Overview, by Industry

Although TRI data present significant information about toxic chemicals that are released on- and off-site, managed in waste

on- and off-site, and transferred off-site for further waste management, certain limitations should be kept in mind, as described in **What Are the Benefits and Limitations of the Data**, in Chapter 1. One such limitation is that TRI data by themselves do not distinguish industry-specific factors that influence the chemicals, the amounts, and the types of releases and waste management reported by facilities. Table 5-5 presents two basic economic measures—employment and dollar value of ship-



Table 5-3. Top 20 Chemicals with Largest Total On-site and Off-site Releases, Original Industries, 1999 (continued)

| Chemical                           | On-site Land Releases               |                           |                          |                                |                          | Total On-site Releases<br>Pounds | Off-site Releases                        | Total On- and Off-site Releases<br>Pounds |
|------------------------------------|-------------------------------------|---------------------------|--------------------------|--------------------------------|--------------------------|----------------------------------|--|---|
|                                    | RCRA Subtitle C Landfills<br>Pounds | Other Landfills<br>Pounds | Land Treatment<br>Pounds | Surface Impoundments<br>Pounds | Other Disposal<br>Pounds |                                  | Transfers Off-site to Disposal<br>Pounds |   |
| Zinc compounds                     | 6,376,406                           | 31,970,479                | 125,988                  | 9,442,775                      | 81,742,150               | 136,410,333                      | 194,251,166                              | 330,661,499                               |
| Nitrate compounds                  | 21,702                              | 50,493                    | 5,317,279                | 1,525,491                      | 87,554                   | 280,759,824                      | 13,075,242                               | 293,835,066                               |
| Methanol                           | 46,913                              | 510,638                   | 18,480                   | 469,731                        | 165,445                  | 203,140,208                      | 2,117,503                                | 205,257,711                               |
| Ammonia                            | 2,113                               | 142,918                   | 1,725,147                | 850,384                        | 151,167                  | 180,391,345                      | 3,667,850                                | 184,059,195                               |
| Manganese compounds                | 1,591,285                           | 23,363,307                | 360,900                  | 14,720,096                     | 4,878,129                | 58,659,185                       | 48,607,421                               | 107,266,606                               |
| Toluene                            | 15,312                              | 13,748                    | 1,587                    | 1,545                          | 61,805                   | 89,842,206                       | 1,448,961                                | 91,291,167                                |
| Xylene (mixed isomers)             | 11,598                              | 7,747                     | 2,502                    | 1,235                          | 19,800                   | 66,249,233                       | 1,090,289                                | 67,339,522                                |
| Styrene                            | 6,461                               | 360,088                   | 3                        | 514                            | 2,084                    | 55,294,572                       | 2,100,121                                | 57,394,693                                |
| Copper compounds                   | 213,715                             | 2,853,728                 | 2,209                    | 6,528,824                      | 34,674,623               | 46,158,090                       | 10,981,320                               | 57,139,410                                |
| n-Hexane                           | 952                                 | 1,471                     | 730                      | 255                            | 4,016                    | 55,112,225                       | 47,900                                   | 55,160,125                                |
| Hydrochloric acid                  | 36,558                              | 0                         | 0                        | 0                              | 28,876                   | 50,808,869                       | 2,399,296                                | 53,208,165                                |
| Chlorine                           | 0                                   | 0                         | 44,684                   | 25                             | 10,611                   | 49,611,048                       | 7,745                                    | 49,618,793                                |
| Lead compounds                     | 463,850                             | 3,024,417                 | 3,857                    | 3,522,735                      | 9,293,502                | 17,394,632                       | 31,961,514                               | 49,356,146                                |
| Chromium compounds                 | 306,008                             | 1,407,348                 | 36,250                   | 24,450,480                     | 3,391,292                | 30,972,545                       | 14,203,028                               | 45,175,573                                |
| Methyl ethyl ketone                | 25,815                              | 3,856                     | 130                      | 1,176                          | 50,544                   | 38,760,746                       | 779,384                                  | 39,540,130                                |
| Glycol ethers                      | 19,642                              | 13,207                    | 10,552                   | 0                              | 5,780                    | 36,203,785                       | 848,254                                  | 37,052,039                                |
| Carbon disulfide                   | 5                                   | 251                       | 0                        | 0                              | 0                        | 35,911,339                       | 2,730                                    | 35,914,069                                |
| Dichloromethane                    | 1,157                               | 1,898                     | 10                       | 0                              | 5,279                    | 35,684,260                       | 154,374                                  | 35,838,634                                |
| Nitric acid                        | 56,463                              | 64,728                    | 187,451                  | 31,548                         | 7,421                    | 19,130,242                       | 10,530,338                               | 29,660,580                                |
| Zinc (fume or dust)                | 1,458,342                           | 812,802                   | 0                        | 2,012                          | 49,754                   | 3,565,308                        | 26,013,507                               | 29,578,815                                |
| <b>Subtotal (top 20 chemicals)</b> | <b>10,654,297</b>                   | <b>64,603,124</b>         | <b>7,837,759</b>         | <b>61,548,826</b>              | <b>134,629,832</b>       | <b>1,490,059,995</b>             | <b>364,287,943</b>                       | <b>1,854,347,938</b>                      |
| <b>Total (all chemicals)</b>       | <b>12,440,355</b>                   | <b>86,002,777</b>         | <b>8,961,222</b>         | <b>73,771,878</b>              | <b>142,491,619</b>       | <b>1,951,862,402</b>             | <b>486,840,002</b>                       | <b>2,438,702,404</b>                      |

Note: On-site Releases are from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change off-site transfers to disposal amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising off-site transfers to disposal for manganese compounds from 5,584,900 pounds to below 500 pounds.

ments—that suggest the relative size of the original industries that report to TRI. Economic analyses make use of data on the value of production (shipments) as one way of indicating the size of industrial sectors because no direct comparison can be drawn among the products of the sectors. The economic data in Table 5-5 are from the 2000 Statistical Abstract of the United States, the latest consistent data available across all TRI industries, original and new.

Table 5-5 also shows total production-related waste managed by TRI facilities in 1999 and provides approximate comparisons with the economic activity of the facilities. The percentages shown in the table indicate the relative contribution of each industry to total employment and production and to the total quantity of TRI chemicals in production-related waste managed. The ratio of total production-related waste managed to production value (value of shipments), in the last column, provides a com-



Table 5-4. Quantities of TRI Chemicals in Waste Managed, Original Industries, by Industry, 1999

| SIC Code Industry        | Recycled             |                      | Energy Recovery      |                    | Treated              |                    | Quantity Released On- and Off-site Treated Pounds | Total Production-related Waste Managed Pounds | Non-production-related Waste Managed Pounds |
|--------------------------|----------------------|----------------------|----------------------|--------------------|----------------------|--------------------|---|---|---|
|                          | On-site Pounds       | Off-site Pounds      | On-site Pounds       | Off-site Pounds    | On-site Pounds       | Off-site Pounds    |   |   |   |
| 20 Food                  | 669,579,214          | 4,021,384            | 368,624              | 186,154            | 117,194,970          | 28,379,792         | 125,728,606                                       | 945,458,744                                   | 339,615                                     |
| 21 Tobacco               | 2,877                | 4,692                | 0                    | 0                  | 1,265,197            | 569,356            | 3,201,944   | 5,044,066                                     | 0   |
| 22 Textiles              | 13,131,341           | 1,193,970            | 5,328,483            | 1,923,938          | 8,766,593            | 1,778,044          | 9,198,301   | 41,320,670                                    | 350   |
| 23 Apparel               | 120,180              | 58,091               | 0                    | 32,084             | 970,870              | 72,574             | 458,224   | 1,712,023                                     | 0   |
| 24 Lumber                | 8,168,812            | 493,445              | 2,763,496            | 2,115,995          | 9,619,148            | 1,627,693          | 34,853,373  | 59,641,962                                    | 539,833                                     |
| 25 Furniture             | 3,759,675            | 4,777,220            | 48,755               | 3,877,812          | 561,325              | 435,753            | 14,250,477  | 27,711,017                                    | 1,403                                       |
| 26 Paper                 | 106,155,787          | 11,846,205           | 206,443,672          | 6,790,097          | 988,175,002          | 44,280,317         | 227,005,796                                       | 1,590,696,876                                 | 10,373                                      |
| 27 Printing              | 187,531,609          | 5,943,127            | 263,870              | 3,941,316          | 97,744,655           | 2,037,158          | 20,653,150  | 318,114,885                                   | 121,037                                     |
| 28 Chemicals             | 4,288,776,638        | 182,418,051          | 1,378,302,403        | 401,877,053        | 3,914,655,653        | 309,149,616        | 662,235,528                                       | 11,137,414,942                                | 6,933,002                                   |
| 29 Petroleum             | 135,610,463          | 22,259,684           | 408,782,307          | 19,580,516         | 530,572,806          | 12,559,640         | 70,761,293  | 1,200,126,709                                 | 520,425                                     |
| 30 Plastics              | 47,915,834           | 18,907,706           | 14,502,896           | 7,925,098          | 40,366,020           | 8,985,212          | 107,483,282                                       | 246,086,048                                   | 37,698                                      |
| 31 Leather               | 464,526              | 226,469              | 0                    | 72,698             | 8,860,855            | 439,888            | 4,412,697   | 14,477,133                                    | 15  |
| 32 Stone/Clay/Glass      | 164,059,360          | 3,773,127            | 651,242,324          | 909,680            | 23,345,061           | 3,100,571          | 42,753,637  | 889,183,760                                   | 270,396                                     |
| 33 Primary Metals        | 1,552,531,491        | 754,626,615          | 37,661,422           | 3,655,699          | 475,675,781          | 30,818,969         | 660,931,823                                       | 3,515,901,800                                 | 293,814,961                                 |
| 34 Fabricated Metals     | 142,101,576          | 351,691,695          | 26,003,219           | 12,919,918         | 100,324,024          | 20,705,710         | 81,423,271  | 735,169,413                                   | 296,165                                     |
| 35 Machinery             | 13,944,720           | 75,086,526           | 310,093              | 2,443,766          | 7,350,148            | 6,285,050          | 15,638,658  | 121,058,961                                   | 74,380                                      |
| 36 Electrical Equip.     | 191,059,754          | 370,996,008          | 11,002,472           | 7,699,478          | 70,082,258           | 23,811,046         | 36,763,938  | 711,414,954                                   | 268,390                                     |
| 37 Transportation Equip. | 20,905,454           | 127,096,625          | 644,190              | 12,550,137         | 29,902,730           | 13,193,003         | 102,506,313                                       | 306,798,452                                   | 14,183                                      |
| 38 Measure/Photo.        | 2,594,636            | 10,836,621           | 561,088              | 2,247,956          | 41,471,165           | 2,356,146          | 10,602,534  | 70,670,146                                    | 760,347                                     |
| 39 Miscellaneous         | 9,065,566            | 13,711,079           | 4,342,249            | 3,371,693          | 5,538,753            | 2,695,392          | 10,307,530  | 49,032,262                                    | 702,014                                     |
| Multiple codes 20-39     | 277,735,580          | 171,186,302          | 56,977,187           | 16,657,952         | 362,947,066          | 34,077,657         | 130,786,592                                       | 1,050,368,336                                 | 1,016,887                                   |
| No codes 20-39           | 4,637,755            | 3,742,825            | 550,243              | 852,366            | 14,936,039           | 24,310,969         | 12,346,509  | 61,376,706                                    | 5,653                                       |
| <b>Total</b>             | <b>7,839,852,848</b> | <b>2,134,897,467</b> | <b>2,806,098,993</b> | <b>511,631,406</b> | <b>6,850,326,119</b> | <b>571,669,556</b> | <b>2,384,303,476</b>                              | <b>23,098,779,865</b>                         | <b>305,727,127</b>                          |

Note: Data are from Section 8 of Form R. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.

Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change the facility's treated off-site amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising treated off-site for manganese compounds from 5,584,900 pounds to below 500 pounds.

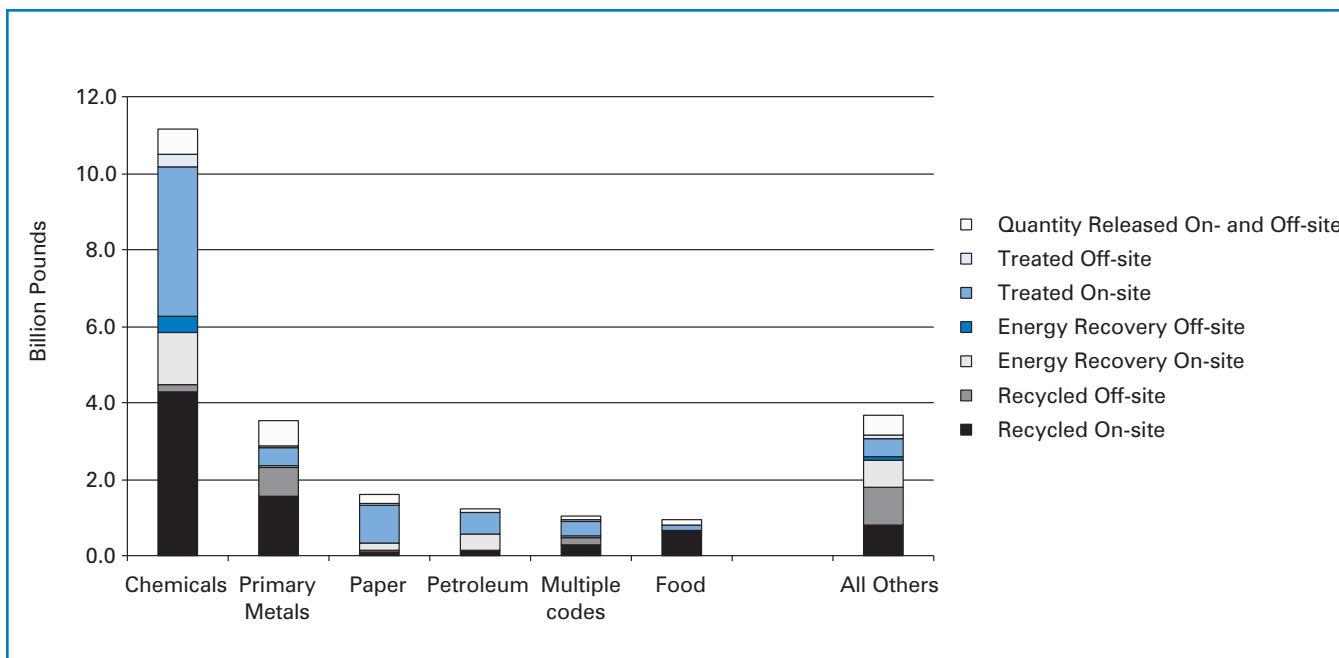
parison of the 1999 TRI quantities reported by each industry with that industry's production level for 1999. Many factors influence the differences in TRI reporting among industries. Relating TRI quantities to the dollar value of each industry's products creates a measure of waste managed

that takes into account differences in size among industries.

As shown in Table 5-5, the chemical manufacturing industry accounted for 5.5 percent of manufacturing employment in 1998, 9.7 percent of the value of manufacturing production (value of shipments) in 1999,



Figure 5-3. Distribution of Quantities of TRI Chemicals in Waste Managed, Original Industries with Largest Totals, 1999



Note: Data are from Section 8 of Form R. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category.

and 50.7 percent of TRI total production-related waste managed in 1999. The chemical manufacturing industry managed 26,949 pounds of total production-related waste for each \$1 million value of shipments. This was the largest ratio among the original TRI industries. The primary metals industry ranked second, with 19,701 pounds per \$1 million value, and the paper products industry ranked third, with 9,666 pounds per \$1 million value. These three industries had the largest total production-related waste managed in 1999.

## YEAR-BY-YEAR COMPARISONS, BY INDUSTRY

Comparisons of TRI data across reporting years are made on the basis of chemicals that were reportable in all years with the same reporting definitions. This ensures that apparent increases or decreases from

one year to another are not the result of changes in the list of TRI chemicals.

**Making Year-to-Year Comparisons of TRI Data**, in Chapter 1, explains these multi-year analyses; an understanding of these issues is essential for accurate interpretation of the multiyear data presented in this chapter.

Progress in reducing releases and other quantities of TRI chemicals in wastes in recent years is measured from 1995. Waste management data authorized under the federal Pollution Prevention Act of 1990 have been collected since 1991 and can be compared using that baseline. Comparisons of on-site and off-site releases can also be made for chemicals that were reportable in all years from 1988 to 1999.

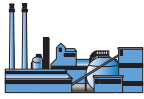


Table 5-5. Employees (1998), Shipments (1999) and Total Production-related Waste Managed (1999), by Industry

| SIC Code | Industry              | Paid Employees, 1998 |              | Value of Shipments, 1999 |              | Total Production-related Waste Managed, 1999 |              | Production-related Waste Managed per Value of Shipments<br>Pounds per \$1,000,000 |
|----------|-----------------------|----------------------|--------------|--------------------------|--------------|--|--------------|---|
|          |                       | Number (000)         | Percent      | \$1,000,000              | Percent      | Pounds                                       | Percent      |   |
| 20       | Food                  | 1,648                | 8.9          | 500,901                  | 11.8         | 945,458,744                                  | 4.3          | 1,888   |
| 21       | Tobacco               | 39                   | 0.2          | 50,551                   | 1.2          | 5,044,066                                    | 0.0          | 100   |
| 22       | Textiles              | 593                  | 3.2          | 78,357                   | 1.8          | 41,320,670                                   | 0.2          | 527   |
| 23       | Apparel               | 745                  | 4.0          | <500                     | <0.01        | 1,712,023                                    | 0.0          | —   |
| 24       | Lumber                | 817                  | 4.4          | <500                     | <0.01        | 59,641,962                                   | 0.3          | —   |
| 25       | Furniture             | 523                  | 2.8          | <500                     | <0.01        | 27,711,017                                   | 0.1          | —   |
| 26       | Paper                 | 671                  | 3.6          | 164,558                  | 3.9          | 1,590,696,876                                | 7.2          | 9,666   |
| 27       | Printing              | 1,478                | 8.0          | <500                     | <0.01        | 318,114,885                                  | 1.4          | —   |
| 28       | Chemicals             | 1,023                | 5.5          | 413,277                  | 9.7          | 11,137,414,942                               | 50.7         | 26,949  |
| 29       | Petroleum             | 135                  | 0.7          | 171,149                  | 4.0          | 1,200,126,709                                | 5.5          | 7,012   |
| 30       | Plastics              | 997                  | 5.4          | 164,654                  | 3.9          | 246,086,048                                  | 1.1          | 1,495   |
| 31       | Leather               | 84                   | 0.5          | <500                     | <0.01        | 14,477,133                                   | 0.1          | —   |
| 32       | Stone/Clay/Glass      | 558                  | 3.0          | 103,773                  | 2.4          | 889,183,760                                  | 4.0          | 8,569   |
| 33       | Primary Metals        | 709                  | 3.8          | 178,466                  | 4.2          | 3,515,901,800                                | 16.0         | 19,701  |
| 34       | Fabricated Metals     | 1,493                | 8.1          | 245,517                  | 5.8          | 735,169,413                                  | 3.3          | 2,994   |
| 35       | Machinery             | 2,181                | 11.8         | 455,140                  | 10.7         | 121,058,961                                  | 0.6          | 266   |
| 36       | Electrical Equip.     | 1,689                | 9.1          | 413,204                  | 9.7          | 711,414,954                                  | 3.2          | 1,722   |
| 37       | Transportation Equip. | 1,881                | 10.2         | 583,559                  | 13.7         | 306,798,452                                  | 1.4          | 526   |
| 38       | Measure/Photo.        | 858                  | 4.6          | 174,661                  | 4.1          | 70,670,146                                   | 0.3          | 405   |
| 39       | Miscellaneous         | 391                  | 2.1          | <500                     | <0.01        | 49,032,262                                   | 0.2          | —   |
|          | <b>Total</b>          | <b>18,513</b>        | <b>100.0</b> | <b>4,259,532</b>         | <b>100.0</b> | <b>21,987,034,823</b>                        | <b>100.0</b> | <b>5,162</b>  |

Note: Paid Employees is from Table No. 1233 and Value of Shipments is from Table No. 1235 of 2000 Statistical Abstract of the United States (<<http://www.census.gov/prod/www/statistical-abstract-us.html>>). Total Production-related Waste Managed is from Section 8 (total of 8.1 through 8.7, Column B) for TRI Form R for 1999. Total Production-related Waste Managed in this table does not include forms reporting more than one 2-digit SIC code within SIC codes 20-39 and forms reporting SIC codes outside the 20-39 range.

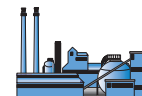
## On- and Off-site Releases, 1995-1999

Table 5-6 summarizes on- and off-site releases by the original TRI industries for 1995 through 1999. During this period, total on- and off-site releases decreased from 2.64 billion pounds to 2.44 billion pounds, a reduction of 7.5 percent.

The two industries with the largest total releases in 1999, the chemical manufacturing and primary metals industries, have exhibited contrasting trends since 1995. The

chemical manufacturing industry's total has decreased steadily, from 828.3 million pounds in 1995 to 670.5 million pounds in 1999, and the industry has fallen from first to second place in total releases. The amount of the reduction was the largest for any original industry, a decrease of 157.8 million pounds, or 19.9 percent, over the five-year period.

Releases from the primary metals industry, by contrast, increased, from 567.5 million pounds in 1995 to 719.0 million pounds in 1998, when primary metals displaced



chemical manufacturing as the industry with the largest total releases. Although total releases for primary metals fell to 683.7 million pounds in 1999, the industry retained its top rank and recorded a total increase of 116.2 million pounds over the period 1995–1999, the largest of any industry. The increase amounted to a 20.5 percent rise in total releases for 1995–1999.

No other original TRI industry reported a reduction or an increase of comparable size between 1995 and 1999. The next largest absolute reductions were in the “multiple-codes” group, from 157.7 million pounds to 129.1 million pounds, a decline of 28.6 million pounds, and in the furniture industry, from 42.7 million pounds to 15.3 million pounds, a difference of 27.3 million pounds. Over the 1995–1999 period, the decrease for the “multiple-codes” group

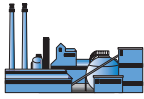
Table 5-6. TRI On-site and Off-site Releases, Original Industries, by Industry, 1995 and 1998–1999

| SIC Code | Industry              | Total On-site and Off-site Releases |                      |                      |                    |             |                     |             |
|----------|-----------------------|-------------------------------------|----------------------|----------------------|--------------------|-------------|---------------------|-------------|
|          |                       | 1995                                | 1998                 | 1999                 | Change 1998-1999   |             | Change 1995-1999    |             |
|          |                       | Pounds                              | Pounds               | Pounds               | Pounds             | Percent     | Pounds              | Percent     |
| 20       | Food                  | 122,826,570                         | 134,685,697          | 123,241,149          | -11,444,548        | -8.5        | 414,579             | 0.3         |
| 21       | Tobacco               | 2,142,358                           | 3,618,629            | 3,697,630            | 79,001             | 2.2         | 1,555,272           | 72.6        |
| 22       | Textiles              | 18,793,736                          | 12,100,340           | 9,812,749            | -2,287,591         | -18.9       | -8,980,987          | -47.8       |
| 23       | Apparel               | 1,287,784                           | 502,558              | 460,661              | -41,897            | -8.3        | -827,123            | -64.2       |
| 24       | Lumber                | 35,993,438                          | 35,018,765           | 35,249,905           | 231,140            | 0.7         | -743,533            | -2.1        |
| 25       | Furniture             | 42,672,922                          | 17,261,004           | 15,331,402           | -1,929,602         | -11.2       | -27,341,520         | -64.1       |
| 26       | Paper                 | 241,130,582                         | 234,255,457          | 225,559,415          | -8,696,042         | -3.7        | -15,571,167         | -6.5        |
| 27       | Printing              | 31,316,321                          | 22,518,392           | 20,677,981           | -1,840,411         | -8.2        | -10,638,340         | -34.0       |
| 28       | Chemicals             | 828,289,631                         | 686,777,949          | 670,529,437          | -16,248,512        | -2.4        | -157,760,194        | -19.0       |
| 29       | Petroleum             | 66,655,532                          | 75,718,581           | 70,540,929           | -5,177,652         | -6.8        | 3,885,397           | 5.8         |
| 30       | Plastics              | 128,215,794                         | 112,004,623          | 103,627,357          | -8,377,266         | -7.5        | -24,588,437         | -19.2       |
| 31       | Leather               | 4,851,489                           | 4,835,113            | 4,380,410            | -454,703           | -9.4        | -471,079            | -9.7        |
| 32       | Stone/Clay/Glass      | 37,117,116                          | 45,143,632           | 42,979,188           | -2,164,444         | -4.8        | 5,862,072           | 15.8        |
| 33       | Primary Metals        | 567,531,674                         | 718,987,188          | 683,732,592          | -35,254,596        | -4.9        | 116,200,918         | 20.5        |
| 34       | Fabricated Metals     | 106,935,535                         | 88,486,037           | 82,229,693           | -6,256,344         | -7.1        | -24,705,842         | -23.1       |
| 35       | Machinery             | 27,925,318                          | 20,144,071           | 15,518,133           | -4,625,938         | -23.0       | -12,407,185         | -44.4       |
| 36       | Electrical Equip.     | 44,286,449                          | 32,558,396           | 41,125,427           | 8,567,031          | 26.3        | -3,161,022          | -7.1        |
| 37       | Transportation Equip. | 123,402,295                         | 102,625,207          | 104,985,128          | 2,359,921          | 2.3         | -18,417,167         | -14.9       |
| 38       | Measure/Photo.        | 17,702,014                          | 12,423,576           | 10,898,979           | -1,524,597         | -12.3       | -6,803,035          | -38.4       |
| 39       | Miscellaneous         | 13,974,408                          | 10,399,631           | 10,229,122           | -170,509           | -1.6        | -3,745,286          | -26.8       |
|          | Multiple codes 20–39  | 157,717,666                         | 127,497,594          | 129,078,067          | 1,580,473          | 1.2         | -28,639,599         | -18.2       |
|          | No codes 20–39        | 15,650,750                          | 6,575,879            | 34,817,050           | 28,241,171         | 429.5       | 19,166,300          | 122.5       |
|          | <b>Total</b>          | <b>2,636,419,382</b>                | <b>2,504,138,319</b> | <b>2,438,702,404</b> | <b>-65,435,915</b> | <b>-2.6</b> | <b>-197,716,978</b> | <b>-7.5</b> |

Note: On-site Releases are from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the “multiple codes” category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the “no codes” category.

Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, reporting in the “no codes” 20–39 category were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change total release amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising total releases for manganese compounds from 5,584,900 pounds to below 500 pounds.





amounted to 18.2 percent and that for the furniture industry, to 64.1 percent.

Four industries, in addition to the primary metals industry, showed increases between 1995 and 1999: stone, clay, glass, and concrete products, from 37.1 million pounds to 43.0 million pounds (an increase of 5.9 million pounds, or 15.8 percent); petroleum refining, from 66.7 million pounds to 70.5 million pounds (3.9 million pounds, or 5.8 percent); tobacco products, from 2.1 million pounds to 3.7 million pounds (1.6 million pounds, or 72.6 percent); and the food industry, from 122.8 million pounds to 123.2 million pounds, an increase of about 415,000 pounds, or 0.3 percent.

In two of the five groups that reported increases between 1995 and 1999, the general upward trend was broken in 1998–1999. Total releases by the petroleum refining industry fell from 75.7 million pounds in 1998 to 70.5 million pounds in 1999, a decline of 6.8 percent. Releases from the food industry dropped by 8.5 percent, from 134.7 million pounds in 1998 to 123.2 million pounds in 1999.

### On- and Off-site Releases, 1988 and 1995–1999

Table 5–7 summarizes original-industry data for the chemicals that have been reportable since 1988. Between 1988 and 1999, total on- and off-site releases decreased from 3.21 billion pounds to 1.75 billion pounds, a decline of 1.46 billion pounds, or 45.5 percent. The chemical manufacturing industry showed the largest absolute reduction, from 879.2 million pounds in 1988 to 384.5 million pounds in 1999, a decrease of 494.7 million pounds.

This amounted to a reduction of 56.3 percent over the period. Only two other industry groups reported reductions of more than 100 million pounds each between 1988 and 1999. Releases from the “multiple-codes” group fell from 303.2 million pounds to 87.4 million pounds, a decrease of 215.7 million pounds, or 71.2 percent. For transportation equipment, the decrease was from 213.7 million pounds to 98.4 million pounds, a drop of 115.3 million pounds, or 54.0 percent.

Only one industry, food products, recorded an increase over the period 1988–1999 period. Reported releases from the industry declined slightly between 1988 and 1995, from 7.0 million pounds to 6.8 million pounds. They then rose to 21.5 million pounds in 1998 before falling to 11.3 million pounds in 1999. The reduction between 1998 and 1999 was 10.2 million pounds, or 47.5 percent, but over the whole 11-year period, releases rose 4.3 million pounds, or 62.0 percent.

### TRI Chemicals Managed in Waste, 2000–2001 Projected, 1995–1998, and 1991–1998

#### *Projected Quantities of TRI Chemicals Managed in Waste, 2000–2001*

As described in **Waste Management** in Chapter 1, on each Form R that it submits, a facility reports actual waste management quantities for the current and prior years and projected quantities for the next two years. TRI facilities projected a 1.4 percent increase between 1999 and 2001 in production-related waste managed, from 23.10 billion pounds to 23.42 billion pounds in 2001, as shown in Table 5–8. The amount was expected to decrease by 2.6 percent in 2000,

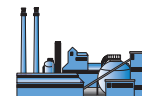


Table 5-7. TRI On-site and Off-site Releases, Original Industries, by Industry, 1988, 1995 and 1998-1999

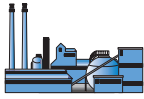
| SIC Code | Industry              | Total On-site and Off-site Releases |                      |                      |                      |                    |             |                       |              |
|----------|-----------------------|-------------------------------------|----------------------|----------------------|----------------------|--------------------|-------------|-----------------------|--------------|
|          |                       | 1988                                | 1995                 | 1998                 | 1999                 | Change 1998-1999   |             | Change 1988-1999      |              |
|          |                       | Pounds                              | Pounds               | Pounds               | Pounds               | Pounds             | Percent     | Pounds                | Percent      |
| 20       | Food                  | 6,960,051                           | 6,754,069            | 21,466,772           | 11,273,723           | -10,193,049        | -47.5       | 4,313,672             | 62.0         |
| 21       | Tobacco               | 214,464                             | 142,916              | 185,062              | 184,056              | -1,006             | -0.5        | -30,408               | -14.2        |
| 22       | Textiles              | 36,798,254                          | 15,917,509           | 10,256,849           | 7,917,290            | -2,339,559         | -22.8       | -28,880,964           | -78.5        |
| 23       | Apparel               | 951,662                             | 1,260,746            | 385,716              | 253,708              | -132,008           | -34.2       | -697,954              | -73.3        |
| 24       | Lumber                | 32,846,967                          | 31,372,956           | 31,907,744           | 32,719,762           | 812,018            | 2.5         | -127,205              | -0.4         |
| 25       | Furniture             | 62,179,772                          | 42,412,333           | 16,959,377           | 15,142,464           | -1,816,913         | -10.7       | -47,037,308           | -75.6        |
| 26       | Paper                 | 205,183,152                         | 181,146,959          | 177,493,380          | 171,397,840          | -6,095,540         | -3.4        | -33,785,312           | -16.5        |
| 27       | Printing              | 56,534,465                          | 31,055,847           | 22,305,321           | 20,470,554           | -1,834,767         | -8.2        | -36,063,911           | -63.8        |
| 28       | Chemicals             | 879,178,871                         | 519,013,264          | 398,204,669          | 384,494,232          | -13,710,437        | -3.4        | -494,684,639          | -56.3        |
| 29       | Petroleum             | 73,910,911                          | 42,426,955           | 41,861,646           | 36,645,595           | -5,216,051         | -12.5       | -37,265,316           | -50.4        |
| 30       | Plastics              | 160,548,761                         | 114,713,683          | 99,360,082           | 93,220,822           | -6,139,260         | -6.2        | -67,327,939           | -41.9        |
| 31       | Leather               | 10,089,020                          | 4,418,337            | 4,266,247            | 3,797,296            | -468,951           | -11.0       | -6,291,724            | -62.4        |
| 32       | Stone/Clay/Glass      | 37,871,123                          | 21,906,899           | 29,118,229           | 27,357,696           | -1,760,533         | -6.0        | -10,513,427           | -27.8        |
| 33       | Primary Metals        | 645,267,231                         | 495,104,404          | 632,926,129          | 592,574,218          | -40,351,911        | -6.4        | -52,693,013           | -8.2         |
| 34       | Fabricated Metals     | 159,981,808                         | 95,153,392           | 80,075,950           | 74,904,189           | -5,171,761         | -6.5        | -85,077,619           | -53.2        |
| 35       | Machinery             | 70,769,700                          | 23,874,525           | 16,730,015           | 12,920,306           | -3,809,709         | -22.8       | -57,849,394           | -81.7        |
| 36       | Electrical Equip.     | 128,704,186                         | 31,699,285           | 23,260,595           | 29,980,664           | 6,720,069          | 28.9        | -98,723,522           | -76.7        |
| 37       | Transportation Equip. | 213,723,723                         | 116,972,513          | 96,258,909           | 98,375,540           | 2,116,631          | 2.2         | -115,348,183          | -54.0        |
| 38       | Measure/Photo.        | 56,725,985                          | 12,564,459           | 6,939,168            | 5,861,067            | -1,078,101         | -15.5       | -50,864,918           | -89.7        |
| 39       | Miscellaneous         | 31,785,682                          | 13,390,926           | 9,968,642            | 9,607,043            | -361,599           | -3.6        | -22,178,639           | -69.8        |
|          | Multiple codes 20-39  | 303,164,914                         | 123,464,135          | 88,752,495           | 87,446,724           | -1,305,771         | -1.5        | -215,718,190          | -71.2        |
|          | No codes 20-39        | 39,707,366                          | 12,870,367           | 4,515,968            | 33,186,396           | 28,670,428         | 634.9       | -6,520,970            | -16.4        |
|          | <b>Total</b>          | <b>3,213,098,068</b>                | <b>1,937,636,479</b> | <b>1,813,198,965</b> | <b>1,749,731,185</b> | <b>-63,467,780</b> | <b>-3.5</b> | <b>-1,463,366,883</b> | <b>-45.5</b> |

**Note:** Does not include delisted chemicals, chemicals added in 1990, 1994 and 1995, aluminum oxide, ammonia, hydrochloric acid and sulfuric acid. **On-site Releases** are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.

Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, reporting in the "no codes" 20-39 category were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change total release amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising total releases for manganese compounds from 5,584,900 pounds to below 500 pounds.

to 22.50 billion pounds, before rising again. Of the five industry groups that had total releases exceeding 1 billion pounds in 1999, reductions were projected for chemical manufacturing, paper products, and petroleum refining, and increases were projected for the primary metals industry and the "multiple-codes" group.

Primary metals was the industry with the largest projected absolute increase, from 3.52 billion pounds in 1999 to 3.68 billion pounds in 2001, a rise of 167.8 million pounds. Although the amount of production-related waste for this industry was expected to dip in 2000, to 3.50 billion pounds, overall growth for the 1999-2001 period was expected to be 4.8 percent. The next-largest absolute increase projected was



for the food industry, which reported 945.5 million pounds of production-related waste in 1999. The amount was projected to grow by 1.2 percent by 2000, to 956.5 million pounds, but then to jump to 1.37 billion pounds by 2001. The increase of 421.8 million pounds over the 1999–2001 period would represent a rise of 44.6 percent.

The printing industry would experience the third-largest increase in production-related waste, nearly 57 million pounds. The growth from 318.1 million pounds in 1999 to 374.9 million pounds in 2001 would amount to an increase of 17.8 percent. The “multiple-codes” group was expected to see a rise of almost 34 million pounds in production-related waste, from 1.05 billion pounds to 1.08 billion pounds, an increase of 3.2 percent. The increase for electrical equipment industry was projected to be nearly 34 million pounds, from 711.4 million pounds to 745.3 million pounds, a rise of 4.8 percent. For transportation equipment, an increase of almost 12 million pounds was projected, from 306.8 million pounds to 318.7 million pounds, or 3.9 percent. Smaller increases, of less than 10 million pounds, were expected for four other industries.

Other industry groups expected to reduce their production-related waste between 1999 and 2001. The projected declines were more than 10 million pounds for several industries including paper manufacturing, plastics, and fabricated metals.

Production-related waste managed by the paper manufacturing industry was projected to fall from 1.59 billion pounds in 1999 to 1.53 billion pounds in 2001, a difference of 58.6 million pounds, or 3.7 percent. For plastics, the decrease was expected to be

20.6 million pounds, from 246.1 million pounds in 1999 to 225.5 million pounds in 2001, a decline of 8.4 percent.

### **Quantities of TRI Chemicals in Waste, 1995–1999**

As shown in Table 5–9, facilities in the original TRI industries reported managing 22.54 billion pounds of production-related waste in 1995 and 23.10 billion pounds in 1999. The chemical manufacturing industry reported the largest absolute increase during the 1995–1999 period, from 9.53 billion pounds to 11.14 billion pounds, a rise of 1.61 billion pounds, or 16.9 percent. Second was the food products industry, which reported an increase of 808.7 million pounds, from 136.8 million pounds in 1995 to 945.5 million pounds in 1999. The increase amounted to 591.1 percent, the largest percentage change for any of the industries listed. A distant third was the petroleum industry, which reported an increase of 252.8 million pounds, from 947.3 million pounds in 1995 to 1.20 billion pounds in 1999, or 26.7 percent. No other industry reported an increase of more than 30 million pounds for the period.

The “multiple-codes” group (forms reporting more than one two-digit SIC code) recorded the largest absolute reduction in total production-related waste between 1995 and 1999. This group’s forms reported 1.83 billion pounds in 1995 and 1.05 billion pounds in 1999, a decrease of 781.9 million pounds, or 42.7 percent. The primary metals industry had the second largest decrease, 591.9 million pounds, from 4.11 billion pounds in 1995 to 3.52 billion pounds in 1999. This represented a decline of 14.4 percent. Third in absolute reductions was the plastics industry, with a decrease of 296.5 million pounds. The drop



**Table 5–8. Current Year and Projected Quantities of TRI Chemicals in Waste, Original Industries, by Industry, 1999–2001**

| SIC Code | Industry              | Total Production-related Waste Managed |                       |                       |                             |                             |
|----------|-----------------------|--|-----------------------|-----------------------|-----------------------------|-----------------------------|
|          |                       | Current Year 1999<br>Pounds            | Projected             |                       | Change 1999-2000<br>Percent | Change 1999-2001<br>Percent |
|          |                       |  | 2000<br>Pounds        | 2001<br>Pounds        |                             |                             |
| 20       | Food                  | 945,458,744                            | 956,515,862           | 1,367,304,781         | 1.2                         | 44.6                        |
| 21       | Tobacco               | 5,044,066                              | 4,807,872             | 4,827,989             | -4.7                        | -4.3                        |
| 22       | Textiles              | 41,320,670                             | 41,149,755            | 40,589,771            | -0.4                        | -1.8                        |
| 23       | Apparel               | 1,712,023                              | 1,727,507             | 1,737,624             | 0.9                         | 1.5                         |
| 24       | Lumber                | 59,641,962                             | 58,202,427            | 60,615,351            | -2.4                        | 1.6                         |
| 25       | Furniture             | 27,711,017                             | 23,275,568            | 22,799,387            | -16.0                       | -17.7                       |
| 26       | Paper                 | 1,590,696,876                          | 1,538,649,164         | 1,532,075,751         | -3.3                        | -3.7                        |
| 27       | Printing              | 318,114,885                            | 346,667,189           | 374,877,662           | 9.0                         | 17.8                        |
| 28       | Chemicals             | 11,137,414,942                         | 10,788,253,237        | 10,925,205,928        | -3.1                        | -1.9                        |
| 29       | Petroleum             | 1,200,126,709                          | 1,039,457,214         | 1,124,560,749         | -13.4                       | -6.3                        |
| 30       | Plastics              | 246,086,048                            | 230,182,484           | 225,454,098           | -6.5                        | -8.4                        |
| 31       | Leather               | 14,477,133                             | 14,211,729            | 13,918,647            | -1.8                        | -3.9                        |
| 32       | Stone/Clay/Glass      | 889,183,760                            | 885,032,733           | 893,848,610           | -0.5                        | 0.5                         |
| 33       | Primary Metals        | 3,515,901,800                          | 3,496,898,737         | 3,683,729,325         | -0.5                        | 4.8                         |
| 34       | Fabricated Metals     | 735,169,413                            | 729,182,579           | 722,185,557           | -0.8                        | -1.8                        |
| 35       | Machinery             | 121,058,961                            | 116,168,073           | 119,756,792           | -4.0                        | -1.1                        |
| 36       | Electrical Equip.     | 711,414,954                            | 716,988,656           | 745,284,087           | 0.8                         | 4.8                         |
| 37       | Transportation Equip. | 306,798,452                            | 313,721,088           | 318,679,702           | 2.3                         | 3.9                         |
| 38       | Measure/Photo.        | 70,670,146                             | 70,506,601            | 70,856,667            | -0.2                        | 0.3                         |
| 39       | Miscellaneous         | 49,032,262                             | 47,209,916            | 46,433,310            | -3.7                        | -5.3                        |
|          | Multiple codes 20–39  | 1,050,368,336                          | 1,041,428,186         | 1,084,287,153         | -0.9                        | 3.2                         |
|          | No codes 20–39        | 61,376,706                             | 43,852,910            | 44,164,047            | -28.6                       | -28.0                       |
|          | <b>Total</b>          | <b>23,098,779,865</b>                  | <b>22,504,089,487</b> | <b>23,423,192,988</b> | <b>-2.6</b>                 | <b>1.4</b>                  |

**Note:** Data are from Section 8 (Total of 8.1 through 8.7) of Form R for 1999. Current Year is Column B, 2000 is Column C and 2001 is Column D. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the “multiple codes” category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the “no codes” category.

Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, reporting in the “no codes” 20–39 category were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change total production-related waste amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising total production-related waste for manganese compounds from 5,584,900 pounds to below 500 pounds.

from 542.6 million pounds in 1995 to 246.1 million pounds in 1999 amounted to a decline of 54.6 percent, the highest percentage decrease among the original industries.

### Quantities of TRI Chemicals in Waste, 1991 and 1995–1998

As shown in Table 5–10, total production-related waste managed rose from 17.91 billion pounds in 1991 to 18.83 billion pounds

in 1999, a 5.1 percent increase. This analysis addresses only the chemicals that were reportable in all years, 1991 to 1999.

The “multiple-codes” group reported the largest absolute reduction in total production-related waste managed. This group’s forms totaled 1.91 billion pounds of production-related waste in 1991 and 877.0 million pounds in 1999. The reduction of



about 1.04 billion pounds represented a decrease of more than half, 54.2 percent. The plastics industry also reduced its production-related waste by more than half, 53.5 percent. With a drop of 252.3 million pounds between 1991 and 1999—from 471.4 million pounds in 1991 to 219.0 million pounds in 1999—the plastics industry ranked second in absolute reductions.

The petroleum industry ranked third in reductions; its production-related waste decreased from 1.17 billion pounds in 1991 to 989.8 million pounds in 1999. The total decrease of 177.2 million pounds over the period amounted to a 15.2 percent reduction. Between 1995 and 1999, however, the industry’s production-related waste rose from 815.0 million pounds to 989.8 million

**Table 5-9. Total Production-related Waste Managed, Original Industries, by Industry, 1995 and 1998–1999**

| SIC Code | Industry              | Total Production-related Waste Managed |                       |                       |                    |            |                    |            |
|----------|-----------------------|--|-----------------------|-----------------------|--------------------|------------|--------------------|------------|
|          |                       | 1995                                   | 1998                  | 1999                  | Change 1998-1999   |            | Change 1995-1999   |            |
|          |                       | Pounds                                 | Pounds                | Pounds                | Pounds             | Percent    | Pounds             | Percent    |
| 20       | Food                  | 136,806,075                            | 1,304,299,754         | 945,458,744           | -358,841,010       | -27.5      | 808,652,669        | 591.1      |
| 21       | Tobacco               | 3,061,366                              | 5,897,772             | 5,044,066             | -853,706           | -14.5      | 1,982,700          | 64.8       |
| 22       | Textiles              | 55,150,811                             | 49,340,819            | 41,320,670            | -8,020,149         | -16.3      | -13,830,141        | -25.1      |
| 23       | Apparel               | 2,161,558                              | 1,820,495             | 1,712,023             | -108,472           | -6.0       | -449,535           | -20.8      |
| 24       | Lumber                | 112,361,152                            | 62,637,123            | 59,641,962            | -2,995,161         | -4.8       | -52,719,190        | -46.9      |
| 25       | Furniture             | 60,757,162                             | 32,459,439            | 27,711,017            | -4,748,422         | -14.6      | -33,046,145        | -54.4      |
| 26       | Paper                 | 1,758,412,836                          | 1,479,054,323         | 1,590,696,876         | 111,642,553        | 7.5        | -167,715,960       | -9.5       |
| 27       | Printing              | 294,766,213                            | 300,492,121           | 318,114,885           | 17,622,764         | 5.9        | 23,348,672         | 7.9        |
| 28       | Chemicals             | 9,531,248,520                          | 10,658,457,726        | 11,137,414,942        | 478,957,216        | 4.5        | 1,606,166,422      | 16.9       |
| 29       | Petroleum             | 947,285,622                            | 1,038,746,885         | 1,200,126,709         | 161,379,824        | 15.5       | 252,841,087        | 26.7       |
| 30       | Plastics              | 542,626,137                            | 262,371,142           | 246,086,048           | -16,285,094        | -6.2       | -296,540,089       | -54.6      |
| 31       | Leather               | 10,331,453                             | 10,755,703            | 14,477,133            | 3,721,430          | 34.6       | 4,145,680          | 40.1       |
| 32       | Stone/Clay/Glass      | 863,902,116                            | 796,266,984           | 889,183,760           | 92,916,776         | 11.7       | 25,281,644         | 2.9        |
| 33       | Primary Metals        | 4,107,828,450                          | 3,599,576,930         | 3,515,901,800         | -83,675,130        | -2.3       | -591,926,650       | -14.4      |
| 34       | Fabricated Metals     | 764,447,335                            | 713,661,894           | 735,169,413           | 21,507,519         | 3.0        | -29,277,922        | -3.8       |
| 35       | Machinery             | 170,690,285                            | 146,965,583           | 121,058,961           | -25,906,622        | -17.6      | -49,631,324        | -29.1      |
| 36       | Electrical Equip.     | 695,872,529                            | 781,666,242           | 711,414,954           | -70,251,288        | -9.0       | 15,542,425         | 2.2        |
| 37       | Transportation Equip. | 399,130,504                            | 297,514,311           | 306,798,452           | 9,284,141          | 3.1        | -92,332,052        | -23.1      |
| 38       | Measure/Photo.        | 79,445,972                             | 74,842,678            | 70,670,146            | -4,172,532         | -5.6       | -8,775,826         | -11.0      |
| 39       | Miscellaneous         | 52,389,911                             | 50,947,108            | 49,032,262            | -1,914,846         | -3.8       | -3,357,649         | -6.4       |
|          | Multiple codes 20–39  | 1,832,303,176                          | 1,076,773,946         | 1,050,368,336         | -26,405,610        | -2.5       | -781,934,840       | -42.7      |
|          | No codes 20–39        | 115,180,667                            | 30,876,676            | 61,376,706            | 30,500,030         | 98.8       | -53,803,961        | -46.7      |
|          | <b>Total</b>          | <b>22,536,159,850</b>                  | <b>22,775,425,654</b> | <b>23,098,779,865</b> | <b>323,354,211</b> | <b>1.4</b> | <b>562,620,015</b> | <b>2.5</b> |

**Note:** Data are from Section 8 (total of 8.1 through 8.7) of Form R of year indicated. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the “multiple codes” category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the “no codes” category. Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, reporting in the “no codes” 20–39 category were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change total production-related waste amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising total production-related waste for manganese compounds from 5,584,900 pounds to below 500 pounds. Seven facilities in the food processing industry (SIC code 20) reported from 150 million pounds to 1 billion pounds each in on-site recycling of n-hexane in 1995, for a total of 4.0 billion pounds. In 1996 these facilities reported no on-site recycling of n-hexane. On their 1996 Form Rs, these facilities also reported zero for on-site recycling of n-hexane for the prior year (1995). However, they have not revised their 1995 form. These amounts of on-site recycling in 1995 have been omitted from this table.



pounds, increasing 16.1 percent in the last year.

Between 1991 and 1999, other industries reported decreases of more than 100 million pounds including machinery (a decline of 152.3 million pounds, or 58.1 percent) and the stone, clay, glass, and concrete group (a decrease of 126.0 million pounds, or 12.9 percent).

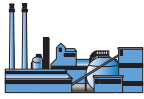
The largest absolute increase in production-related waste between 1991 and 1999—about 2.10 billion pounds—was reported by the chemical manufacturing industry. Its total rose from 6.86 billion pounds to 8.95 billion pounds, an increase of 30.3 percent. The primary metals industry had the second-largest increase, about 838.3 million pounds. Its production-related waste rose from 2.32 billion pounds in 1991 to 3.16 billion pounds in 1999, a 36.2 percent

**Table 5-10. Total Production-related Waste Managed, Original Industries, by Industry, 1991, 1995 and 1998-1999**

| SIC Code | Industry              | Total Production-related Waste Managed |                       |                       |                       |                    |            |                    |            |
|----------|-----------------------|--|-----------------------|-----------------------|-----------------------|--------------------|------------|--------------------|------------|
|          |                       | 1991                                   | 1995                  | 1998                  | 1999                  | Change 1998-1999   |            | Change 1991-1999   |            |
|          |                       | Pounds                                 | Pounds                | Pounds                | Pounds                | Pounds             | Percent    | Pounds             | Percent    |
| 20       | Food                  | 34,030,866                             | 54,870,869            | 85,307,686            | 66,123,801            | -19,183,885        | -22.5      | 32,092,935         | 94.3       |
| 21       | Tobacco               | 51,388,971                             | 169,261               | 193,470               | 185,491               | -7,979             | -4.1       | -51,203,480        | -99.6      |
| 22       | Textiles              | 46,542,986                             | 44,062,387            | 42,525,705            | 35,426,982            | -7,098,723         | -16.7      | -11,116,004        | -23.9      |
| 23       | Apparel               | 2,284,692                              | 2,106,759             | 1,632,105             | 1,398,157             | -233,948           | -14.3      | -886,535           | -38.8      |
| 24       | Lumber                | 59,992,495                             | 108,841,005           | 60,012,518            | 56,835,760            | -3,176,758         | -5.3       | -3,156,735         | -5.3       |
| 25       | Furniture             | 61,297,883                             | 60,041,328            | 31,977,087            | 27,350,378            | -4,626,709         | -14.5      | -33,947,505        | -55.4      |
| 26       | Paper                 | 1,381,526,976                          | 1,309,311,403         | 1,282,125,764         | 1,392,598,205         | 110,472,441        | 8.6        | 11,071,229         | 0.8        |
| 27       | Printing              | 258,847,784                            | 291,431,644           | 299,229,547           | 316,166,258           | 16,936,711         | 5.7        | 57,318,474         | 22.1       |
| 28       | Chemicals             | 6,864,419,809                          | 7,308,331,935         | 8,494,597,668         | 8,946,237,562         | 451,639,894        | 5.3        | 2,081,817,753      | 30.3       |
| 29       | Petroleum             | 1,166,992,745                          | 814,951,500           | 852,228,535           | 989,803,680           | 137,575,145        | 16.1       | -177,189,065       | -15.2      |
| 30       | Plastics              | 471,361,440                            | 498,338,513           | 233,487,822           | 219,020,288           | -14,467,534        | -6.2       | -252,341,152       | -53.5      |
| 31       | Leather               | 17,878,399                             | 7,025,037             | 6,357,174             | 10,884,687            | 4,527,513          | 71.2       | -6,993,712         | -39.1      |
| 32       | Stone/Clay/Glass      | 973,517,811                            | 839,829,747           | 758,453,750           | 847,543,492           | 89,089,742         | 11.7       | -125,974,319       | -12.9      |
| 33       | Primary Metals        | 2,318,461,645                          | 3,174,533,241         | 3,248,311,739         | 3,156,767,694         | -91,544,045        | -2.8       | 838,306,049        | 36.2       |
| 34       | Fabricated Metals     | 577,710,938                            | 674,521,043           | 669,846,491           | 692,674,442           | 22,827,951         | 3.4        | 114,963,504        | 19.9       |
| 35       | Machinery             | 261,885,615                            | 156,608,789           | 134,952,542           | 109,627,942           | -25,324,600        | -18.8      | -152,257,673       | -58.1      |
| 36       | Electrical Equip.     | 672,688,221                            | 584,251,230           | 674,122,398           | 630,274,036           | -43,848,362        | -6.5       | -42,414,185        | -6.3       |
| 37       | Transportation Equip. | 378,444,124                            | 374,408,086           | 278,070,502           | 289,166,623           | 11,096,121         | 4.0        | -89,277,501        | -23.6      |
| 38       | Measure/Photo.        | 116,365,141                            | 69,734,482            | 62,842,869            | 59,143,750            | -3,699,119         | -5.9       | -57,221,391        | -49.2      |
| 39       | Miscellaneous         | 67,562,403                             | 49,482,747            | 48,058,590            | 46,359,139            | -1,699,451         | -3.5       | -21,203,264        | -31.4      |
|          | Multiple codes 20-39  | 1,914,546,773                          | 1,271,967,092         | 869,100,658           | 876,956,089           | 7,855,431          | 0.9        | -1,037,590,684     | -54.2      |
|          | No codes 20-39        | 208,496,326                            | 107,152,545           | 25,629,796            | 55,558,337            | 29,928,541         | 116.8      | -152,937,989       | -73.4      |
|          | <b>Total</b>          | <b>17,906,244,043</b>                  | <b>17,801,970,643</b> | <b>18,159,064,416</b> | <b>18,826,102,793</b> | <b>667,038,377</b> | <b>3.7</b> | <b>919,858,750</b> | <b>5.1</b> |

**Note:** Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid and sulfuric acid. Data are from Section 8 (total of 8.1 through 8.7) of Form R of year indicated. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.

Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, reporting in the "no codes" 20-39 category were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change the facility's total production-related waste amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising total production-related waste for manganese compounds from 5,584,900 pounds to below 500 pounds.



increase. In the last year, however, the total decreased by 2.8 percent. The fabricated metals industry had the third largest absolute increase, reporting 577.7 million pounds in 1991 and 692.7 million pounds in 1999. The rise of 115.0 million pounds amounted to a 19.9 percent increase in production-related waste. No other original industry reported an increase of more than 100 million pounds.

### Economic Overview, by Industry, Multi-Year Comparisons

U.S. economic expansion continued in 1999, with 4.2 percent real growth (adjusted for inflation) in gross domestic product (*Economic Report of the President*, January 2001). As shown in Table 5–11, manufacturing production also continued to increase, for all industry groups except tobacco, leather, printing, fabricated metals, and textiles.

Table 5–11 presents production indexes for each industrial sector from 1991 to 1999.

During this period, production increased 47.9 percent for U.S. manufacturing overall. Table 5–12 compares the change in manufacturing production since 1991 with the change in TRI quantities released on- and off-site and in TRI total production-related waste managed. As shown in Table 5–12, the quantity released on- and off-site steadily decreased (except for a very small increase between 1996 and 1997), even as manufacturing production expanded. Overall, while production rose 47.9 percent, TRI facilities reported a decrease of 28.3 percent in quantity released on- and off-site since 1991. Although the total quantity of production-related waste that facilities managed rose, by 5.1 percent, the overall increase was considerably smaller than the nation's increase in manufacturing production. While manufacturing production steadily increased from 1991 to 1999, for a gain of 47.9 percent over the period, TRI production-related waste decreased in about half of the years. Increases in 1994, 1997, 1998 and 1999, however, led to an overall increase for the period.



Table 5-11. Industrial Production Indexes by Industry, 1991-1999

|                          | 1991  | 1992  | 1993  | 1994  | 1995  | 1996  | 1997  | 1998  | 1999  |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>Total Index</b>       | 100.0 | 103.1 | 106.6 | 112.5 | 117.9 | 123.1 | 131.0 | 136.5 | 141.3 |
| <b>Manufacturing</b>     | 100.0 | 104.0 | 107.8 | 114.3 | 120.4 | 126.1 | 135.2 | 141.8 | 147.9 |
| <b>SIC Code Industry</b> |       |       |       |       |       |       |       |       |       |
| 20 Food                  | 100.0 | 101.6 | 103.7 | 105.4 | 107.5 | 107.1 | 109.6 | 111.1 | 111.9 |
| 21 Tobacco               | 100.0 | 101.1 | 85.0  | 105.6 | 113.0 | 114.8 | 114.2 | 107.4 | 95.3  |
| 22 Textiles              | 100.0 | 107.9 | 113.6 | 119.3 | 118.9 | 117.3 | 120.7 | 119.6 | 119.6 |
| 23 Apparel               | NA    | NA    | NA    | NA    | NA    | NA    | NA    | NA    | NA    |
| 24 Lumber                | 100.0 | 105.8 | 106.7 | 112.1 | 114.2 | 116.5 | 121.7 | 125.4 | 128.7 |
| 25 Furniture             | 100.0 | 105.5 | 110.7 | 114.0 | 117.5 | 119.3 | 124.5 | 128.7 | 132.4 |
| 26 Paper                 | 100.0 | 103.3 | 107.4 | 112.0 | 113.2 | 112.4 | 118.1 | 118.7 | 120.0 |
| 27 Printing              | 100.0 | 100.9 | 101.6 | 101.6 | 102.2 | 102.2 | 106.2 | 106.1 | 105.3 |
| 28 Chemicals             | 100.0 | 103.7 | 105.4 | 108.7 | 111.4 | 113.9 | 118.9 | 119.4 | 121.9 |
| 29 Petroleum             | 100.0 | 100.9 | 103.8 | 103.6 | 105.4 | 107.8 | 111.8 | 114.3 | 115.7 |
| 30 Plastics              | 100.0 | 110.3 | 117.9 | 128.4 | 132.0 | 135.9 | 141.6 | 146.9 | 151.8 |
| 31 Leather               | 100.0 | 101.6 | 102.6 | 95.1  | 88.3  | 88.9  | 85.0  | 78.4  | 70.9  |
| 32 Stone/clay/glass      | 100.0 | 102.9 | 105.0 | 111.0 | 114.3 | 117.9 | 124.0 | NA    | NA    |
| 33 Primary metals        | 100.0 | 103.4 | 108.7 | 117.7 | 120.2 | 123.7 | 131.0 | 129.9 | 130.9 |
| 34 Fabricated metals     | 100.0 | 104.0 | 108.5 | 116.6 | 121.0 | 124.9 | 131.1 | 133.9 | 133.8 |
| 35 Machinery             | 100.0 | 104.8 | 115.4 | 131.7 | 150.6 | 167.3 | 186.9 | 216.4 | 241.2 |
| 36 Electrical Equip.     | 100.0 | 111.6 | 122.1 | 145.6 | 184.9 | 230.6 | 290.2 | 351.7 | 435.5 |
| 37 Transportation Equip. | 100.0 | 103.6 | 107.3 | 111.4 | 110.6 | 111.5 | 121.3 | 126.0 | 126.8 |
| 38 Measure/Photo.        | 100.0 | 100.2 | 101.0 | 100.0 | 103.8 | 107.8 | 109.8 | 112.8 | 116.7 |
| 39 Miscellaneous         | 100.0 | 101.6 | 107.4 | 111.8 | 115.5 | 120.7 | 127.9 | NA    | NA    |

Note: From 2000 Statistical Abstract of the United States, No. 1238. Industrial Production Indexes, by Industry: 1990 to 1999 (<<http://www.census.gov/prod/www/statistical-abstract-us.html>>, accessed February 24, 2001).  
NA—data not provided.

Table 5-12. Cumulative Change in Manufacturing Production and in TRI Quantities in Waste Managed, 1991-1999

|   | 1991-1992 | 1992-1993 | 1993-1994 | 1994-1995 | 1995-1996 | 1996-1997 | 1997-1998 | 1998-1999 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Manufacturing Production</b>                   | 4.0       | 3.8       | 6.5       | 6.0       | 5.7       | 9.1       | 6.5       | 6.1       |
| <b>TRI Quantity Released On- and Off-site</b>     | -8.5      | -7.6      | -1.1      | -3.3      | -3.4      | 0.3       | -3.0      | -5.5      |
| <b>TRI Total Production-related Waste Managed</b> | -2.4      | -0.6      | 6.6       | -3.8      | -1.7      | 2.8       | 0.9       | 3.7       |

Note: From 2000 Statistical Abstract of the United States, No. 1238. Industrial Production Indexes, by Industry: 1990 to 1999 (<<http://www.census.gov/prod/www/statistical-abstract-us.html>>, accessed February 24, 2001).