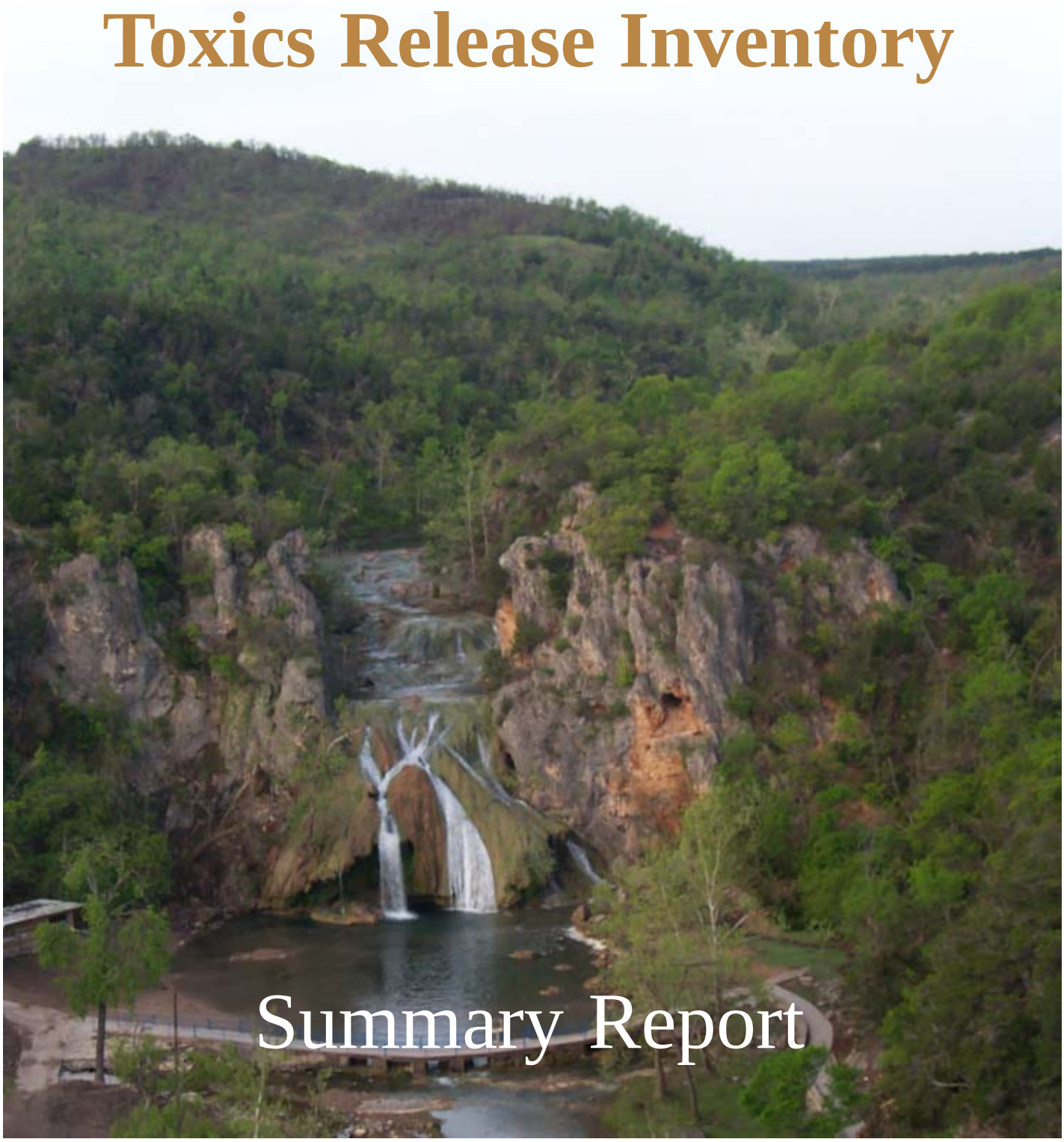
2001 Oklahoma TRI

Toxics Release Inventory



Summary Report

Contents

Prepared by Jami M. Murphy
Customer Services Division
SARA Title III Program

This publication is issued by the Oklahoma Department of Environmental Quality as authorized by Steven A. Thompson. Fifty copies have been produced at the cost of ?. Copies have been deposited with the Publications Clearinghouse of the Oklahoma Department of Libraries. Printed on recycled content paper. 11/25/03- 1/22/04. \\Filemaker1\web\CMullins\TRIREP~1\TRIReport2001.pmd.

Executive Summary

Environmental releases of toxic wastes continue to decrease in Oklahoma according to figures released by the Department of Environmental Quality (DEQ). The numbers are based on Toxics Release Inventory (TRI) reports for the year 2001, the most current reporting year. 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. Information from TRI reflects the legal emissions, transfers, and treatment of over 600 toxic chemicals used in the manufacture or processing of a wide variety of products. Not all industries or facilities are required to report under TRI. Covered industries 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 2001, DEQ received reports from 354 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 2001.

Oklahoma companies reported 25.5 million pounds released in 2001, a decrease of 3.3 million pounds or over 11 percent from 2000. Significant reductions in emissions to deep underground injection wells and a continued decline in releases to surface waters and air account for the majority of the decrease. The numbers also demonstrate a 39 per cent reduction in releases of toxic chemicals in the State since 1991. Re-use, primarily recycling, increased slightly in 2001 to 69.2 million pounds. In addition, 42 million pounds of chemicals were destroyed by treatment, and 4.2 million pounds of chemicals were transferred off-site for proper disposal.

The total of the numbers for 2001 sets total production related wastes at 140.9 million pounds, a drop of 1.7 million pounds from the previous year. Since 1994, the first year this figure was determined, total production related wastes generated in the State decreased by over 50 percent or 143 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 last year, 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. Releases decreased in 2001 for four of twelve PBT chemicals reported in Oklahoma. The total of all PBT releases was under half a million pounds or less than 2 per cent of total releases Statewide. The number of reports processed by DEQ for 2000 increased by about 20 percent due to the implementation of the PBT rule and by another 12 percent when the lower threshold for lead and lead containing chemicals went into effect for 2001.

Production related wastes and releases of toxic chemicals 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 fourteen years and this is the fourth 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. In 2002, DEQ received and processed 1,218 reports from 354 facilities for the 2001-reporting year. 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 of environmental programs.

Background

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 32,115 Tier II forms, 1,069 of those describing 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/saraiii.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. 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 643 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.

Table A. Standard Industrial Classifications Subject to Section 313

Industrial Sector	SIC code
Manufacturing	2000-3999
Metal mining	10 (except 1011, 1081, and 1094)
Coal Mining	12 (except 1241)
Electical utilities	4911, 4951, and limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce
Treatment, Storage, and Disposal facilities	4953, limited to RCRA Subtitle C permitted or interim status facilities
Solvent recovery services	7389, limited to facilities primarily engaged in solvent recovery services on a contract or fee basis
Chemical distributors	5169
Petroleum bulk terminals	5171
National Defense	9711

Table A

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

TRI Reporting Requirements

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

Limitations of TRI DataThe 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 techniques. 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 2001”) 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

Limitations of TRI Data

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.

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.

2001 TRI Overview

Table B

COUNTY	AIR	LAND	INJECTION	WATER	ONE TIME	TOT. ON-SITE RELEASE	TRANSFER DISPOSAL	TOTAL REUSE				
Adair	38,063	0	0	0	0	38,063	11,549	11,549	0	0	0	61,161
Alfalfa	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atoka	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beaver	14,771	0	0	0	0	14,771	1,755	122,926	17,478	0	17,478	156,930
Beckham	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blaine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bryan	61,779	0	0	0	0	61,779	NA	58,563	NA	NA	NA	NA
Caddo	0	0	0	0	0	0	0	0	0	0	0	0
Canadian	80,896	0	0	0	0	80,896	NA	840,679	405	0	405	921,980
Carter	375,993	2,774	0	118,437	3,820	501,024	550,823	8,850,858	6,082,932	7,340	6,090,272	10,934,082
Cherokee	258	0	0	0	0	258	0	0	0	0	0	258
Choctaw	214,351	6,285	0	0	0	220,636	0	0	0	0	0	220,636
Cimarron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cleveland	22,215	0	0	250	0	22,465	586,545	255,467	0	250	250	864,977
Coal	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Comanche	758	69,879	0	121	0	70,758	12	230,547	38,508	7,208	45,716	354,241
Cotton	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Craig	0	0	0	0	0	0	500	4,901,151	0	0	0	4,901,651
Creek	10,992	6,247	0	0	0	17,239	264,991	547,470	124,260	39,750	164,010	1,033,460
Custer	97,003	0	0	0	0	97,003	0	56,250	572,062	0	572,062	725,315
Delaware	0	0	0	0	0	0	NA	0	18,840	1,500	20,340	21,840
Dewey	0	0	0	0	0	0	0	0	0	0	0	0
Ellis	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Garfield	2,288,219	250	0	5,510	0	2,293,979	0	2,289	1,261,780	578,180	1,839,960	4,714,408
Garvin	107,863	1,250	0	33,029	0	142,142	2	230,064	279,060	0	279,060	651,268
Grady	73,787	0	0	0	0	73,787	55,368	114,895	90,000	51,202	141,202	436,454
Grant	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Greer	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Harmon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Harper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Haskell	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hughes	0	0	0	0	0	0	0	0	0	0	0	0
Jackson	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jefferson	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Johnston	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kay	663,329	40,795	0	45,946	1	750,071	158,420	402,138	1,889,738	1,196	1,890,934	3,201,563
Kingfisher	1,368	0	0	0	0	1,368	O	0	0	0	0	1,368

Kiowa	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Latimer	0	0	0	0	0	0	0	0	0	0	0	0
LeFlore	176,693	0	0	0	0	176,693	395,879	0	9,968	9,968	19,936	602,476
Lincoln	6,832	16,200	0	0	0	23,032	0	0	0	0	0	23,032
Logan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Love	22,329	0	0	0	0	22,329	0	0	0	0	0	0
Major	456	2,390,534	0	0	0	2,390,990	53,422	0	193,566	0	193,566	2,637,978
Marshall	101,329	10	0	0	0	101,339	5,777	10,988	0	0	0	118,104
Mayes	211,743	1,677,748	0	1,867,842	0	3,757,333	6,266	370,591	20,271,841	0	20,271,841	24,406,031
McClain	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
McCurtain	4,100,424	28,789	0	73,802	0	4,203,015	8,531	16	5,335,942	255	5,336,197	9,547,998
McIntosh	27,287	0	0	11	0	27,298	7	2,329	0	0	0	29,634
Murray	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Muskogee	869,816	103,739	0	25,450	0	999,005	169,626	365,437	780,634	5	780,639	2,314,712
Noble	237,828	184,200	0	674	0	422,702	33,220	0	300,000	0	300,000	755,922
Nowata	750	0	0	0	150	900	0	0	0	0	0	900
Ofuskee	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oklahoma	1,310,616	2,812	0	14	640	1,314,082	57,408	1,504,655	538,530	125,782	664,312	4,094,769
Okmulgee	263	0	0	0	0	263	0	0	19,856	19,856	39,712	39,975
Osage	930,337	0	1,000	0	146,600	1,077,937	0	34,440,450	50,142	0	50,142	35,568,529
Ottawa	100,578	0	0	0	0	100,578	0	33,700	58,401	0	58,401	192,679
Pawnee	1	87,766	0	894	0	88,661	0	2,951	0	0	0	91,612
Payne	160,530	79,746	0	0	0	240,276	74,610	961,170	41,989	11	42,000	1,318,067
Pittsburg	34,504	110,721	0	0	0	145,225	0	514,660	509,680	0	509,680	1,169,565
Pontotoc	277,824	102,040	0	0	0	379,864	0	270,592	321,640	0	321,640	972,096
Pottawatomie	72,696	175	0	344	12,000	85,215	24,966	340,435	32,800	7,128	39,928	490,190
Pushmataha	0	0	0	0	0	0	5,927	0	5,927	0	5,927	11,854
Roger Mills	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rogers	3,339,699	347,012	0	171,004	7,460	3,865,175	228,666	6,934,674	762,911	81,343	844,254	11,872,769
Seminole	0	0	0	0	0	0	0	102,448	0	0	0	102,448
Sequoyah	78,284	386	0	0	0	78,670	0	0	0	0	0	78,670
Stephens	1,900	0	0	0	0	1,900	0	46,739	0	0	0	48,639
Texas	21,012	0	0	0	0	21,012	0	0	148,016	148,016	296,032	465,060
Tillman	51,500	0	0	0	2,500	54,000	0	0	0	0	0	54,000
Tulsa	616,716	138,964	2,021	6,517	671	764,889	804,133	6,149,551	1,100,320	56,274	1,156,594	9,975,487
Wagoner	295	0	0	5	0	300	0	63,411	0	250	250	64,211
Washington	2,032	79,557	1,807	15	0	83,41	688,598	326,929	10	13	23	1,098,974
Washita	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Woods	21,35	0	0	0	0	21,350	0	0	0	0	0	21,350
Woodward	550,311	25,239	0	41,250	12,000	628,800	1,000	93,000	0	0	0	722,800

2001 TRI Overview

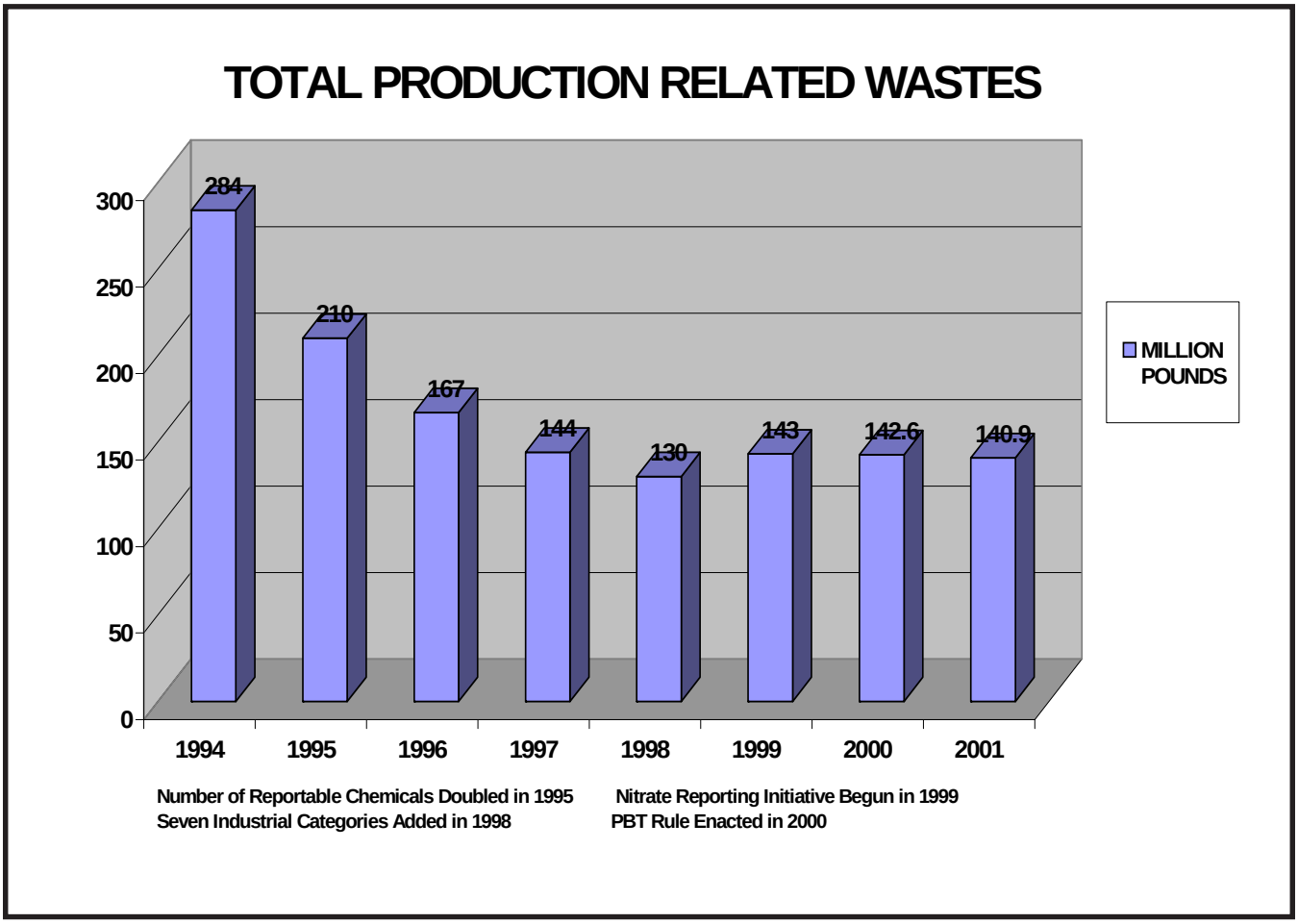


Figure 2

- 69.2 million pounds reused
- 42.0 million pounds treated

(Figure 3)

Total releases were:

- 17.4 million pounds released to air
- 5.5 million pounds released to land or permitted landfills
- 5,000 pounds disposed in underground injection wells
- 2.4 million pounds discharged to surface waters.
- 185,000 pounds of one time releases

(Figure 4)

Releases

Total on-site releases continue to decrease in Oklahoma, according to numbers reported to TRI, (Figure5), down 26 percent in the past ten years.

Total **air releases** are the sum of permitted stack releases and fugitive air releases from facilities covered by Section 313 (Figure 6), and as such can be considered point source or non-point source emissions respectively. Fugitive emissions result largely from the natural volatility of some chemical compounds and encompass any 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.

Total air releases appear to have increased greatly from 1997 to 1998 when industries added for RY 1998, especially coal-fired electricity plants, reported for the first time.

2001 TRI Overview

These utilities, some that utilize coal for start-ups only, account for the majority of electrical plants in the State. However, the figures reflected the increase in the number of facilities reporting rather than an increase in actual air emissions. Yet even with the significant rise in the number and size of facilities beginning with RY 1998, total air releases as reported to TRI decreased 6 million pounds in four years, from 1998 to 2001. (Figure 7) Reported releases decreased over five per cent from 2000 to 2001 alone. The TRI data demonstrate that the goal of cleaner air in Oklahoma is being attained, and also indicates the continued success between DEQ sponsored pollution prevention programs and the industries that participate in them.

Total **on-site releases to land** include surface impoundment, land application, use of permitted landfills or other release to land within the boundaries of a facility. A significant increase in reported numbers occurred for RY 1998 when industrial waste handlers permitted under RCRA Subtitle C were required to report to TRI for the first time. (Figure 8) As a frequently used medium for disposal of nitrate compounds is release to surface impoundments or total retention lagoons, the nitrate reporting initiative of 1999 caused the figure for releases to land to increase again. 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 then may result in "double counting", as off-site transfers for disposal then largely as releases to RCRA Subtitle C landfills. Approximately one million pounds or roughly

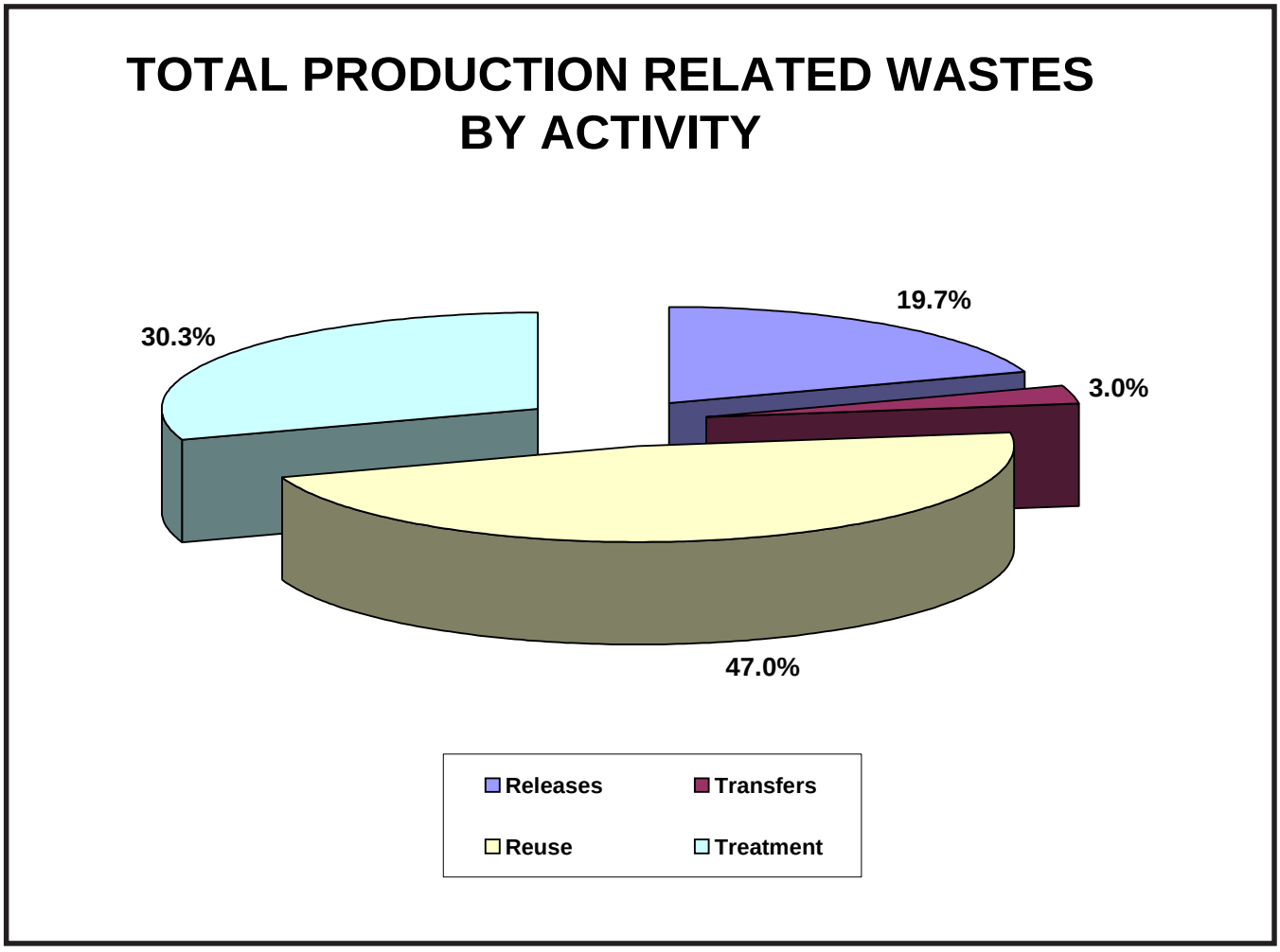


Figure 3

2001 TRI Overview

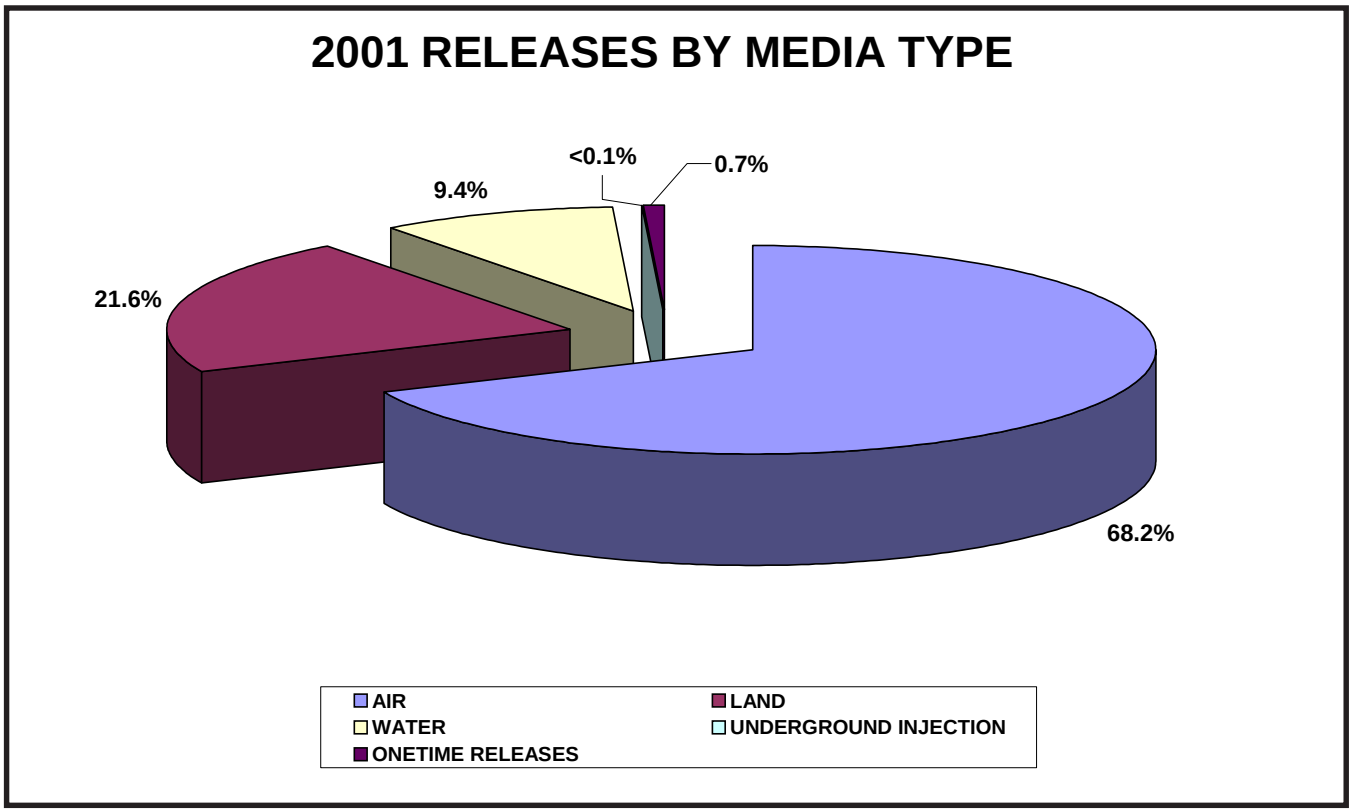


Figure 4

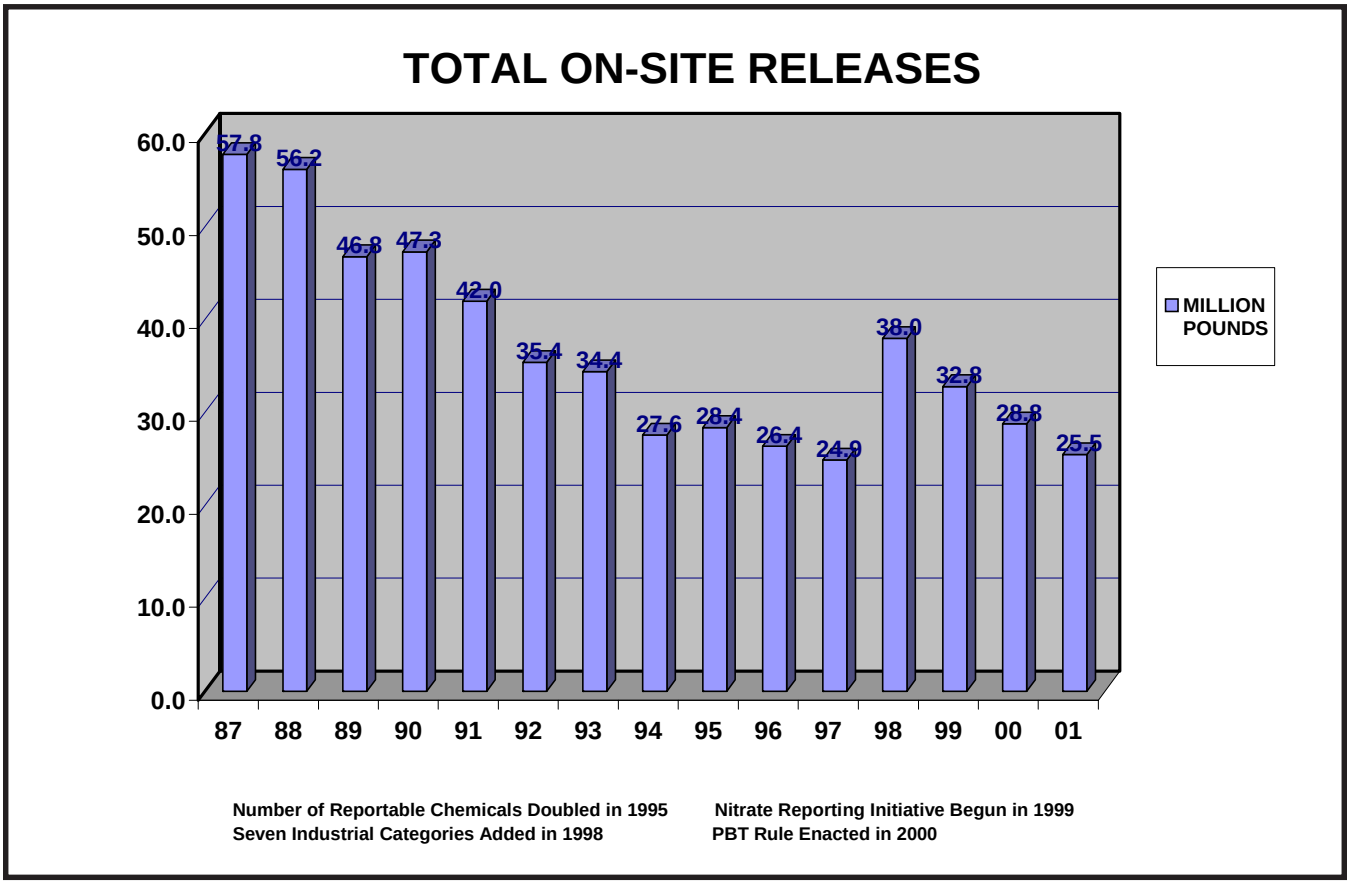


Figure 5

22 per cent of off-site transfers for disposal reported by Oklahoma facilities in 2001 were to Oklahoma TSD's. The inclusion of TSD's in TRI reporting also accounts for the greatest percentage of reported land releases going into on-site RCRA Subtitle C landfills. (Figure 9)

The effect of large facilities on TRI reporting is seen in the numbers for releases to permitted **underground injection wells**. While this releases to this medium also continue to decline, the drastic reduction for RY 2001 is primarily the result of a change in the business of a singe facility. (Figure 10) 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.

Following a dramatic increase in 1999, total **releases to surface waters** continue to decrease, diminishing by over 21 per cent from 1999 to 2001. (Figure 11) 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 releases. The number of facilities utilizing surface water discharges for waste management also continues to decrease.

Transfers

Transfers to off-site facilities for disposal increased slightly in 2001. However, the current

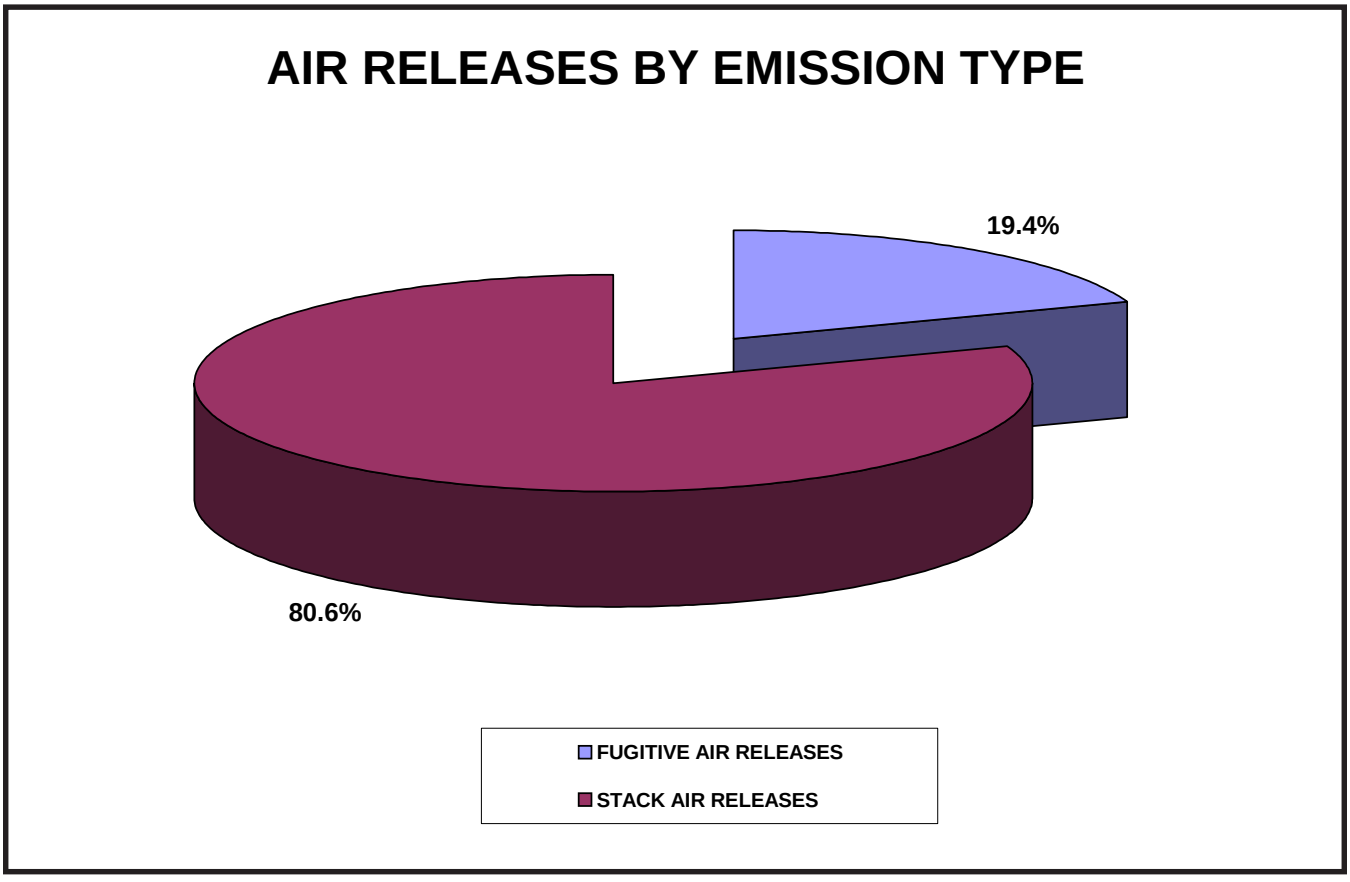


Figure 6

2001 TRI Overview

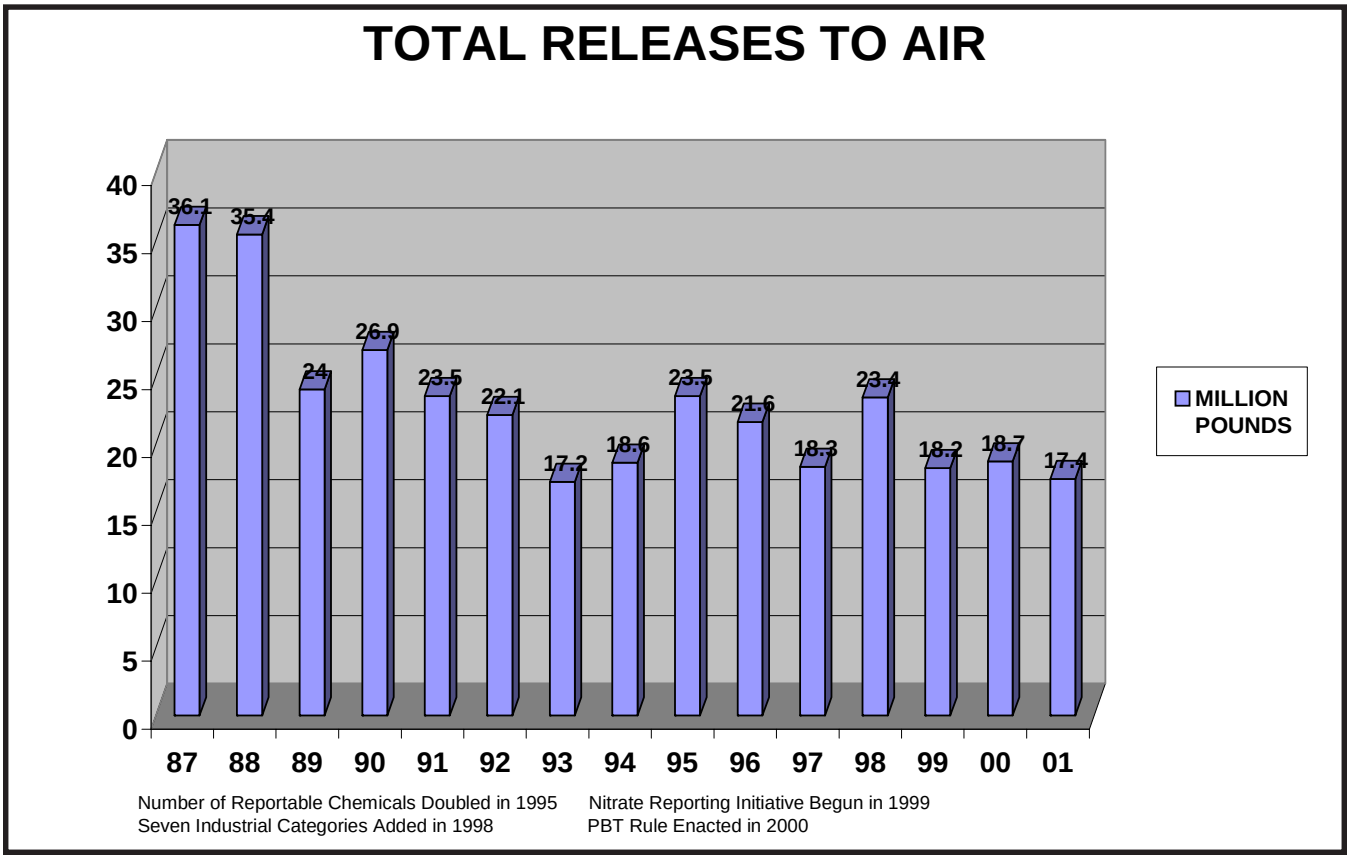


Figure 7

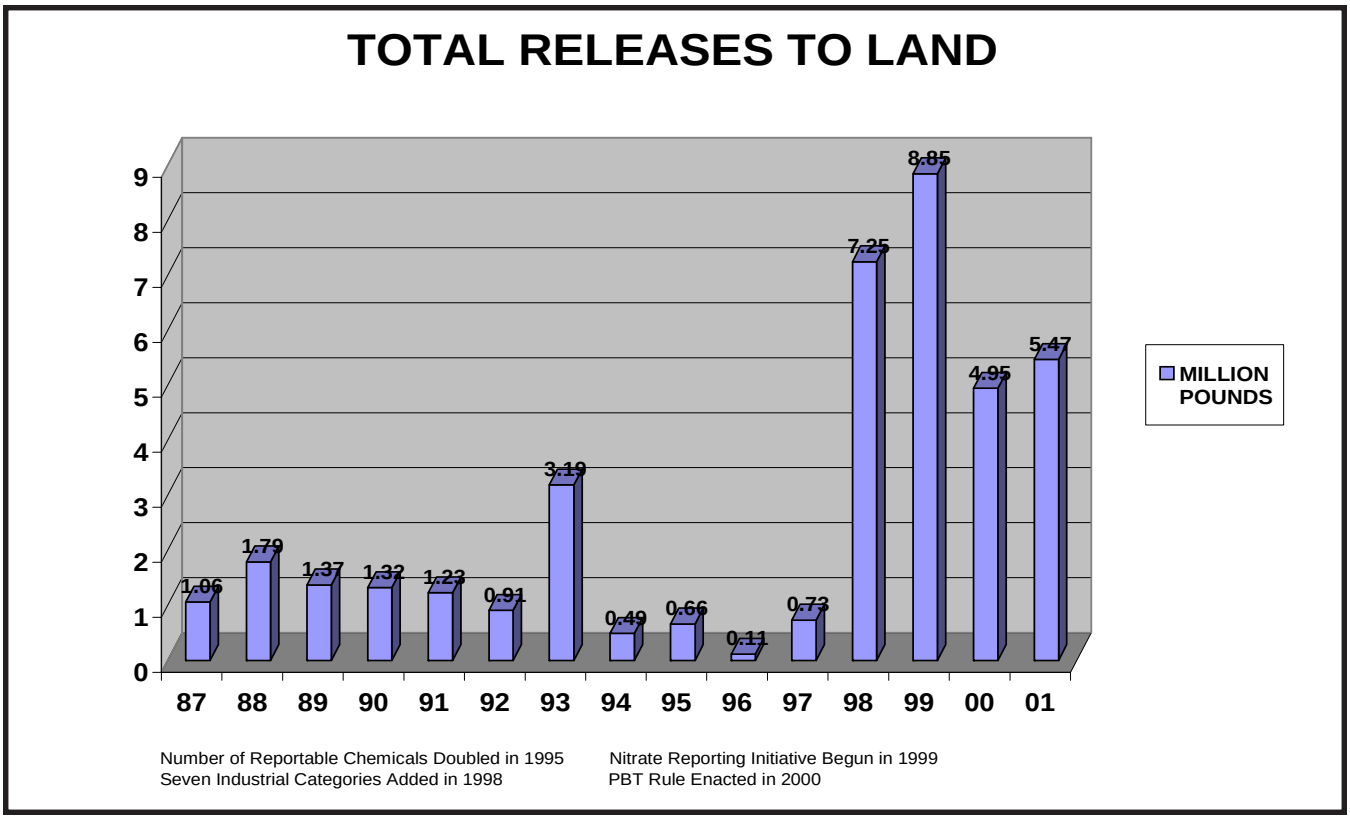


Figure 8

figures are only 27 per cent of those reported a decade ago as the trend toward waste reduction continues even as the TRI program expands. (Figure 12) The majority of off-site transfers for disposal are managed in landfills or surface impoundments. (Figure 13) Releases to Publicly Owned Treatment Works (POTW), which consist of water discharges made into sanitary drains and sewers that then are received and treated by waste water treatment plants, are counted as transfers for treatment rather transfers for disposal. (see *Treatment,* below) Discharges to POTW's of wastewater containing metals and metal compounds are the exception and are counted as releases.

Reuse

Total reuse as defined by TRI is the sum of on- and off-site recycling and energy recovery and increased slightly in 2001. (Figure 14) Total production related wastes and total releases continue to diminish through source reductions and increased reuse programs. on- and off-site recycling continues to increase. (Figures 15, 16) In 2001, 54.9 percent of all chemicals reportable under TRI were managed by recycling, increasing from 49% in 1999. 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 maintain these lists as well. This type of recycling 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 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-

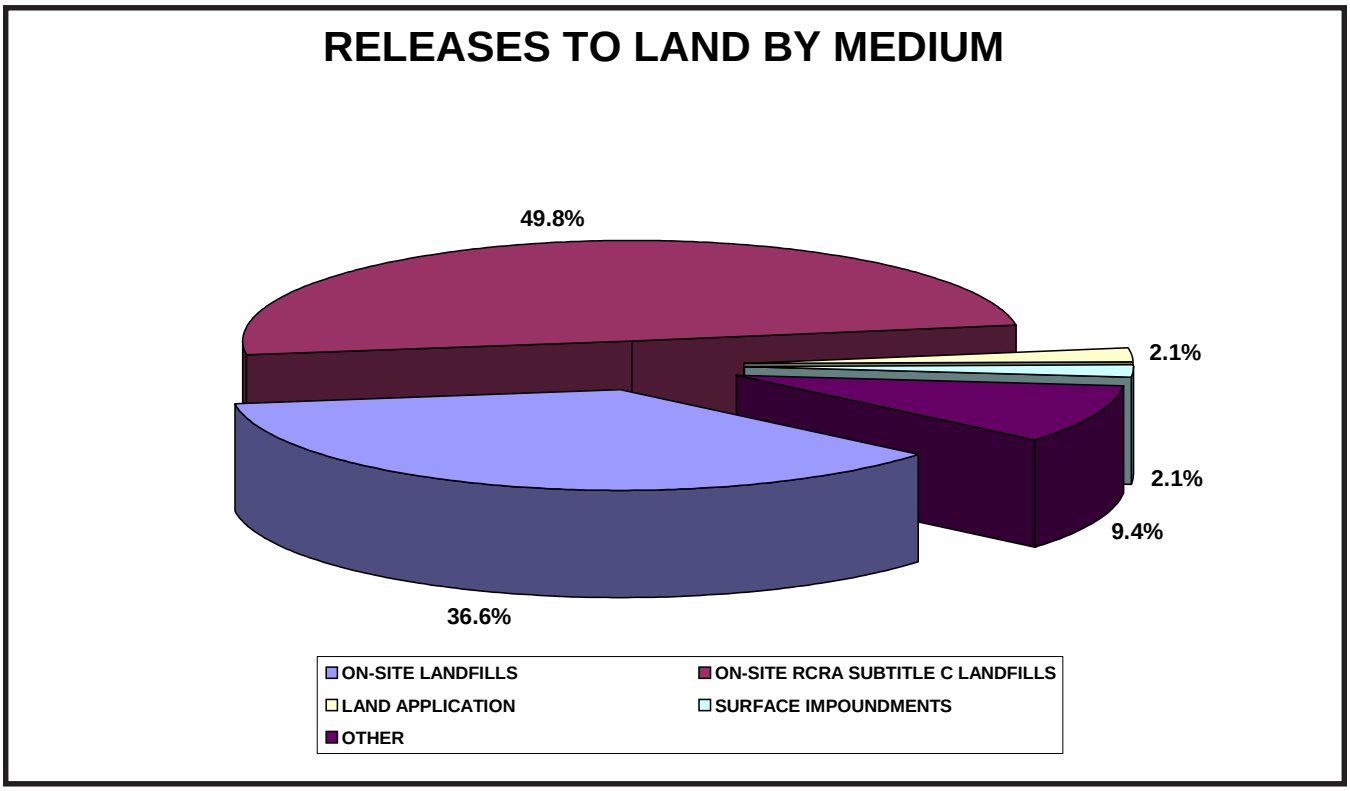


Figure 9

2001 TRI Overview

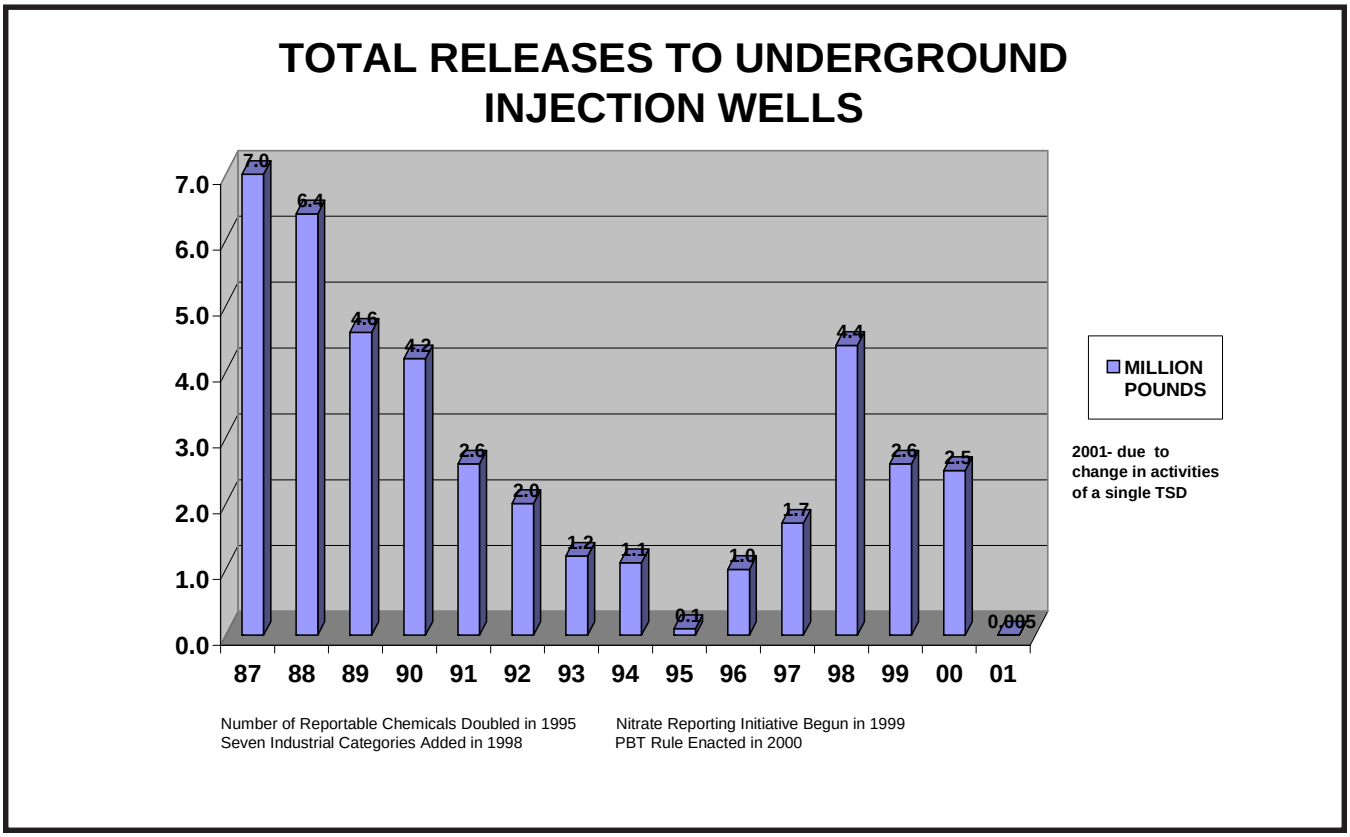


Figure 10

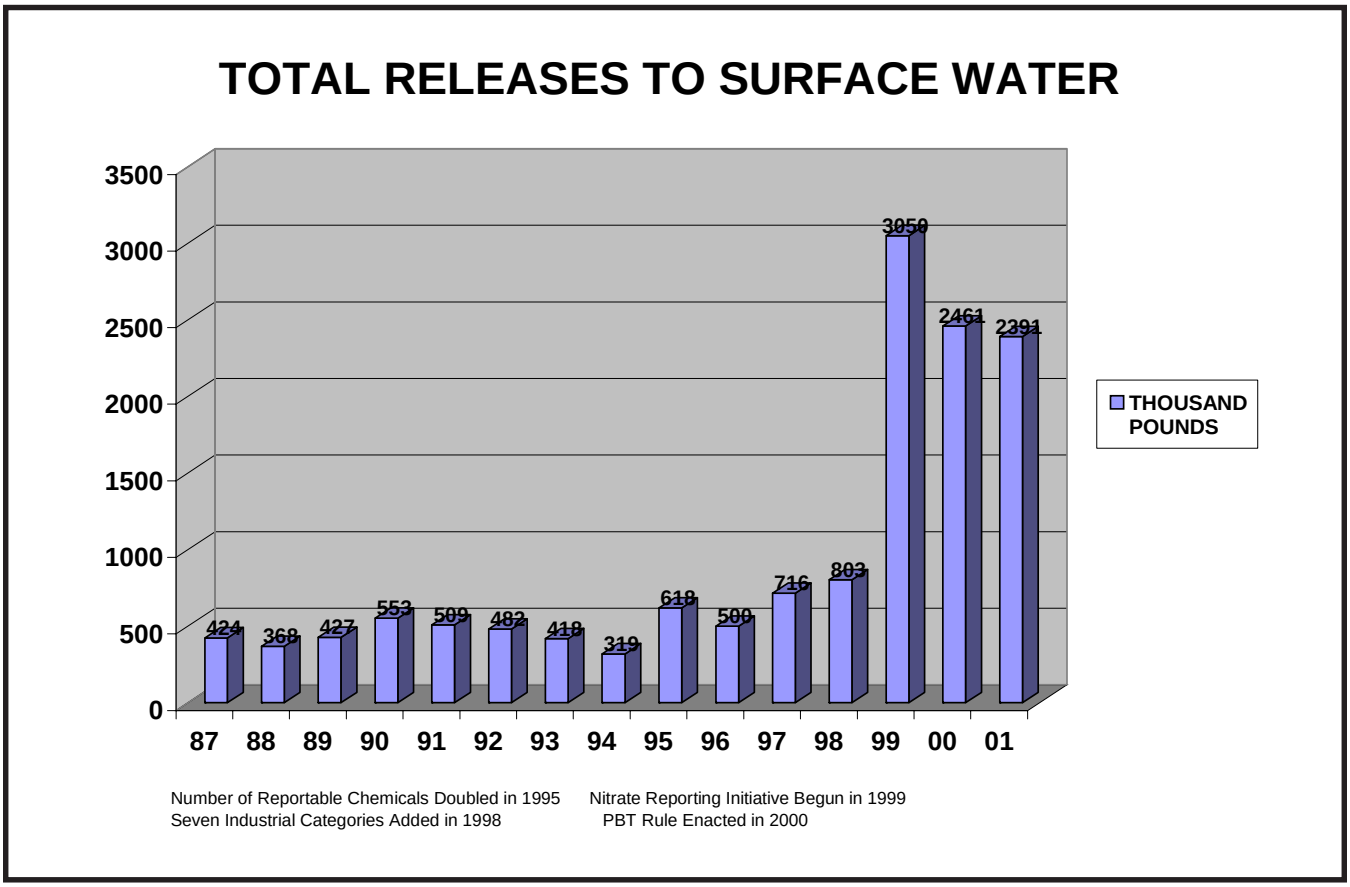


Figure 11

2001 TRI Overview

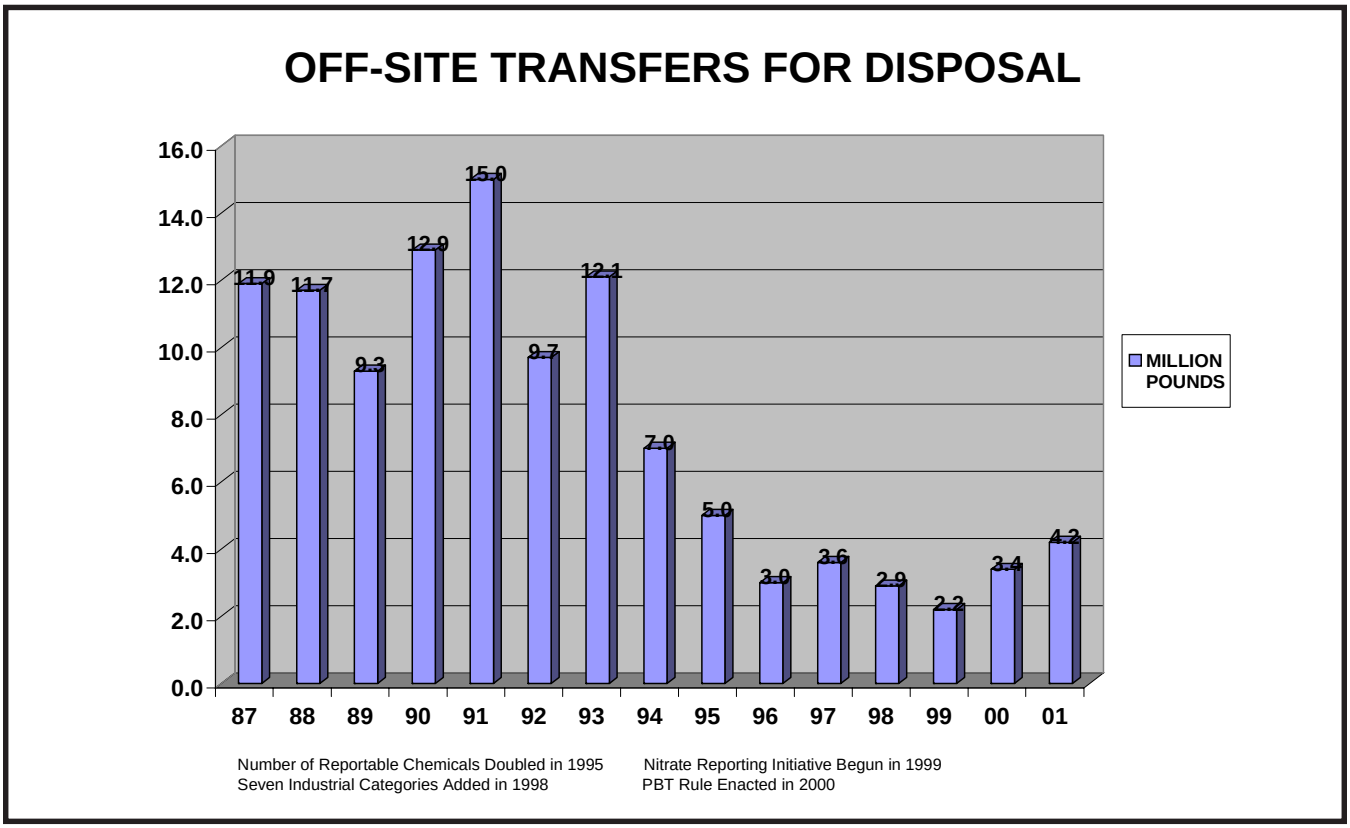


Figure 12

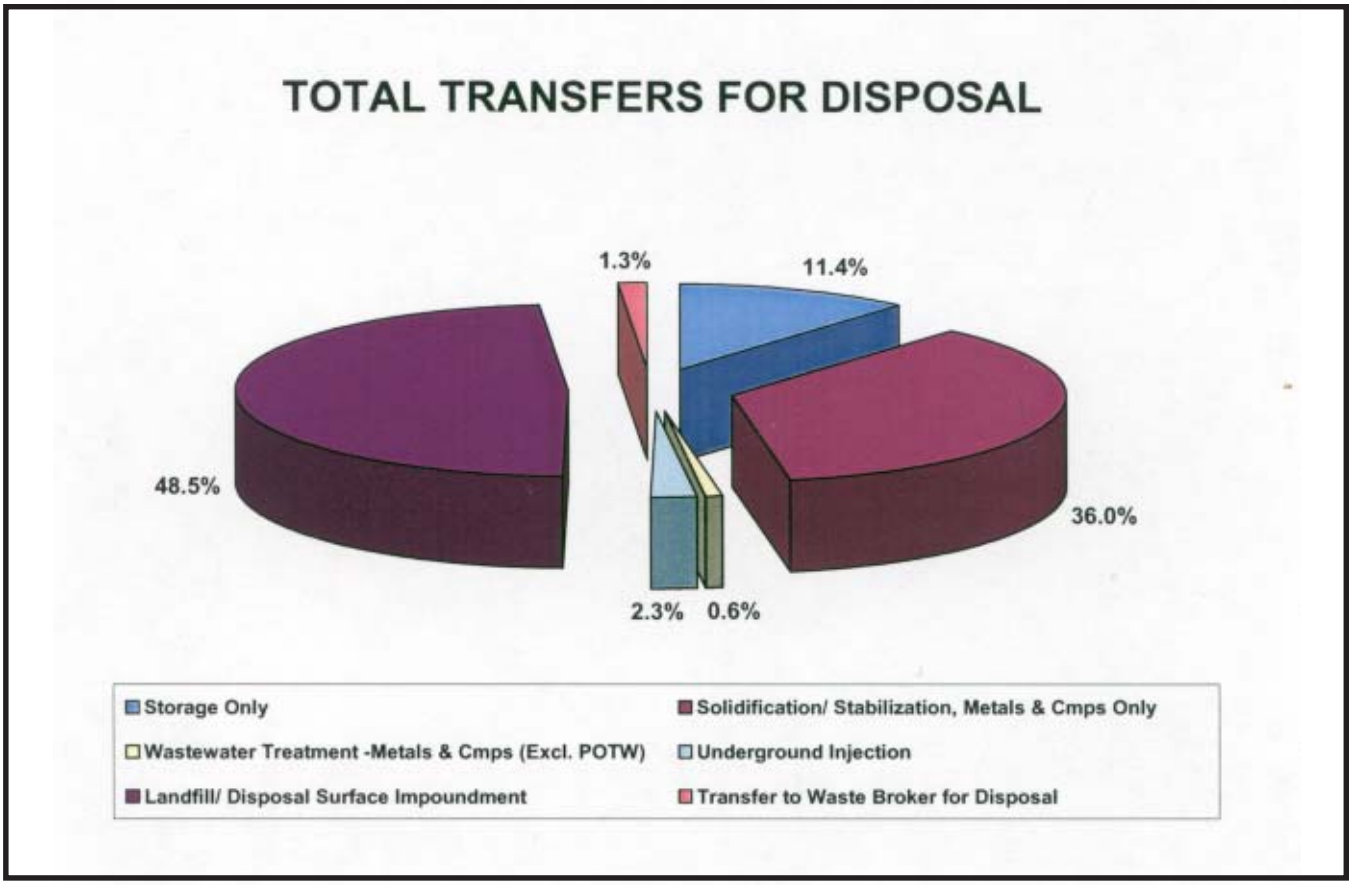


Figure 13

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 in 2001; nitrate compounds formed by the neutralization of nitric acid that previously were disposed to underground injection wells account of a substantial portion of the increase (Figure 17)Total treatment in the State decreased in 2001, (Figure 18); however the majority, over 90 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.

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 demonstrates Oklahoma industries are managing the majority of wastes on-site. (Figure 19) 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.

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 wastes while reporting a corresponding increase in off-site transfers.

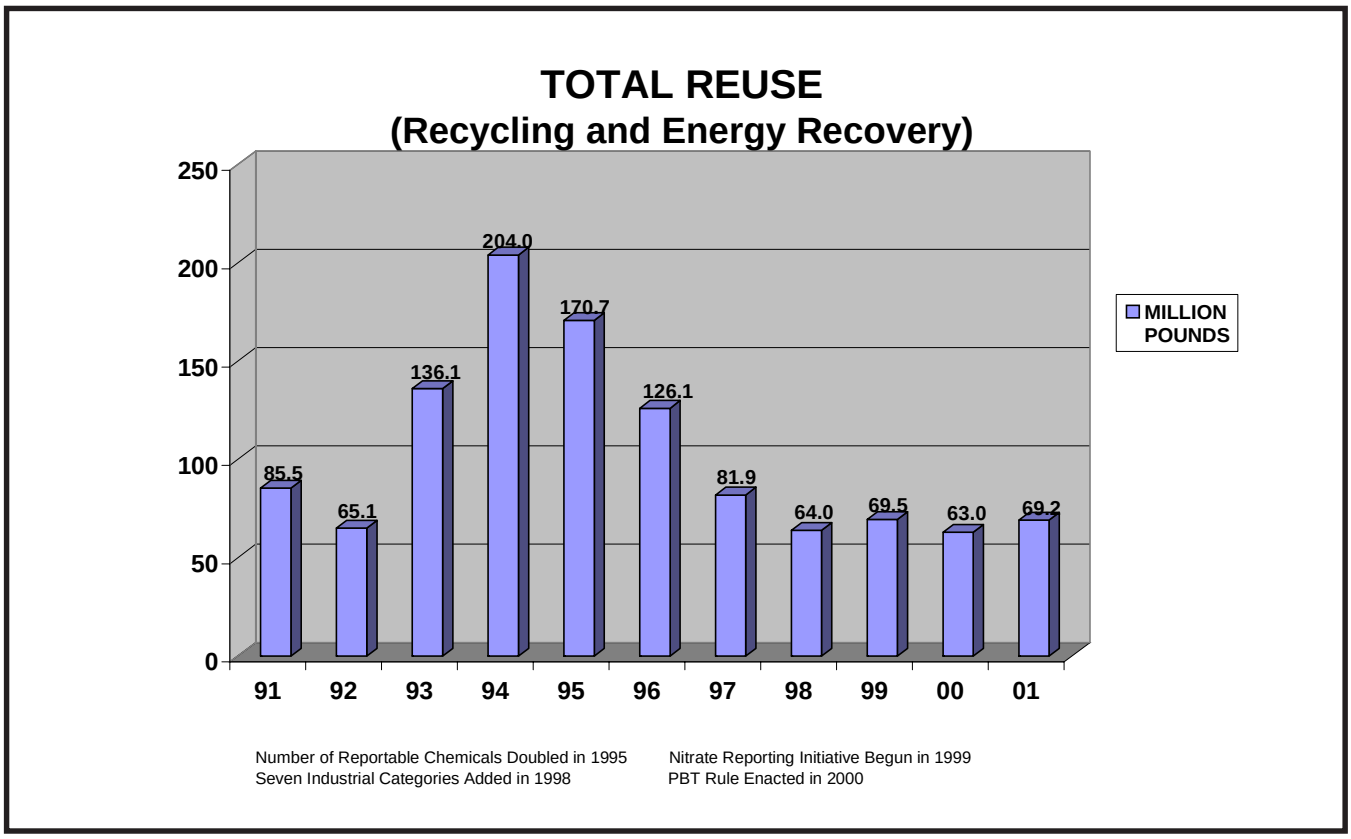


Figure 14

2001 TRI Overview

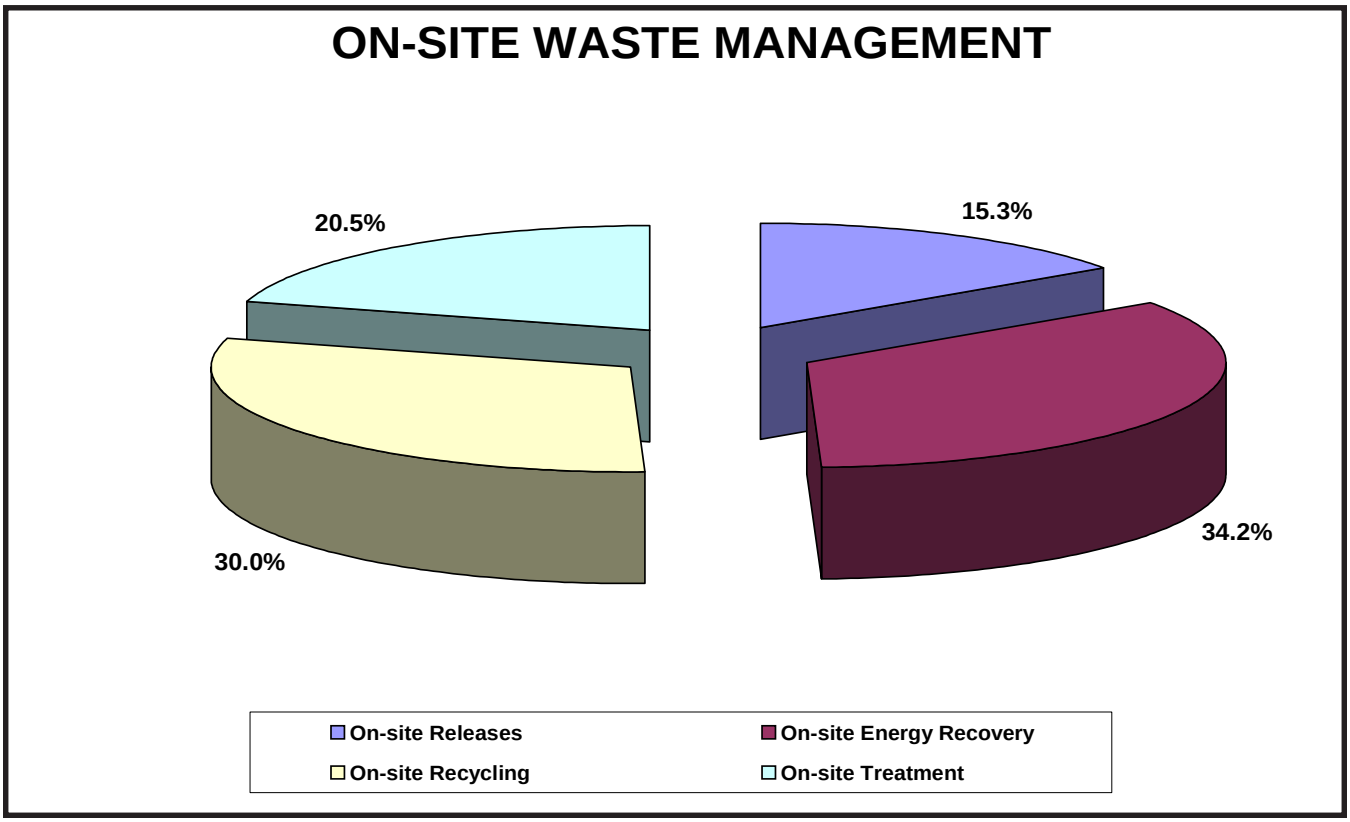


Figure 15

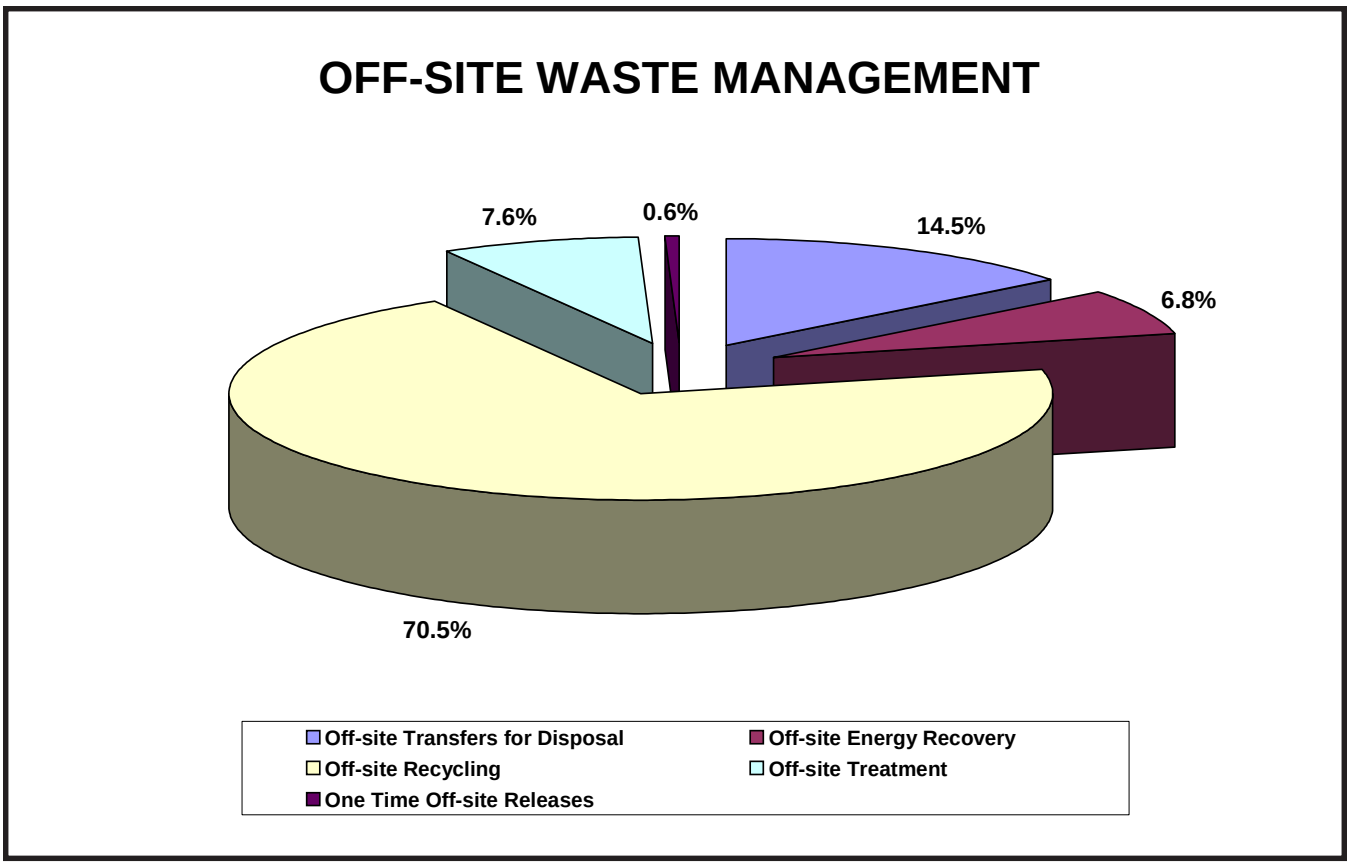


Figure 16

2001 TRI Overview

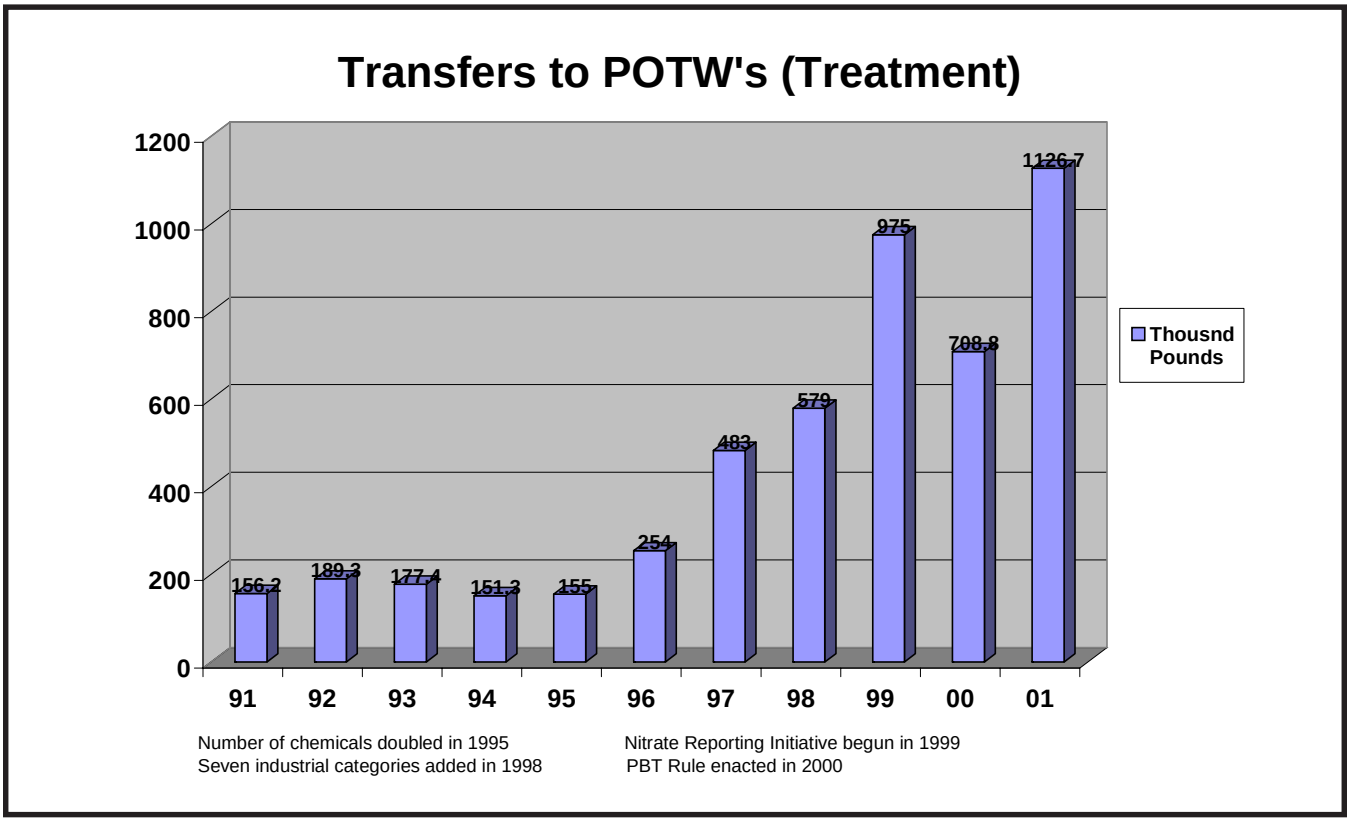


Figure 17

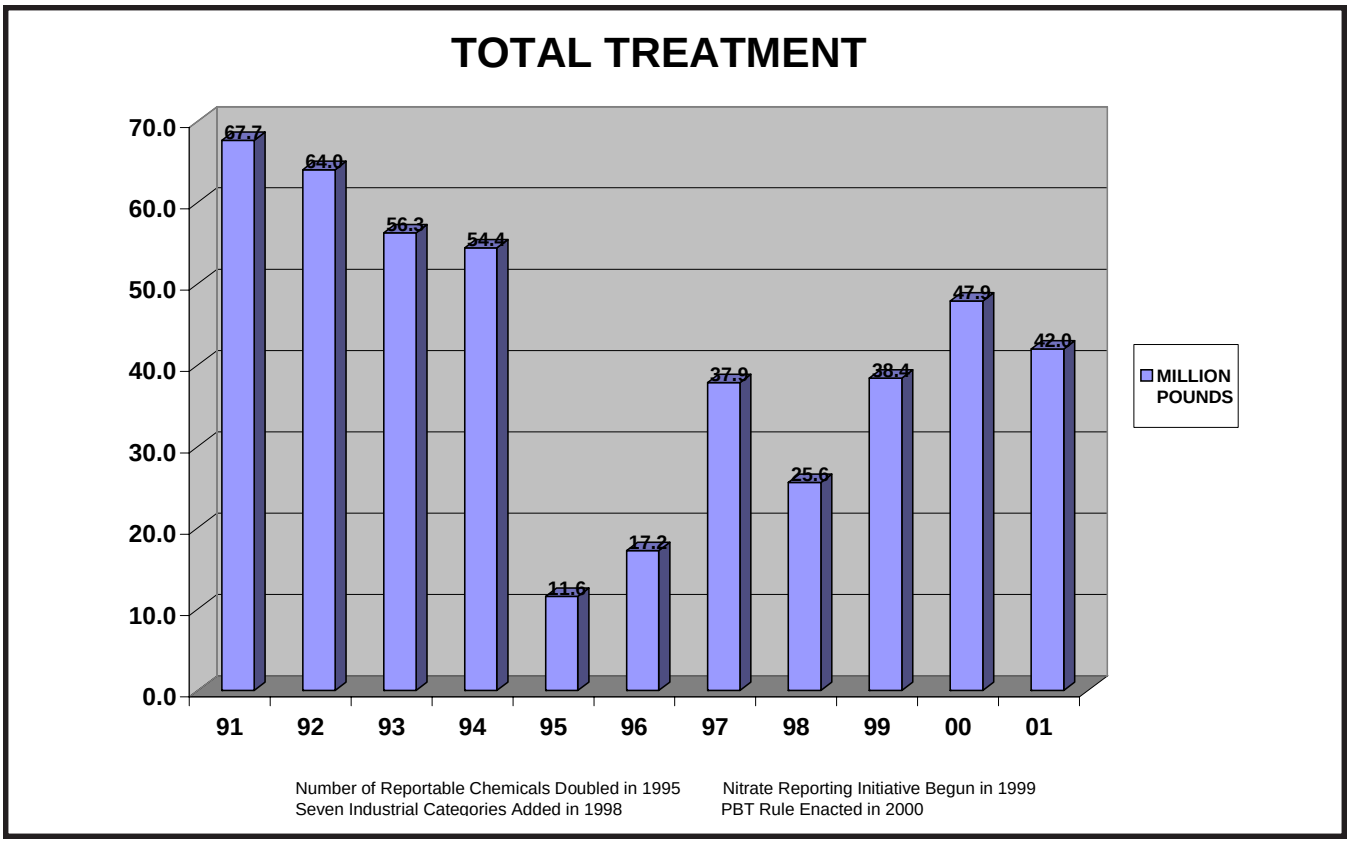


Figure 18

2001 TRI Overview

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 2001 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

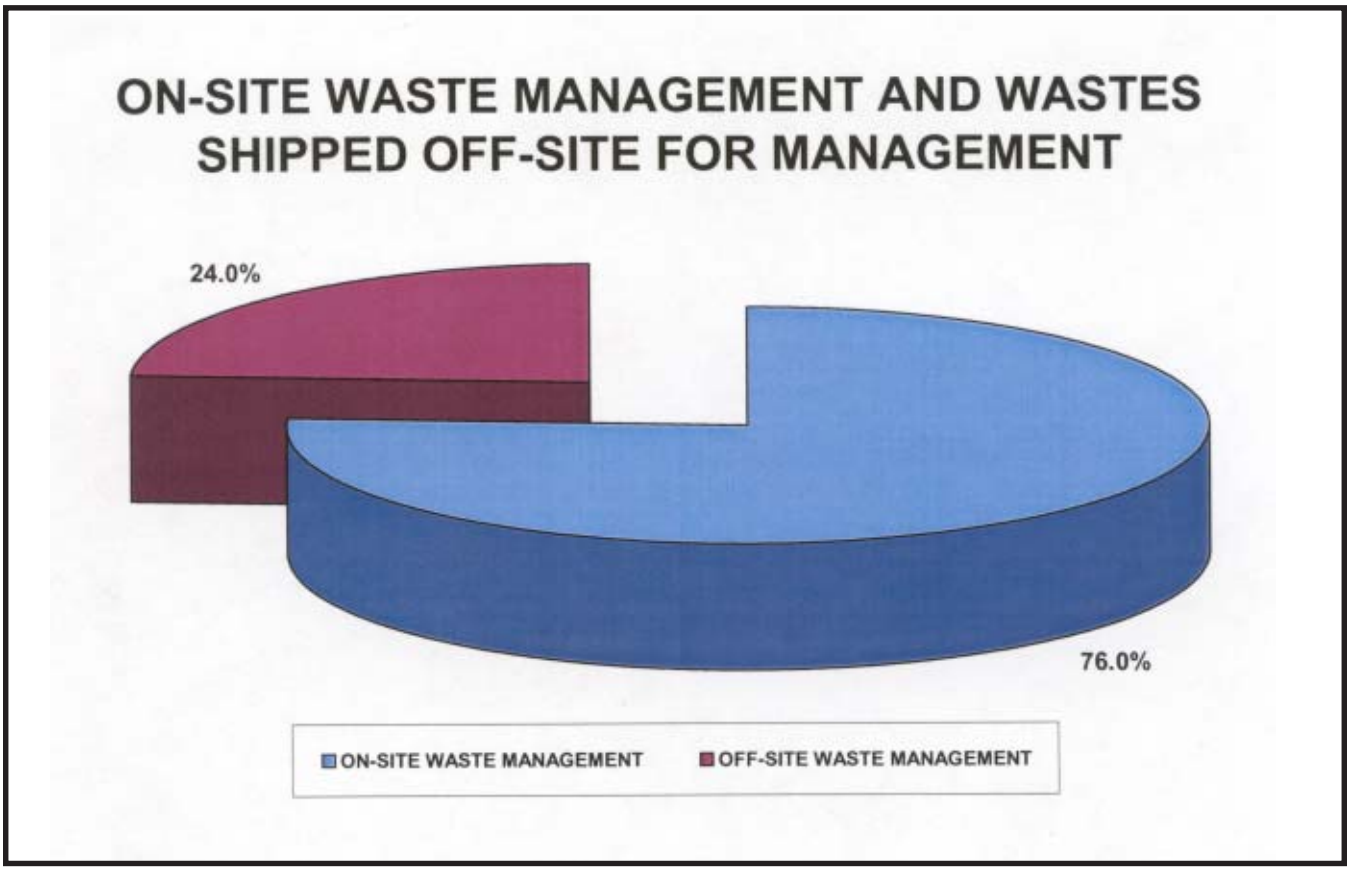


Figure 19

2001 Tier II Overview

The owner or operator of all facilities or sites that store hazardous substances on-site must submit a Tier II report 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 to the Local Emergency Planning Committee (LEPC), and the local fire department. 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

RANK	COUNTY	REPORTING SITES TOTAL	OIL AND GAS TOTAL	EHS SITES,	TOTAL EHS, LBS.
1	Major	2,333	2,309	12	1,022,550
2	Beaver	1,888	1,836	7	606,050
3	Kingfisher	1,500	1,456	14	2,022,550
4	Canadian	1,381	1,321	46	1,940,000
5	Grady	1,347	1,306	24	223,500
6	Garvin	1,171	1,101	15	673,500
7	Garfield	1,147	1,080	47	28,711,650
8	Oklahoma	1,063	664	249	54,851,650
9	Blaine	1,035	1,012	10	556,700
10	Texas	949	917	15	2,671,050
11	Roger Mills	886	881	1	500
12	Stephens	878	837	4	56,000
13	Custer	817	781	20	2,118,250
14	Woods	810	787	11	1,072,000
15	Caddo	803	763	68	2,046,850
16	Carter	800	757	20	5,702,050
17	Woodward	795	761	27	76,853,050
18	Dewey	771	753	5	1,100,500
19	Ellis	766	760	0	0
20	Harper	754	747	2	1,000
21	Osage	684	543	25	56,150
22	Pittsburg	560	526	13	73,550
23	McClain	531	505	4	56,000
24	Lincoln	516	489	16	137,150
25	Logan	512	480	13	1,562,600

Table C

2001 Tier II Overview

address of the owner or operator and two emergency contacts that can be used by emergency responders 24 hours a day.

Over 25,000 of the 28,000 Tier II reports received for 2001 were from Oil and Gas sites which 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 20) A total of 1,267 reports from sites storing one or more Extremely Hazardous Substance. Counties storing the greatest quantities of EHS 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 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 2001*)

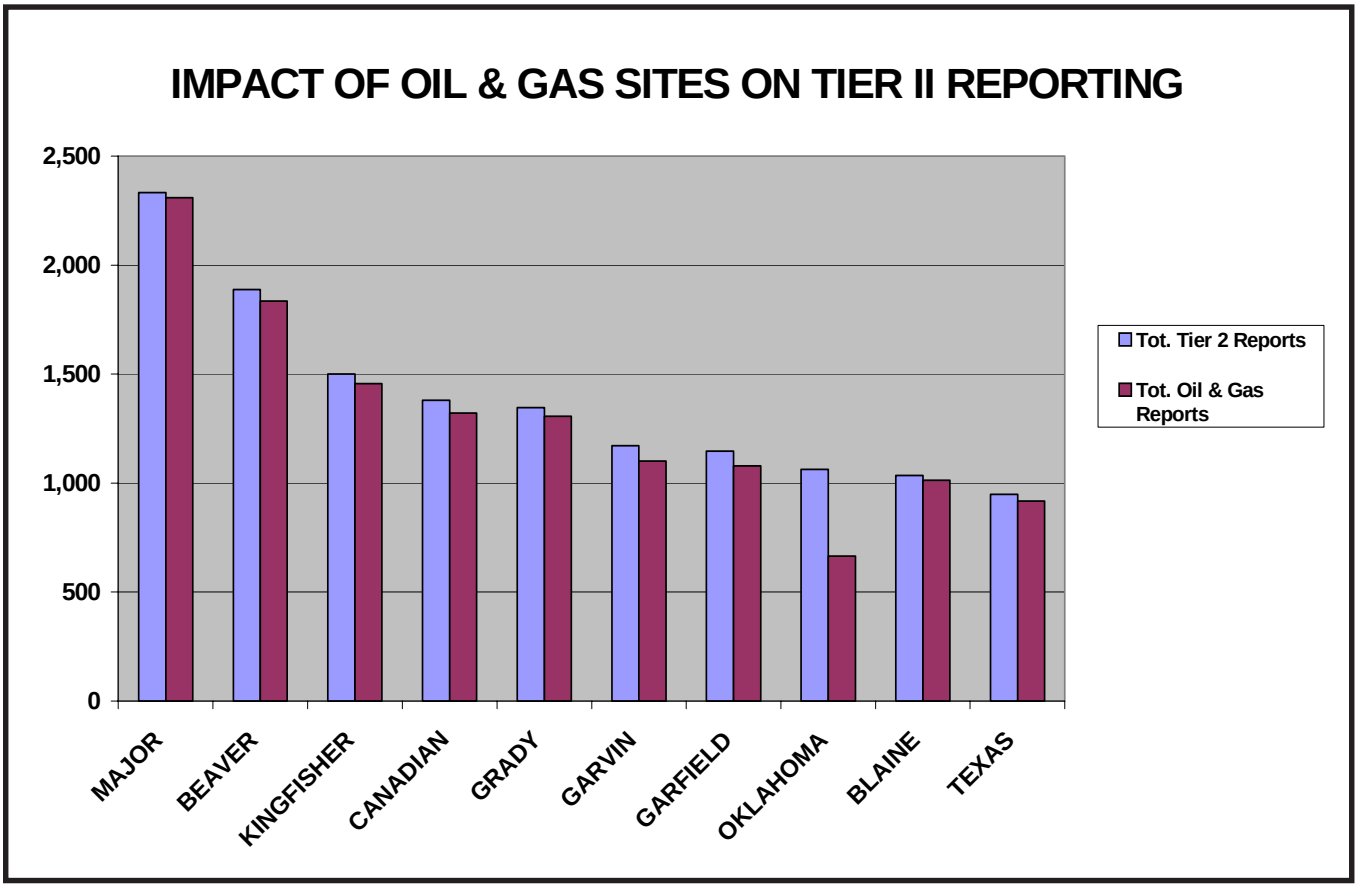


Figure20

2001 Tier II Overview

RANK	COUNTY	TOT. EHS POUNDS	TOTAL FACILITIES
1	ROGERS	88,488,800	31
2	WOODWARD	76,853,050	8
3	TULSA	74,668,700	187
4	OKLAHOMA	54,851,650	205
5	MAYES	31,003,500	19
6	GARFIELD	28,711,650	24
7	KAY	8,758,550	20
8	MUSKOGEE	7,316,550	26
9	JACKSON	6,817,750	9
10	KIOWA	6,510,100	9
11	POTTAWATOMIE	6,203,550	18
12	CARTER	5,702,050	13
13	WASHINGTON	5,604,000	19
14	COTTON	5,057,550	7
15	TEXAS	2,671,050	8
16	CUSTER	2,118,250	14
17	GRANT	2,051,650	6
18	CADDO	2,046,850	23
19	KINGFISHER	2,022,550	9
20	CANADIAN	1,940,000	32
21	LOGAN	1,562,600	9
22	ALFALFA	1,550,550	5
23	NOBLE	1,517,050	5
24	WASHITA	1,336,650	7
25	DEWEY	1,100,500	2

Table D

Facilities Reporting in 2001

For Reporting Year 2001, 354 Oklahoma facilities reported to TRI, operating under 130 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 330 of 354 facilities that reported for 2001. (Table E) Nineteen facilities reported for the first time in 2001 with only two 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 twenty-three percent of all TRI releases in Oklahoma in 2001. Seven of the 25 facilities with the largest total releases for 2001 reported the first time for under the 1998 changes and all of these were operational prior to 1998. (Table F) Together the ten industrial classifications reporting the largest total releases account for 80 per cent of all TRI releases in the State. (Figure 21) A discussion of the five industries with the largest total releases follows.

Nitrogenous Fertilizers- SIC 2873

The use of agricultural chemicals essential to 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 2001 as reported

Ranking	SIC Code	Industry	Tot. Lbs. Released
1	2873	Chemicals- Nitrogenous Fertilizers	6,186,774
2	4911	Coal Fired Utilities	4,184,594
3	2631	Paperboard Mills	3,999,206
4	4953	Industrial Waste Handlers, Under RCRAS Subtitle C	2,545,161
5	2075	Soybean Mills	1,901,529
6	2911	Petroleum Refining	1,411,145
7	3341	Secondary Smelting of Nonferrous Metals	1,167,982
8	all other 3400's	Fabricated Metal Products, except metal cans	901,876
9	2869	Chemicals- Industrial Organics	755,051
10	2013	Sausage & Other Prepared Meats	578,180
11	9711	National Security (Armed Forces)	547,908
12	2621	Paper Mills	412,518
13	3089	Unclassified Misc. Plastics	385,102
14	all other 3700's	Transportation Equipment, except car bodies	380,649
15	3011	Tires and Inner Tubes	367,289
16	2999	Misc. Products of Coal & Petroleum	347,963
17	3411	Metal Cans	338,636
18	all other 3000's	Rubber and Misc. Plastic Products, except tires and inner tubes	274,507
19	all other 3300's	Primary Metal Industries, except secondary smelting of nonferrous metals	256,762
20	3500's	Ind. & Com. Machinery & Computer Equipment	240,232
21	all other 2800's	Chemicals, except nitrogenous fertilizers & industrial organics	193,603
22	3251	Brick and Structural Clay Tile	174,649
23	2074	Cottonseed Oil Mills	172,576
24	2011	Meat Packing Plants	169,028
25	3711	Transportation Equip.- Vehicles & Car Bodies	167,589
		All Other Manufacturing Classes	756,037

Table E

Facilities Reporting in 2001

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 92 per cent of all TRI chemicals used or produced 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 2001*)

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. Eight coal fired utilities reported chemical usage above thresholds for 2001. The chemicals reported are either components of bituminous coal or formed during its combustion. (See *Chemicals Reported in 2001)* Overwhelmingly the compounds are released through permitted, stack air 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.

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

RANK	FACILITY	COUNTY	TOTAL RELEASES, LBS
1	Weyerhaeuser-Valliant	McCurtain	3,999,002
2	Terra Nitrogen- Catoosa	Rogers	3,270,610
3	Safety Kleen	Major	2,446,750
4	Farmland Industries	Garfield	2,304,075
5	Protein Technologies, Inc.	Mayes	1,901,529
6	Grand River Dam Authority (OG&E)	Mayes	1,757,724
7	Baker Petrolite- Barnsdall	Tulsa	750,900
8	AES Shady Point	Leflore	686,340
9	Conoco Refinery	Kay	631,101
10	Terra Nitrogen- Woodward	Woodward	610,090
11	Muskogee Generating Station (OG&E)	Muskogee	543,131
12	Northeastern Station	Rogers	518,513
13	Sooner Generating Station (OG&E)	Noble	458,251
14	U.S. DOD- Tinker Air Force Base	Oklahoma	437,365
15	TPI Valero Refinery	Carter	396,361
16	Fort James Operating Co.	Muskogee	396,036
17	Chevron Phillips Chemical Co,	Osage	347,779
18	Flex-n-Gate Oklahoma LLC	Pontotoc	277,063
19	Western Farmers Electric Co-Operative	Choctaw	220,635
20	Michelin North America	Carter	218,662
21	Producers Co-Operative Mill	Oklahoma	172,576
22	General Motors SGC- Okla. City	Oklahoma	167,589
23	Sunoco Refinery	Tulsa	160,304
24	Mercury Mercruiser	Payne	108,018
25	Perma-Fix Treatment Services	Tulsa	98,411
81.08% of Total Releases			

Table F

Facilities Reporting in 2001

an alternative to more toxic organo-chloride compounds. Permitted stack air releases of methanol account for over 89 per cent of all releases for this industry in 2001.

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.

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

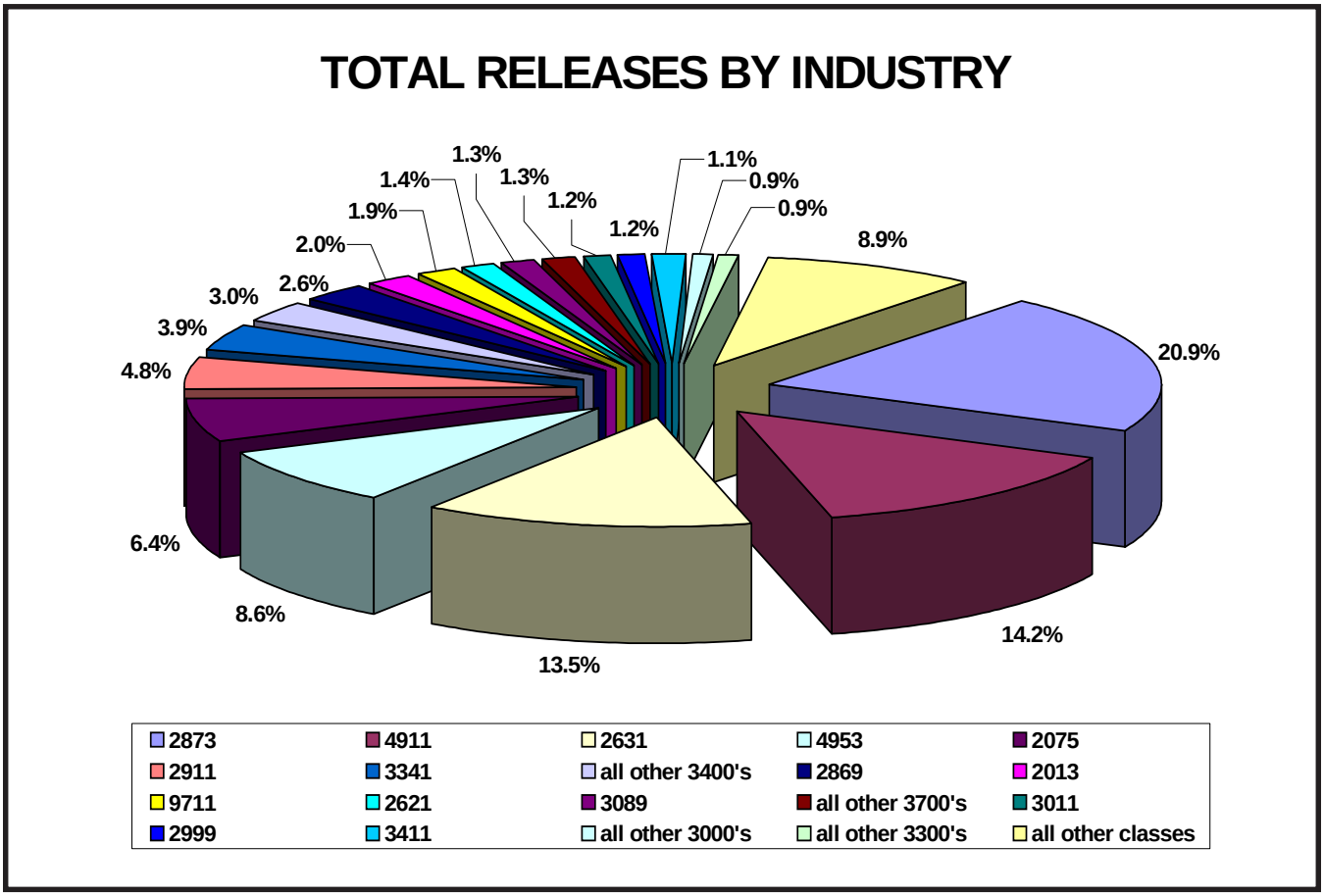


Figure 21

Facilities Reporting in 2001

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. Through improved waste management the industry reduced its releases of nitrates by nearly 600,000 pounds in 2000, and this reduction alone accounted for the majority of recovery in Oklahoma's surface water releases from 1999 to 2000. (see *2001 TRI Overview*)

Chemicals Reported in 2001

Oklahoma facilities reported the manufacture, process or otherwise use of 119 toxic chemicals or chemical groups for 2001 as reportable under TRI. The percentages of total releases for these chemicals are illustrated in Figure 22. The ten chemicals released in greatest quantities are discussed below, and together ammonia, nitrate compounds, methanol, barium compounds, zinc compounds, toluene, xylenes, hydrofluoric acid, chromium compounds and hydrochloric acid aerosols accounted for 73 percent of all chemicals managed, as defined by TRI. (Table G) The chemicals reported for 2001 are largely a reflection of commerce in the State.

Ammonia remains the chemical released in the largest quantities in Oklahoma during 2001, as in previous years. This nitrogen-based compound is component of fertilizers and stock feed stuffs and accounted for 35 per cent of all toxic chemicals released in Oklahoma in 2001. Ammonia gas is used by other industries as a refrigerant, while ammonia solutions are used in paper pulping operations and food processing. (Figure 23) Twenty-seven facilities reported a total of 6.2 million pounds of ammonia released in 2001.

Due to its volatility, 98 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.

Methanol, also known as methyl alcohol or wood alcohol, is a common industrial solvent, and was reported by 33 facilities in seventeen industrial classifications for 2001. The primary

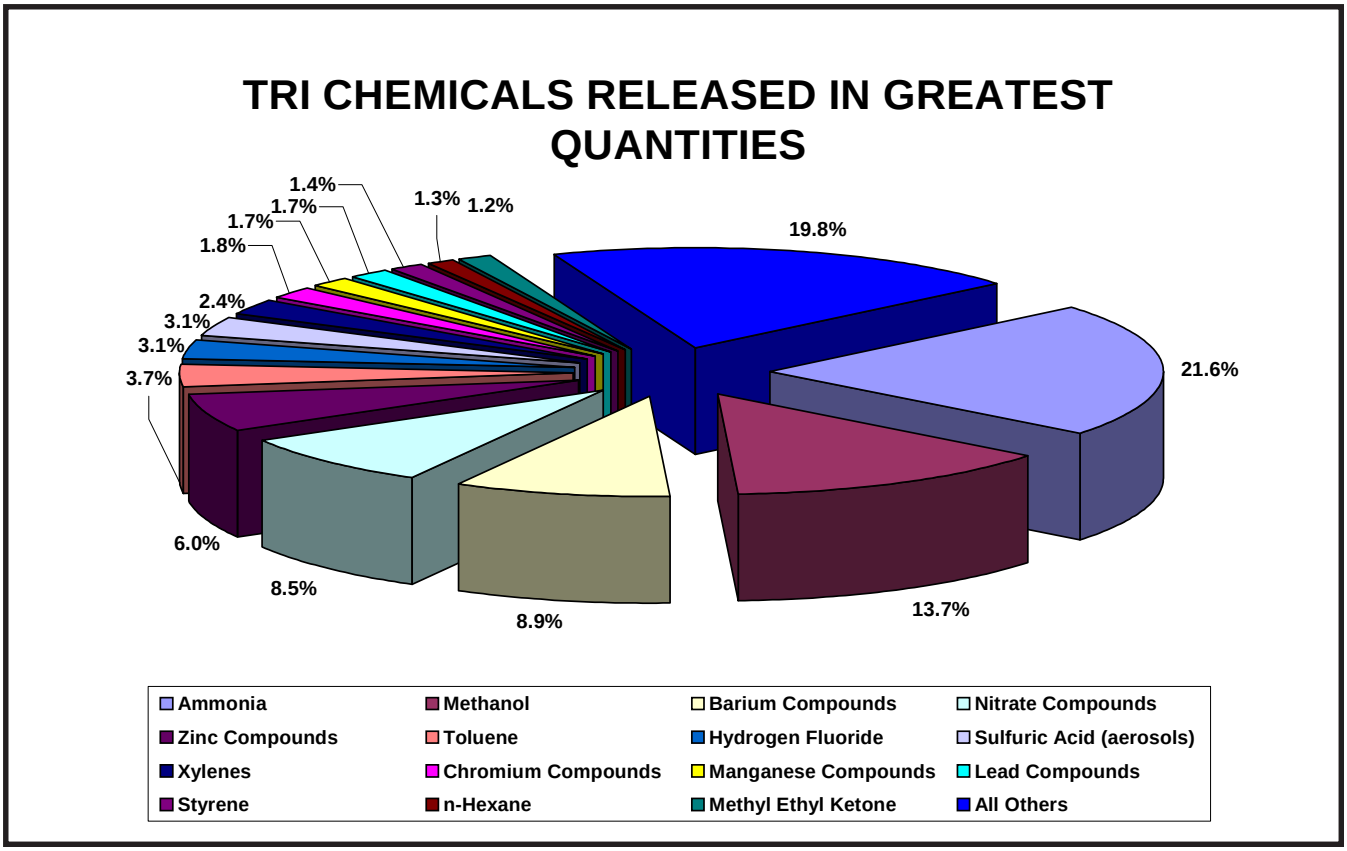


Figure 22

Chemicals Reported in 2001

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 2001, 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 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

RANK	CHEMICAL	POUNDS RELEASED
1	Ammonia	6,224,184
2	Methanol	3,947,491
3	Barium Compounds	2,577,607
4	Nitrate Compounds	2,456,556
5	Zinc Compounds	1,739,786
6	Toluene	1,061,994
7	Hydrogen Fluoride	903,166
8	Sulfuric Acid (aerosols)	880,333
9	Xylenes	704,216
10	Chromium Compounds	527,887
TOTAL		21,023,220

Table G

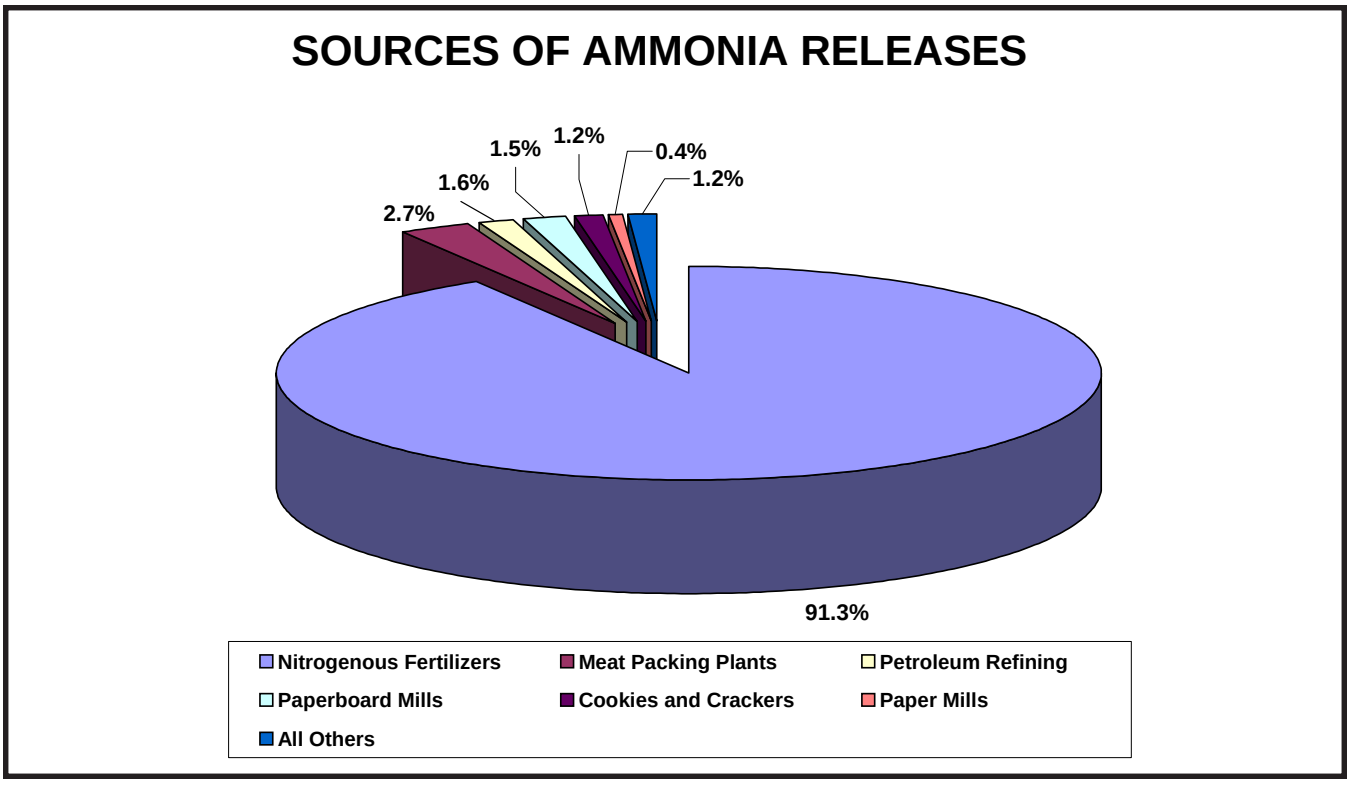


Figure 23

Chemicals Reported in 2001

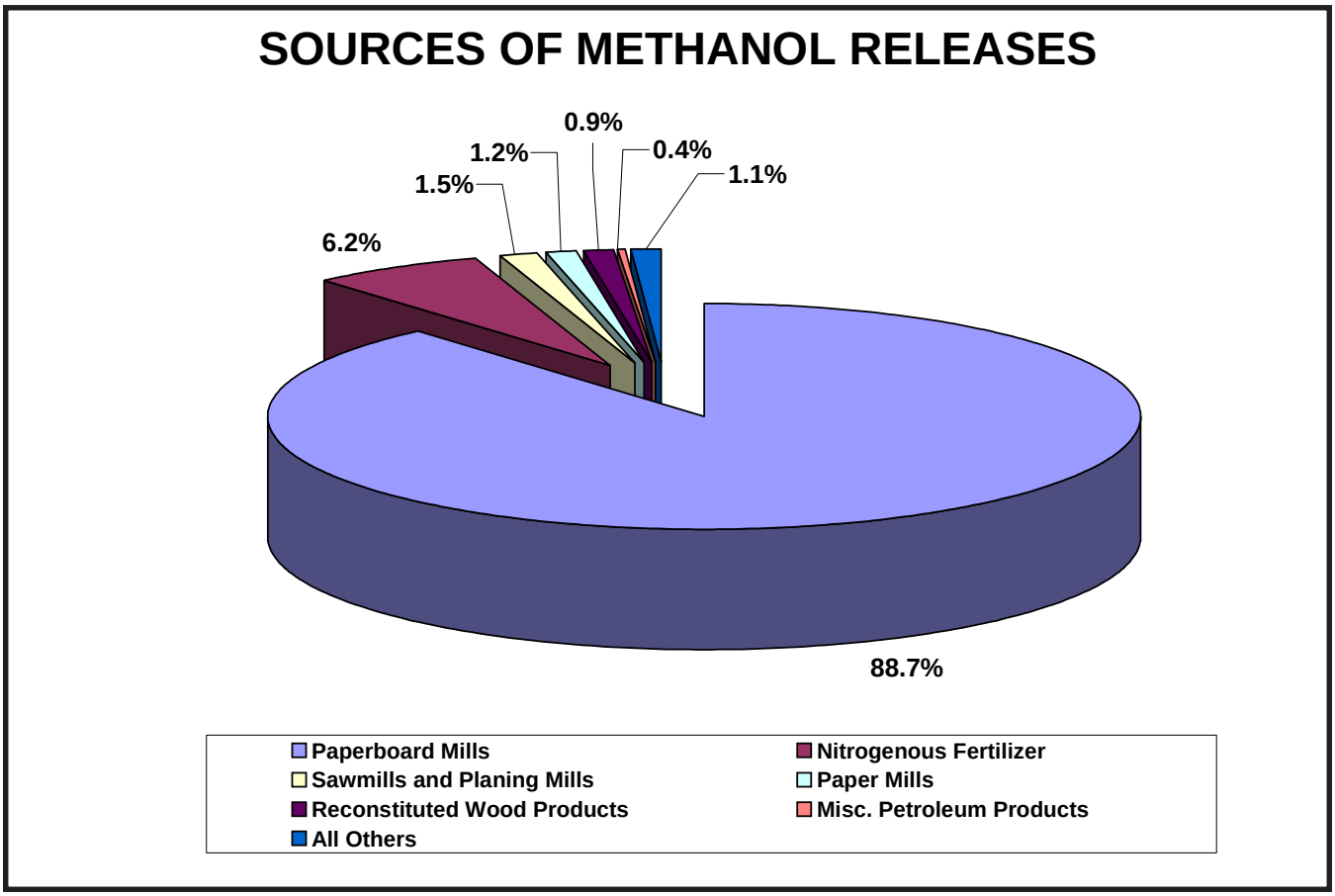


Figure 24

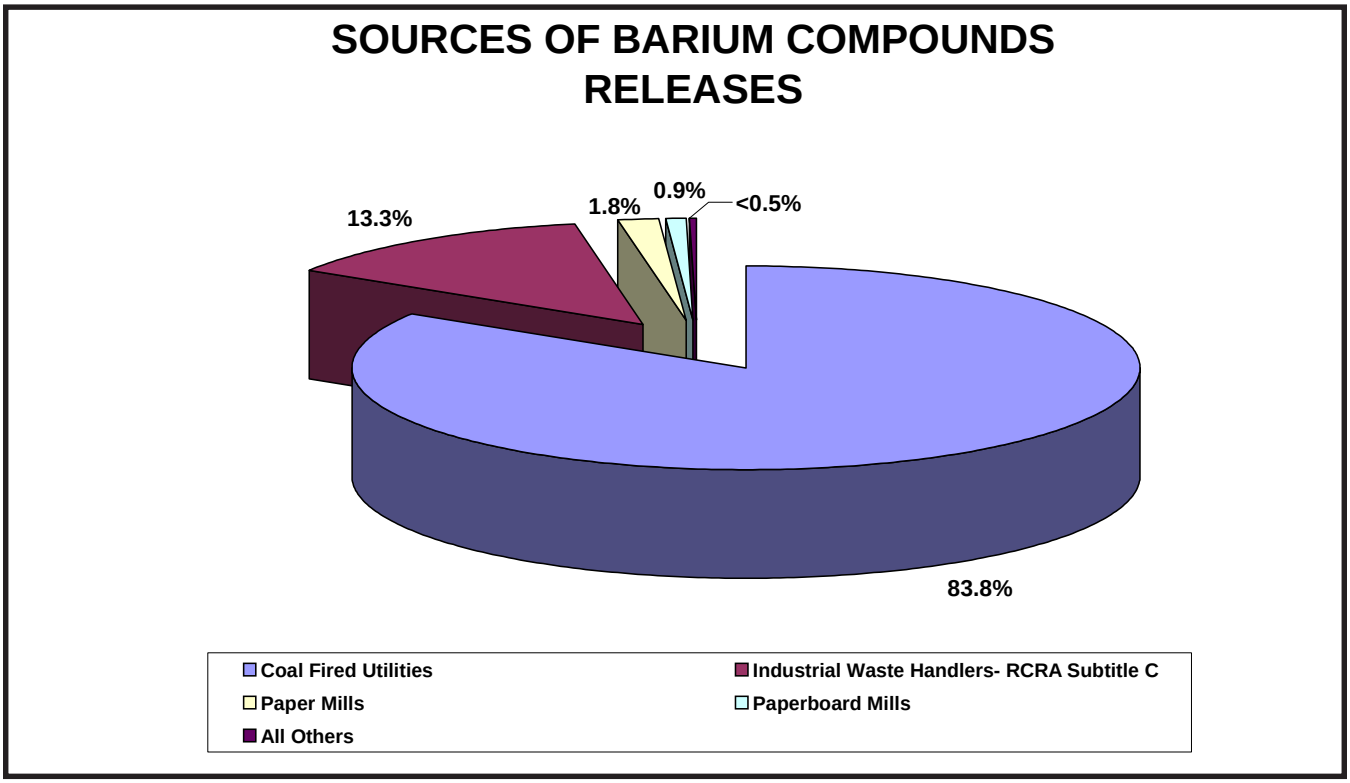


Figure 25

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.

Nitrate compounds are another group of nitrogen containing chemicals also associated with the fertilizer production; however, this group of chemicals is used or generated by 14 industrial categories in the State. At ambient temperatures, nitrates exist as solid salts containing the nitrate ion, for example, sodium nitrate, silver nitrate and ammonium nitrate. However, in aqueous solutions, 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 the neutralization of nitric acid, often was excluded from the calculations for numbers reported to TRI. Beginning with figures reported for 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, efforts to reduce the quantity of nitrate compounds discharged to the environment figured largely in the overall

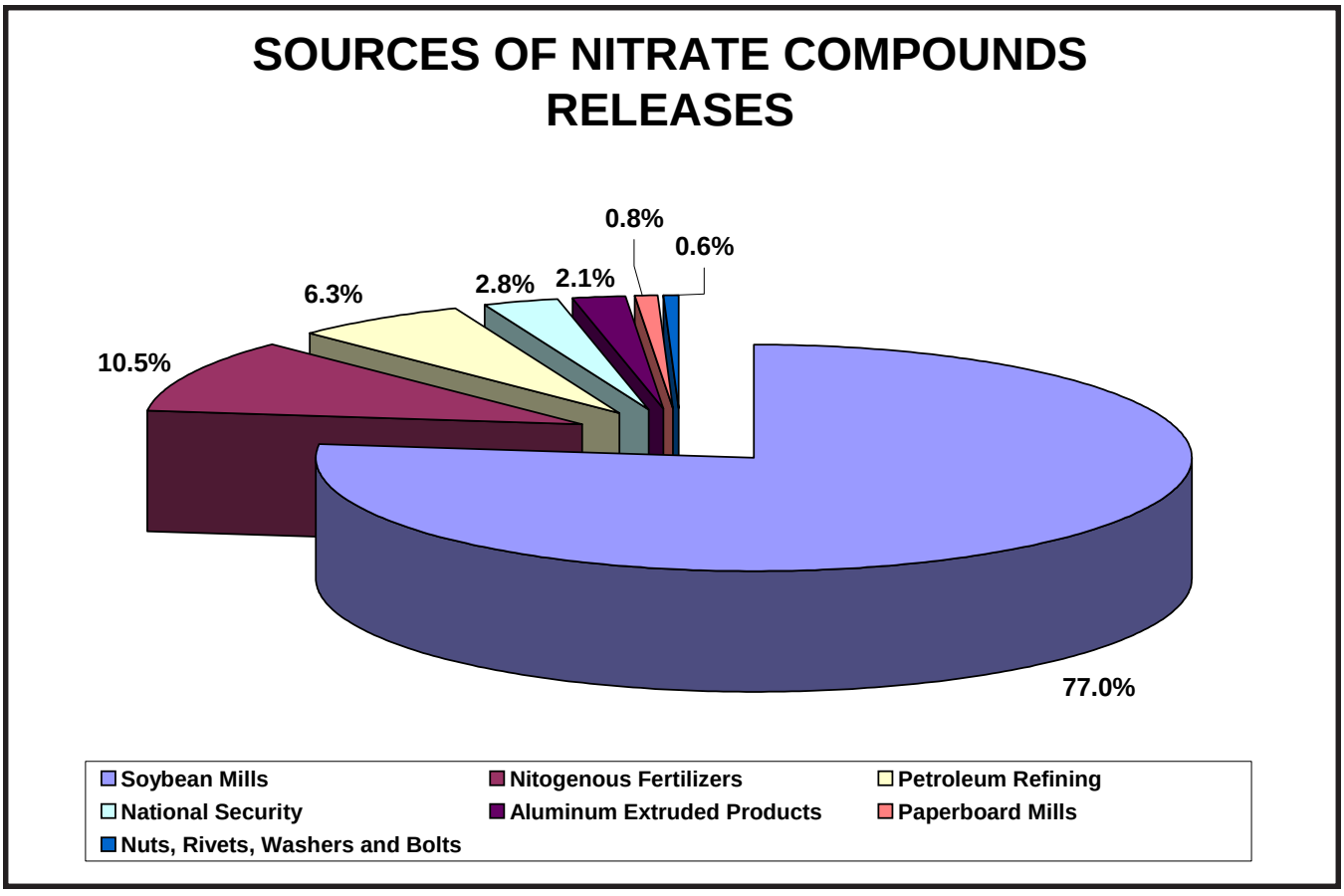


Figure 26

reduction in releases to surface waters and POTWs for RY 2000. Efforts by soybean mills to reduce their nitrates discharged to water were the sources of the decline which wass especially significant as this industry is the largest manufacturing sector of nitrate wastes. (Figure 26)

Solutions of nitrate compounds can be disposed into deep underground 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.

Zinc compounds occur naturally in the earth's crust and zinc is a nutritionally essential trace metal in humans. Forty-eight facilities used produced or used zinc compounds at or above the TRI thresholds and reported a total of 1.7 million pounds released in 2001. 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 27) 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

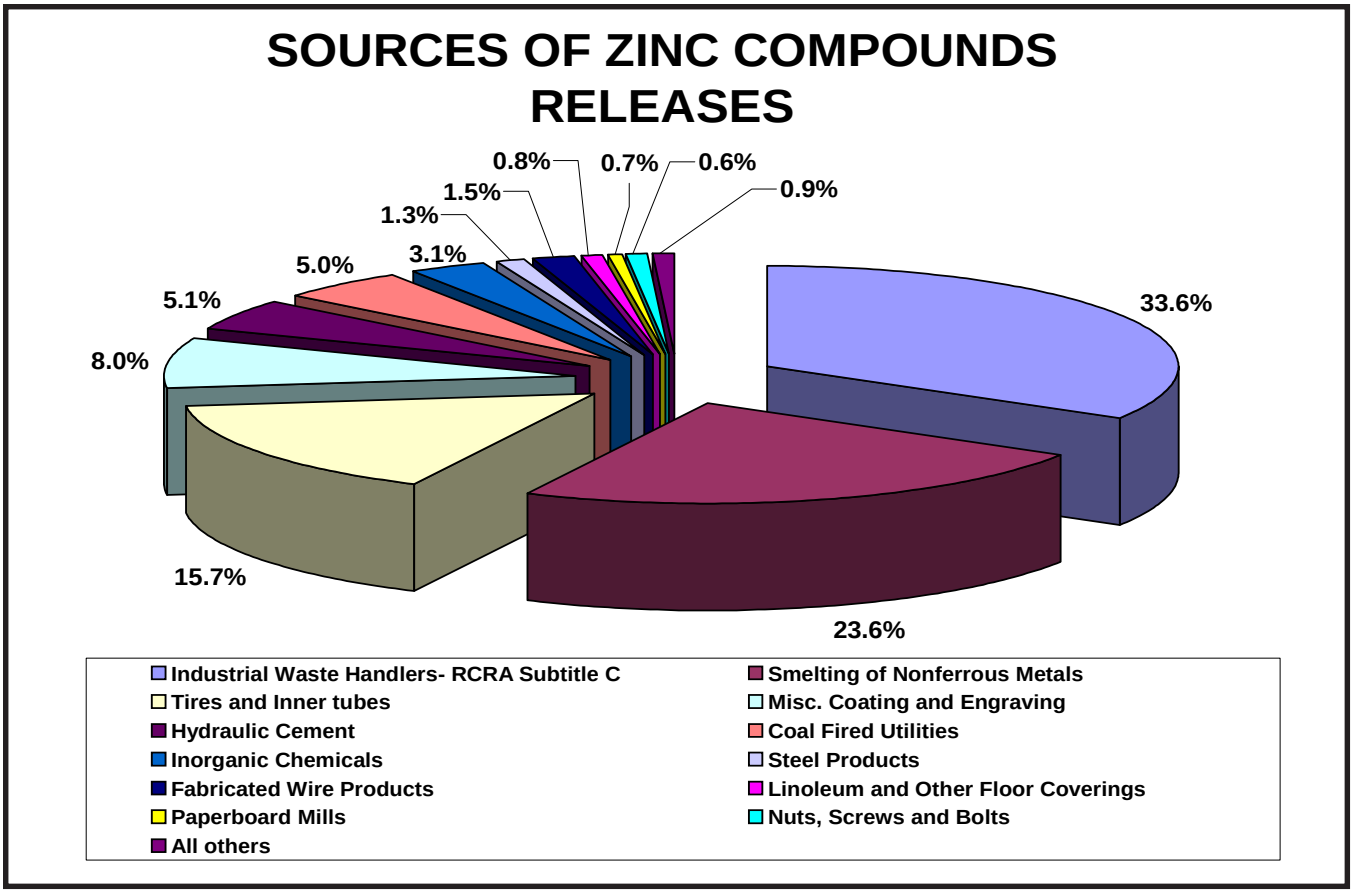


Figure 27

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.

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, it is isolated, and back blended into fuels to raise octane levels. Toluene also is a by-product of styrene production. Forty-two facilities reported toluene usage in 2001. Because of its high volatility, the majority of toluene released to the environment is through stack or fugitive air emissions and inhalation of fumes is the primary means of exposure, although it may be absorbed dermaly 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.

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

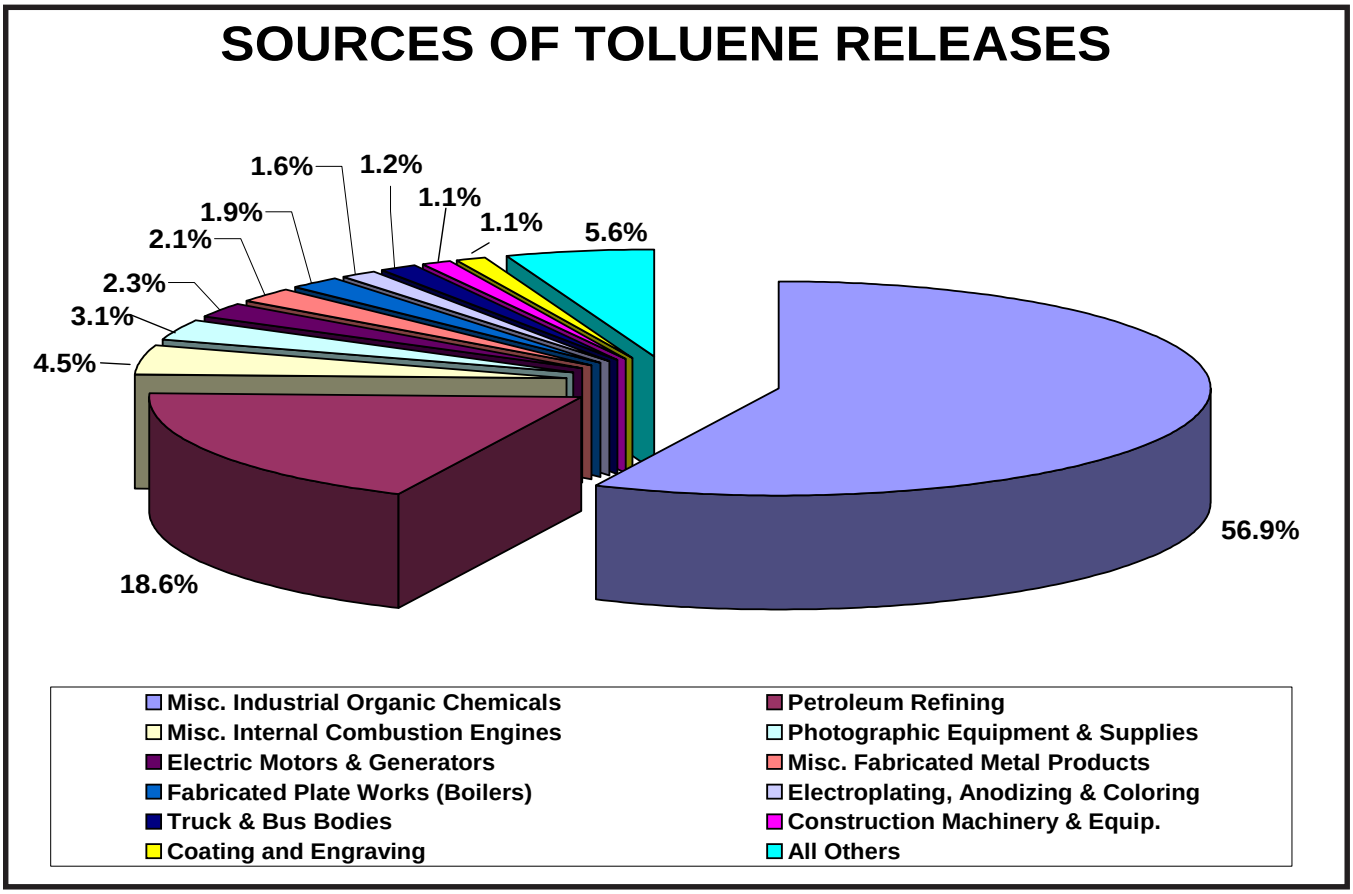


Figure 28

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 highly 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 29) Other common uses are as a catalyst or hardener or an agent to etch glass.

Sulfuric Acid aerosols, reported as "Sulfuric Acid, 1994 and after" refers to any mists, vapors, fogs, gases or "other airborne particles of any size" of the acid. Starting with RY 1995 all other forms of sulfuric were delisted when the qualifier was added. This excludes fuming or concentrated sulfuric acid or aqueous solutions of any concentration. As with concentrated solutions, acid aerosols are highly corrosive and strong oxidizers. Air borne sulfuric acid is irritating and damaging to the eyes, skin, respiratory system and any mucous membranes and can cause permanent damage to any of these. Inhalation of micro droplets of this compound can result in the rapid onset of pulmonary edema.

The five greatest industrial sources for this material are demonstrated in (Figure 30). Sulfuric acid aerosols are formed by the oxidation of sulfur or sulfur oxides to sulfur trioxide which then reacts with water forming sulfuric acid. Therefore, the majority of air emissions of sulfuric acid aerosols result from reactions with moisture inside air stacks. Crude oil contains small amounts of sulfur as impurities; sulfur oxides are formed during petroleum refining which react to become sulfuric acid aerosols. This also occurs when sulfur-containing fossil fuels, such as petroleum

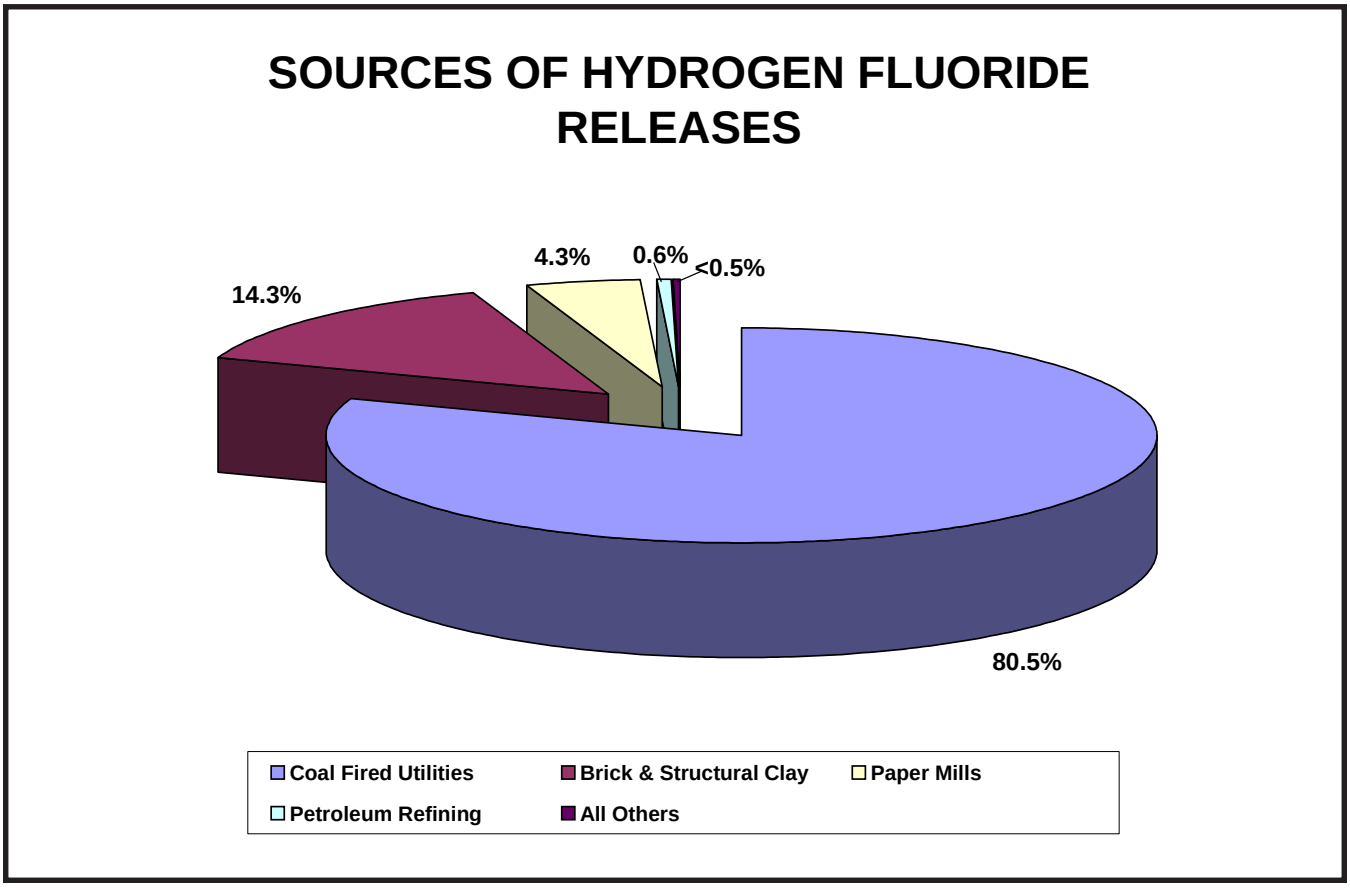


Figure 29

and coal, are combusted and waste gases exhausted into stacks. Scrubbers installed in industrial flues gather aerosolized droplets of sulfuric acid into non-aerosol and therefore non-reportable forms. During kraft pulping of wood for paper, wood chips are digested in an aqueous solution of sodium sulfide and sodium hydroxide at elevated temperature to dissolve the lignin between cellulosed fibers, and the spent liquid, called “black liquor”, is combusted to recover heat and chemicals. Acid aerosols of sulfuric then are created in the flues of recovery furnaces in reactions similar to the process in the stacks of fossil fuel plants. Sulfuric acid aerosols also are created when the acid is misted or sprayed to etch solid surfaces. Sulfuric acid is the most commonly used acid for adjusting the acidity in wastewater treatment. Because the acid reacts vigorously with water, vapors often form during mixing and the quantities produced are reportable under EPCRA 313.

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 46 facilities in the State report its use in quantities exceeding the threshold levels. (Figure 31) 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

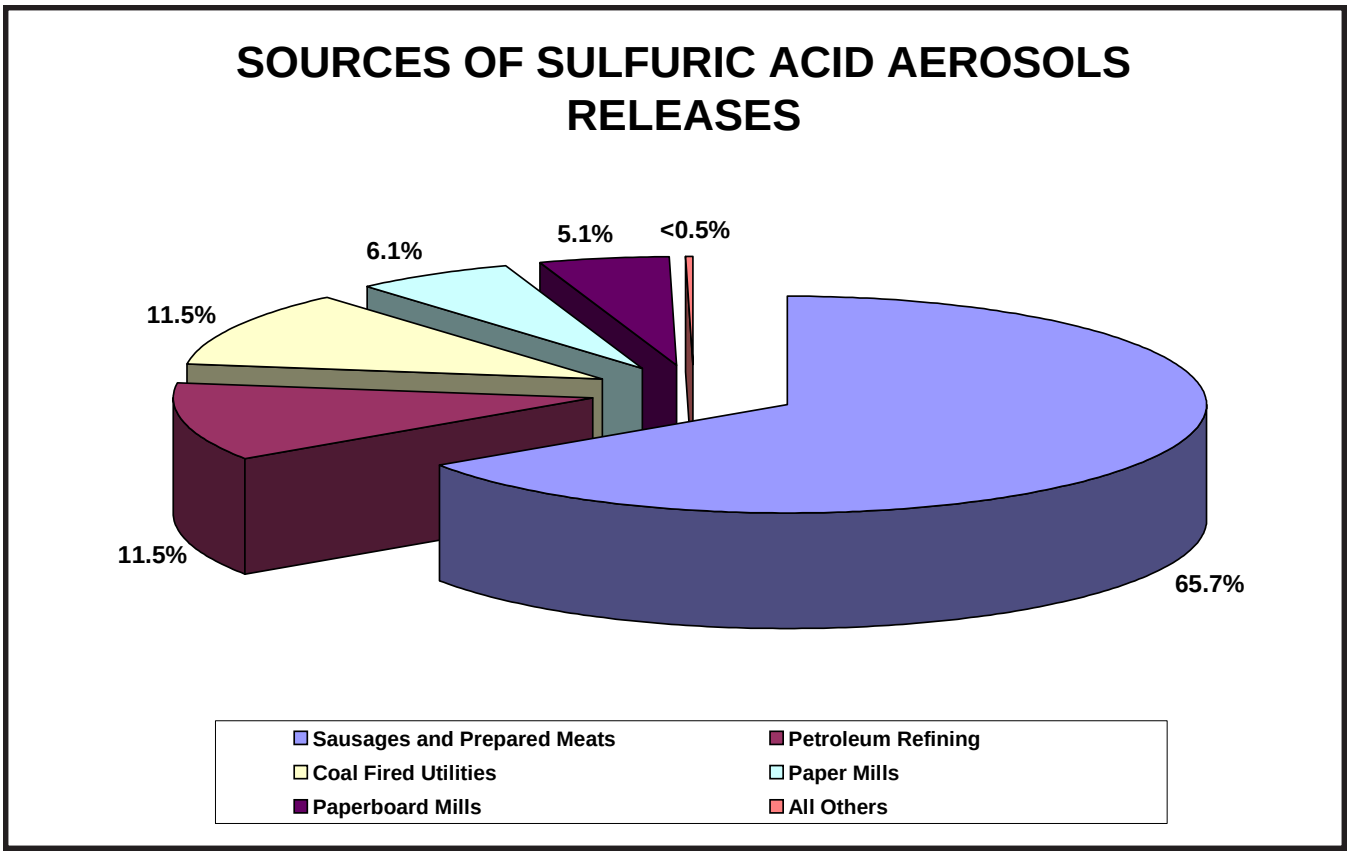


Figure 30

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.

Chromium compounds are classified by the charge (valence) of the chromium atom in the compound. The distinction is important because as with many classes of related chemicals, toxicity varies greatly among compounds. For example, chromium (III) compounds include chromium chloride, chromium phosphate, ferrochromite and chromium sulfate, whereas hexavalent or chromium (VI) compounds include chemicals such as ammonium dichromate, barium chromate, chromium trioxide and potassium dichromate. Chromium compounds are classified as known chemical carcinogens, although the evidence is based on selected hexavalent chromium compounds. Chromium (VI) compounds also are far more irritating and corrosive than trivalent chromium compounds, and as such skin ulcerations result from dermal contact and respiratory irritation and distress occur from inhalation exposure. Ingestion may result in necrosis of the renal tubes. Trivalent compounds occur naturally in the environment, however, chromium (IV) compounds are produced during industrial processes. Although there are many applications for chromium compounds of all types in industry, chromium containing stainless steel is by far the largest. Harmful exposure to chromium compounds from alloys is minimal. The exception is inhalation from steel cutting and grinding operations, although deleterious effects result from mechanical as well as chemical action. The majority of chromium compounds releases in the Oklahoma are actually disposals to RCRA Subtitle C landfills and the risk for exposure is extremely low. (Figure 32)

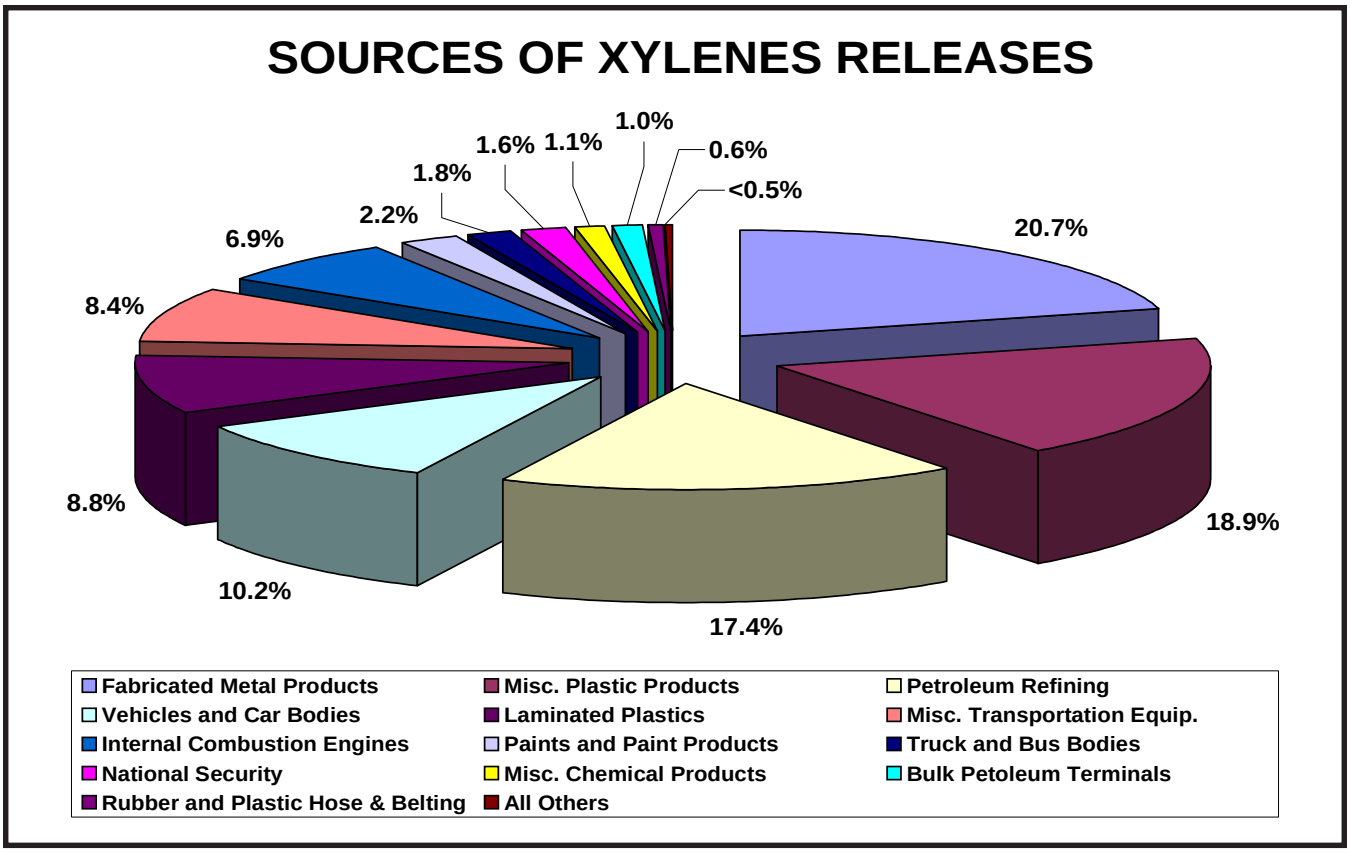


Figure31

Chemicals Reported in 2001

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.

The EHS chemicals reported in greatest quantities are shown in Table H. As in TRI reporting, ammonia is by far the EHS stored in greatest amounts due to agriculture and the need to manufacture nitrogenous fertilizers. Chlorine also is reportable under both programs, however, significantly greater quantities are reported to Tier II as municipal water treatment plants are not covered under TRI. The other of the top five reported EHS chemicals are not reportable under TRI, and therefore no correlation is seen. However, cyclohexylamine is utilized in petroleum refining as are many of the TRI chemicals reported.

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

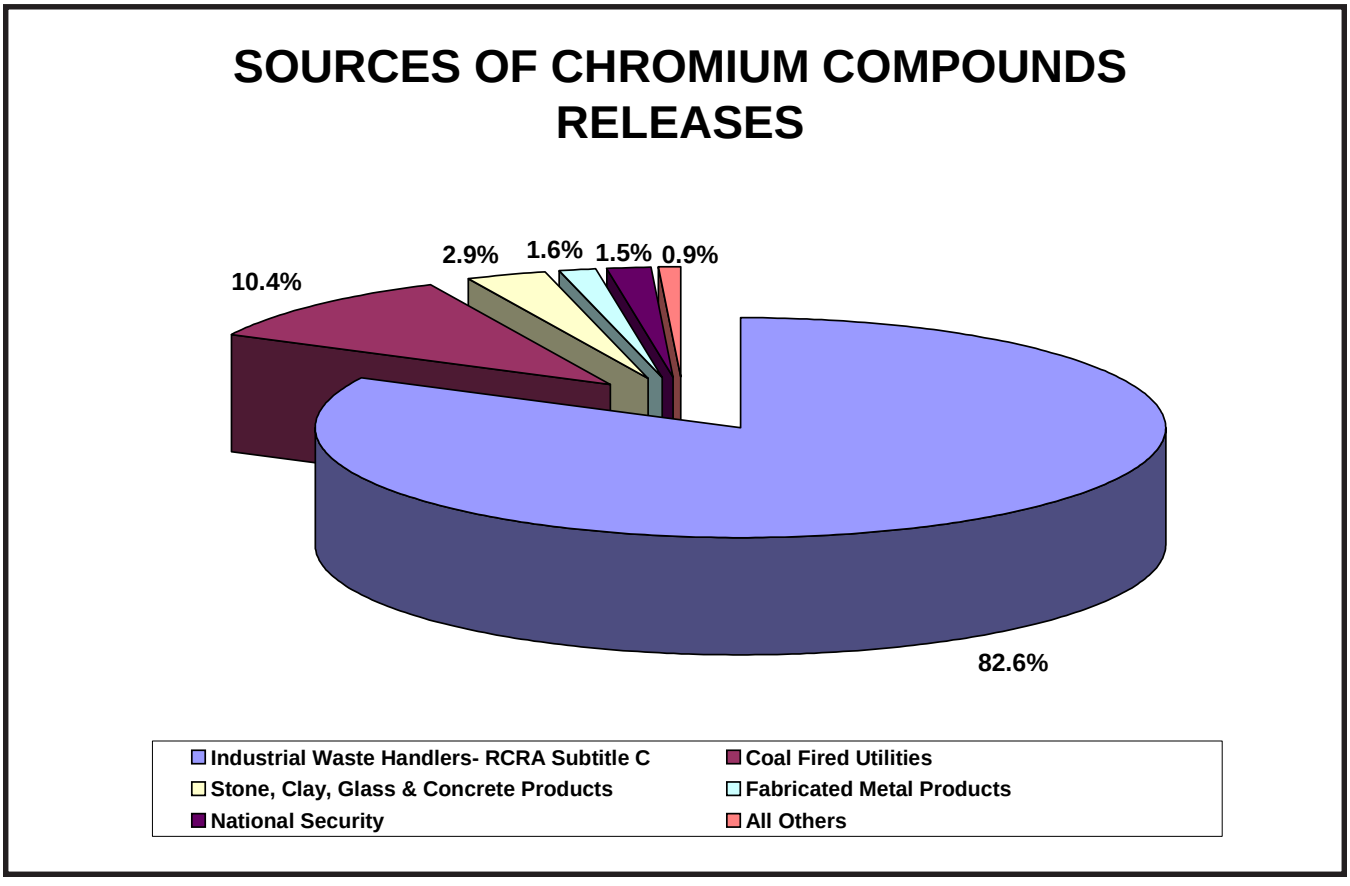


Figure 32

Chemicals Reported in 2001

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.

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 produced 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.

RANK	CHEMICAL	TOTAL POUNDS REPORTED	TOTAL SITES REPORTING
1	AMMONIA	248,569,150	170
2	SULFURIC ACID	81,127,800	568
3	NITRIC ACID	37,396,100	72
4	CYCLOHEXYLAMINE	25,691,600	18
5	CHLORINE	23,555,200	242
6	HYDROFLUORIC ACID	1,879,200	45
7	HYDROGEN PEROXIDE	1,496,550	24
8	SULFUR DIOXIDE	1,461,100	44
9	FORMALDEHYDE	1,403,000	25
10	FLUORINE	500,050	2
11	DIMETHOATE	372,100	53
12	METHYL PARATHION, [LIQUID]	322,050	24
13	TERBUFOS	272,000	13
14	PHOSPHOROUS	256,500	36
15	CARBOFURAN	237,200	46
16	ALDICARB	187,150	17
17	PARATHION	165,550	8
18	HYDROQUINONE	165,050	7
19	HYDRAZINE HYDRATE	134,100	18
20	PHENOL	134,050	17
21	PARAQUAT DICHLORIDE	127,900	29
22	VANADIUM PENTOXIDE	122,050	11
23	ETHYLENEDIAMINE	120,000	6
24	TETRAETHYL LEAD, [LIQUID]	101,000	4
25	OXAMYL	63,550	11

Table H

Chemicals Reported in 2001

Cyclohexyl amine, also known as aminocyclohexane and hexahydroanaline, is a colorless to pale yellow liquid with a strong "fishy" (amine) odor. It is flammable with a flash point of 110 degrees Fahrenheit. It is a somewhat unstable compound and reacts violently with nitric acid and other oxidizers. When cyclohexyl amine is heated to decomposition highly toxic fumes are produced. Most common means of exposure are dermal contact and inhalation. It is a contact irritant for skin, eyes and the respiratory tract. Acute inhalation exposure causes nausea and narcotic effects. This chemical is a suspected mutagen and long-term exposure should be avoided. Cyclohexyl amine is used in pesticides and herbicides and also as a surfactant and emulsifier, especially in boilers and oil field operations. It also is used in the synthesis of paints, pigments, plasticizers and rubber chemicals. This chemical is not reportable 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 2001 industrial facilities covered under EPCRA 313 reported 13,971 pounds of chlorine released.

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 I) 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 organo-chlor pesticides, other highly chlorinated or brominated aromatic compounds, chemicals with multiple, linked aromatic rings

Manufacture, process and otherwise use thresholds	
Aldrin	100 lbs./yr.
Lead and lead cmpds.	100 lbs./yr.
Methoxychlor	100 lbs./yr.
Pendimethalin	100 lbs./yr.
Polycyclic Aromatic Cmpds.	100 lbs./yr.
Tetrabromobisphenol	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.
Octa-styrene	10 lbs./yr.
PCB's	10 lbs./yr.
Pentachlorobenzene	10 lbs./yr.
Toxaphene	10 lbs./yr.
Dioxin and dioxin-like cmpds.	0.1 gm/yr.

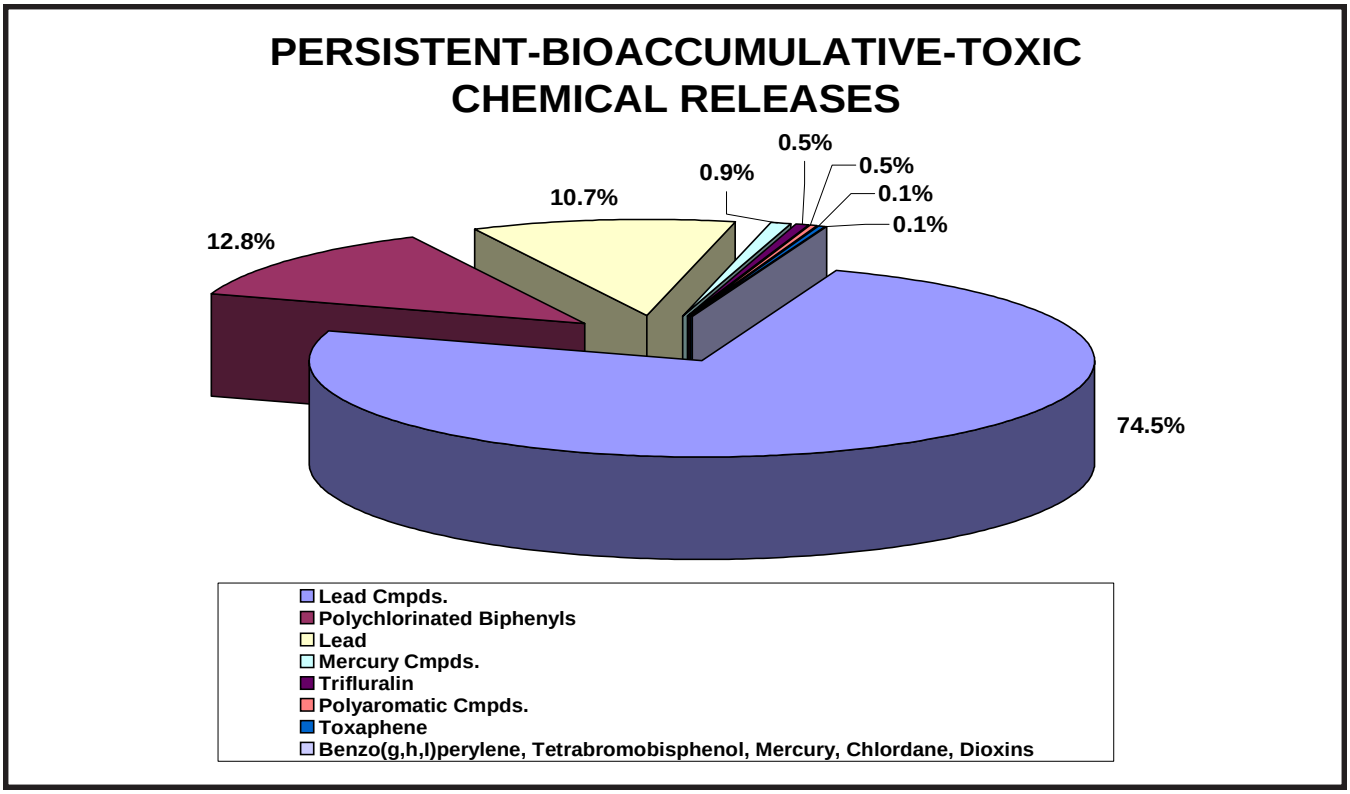


Figure 33

(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 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 twelve Persistent Bioaccumulative Toxic chemicals for 2001. (Figure 33) The number of facilities reporting at least one PBT chemical increased from 104 in 2000 to 178, meaning over half of the TRI facilities in the State reported at least one Persistent, Bioaccumulative and Toxic chemical. The Final Rule for Lead enacted for RY 2001 resulted in the first time reporting by ten facilities. Only two per cent of all TRI releases and 3.7 per cent of total production related wastes reported in Oklahoma for 2001 were from PBTs.

Lead and lead compounds accounted for 85.2 percent of all PBT chemical releases reported for 2001. Twenty-nine of 56 Oklahoma facilities reporting for the first time in 2001 reported lead or lead compounds and correspondingly releases of lead increased by slightly over 52,000 pounds from 2000 to 2001. While the production of steel wire, nails and spikes remains the source of the majority of **elemental lead** releases, (Figure 34), the rise in reported releases of lead is due chiefly to a 41,000-

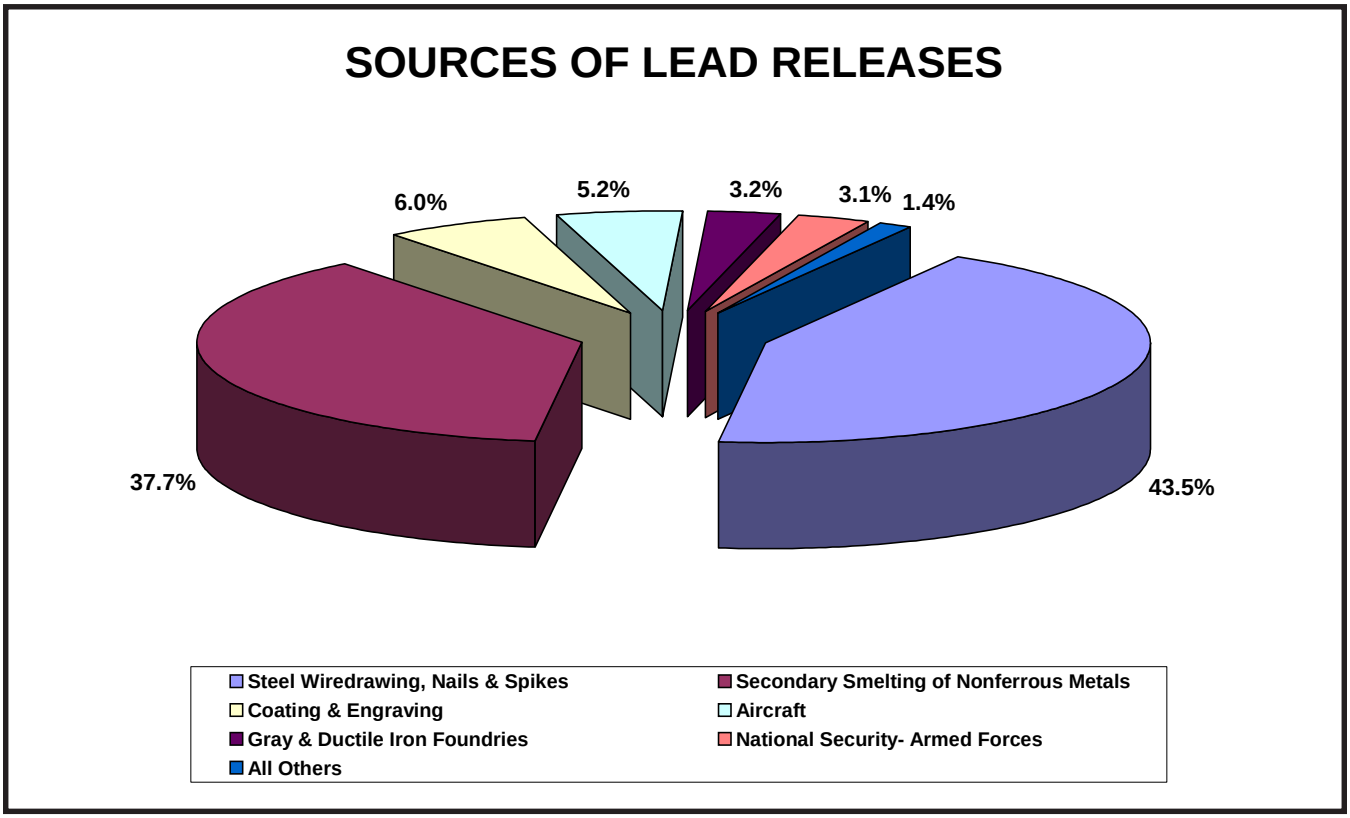


Figure 34

pound increase reported by secondary smelters of nonferrous metals. Increases in reported quantities by coating and engraving facilities, aircraft manufacturers and military bases account for the balance of the lead releases increase. Seventy-seven percent of all **lead compounds** 'releases' were permitted land disposals at highly regulated RCRA Subtitle C hazardous waste facilities. (Figure 35) Releases to these sites have virtually no impact on the environment or human health. Secondary smelting of nonferrous metals, which includes activities such as the refining and smelting of zinc, tin or precious metals or silver recovery from used photographic film, was the source of approximately eight per cent of lead compounds releases. This was the first year that the 100-pound threshold applied for both lead and lead compounds. While releases of lead and lead compounds increased as a result, 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 alloys and therefore will continue to report under the higher thresholds.

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. Sixty-two per cent of all mercury compounds released were permitted disposals into highly regulated RCRA Subtitle C landfills. (Figure 36) Paper milling was the source of 95 per cent of **elemental mercury** releases, (Figure 37) followed by concrete and cement facilities and petroleum refining. While the hazards of mercury and compounds are well documented, it is important to keep the scale in perspective. Combined releases of mercury and mercury compounds totaled less than

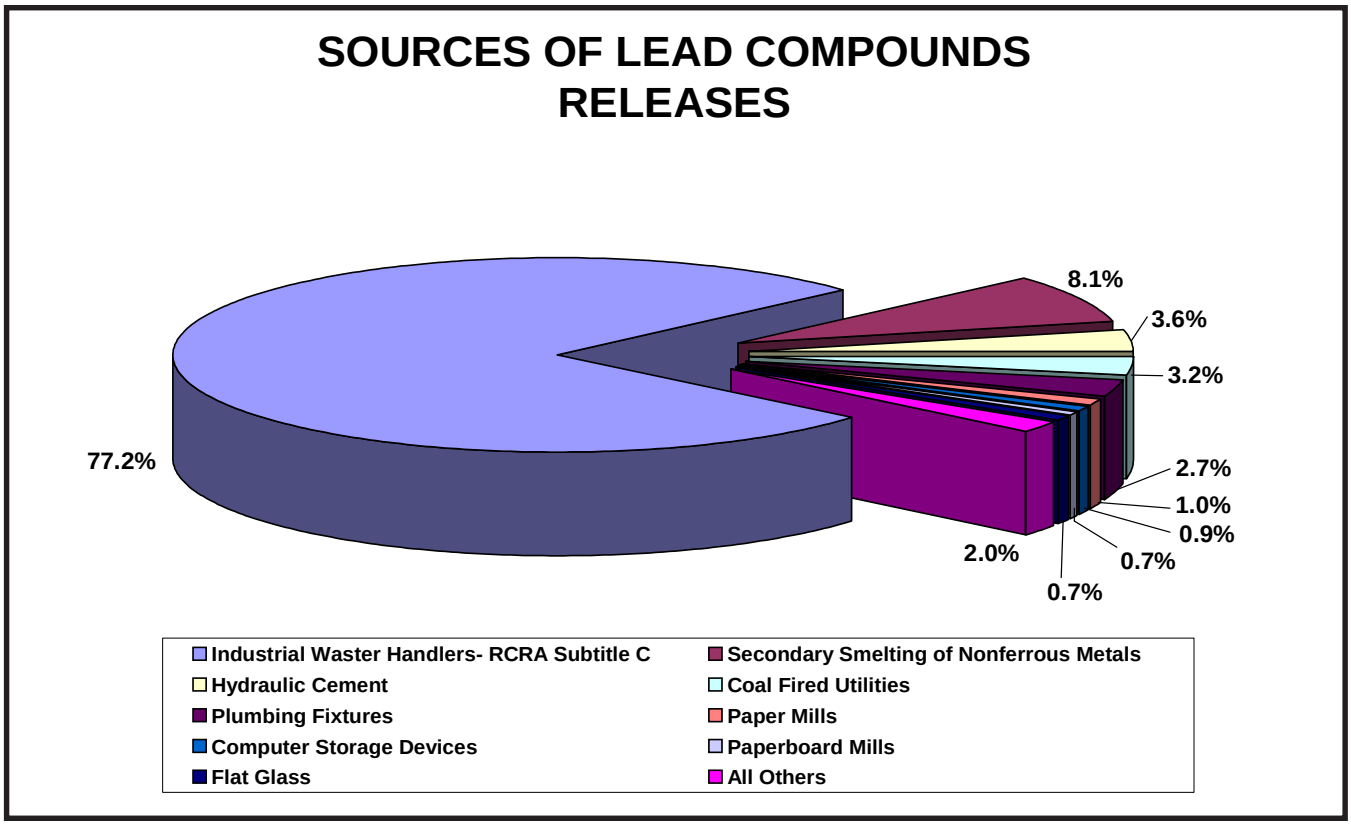


Figure 35

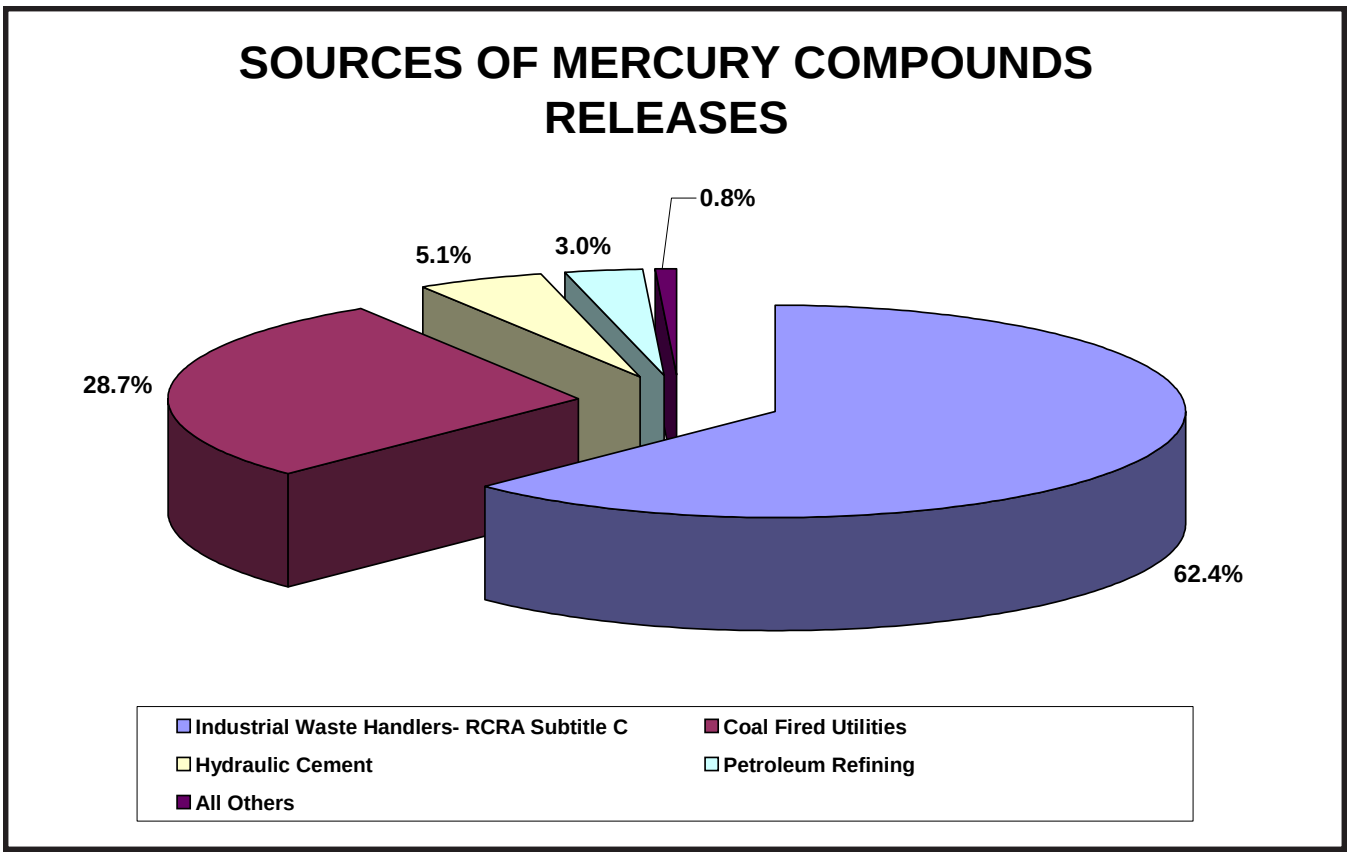


Figure 36

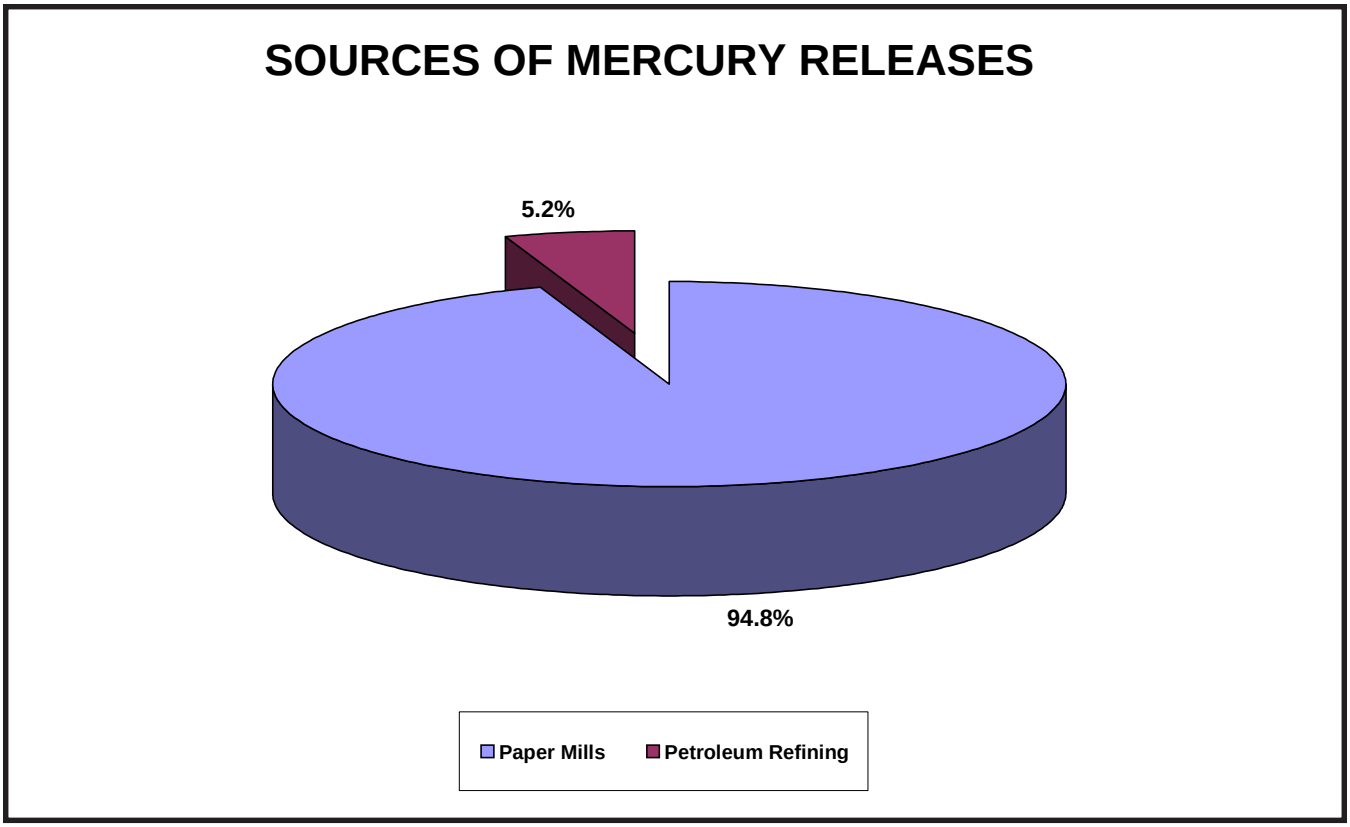


Figure 37

10,000 pounds or about three one thousandths of one percent (.0003%) of the total releases reported in Oklahoma for 2001.

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 38) As major constituents of carbon black, tire manufacturing also is a source of releases.

While **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 and 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 39)

Tetrabromobisphenol A is used as a reactive flame retardant in epoxy, vinyl esters and polycarbonate resins and in polymers, polystyrenes, phenolic resins, adhesives, paper, and textiles. It was reported by only one facility in the State for 2001.

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 commercially in the United States are extremely small quantities for research purposes. Dioxins are the only TRI chemicals with a threshold expressed in grams. Releases of dioxins in 2001 totaled only 440 grams, or

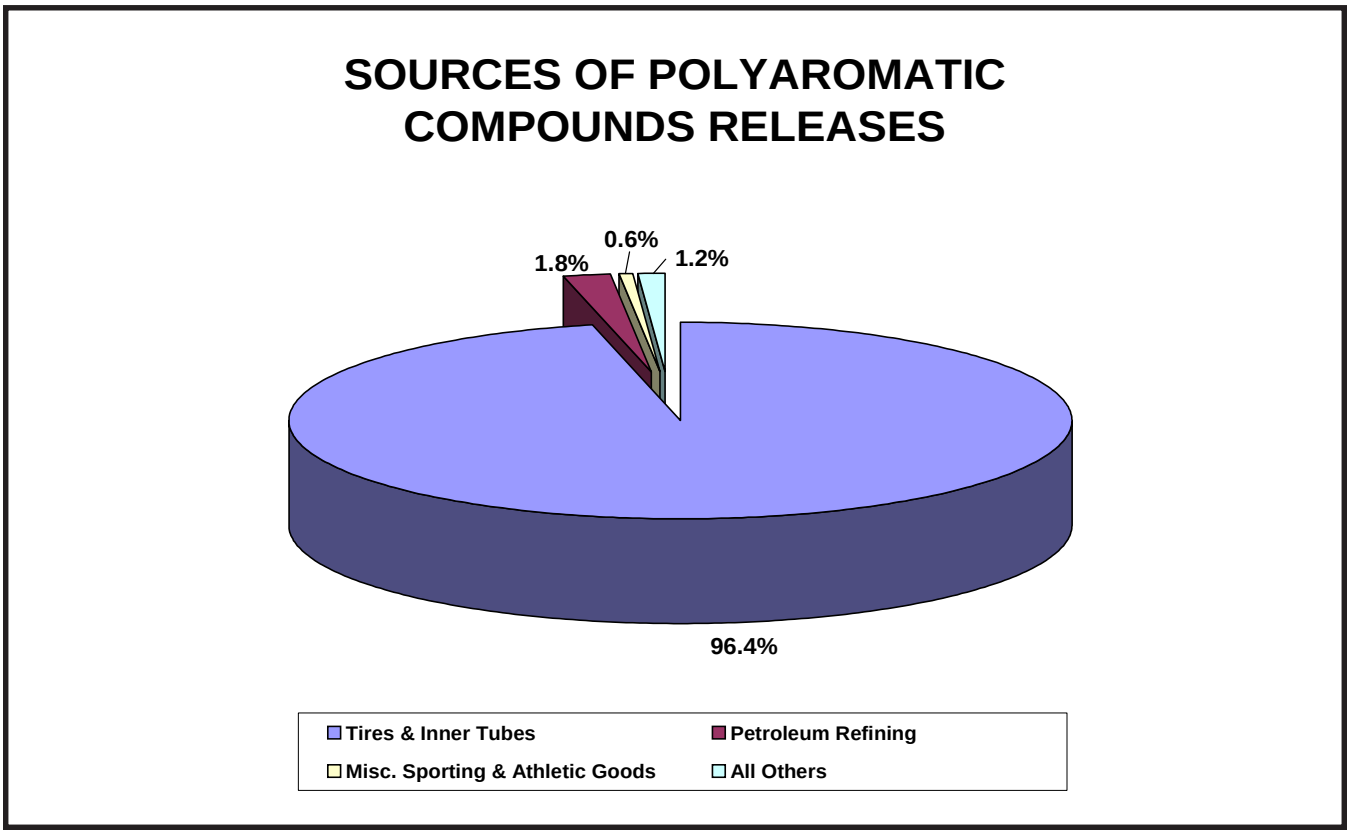


Figure 38

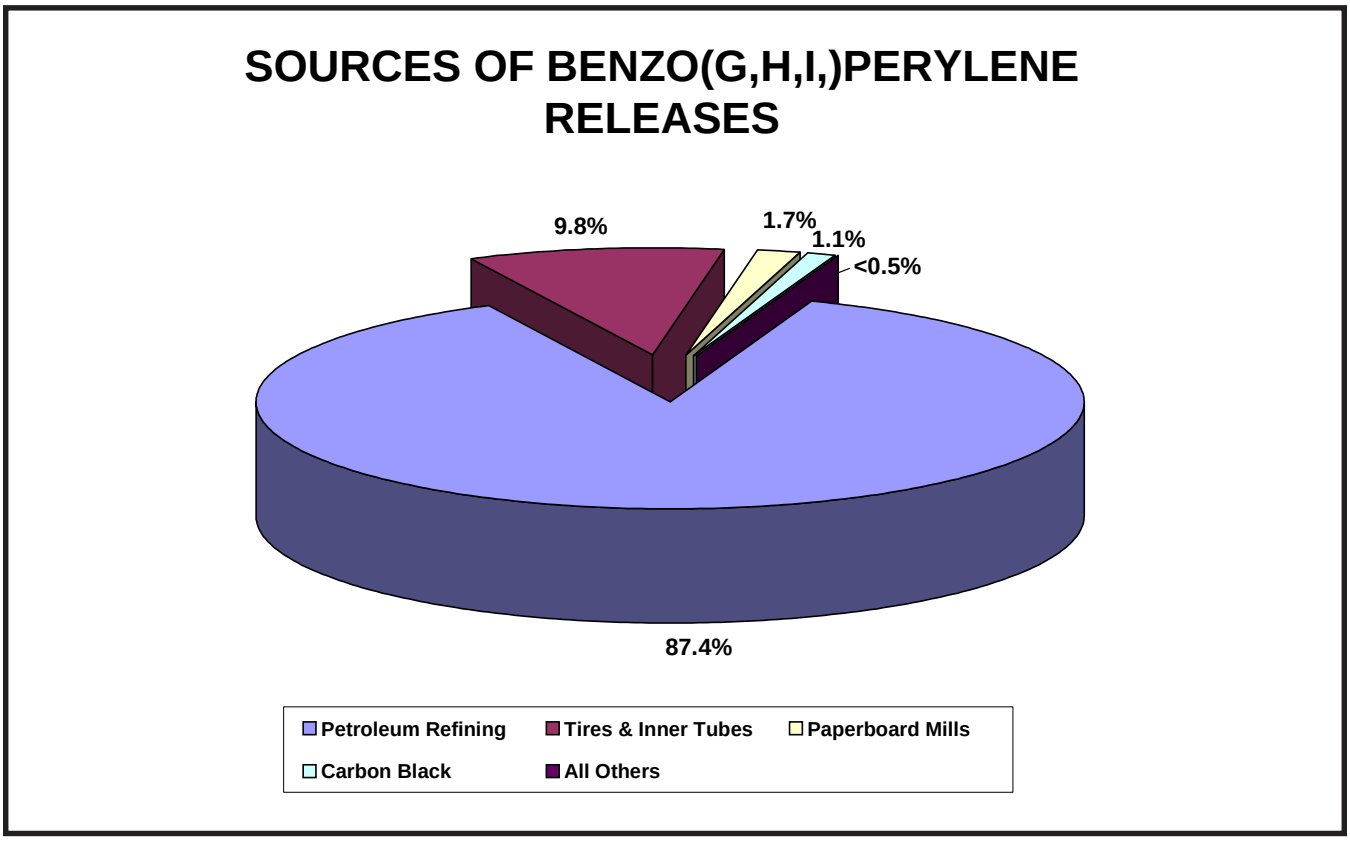


Figure 39

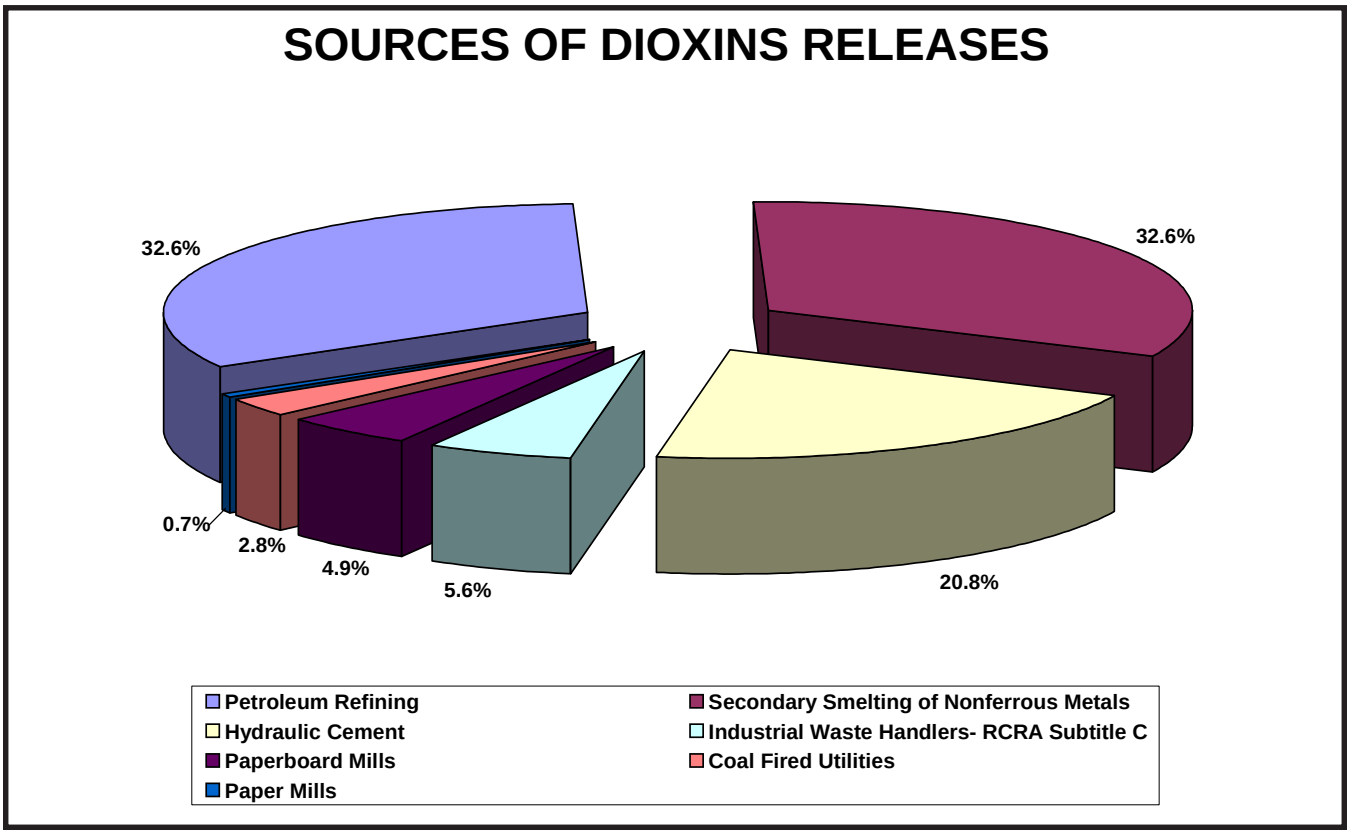


Figure 40

TRI Persistent, Bioaccumulative and Toxic Chemicals

0.97 pounds, and total production related wastes equaled 532 grams or 1.07 pounds for the entire state. (Table J) 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 40)

All reported releases in 2001 of polychlorinated biphenyls (PCB's), chlordane, 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. 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.

CHEMICAL	NO. FAC'S.	AIR RELEASES	LAND RELEASES	WATER RELEASES	UG INJECTION
Benzo(g,h,l)perylene	12	138 lbs.	5 lbs.	4 lbs.	0
Chlordane	1	0	41 lbs.	0	0
Lead	59 (10 new)	14,714 lbs.	43,718 lbs.	19 lbs.	0
Lead Cmpds.	40	6,467 lbs.	397,852 lbs.	260 lbs.	557 lbs.
Mercury	2	55 lbs.	0	1 lb.	38 lbs.
Mercury Cmpds.	18	1,307 lbs.	3,493 lbs.	7 lbs.	0
Polyaromatic Cmpds.	23	2,323 lbs.	172 lbs.	17 lbs.	0
Polychlorinated Biphenyls	2	20 lbs.	69,557 lbs.	0	0
Tetrabromo bisphenol	1	62 lbs.	0	0	0
Toxaphene	1	0	504 lbs.	0	0
Trifluralin	1	0	2,545 llbs.	0	0
Dioxin & dioxin-like Cmpds.	18	83.00 gm	0	0	0
Totals for PBT's	***178***	***25,086 lbs.***	***517,887 lbs.***	***308 lbs.***	***595 lbs.***

CHEMICAL	TOT. RELEASES	TRANSFERS	REUSE	TREATMENT	TPRW
Benzo(g,h,l)perylene	147 lbs.	59 lbs.	4,222 lbs.	5,047 lbs.	9,475 lbs.
Chlordane	41 lbs.	0	0	0	41 lbs.
Lead	58,451 lbs.	1,180,461 lbs.	1,303,979 lbs.	1,420 lbs. **	2,542,891 lbs.
Lead Cmpds.	405,136 lbs.	843,121 lbs.	783,196 lbs.	2,868 lbs. **	2,031,453 lbs.
Mercury	94 lbs.	8 lbs.	0	0	102 lbs.
Mercury Cmpds.	4,807 lbs.	631 lbs.	0	11 lbs. **	5,438 lbs.
Polyaromatic Cmpds.	2,512 lbs.	0	306,772 lbs.	125,140 lbs.	434,424 lbs.
Polychlorinated Biphenyls	69,577 lbs.	0	0	0	69,577 lbs.
Tetrabromo bisphenol	62 lbs.	0	0	0	62 lbs.
Toxaphene	504 lbs.	0	0	0	504 lbs.
Trifluralin	2,545 lbs.	0	0	0	2,545 lbs.
Dioxin & dioxin-like Cmpds.	83.00 gm	48.00 gm	0	1.00 gm	132.00 gm
Totals for PBT's	***543,876 lbs.***	***2,024,280 lbs.***	***2,398,169 lbs.***	***130,187 lbs.***	***5,096,512 lbs.***

** misreported

Table J

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

Glossary

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

Glossary

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.