2003 Oklahoma TRI

Toxic Release Inventory Summary Report

Contents

OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY
. . . for a clean, attractive, prosperous Oklahoma

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Executive Summary

Numbers based on Toxics Release Inventory (TRI) reports for 2003 indicate industrial wastes released into the environment are declining even as manufacturing activity across the State increases. TRI is part of the federal Emergency Planning and Community Right to Know Act and is administered by the U.S. Environmental Protection Agency (EPA). The law requires covered facilities in Oklahoma submit reports to DEQ which manages a TRI database for the entire state. TRI data reflect the legal emissions, transfers, and treatment of over 600 toxic chemicals used in the manufacture or processing of a wide variety of products. Industries required to report under TRI must engage in manufacturing, coal-fired electric power generation, commercial hazardous waste disposal, solvent recovery or serve as a bulk petroleum terminal. Facilities in these categories must have the equivalent of at least 10 full time employees and use one or more listed toxic chemicals. For RY 2003, DEQ received 1,178 reports from 344 Oklahoma facilities.

Releases and transfers of chemicals used in the State are regulated under permits issued by state and federal agencies. Releases are the quantities of chemical emissions going directly to air, water or onto land. Transfers are the quantities of chemicals discharged into public sewers, off-site landfills or removed to other disposal facilities. Re-use includes figures for both recycled chemicals and those used for energy recovery. Treatment numbers include both on-site and off-site treatment to neutralize or destroy the toxic chemicals. The total of these activities reflects the total production related wastes generated in the State in 2003.

Oklahoma companies reported 24.8 million pounds released in 2003, a decrease of almost 600,000 pounds, or 2.31 percent from 2002. While releases into Class I injection wells increased substantially, significant reductions in on-site releases to land and a continued decline in air emissions account for the majority of the decrease. The numbers demonstrate a 10 percent reduction in the release of toxic chemicals throughout the State in the past ten years. Re-use, primarily recycling, decreased slightly in 2003 to 71.4 million pounds. Over 48 million pounds of chemicals were destroyed by treatment, which includes transfers to Publicly Owned Treatment Works, an increase of 6.1 percent from 2002 to 2003. 4.6 million pounds of chemical wastes were transferred off-site for proper disposal. Treatment and reuse accounted for 80.2 per cent of all waste management in Oklahoma in 2003.

The total of these numbers sets total production related wastes at 148.9 million pounds for 2003, approximately the same quantity as the previous year. Since 1994, the first year this figure was determined, total production related wastes generated in the State decreased by almost half or 135 million pounds, based on TRI. Expansions in the program since 1994 both doubled the number of chemicals reportable and required additional industries to report, making the reductions even more significant.

Enacted three years ago, the Persistent, Bioaccumulative, and Toxic (PBT's) rule greatly lowered reporting thresholds for TRI chemicals with these characteristics and required reporting of additional chemicals. Chemicals in this category possess a potential to seriously impact the environment and are tracked at significantly lower levels under the new requirements. The total releases of all PBT chemicals were less than 275,000 pounds in 2003 or less than 1.1 percent of total releases Statewide.

The trend is for production related wastes and releases of toxic chemicals to continue to decline in Oklahoma, largely due to the continued effectiveness of DEQ sponsored pollution prevention programs and cooperation from industries throughout the State. The DEQ has compiled this information for sixteen years and this is the sixth summary report.

Background

In 1984, a release of deadly methyl isocyanate gas in Bhopal, India resulted in the deaths of thousands living near a chemical plant. Soon after, a serious, although not fatal, chemical release occurred at a similar plant in West Virginia. These incidents emphasized the need for communities to be informed of hazardous materials in their midst and to plan for possible chemical emergencies. In response, the United States Congress passed Title III of the Superfund Amendments and Reauthorization Act (SARA), also known as Emergency Planning and Community Right-to-Know Act (EPCRA) on October 16, 1986. The fundamental purposes of the Act are to provide the public with information about toxic chemicals used and stored within communities, thereby raising public awareness of potential chemical hazards, and to encourage local planning for chemical emergencies. Section 313 of this Bill, known as the Toxics Release Inventory (TRI), requires covered industries that manufacture, process or otherwise use any of over 600 listed toxic chemicals to annually report releases and waste management of these chemicals to the Environmental Protection Agency (EPA) and to states. Also, under Section 312, the Hazardous Chemical Inventory (Tier II), sites storing certain hazardous chemicals or materials must report to states, first responders and LEPC's once a year. By mandate, data contained in the TRI and Tier II are available to the public.

Facilities covered by TRI report total quantities of wastes generated, quantities released and the maximum amounts of listed toxic chemicals present on-site during the calendar year. Releases of listed chemicals are reported according to the media into which they enter: air, water, land or underground injection. Quantities of waste chemicals transferred off-site for treatment, disposal, or reuse also are reported. The Pollution Prevention Act of 1990 requires additional data describing waste streams and measures taken to reduce the quantities of reportable chemicals used. The change underscores the importance of pollution prevention and encourages the development and implementation of measures for reducing toxic wastes. Since 1991, TRI has contained information on the re-use of chemicals, including quantities recycled or combusted for energy recovery along with methods used for reducing the volume of toxic chemicals used. Treatment numbers reported include both on-site and off-site treatments to neutralize or reduce the effects of the toxic chemical. The total of release, transfer, and re-use numbers yields a value for the total production-related wastes generated annually.

Tier II reports describe chemical storage, including information on the type and location of storage containers and the maximum and average quantities stored. Reports are filed with the state, appropriate Local Emergency Planning Committees (LEPC), and local fire departments.

The Oklahoma Department of Environmental Quality receives TRI report forms annually from those Oklahoma industries covered by Section 313. DEQ compiles and maintains a TRI database, reconciles it to the EPA database, analyzes the data and publishes a summary. Because the intent of the TRI is to provide information for the public, it frequently is the first set of data supplied to and examined by citizens or citizen workgroups in the resolution of complaints against a specific facility. Schools, hospitals and others frequently use the information in determining site selections. TRI data is used as an indicator of the progress facilities or industries achieve in waste reduction, and the dissemination of TRI data can encourage dialogue between citizens and industries. Trends in TRI data frequently serve as markers for the progress environmental programs.

Similarly, the agency receives Tier II reports from throughout the State and constructs a database yearly; however, EPA does not receive Tier II forms and therefore does not maintain a database. For RY 2001, DEQ received 33,140 Tier II forms, 1,173 of those describing

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storage of a chemical designated as an Extremely Hazardous Substance (EHS).

TRI data describe use, releases, waste management and pollution prevention activities for individual chemicals and Tier II reports storage of hazardous chemicals and materials. The information generated by these programs is available from the DEQ for use by emergency managers, fire departments, Local Emergency Planning Committees, emergency medical services, law enforcement and the general public. Local entities then can use the data to identify potential chemical hazards and prepare for chemical emergencies, allowing for faster and more efficient responses. Additional copies of this report or more in depth information about TRI or Tier II reporting or other EPCRA programs may be obtained by contacting the Oklahoma DEQ Customer Services Division/SARA Title III Programs at 405-702-1000 or at 1-800-869-1400 or by visiting the DEQ website at:http: // www.deq.state.ok.us/ CSDnew/saratitleiii/ index.htm

TRI Reporting Requirements

A plant, factory or other facility is subject to TRI and must annually report releases, transfers and waste management activities if it meets all three of the following criteria:

• Is included in one of the covered Standard Industrial Classification (SIC) codes. (Table A) Initially, the listed codes covered manufacturing activities, however, seven additional categories were added beginning in reporting year 1998;

• Has ten or more full-time employees (or the equivalent 20,000 hours per year);

• Manufactures, imports, processes or otherwise uses any of 667 listed toxic chemicals or chemical categories in quantities greater than the specified thresholds. The threshold quantity for toxic chemicals manufactured, imported or processed is 25,000 pounds over the calendar year. For other uses, the threshold quantity is 10,000 pounds over the calendar year, with the exception of PBT's.

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Table A

SIC	Industry Group
1000-1099	Metal mining (except for SIC codes 1011,1081, and 1094)
1200-1299	Coal mining (except for 1241 and extraction activities)
2000-2099	Food manufacture
2100-2199	Tobacco products manufacture
2200-2299	Textiles manufacture
2300-2399	Apparel manufacture
2400-2499	Lumber and Wood products manufacture
2500-2599	Furniture manufacture
2600-2699	Paper and Paper products manuacture
2700-2799	Printing and Publishing
2800-2899	Chemicals manufacture
2900-2999	Petroleum refining and related products
3000-3099	Rubber and Plastics products manufacture
3100-3199	Leather and products manufacture
3200-3299	Stone, Clay, Glass and Concrete manufacture
3300-3399	Primary Metals industries
3400-3499	Fabricated Metals products manufacture
3500-3599	Industrial and Commercial Machinery and Computer Equipment manufacture (excluding electrical)
3600-3699	Electrical and Electronic Equipment manufacture
3700-3799	Transportation Equipment manufacture
3800-3899	Instruments manufacture including analytical, photographic, medical and optical goods
3900-3999	Miscellaneous Manufacturing
4911, 4931, and 4939	Electrical utilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce
4953	Limited to RCRA Subtitle C permitted hazardous waste treatment and disposal facilities (TSD) or interim status facilities
5169	Chemicals and allied products wholesale distributors
5171	Petroleum bulk plants and terminals
7389	Solvent recovery services
9711	National Defense

Federal facilities that meet the personnel and threshold requirements are required to report releases annually as well and have done so since 1994.

A facility may need to report if it used one or more of the listed chemicals, even if it had no chemical releases, because reporting thresholds are based on the quantities of chemicals manufactured, processed or used rather than discharges or emissions. The abbreviated Form A may be used for reporting if the total quantity released of a chemical or chemical group is less than 500 pounds and the total amount manufactured, processed or otherwise used is less than 1,000,000 pounds.

Exemptions to the reporting requirements for Section 313 are designed to reduce the burden associated with comparatively small quantities of chemicals used and are applicable in limited circumstances. The *de minimis* concentration exemption applies to reporting if the chemical comprises less than 1 per cent (<1%) of a mixture, even though the total quantity of the chemical exceeds the reporting threshold. However, for those TRI listed chemicals also classified by the Occupational Safety and Health Administration (OSHA) as carcinogenic, the *de minimis* concentration drops to less than 0.1 per cent (<0.1%). The *de minimus* concentration exemption applies only to those chemicals manufactured, and does not apply to wastes that are processed or otherwise used. Owners of leased property may not be required to report to TRI, nor are the majority of activities in analytical laboratories. Toxic chemicals that are parts of the structural components of a facility as well as chemicals used for janitorial or facility maintenance are exempted from reporting even if percentages exceed threshold requirements. Freon in air conditioners used solely for employee comfort is exempt from TRI reporting, as is chlorine used to treat on-site potable water. Other exemptions for personal use may apply. Reportable chemicals taken into a facility from the environment are exempt, for example, any quantities of reportable chemicals in intake water. Chemicals contained in materials used to maintain or refuel motor vehicles need not be reported provided the vehicles are used only by the facility. The article exemption applies to any item already manufactured before reaching a facility and whose end use is more or less dependent on the shape or design of the item, providing that no 313 chemicals are released during the normal processing or otherwise use of the item while at the reporting facility. For additional information about the article exemption and other exemptions, general TRI reporting and threshold quantities, contact the EPA Region 6, the Oklahoma DEQ, or visit the following website: http://epa.gov/tri/

Reporting Year 2000 was the first year for implementation of the rule for Persistent, Bioaccumulative and Toxic (PBT) chemicals, and 2001 was the first year the reduced threshold for lead was in effect. Thresholds for PBT's are far lower and no distinction is made between the reporting thresholds for manufacture, process or otherwise use. The de minimis concentration exemption does not apply. A table listing PBT chemicals and a more detailed description of the program is included in the section "TRI Persistent, Bioaccumulative and Toxic Chemicals" in this report.

Limitations of TRI Data

The Toxics Release Inventory provides information on quantities of specific toxic chemicals released and managed by facilities covered under Section 313 of SARA Title III. As such, TRI is the most comprehensive overview available on chemical usage, releases and waste management. Responsible use of this information can enable the public to identify and better understand potential chemical hazards in their communities. From there, citizens can delineate plans of action in the event of chemical emergencies and work with industry and government to reduce toxic releases. However, there are limitations to consider when using TRI data.

The majority of releases reported in the TRI are regulated by State or Federal permits. Transfers to off-site locations for treatment, storage or disposal also are regulated, as are on-site disposals. For example, sites permitted under RCRA Subtitle C are strictly regulated and monitored to insure that human exposure and impact to the environment are minimal. It should not be construed that all TRI releases have direct deleterious effects. Prior to 1998, only manufacturing facilities were required to report to the TRI. And while the addition of seven industrial categories expanded TRI reporting to make it more representative, not all sources of toxic materials are covered. For example, neither transportation emissions nor releases from small facilities are reported.

TRI expanded for reporting year 1995 to double the number of covered chemicals or chemical groups. At present, over 600 chemicals and chemical groups known to impact human health, the environment, or both are reported. As extensive as the current list is, it does not include every toxic chemical used in industry. Chemicals that are reportable under TRI vary greatly in individual toxicity and persistence in the environment. For example, the release of a small quantity of a highly toxic material, whose usage may fall below the reporting threshold could pose a more serious health or environmental hazard than a large release of a less toxic chemical. The rule for Persistent, Bioaccumulative and Toxic chemicals (PBT) is an initial step in addressing these variabilities. (see "Chemicals Reported in 2003", below) TRI reporting requirements are based on the quantities of chemicals used and facility classifications, not on the quantities of chemicals released. The different media into which toxic chemicals are released greatly affects exposure levels and the means of exposure, (inhalation, dermal absorption or ingestion). For example, disposal to underground injection wells are reported as a releases even though the potential impact on public health or environmental is minimal. Quantities in the TRI database are totals for a given year; and peak concentrations or accidental discharges are not specifically sited. Therefore, health assessments or environmental risks/exposures based solely on TRI data are not valid.

Facilities are required to base numbers reported to TRI on monitoring data when available. However, if actual process data are not available, TRI figures can be based on estimates. In fact, much of the data reported is estimated. Although EPA publishes estimation guidance, several techniques can be used. Variations between similar facilities may result from the use of different estimation methodologies or differences in technologies. A facility's production level may change from year to year and consequently affect the quantities of chemicals handled. Productivity ratios are provided by facilities for each reporting year and can be used for normalizing year-to-year comparisons of quantities released or managed; however, this assumes a direct linear relationship between production levels and wastes generated, which is not always accurate. For example, total wastes may fall as productivity improves due to waste reduction or improved process efficiency. Also productivity ratios will not take into account chemical releases resulting from any remedial action or one-time event. These factors also must be considered when reviewing TRI data.

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Continued expansions in reporting, such as the increase in the number of reportable chemicals and the addition of industrial categories, reflect efforts to build the TRI into an increasingly comprehensive database. Changes in the program, however, necessitate that the data be viewed with caution when making comparisons from year to year or facility to facility. Many of the chemical releases and waste management reported in the TRI are permitted under State programs, and data from these regulatory programs should provide additional information to clarify citizens about toxic chemicals in the environment.

2003 TRI Overview

Fifty-two of seventy-seven Oklahoma counties contain at least one industrial facility that meets the requirements for TRI reporting, and a total of 344 facilities reported for 2003. (Figure 1) Of those counties with reporting facilities located in them, only seven had total TRI releases exceeding one million pounds, and these include the major metropolitan areas of Oklahoma City and Tulsa, counties accessing the Port of Catoosa and counties with wood processing/paper manufacturing facilities, nitrogen fertilizer plants or major treatment, storage and disposal sites. Information on releases and waste management in individual counties is found in Table B.

Total production related wastes were 148.9 million pounds in 2003, a decrease of 755,000 pounds from 2002, as reported under TRI. (Figure 2) In the ten-year period from 1994 to 2003, total production related wastes in the state decreased by over 47 percent. According to the TRI data, 80 percent of industrial waste management in the State is resolved through reuse and treatment.

For 2003 Oklahoma companies reported:

- 24.8 million pounds released
- 4.6 million pounds transferred for disposal
- 71.4 million pounds reused
- 48.1 million pounds treated

(Figure 3)

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Figure 1

TRI Reporting Facilities
Total Chemical Releases by County

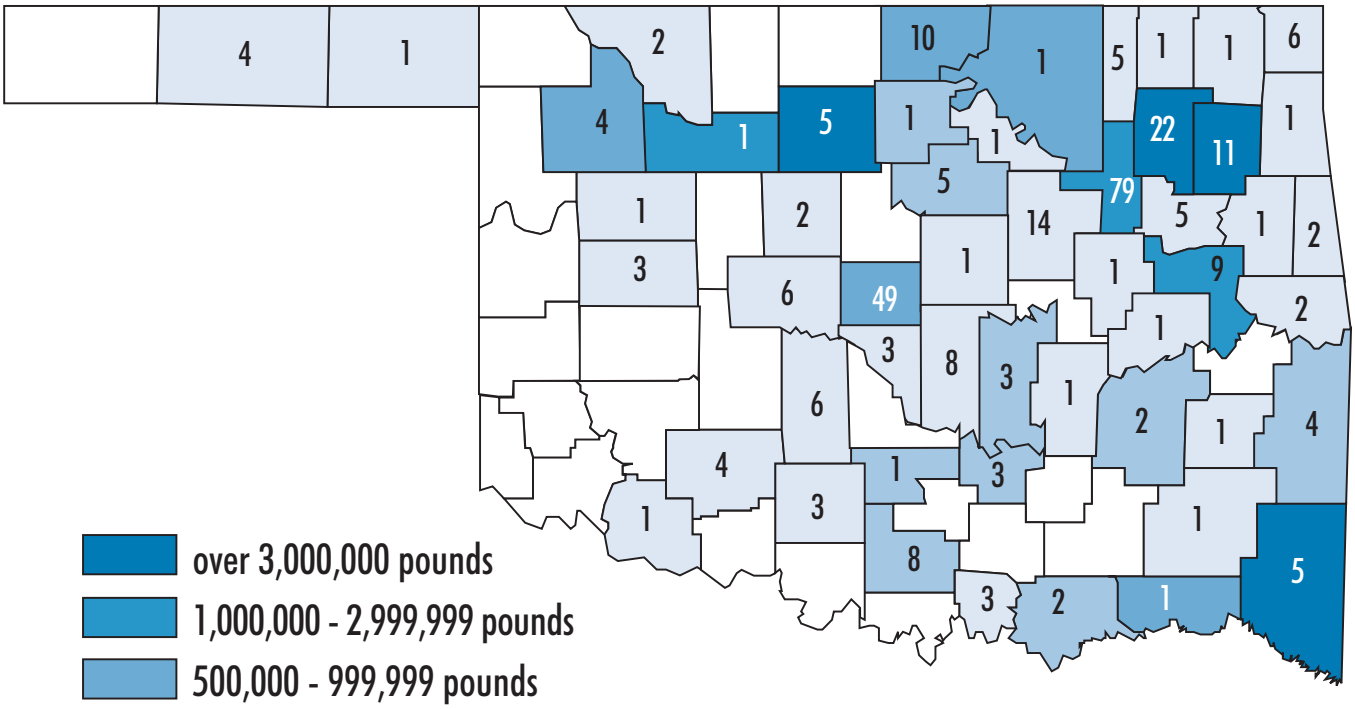


Table B

COUNTY	# FAC.	AIR	LAND	INJECTION	WATER	ONE TIME	TOT. ON-SITE RELS.	TRANS. DISPOSAL
Adair	2	46,698	0	0	0	0	46,698	0
Alfalfa	0	0	0	0	0	0	0	0
Atoka	0	0	0	0	0	0	0	0
Beaver	1	6,101	0	0	0	0	6,101	0
Beckham	0	0	0	0	0	0	0	0
Blaine	0	0	0	0	0	0	0	0
Bryan	2	191,297	0	0	0	0	191,297	45
Caddo	0	0	0	0	0	0	0	0
Canadian	6	47,312	0	0	0	0	47,312	2,154
Carter	8	225,132	10	0	133,739	0	358,881	720,069
Cherokee	1	273	0	0	0	0	273	0
Choctaw	1	222,710	351,525	0	0	0	574,235	0
Cimarron	0	0	0	0	0	0	0	0
Cleveland	3	4,852	0	0	18	0	4,870	8,235
Coal	0	0	0	0	0	0	0	0
Comanche	4	30,506	355,479	0	60	0	386,045	100,167
Cotton	0	0	0	0	0	0	0	0
Craig	1	0	0	0	0	0	0	547
Creek	14	10,618	1,429	0	2560	892	15,499	406,844
Custer	3	61,978	0	0	0	0	61,978	0
Delaware	1	0	0	0	0	0	0	0
Dewey	1	0	0	0	0	0	0	0
Ellis	0	0	0	0	0	0	0	0
Garfield	5	2,653,790	0	0	518,649	0	3,172,439	0
Garvin	1	136,349	1,270	0	2,757	0	140,376	24,053
Grady	6	98,417	0	0	0	0	98,417	36,971
Grant	0	0	0	0	0	0	0	0
Greer	0	0	0	0	0	0	0	0
Harmon	0	0	0	0	0	0	0	0
Harper	0	0	0	0	0	0	0	0
Haskell	0	0	0	0	0	0	0	0
Hughes	1	0	0	0	0	0	0	0
Jackson	0	0	0	0	0	0	0	0
Jefferson	0	0	0	0	0	0	0	0
Johnston	0	0	0	0	0	0	0	0
Kay	10	586,718	8,931	0	89,045	945	685,639	2,650
Kingfisher	2	10,538	0	0	0	0	10,538	0
Kiowa	0	0	0	0	0	0	0	0
Latimer	1	0	0	0	0	0	0	0
LeFlore	4	185,374	0	0	0	50	185,424	575,260
Lincoln	1	1,608	0	0	0	1,608	3,216	0

TOT. ENERGY REC.	TOT. RECYCLING	TOTAL REUSE	TREATMENT	POTW TREAT.	TOT. TREATMENT	TPRW
13,797	0	13,797	0	13,066	13,066	287,568
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	21,902	21,902	27,227	0	27,227	55,427
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	202,840	114,336	0	0	0	231,598
0	0	0	0	0	0	0
93,673	285,433	379,106	270	0	270	368,439
4,965,637	1,922,319	6,887,956	7,694,874	14,354	7,709,228	10,966,825
0	0	0	0	0	0	185
0	0	0	0	0	0	478,993
0	0	0	0	0	0	0
0	195,547	195,547	0	0	0	225,799
0	0	0	0	0	0	0
0	230,368	230,368	49,285	8,612	460,736	361,766
0	0	0	0	0	0	0
0	3,469,546	6,601,882	0	0	0	6,601,989
0	500,901	500,901	101,893	1,000	102,893	974,351
14,200	350	14,550	454,439	0	454,439	670,375
0	0	0	17,990	0	17,990	18,095
0	0	0	0	0	0	0
0	0	0	0	0	0	0
550,000	4,762,319	5,312,319	1,938,638	624,860	2,563,498	11,497,329
230,014	9488	239,502	375,330	0	375,330	573,234
13,272	158,584	171,856	83,504	44,805	128,309	
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
64,074	207,244	271,318	4,458,848	900	4,459,748	4,238,154
0	75519	0	0	0	0	794
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	7,854	0	0	714,866
0	4,800	4,800	9,662	0	9,662	14,700

Table B continued...

COUNTY	# FAC.	AIR	LAND	INJECTION	WATER	ONE TIME	TOT. ON-SITE RELS.	TRANS. DISPOSAL
Logan	0	0	0	0	0	0	0	0
Love	0	0	0	0	0	0	0	0
Major	1	292	1,691,817	0	0	0	1,692,109	1,736
Marshall	3	70,502	0	0	0	0	70,502	20,014
Mayes	11	202,483	1,204,708	0	2,041,898	0	3,449,089	214
McClain	0	0	0	0	0	0	0	0
McCurtain	5	2,924,142	202,891	0	317,855	0	3,444,888	6,720
McIntosh	1	24,167	0	0	0	0	24,167	0
Murray	0	0	0	0	0	0	0	0
Muskogee	9	956,282	43,093	0	35,415	1,635	1,036,425	213,936
Noble	1	272,761	42,179	0	3465	0	318,405	358,580
Nowata	1	0	0	0	0	0	0	0
Ofuskee	0	0	0	0	0	0	0	0
Oklahoma	49	845,855	36	0	26	36	845,953	161,465
Okmulgee	1	0	0	0	0	0	0	0
Osage	1	107,837	0	400	0	5,500	113,737	0
Ottawa	6	31,412	0	0	5	10	31,427	0
Pawnee	1	0	13,954	0	538	0	14,492	0
Payne	5	272,169	0	0	0	0	272,169	165,289
Pittsburg	2	87,885	147,030	0	0	0	234,915	26,700
Pontotoc	3	217,708	77,490	0	0	0	295,198	463
Pottawatomie	8	56,187	0	0	0	0	56,187	14,418
Pushmataha	1	0	0	0	0	0	0	0
Roger Mills	0	0	0	0	0	0	0	0
Rogers	22	3,365,577	497,586	0	234,522	2,111	4,099,796	166,582
Seminole	3	182,491	0	0	0	0	182,491	0
Sequoyah	2	41,786	467	0	0	166	42,419	0
Stephens	3	155	0	0	10	0	165	0
Texas	4	15,000	0	0	0	0	15,000	0
Tillman	1	6,330	0	0	0	0	6,330	
Tulsa	79	438,601	2,273	1,306,018	33,357	20,703	1,800,952	734,443
Wagoner	5	800	0	0	5	0	805	0
Washington	5	1,903	0	1,108	18	0	3,029	1,027,091
Washita	0	0	0	0	0	0	0	0
Woods	2	14,532	0	0	0	0	14,532	0
Woodward	4	758,615	124,000	0	43,150	4,500	930,265	669

TOT. ENERGY REC.	TOT. RECYCLING	TOTAL REUSE	TREATMENT	POTW TREAT.	TOT. TREATMENT	TPRW
0	0	0	0	0	0	0
0	0	0	0	0	0	20,517
0	0	0	6,059	0	6,059	2,370,551
7,749	97	7,846	0	0	0	142,393
16,060	110,818	126,878	17,212,901	0	17,212,901	25,506,109
0	0	0	0	0	0	0
26	176	202	9,685,591	500	9,686,091	12,724,630
0	0	0	0	0	0	27,279
0	0	0	0	0	0	0
18,882	827,255	846,137	670,726	0	670,726	2,844,789
0	0	0	364,600	0	364,600	925,699
0	0	0	0	0	0	0
0	0	0	0	0	0	0
25,999	648,496	674,495	1,089,643	250,058	1,339,701	2,956,074
0	0	0	27,598	27,598	55,196	55,196
62,700	34,440,400	34,503,100	0	0	0	35,016,700
0	0	0	72,228	0	72,228	102,327
0	0	0	0	0	0	58,861
7,211	680,570	687,781	36,526	1	36,527	886,555
0	1,159,178	1,159,178	388,370	0	388,370	942,148
221,100	0	0	0	0	0	245,092
0	390,893	390,893	32,400	7,100	39,500	383,054
0	0	0	1,127	0	1,127	358
0	0	0	0	0	0	0
5,700	6,155,183	6,160,883	753,334	90,713	844,047	10,606,363
0	0	0	0	0	0	9,732
0	0	0	0	0	0	41,176
0	35,103	35,103	0	0	0	200,548
0	0	0	109,792	129,066	238,858	275,812
0	0	0	999	0	0	3,750
812,125	5,064,254	5,876,379	1,328,671	53,959	1,382,630	9,826,886
0	142,750	142,750	0	0	0	127,026
0	183,074	277,637	8	5	0	610,569
0	0	0	0	0	0	0
0	0	0	0	0	0	15,060
0	304,811	304,811	230,000	0	230,000	3,079,263

Figure 2

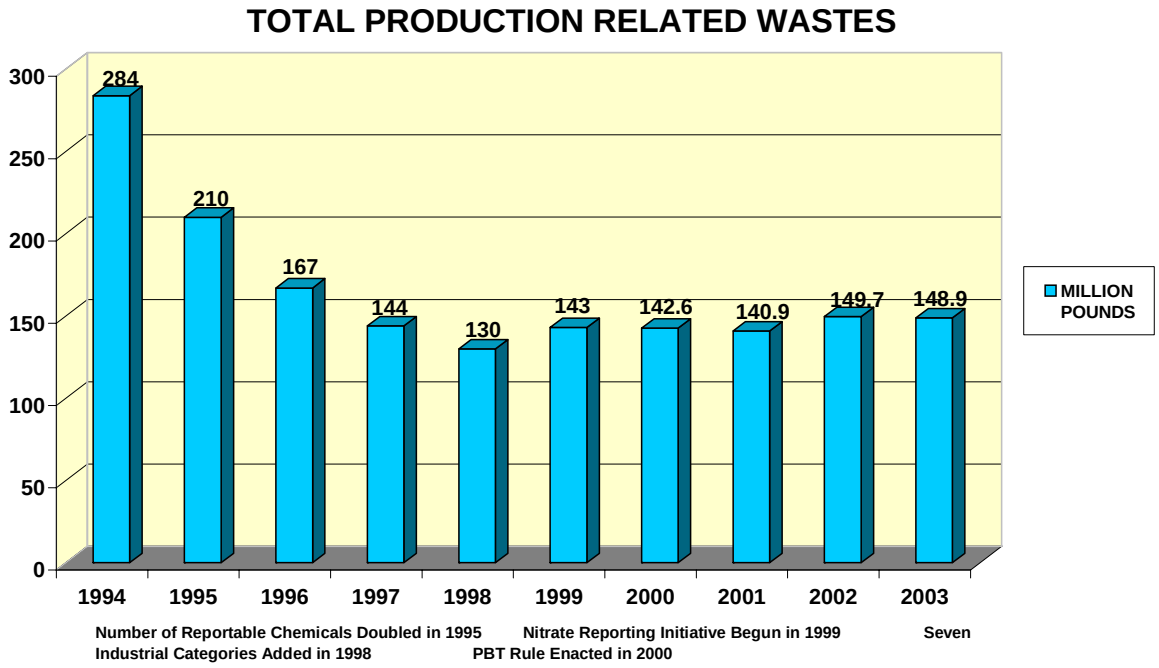
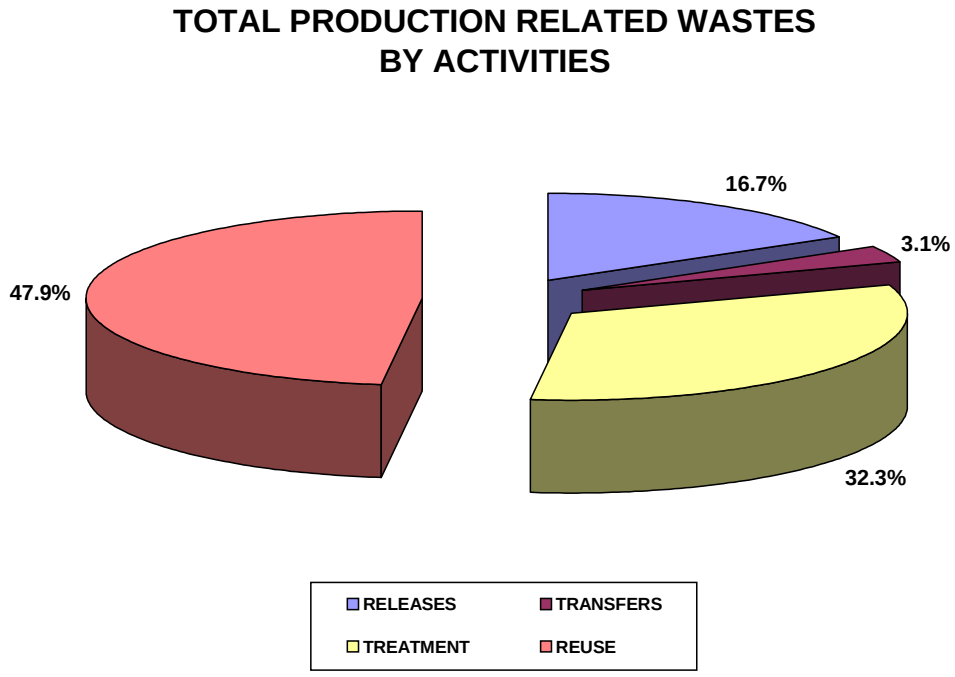


Figure 3



Total releases were:

- 15.9 million pounds released to air
- 4.2 million pounds released to land or permitted landfills
- 13,000 pounds disposed in underground injection wells
- 2.9 million pounds discharged to surface waters.
- 171,000 pounds of one time releases (Figure 4)

Releases

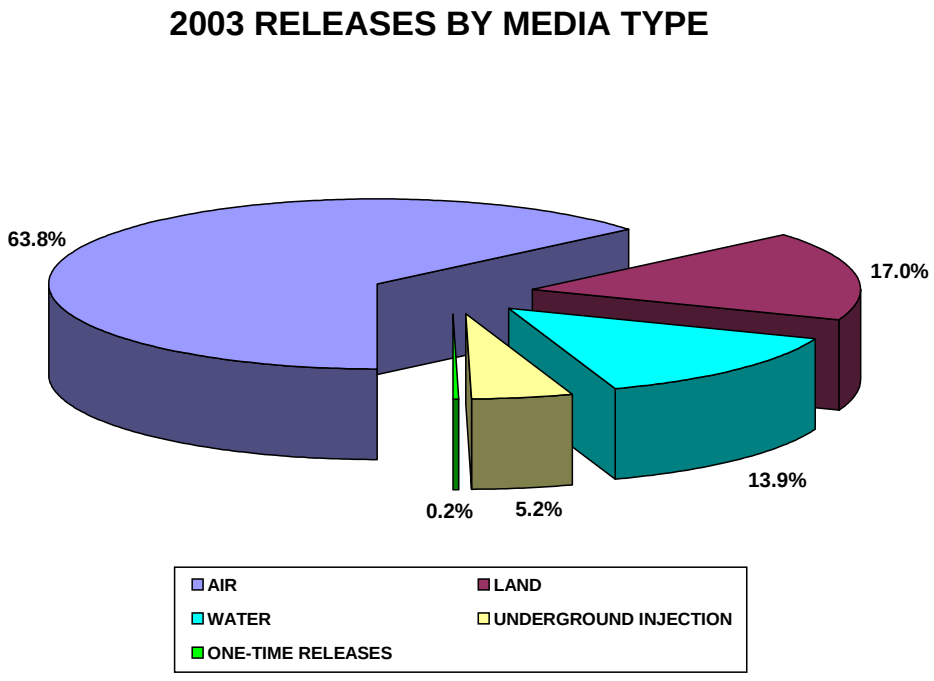
Total on-site releases include all discharges to air, land, water or underground injection wells of any TRI reportable chemicals that occur within a facility's property lines. Permitted, non-permitted and accidental releases are reported. Oklahoma companies reported 24.8 million pounds released in 2003, a decrease of almost 600,000 pounds or more than two percent from 2002. Significant reductions in emissions to air and releases to land account for the majority of the decrease. The numbers also demonstrate a 10 percent reduction in releases of toxic chemicals in the State in the past ten years. On-site releases accounted for only 16.7 percent of the 2003 Total Production Related Wastes in Oklahoma.

Total **air releases** are the sum of permitted stack releases and fugitive air releases, and also can be considered point source or non-point source emissions respectively. Fugitive emissions result largely from the natural volatility of some chemical compounds and are defined as any air releases that do not go through a confined air stream. Evaporation, equipment leaks or releases from building ventilation systems are possible sources of fugitive releases. Stack air releases occur through confined air streams such as stacks, ducts or pipes. Overwhelmingly stack releases are permitted and regulated under the Clean Air Act. For 2003, 84.5 percent of all on-site air releases in Oklahoma as reportable under TRI were stack emissions. (Figure 5)

Total air releases in the State appear to increase significantly from 1997 to 1998

Continued on next page

Figure 4



when new industries added for RY 1998, especially coal-fired electricity plants, reported for the first time. These utilities, some that utilize coal for start-ups only, account for the majority of electrical plants in the State. The figures however reflected the increase in the number of facilities reporting rather than an increase in actual air emissions. Yet even with the rise in the number and size of facilities beginning with RY 1998, total air releases as reported to TRI continue to decrease, dropping 7.5 million pounds or 32 percent in the past six years, from the time the new reporting facilities were introduced. (Figure 6) For Reporting Year 2003, total air emissions decreased again by nearly 1.3 million pounds. The TRI data continue to demonstrate that the goal of cleaner air in Oklahoma is being attained, and also indicate the continued success between DEQ sponsored pollution prevention programs and the industries that participate in them.

Total **on-site releases to land** include surface impoundments, land application, use of permitted landfills or other releases to land within the boundaries of a facility. A significant increase in the numbers reported for total land releases occurred for RY 1998 when industrial waste handlers permitted under RCRA Subtitle C were required to report to TRI for the first time. (Figure 7) Disposal by this type of facility accounted for 12 percent of total releases in 2003 (see *Facilities Reporting in 2003)* and 39 percent of all land releases. (Figure 8) Additionally, Oklahoma treatment, storage, and disposal facilities receive transfers from both in-state and out-of-state sites for managed disposal of toxic wastes. Transfers made from in-state facilities to in-state TSD's result in a "double counting effect", first as off-site transfers for disposal then as releases to RCRA Subtitle C landfills and surface impoundments. The Nitrate Reporting Initiative of 1999 also caused the figures for releases to land to increase significantly as discharges to surface impoundments or total retention lagoons are a frequently used medium for nitrate compounds disposal. Again, this

Continued on page 22

Figure 5

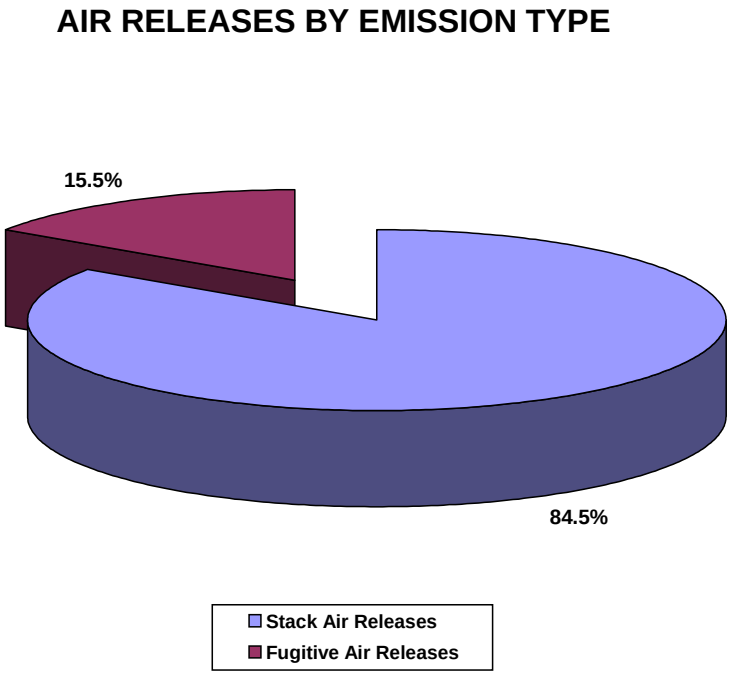


Figure 6

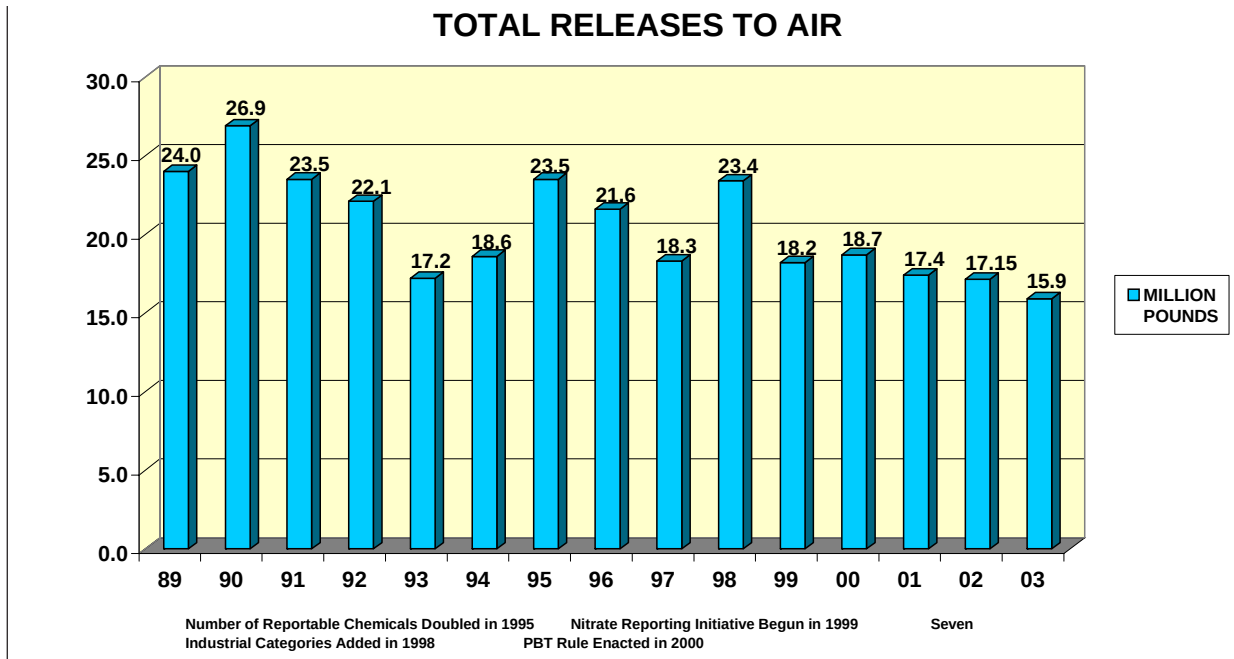
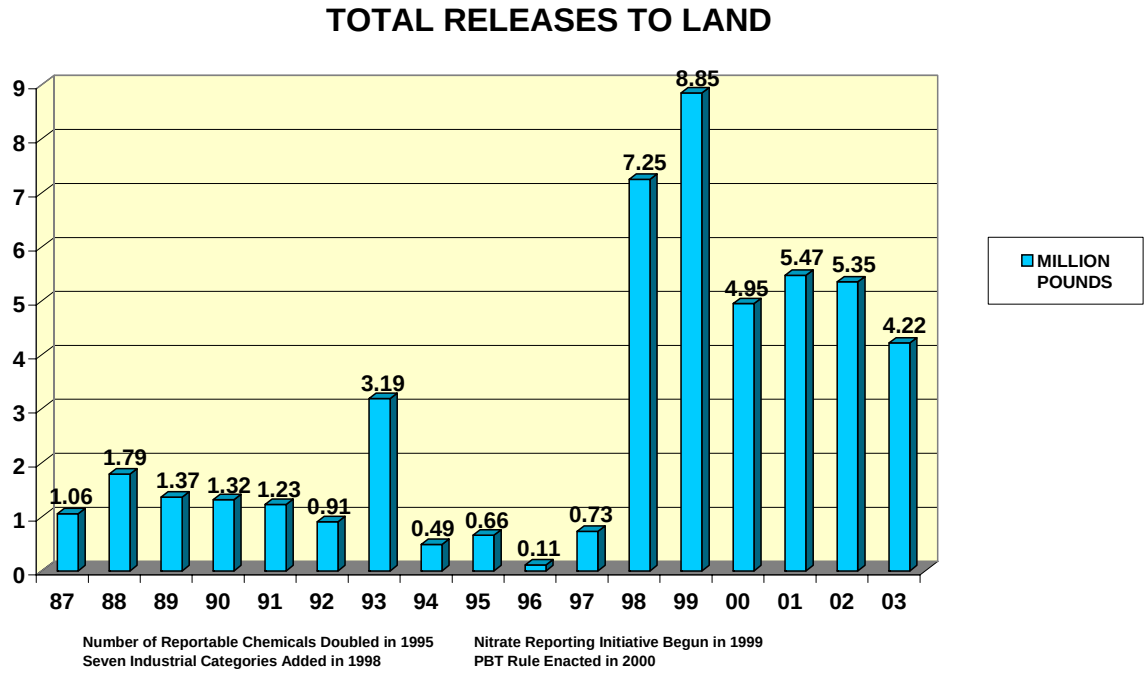


Figure 7



should be interpreted as an increase in reporting accuracy rather than actual increase in the quantities released.

The effects of large facilities on TRI reporting is seen in the numbers for releases to permitted **underground injection wells**. While the overall trend for releases to this medium also continues to decline, the drastic reduction from RY 2000 to 2001 and the increase from 2002 to 2003 resulted from changes in the business of a single facility. (Figure 9) Disposals to deep underground injection wells are considered releases under TRI, however, this type of waste management has an extremely low potential for human exposure or contact with the environment.

A dramatic increase in reported releases to **surface waters** began with RY 1999 due to the Nitrate Reporting Initiative. EPA's reinterpretation of reporting water dissociable nitrates, the Nitrate Initiative, addressed under reporting or non-reporting of aqueous nitrate compounds. The consequent jump in surface waters releases actually represented an improvement in reporting accuracy rather than an actual increase in the quantities released. (Figure 10) Additionally, three of the five industries with largest total releases in the State, nitrogenous fertilizer producers, soybean mills and industrial waste handlers permitted under RCRA Subtitle C, produce the majority of nitrogenous wastes. The impact of actions such as the Nitrate Initiative significantly affected release data reported for a few large facilities therefore skewing the trend for total water releases in the State. In fact, the actual number of facilities discharging into Oklahoma streams and rivers continues to decrease.

Transfers

Transfers to off-site facilities for disposal increased slightly, about 8.6 percent from 2002 to 2003. The current figures however are only 38 per cent of those reported a decade ago, indicating that the trend toward waste reduction and on-site management continues even as TRI

Continued on page 24

Figure 8

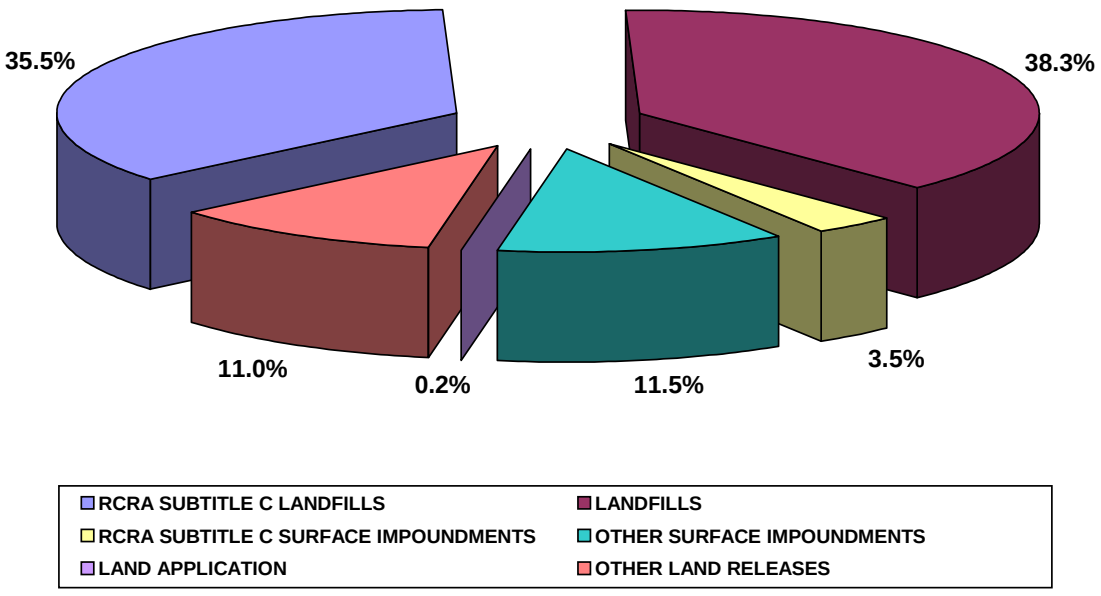


Figure 9

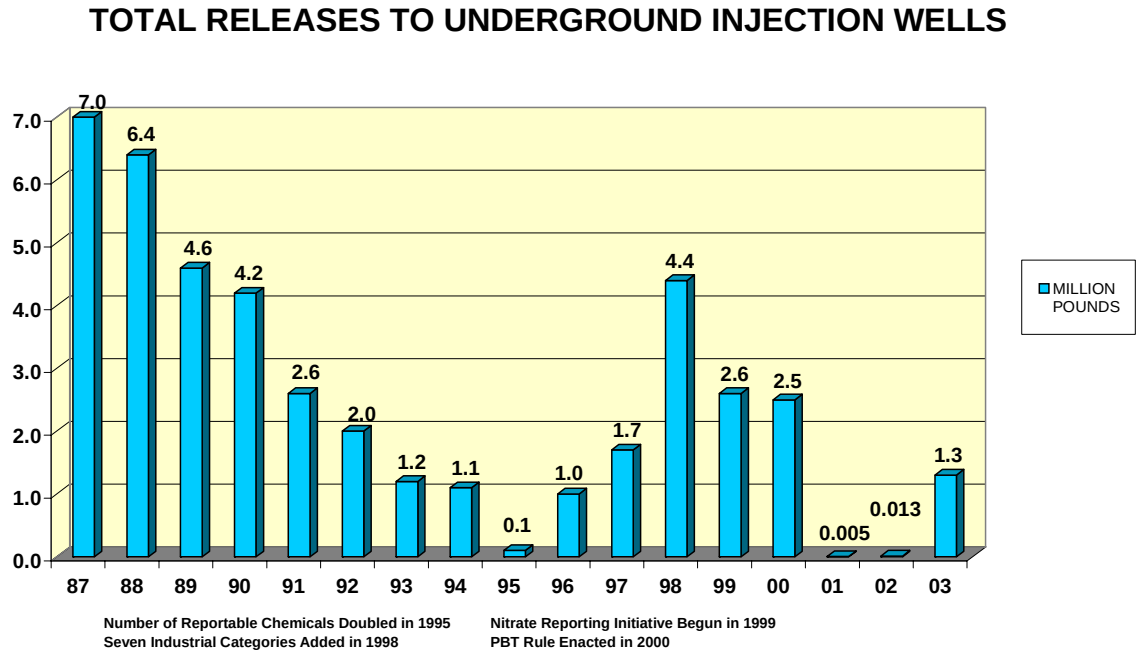
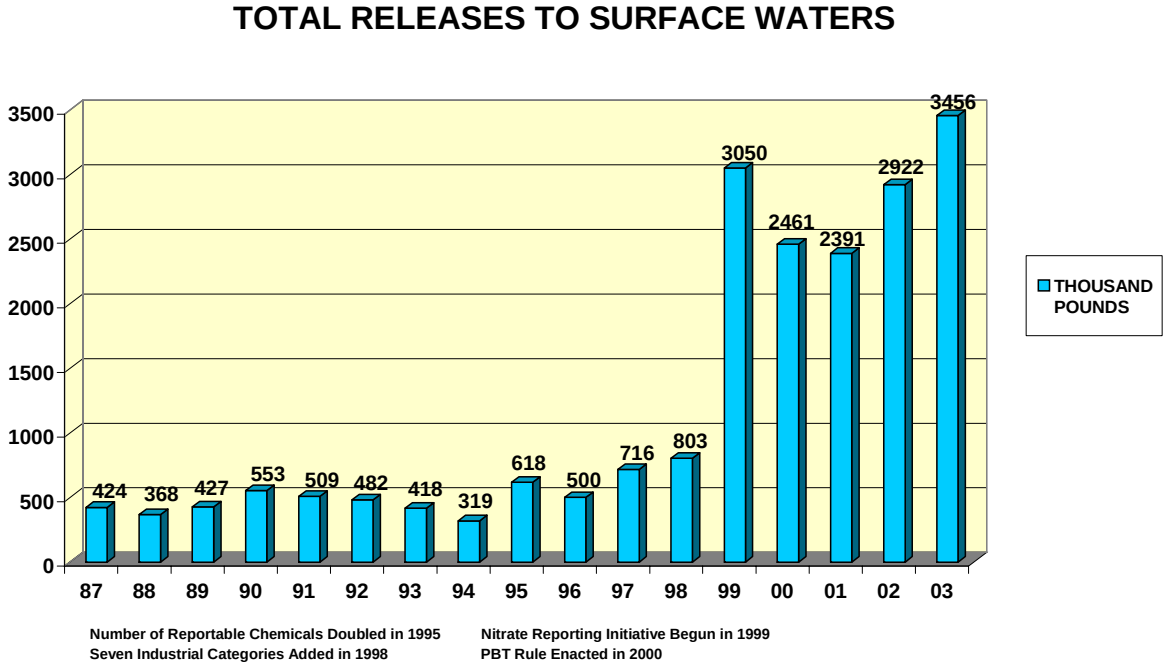


Figure 10



reporting has expanded. (Figure 11) In 2003, the majority of off-site transfers for disposal, 45 percent, were managed in landfills (Figure 12) Releases to Publicly Owned Treatment Works, (POTW), consist of water discharges made into sanitary drains and sewers that then are received and treated by wastewater treatment plants. These are counted chiefly as transfers for treatment (see *Treatment,* below) with the exception of wastewater containing metals and metal compounds, which are counted as transfers for disposal. However, transfers to POTW of metals and metal compounds account for only 0.2 percent of all transfers for disposal in 2003. Off-site disposal comprised only 3.1 percent of total waste management for the year. (Refer to Figure 3 on page 18)

Reuse

Total reuse as defined by TRI is the sum of on- and off-site recycling and energy recovery and reuse in Oklahoma equaled 71.4 million pounds in 2003. (Figure 13) In 2003 nearly half, 47.9 precent, of all chemicals reportable under TRI were managed through reuse, and of off-site post-production management, 77 percent of wastes were reused. The DEQ Pollution Prevention Program established and maintains a waste exchange list that promotes the use, reuse, or recycling of industrial waste streams. Industrial waste handlers also maintain such lists. This type of reuse not only reduces the quantities of toxic chemicals that ultimately find their way into the environment, but also in many instances, reduces the need to manufacture some of these chemicals, thus eliminating other potential wastes.

Treatment

Post-production treatment, both on- and off-site, neutralizes or destroys toxic chemicals in the waste stream. Frequently some type of on-site treatment is

Continued on page 26

Figure 11

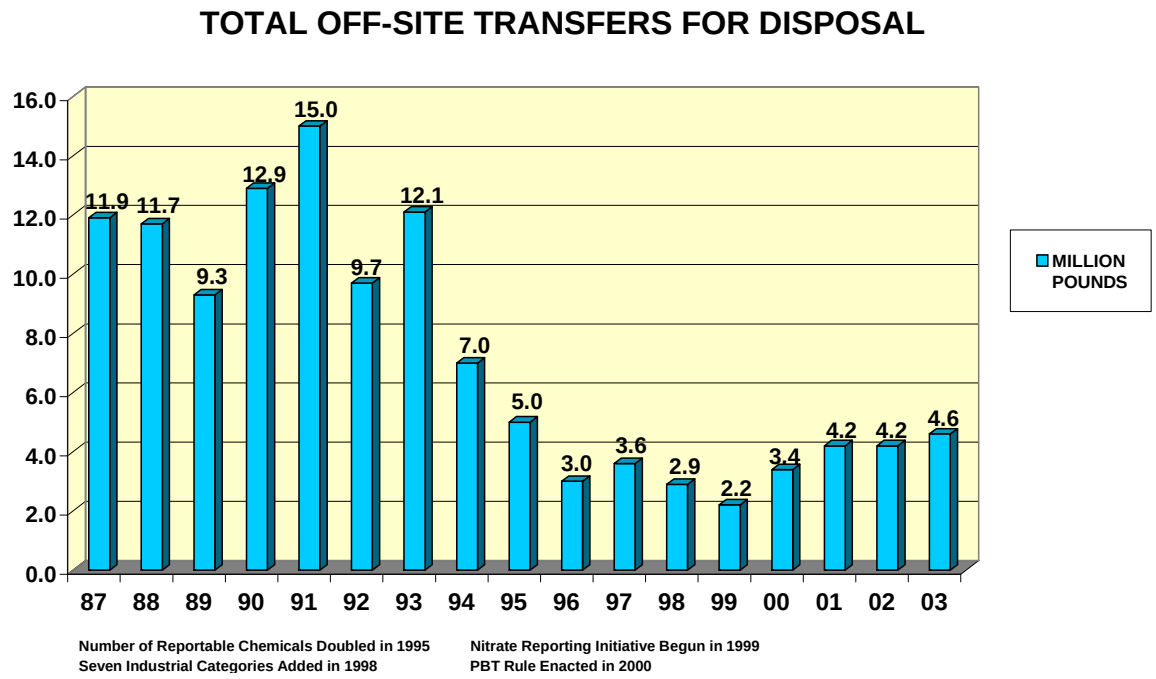


Figure 12

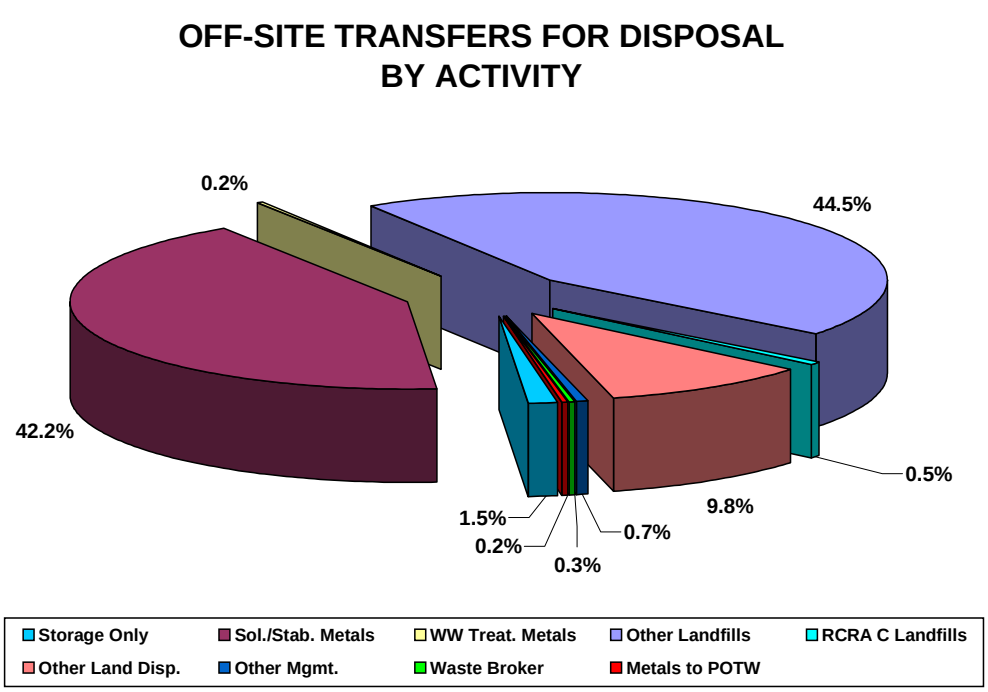
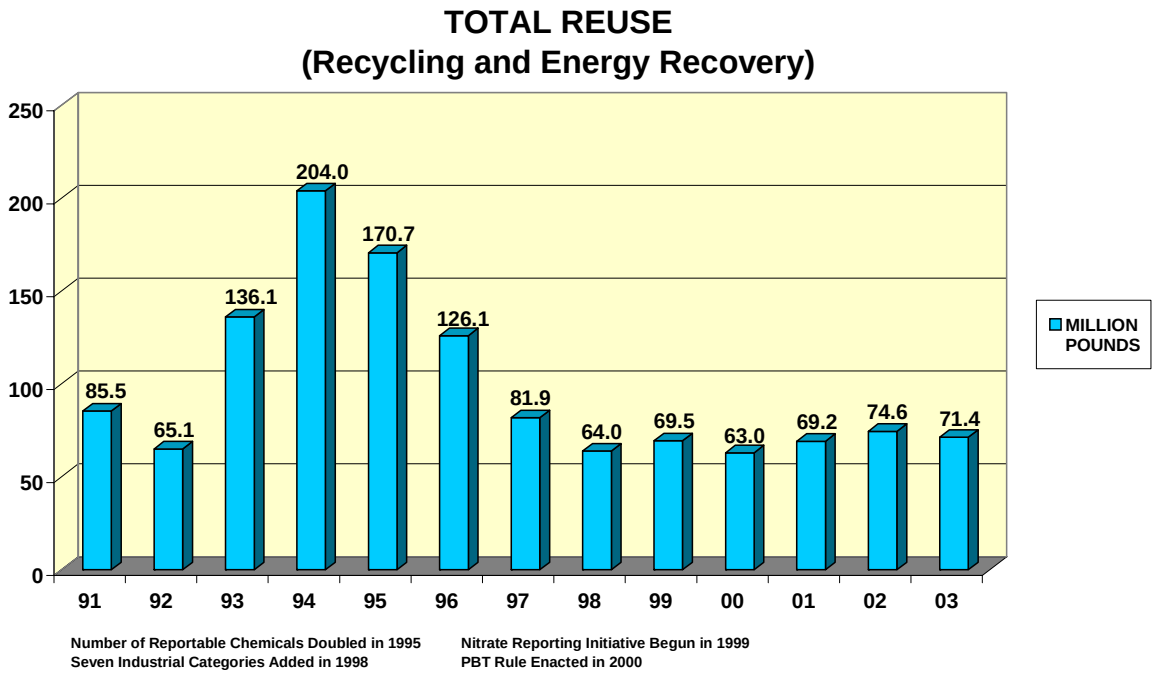


Figure 13



required before wastes can be discharged or transferred for disposal. A common example of this is the neutralization of spent acids in an aqueous waste. Another example of on-site treatment is the bio-degradation of organic compounds in retention ponds due to bacterial action. Municipalities generally require acid neutralization as pretreatment prior to discharge into a sanitary sewer, and nitrate compounds formed by the neutralization of nitric acid were a particular focus of the Nitrate Initiative. Accordingly quantities reported for transfers to POTWs rose significantly in 1999; nitrate compounds formed by the neutralization of nitric acid that previously were disposed to underground injection wells account of a substantial portion of the increases in 2001 and 2002. (Figure 14) However, industrial wastewater treatment by POTW's decreased in part due to increased nitrates disposal into underground injection wells. Total treatment in the State increased by 2.7 million pounds in 2003, (Figure 15). The majority, 95 percent, was on-site treatment. Industrial waste handlers are responsible for the majority of off-site treatment and disposal of wastes containing toxic chemicals. As with on-site treatment, off-site treatment frequently is a requirement prior to disposal.

In 2003, 80.2 per cent of postproduction wastes were managed through treatment and reuse. (Figure 16) On-site reuse and on-site treatment minimize the need to transport toxics for disposal or off-site reuse. This decreases exposure risks due to transportation related incidents, and the 2003 data demonstrate that Oklahoma industries are managing the majority of wastes on-site. (Figure 17) On-site waste management along with voluntary reductions in the quantity and toxicity of chemicals used are important means through which DEQ and industries across Oklahoma are working together to reduce the total volume of toxic chemicals managed in the State. Of industrial wastes managed off-site reported, only 17.5 percent of

Continued on page 28

Figure 14

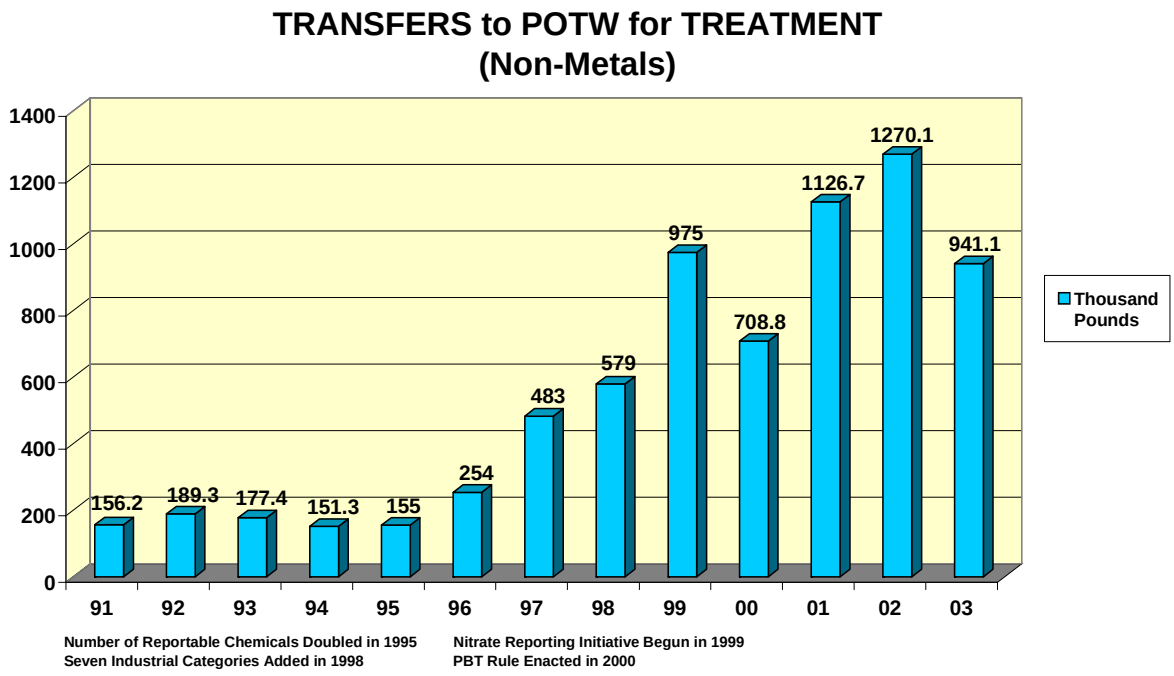


Figure 15

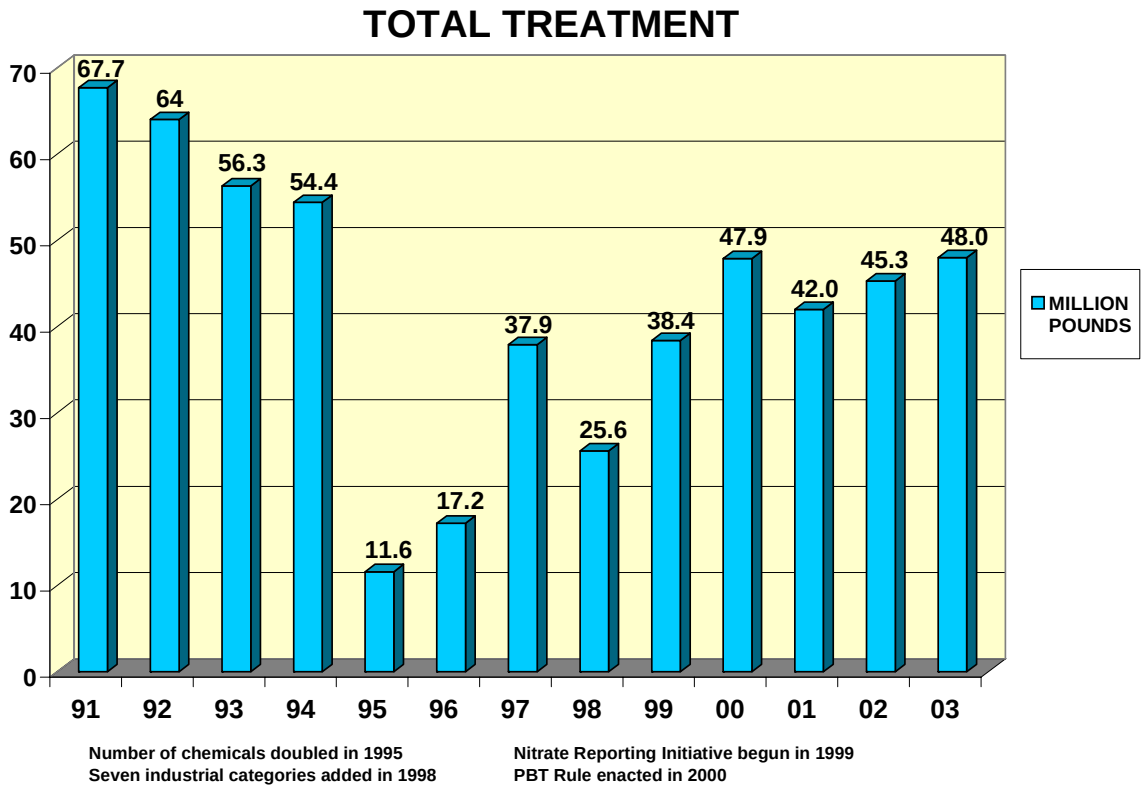
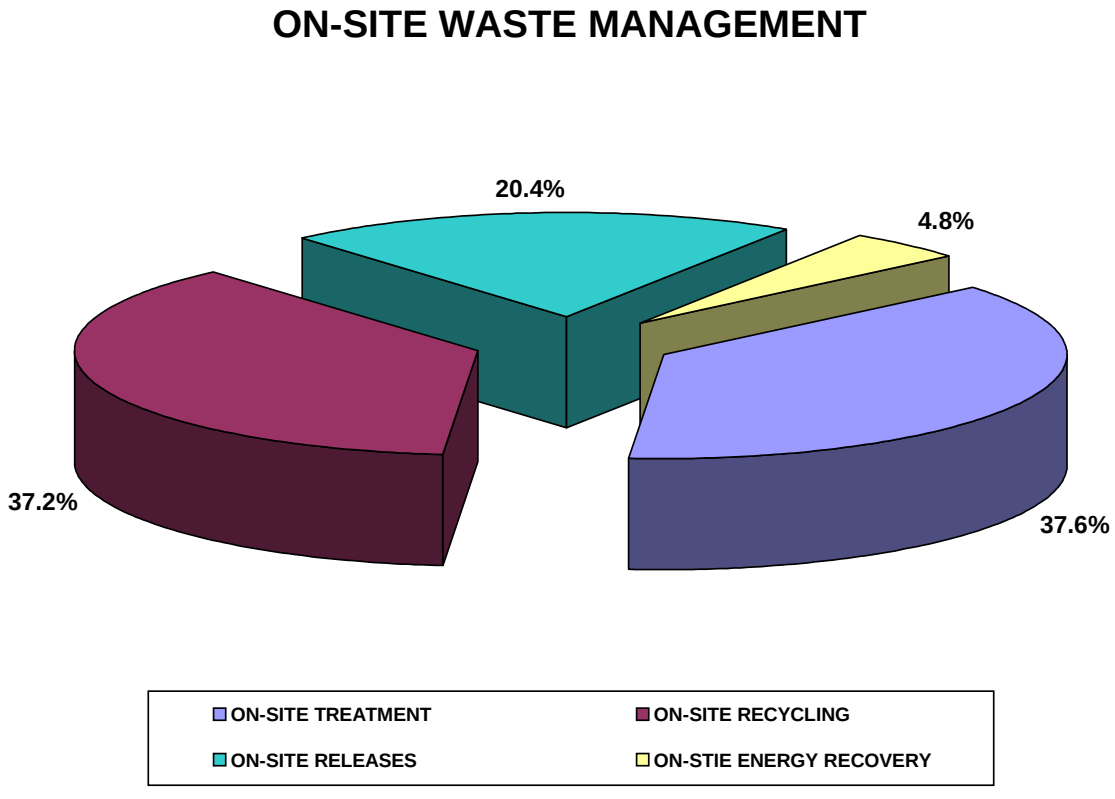


Figure 16



those were transfers for disposal (Figure 18), and of the 148.9 million pounds of Total Production Related Wastes calculated for 2003, only 3.1 percent of these were transferred off-site for disposal.

TRI data can be used for targeting facilities, industries or specific chemicals for pollution prevention efforts. The Toxics Release Inventory looks at the total picture of releases, transfers as well as reuse activities; analysis of the data can be used as an index of the success of prevention measures. Nationally, the figures for total production related wastes have increased for several years. Often states report a reduction in total releases while reporting a corresponding increase in off-site transfers. This waste management system transfers toxic wastes from one location to another rather than generating less waste. Oklahoma continues to see its total releases diminish along with a decrease in off-site transfers, indicating that the total amount of toxic wastes in the State actually is decreasing. The 2003 Oklahoma TRI report reflects the success of voluntary pollution prevention programs sponsored by DEQ and cooperation from industries.

DEQ provides assistance to businesses wanting to reduce the overall volume of toxic chemicals used and also offers strategies for the best reuse techniques. For additional information about pollution prevention or for business assistance in implementing source reduction measures, please contact the DEQ Customer Services Division/Pollution Prevention Programs at 405-702-1000 or 1-800-869-1400, or visit the DEQ website at: http://www.deq.state.ok.us/CSDnew/p2.htm

Figure 17

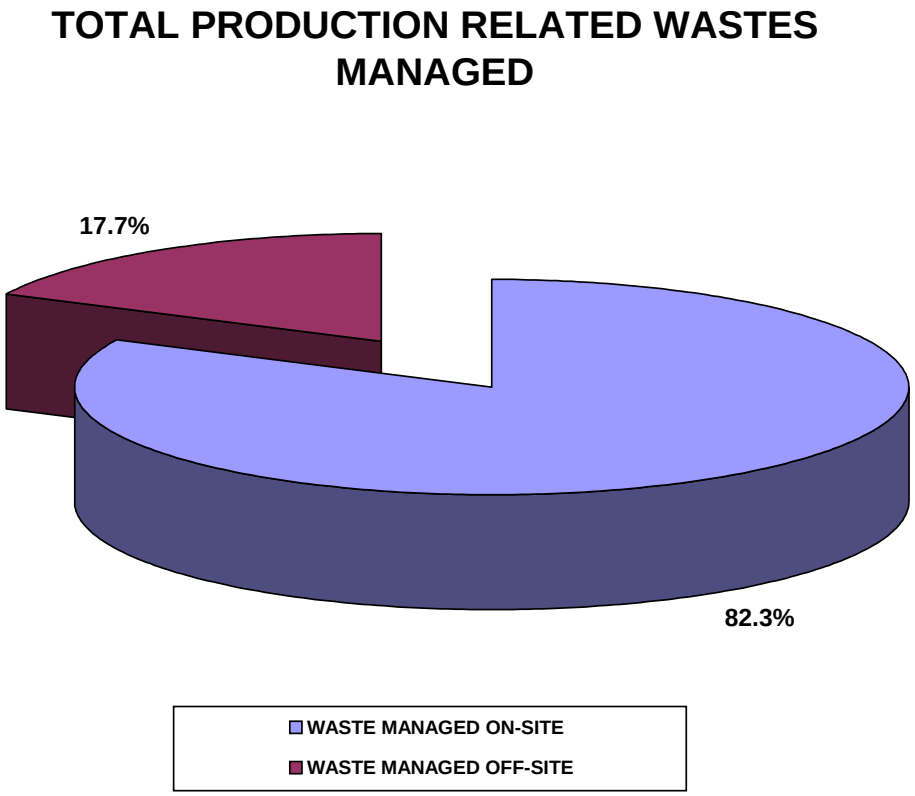
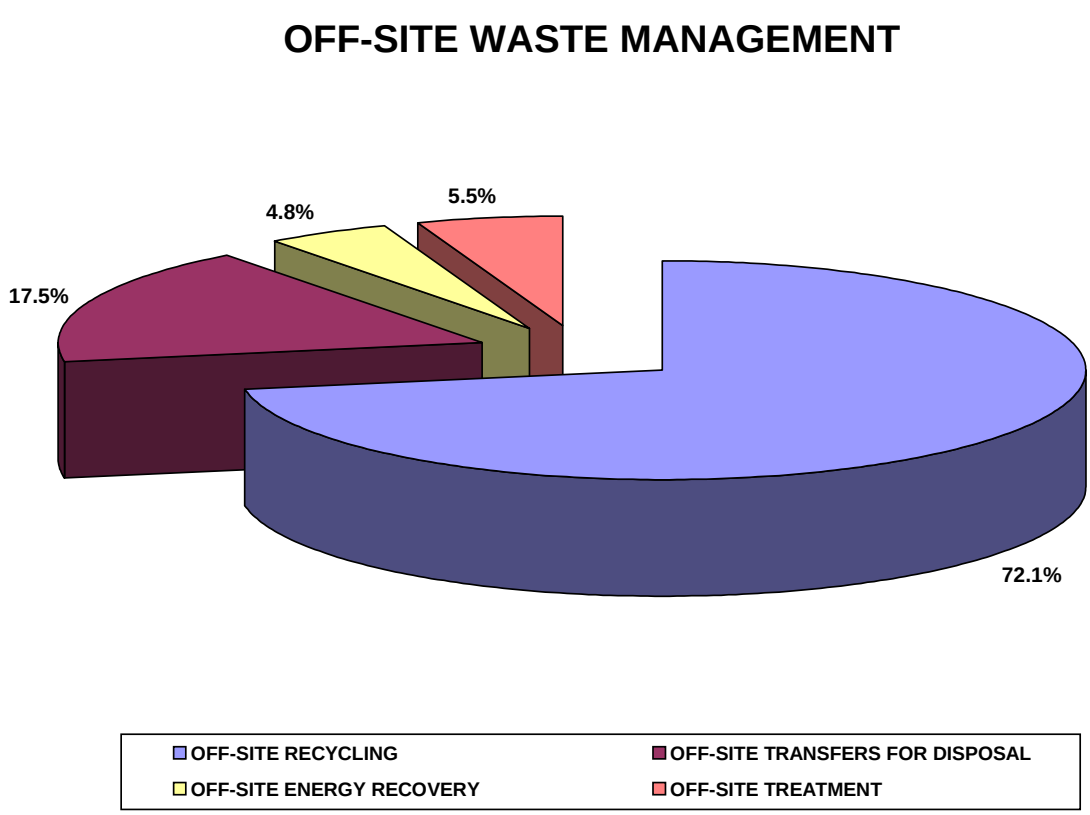


Figure 18


OFF-SITE WASTE MANAGEMENT
4.8%
5.5%
17.5%
72.1%
OFF-SITE RECYCLING
OFF-SITE TRANSFERS FOR DISPOSAL
OFF-SITE ENERGY RECOVERY
OFF-SITE TREATMENT

2003 Tier II Overview

The owners or operators of all facilities or sites that store hazardous substances on-site must submit Tier II reports annually for each hazardous material stored. These forms are submitted to DEQ acting as an agent of the Oklahoma Emergency Response Commission (OHMERC), and also

continued on next page...

Table C

COUNTY	TIER II REPORTS SUBMITTED	OIL & GAS SITES	EHS FACILITIES	TOTAL EHS STORED, POUNDS
ADAIR	32	1	5	165,500
ALFALFA	380	360	9	2,700,000
ATOKA	28	18	4	7,005
BEAVER	1,910	1,784	10	1,612,000
BECKHAM	478	442	9	162,732
BLAINE	955	928	10	2,106,250
BRYAN	39	23	2	57,870
CADDO	898	842	16	1,255,123
CANADIAN	1,433	1,362	29	2,151,579
CARTER	713	669	13	10,743,255
CHEROKEE	19	0	5	9,366
CHOCTAW	11	0	3	2,008
CIMARRON	78	67	5	1,051,000
CLEVELAND	177	127	20	839,800
COAL	93	88	1	500
COMANCHE	205	123	29	1,411,470
COTTON	20	11	6	5,006,129
CRAIG	82	55	11	76,529
CREEK	426	343	31	318,491
CUSTER	1,043	1,002	17	2,622,700
DELAWARE	27	0	8	117,456
DEWEY	911	896	6	2,650,500
ELLIS	808	794	0	0
GARFIELD	1,191	1,088	38	56,855,245
GARVIN	1,150	1,120	8	647,191
GRADY	1,412	1,348	23	806,585
GRANT	249	218	17	7,056,050
GREER	21	2	3	505,500
HARMON	8	2	2	2,000
HARPER	734	678	2	550,000
HASKELL	277	240	5	2,573
HUGHES	187	178	4	6,500
JACKSON	23	2	14	7,576,088
JEFFERSON	16	12	0	0
JOHNSTON	10	1	2	1,073
KAY	193	130	23	10,271,832
KINGFISHER	1,428	1,383	12	2,568,245

Table C continued on next page...

Table C Continued

COUNTY	TIER II REPORTS SUBMITTED	OIL & GAS SITES	EHS FACILITIES	TOTAL EHS STORED, POUNDS
KIOWA	76	60	10	2,117,550
LATIMER	321	312	9	4,573
LEFLORE	232	205	15	275,497
LINCOLN	537	508	13	94,734
LOGAN	577	548	8	1,562,209
LOVE	154	144	5	12,737
MAJOR	2,112	2,090	6	1,072,250
MARSHALL	53	43	4	6,579
MAYES	54	3	21	56,408,987
MCCLAIN	507	481	4	6,500
MCCURTAIN	22	1	11	1,195,157
MCINTOSH	77	64	3	1,279
MURRAY	40	23	7	111,630
MUSKOGEE	88	8	29	6,887,508
NOBLE	420	399	10	2,565,781
NOWATA	283	273	5	5,156,050
OKFUSKEE	208	201	2	1,000
OKLAHOMA	1,003	613	177	5,134,707
OKMULGEE	91	63	12	1,079,718
OSAGE	585	489	13	112,723
OTTAWA	24	0	12	225,884
PAWNEE	150	130	5	61,696
PAYNE	260	216	16	843,174
PITTSBURG	754	715	13	631,919
PONTOTOC	147	122	5	22,334
POTTAWATOMIE	299	254	15	5,659,061
PUSHMATAHA	11	0	4	5,150
ROGER MILLS	1,104	1,099	1	500
ROGERS	86	9	31	513,356,381
SEMINOLE	418	393	9	129,028
SEQUOYAH	46	24	10	74,518
STEPHENS	936	900	7	15,041
TEXAS	996	974	13	3,325,969
TILLMAN	27	9	12	2,117,300
TULSA	458	31	201	114,617,614
WAGONER	36	8	10	200,336
WASHINGTON	102	67	13	523,442
WASHITA	475	451	11	2,835,650
WOODS	830	807	11	1,712,145
WOODWARD	876	847	8	501,238,533

to the applicable Local Emergency Planning Committees (LEPC), and the local fire departments. Tier II forms require specific information describing the quantities and locations of hazardous substances as defined under the OSHA Hazard Communication Standard, which states that a hazardous chemical or substance is any substance for which a facility must maintain a Material Safety Data Sheet (MSDS). Additionally, a chemical or substance is reportable if the material is present on the site for at least 24 continuous hours in a quantity that equals to or exceeds the reporting threshold. Within the same program, EPA lists over 250 materials as Extremely Hazardous Substances (EHS), and specifies a threshold planning quantity (TPQ) for each. For an EHS the threshold for Tier II reporting is either the TPQ or 500 pounds whichever is lower. The reporting threshold for all other covered substances is 10,000 pounds. Tier II reports also provide the name and address of the owner or operator and two emergency contacts that can be used by emergency responders 24 hours a day.

Over 29,000 of the 33,140 Tier II reports submitted for 2003 were from Oil and Gas sites that include tank batteries as well as production sites. (Table C) The correlation between total number of Tier II sites and the number of Oil and Gas Tier II sites is based in the State's strong petroleum hydrocarbons and natural gas production industries. (Figure 19) A total of 1,173 reports were received by DEQ from sites storing one or

continued on page 34...

Figure19

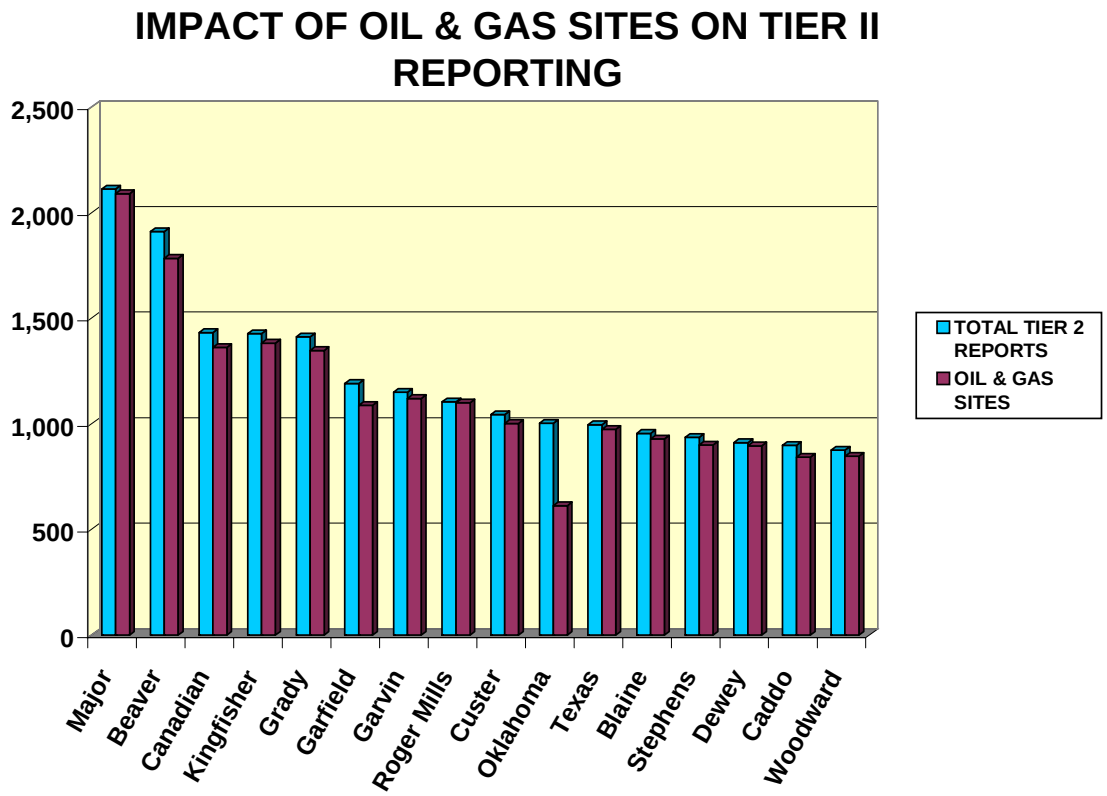


Table D

RANK	COUNTY	TOTAL TIER 2 REPORTS	OIL & GAS SITES	EHS SITES	EHS STORED, lbs.
1	Major	2,112	2,090	6	1,072,250
2	Beaver	1,910	1,784	10	1,612,000
3	Canadian	1,433	1,362	29	2,151,579
4	Kingfisher	1,428	1,383	12	2,568,245
5	Grady	1,412	1,348	23	806,585
6	Garfield	1,191	1,088	38	56,855,245
7	Garvin	1,150	1,120	8	647,191
8	Roger Mills	1,104	1,099	1	500
9	Custer	1,043	1,002	17	2,622,700
10	Oklahoma	1,003	613	177	5,134,707
11	Texas	996	974	13	3,325,969
12	Blaine	955	928	10	2,106,250
13	Stephens	936	900	7	15,041
14	Dewey	911	896	6	2,650,500
15	Caddo	898	842	16	1,255,123
16	Woodward	876	847	8	501,238,533
17	Woods	830	807	11	1,712,145
18	Ellis	808	794	0	0
19	Pittsburg	754	715	13	631,919
20	Harper	734	678	2	550,000
21	Carter	713	669	13	10,743,255
22	Osage	585	489	13	112,723
23	Logan	577	548	8	1,562,209
24	Lincoln	537	508	13	94,734
25	McClain	507	481	4	6,500

more Extremely Hazardous Substance. Counties with the greatest number of reportable sites are listed in (Table D).

Initially there would seem to be no correlation between the quantities of stored materials as reported to Tier II and total reported releases under TRI. However comparison between counties ranked according to Extremely Hazardous Substances stored (Table E) and counties with the most reported TRI chemicals released, six of the nine counties reporting over a million pounds of TRI releases are among the ten counties with the most EHS chemicals stored. Not all of the greater than 250 EHS chemicals are found on the list of over 600 chemicals reportable under TRI. However, sufficient numbers of chemicals are common to both lists and therefore both programs, and while TRI and Tier II satisfy different intentions under the law, facilities reporting under both provide a great deal of chemical information for use in emergency planning. (see *Chemicals Reported in 2003*)

Table E

RANK	COUNTY	TOTAL EHS STORED, lbs.	EHS FACILITIES, TOTAL	TOTAL SITES REPORTING
1	ROGERS	513,356,381	31	86
2	WOODWARD	501,238,533	8	876
3	TULSA	114,617,614	201	458
4	GARFIELD	56,855,245	38	1191
5	MAYES	56,408,987	21	54
6	CARTER	10,743,255	13	713
7	KAY	10,271,832	23	193
8	JACKSON	7,576,088	14	23
9	GRANT	7,056,050	17	249
10	MUSKOGEE	6,887,508	29	88
11	POTTAWATOMIE	5,659,061	15	299
12	NOWATA	5,156,050	5	283
13	OKLAHOMA	5,134,707	177	1003
14	COTTON	5,006,129	6	20
15	TEXAS	3,325,969	13	996
16	WASHITA	2,835,650	11	475
17	ALFALFA	2,700,000	9	380
18	DEWEY	2,650,500	6	911
19	CUSTER	2,622,700	17	1043
20	KINGFISHER	2,568,245	12	1428
21	NOBLE	2,565,781	10	420
22	CANADIAN	2,151,579	29	1433
23	KIOWA	2,117,550	10	76
24	TILLMAN	2,117,300	12	27
25	BLAINE	2,106,250	10	955

Facilities Reporting in 2003

For Reporting Year 2003, 344 Oklahoma facilities reported to TRI, operating under 128 primary SIC Codes. EPA expanded TRI in reporting year 1998 with the addition of seven industrial categories. The added categories are linked to manufacturing by providing energy, managing products or managing wastes from the manufacturing sector.

Manufacturing facilities continue to be the majority of TRI reporters, comprising 314 of 344 facilities that reported for 2003. Twenty facilities reported for the first time in 2003 with only four plants falling under an industrial sector added in 1998. However, the recently added industries continued to impact the data for Oklahoma. Coal-fired electrical plants and permitted commercial hazardous waste management facilities are two of the categories added in 1998 and together accounted for almost 26 percent of all TRI releases in Oklahoma in 2003. (Table F) Seven of the 25 facilities with the largest total releases for 2003 reported the first time for under the 1998 changes and all of these were operational prior to 1998. (Table G) Together the ten industrial classifications reporting the largest total releases account for slightly over 90 percent of all TRI releases in the State. (Figure 20) A discussion of the five industries with the largest total releases follows.

Nitrogenous Fertilizers- SIC 2873

The use of agricultural chemicals essential to

continued on next page...

Table F

RANK	SIC CODE	INDUSTRY	TOT. RELEASES, LBS.
1	2873	Nitrogenous Fertilizers	7,483,580
2	4911	Coal Fired Electric Utilities	3,464,060
3	4953	Industrial Waste Handlers, Under RCRA Subtitle C	2,991,773
4	2631	Paperboard Mills	2,902,875
5	2075	Soybean Mills	2,043,612
6	2911	Petroleum Refining	1,339,617
7	9711	National Defense (Armed Forces)	834,245
8	2869	Industrial Organic Chemicals	567,355
9	2621	Paper Mills	442,442
10	3251	Brick & Structural Clay Tile	333,441
11	2015	Poultry Slaughtering & Processing	285,597
12	3089	Misc. Plastic Products	234,248
13	3411	Metal Cans	222,720
14	3519	Misc. Internal Combustion Engines	212,872
15	2493	Reconstituted Wood Products	204,453
16	2074	Cottonseed Oil Mills	200,025
17	3499	Fabricated Metal Products	196,138
18	3241	Hydraulic Cement	161,532
19	2819	Industrial Inorganic Chemicals	75,190
20	3799	Misc. Transportation Equipment	70,002

95.5% of Tot. Releases

Table G

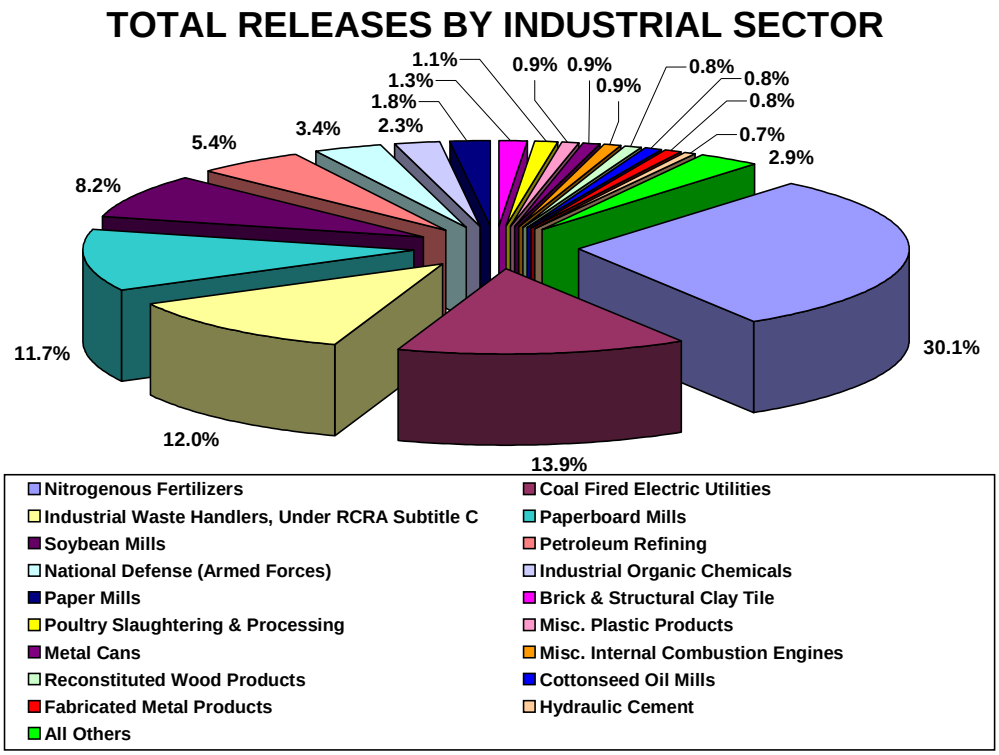
RANK	FACILITY	COUNTY	TOT. RELEASES, LBS.	INDUSTRIAL CLASSIFICATION
1	TERRA NITROGEN, L.P.-Verdigris Plant	Rogers	3,379,860	Nitrogenous Fertilizer Production
2	KOCH NITROGEN	Garfield	3,172,479	Nitrogenous Fertilizer Production
3	WEYERHAEUSER COMPANY- Valliant	McCurtain	2,903,871	Paperboard Mill
4	SOLAE- Pryor	Mayes	2,043,612	Soybean Mill
5	CLEAN HARBORS- Lone Mntn.	Major	1,692,109	RCRA Subtitle C Landfill (TSD)
6	GRAND RIVER DAM AUTHORITY	Mayes	1,327,021	Coal Fired Utility
7	PERMA-FIX TREATMENT SERVICES	Tulsa	1,299,664	Refuse Systems- Waste Disposal
8	TERRA INTERNATIONAL- Woodward	Woodward	798,665	Nitrogenous Fertilizer Production
9	CONOCOPHILLIPS- Ponca City Refinery	Kay	621,308	Petroleum Refining
10	BAKER PETROLITE- Barnsdall	Osage	557,850	Misc. Industrial Organic Chemicals
11	NORTHEASTERN STATION	Rogers	506,250	Coal Fired Utility
12	FORT JAMES OPERATING CO.	Muskogee	442,440	Paper Mill
13	MUSKOGEE GENERATING STATION	Muskogee	408,875	Coal Fired Utility
14	WESTERN FARMERS ELECTRIC COOP	Choctaw	392,207	Coal Fired Utility
15	U.S. DOD, FORT SILL FIELD ARTILLERY CNTR.	Comanche	356,702	National Defense (Armed Forces)
16	TPI PETROLEUM INC.	Carter	338,733	Petroleum Refining
17	TYSON FOODS INC.- Broken Bow	McCurtain	282,181	Poultry Slaughtering & Processing
18	SOONER GENERATING STATION (OG&E)	Osage	276,226	Coal Fired Utility
19	U.S. DOD, TINKER AFB	Oklahoma	242,563	National Defense (Armed Forces)
20	MCALESTER ARMY AMMUNITION PLANT	Pittsburg	234,915	National Defense (Armed Forces)
21	REXAM BEVERAGE CAN CO.- Okla. City	Oklahoma	222,720	Metal cans
22	MERCURY MARINE - MERCRUISER	Payne	212,872	Marine Internal Combustion Engines
23	DOMINANCE INDUSTRIES, INC.	McCurtain	204,453	Reconstituted Wood Products
24	PRODUCERS COOPERATIVE OIL MILL	Oklahoma	200,025	Cottonseed Oil Mills
25	ROLL-OFFS OF AMERICA	Bryan	191,297	Fabricated Metal products

Oklahoma's agricultural base is not reportable under TRI; however, the manufacture of these chemicals and precursor chemicals used to produce them are covered. Facilities manufacturing nitrogenous fertilizers were the largest source of releases in 2003 as reported to TRI. These facilities produce hydrogen and nitrogen gases from methane (natural gas), then through a catalytic process produce ammonia that is condensed to anhydrous ammonia and finally oxidized to form ammonium nitrate. Methanol is a secondary product of this process. Ammonia accounts for over 90 percent of all TRI chemicals released by this industry. Due to the very large quantities of anhydrous ammonia used and stored and the volatility of ammonia, fugitive air emissions are the medium for ammonia releases. (see *Chemicals Reported in 2003*)

Coal-Fired Utilities- SIC 4911

The majority of electricity generating plants in the State burn coal as a source of all or part of their energy. This industry was required to report for the first time for 1998 and contributed to a significant rise in Oklahoma's figures for land releases and air emissions. Six coal-fired utilities reported chemical usage above thresholds for 2003. The chemicals reported are either components of bituminous coal or formed during its combustion, (See *Chemicals Reported in 2003)*, with barium compounds accounting for over 55 percent of all chemicals released by this industry. Overwhelmingly chemical released by coal-fired utilities are through permitted, stack air

Figure 20



emissions, and these are greatly reduced through the use of in-line air scrubbers and neutralizers. Comparatively small quantities of metallic compounds are released through stack air emissions; the bulk of these compounds are found in residual ashes and released into permitted on- and off-site landfills.

Industrial Waste Handlers, RCRA Subtitle C- SIC 4953

Industrial waste handlers permitted to operate RCRA Subtitle C landfills for hazardous wastes appear to be considerable sources of environmental releases in the State. Although some quantities of the materials transferred to these facilities are neutralized through treatment, the bulk of hazardous wastes managed are disposed into highly regulated and monitored landfills. While both the toxicity and quantities of chemicals managed by this type of facility can be quite large, the risks of public exposure or adverse environmental effects from disposal to a RCRA Subtitle C site are extremely low. Additionally, transfers from Oklahoma facilities to in-state treatment, storage and disposal (TSD) sites result in a ''double counting" effect, that is, the majority of chemicals reported as transferred for treatment, storage or disposal will be counted again in the releases reported by the TSD. Similarly, transfers of chemicals from out-of-state facilities for disposal to RCRA Subtitle C landfills located in Oklahoma are counted in the releases made for this state. Consequently Oklahoma's total land releases rose substantially due to the first time reporting by this sector.

Paperboard Mills- SIC 2631

Another industry utilizing large amounts of volatile chemicals is paperboard manufacturing. Pulp paper is formed into various pressed paper products, a process in which large quantities of ammonia and methanol are required. Increasingly methanol is used by this sector as an alternative to more toxic organo-chloride compounds. Permitted stack air releases of methanol account for 80 percent of all releases for this industry in 2003.

Soybean Mills- SIC 2075

Soybean mills process soybeans through fermentation and extract proteins to form a variety of products for

human and livestock consumption. Nitrate compounds are the largest reportable component in the waste streams of this industry and figures for releases of these compounds were greatly effected by the Nitrate Reporting Initiative begun in 1999. Increases in the reported quantities of nitrates released by this industry alone resulted in an increase in excess of three times that for all surface water releases in the State combined. As striking as the increase appears, it represented an improvement in the accuracy of reporting nitrates rather than an actual increase in discharges of these compounds.

Chemicals Reported in 2003

Oklahoma facilities reported the manufacture, process or otherwise use of 121 toxic chemicals or chemical groups for 2003 as reportable under TRI. The percentages of total releases for the chemicals reported in greatest quantities are illustrated in Figure 21. The ten chemicals released in greatest quantities are discussed below, and together ammonia, nitrate compounds, methanol, barium compounds, hydrofluoric acid, hydrochloric acid aerosols, toluene, xylenes, zinc compounds and manganese compounds accounted for 84.4 percent of all chemicals released or managed, as defined by TRI. (Table H) The chemicals reported for 2003 are largely a reflection of commerce in the State.

Ammonia remains the chemical released in the largest quantities in Oklahoma during 2003, as in previous years. This nitrogen-based compound is component of fertilizers and stock feed stuffs and accounted for 30.1 percent of all toxic chemicals released in Oklahoma in 2003. Ammonia gas is used by other industries as a refrigerant, while ammonia solutions are used in paper pulping operations and food processing. (Figure 22) Twenty-five facilities reported a total of over 6.9 million pounds of ammonia released in 2003.

Due to its volatility, 99 per cent of reported ammonia releases are air emissions. Ammonia gas produces highly irritating and corrosive vapors and is an inhalation and dermal hazard. Skin contact with ammonia vapor or compressed gas may result in cryogenic burns as well. Nitrogen fertilizers production uses anhydrous gaseous ammonia, which is hydroscopic and therefore extremely damaging to the mucus membranes of the eyes and respiratory tract.

Nitrate compounds are another group of nitrogen containing chemicals also associated with fertilizer production, and this group of chemicals was produced or used by a total of 21 facilities in the State in 2003. At ambient temperatures, nitrates exist as solid salts containing the nitrate ion, for example, sodium nitrate, silver nitrate and ammonium nitrate. However, in aqueous solu-

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Figure 21

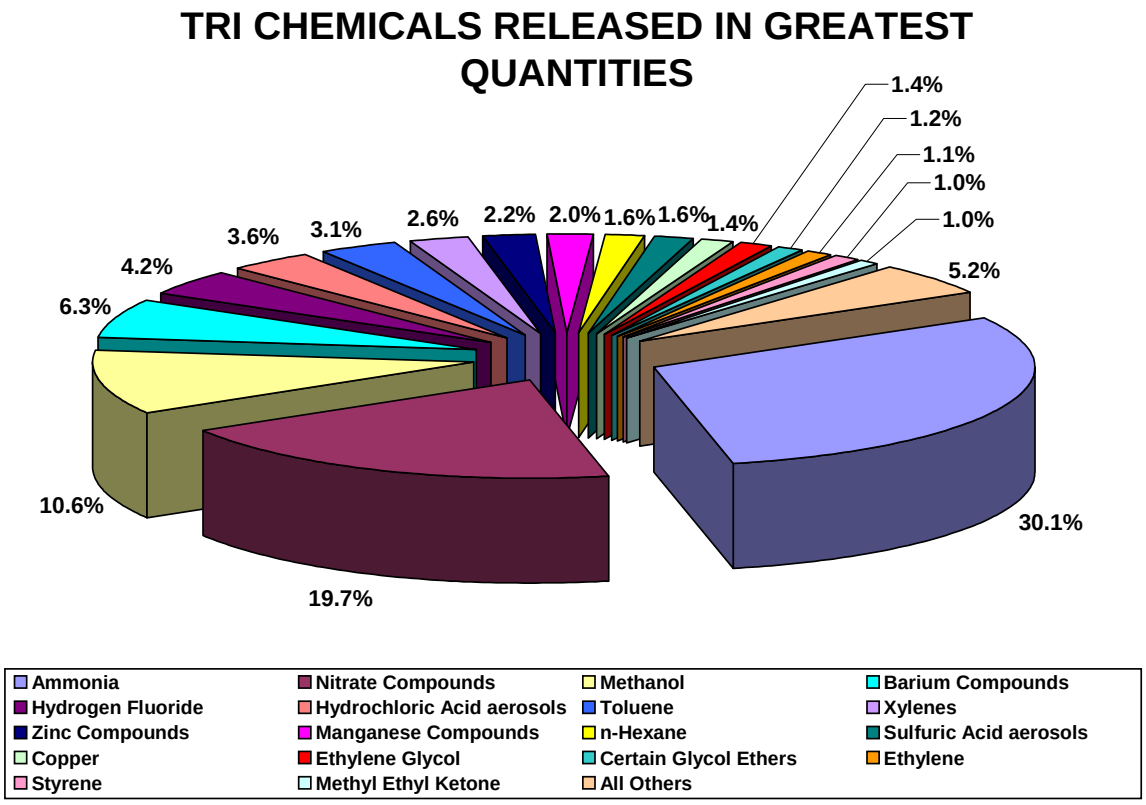

Table H

RANK	CHEMICAL	TOT. RELEASES, lbs.
1	Ammonia	6,979,533
2	Nitrate Compounds	4,561,939
3	Methanol	2,445,952
4	Barium Compounds	1,470,066
5	Hydrogen Fluoride	974,373
6	Hydrochloric Acid aerosols	843,701
7	Toluene	724,907
8	Xylenes	592,872
9	Zinc Compounds	509,814
10	Manganese Compounds	474,400
11	n-Hexane	374,772
12	Sulfuric Acid aerosols	373,455
13	Copper	334,892
14	Ethylene Glycol	313,067
15	Certain Glycol Ethers	283,635
16	Ethylene	249,920
17	Styrene	233,561
18	Methyl Ethyl Ketone	220,935
19	Formaldehyde	218,626
20	Chromium Compounds	202,157
21	n,n-Dimethylformamide	199,364
22	Lead Compounds	188,790
23	Copper Compounds	148,749
24	n-Buytl Alcohol	146,517
25	Manganese	104,719
	Tot. Releases of Top 25	23,170,716
	93.26% of Tot. Releases	

tions, the form in which most nitrate compounds are used and released, the compounds dissociate to form negatively charged nitrate ions and the corresponding cations. The production of water dissociable nitrates in waste streams, frequently formed by nitric acid neutralization, often was excluded from the calculations of numbers reported to TRI. Beginning with RY 1999, EPA's Nitrate Initiative sought to improve the accuracy of nitrate release figures by addressing the under reporting of water dissociable nitrate compounds. Additional clarification stated that nitrate anions formed by the dissociation of any nitrate-containing chemical are reportable, regardless of whether the compound itself is listed under Section 313. As a result, Oklahoma saw a substantial increase in the overall numbers reported for nitrates and a consequential and dramatic increase in the figures for releases to surface waters, POTWs and landfills as well as in treatment figures. However, a significant amount, 27.3 percent in 2003, of nitrate compounds releases were postproduction waste management by permitted industrial waste handlers. (Figure 23) Solutions of nitrate compounds can be disposed into deep under-

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Figure 22

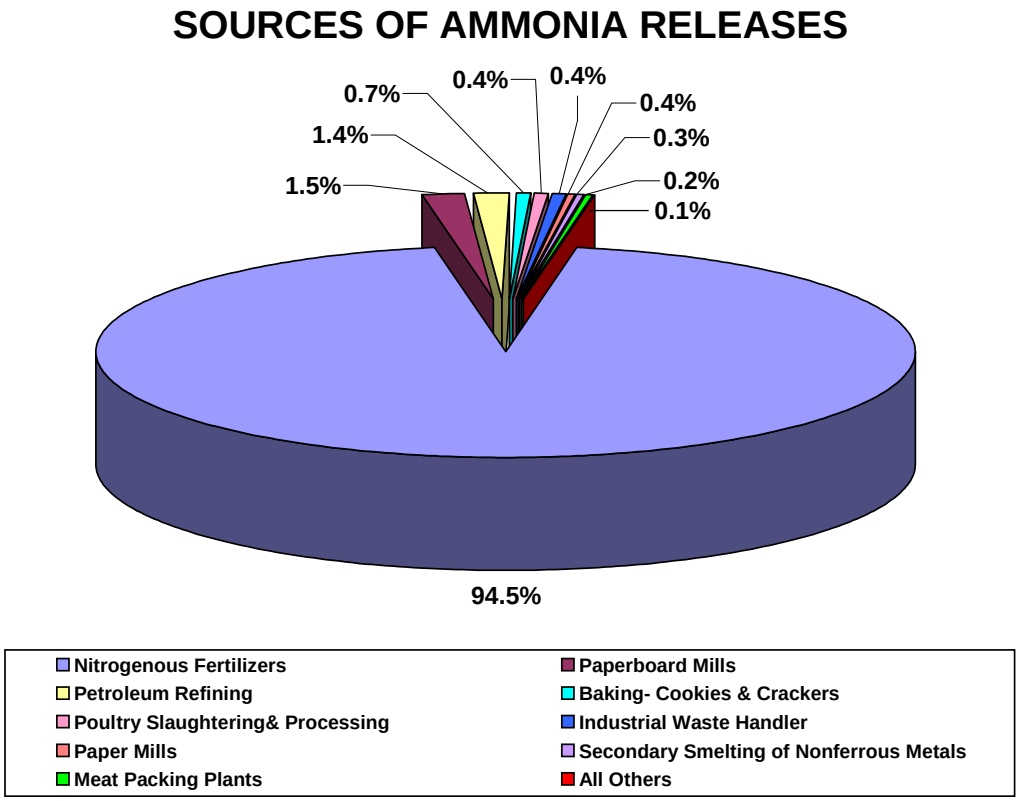
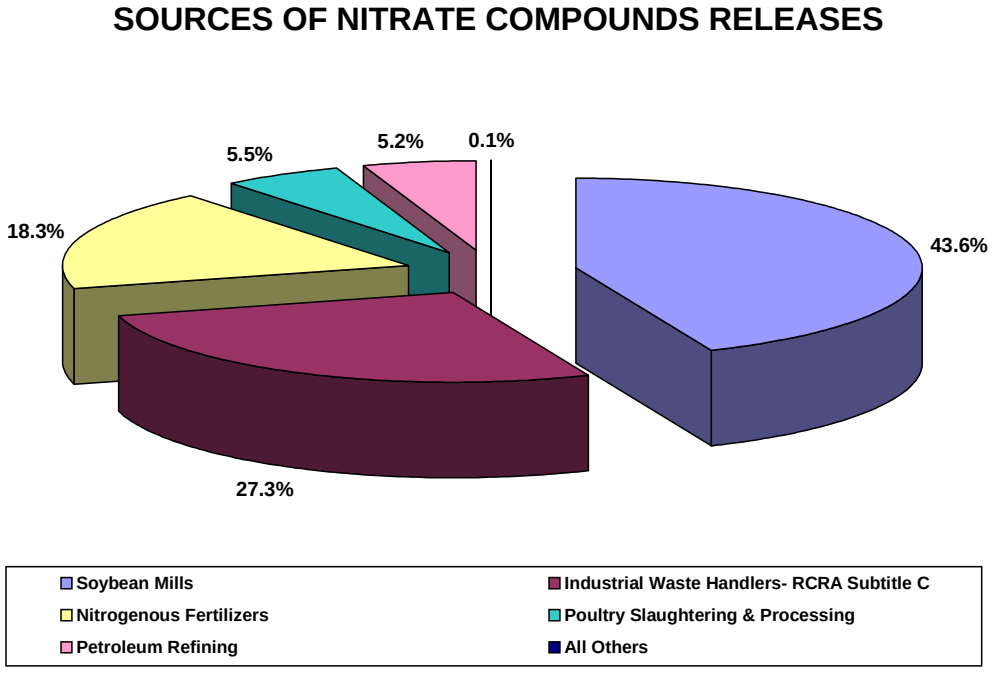


Figure 23



ground injection wells, and in fact, injection is the means of disposal used most often by industrial waste management operations handling these chemicals. This method of disposal presents an extremely small risk of human exposure. Certain geological formations may cause naturally high concentrations of nitrates in potable groundwater.

Prolonged ingestion of high concentrations of nitrates, which oxidize the iron in hemoglobin to form methemoglobin in the blood, leads to methemoglobinemia ("blue-baby" syndrome). Children and in particular infants under age six months are most susceptible to this disease and most likely to suffer long term deleterious effects from it.

Methanol, also known as methyl alcohol or wood alcohol, is a common industrial solvent, and was reported by 31 facilities in 13 different industrial classifications for 2003. The primary users of methanol in Oklahoma are the pulping and paper production industries. (Figure 24) Methanol also is produced as a secondary product by ammonia fertilizer plants. It is highly volatile and flammable, and virtually all releases of methanol are permitted air emissions. Exposure to vapors can result in eye irritation, headaches, fatigue and drowsiness; exposure to high doses may cause temporary coma. Methanol is highly water soluble, and ingestion of the compound can cause permanent blindness, liver damage and death; however, the risk of this means of exposure from environmental contaminants is very low.

Barium is a naturally occurring metal, and small quantities of **barium containing compounds** may be present normally in the soils of Oklahoma. Barium compounds have varied industrial uses; however, under TRI reporting requirements, in Oklahoma for 2003 these chemicals are reported chiefly as non-combustible components of coal found in the ash produced by coal-fired electrical plants. (Figure 25) Fly ash along with other barium compounds most frequently are disposed to land through the use of permitted

Figure 24

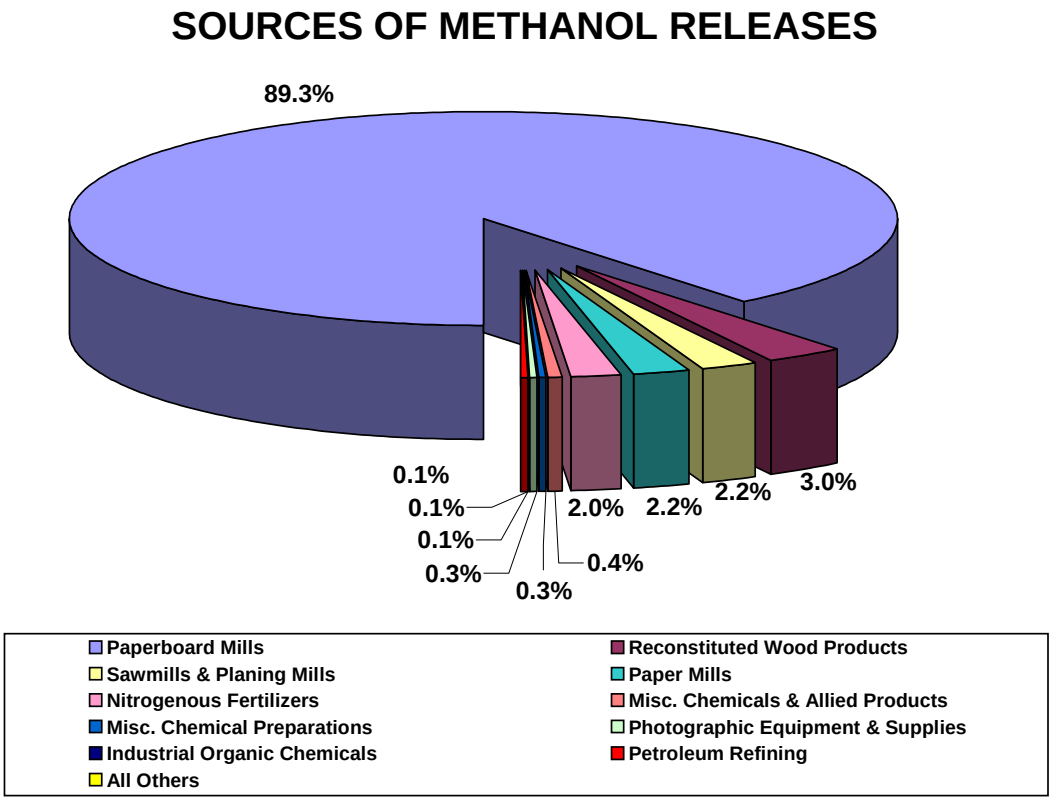
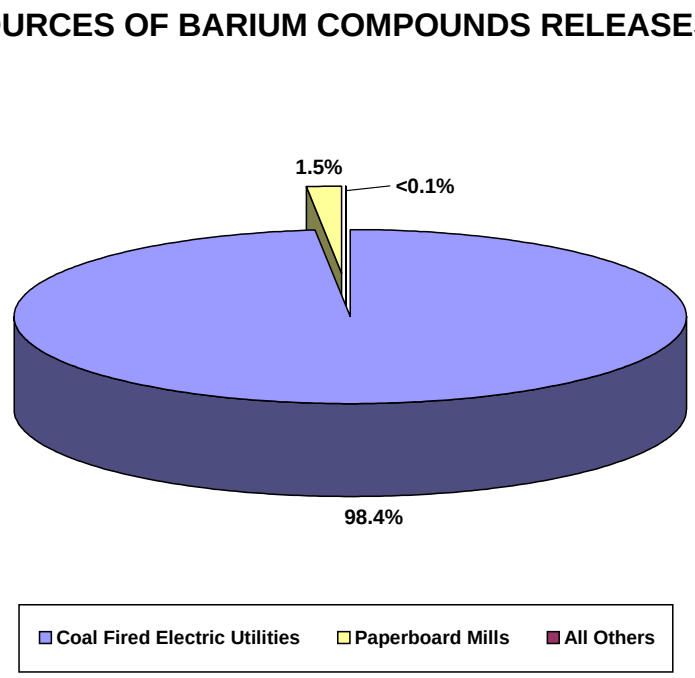


Figure 25



sanitary landfills, RCRA Subtitle C regulated disposal facilities and surface impoundments.

The ability of barium compounds to create health or environmental hazards is dependent on the water solubility of individual compounds and the toxicity of each. Generally, relatively high concentrations of barium are required to be toxic or hazardous. Ingestion is the most common means of exposure, although the dust of dry barium compounds may pose an inhalation hazard. Potential health effects from exposure to high concentrations of barium or barium compounds are gastric irritation, muscle fatigue, cardiac arrhythmia, and damage to internal organs. Barium sulfate (barite) is excluded from TRI reporting.

Hydrogen fluoride is a colorless gas with a sharp, acrid odor. It is hygroscopic and readily dissolves in water to form hydrofluoric acid. In its gaseous state, releases occur to the air and inhalation is the means of exposure. Even at low levels hydrogen fluoride is an eye, skin and respiratory irritant as hydrofluoric acid is formed when the gas comes into contact with moisture in these organs. Acute inhalation exposure at high concentrations may cause pulmonary edema and cardiac arrhythmia. Hydrofluoric acid is extremely corrosive and may cause severe burns. Hydrogen fluoride is formed during coal combustion and this is the largest source of releases in the State. (Figure 26) Other common uses are as a catalyst or hardener or an agent to etch glass. Fourteen facilities reported hydrogen fluoride releases in 2003.

Hydrochloric acid is extremely corrosive and is always handled in solution, usually aqueous. However, even dilute solutions of hydrochloric acid will corrode most metals and of course is extremely damaging to skin and mucus membranes. For TRI reporting only **hydrochloric acid aerosols** are reportable, also known as "1995 and after", referring to a 1995 clarification that specifies only aerosols of the chemical are counted. An aerosol of hydrochloric acid is considered to be any mist, vapor, gas, fog or other airborne form of particle size. Sprayed or distilled acid is covered, as is hydrogen chloride gas. Hydrochloric acid is a by-product of coal combustion, and coal fired electrical utilities were the source of 83 percent of releases in 2003. (Figure 27) However, gases

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Figure 26

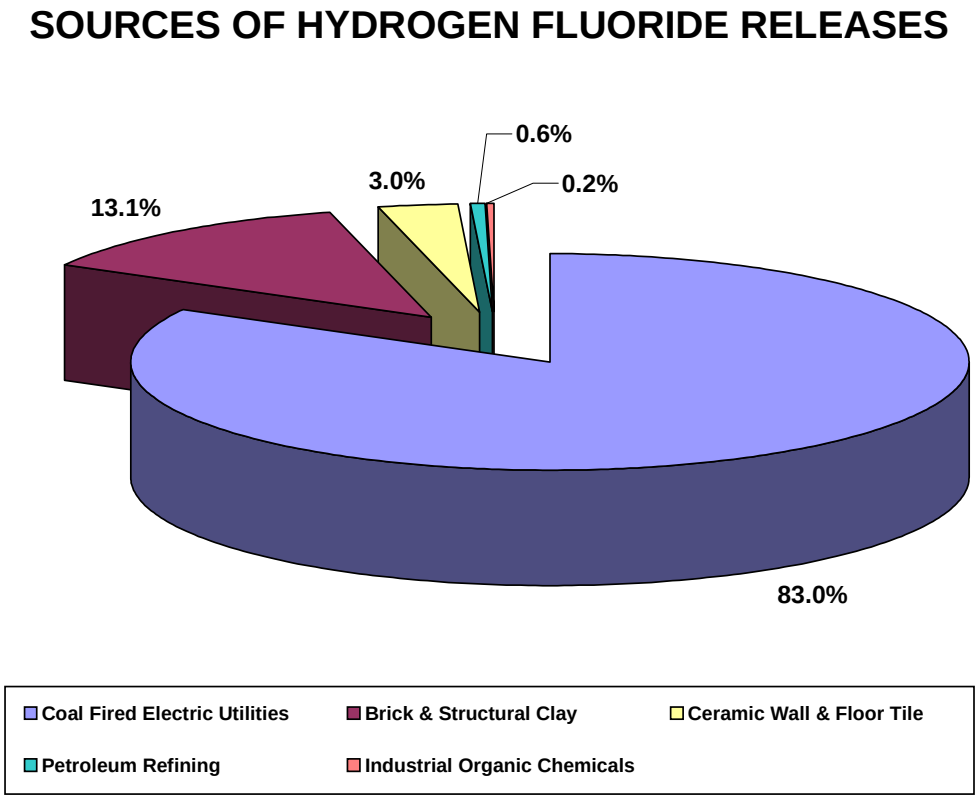
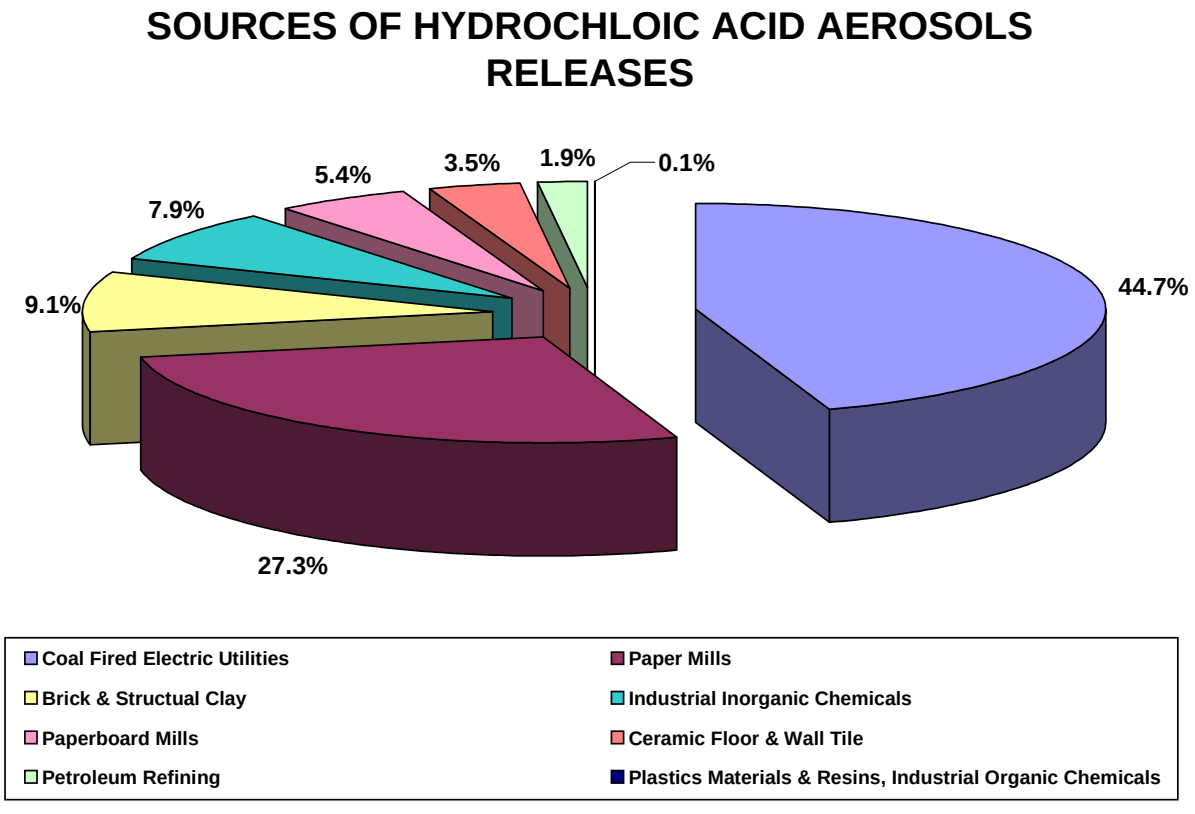


Figure 27



generated by coal combustion are treated by in-line or stack scrubbers that greatly reduce concentrations of hydrochloric acid and other chemicals prior to release as permitted, stack air emissions. Sixteen facilities reported hydrochloric acid aerosol releases for 2003.

Toluene, also known as methyl benzene or toluol, is an aromatic compound and is a clear, colorless liquid at ambient temperature and pressure with a sweet, pungent odor. It is a widely used industrial solvent, a component of paints, inks, adhesives, degreasers and cleaning agents, and used for chemical extractions. (Figure 28) During petroleum refining, toluene is isolated, and back blended into fuels to raise octane levels. It also is a by-product of styrene production. Thirty-two facilities reported toluene releases in 2003. Because of its high volatility, the majority of toluene released to the environment is through stack or fugitive air emissions. Inhalation of fumes is the primary means of exposure, although it may be absorbed dermally as well. Continuous exposure or exposure to higher concentrations may cause unconsciousness and eventual asphyxiation. Long-term exposure eventually results in kidney and brain damage. Toluene is not classified as a known or potential carcinogen; however, it is a possible mutagen and highly flammable.

For the purpose of this report, **xylenes** were considered together as a single compound without distinguishing between the three isomers: ortho-, meta-, and para-xylene, (1,2-, 1,3- and 1,4-xylene respectively). Xylenes are aromatic compounds often found in mixtures with ethyl benzene. These compounds are highly volatile and flammable with boiling points so near one another that separation of the isomers by conventional methods is difficult. At ambient temperature and pressure, xylenes are clear liquids with a sweet odor. In Oklahoma mixed isomer solutions of xylenes are most commonly used. The mixture is a widely used industrial solvent with uses in many industries, and 36 facilities in the State report its use in quantities exceeding

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Figure 28

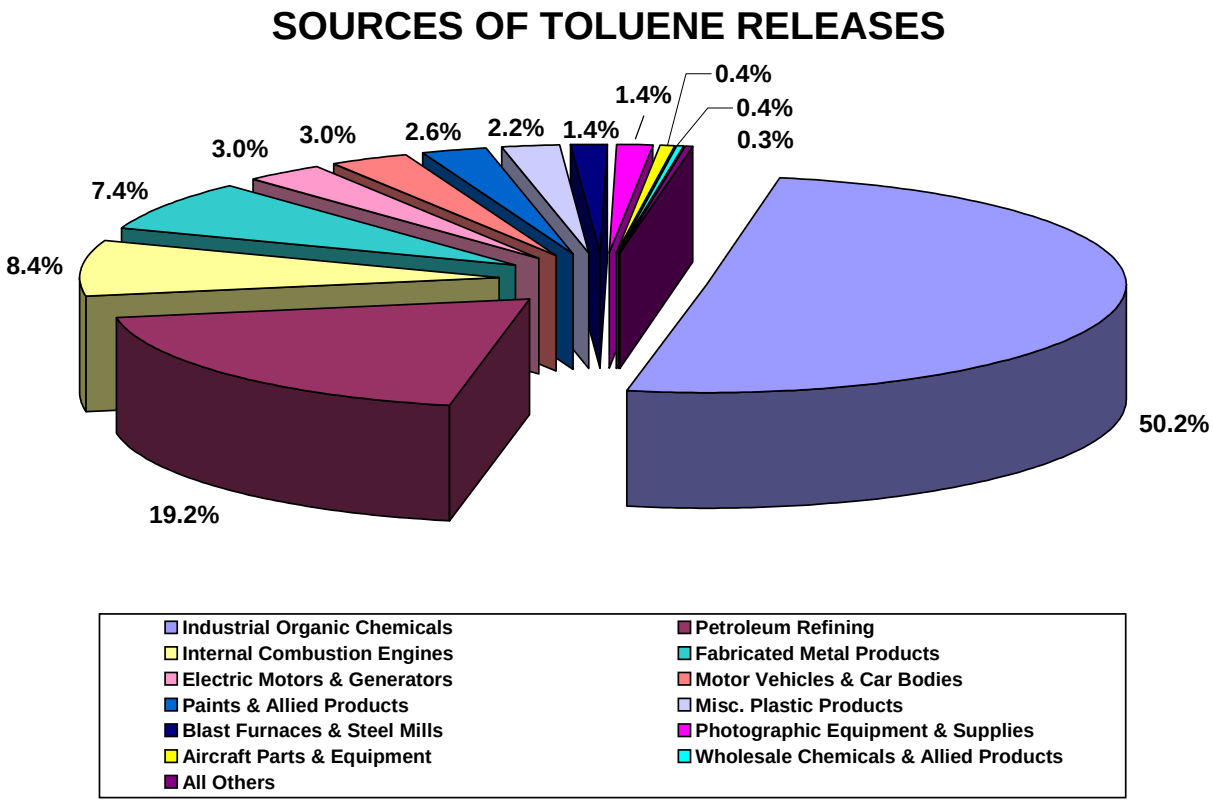


Figure 29

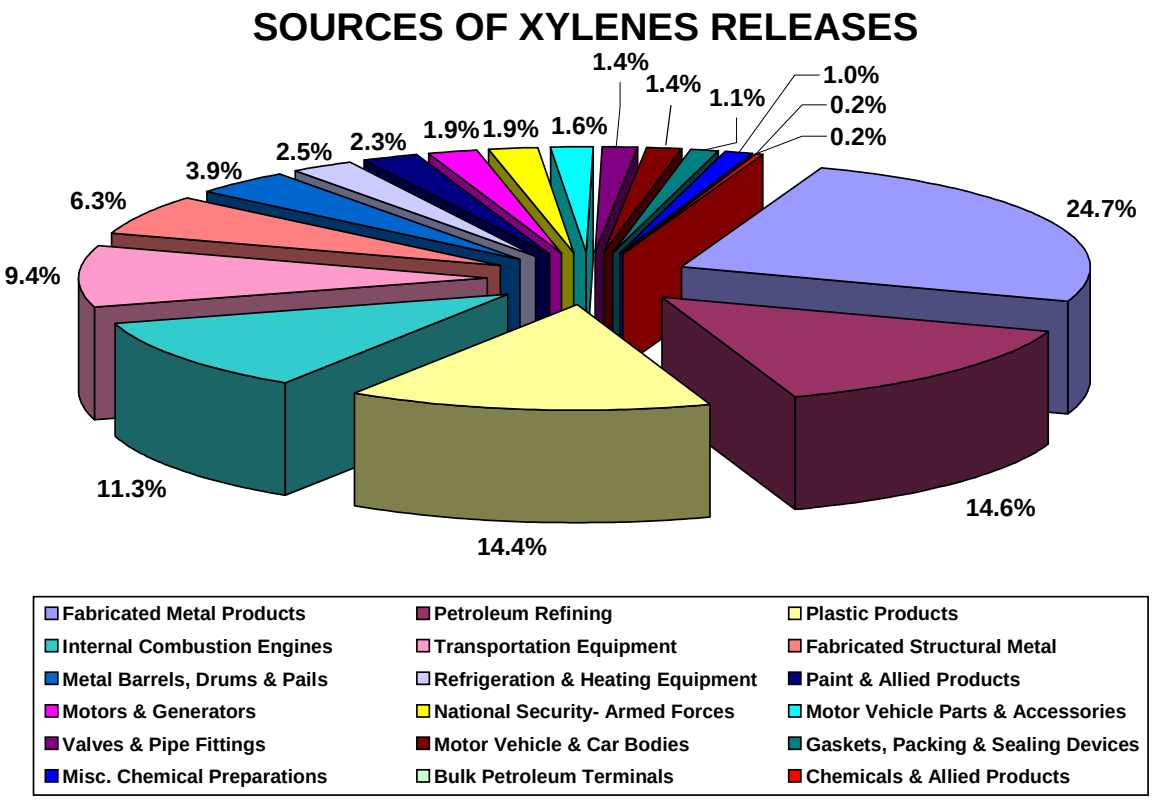
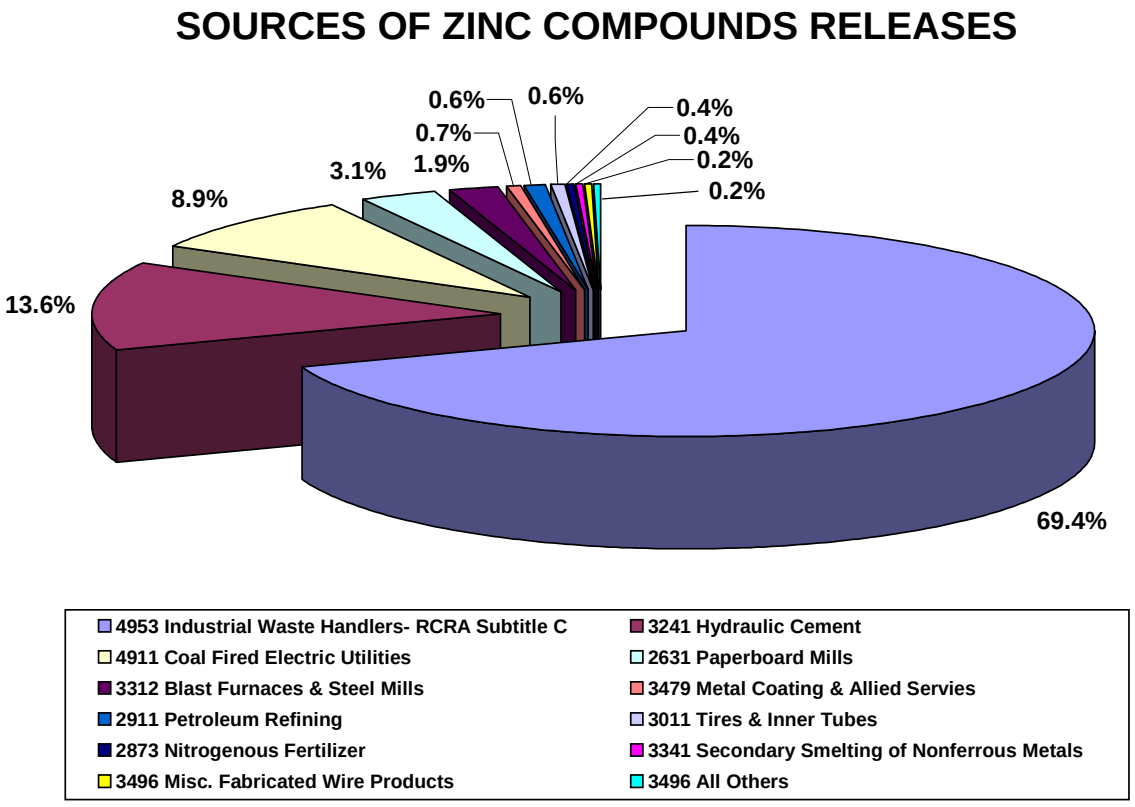


Figure 30



the threshold levels. (Figure 29) It also is a component of paints and refined petroleum hydrocarbons. Releases occur to air and inhalation is the means of exposure, although they may be absorbed through the skin. Xylenes are central nervous system depressors causing dizziness, motor disturbances, nausea and loss of consciousness as a result of acute exposure. High concentrations may cause asphyxia. Chronic exposure may damage bone marrow and thereby cause depressed blood cell counts.

Zinc compounds occur naturally in the earth's crust and zinc is a nutritionally essential trace metal in humans. Fifty-two facilities used produced or used zinc compounds at or above the TRI thresholds in 2003. Zinc compounds are widely used in the manufacture of metal alloys, paint and dyes, ointments, wood preservatives and wire coatings and also are present in the residual ash of coal combustion. (Figure 30)

Exposure occurs through ingestion or inhalation. Ingestion of zinc or zinc compounds at levels 10-15 times the Required Daily Allowance (RDA) is deleterious to health. Excess ingestion over a short-term exposure results in gastric disturbances; long time exposure may result in anemia, pancreatic damage, and changes in blood cholesterol levels. Short-term inhalation of zinc fumes or dust can cause a disease called metal fume fever that has flu-like symptoms and is largely reversible. The long-term effect of inhaling elemental zinc or zinc compounds is unknown. Disposal through RCRA Subtitle C landfills is the most common source of releases in Oklahoma and the risk for exposure is extremely low.

Manganese is the twelfth most common element and a component of many common minerals, although it does not occur naturally as a pure metal. **Manganese compounds** ranked tenth as the chemical or chemical group released in greatest quantities statewide in 2003. Industrial applications for the use manganese-containing compounds are many. (Figure 31) Ferromanganese

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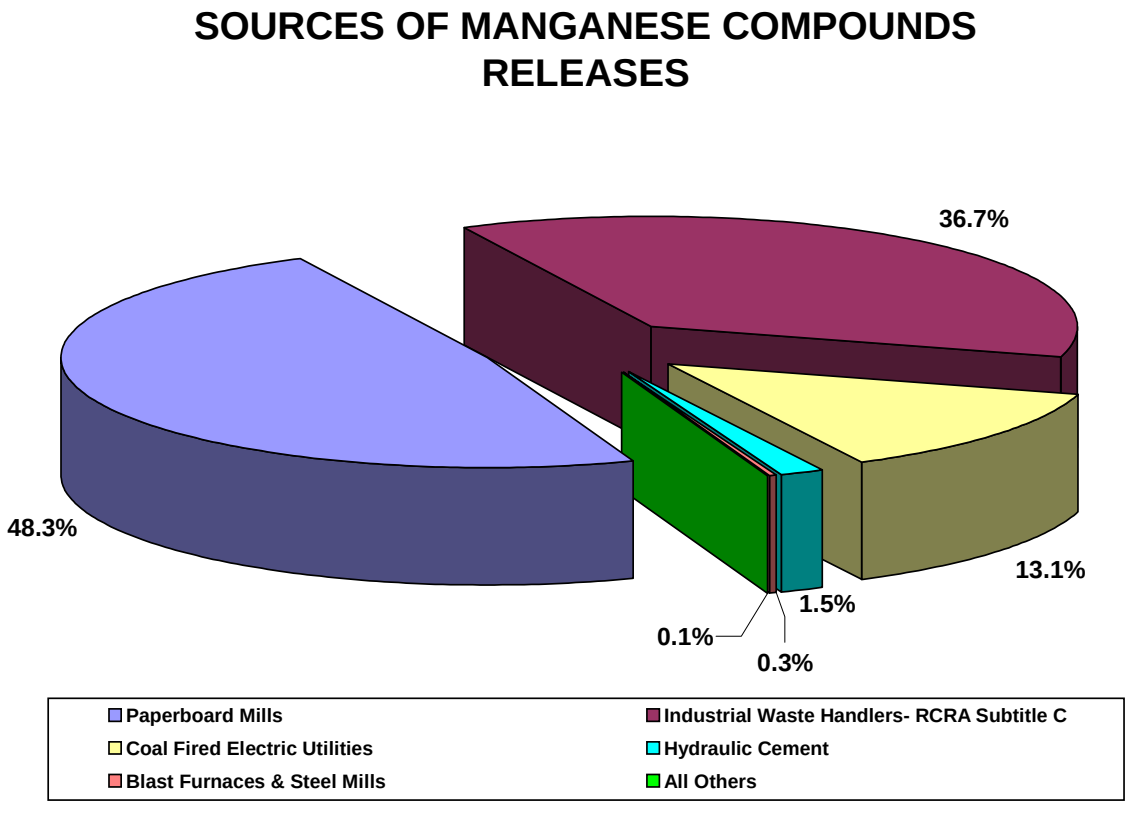
Figure 31



mixtures improve the strength and hardness of carbon steel, stainless steel, high-temperature steel, tool steel, cast iron and alloys and manganese compounds contained in steel account for the largest amount of these chemicals reported to TRI nationally. These compounds also are components of ash from coal-fired electrical utilities, and in Oklahoma this accounts for the majority releases after disposal to RCRA Subtitle C landfills. Manganese compounds are used in glazes, varnishes and ceramics.

Manganese through manganese compounds is another trace element considered essential in the diet for human health. Ingestion or inhalation of particulates of manganese compounds has much the same toxic effects. The central nervous system is targeted and a combination of mental and emotional disturbances coupled with poor hand and body coordination symptomatic of a disease called manganism may ensue with weakness and lethargy as well. The symptoms progress with continued exposure eventually causing Parkinson-like tremors and difficulty in walking which are irreversible.

The list of chemicals and chemical families reportable under TRI continues to change. Beginning with Reporting Year 1995, the list increased from 313 to over 600. The PBT Rule went into effect for RY 2000 (see Persistent, Bioaccumulative, Toxic Chemicals, below). The Final Rule for Lead, which set the reporting threshold at 10 pounds per year, applied for the first time in RY 2001. Concerned parties outside of the EPA may petition the agency to add or delete chemicals from the list. For example, Methyl Ethyl Ketone (MEK) is delisted for RY 2004.

The materials reported stored in greatest quantities to Tier II for 2003 are listed in Table I. With the exception of ammonia, the only Extremely Hazardous Substance on the list, all other chemicals or materials fell under the 10,000 pound threshold for reporting. The EHS chemicals reported in greatest quantities are shown in Table J. As in TRI reporting, ammonia is by far the EHS stored in greatest amounts due to agriculture and the need to manufacture nitrogenous fertilizers. Because Tier II reflects only storage, chemicals produced as wastes or byproducts such as nitrate compounds frequently are unreported. Chlorine is reportable under both programs, however; significantly greater quantities are reported to Tier II as

Table I

RANK	CHEMICAL/MATERIAL REPORTED	TOTAL STORED, lbs.
1	Crude Oil	6,439,944,573
2	Coal	4,055,600,000
3	Propane	3,318,987,181
4	Diesel fuel	2,837,346,294
5	Gasoline	2,605,419,491
6	Cement, Asphalt	2,096,295,752
7	Fly Ash	758,805,000
8	Ethylene Glycol Monobutyl Ether	751,372,867
9	Kerosene	404,939,475
10	Methanol	373,091,136
11	Calcium Fluoride	275,005,000
12	Ammonia	269,429,642
13	Butane	266,271,000
14	Petroleum Naphtha	257,705,000
15	Nitrogen	184,470,282

Table J

RANK	CHEMICAL	TOTAL STORED, lbs.	TOTAL SITES REPORTING
1	Ammonia	269,429,642	257
2	Sulfuric Acid	52,854,424	637
3	Chlorine	22,489,220	226
4	Nitric Acid	12,361,470	58
5	Hydrofluoric Acid	5,990,850	41
6	Formaldehyde	2,467,163	32
7	Sulfur Dioxide	1,495,350	43
8	Hydrogen Peroxide	1,436,650	21
9	Ethylene Oxide	520,000	9
10	Dimethoate	299,718	38

municipal water treatment plants are not covered under TRI. Hydrofluoric acid also is reportable under TRI and is an EHS. Methanol while not an EHS was the tenth most reported chemical in Tier II reporting and the third TRI chemical released in greatest quantities. Discussions of the five EHS stored in greatest quantities in 2003 follow.

Ammonia, its sources and effects were discussed in the above TRI section. The remainder of the five largest EHS chemicals according to quantities stored is considered below.

More **sulfuric acid** is produced in the United States than any other chemical and its industrial uses are many. Among them are lead-acid batteries, petroleum refining, electroplating and production of rayon, film, explosives, dyes and wood preservatives. It is a clear, colorless, oily liquid and highly corrosive even in aqueous solutions. Sulfuric acid is a strong oxidizer and can combust or explode upon contact with acetone, alcohols and other specific organic materials. It reacts violently with water. When heated it produces fumes of highly toxic sulfur trioxide. Blindness can occur if sulfuric comes in contact with eyes. It is irritating and damaging to the respiratory system and any mucous membranes as well and can cause permanent damage to any of these. Dermal contact leads to severe burns. While quantities of sulfuric acid stored are reportable to Tier II, only aerosols are reported to TRI.

Chlorine is a toxic chemical familiar to most people. Chlorine gas, which is yellow-green with a pungent, irritating odor, is commonly used as a disinfectant especially for public water supplies. Dissolved in water it forms hydrochloric or hypochlorous acids or under certain conditions sodium hypochlorite, that is bleach. Inhalation at concentrations of 1,000 ppm and greater causes fatal pulmonary edema and cardiac arrest. The extent of damage from acute exposure at lower levels depends on the duration of the exposure as well concentration and symptoms can range from mucus membrane irritation to chemical pneumonia. If acute exposure to chlorine is survived recovery is usually rapid and complete. Long term exposure causes reductions in red blood cell counts and increases the fragility of these cells; however these conditions are known to reverse within six months from the cessation of exposure. Chlorine use, releases and management are reportable to TRI, and for 2002 industrial facilities covered under EPCRA 313 reported 8,974 pounds of chlorine released.

Nitric acid is a clear, oily liquid that may be colorless, yellow or red and has a choking, acrid odor. The largest use of nitric acid is for the manufacture of ammonium nitrate fertilizer. Other uses include photo engraving, metal etching, and synthesis of organic chemicals. It is highly corrosive and can attack some forms of plastic and rubber. Poisonous nitrous oxide fumes are pro-

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duced when heated, and mixture with steam or water produces toxic, corrosive and flammable vapors. It is a strong oxidizer and will react explosively with metal powders, cyanides, sulfides, turpentine, acetonitrile and many reducing agents. Acetone, arsine, and other chemicals are oxidized explosively by fuming nitric acid. Nitric acid will cause severe burns to any tissues with which it comes into contact. Inhalation of nitric acid fumes can cause pulmonary edema and pneumonitis, and acute exposure to high concentrations can cause shock and cardiac insufficiency. Use, releases and waste management of nitric acid are not reportable under TRI.

Hydrofluoric acid, its sources and effects were discussed in the above TRI section.

Information provided to the Hazardous Chemical Inventory about dangerous materials is intended both to protect emergency responders and facilitate planning for chemical emergencies.

TRI Persistent, Bioaccumulative and Toxic Chemicals

The most significant recent change to the list of chemicals reportable to TRI was the 1999 Final Rule on Persistent, Toxic and Bioaccumulative chemicals, (64 FR 58666). Chemicals designated as persistent, bioaccumulative and toxic (PBT) are of particular concern as they are demonstrated to be highly toxic, difficult to destroy, tend not to degrade but persist in the environment and accumulate in the body tissues of humans and wildlife, (bioaccumulate). Implementation of the PBT rule should be viewed as a step in addressing one of the chief limitations of TRI data, specifically, the wide variability in toxicity between different chemicals. Beginning with RY 2000, reporting thresholds for eighteen chemicals classified as persistent, bioaccumulative, toxic were lowered substantially. (Table K) Each of the lower thresholds also takes into account exposure risks to the particular chemical. Seven chemicals and two chemical families previously not reportable under Section 313 were added to the list as part of the final PBT rule. The first PBT list is composed of organochlor pesticides, other highly chlorinated or brominated aromatic compounds, chemicals with multiple, linked aromatic rings (polyaromatic compounds), and two heavy metals reported as elements or compounds.

The lowered thresholds apply to all reportable activities, that is, no alternate thresholds for 'otherwise use' are applicable. Use of Form A is disallowed for any PBT chemical. The *de minimus* concentration exemption is not applicable for any PBT chemical, with the exception of lead containing alloys. A separate rule (66 FR 4500), which classified lead and lead compounds as PBTs and lowered thresholds for both, became effective with RY 2001. The new thresholds do not apply to lead contained in stainless steel, brass or bronze alloys. When lead

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Table K

Manufacture, process and otherwise use thresholds	
Aldrin	100 lbs./yr.
Lead	100 lbs./yr.
Lead Cmpds.	100 lbs./yr.
Methoxychlor	100 lbs./yr.
Pendimethalin	100 lbs./yr.
Polycyclic Aromatic Cmpds. (PAC's)	100 lbs./yr.
Tetrabromobisphenol A	100 lbs./yr.
Trifluralin	100 lbs./yr.
Chlordane	10 lbs./yr.
Benzo(g,h,i) perylene	10 lbs./yr.
Heptachlor	10 lbs./yr.
Hexachlorobenzene	10 lbs./yr.
Isodrin	10 lbs./yr.
Mercury	10 lbs./yr.
Mercury Cmpds.	10 lbs./yr.
Octachlorostyrene	10 lbs./yr.
Polychlorinated Biphenyls (PCB's)	10 lbs./yr.
Pentachlorobenzene	10 lbs./yr.
Toxaphene	10 lbs./yr.
Dioxin and dioxin-like Cmpds.	0.1 gm/yr.

Table L

	Facilities	Air Releases	Land Releases	UI Releases	Water Releases	Total Releases	Transfers	Treatment	Reuse	TPRW
Benzo(g,h,I) perylene	15	209.0	16.0	0.0	21.0	246.0	1,078.0	26.0	4,349.0	5,699
Chlordane	1	0.0	1,681.0	0.0	0.0	1,681.0	0.0	0.0	0.0	1,681
Dioxin and dioxin-like Cmpds.	17	15.0 gm	9.0 gm	0.0 gm	0.0 gm	24.0 gm	48.0 gm	0.0 gm	0.0 gm	72 gm
Lead	56	9,764.0	34,818.0	0.0	7.0	44,589.0	175,673.0	0.0	774,561.0	994,823
Lead Cmpds.	43	8,883.0	179,103.0	357.0	447.0	188,790.0	1,589,271.0	0.0	1,547,626.0	3,325,687
Mercury	6	75.0	20.0	0.0	0.0	95.0	53.0	0.0	70.0	218
Mercury Cmpds.	15	1,584.0	8,867.0	0.0	3.0	10,454.0	419.0	0.0	0.0	10,873
Polychlorinated Biphneyls (PCB's)	1	3.0	18,458.0	0.0	0.0	18,461.0	0.0	0.0	0.0	18,461
Polycyclic Aromatic Cmpds.	23	3,450.0	256.0	0.0	50.0	3,756.0	165,445.0	40,703.0	214,644.0	424,548
Tetrabromobisphenol A	1	48.0	0.0	0.0	0.0	48.0	0.0	0.0	0.0	48
Trifluralin	1	1.0	4,922.0	0.0	0.0	4,923.0	0.0	0.0	0.0	4,923
Totals		24,002.0	248,132.0	357.0	528.0	273,019.0	1,931,939.0	40,729.0	2,541,250.0	4,786,961

or lead compounds contained in these alloys are reported, the 25,000 lb. threshold for produce and manufacture and the 10,000 lb. threshold for otherwise use remain in effect.

Oklahoma companies reported eleven Persistent Bioaccumulative Toxic chemicals for 2003. (Table L) Approximately one third of TRI facilities in the State reported at least one Persistent, Bioaccumulative and Toxic chemical for a total of 109 facilities. Despite the frequency of PBT's reported, these chemicals nominally effect TRI data for the State. Less than one one-thousandth of one percent or 0.001% of all TRI releases and only 3.2 percent of total production related wastes reported in Oklahoma for 2003 were from PBTs.

Lead and lead compounds accounted for 85.4 percent of all PBT chemical releases reported for 2003. (Figure 32) This was the third year that the 100-pound threshold applied for both lead and lead compounds. While the reported numbers for releases of both increased with the implementation of the 2001 Final Rule, this does not indicate greater quantities of these chemicals in the environment but rather reflects an improvement in the reporting of these chemicals. It is important to note that those facilities reporting the greatest usage and waste management for lead and compounds use primarily lead containing alloys and therefore will continue to report under the higher thresholds.

Seventy-two Oklahoma facilities reported lead or lead compounds releases for 2003. The Armed Forces followed by the production of steel wire, nails and spikes remain the major sources of **elemental lead** releases, (Figure 33). Other industrial sectors using lead reported decreased releases, including SIC 3341, Secondary Smelting of Nonferrous Metals. Thirty-six industrial sectors reported usage of lead above the reporting threshold in 2003.

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Figure 32

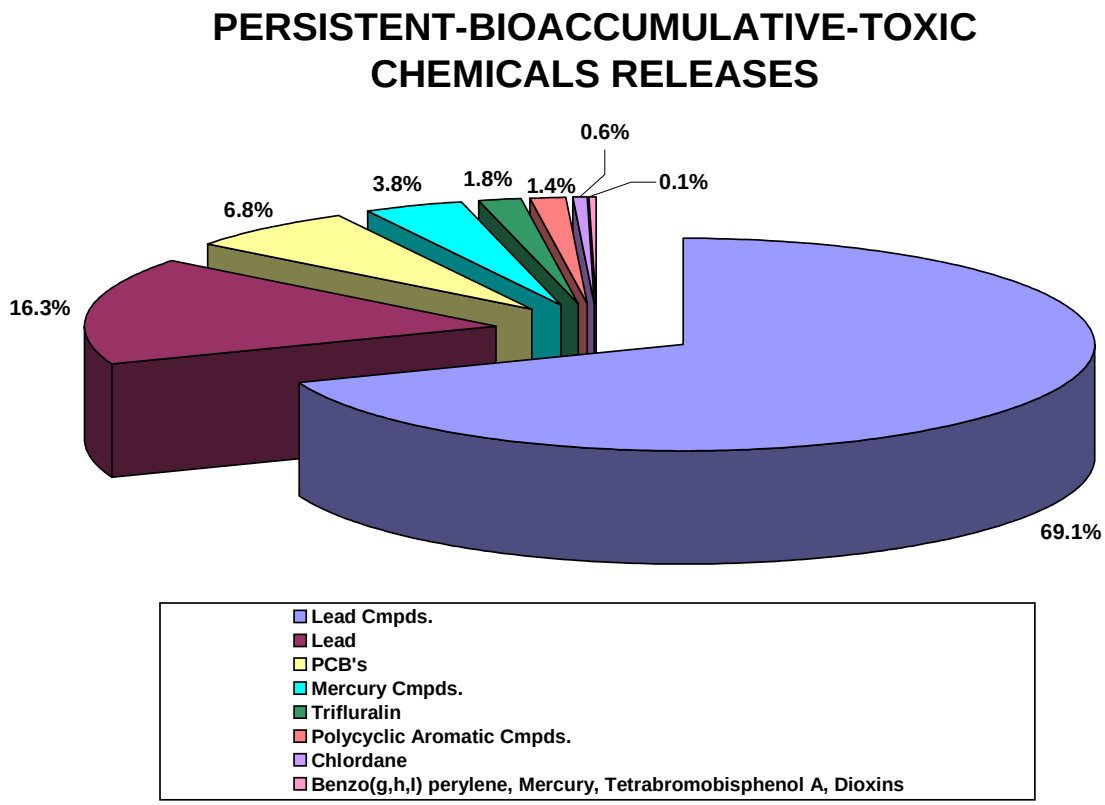
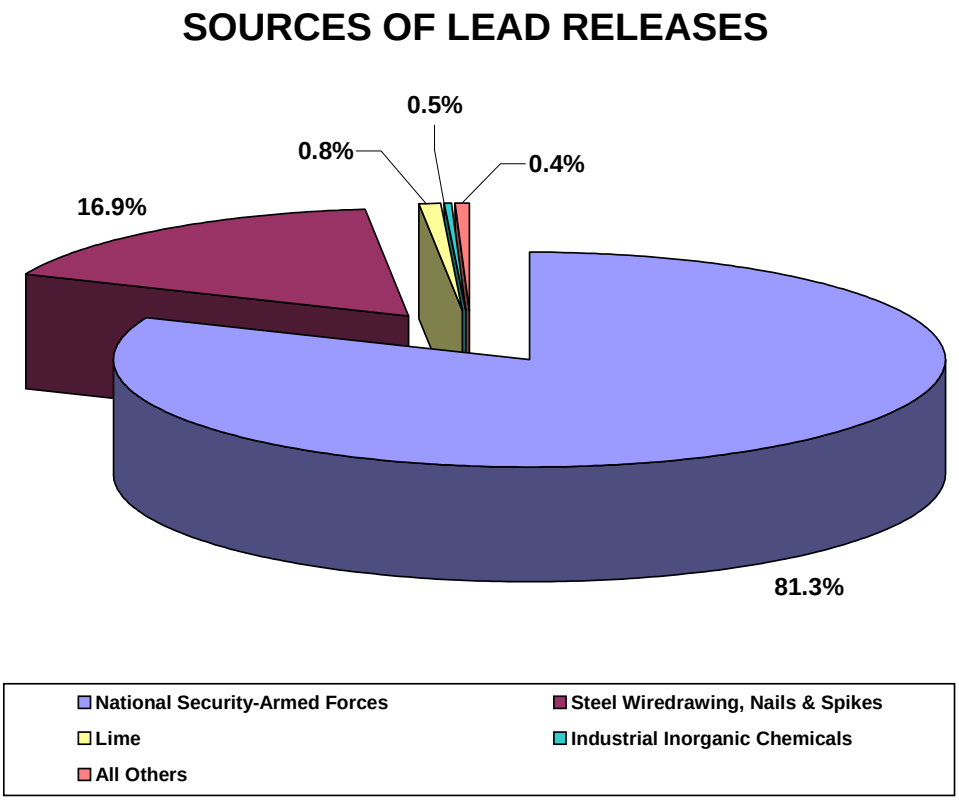


Figure 33



Total releases of **lead compounds** increased sharply from 2002 to 2003 due chiefly from a threefold increase in quantities reported by the Armed Services. However, despite the increase in total releases, eighty percent of these 'releases' were permitted land disposals at highly regulated RCRA Subtitle C hazardous waste facilities. (Figure 34) Releases to these sites have extremely minimal impact on the environment or human health. Coal fired electrical utilities were the sources of 7.7 percent of all lead compounds releases.

Mercury compounds are trace constituents of coal and crude oil, and consequently coal-fired utilities and petroleum refining release these chemicals. Trace quantities of naturally occurring mercury in native rock also accounts for the production of mercury compounds in hydraulic cement kilns. Over 84 per cent of all mercury compounds released were permitted land disposals into highly regulated RCRA Subtitle C landfills. (Figure 35) Lime kilns were the major source of **elemental mercury** releases, (Figure 36), with bulk chemical distributors, paper mills and petroleum refining making up the balance. While the hazards of mercury and compounds are well documented, it is important to keep the scale in perspective. For 2003, only 95 pounds of mercury were reported released throughout the entire State with combined releases of mercury and mercury compounds only about forty-two thousandths of one percent (.042%) of the total releases reported in Oklahoma for 2003.

Polyaromatic compounds (PACs), also known as polynuclear aromatics (PNAs) or polycyclic aromatic hydrocarbons (PAHs) describes a group of related chemicals that generally occur as complex mixtures rather than as any individual compound. These chemicals are byproducts of incomplete combustion of fossil fuels or incineration of organic materials such as wood or garbage. Polyaromatics are natural components of crude oil and are produced during petroleum refining. (Figure 37) As major constituents of carbon black, tire manufacturing also is a significant source of PAC releases. While

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Figure 34

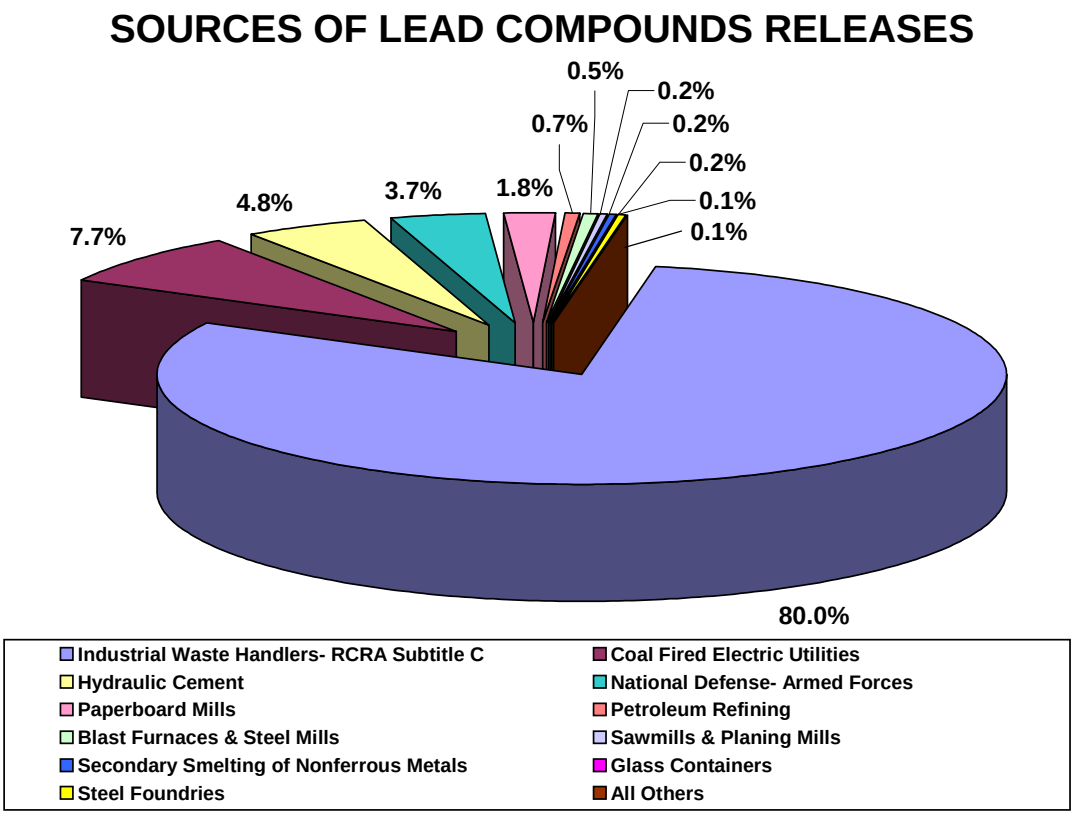


Figure 35

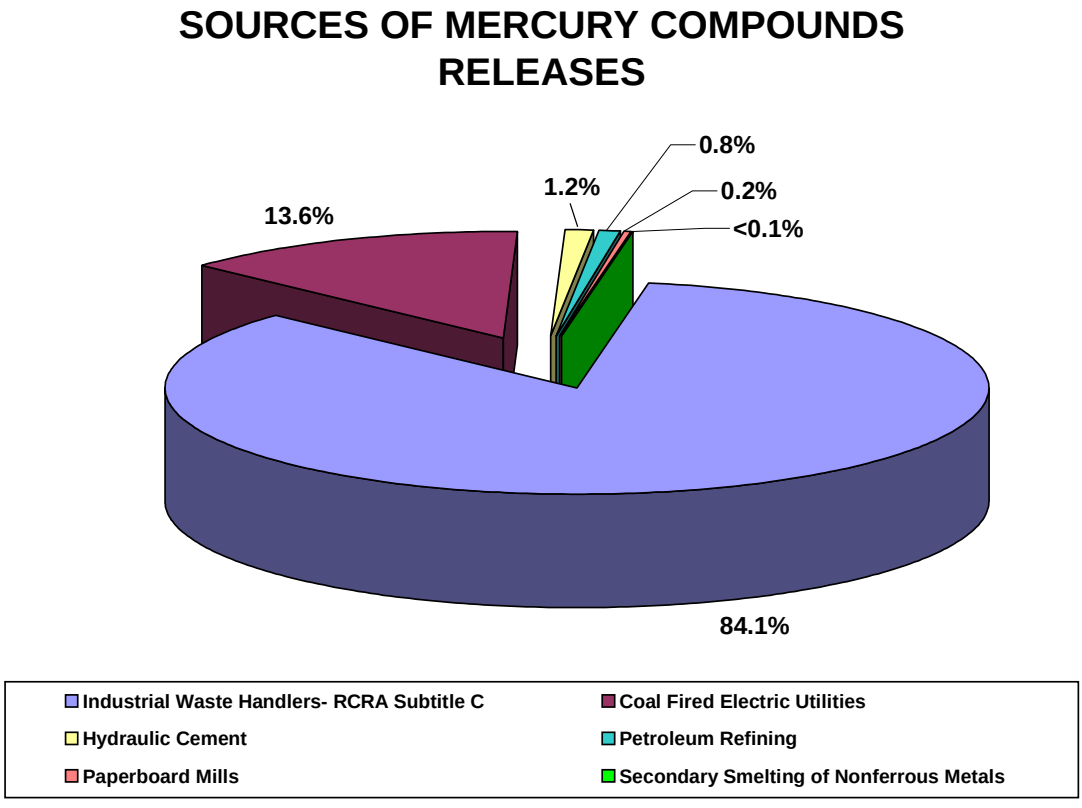


Figure 36

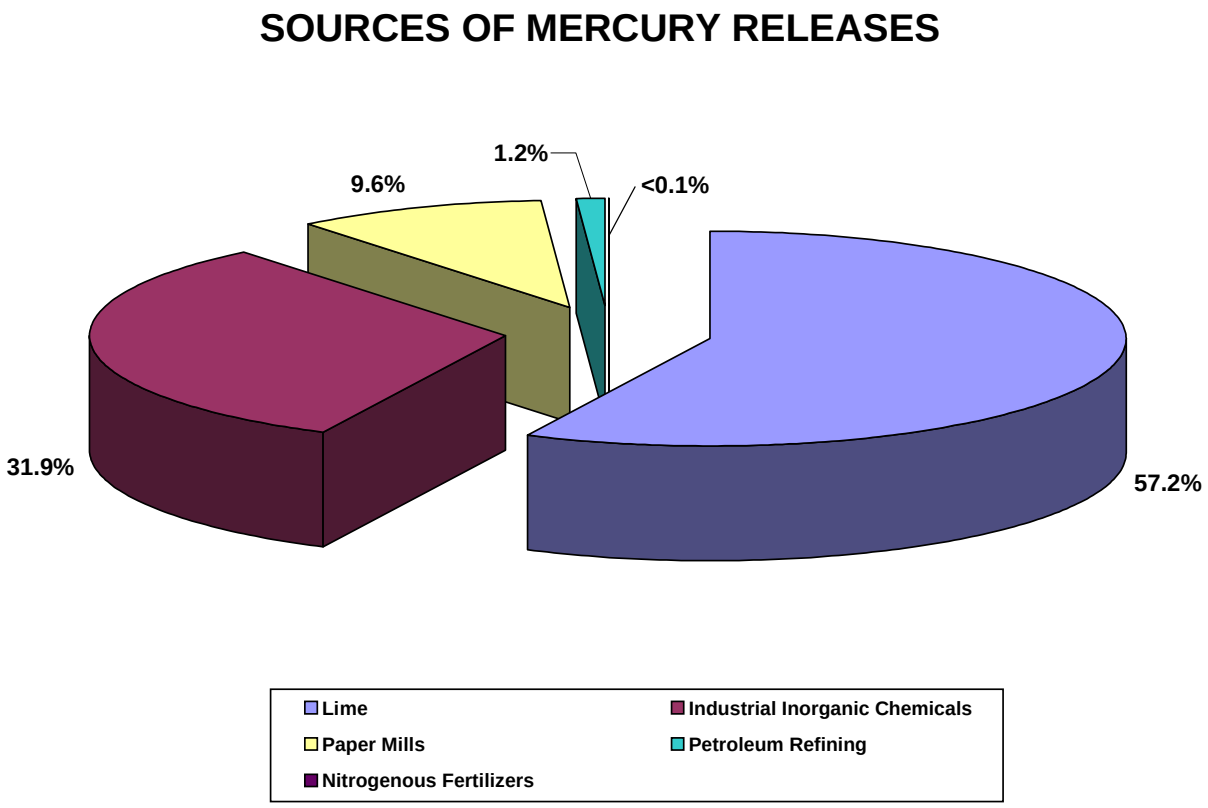
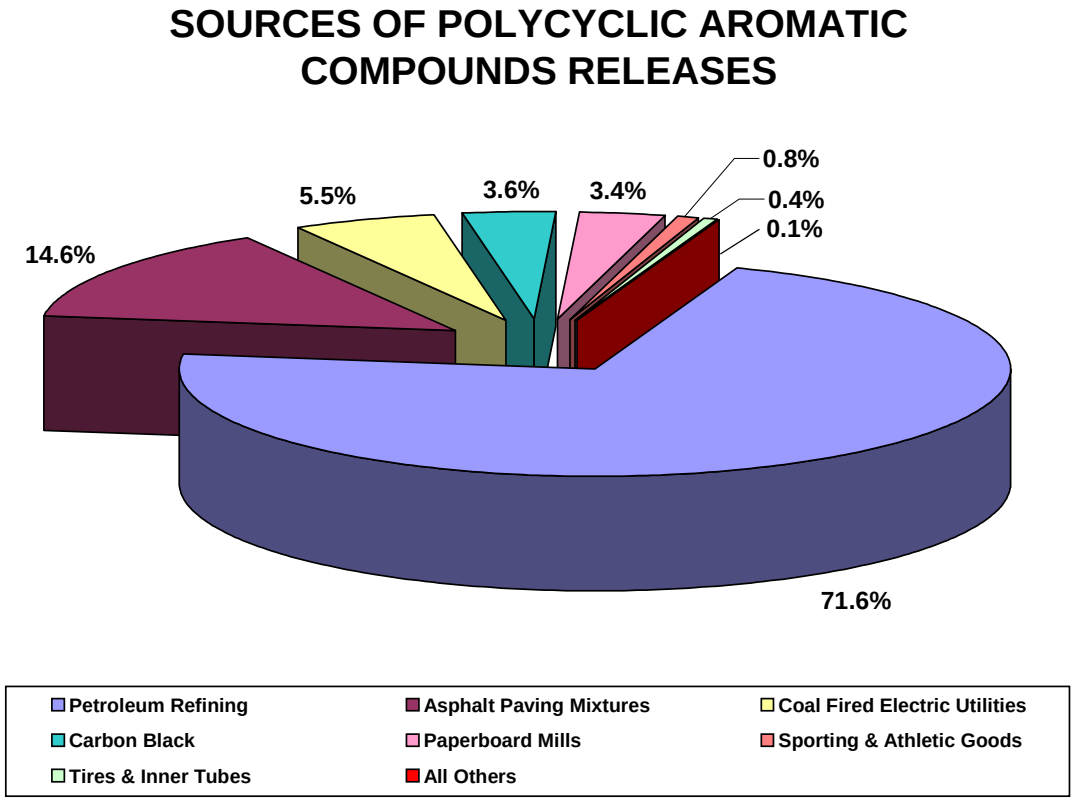


Figure 37



benzo(ghi)perylene is a polyaromatic compound, it is the only one of these chemicals listed separately as a PBT. There are no commercial uses of benzo(ghi)perylene specifically although like other PACs it is produced by incomplete combustion or burning. As would be expected, sources of benzo(ghi)perylene releases are similar to those for polyaromatics in general. (Figure 38)

Dioxin and dioxin like chemicals refers to a group of chlorinated aromatic compounds containing the dioxin linkage, that is, a double substitution of oxygen in an aromatic ring. These chemicals once were used as defoliants; however, in the past 20 years the only dioxins manufactured for commercial use in the United States are extremely small quantities for research purposes. Dioxins are the only TRI chemicals reported in grams with a reporting threshold of 0.1 gram. Releases of dioxins in 2003 totaled only 24 grams, or 0.053 pounds. Total production related wastes for dioxins equaled 72 grams or 0.159 pounds for the entire state, a 2.7 percent decrease from the previous year. The most commonly known dioxin, tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) is highly toxic and classified as a known carcinogen; however, as with most families of chemicals, there is a wide variability in toxicity between 2,3,7,8-TCDD and other congeners. TRI reporting for dioxin and dioxin-like compounds requires that the distribution between seventeen of the most chlorinated dioxin compounds be reported as well. Therefore, no assumptions should be made concerning the toxicity of reported dioxins without analyzing the distribution of compounds. Dioxins are incidentally produced as byproducts from combustion of fossil fuels or incineration of organic materials, formed as paper pulp is bleached, or appear as impurities in chlorinated pesticides. (Figure 39)

Tetrabromobisphenol A is used as a reactive flame retardant in epoxy, vinyl esters and polycarbonate resins

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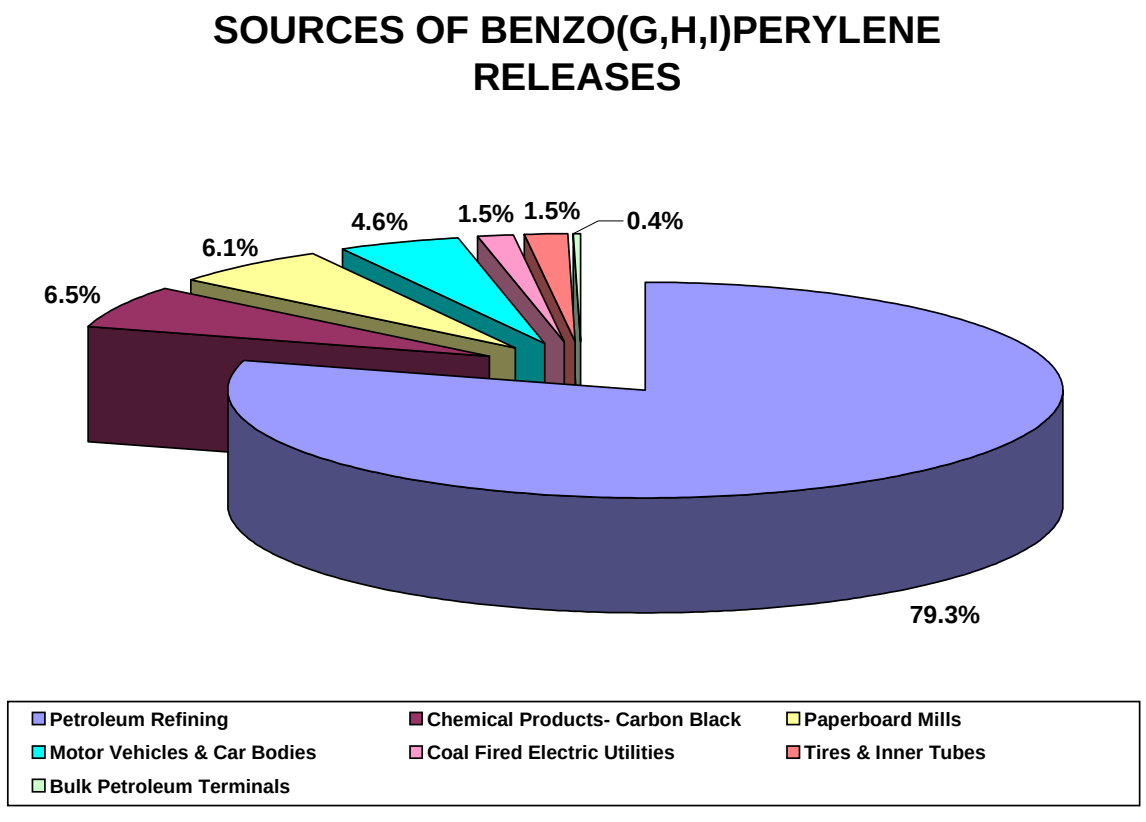
Figure 38

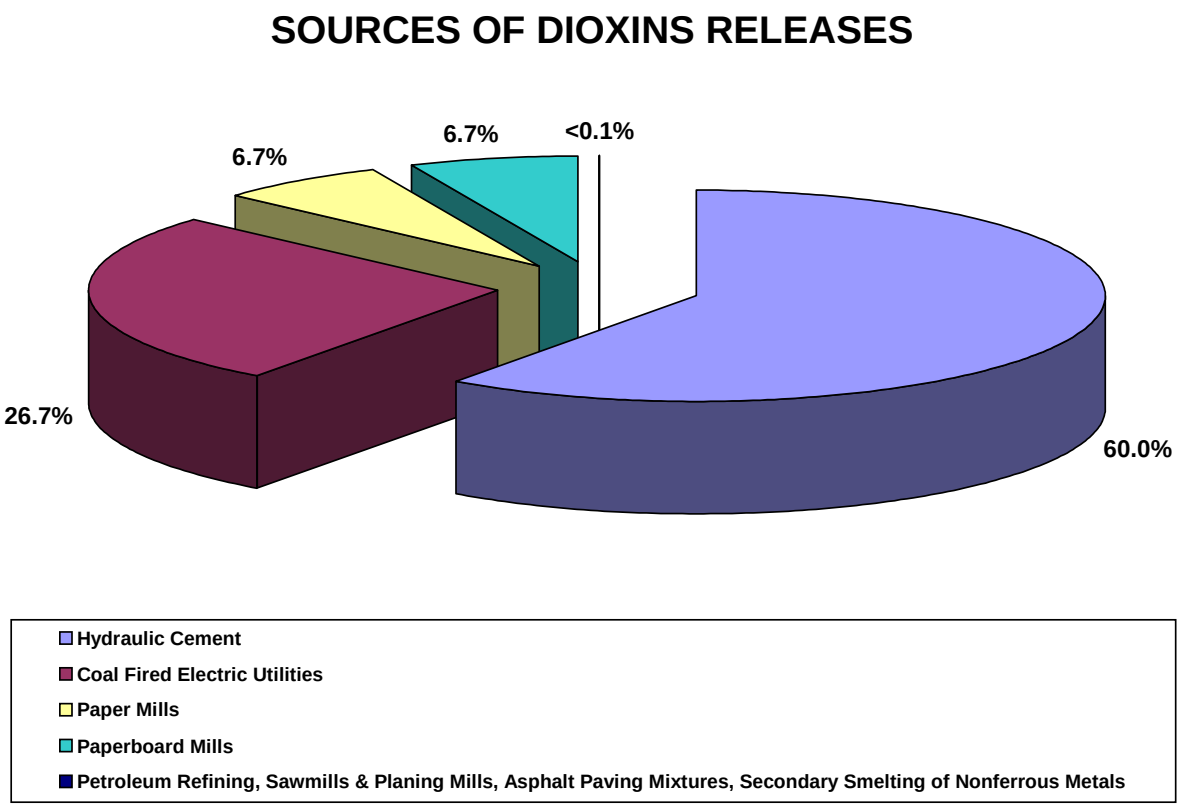


and in polymers, polystyrenes, phenolic resins, adhesives, paper, and textiles. It was reported by only one facility in the State for 2003 with total releases of only 48 pounds.

All reported releases in 2003 of **polychlorinated biphenyls** (PCB's), **toxaphene and trifluralin** were permitted disposals to a RCRA Subtitle C landfill, that is, these chemicals were managed by an Oklahoma TSD rather than generated or used by an in-state industry.

Modifications and additions to the list of PBT chemicals should be expected. For example, EPA deferred a decision in the final rule on dicofol, a pesticide, until the agency further evaluates data on its persistence. Cobalt and cobalt compounds were considered for the initial PBT list as well, however, EPA deferred the decision pending more investigation into the bioaccumulative properties of these chemicals. Another pesticide, mirex, already considered a PBT for Pollution Prevention activities could eventually be listed as such for TRI reporting, and additionally benzo(a)pyrene, another PAC, could be separated out for discreet reporting. As with previous expansions in TRI reporting, future changes in PBT reporting will make the data more representative and thereby better inform the public of chemical risks in the community.

Figure 39



Glossary

Acid aerosols- Mists, vapors, gas, fog and other airborne forms of any particle size of a chemical; current TRI usage refers to aerosols of sulfuric acid or hydrochloric acid.

Bioaccumulation- The process by which organisms may accumulate chemical substances in their bodies. The term refers to both uptakes of chemicals from water and from ingested foods and sediment residues.

CAS- Chemical Abstract Service; numerical designations for chemicals generated under the CAS system are discrete identifiers.

de minimis- An exemption to TRI reporting whereby any chemical or chemical group that comprises less than 1% of a mixture need not be reported even if the total quantity of the chemical exceeds the threshold quantity. If Occupational Safety and Health Administration (OSHA) lists the chemical or chemical group as a carcinogen, the de minimis concentration drops to 0.1%.

DEQ- Oklahoma Department of Environmental Quality

Extremely Hazardous Substance (EHS)- any of over 250 chemicals listed as such under by the Hazardous Chemical Inventory (Tier II) under Section 302 of SARA Title III

EPA- the federal Environmental Protection Agency

EPCRA- Emergency Planning and Community Right to Know (see **SARA Title III**)

Energy Recovery- Recovery of useful energy from waste mainly through combustion of chemical waste.

Facility- Defined for the purposes of TRI reporting as all buildings, equipment, structures and other stationary items which are located on a single site or on contiguous or adjacent sites and which are owned or operated by the same entity.

Form A- The abbreviated version of the Toxic Chemical Release Inventory Form for TRI reporting, used when total releases of chemical or chemical group during a calendar year do not exceed 500 pounds and the total amount manufactured, processed or otherwise used does not exceed one million pounds. Form A is actually a certification statement attesting to these conditions. More than one chemical or group can be reported on one Form A.

Form R- The Toxic Chemical Release Inventory Form standard for TRI reporting. Facility information and activities relating to a specific chemical are stated on a Form R along with releases and the media into which the chemical is released, transfers and treatment of wastes, and sources reductions and reuse.

Fugitive (Non-Point) Air Releases- Emissions to the air that are not conveyed through stacks, vents, ducts, pipes or other confined air streams. Examples include equipment leaks from valves, pump seals, flanges, compressors, sampling connections, open-ended lines and evaporative losses from surface impoundments and spills.

LEPC- Local Emergency Planning Committee; LEPC's are mandated under SARA Title III.

Manufacture- To produce, prepare, import or compound a toxic chemical.

Off-Site Locations- Locations outside the boundaries of a facility to which wastes are transported for treatment, energy recovery, recycling or disposal.

Otherwise Use- Any use of a toxic chemical at a facility which is not covered by the definition of manufacture or process. This includes any activities in which a listed toxic chemical does not become intentionally incorporated into the final product for distribution in commerce. Examples of otherwise use include but are not limited to degreasers, solvents in paints that are applied to a product, chemicals used in water treatment and refrigerants or coolants.

PAH- Polynuclear Aromatic Hydrocarbons, also known as PNA's; a group of chemicals characterized by multiple, joined aromatic rings.

PBT- for TRI reporting, those chemicals designated by the EPA to be Persistent, Bioaccumulative and Toxic

PCB- Polychlorinated Biphenyls, individually identified by Arachlor series; the higher the Arachlor series number the greater the degree of chlorination. Once used in electrical transformer oil.

Persistence- As related to chemicals in the environment, the length of time a chemical can exist in the environment before being destroyed (i.e., transformed) by natural processes.

Publicly Owned Treatment Works (POTW)- A wastewater treatment facility that is owned by a unit of the government.

Process- Refers to the preparation of a listed toxic chemical after its manufacture for distribution in commerce. Processing is usually the intentional incorporation of a toxic chemical into a product. It includes but is not limited to making mixtures, repackaging or using a toxic chemical as a feedstock, raw material or starting material for making another chemical.

RCRA- Resource Conservation and Recovery Act

Recycle- The process of capturing a useful product from a waste stream. Solvent recovery, metals recovery and acid regeneration are examples of recycling.

Releases- Refers to on-site discharges of TRI listed chemicals to the air, water, land or disposal in underground injection wells. Includes permitted, accidental and non-permitted discharges.

Releases to Air- Sum of Fugitive (Non-Point) Air Releases plus Stack (Point Source) Air Releases.

Releases to Land- Refers to land filling, surface impoundments, land treatment/application farming or any other release of a toxic chemical to land within the boundaries of a facility.

Releases to Water- Refers to discharging of chemicals to surface waters, ie, rivers, lakes, ponds and streams.

SARA Title III- The section of the Superfund Amendments and Reauthorization Act (SARA) which mandates Emergency Planning and Community Right to Know.

Stack (Point Source) Air Releases- Emissions to the air that are conveyed through stacks, vents, ducts, pipes or other confined air streams. Examples include storage tank emissions from air pollution control equipment.

Standard Industrial Classification Code (SIC Code)- A four digit number code designated by the Federal Office of Management and Budget to describe the type of activity(s) at a facility. The first two numbers of the code define a major business sector, and the last two numbers define a facility's specialty within the major sector.

Threshold Planning Quantity- quantity of a stored EHS requiring emergency planning also used as reporting threshold for Tier II

Tier II- the form for reporting chemical storage under Section 312 of SARA Title III and synominous with the program, also known as the Hazardous Chemical Inventory

Toxic- A substance that produces or causes a systemic damage to an organism, for example acute or chronic neurological, respiratory or reproductive disorders, also carcinogenic or teratogenic effects.

TRI- Toxics Release Inventory; Section 313 of SARA Title III

Transfers- Refers to TRI listed chemicals sent off-site for energy recovery, recycling, treatment or disposal. Reported as transfers to either Publicly Owned Treatment Works or other off-site transfers (non-POTW) such as incinerators, landfills, other treatment, recycling, energy recovery or disposal facilities not part of the reporting facility.

TSD- Treatment, Storage and Disposal facility for industrial wastes.