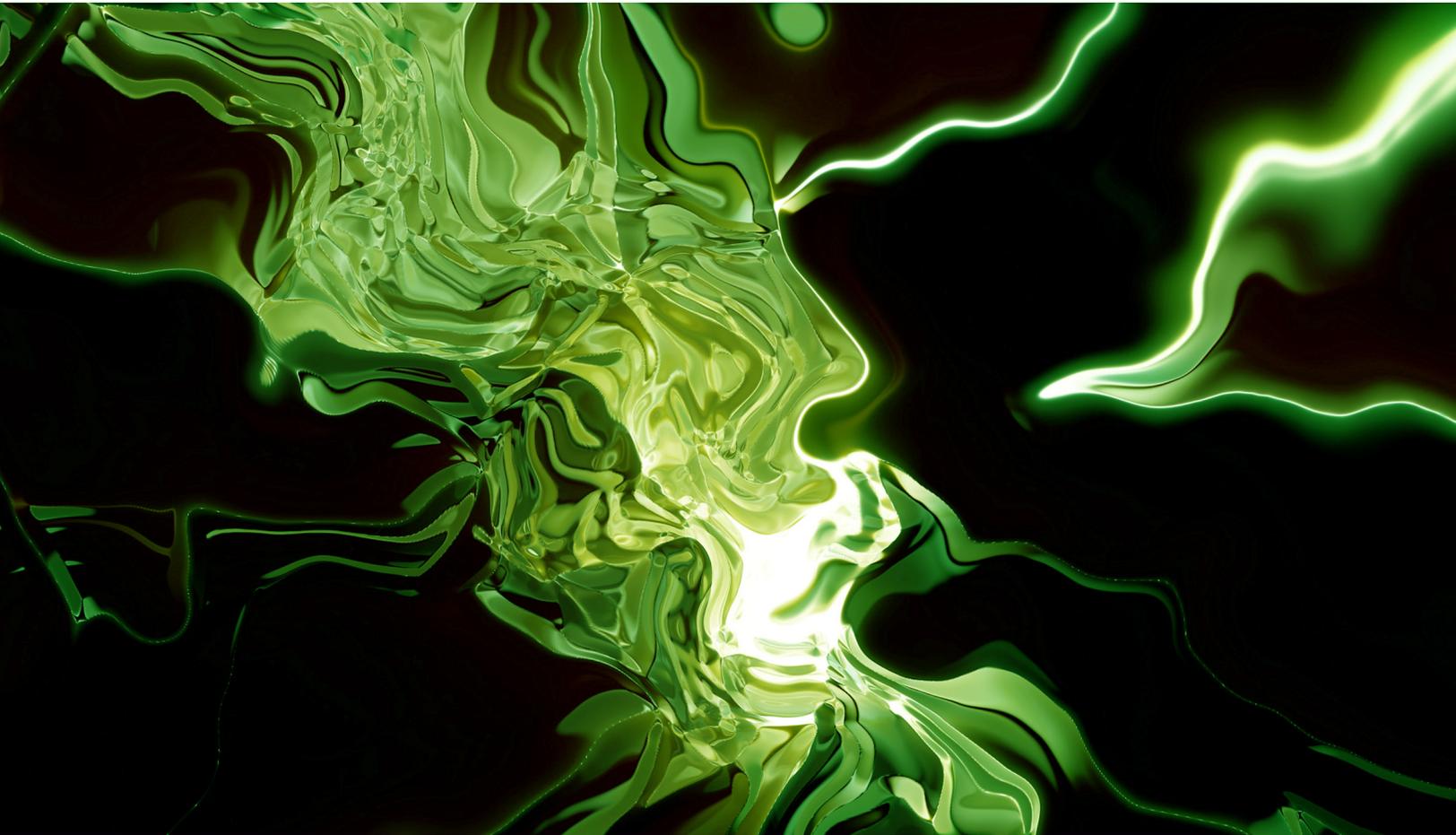


Oklahoma Toxic Release Inventory 2006 Report



O K L A H O M A
DEPARTMENT OF ENVIRONMENTAL QUALITY

...for a clean, attractive, prosperous Oklahoma

Contents

I.	Executive Summary	4
II.	Background	5
III.	TRI Reporting Requirements	7
IV.	Limitations of TRI Data	9
V.	2006 TRI Overview	11
VI.	2006 Tier II Overview	26
VII.	Facilities Reporting in 2006	28
VIII.	Chemicals Reported in 2006	33
IX.	Persistent, Bioaccumulative and Toxic Chemicals	44
X.	Glossary of Terms	52

Prepared by: Jami Murphy

**Oklahoma Department of
Environmental Quality**

707 N. Robinson

P.O. Box 1677

Oklahoma City, OK 73101-1677

Executive Summary

The 2006 Toxics Release Inventory (TRI) indicates environmental releases of toxic chemicals relative to total toxic wastes in Oklahoma continue to trend downward. TRI is part of the federal Emergency Planning and Community Right to Know Act (EPCRA) and is administered by the U.S. Environmental Protection Agency (EPA). The law requires covered facilities in Oklahoma to submit annual reports to the Oklahoma Department of Environmental Quality (DEQ) which compiles a TRI database for the entire state. The TRI reports provide information on legal emissions, transfers, treatment and reuse of over 600 toxic chemicals used in the manufacture or processing of a wide variety of products. Covered industries engage in manufacturing, coal-fired electric power generation, commercial hazardous waste disposal, solvent recovery or serve as bulk petroleum terminals. Facilities in these categories also must have the equivalent of at least 10 full time employees and use one or more listed toxic chemicals. For 2006, DEQ received 1,247 reports from 324 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, onto land or into deep underground injection wells. Transfers are the quantities of chemicals discharged into public sewers and off-site landfills or removed to other disposal facilities. Re-use includes the quantity of recycled chemicals and the quantity consumed in energy recovery operations. The figure

for treatment is both on-site and off-site treatments that neutralize or destroy the toxic chemicals. The sum of these activities yields the figure for total production related wastes generated in the State in 2006.

Oklahoma companies reported 25.5 million pounds released in 2006. Air emissions continued to decline significantly as did disposals to underground injection wells. The TRI numbers indicate that total air releases decreased by almost 20 percent since 2000. Reuse, primarily recycling, increased from 2000 to 2006 by 36.2 million pounds, an increase of over 36 percent. Over 54 million pounds of chemicals were destroyed by treatment, and 4.3 million pounds of chemicals were transferred off-site for proper disposal. The total of these numbers sets the quantity of Total Production Related Wastes at 183.9 million pounds in the State for 2006.

Expansions in the program since 1994 both doubled the number of reportable chemicals and also required additional industries to report, making reductions even more significant. Enacted seven years ago, the Persistent, Bioaccumulative and Toxic (PBT) rule greatly lowered reporting thresholds for TRI chemicals with these characteristics. Chemicals classified as PBTs possess the potential to seriously impact the environment and are tracked at significantly lower levels under the new requirements. The total for all releases of PBT chemicals was 476,471 pounds in 2006 or less than two percent of total releases Statewide. This is the nineteenth year the DEQ has compiled TRI information and this is the eighth 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 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 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 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 Local Emergency Planning Committees (LEPC) 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 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 specific chemicals. The total of release, transfer, treatment 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 LEPCs, and local fire departments. Beginning with the 2006 data, DEQ mandated on-line submission of Tier II data and offered grants to LEPCs that disseminate the information for their respective counties to responding fire departments.

The DEQ receives TRI report forms annually from those Oklahoma industries covered by Section 313. The DEQ compiles and maintains a TRI database, reconciles it to the EPA database, analyzes the data and publishes a summary. In 2007, DEQ received and processed 1,247 reports from 324 facilities for the 2006 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. Toxic Release

continued on next page...

Inventory 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.

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 Reporting Year 2006, DEQ received 33,702 Tier II forms, 1,124 of those describing storage of a chemical designated as an Extremely Hazardous Substance (EHS).

Toxic Release Inventory 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, LEPCs, 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 DEQ's Customer Services Division/SARA Title III Programs at 405-702-1000 or at 1-800-869-1400 or by visiting the DEQ website at: <http://www.deq.state.ok.us/CSDnew/saratitleiii/index.htm>

TRI 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 North American Industrial Classification System (NAICS) codes. (Table 1);
- 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 PBTs.

Facilities required to report to TRI engaged primarily in a wide range of manufacturing activities. Additional industries linked to manufacturing were added for 1998 including fossil fuel electricity generation plants, hazardous waste treatment, storage and disposal sites, bulk petroleum terminals, chemical wholesalers and some mining activities are required to report under the program. Initially, covered industries were listed by Standard Industrial Classification (SIC) codes; however, 2006 is the initial year for facilities to be identified and report using NAICS codes. All industries operating under former SIC codes are included in the currently covered NAICS codes.

A facility may need to report if it used one or more of the listed chemicals, even if it had no chemical releases, as reporting thresholds are based on the quantities of

continued on next page...

Table 1

NAICS	Industrial Group
111998	All Other Misc. Crop Farming
211112	Natural Gas Liquid Extraction
212111	Bituminous Coal & Lignite Surface Mining
212112	Bituminous Coal & Underground Mining
212113	Anthracite mining
212221	Gold Ore Mining
212222	Silver Ore Mining
212231	Lead Ore & Zinc Ore Mining
212234	Copper Ore & Nickel Mining
212229	Other Metal Ore Mining
212324	Kaolin and Ball Clay Mining
212325	Mining
212393	Other Chemical & Fertilizer Mining
212399	All Other Nonmerallic Mineral Mining
221111	Hydroelectric Power Generation
221112	Fossil Fuel Electric Power Generation
221113	Nuclear Electric Power Generation
221119	Other electric Power Generation
221121	Electric bulk Pwer Transmission Control
221122	Electric Power Distribution
311---	Food Manufacturing
312---	Beverage & Tobacco Manufacturing
313---	Textile Mills
314---	Textile Product Mills
315---	Apparel Manufacturing
316---	Leather and Allied Products
321---	Wood Products
322---	Paper Manufacturing
323---	Printing & Related Activities
324---	Petroleum & Coal Products
325---	Chemical Manufacturing
326---	Plastics & Rubber Products
327---	Nonmetallic Mineral Products
331---	Primary Metal Manufacturing
332---	Fabricated Metal Products
333---	Machinery Manufacturing
334---	Computer & Electronic Products
335---	Electrical Equipment, Appliances & Components
336---	Transportation Equipment Manufacturing
337---	Furniture & Related Products
339---	Misc. Manufacturing
424690	Chemical & Allied Products Wholesalers
424710	Petroleum Bulk Stations & Terminals
425110	Business to Business Electronics
425120	Wholesale Trade Agents & Brokers
488390	Other Support Activities for Water Transportation
511110	Newspaper Publishers
511120	Periodical Publishers
511130	Book Publishers
511140	Directory and Mailing List Publishers
511191	Greeting Card Publishers
511199	All Other Publishers
512220	Integrated Record Production/Distribution

Table 1 (continued...)

512230	Music Publishers
516110	Internet Publishing & Broadcasting
541710	Research & Development in Science & Engineering
562112	Hazardous Waste Collection
562211	Hazardous Waste Treatment and Disposal
562212	Solid Waste Landfill
562213	Solid Waste Combustors & Incinerators
562219	Nonhazardous Waste Treatment & Disposal
562920	Materials Recovery Facilities
811490	Pleasure Boat Building & Repair
928110	National Security

chemicals manufactured, processed or used rather than discharges or emissions. The abbreviated Form A may be used for reporting if the total quantity released of a chemical or chemical group is less than 500 pounds and the total amount manufactured, processed or otherwise used is less than 1,000,000 pounds.

Exemptions to the reporting requirements for Section 313 are designed to reduce the burden associated with comparatively small quantities of chemicals used and are applicable in limited circumstances. The *de minimis* concentration exemption applies to reporting if the chemical comprises less than 1 per cent (<1%) of a mixture, even though the total quantity of the chemical exceeds the reporting threshold. However, for 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 minimis* 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 quantities used would 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, the article is not significantly modified and 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, DEQ, or visit the following website: <http://epa.gov/tri/>

Reporting Year 2000 was the first year for implementation of the rule for PBT chemicals, and 2001 was the first year the Final Rule for lead was in effect. Thresholds for PBTs 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 to reporting of PBTs. A table listing PBT chemicals and a more detailed description of the program is included in the section “TRI Persistent, Bioaccumulative and Toxic Chemicals” in this report.

Limitations of TRI Data

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

The majority of releases reported in 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.

Toxic Release Inventory expanded for RY 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 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 PBT chemicals is an initial step in addressing the variability. (See “Chemicals Reported in 2006”, on page 33) Toxic Release Inventory reporting requirements are based on the quantities of chemicals used and facility classifications, rather than 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

continued on next page...

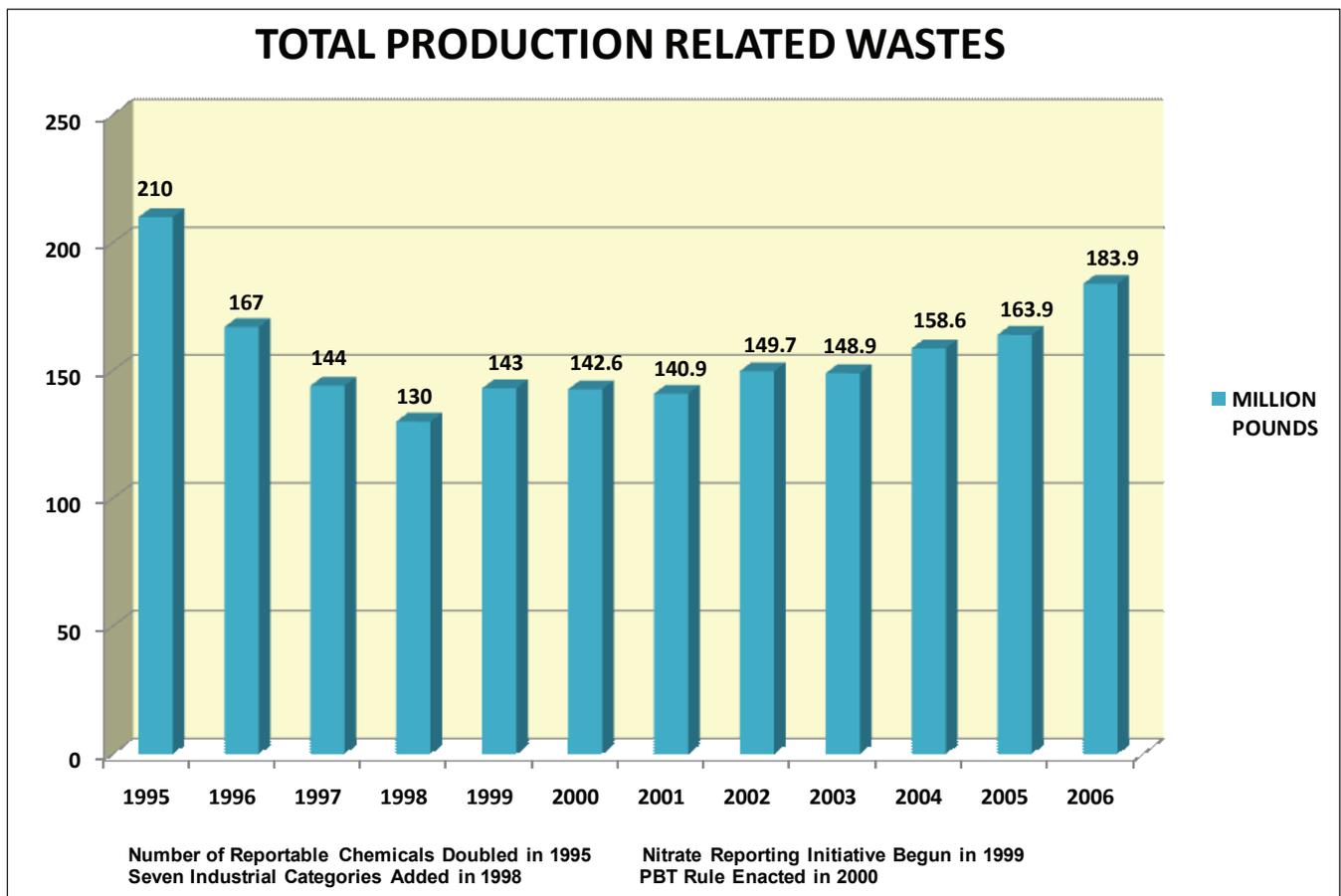
are provided by facilities for each reporting year and can be used for normalizing year-to-year comparisons of quantities released or managed; however, this assumes a direct linear relationship between production levels and wastes generated, which is not always accurate. For example, total wastes may fall as productivity improves due to waste reduction or improved process efficiency. Also productivity ratios will not take into account chemical releases resulting from any remedial action or one-time event. These factors also must be considered when reviewing TRI data.

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.

Table 2

County	# Fac.	Air	Land	Injection	Water	One Time	Tot. On-Site Rel.	Trans. Disposal
Adair	2	52,811	0	0	0	0	52,811	0
Alfalfa	0	0	0	0	0	0	0	0
Atoka	0	0	0	0	0	0	0	0
Beaver	0	0	0	0	0	0	0	0
Beckham	0	0	0	0	0	0	0	0
Blaine	1	0	0	0	0	0	0	0
Bryan	3	155,030	0	0	0	0	155,030	37,137
Caddo	0	0	0	0	0	0	0	0
Canadian	9	49,152	0	0	0	0	49,152	755
Carter	8	246,332	0	0	182,956	0	429,288	207,881
Cherokee	2	235	0	0	0	0	235	5
Choctaw	1	251,133	275,203	0	0	0	526,336	0
Cimarron	0	0	0	0	0	0	0	0
Cleveland	3	8,868	0	0	5	7,684	16,557	16,836
Coal	0	0	0	0	0	0	0	0
Comanche	4	36,999	29	0	450	0	37,478	76,475
Cotton	0	0	0	0	0	0	0	0
Craig	1	0	0	0	0	0	0	0
Creek	12	10,085	15,502	0	0	0	25,587	427,160
Custer	4	15,505	0	0	0	0	15,505	0
Delaware	0	0	0	0	0	0	0	0
Dewey	1	0	0	0	0	0	0	0
Ellis	0	0	0	0	0	0	0	0
Garfield	5	2,739,077	0	0	775,258	0	3,514,335	98
Garvin	1	127,756	1,280	0	61,543	2	190,581	197,386
Grady	5	39,349	0	0	0	14	39,363	17,325
Grant	0	0	0	0	0	0	0	0
Greer	0	0	0	0	0	0	0	0
Harmon	0	0	0	0	0	0	0	0
Harper	0	0	0	0	0	0	0	0
Haskell	0	0	0	0	0	0	0	0
Hughes	1	0	0	0	0	0	0	0
Jackson	0	0	0	0	0	0	0	0
Jefferson	1	11,546	0	0	0	0	0	0
Johnston	0	0	0	0	0	0	0	0
Kay	10	596,160	2,709	0	42,967	153	641,989	56,785
Kingfisher	2	36,174	0	0	0	0	36,174	0
Kiowa	0	0	0	0	0	0	0	0
Latimer	1	0	0	0	0	0	0	0
Leflore	3	258,188	0	0	0	0	258,188	524,107
Lincoln	1	3,240	5,890	0	0	0	9,130	0
Logan	0	0	0	0	0	0	0	0
Love	0	0	0	0	0	0	0	0
Major	1	1324	4,011,085	0	0	0	4,012,409	0
Marshall	3	117,090	2,440	0	0	0	119,530	33,356
Mayer	12	173,860	717,901	0	1,375,422	0	2,267,183	465
Mcclain	0	0	0	0	0	0	0	0
Mccurtain	7	3,289,723	301,153	0	614,200	0	4,205,076	50,553
Mcintosh	1	12,640	0	0	0	0	12,640	0
Murray	0	0	0	0	0	0	0	0
Muskogee	9	958,400	16,245	0	36,324	14,838	1,025,807	348,647
Noble	3	247,455	0	0	1,230	0	248,685	26,709
Nowata	2	0	0	0	0	0	0	0
Ofuskee	0	0	0	0	0	0	0	0
Oklahoma	48	656,439	0	0	12	6,776	663,227	86,629
Okmulgee	2	0	0	0	20,505	0	20,505	0
Osage	1	996,650	0	240	0	0	996,890	0
Ottawa	3	288,358	0	0	0	0	288,358	0
Pawnee	0	0	0	0	0	0	0	0
Payne	4	144,796	0	0	0	3	144,799	104,797
Pittsburg	2	22,593	244,513	0	0	0	267,106	85,145
Pontotoc	2	61,663	7,146	0	0	0	68,809	0
Pottawatomie	7	77,770	0	0	0	0	77,770	17,354
Pushmataha	1	250	0	0	0	0	250	796
RoGer Mills	0	0	0	0	0	0	0	0
Rogers	25	1,910,998	671,100	0	160,487	200	2,742,785	294,082
Seminole	3	72,053	0	0	0	0	72,053	0
Sequoyah	2	26,874	3,516	0	0	0	30,390	0
Stephens	5	12,789	0	0	0	0	12,789	0
Texas	3	4,209	0	0	0	0	4,209	15
Tillman	1	0	0	0	0	0	0	83,415
Tulsa	81	825,734	1,468	52,868	73,603	0	953,673	895,661
Wagoner	5	803	0	0	5	0	808	0
Washington	4	1,900	0	1,369	69	1	3,339	703,379
Washita	0	0	0	0	0	0	0	0
Woods	2	9,960	0	0	0	0	9,960	0
Woodward	4	555,500	72,010	0	63,300	14,500	705,310	869

Figure B



- 54,800 pounds disposed in underground injection wells
- 3.4 million pounds discharged to surface waters.
- 44,000 pounds of one time releases (Figure D)

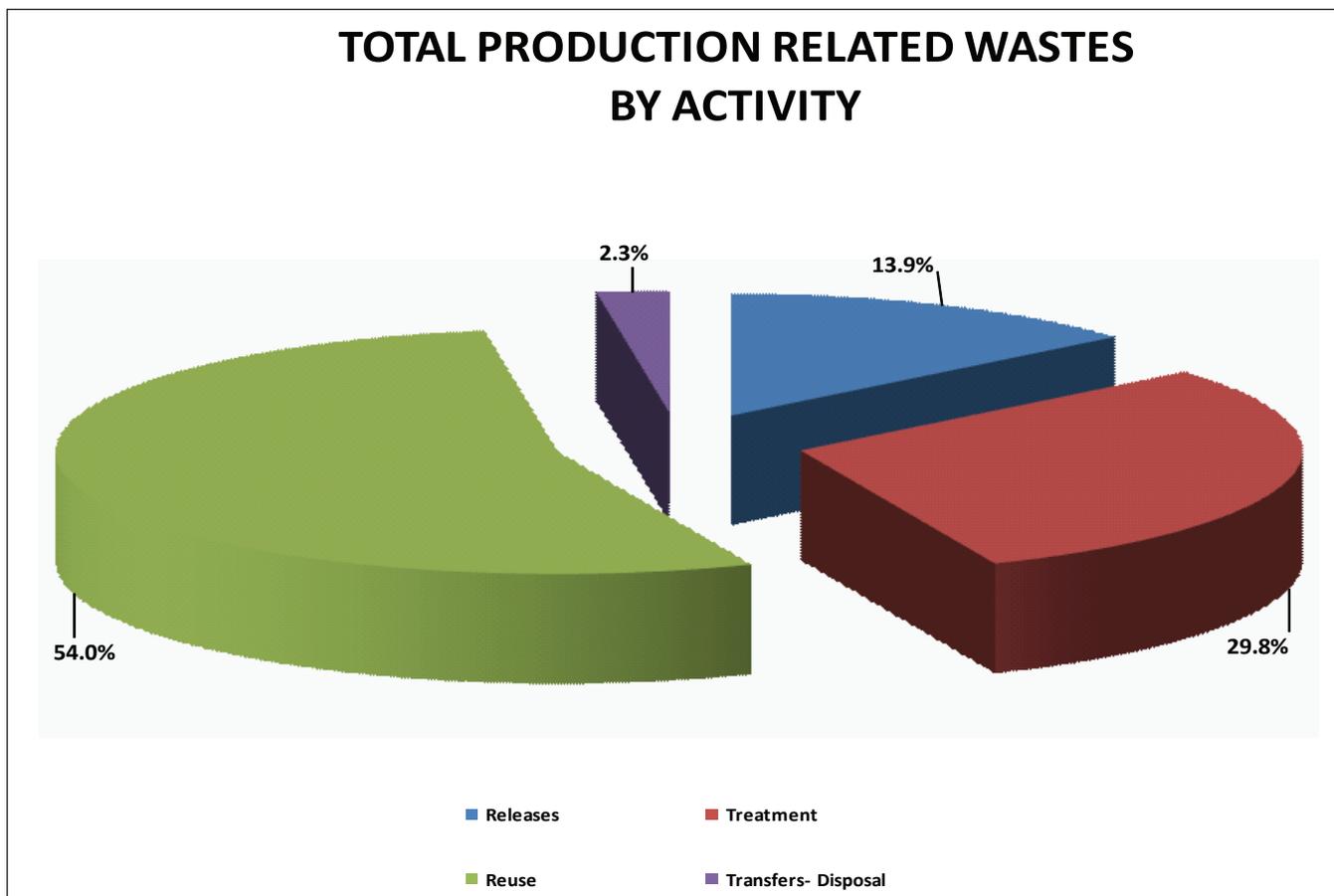
Releases

Total on-site releases include all discharges to air, land, water or underground injection wells of any TRI reportable chemicals that occur within a facility's property lines. Permitted, non-permitted and accidental releases are reported. Oklahoma companies reported 25.5 million pounds released in 2006, a decrease of almost 33 percent since industries were added for 1998. (Figure E) On-site releases accounted for only 13.9 percent of the Total Production Related Wastes managed in 2006 in Oklahoma.

Total **air releases** are the sum of permitted stack releases and fugitive air releases, and also can be considered point source or non-point source emissions respectively. Fugitive emissions result largely from the natural volatility of some chemical compounds and are defined as any air releases that do not go through a confined air stream. Evaporation, equipment leaks or releases from building ventilation systems are possible sources of fugitive releases. Stack air releases occur through confined air streams such as stacks, ducts or pipes. Overwhelmingly stack releases are permitted and regulated under the Clean Air Act. For 2006, 79.8 percent of all reportable on-site air releases in Oklahoma were stack emissions. (Figure F)

Total air releases as reported under TRI appeared to increase significantly from 1997 to 1998 when new industries

Figure C



added to the program reported for the first time, especially coal-fired electric utilities. However, the change in quantities reported to TRI for air releases indicated an increase in the actual number of facilities reporting rather than a true increase in reportable air emissions. Yet even with the rise in the number and size of facilities beginning with RY 1998, total air releases as reported to TRI continue to decrease, dropping 8.3 million pounds or 35 percent in the past eight years, from the time the new reporting facilities were introduced. **(Figure G)** For RY 2006, total air emissions continued to decrease, demonstrating the goal of cleaner air in Oklahoma is being attained through the continued success between DEQ sponsored programs and the efforts of industries.

Total **on-site releases to land** include surface impoundments, land application, use of permitted landfills or other releases

to land within the boundaries of a facility. A significant increase in the numbers reported for total land releases also occurred for RY 1998 when industrial waste handlers permitted under RCRA Subtitle C were required to report to TRI for the first time. **(Figure H)** Disposal by this type of facility accounted for 16 percent of total releases in 2006 (see Facilities Reporting in 2006) and over 58 percent of all land releases. **(Figure I)** Additionally, Oklahoma treatment, storage, and disposal facilities receive transfers from both in-state and out-of-state sites for managed disposal of toxic wastes. Transfers made from in-state facilities to in-state TSD's result in a "double counting effect", first as off-site transfers for disposal then as releases to RCRA Subtitle C landfills and surface impoundments.

Disposals to **deep underground injection wells** are considered as releases
continued on page 19...

Figure D

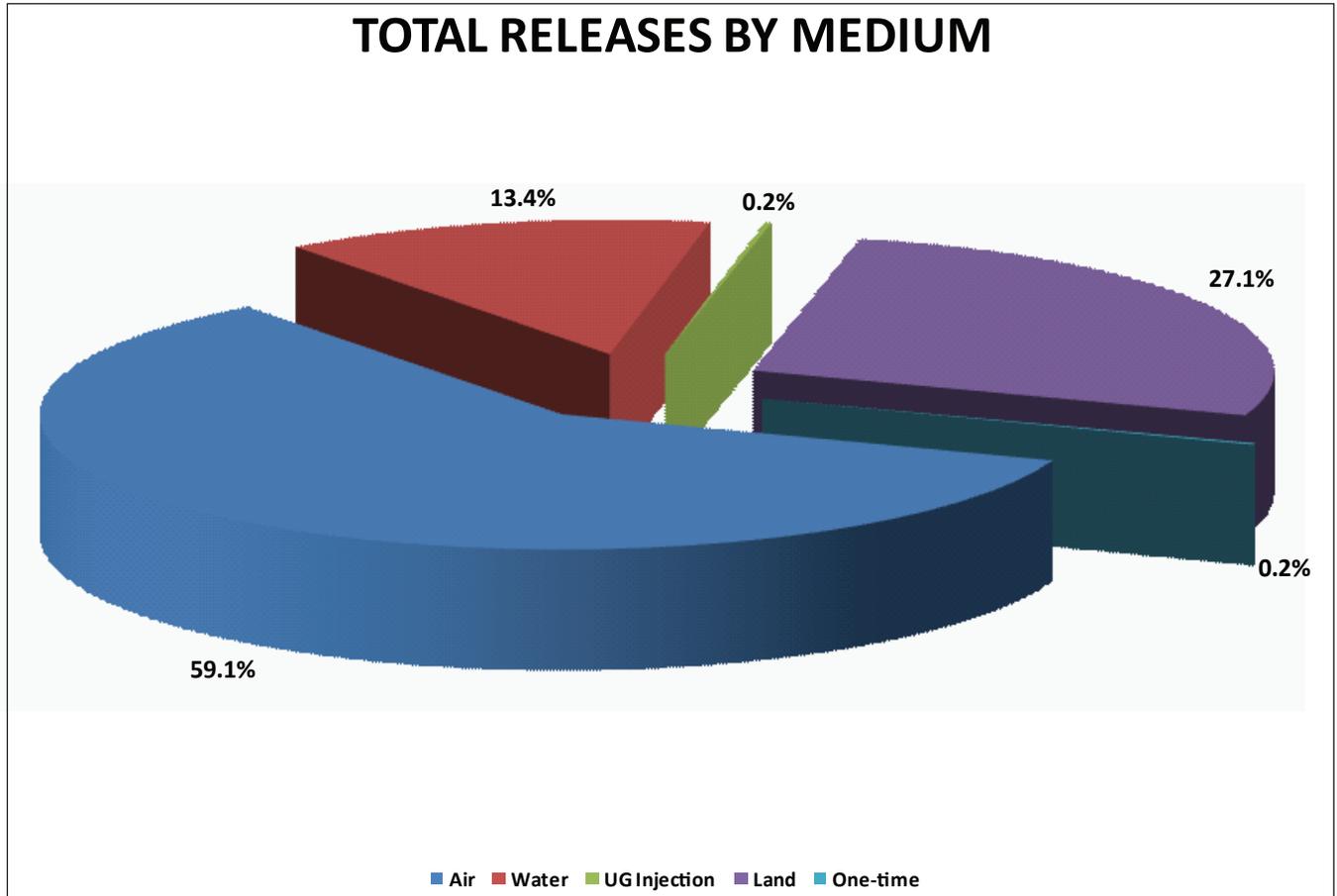


Figure E

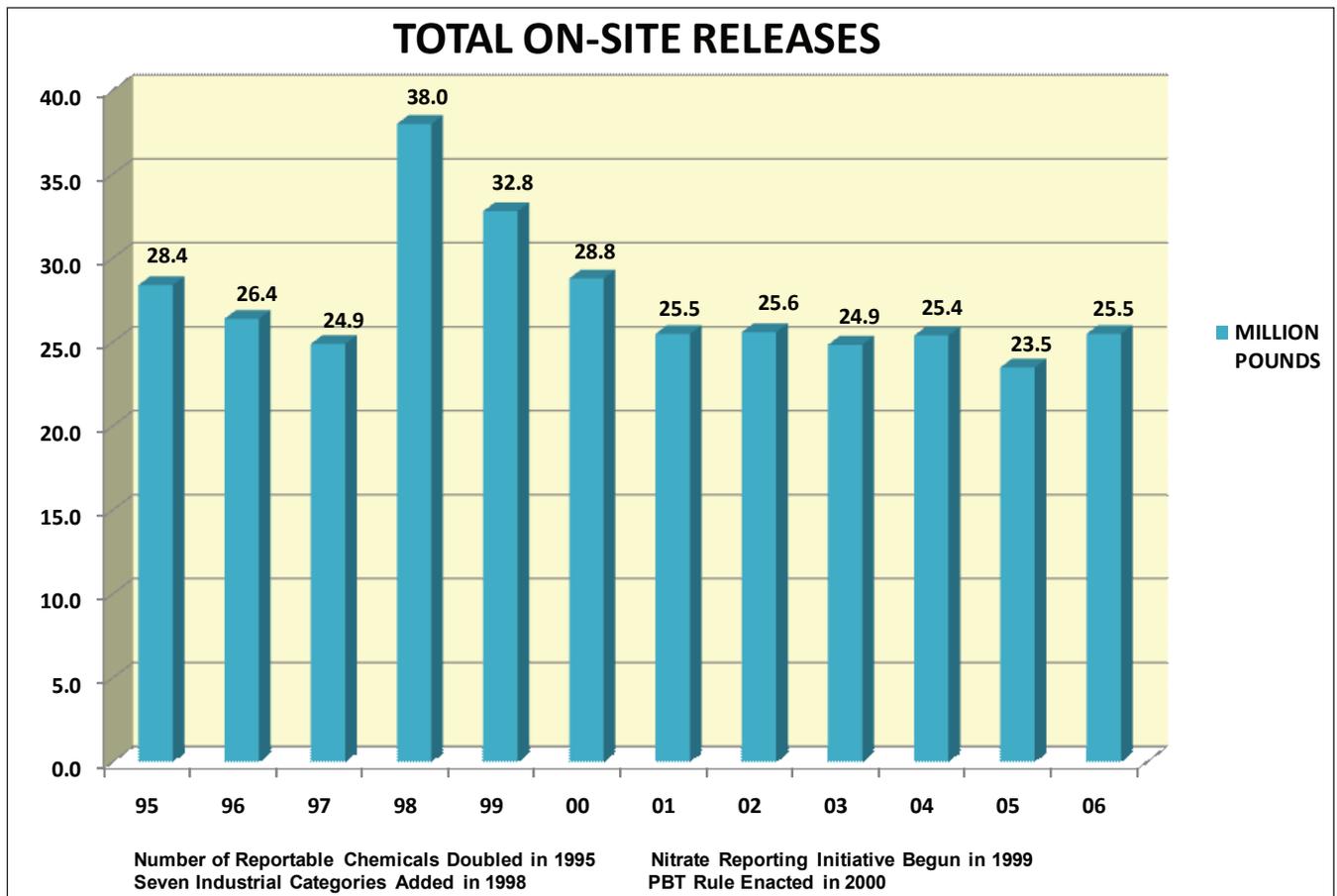


Figure F

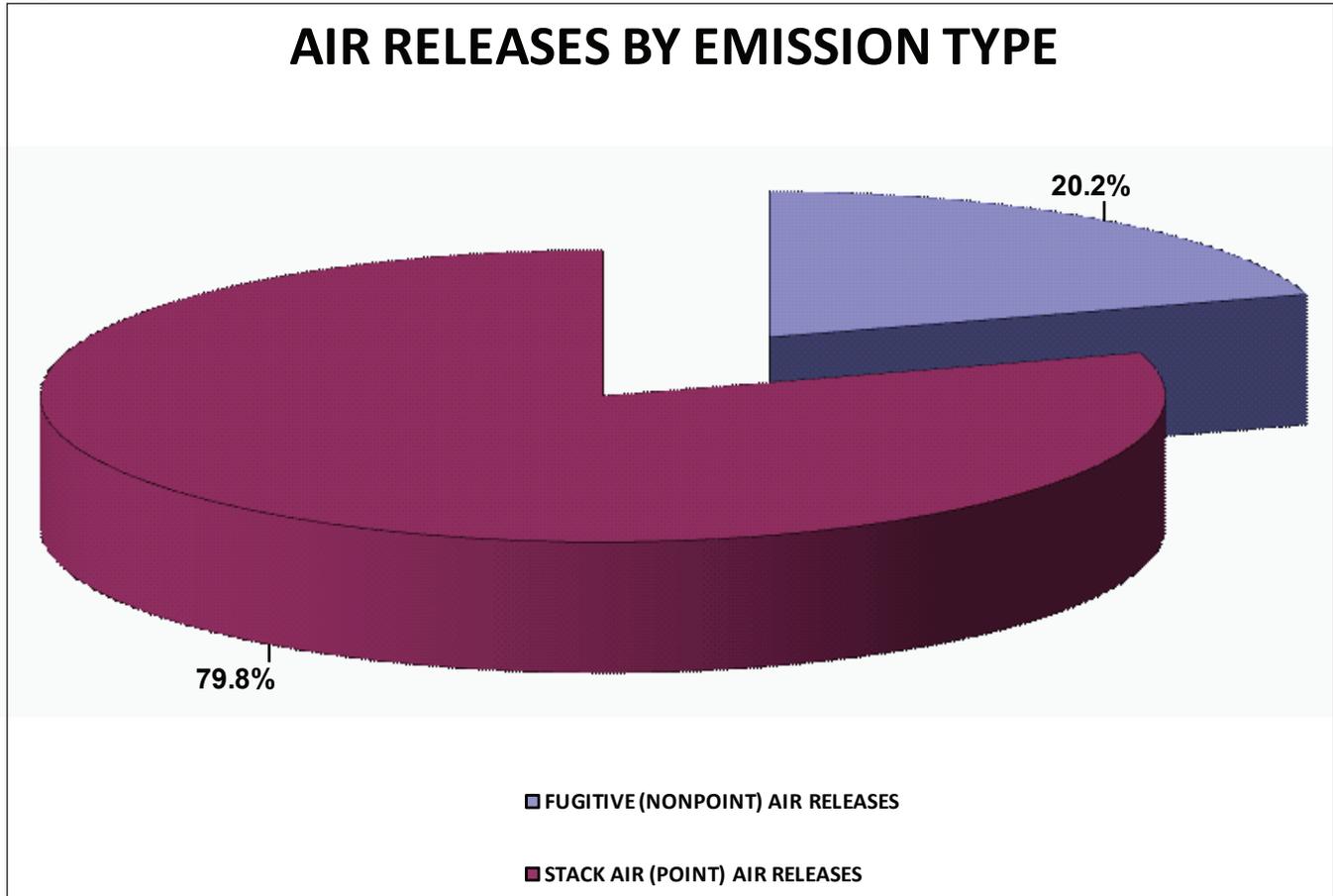


Figure G

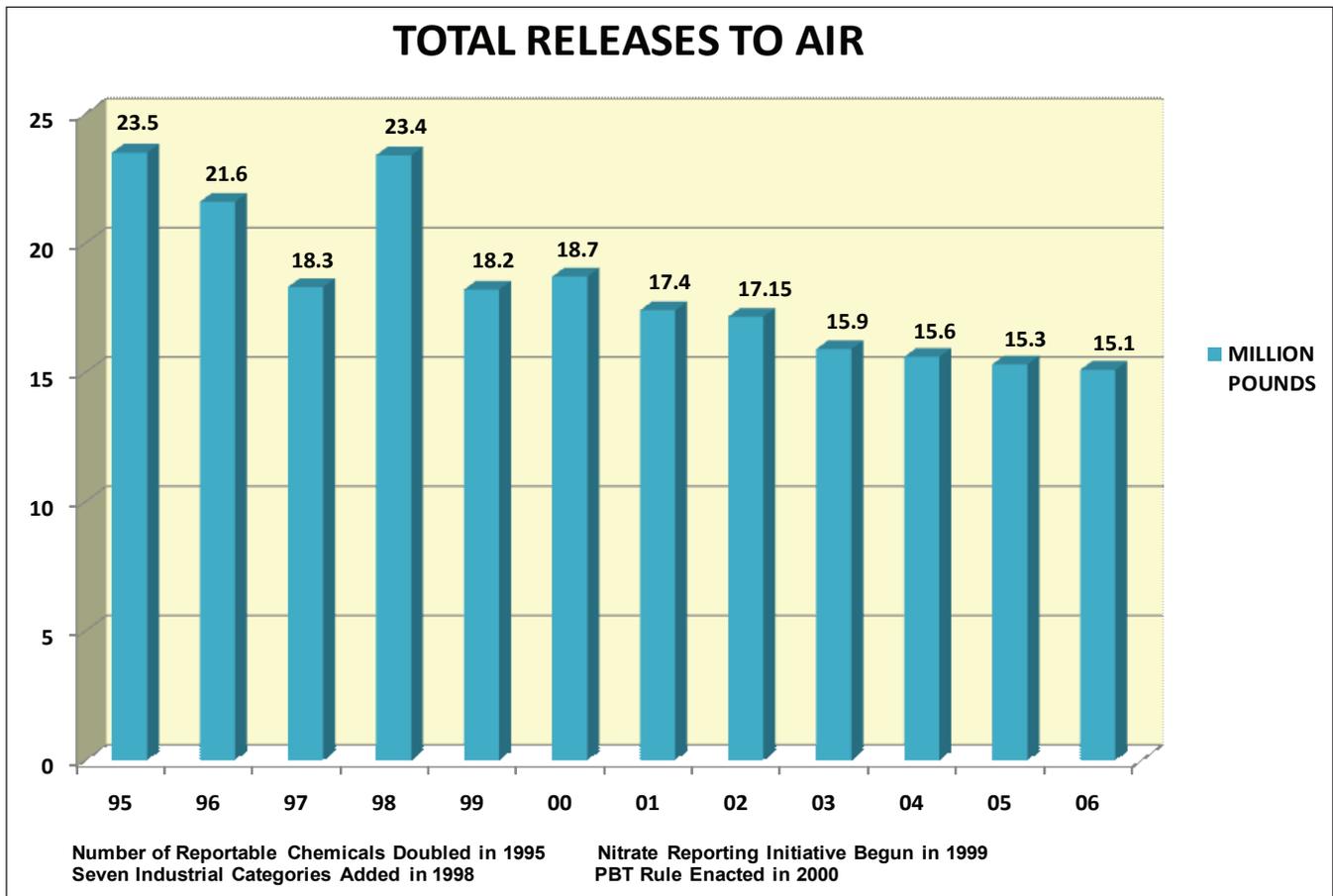


Figure H

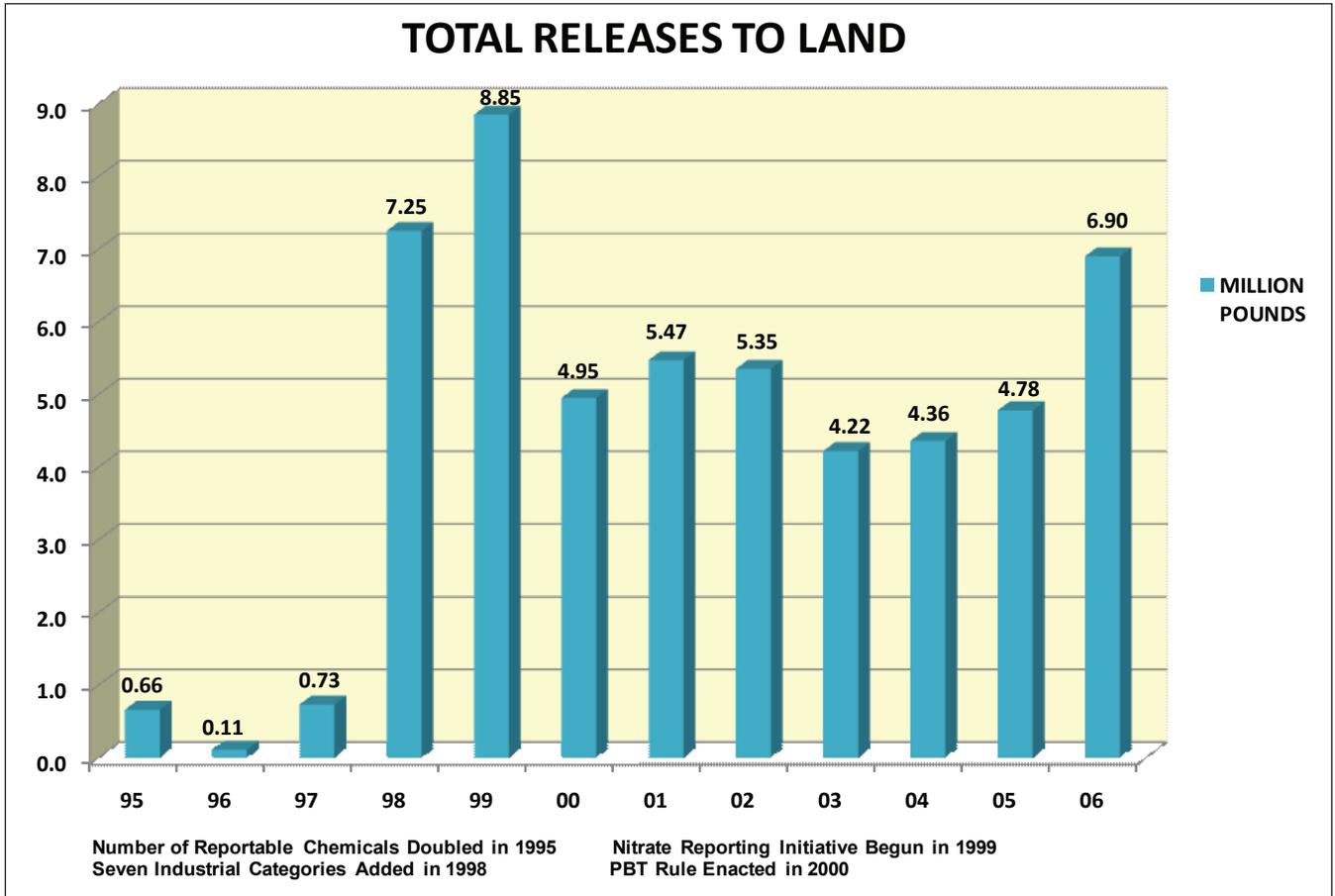
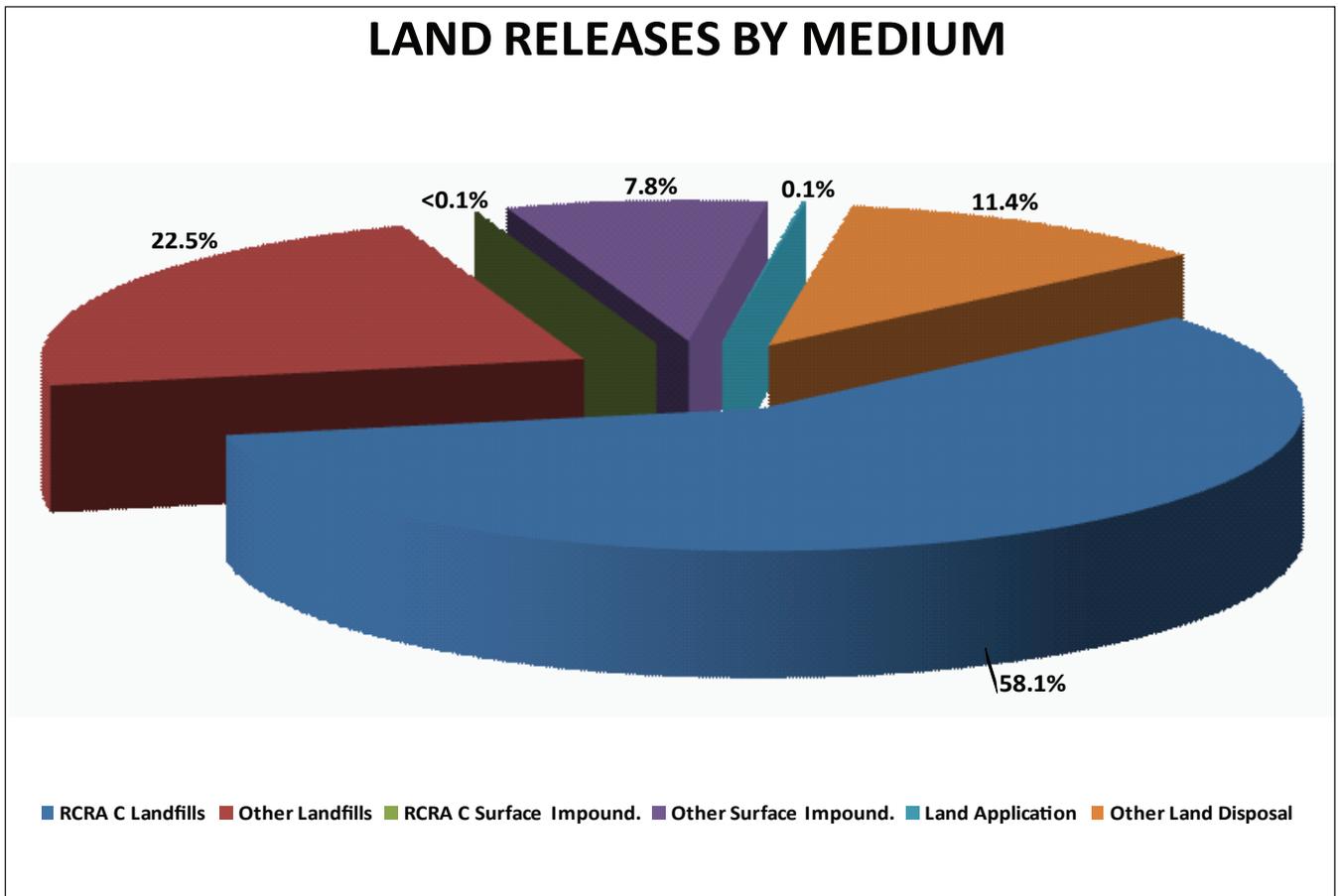


Figure I



under TRI, however, this type of waste management has an extremely low potential for human exposure or contact with the environment. The effects of large facilities on TRI reporting are seen in the numbers for releases to permitted underground injection wells. While the overall trend for releases to this medium also continues to decline, the drastic reductions seen in 2001, 2002, 2005 and 2006 resulted from changes in the business of a single facility. **(Figure J)**

A dramatic increase in reported releases to **surface waters** began with the 2000 data as a result of EPA's Nitrate Reporting Initiative, EPA reinterpretation of the reporting of aqueous nitrate compounds. Specifically, the Nitrate Initiative addressed the under or non-reporting of water dissociable nitrates. The resultant increase in surface waters releases represented an

improvement in reporting accuracy rather than an actual increase in the quantities released. **(Figure K)** Two of the five industries in the State reporting the largest total surface water releases, nitrogenous fertilizer producers and soybean mills, also report the majority of nitrate compounds releases. For 2006, 138 facilities reported discharges into Oklahoma streams and rivers.

Transfers

Transfers to off-site facilities for disposal decreased slightly from 2005 to 2006. The current figures however are only 29 percent of those reported for 1991, indicating that the trend toward waste reduction and on-site management continues even as TRI reporting has expanded. **(Figure L)** Only 9.9 percent of post production wastes managed off-site was transfers for disposal.

continued on next page...

Figure J

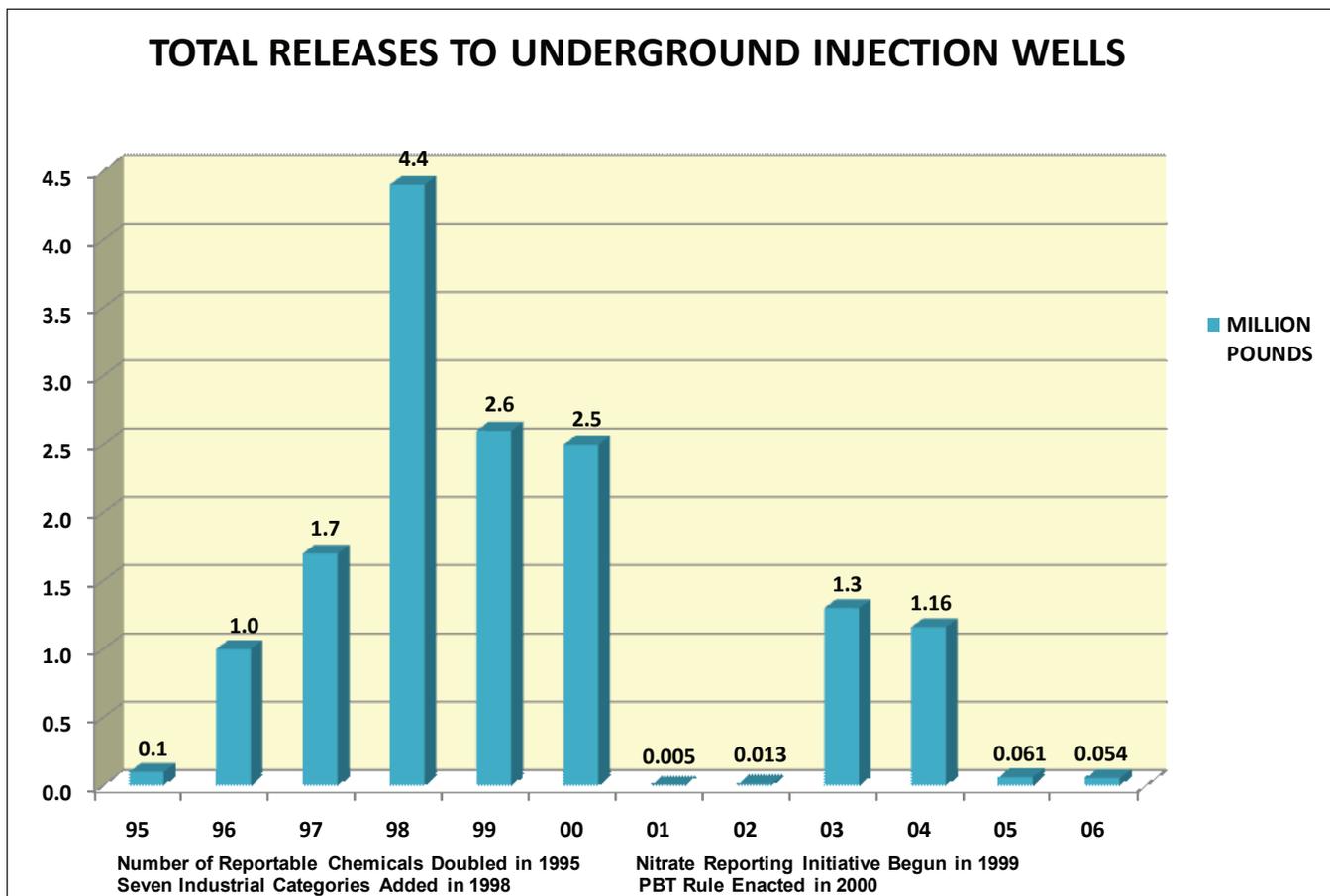


Figure K

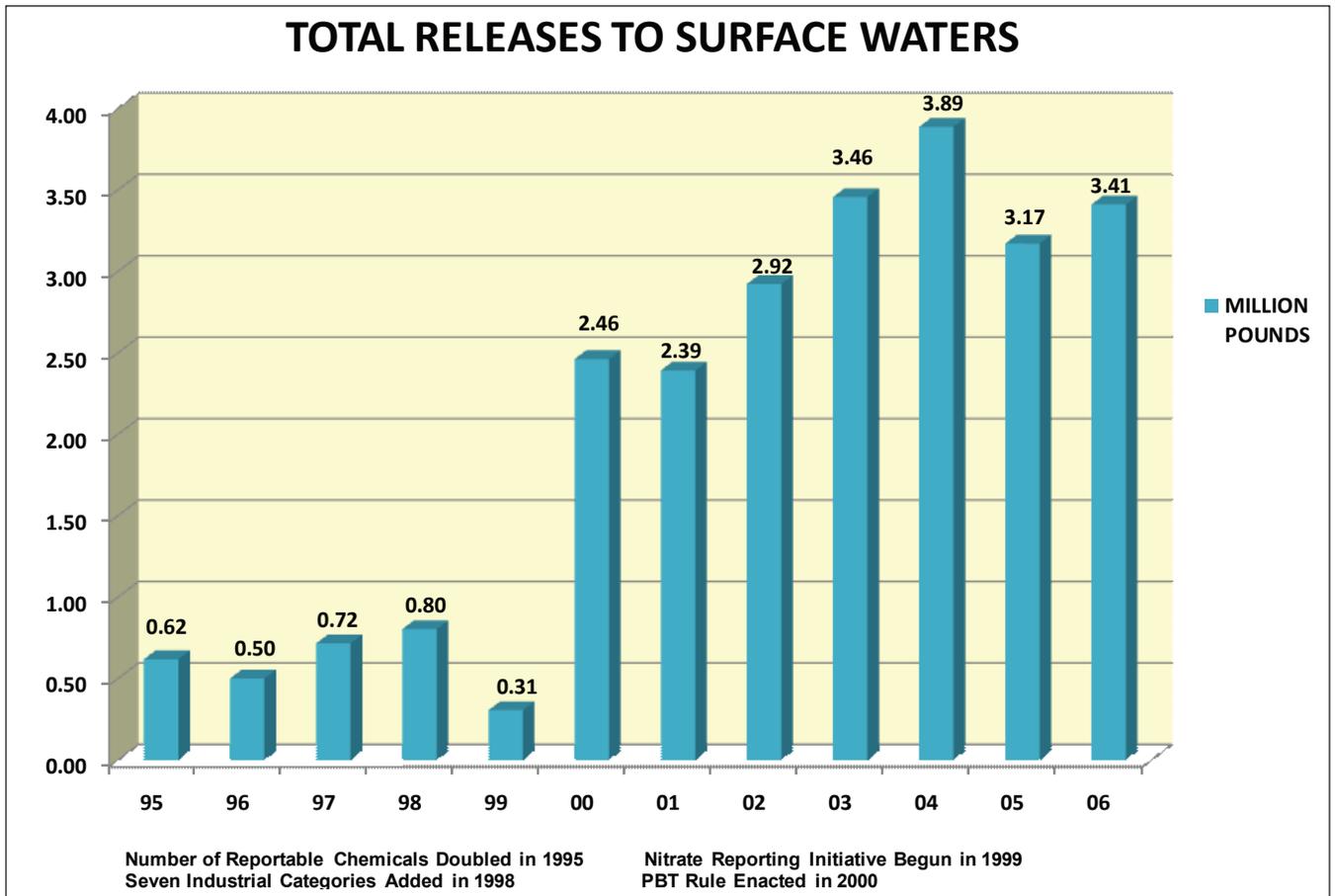
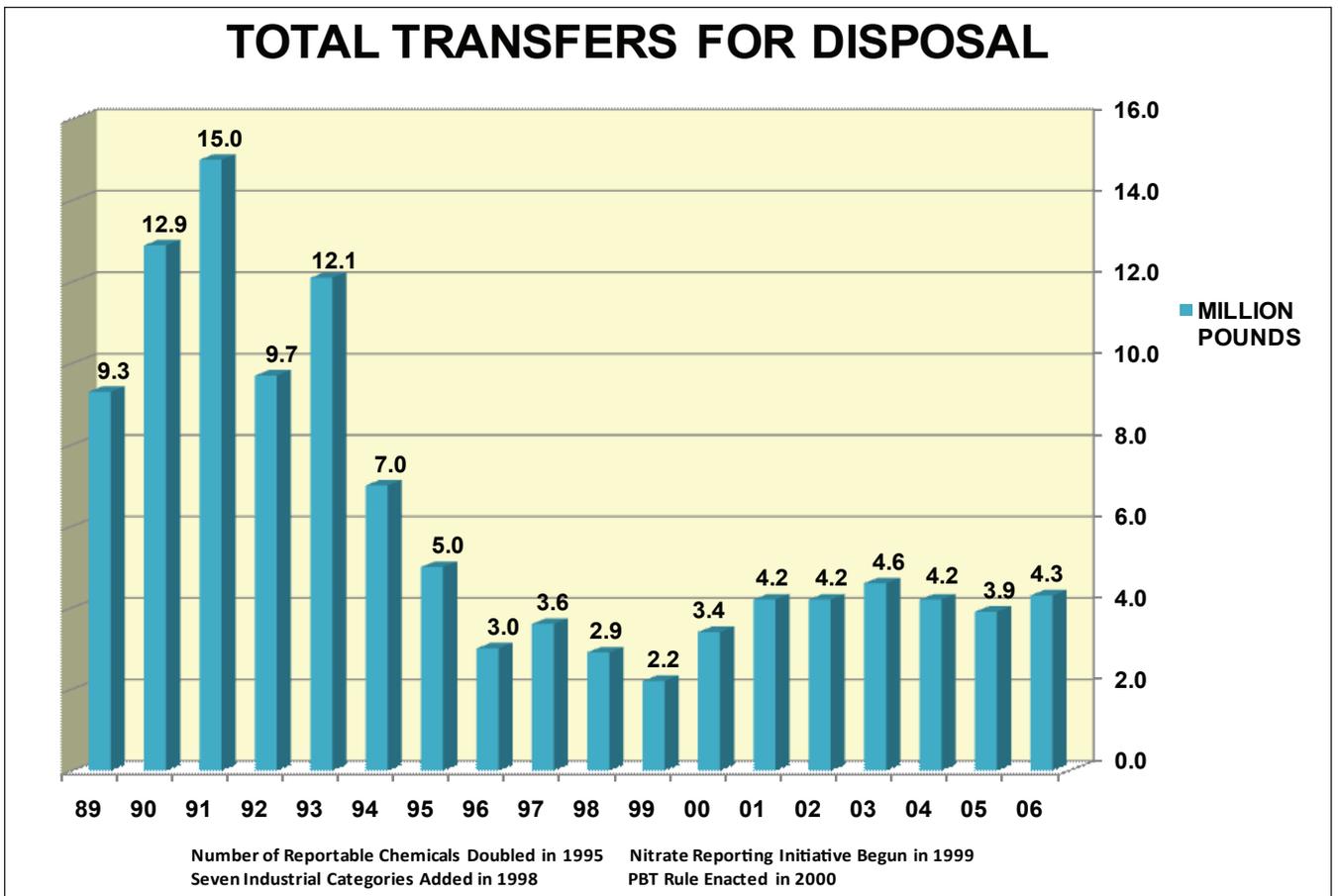


Figure L



In 2006, the majority of off-site transfers, 42 percent, were managed in landfills (**Figure M**) Releases to Publicly Owned Treatment Works (POTW) consist of water discharges made into sanitary drains and sewers that then are received and treated by wastewater treatment plants. These are counted chiefly as transfers for treatment (see Treatment, below) with the exception of wastewater containing metals and metal compounds, which are counted as transfers for disposal. However, transfers to POTW of metals and metal compounds account for only 0.1 percent of all transfers for disposal in 2006.

Reuse

Total reuse as defined by TRI is the sum of recycling and energy recovery both on- and off-site. Reuse in Oklahoma

was reported as 99.2 million pounds in 2006. (**Figure N**) Over half, 54 percent, of reported total production related wastes were managed through reuse; 88.4 percent of wastes of wastes managed off-site were reused. (**Figure O**) The Oklahoma Department of Environmental Quality’s Pollution Prevention Program established and maintains a waste exchange list that promotes the use, reuse, or recycling of industrial waste streams as do some industrial waste handlers. This type of reuse not only reduces the quantities of toxic chemicals that ultimately find their way into the environment, but also in many instances, reduces the need to manufacture some of these chemicals, thus eliminating other potential wastes.

continued on next page...

Figure M

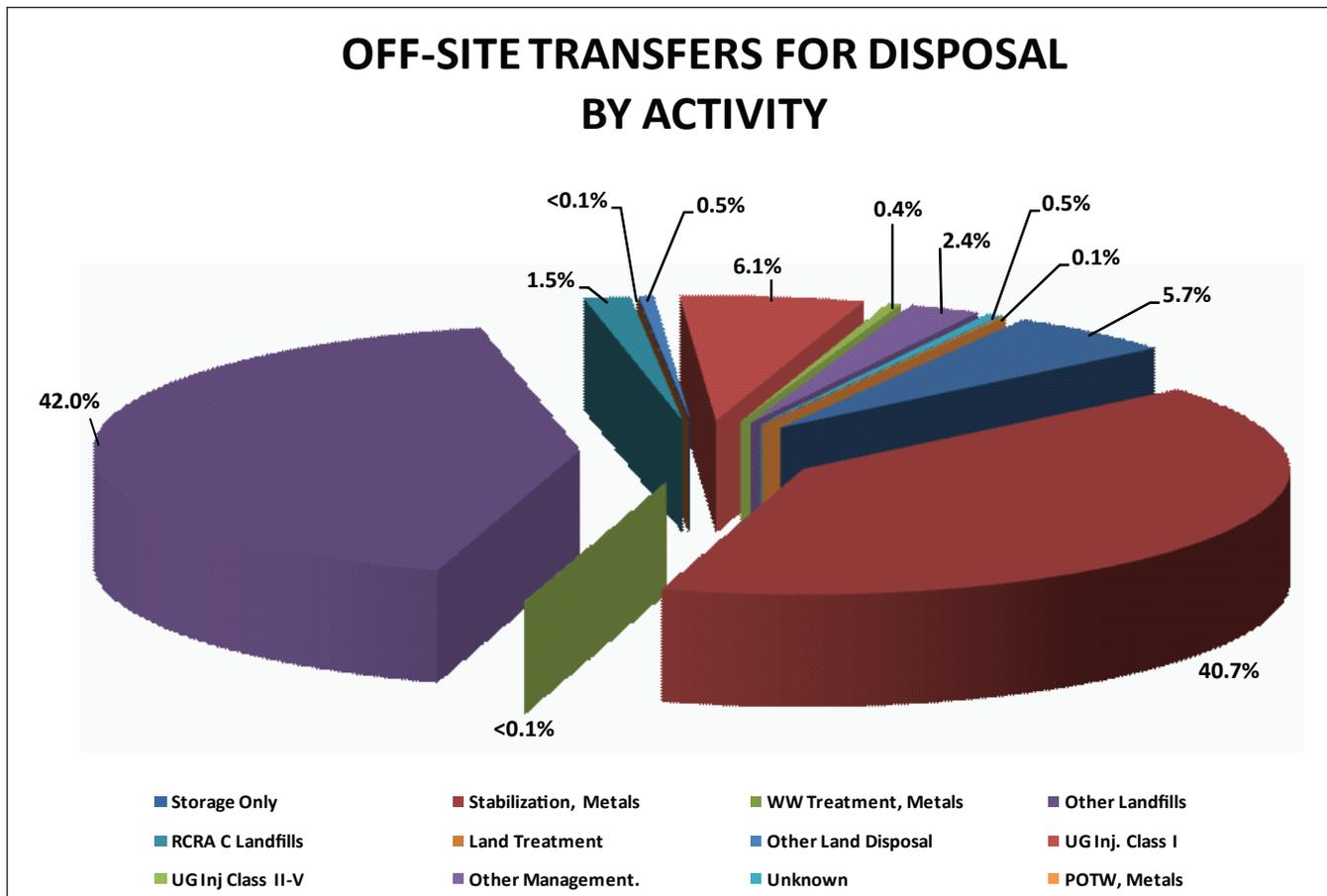
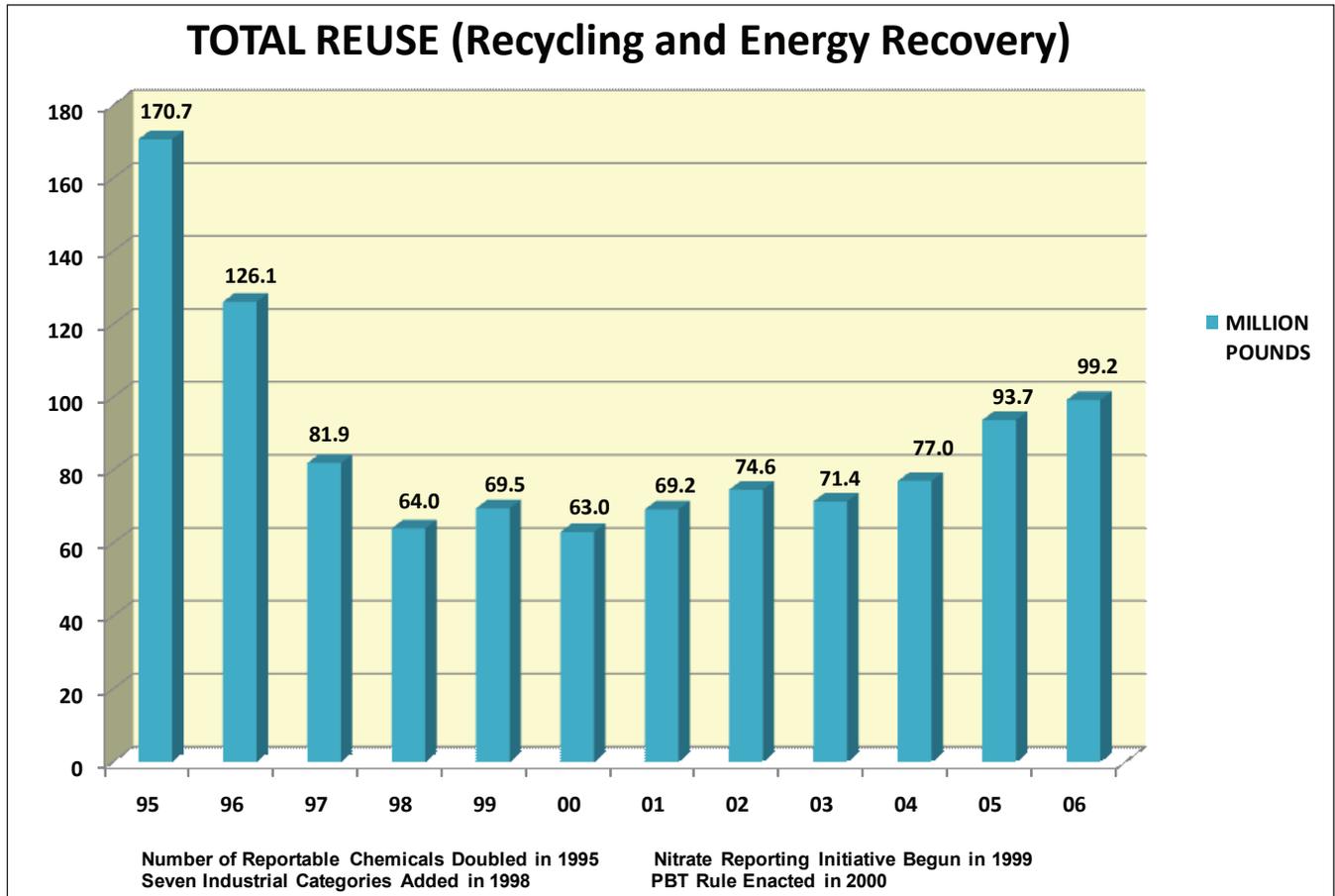


Figure N



Treatment

Post-production treatment, either on- or off-site, neutralizes or destroys toxic chemicals in the waste stream. Some type of on-site treatment frequently is required before wastes can be discharged or transferred for disposal. Common examples of this are the neutralization of spent acids in aqueous wastes and on-site microbial degradation of organic compounds in bio-retention ponds. Municipalities generally require acid neutralization as pretreatment prior to discharge into sanitary sewers, and nitrate compounds formed by the neutralization of nitric acid were a particular focus of EPA's Nitrate Initiative. As a result, quantities reported for transfers to POTWs also rose significantly in 1999. Nitrate compounds formed by the neutralization of nitric acid and previously disposed to underground injection wells accounted for a substantial portion of the increases in nonmetal

POTW transfers in 2001 and 2003. **(Figure P)** Total treatment in the State increased by 8.5 million pounds in 2006, **(Figure Q)**. The majority of treatment, 98.6 percent, occurred on-site. Industrial waste handlers were responsible for the majority of off-site treatment and disposal of toxic wastes. As with on-site treatment, off-site treatment frequently is a requirement prior to disposal.

In 2006, 75.5 percent of production wastes were managed on-site. On-site reuse and on-site treatment minimize the need to transport toxics for disposal or off-site reuse, decreasing exposure risks due to transportation related incidents. **(Figure R)** On-site waste management along with voluntary reductions in the quantity and toxicity of chemicals used are important means through which DEQ and industries across Oklahoma are working together to reduce the total volume of toxic chemicals managed in the State. Of the 183.9 million pounds of Total Production Related Wastes

continued on page 20...

Figure O

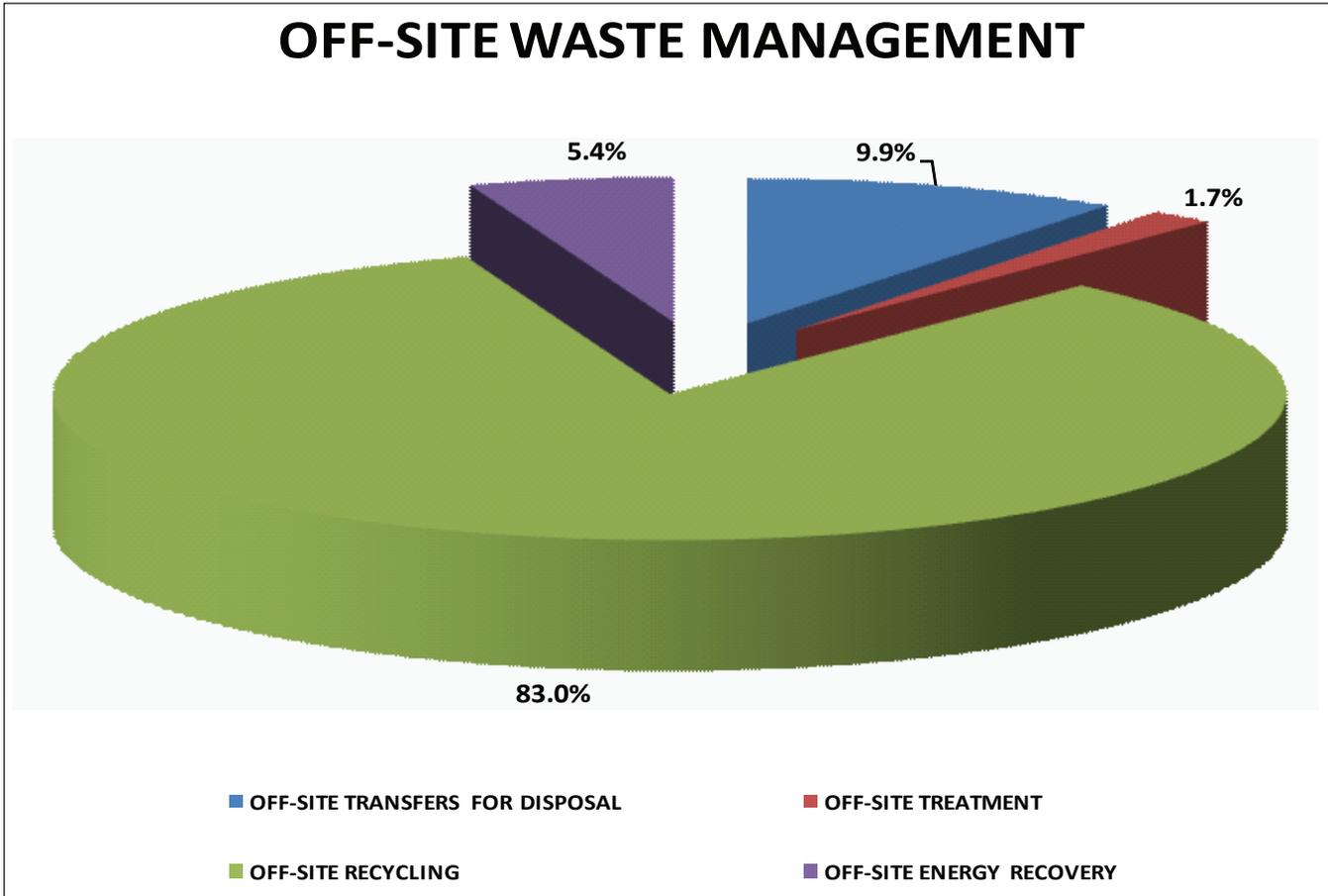


Figure P

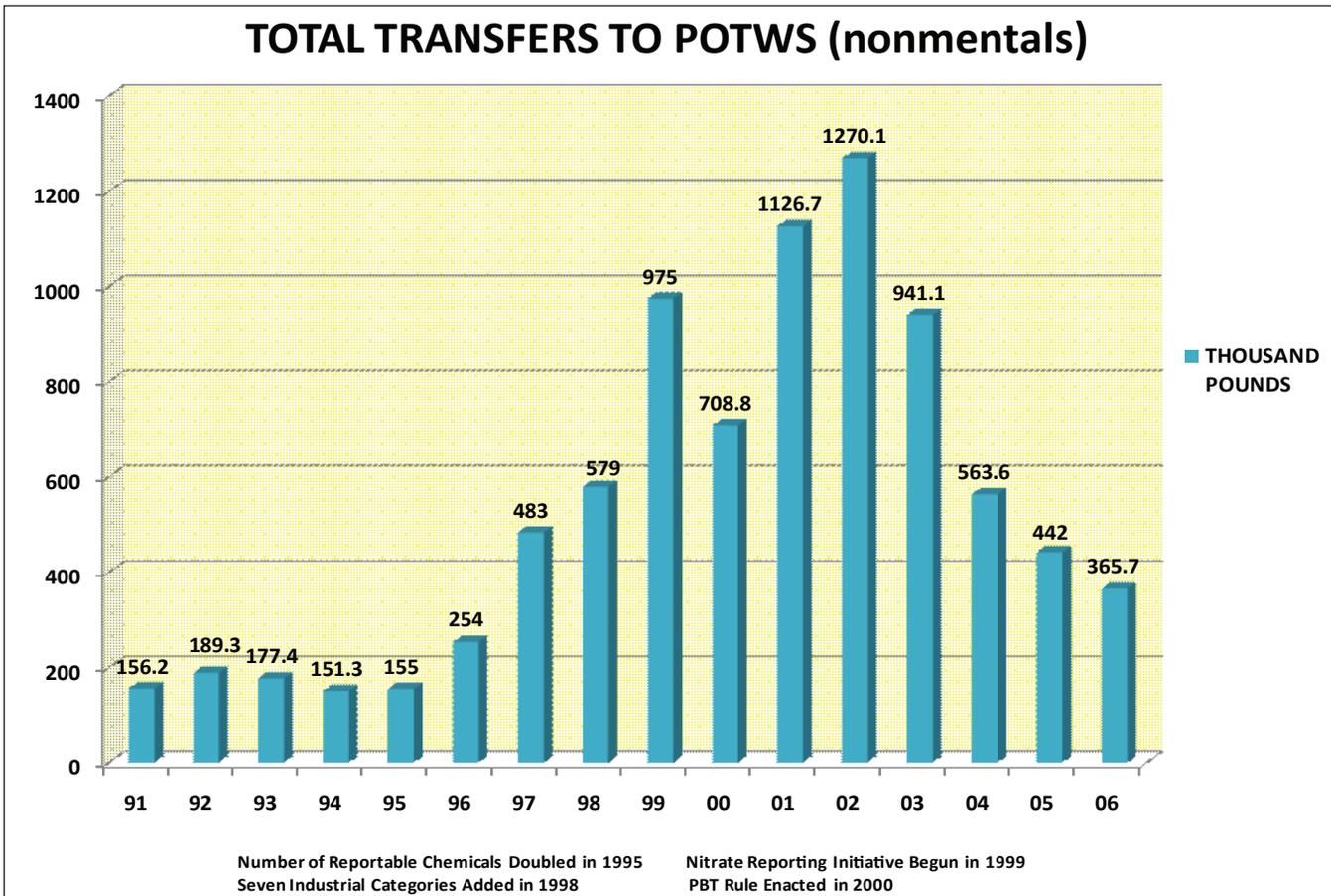


Figure Q

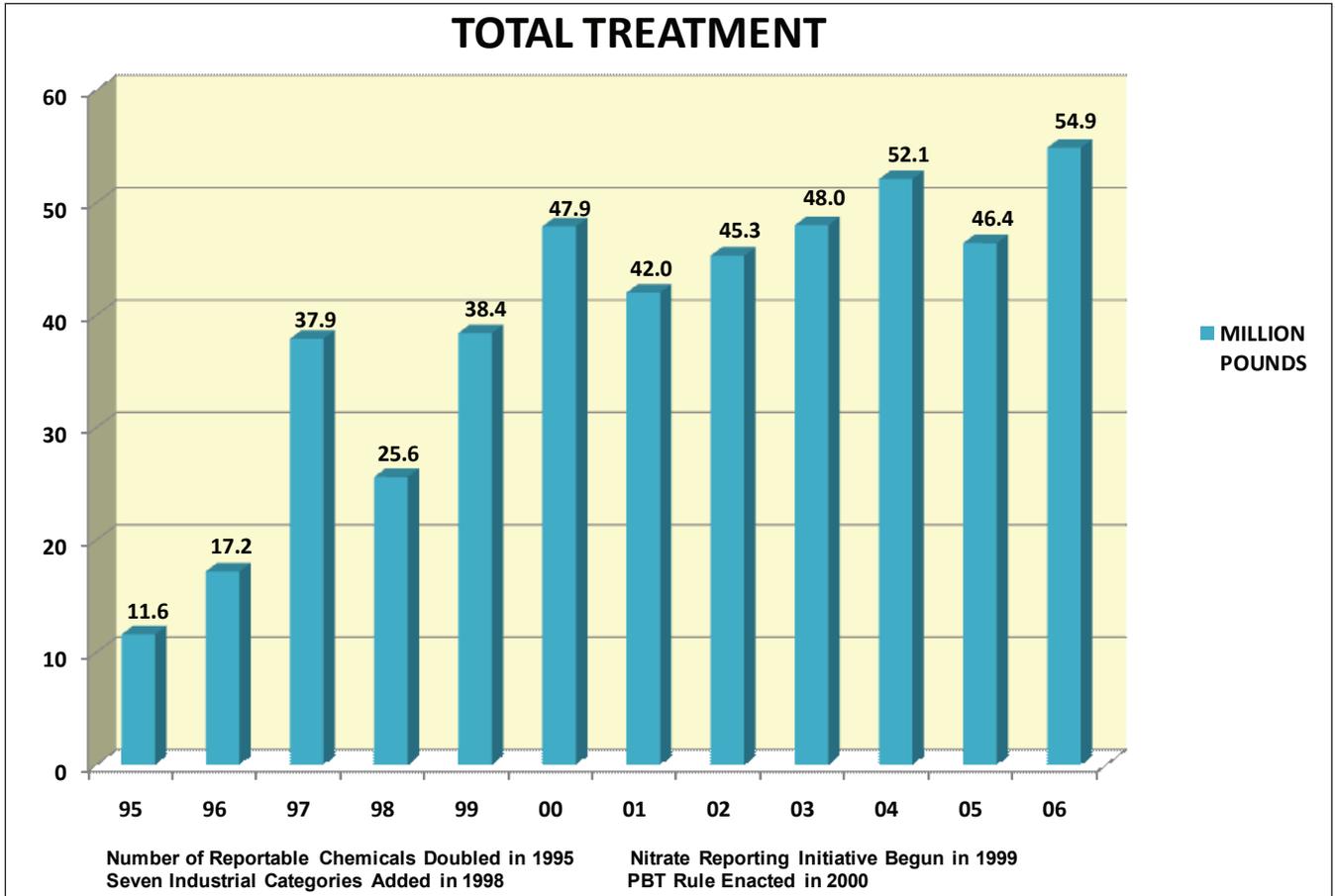
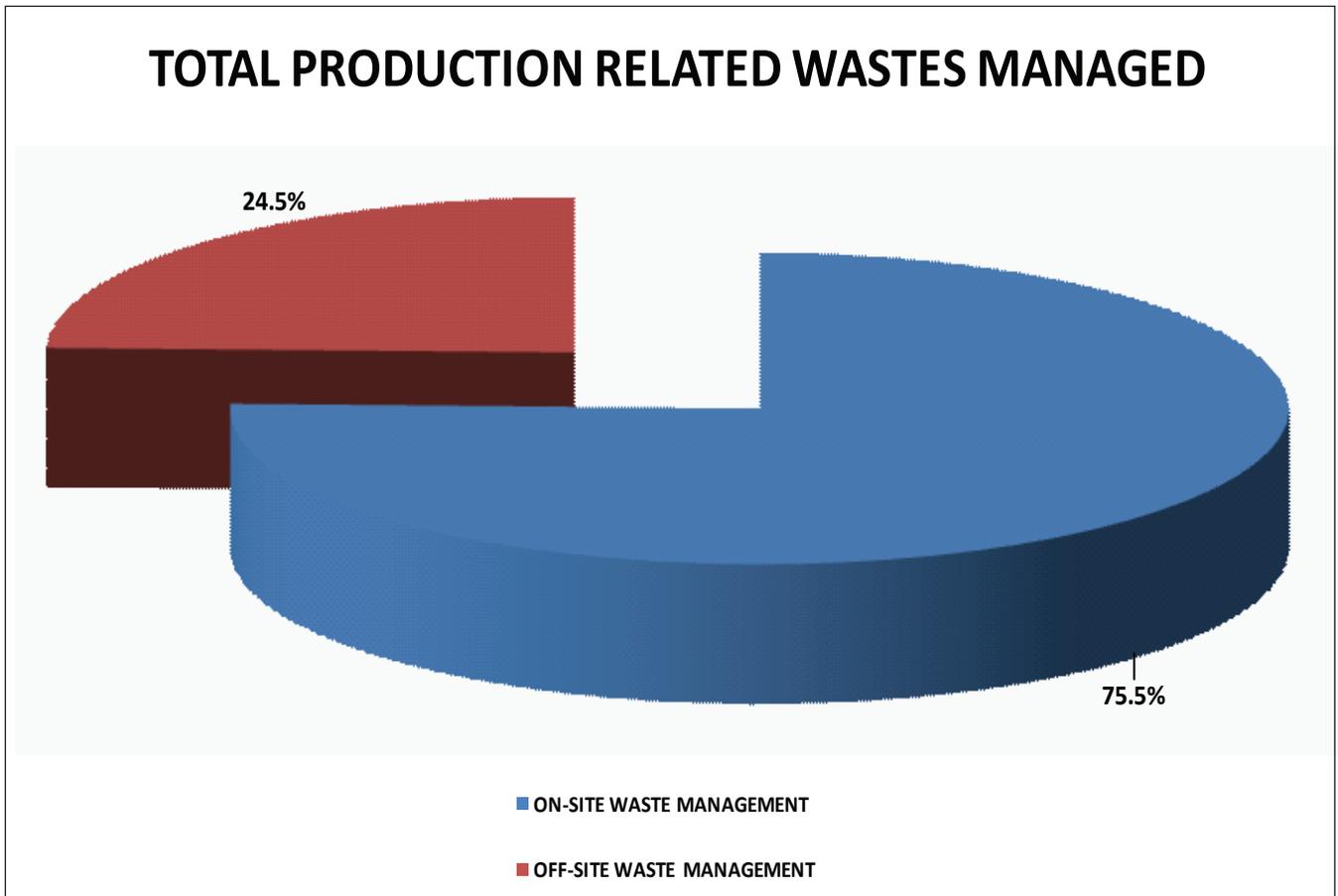


Figure R



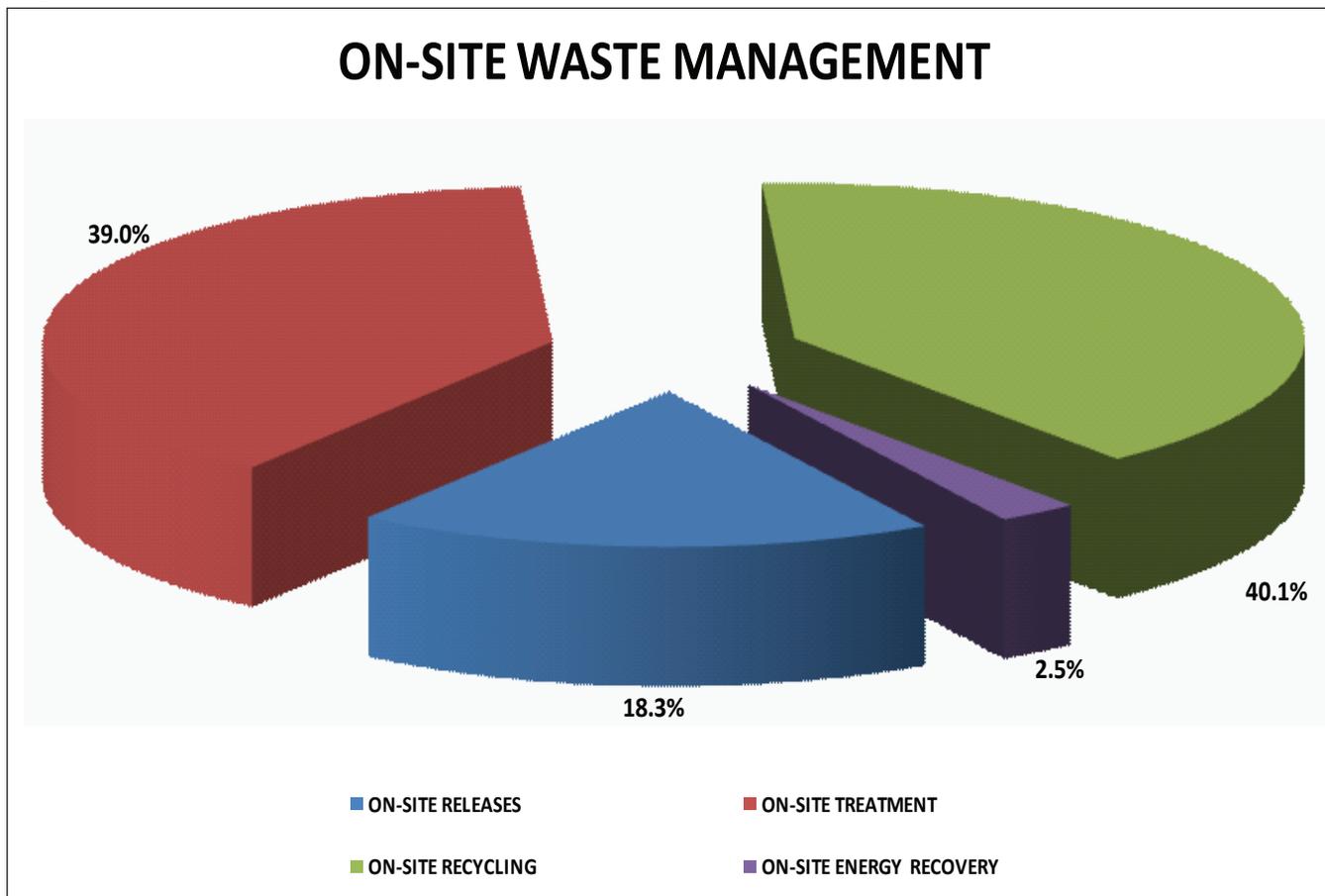
reported for 2006, only 2.3 percent of these were transferred off-site for disposal.

Toxics Release Inventory looks at the total picture of releases and transfers as well as reuse activities and treatment; analysis of the data can be used as an index of the success of prevention and reduction measures. Often states report a reduction in total releases while reporting a corresponding increase in off-site disposals, essentially transferring toxic wastes from one location to another rather than management through reuse, treatment or reductions in wastes or process chemicals. Oklahoma continues to see its total releases as percentages of Total Production Related Wastes diminish along with a decrease in off-site transfers; releases relative to TPRW decreased six percent in the past six years and in 2006, releases accounted for only 18.3 percent of on-site waste management. (Figure S)

Toxic Release Inventory data can be used for targeting facilities, industries or specific chemicals for pollution prevention efforts. The 2006 Oklahoma TRI data reflect the continued success of voluntary programs sponsored by DEQ and cooperation from industries.

The Oklahoma Department of Environmental Quality 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 and business assistance regarding pollution prevention and source reduction measures, contact the DEQ Land Protection Division/Pollution Prevention Programs at 405-702-5100 or 1-800-869-1400, or visit the DEQ website at: <http://www.deq.state.ok.us/LPDnew/p2index.htm>

Figure S



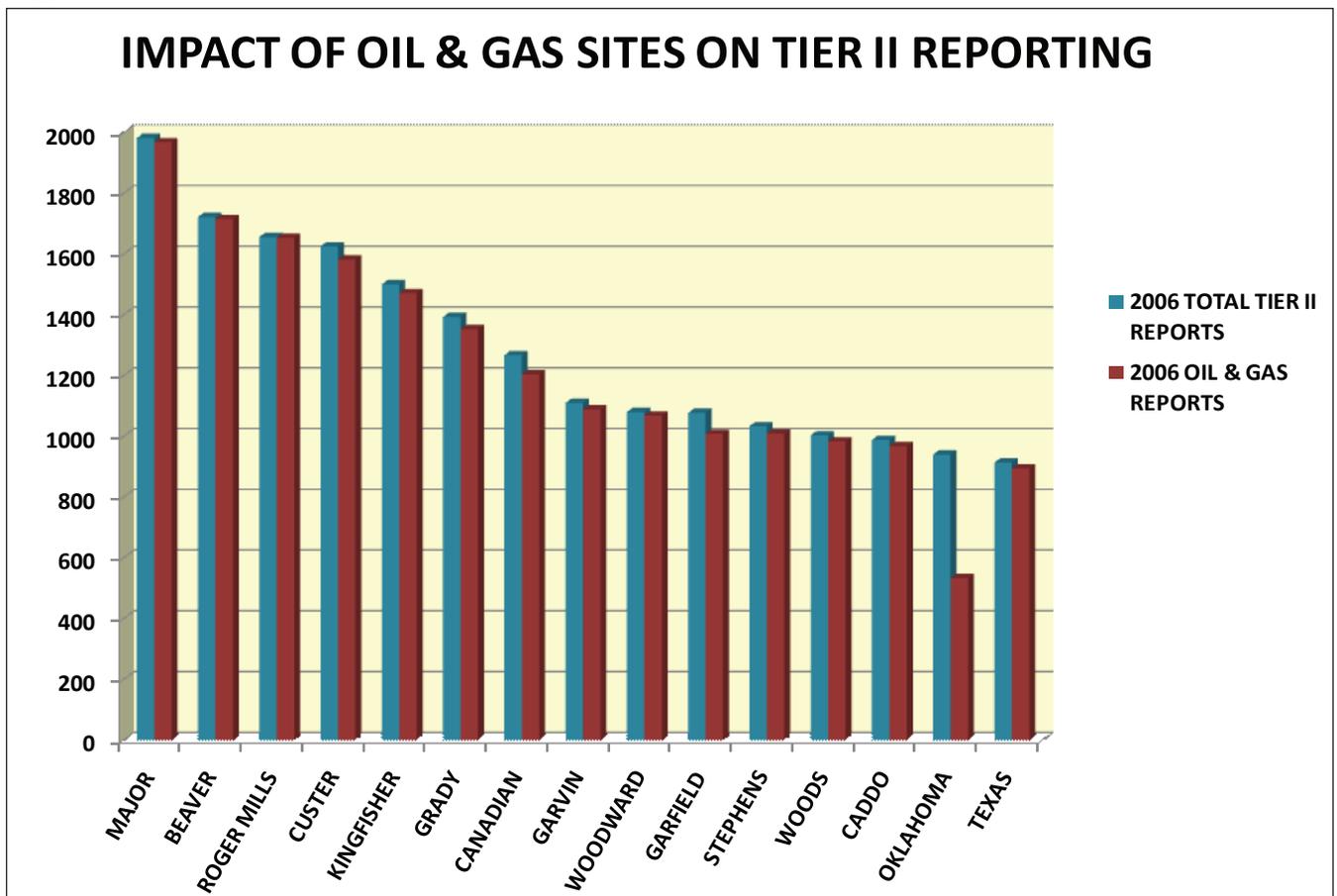
2006 Tier II Overview

The owners or operators of all facilities or sites that store hazardous substances on-site must submit Tier II reports annually for each hazardous material stored. Forms are submitted to DEQ acting as an agent of the Oklahoma Emergency Response Commission (OHMERC), and also to appropriate LEPC, and responding local fire departments. Tier II forms require specific information describing the quantities and locations of hazardous substances as defined under the OSHA Hazard Communication Standard, which states that a hazardous chemical or substance is any substance for which a facility must maintain a Material Safety Data Sheet (MSDS). Additionally, a chemical or substance is reportable if the material is present on the site for at least 24 continuous hours in a quantity that equals to or exceeds the reporting threshold. Within

the same program, EPA lists over 250 materials as EHS, and specifies a threshold planning quantity (TPQ) for each. For an EHS the threshold for Tier II reporting is either the TPQ or 500 pounds whichever is lower. The reporting threshold for all other covered substances is 10,000 pounds. Tier II reports also provide the name and address of the owner or operator and two emergency contacts that can be used by emergency responders 24 hours a day.

Over 31,000 of the 33,702 Tier II reports submitted for 2006 were from Oil and Gas sites that include tank batteries as well as production sites. (Table 3) 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 petroleum and natural gas production industries. (Figure T) A total of 1,124 reports were received by

Figure T



DEQ from sites storing one or more EHS.

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 EHSs stored and counties with the most reported TRI chemicals released, all six 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. While TRI and Tier II satisfy different intentions under the law, facilities reporting under both provide a great deal of chemical information to address public concerns and use for emergency planning. (See Chemicals Reported in 2006)

Table 3

County	Total TIER II Reports	Oil & Gas Reports	EHS Facilities
Adair	24	0	5
Alfalfa	387	380	4
Atoka	19	10	3
Beaver	1,722	1,715	4
Beckham	535	518	9
Blaine	842	821	6
Bryan	31	18	2
Caddo	988	967	13
Canadian	1,267	1,204	24
Carter	728	695	15
Cherokee	19	0	6
Choctaw	9	0	3
Cimarron	83	76	4
Cleveland	185	146	19
Coal	103	99	3
Comanche	174	93	29
Cotton	15	8	6
Craig	74	57	9
Creek	425	365	23
Custer	1,625	1,582	22
Delaware	23	0	7
Dewey	832	816	6
Ellis	906	901	0
Garfield	1,077	1,008	33
Garvin	1,110	1,089	6
GradY	1,393	1,353	15
Grant	374	358	14
Greer	11	3	6
Harmon	6	2	2
Harper	683	679	1
Haskell	305	297	2
Hughes	221	211	2
Jackson	26	4	14
Jefferson	19	13	2
Johnston	11	0	3
Kay	160	121	16
Kingfisher	1,500	1,471	9
Kiowa	70	57	7
Latimer	169	162	2
Leflore	198	168	14
Lincoln	343	322	9
Logan	530	511	8
Love	122	115	4
Major	1,982	1,968	3
Marshall	53	35	7
Mayes	52	5	21
Mcclain	564	550	4
Mccurtain	23	0	12
Mcintosh	136	127	4
Murray	33	17	6
Muskogee	72	8	23
Noble	824	810	9
Nowata	282	271	7
Okfuskee	158	151	2
Oklahoma	940	533	201
Okmulgee	79	53	12
Osage	440	386	13
Ottawa	23	0	11
Pawnee	136	116	6
Payne	246	199	20
Pittsburg	493	466	11
Pontotoc	137	123	4
Pottawatomie	290	249	17
Pushmataha	23	14	4
Roger Mills	1,656	1,653	1
Rogers	86	2	32
Seminole	416	389	7
Sequoyah	44	28	8
Stephens	1,033	1,009	8
Texas	913	894	14
Tillman	29	11	9
Tulsa	444	4	206
Wagoner	35	3	11
Washington	87	56	15
Washita	546	531	8
Woods	1,003	983	8
Woodward	1,080	1,068	9
Totals	33,702	31,127	1,124

Facilities Reporting in 2006

For RY 2006, 324 Oklahoma facilities reported to TRI, operating under 131 NAICS codes. The EPA expanded TRI in RY 1998 with the addition of seven industrial categories. The added categories, initially listed under SIC codes, are linked to manufacturing by providing power, managing products, managing wastes, or providing limited raw materials for the manufacturing sector.

Manufacturing facilities continue to be the majority of TRI reporters in the State, comprising 307 of 324 facilities reporting for 2006. (Table 4) However, the industries added in RY 1998 continued to impact the data for Oklahoma. Coal-fired electrical plants and commercial hazardous waste management facilities permitted under the Resource Conservation and Recovery Act (RCRA) Subtitle C are two of the categories added for 1998 and together accounted for over 28 percent of all on-site releases in Oklahoma for 2006. Seven of the 25 facilities with the largest

total on-site releases reported the first time for under the 1998 changes and all of these were operational prior to 1998.

The top 25 facilities in terms of largest total on-site releases produced 89.1 percent of releases reported for 2006. (Table 5) However, six of the facilities ranked in the top 25 for releases are also among the 25 facilities reusing toxic chemicals in largest quantities. The facilities practicing greatest reuse by quantity recycled and use for energy recovery accounted for 94.6 percent of total reuse in 2006. As with the overall numbers for reuse, the majority of recycling and energy recovery, 71.4 percent occurred on-site. (Table 6) Chemicals reused on-site do not leave the boundaries of the facility.

Together the ten industrial classifications reporting the largest on-site releases account for 87 percent of reportable releases in the State, (Figure U), with the top 21 industries in terms of on-site releases accounting for 91.4 percent. A brief discussion of the industries with the largest total on-site releases follows.

Nitrogenous Fertilizers Production- NAICS 325311 (SIC 2873)

The use of agricultural chemicals essential to Oklahoma's agricultural base is not covered under TRI; however, the manufacture of these chemicals and the precursors used to produce them are reportable. Facilities manufacturing nitrogenous fertilizers were the largest source of releases in 2006 as reported to TRI. These facilities produce hydrogen and nitrogen gases from methane (natural gas), then through a catalytic process produce ammonia that is condensed to anhydrous ammonia and finally oxidized to form ammonium nitrate. Methanol is a secondary product of this process. Ammonia accounts for over 91 percent of all TRI chemicals released by this industry.

Table 4

NAICS Code	Industrial Classification	Total Releases, lbs.
325311	Nitrogenous Fertilizer Production	5,967,281
562211	Hazardous Waste Treatment & Disposal	4,065,027
322130	Paperboard Mill	3,276,936
221112	Fossil Fuel Electric Power Generation	3,095,701
324110	Petroleum Refining	1,496,587
311222	Soybean Processing	1,375,168
325110	Petrochemical Manufacturing	969,890
928110	National Security	914,567
311615	Poultry Processing	577,292
327121	Brick & Structural Clay Tiles	346,032
336612	Boat Building	313,500
321219	Reconstituted Wood Products	291,876
332431	Metal Can Manufacturing	186,645
332999	Misc. Fabricated Metal Product Manufacturing	182,942
311223	Other Oilseed Processing	140,108
333618	Engine Equipment Manufacturing	87,926
	All Others	2,188,043
		25,475,521

Table 5

Rank	Facility Name	Facility County	Primary NAICS Code	Total Releases, lbs.	Industrial Classification
1	Clean Harbors-Lone Mountain	Major	562211	4,012,409	Hazardous Waste Treatment & Disposal
2	Koch Nitrogen Co.	Garfield	325311	3,514,110	Nitrogenous Fertilizer Production
3	Weyerhaeuser Co.	McCurtain	322130	3,276,951	Paperboard Mill
4	Terra Nitrogen LP Verdigris Plant	Rogers	325311	1,755,367	Nitrogenous Fertilizer Production
5	Solae, Pryor	Mayes	311222	1,375,158	Soybean Processing
6	Baker Petrolite Corp.	Osage	325110	969,890	Petrochemical Manufacturing
7	Northeastern Station Plant- American Electric Power	Rogers	221112	856,768	Fossil Fuel Electric Power Generation
8	Grand River Dam Authority Coal Fired Complex	Mayes	221112	824,683	Fossil Fuel Electric Power Generation
9	Terra International (Oklahoma) Inc.	Woodward	325311	688,230	Nitrogenous Fertilizer Production
10	Tyson Foods Inc. Broken Bow Processing Plant	McCurtain	311615	577,292	Poultry Processing
11	U.S. Army Fort Sill	Comanche	928110	543,357	National Security
12	Conoco-Phillips, Ponca City Facility	Kay	324110	532,877	Petroleum Refining
13	Western Farmers Electric Co-op.	Choctaw	221112	526,336	Fossil Fuel Electric Power Generation
14	Muskogee Generating Station - OGE	Muskogee	221112	433,780	Fossil Fuel Electric Power Generation
15	Georgia-Pacific Consumer Products LP	Muskogee	322121	413,911	Paper Mill
16	Sinclair, Tulsa Refining Co.	Tulsa	324110	339,904	Petroleum Refining
17	Valero Refining Co. - Oklahoma Valero Ardmore Refinery	Carter	324110	312,972	Petroleum Refining
18	Tracker Marine LLC	Ottawa	336612	288,220	Boat Building
19	U.S. Army McAlester Army Ammunitions	Pittsburg	928110	267,106	National Security
20	Sooner Generating Station- OGE	Noble	221112	246,442	Fossil Fuel Electric Power Generation
21	AES Shady Point LLC	Le Flore	221112	207,691	Fossil Fuel Electric Power Generation
22	Wynnewood Refining Co.	Garvin	324110	190,578	Petroleum Refining
23	Rexam Beverage Can Co. RE: Oklahoma City Plant	Oklahoma	332431	186,645	Metal Can Manufacturing
24	Dominance Industries Inc. (DBA Pan Pacific Products)	McCurtain	321219	165,387	Reconstituted Wood Products
25	Boral Bricks Of Texas LP Muskogee Plant	Muskogee	327121	162,249	Brick & Structural Clay Tiles Plant

Nitrogen fertilizers production is also the second largest source of nitrate compounds releases in the State. Due to the very large quantities of anhydrous ammonia used and stored and the volatility of ammonia, fugitive air emissions are the chief medium for releases from nitrogen fertilizer plants. (See **Chemicals Reported in 2006**)

Industrial Waste Handlers Permitted Under RCRA Subtitle C- NAICS 562211 (SIC 4953)

Industrial waste handlers permitted to operate RCRA Subtitle C landfills for

hazardous wastes disposal appear to be considerable sources of environmental releases in the State. While some materials transferred to these facilities are neutralized through treatment, the bulk of hazardous wastes managed are disposed into highly regulated and monitored landfills. The toxicity and quantities of chemicals managed at this type of facility can be substantial; however, the risks of public exposure or adverse environmental effects from disposal to a RCRA Subtitle C site are low. Additionally, transfers from Oklahoma facilities to in-state hazardous

continued on page 31...

Table 6

Rank	Facility Name	County	Total Recycling & Energy Recovery, lbs.	Industrial Classification
1	Baker Petrolite Corp.	Osage	34,865,810	Petrochemical Manufacturing
2	Eaton Aeroquip Inc. Vinita Facility	Craig	16,942,276	Fluid Power Valve & Hose Fitting Manufacturing
3	Terra Nitrogen LP Verdigri S. Plant	Rogers	7,577,800	Nitrogenous Fertilizer Production
4	American Castings LLC.	Mayer	6,966,554	Iron Foundries
5	Centrilift Cable Plant	Rogers	5,571,254	Copper Wire (Except Mechanical) Drawing
6	Koch Nitrogen Co.	Garfield	5,455,000	Nitrogenous Fertilizer Production
7	Sheffield Steel Corp.	Tulsa	3,558,658	Iron & Steel Mills
8	Baker Petrolite Corp.	Tulsa	1,886,860	Misc. Chemical Product & Preparation Manufacturing
9	Valero Refining Co.- Ardmore Refinery	Carter	1,696,625	Petroleum Refining
10	Halliburton Energy Service- Duncan Manufacturing Center	Stephens	1,482,300	Oil & Gas Field Equip. Manufacturing AC & Heating Equip. & Commercial & Industry Refrigeration Manufacturing
11	Temtrol, Inc.	Kingfisher	1,232,466	Refrigeration Manufacturing
12	U.S. Army McAlester Army Ammunition Plant	Pittsburg	820,559	National Security
13	Hawk Corp. Wellman Products	Rogers	632,500	Powder Metallurgy Part Manufacturing
14	Norit Americas Inc.	Mayer	621,479	Misc. Chemical Product & Preparation Manufacturing
15	Acme Engineering & Engineering & Corp.	Muskogee	515,500	Ind. & Commercial Fan & Blower Manufacturing
16	Simmons Metal Container	Muskogee	504,793	Metal Can Manufacturing
17	American Foundry Group LLC. Alloy 2 Facility	Muskogee	472,130	Steel Foundries
18	National Standard LLC.	Payne	463,126	Steel Wire Drawing
19	Sulzer Chemtech, Tulsa	Tulsa	440,002	Misc. Fabricated Metal Product Manufacturing
20	Gemini Coatings Inc.	Canadian	435,267	Paint & Coating Manufacturing
21	Sulzer Chemtech USA	Tulsa	405,000	Misc. Fabricated Metal Product Manufacturing
22	Roll-Offs USA	Bryan	389,857	Misc. Fabricated Metal Product Manufacturing
23	Valmont Coatings- Oklahoma Galvanizing	Rogers	357,100	Metal Coating, Engraving & Allied Ser., Exc. Jewelry & Silverware
24	Goodyear Tire & Rubber Co.	Comanche	300,022	Tire Manufacturing
25	Wynnewood Refining Co.	Garvin	270,680	Petroleum Refining

waste treatment, storage and disposal sites result in a “double counting” effect, that is, the chemicals reported as transferred in-state for treatment, storage or disposal will be counted again in the quantities of 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 as releases in this state. Consequently Oklahoma’s total land releases rose significantly when this industrial sector was required to report to TRI.

Paperboard Mills- NAICS 322130 (SIC 2631)

Another industry utilizing large amounts of volatile chemicals is paperboard manufacturing. Pulp paper is formed into various pressed paper products, a process which uses both ammonia and

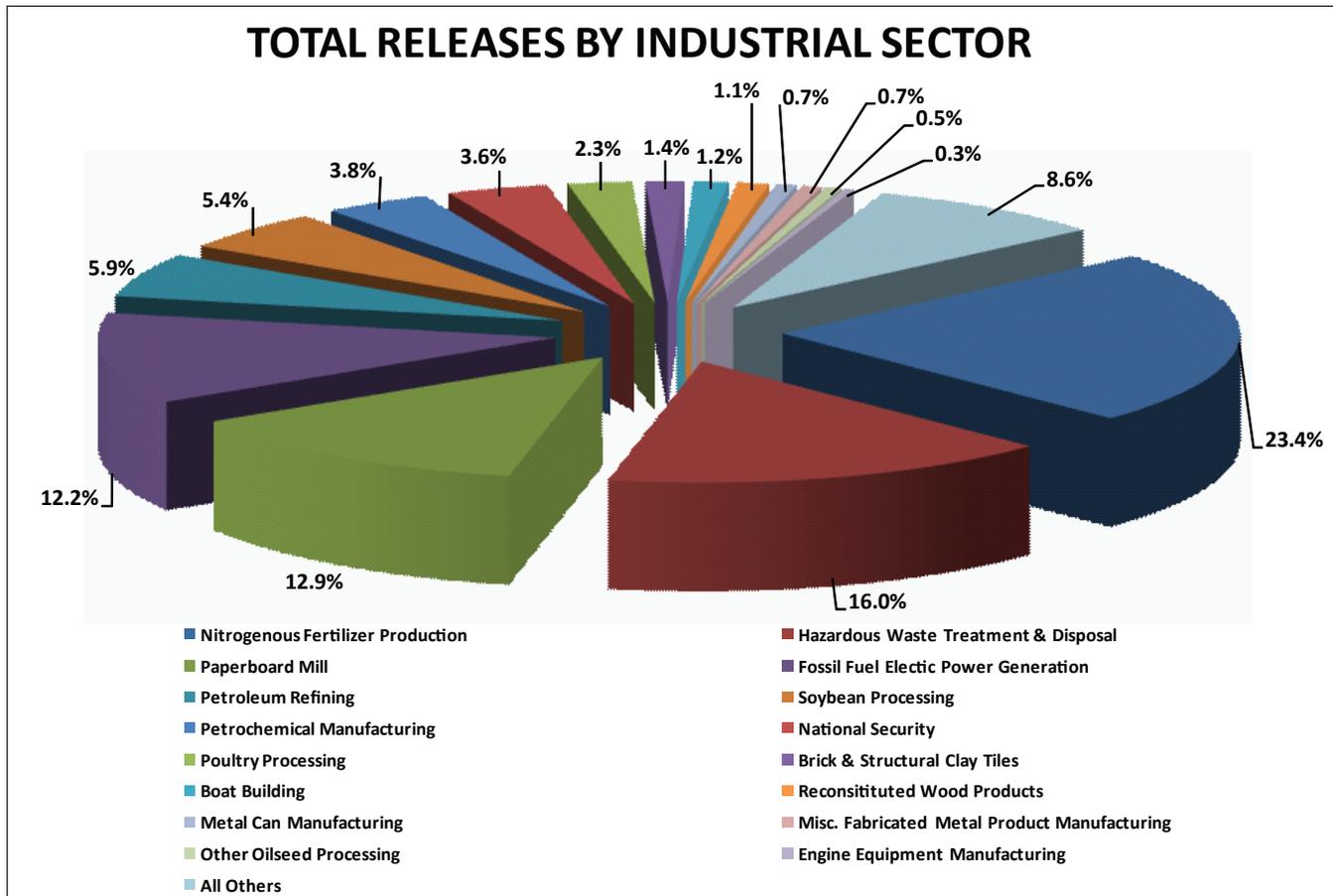
methanol. Methanol increasingly is used by this industry as an alternative to more toxic organo-chloride compounds, and paperboard mills accounted for over 85 percent of reportable methanol releases in 2006. Permitted stack air releases of methanol account for 71 percent of all releases for this industry in 2006.

Fossil Fuel Electric Power Generation- NAICS 221112 (Coal-Fired Utilities- SIC 4911)

This industry was required to report for the first time for 1998 and contributed to a significant rise in Oklahoma’s figures for land and air releases. Electricity generating plants in the State utilize coal as a source of all or part of their fuel. All power generating plants operating in Oklahoma consume fossil fuels to generate electricity.

continued on next page...

Figure U



Seven fossil fuel powered utilities reported chemical usage above thresholds for 2006. The majority of chemicals reported by this industry are either components of bituminous coal or formed during its combustion. (See Chemicals Reported in 2006) For example, 95 percent of on-site barium compounds releases in 2006 came from this industry. Overwhelmingly chemicals releases by fossil fuel-fired utilities are 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.

Petroleum Refining- NAICS 324110 (SIC 2911)

Petroleum refining is the physical, thermal and chemical separation of crude oil into its major distillation fractions which then are processed through separation and conversion steps into finished petroleum products. The chief products of this industry fall into three categories: **fuels** such as gasoline, diesel, liquefied petroleum gas, jet fuel and kerosene; **finished nonfuel products** such as solvents, lubricating oils and greases, petroleum wax and jelly, asphalt and coke; and **chemical industry feedstocks** such as naphtha, ethane, propane, butane, ethylene, propylene, butadiene, benzene, toluene and xylenes. The latter

are primary materials for a large number of products, including pesticides, paints, waxes, thinners, solvents, detergents, refrigerants, resins, sealants, latex, plastics and synthetic fibers. Petroleum fuels comprise about 40 percent of the total energy consumed in the U.S., based on BTUs. Approximately 90 percent of the petroleum products used in the U.S. is fuels, with gasoline accounting for about 43 percent of the total. Five petroleum refineries were operational in Oklahoma in 2006, and together accounted for approximately six percent of total on-site releases in the State for the year. Petroleum refining was the chief source for reportable releases of polyaromatic compounds (PACs), in particular benzo(g,h,i)perylene in Oklahoma in 2006.

Soybean Mills- NAICS 311222 (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 affected by the Nitrate Reporting Initiative begun in 1999. Increases in reported nitrates released by this industry alone resulted in an increase in excess of three times that for all reported releases to surface water in the State combined. As striking as the increase appears, it represented an improvement in the accuracy of reporting nitrates rather than an actual increase in discharges of these compounds.

Chemicals Reported in 2006

Oklahoma facilities reported the manufacture, process or otherwise use of 123 listed toxic chemicals or chemical groups for 2006. The chemicals released in greatest quantities are illustrated in **Figure V**. The ten chemicals released in greatest quantities are discussed below, and together ammonia, nitrate compounds, methanol, barium compounds, hydrogen fluoride, toluene, hydrochloric acid aerosols, copper, styrene and manganese compounds accounted for 69.8 percent of all chemicals released or managed, as defined by TRI. (**Table 7**) The chemicals reported for 2006 are largely a reflection of commerce in the State.

Ammonia remained the chemical released in the largest quantities in Oklahoma during 2006, as in previous years and accounted for 20.7 percent of all toxic chemicals released in Oklahoma for the year.

This compound is a component of fertilizers and stock feeds, and over 91 percent of ammonia releases came from this industry. Ammonia gas is used by other industries as a refrigerant, while ammonia solutions are used in paper pulping operations and food processing. (**Figure W**) Twenty-six facilities reported a total of over five million pounds of ammonia released in 2006; however total ammonia releases decreased by over 25 percent from 2004 to 2006.

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 hygroscopic and

continued on next page...

Figure V

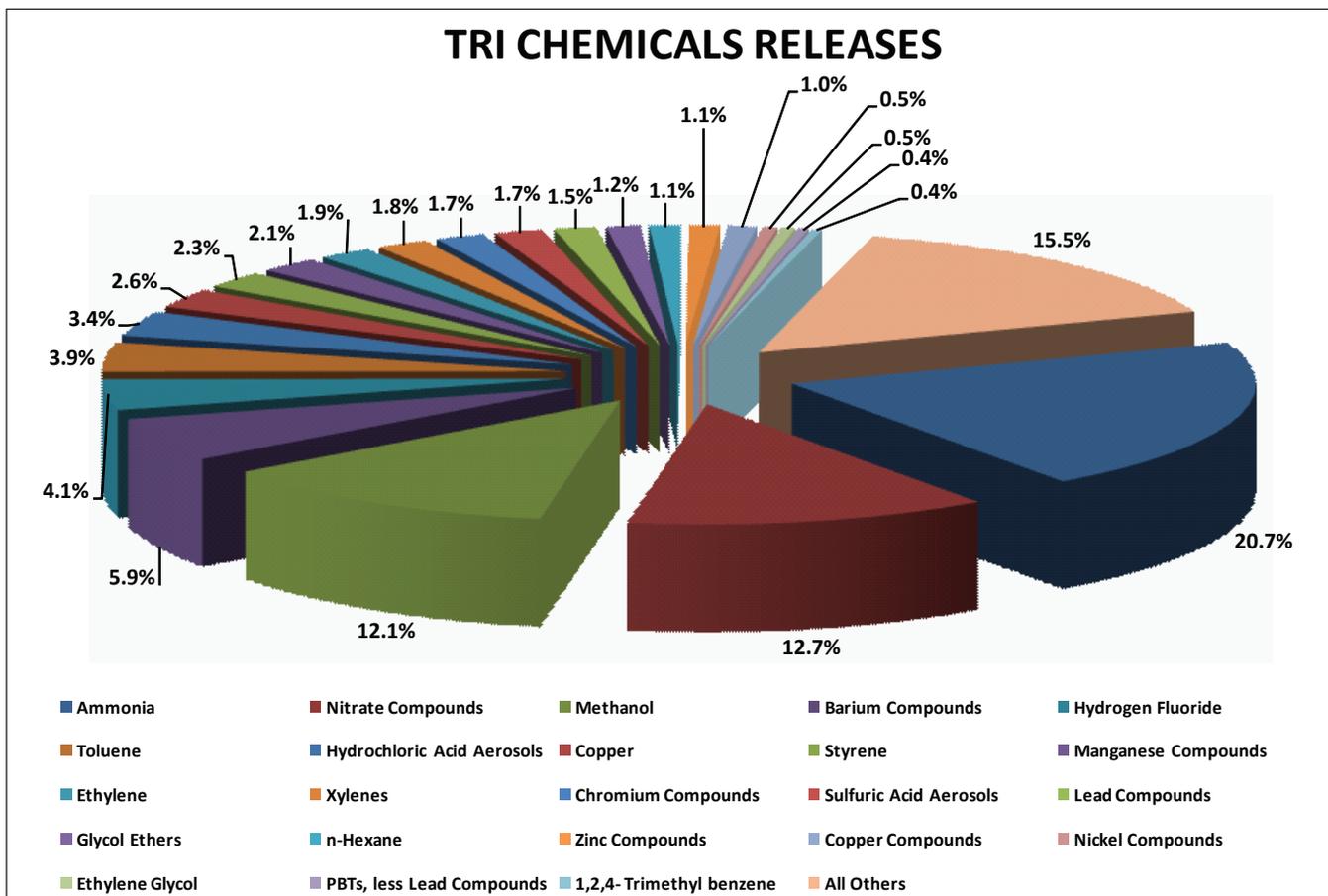


Table 7

Rank	Chemical Or Chemical Group	Total Releases, lbs.
1	Ammonia	5,261,402
2	Nitrate Compounds	3,223,553
3	Methanol	3,094,983
4	Barium Compounds	1,505,337
5	Hydrogen Fluoride	1,051,313
6	Toluene	1,004,821
7	Hydrochloric Acid Aerosols	863,454
8	Copper	655,510
9	Styrene	574,291
10	Manganese Compounds	531,271
11	Ethylene	482,707
12	Xylenes	462,001
13	Chromium Compounds	439,880
14	Sulfuric Acid Aerosols	433,814
15	Lead Compounds	378,591
16	Glycol Ethers	306,373
17	n-Hexane	281,504
18	Zinc Compounds	272,953
19	Copper Compounds	257,578
20	Nickel Compounds	135,964
21	Ethylene Glycol	125,237
22	PBTs, less Lead Compounds	95,273
23	1,2,4- Trimethyl benzene	92,462
	All Others	3,945,249

therefore extremely damaging to the mucus membranes of the eyes and respiratory tract.

Nitrate compounds are another group of nitrogen containing chemicals and are chiefly released by soybean mills and fertilizer production. **(Figure X)** This group of chemicals was reported by a total of 22 facilities in the State in 2006 and accounted for 12.7 percent of total releases. 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 nitric acid neutralization, often

Figure W

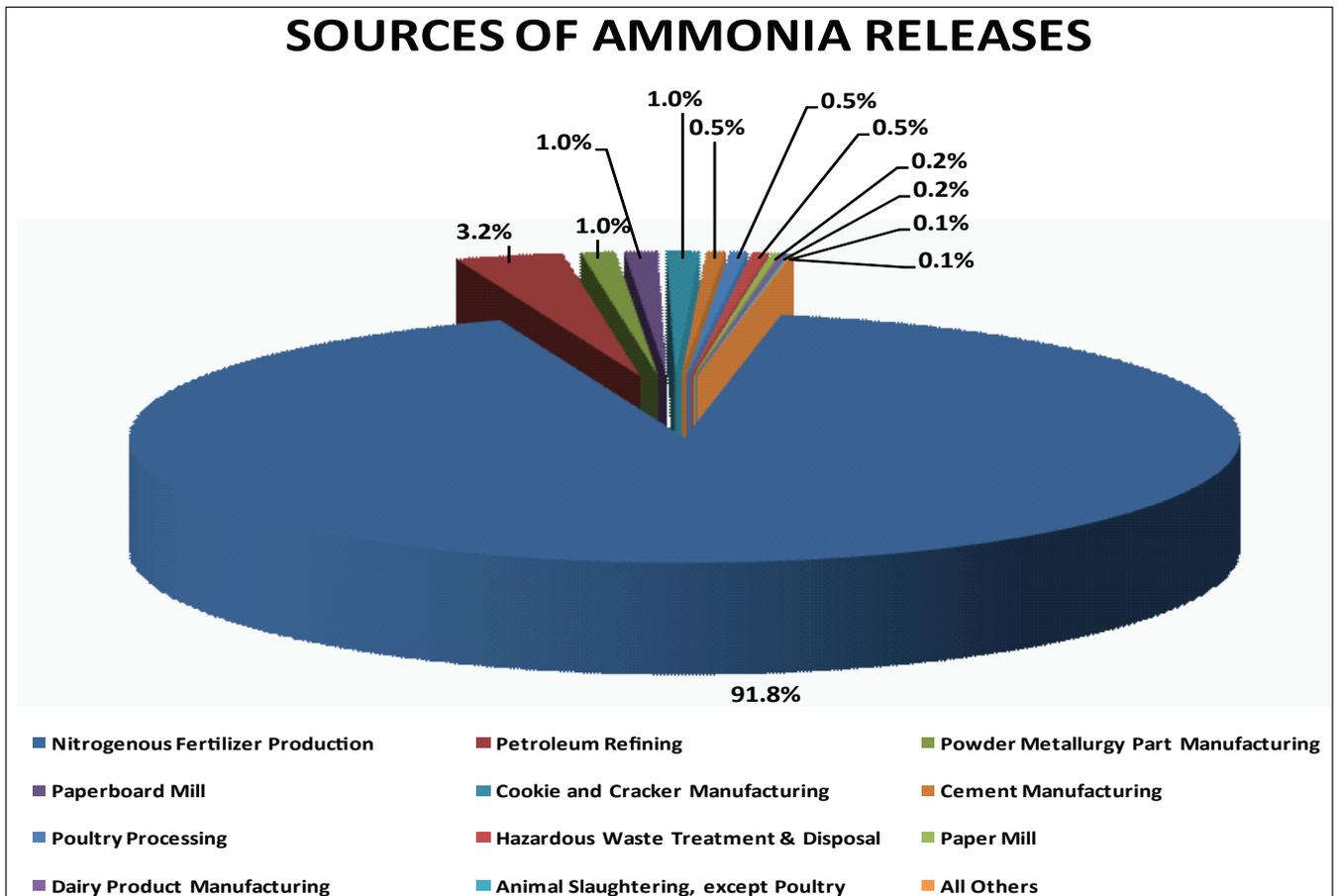
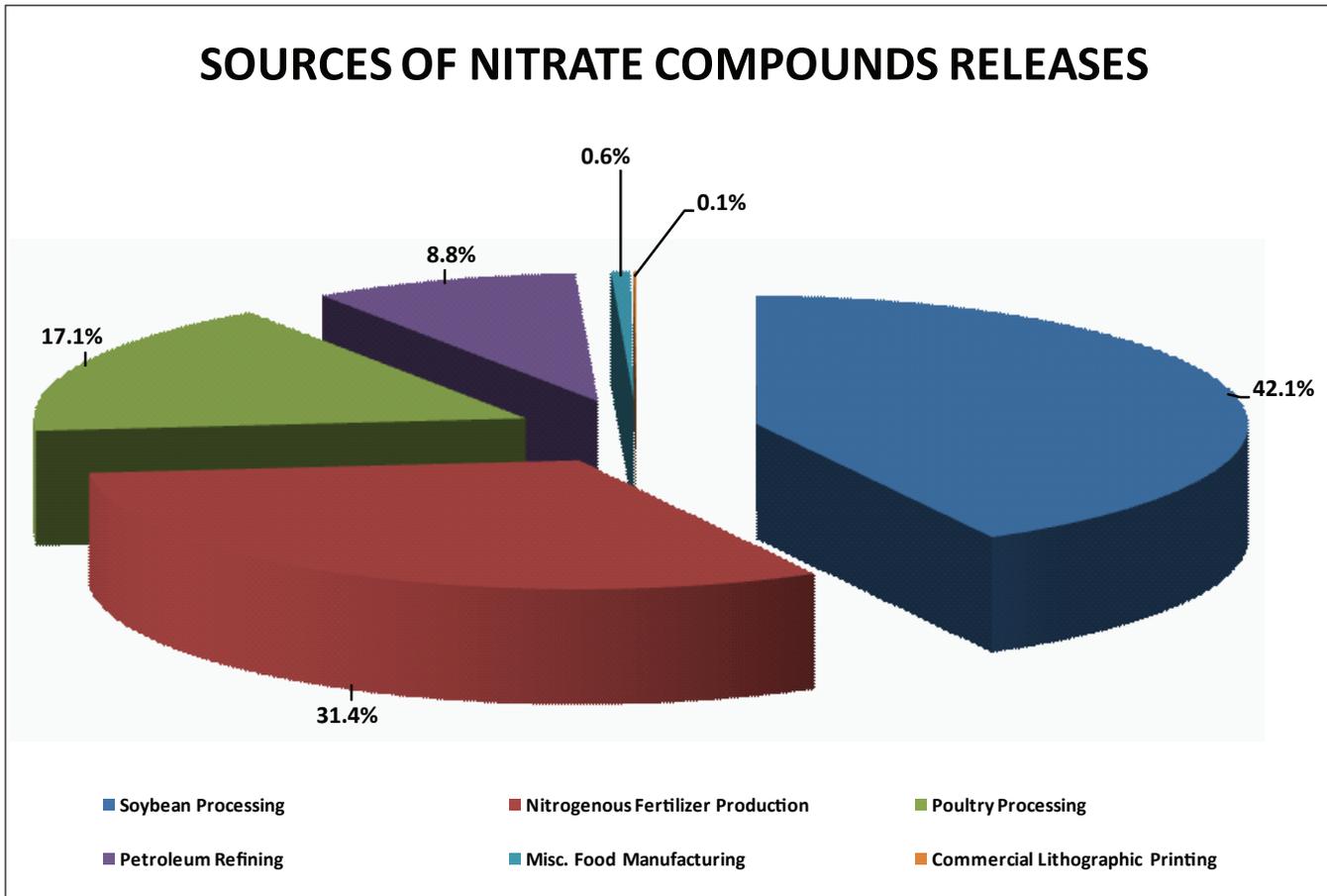


Figure X



was excluded from the calculations of numbers reported to TRI. Beginning with RY 1999, EPA's Nitrate Initiative sought to improve the accuracy of nitrate release numbers 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 of the Nitrate Initiative, 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. 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 oxidizes the iron in hemoglobin to form methemoglobin in the blood leading to methemoglobinemia ("blue-baby" syndrome). Children and in particular infants under age six months are most susceptible to this disease and most likely to suffer long term deleterious effects from it.

Methanol, also known as methyl alcohol or wood alcohol, is a common industrial solvent, and was reported by 36 facilities in 19 different industrial classifications for total releases of over three million pounds. Primary users of methanol in Oklahoma are the wood processing and paper production industries. Methanol also is a secondary product of ammonia fertilizer plants. (Figure Y) It is highly

continued on next page...

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 can be present naturally in the soils of Oklahoma. **Barium compounds** have varied industrial uses, however, under TRI reporting requirements, these chemicals were reported chiefly as managed industrial wastes from non-combustible components of coal found in the ash produced by coal-fired electrical plants. (Figure Z) Fly ash

along with other barium compounds most frequently is disposed to land through the use of permitted sanitary landfills, RCRA Subtitle C regulated disposal facilities and surface impoundments. Barium compounds accounted for 5.0 percent of total TRI releases in the State in 2006.

The ability of barium compounds to create health or environmental hazards is dependent on the water solubility of individual compounds and the toxicity of each. Generally, relatively high concentrations of barium are required to be toxic or hazardous. Ingestion is the most common means of exposure, although the dust of dry barium compounds may pose an inhalation hazard. Potential health effects from exposure to high concentrations of barium or barium compounds are gastric irritation, muscle

continued on page 38...

Figure Y

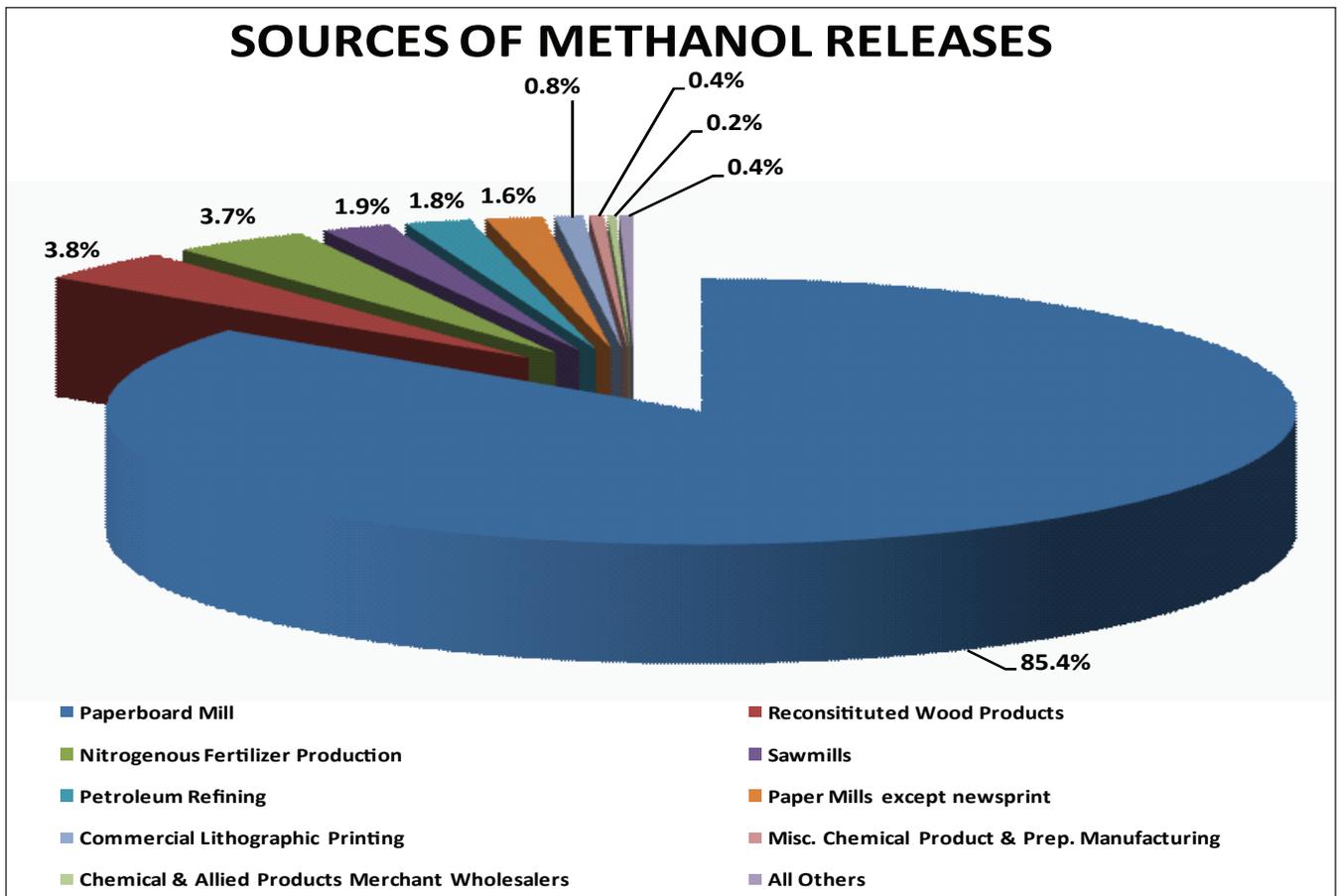


Figure Z

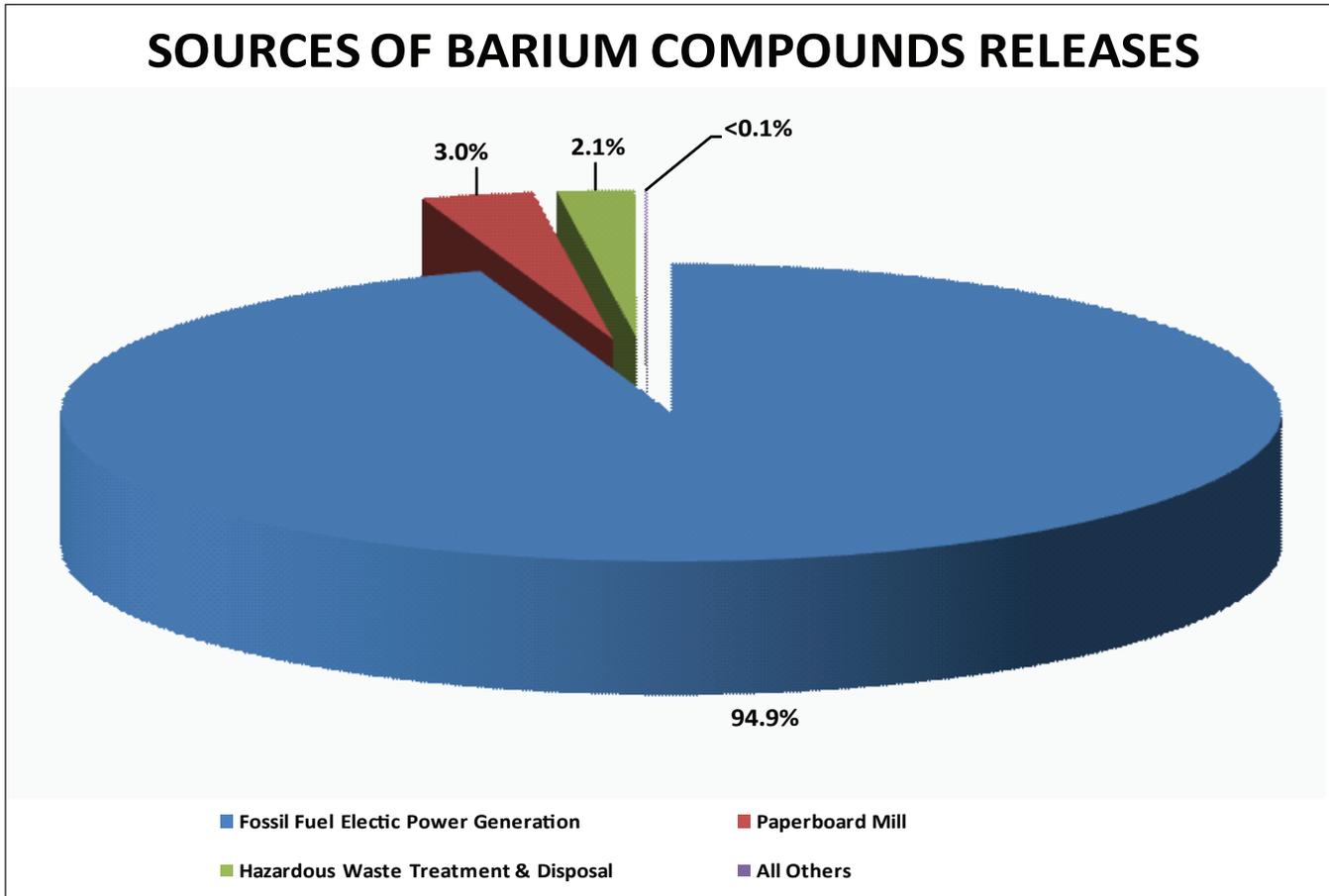
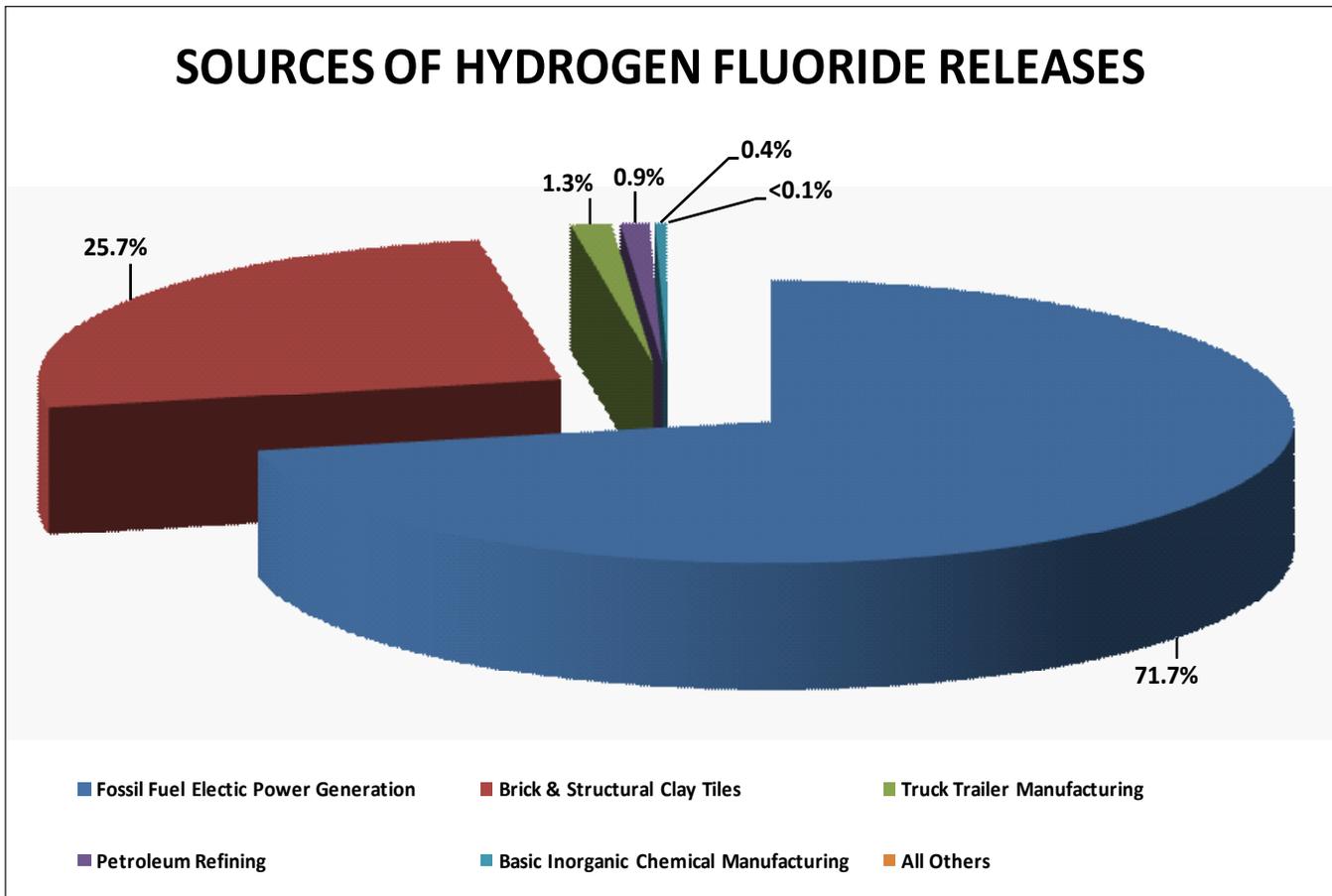


Figure AA



fatigue, cardiac arrhythmia, and damage to internal organs. Barium sulfate (barite) is excluded from TRI reporting.

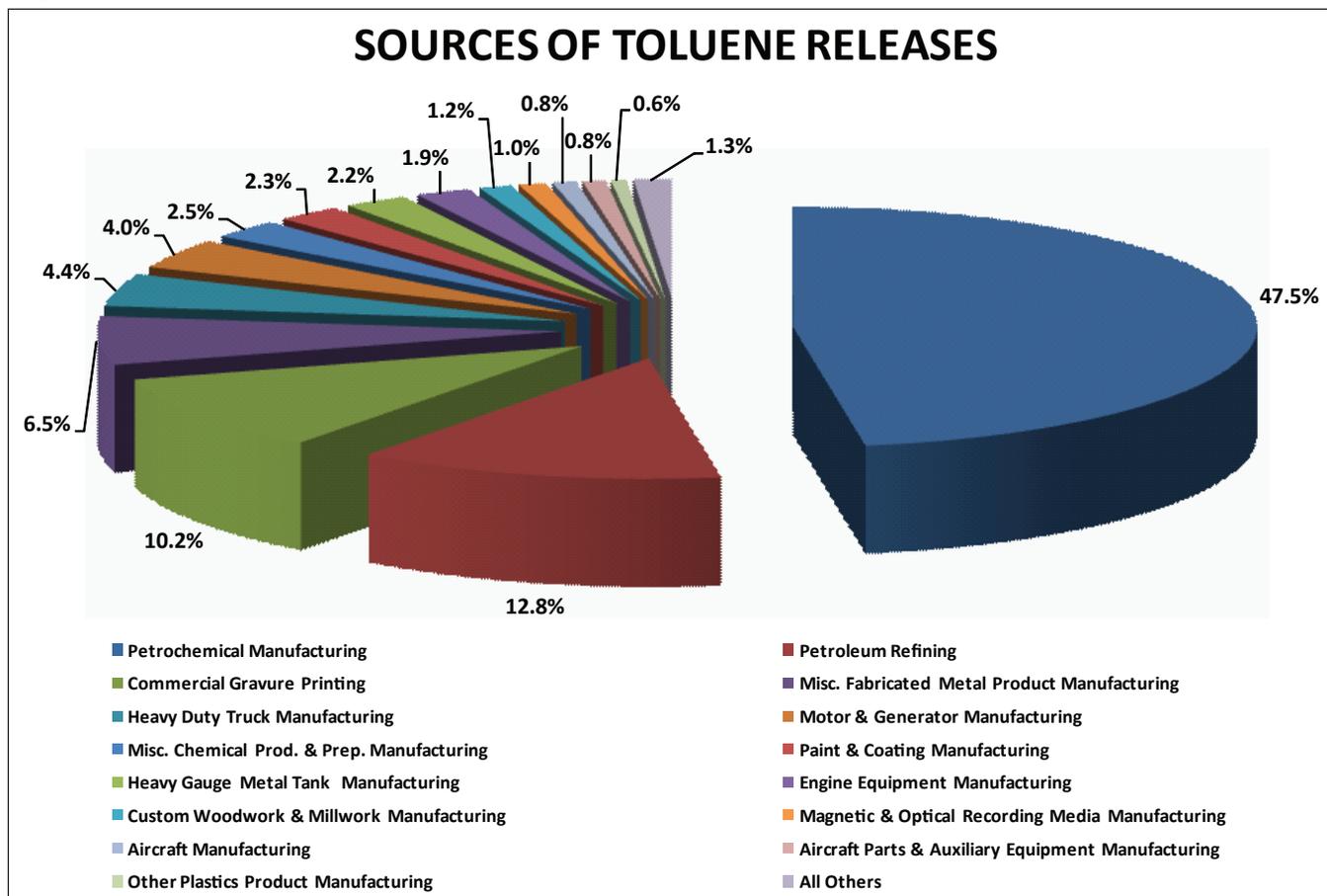
Hydrogen fluoride is a colorless gas with a sharp, acrid odor. It is hygroscopic and readily dissolves in water to form hydrofluoric acid. In its gaseous state, releases occur to the air and inhalation is the means of exposure. Even at low levels hydrogen fluoride is an eye, skin and respiratory irritant as hydrofluoric acid is formed when the gas comes into contact with moisture in these organs. Acute inhalation exposure at high concentrations may cause pulmonary edema and cardiac arrhythmia. Hydrofluoric acid is extremely corrosive and may cause severe burns.

Hydrogen fluoride is formed during coal combustion and this is the largest source of releases in the State. **(Figure AA)** Other common uses are as a catalyst or hardener

or an agent to etch glass. Fifteen facilities reported hydrogen fluoride releases for 2006.

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 BB)** During petroleum refining, toluene is isolated, and back blended into fuels. It also is a by-product of styrene production. Toluene accounted for 3.9 percent of total releases in 2006 and was reported by thirty-six facilities. Because of its volatility, the majority of toluene released to the environment is through stack or fugitive air emissions.

Figure BB



Inhalation of fumes is the primary means of exposure, although it may be absorbed through the skin 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.

Hydrochloric acid is extremely corrosive and the vast majority is handled in aqueous solutions. Even dilute solutions of hydrochloric acid will corrode most metals and of course it is extremely damaging to skin and mucus membranes. However, under TRI only **hydrochloric acid aerosols** are reported, also known as “1995 and after”, referring to a 1995 clarification that specifies only aerosols of the chemical are reported. An aerosol of hydrochloric acid is considered to be any mist, vapor, gas, fog or other airborne form of particle size. Sprayed or distilled acid is reportable, as is hydrogen chloride gas. Hydrochloric acid is a by-product of coal combustion, and coal fired electrical utilities were the source of 48.4 percent of releases in 2006. **(Figure CC)** However, gases generated by coal combustion are treated by in-line or stack scrubbers that greatly reduce concentrations of hydrochloric acid and other chemicals prior to release as permitted, stack air emissions. Sixteen facilities reported hydrochloric acid aerosol releases for 2006,

Elemental copper is a light reddish-brown metal that occurs naturally in deposits in the earth’s crust and also in minute quantities in soils, sediments, waters and air. Oxidized copper develops a green coating or patina. It is a component of a number of compounds found in nature, many distinguished by their blue-green color.

Copper smelting and mixing of molten copper with other metals to form alloys,

such as bronze (copper and tin) and brass (copper and zinc) dates to ancient times. Common industrial uses are for pipes and valves in distribution systems, in fertilizers, bactericides, fungicides, algicides, animal feed additives, electroplating and the manufacturing of azo-dyes. Sixty-five Oklahoma facilities used or processed copper at or above the TRI thresholds; however, artillery produced by the U.S. Armed Forces was the source of 96.6 percent of copper releases in 2006. **(Figure DD)** The majority of releases are made to permitted landfills and recycling is the chief means of managing copper wastes in the State.

Copper is an essential trace nutritional element for all organisms including humans and other animals. However, inhalation of copper dust and fumes can affect the respiratory tract causing coughing, sneezing, and pain in the chest. Liver and endocrine function also may be affected. Copper dust and fumes can cause eye irritation, headaches and muscle aches. Ingesting large amounts of copper from drinking water can cause vomiting, abdominal pain, nausea, diarrhea. Copper is not known to play a role in cancer or birth defects.

Styrene is a colorless liquid at ambient temperature and pressure with a sweet smell in its pure form. It is highly flammable and polymerizes rapidly and explosively. Industrially its primary use is in the production of polystyrene plastics and resins used for insulation or fiberglass boats; copolymers of styrene are used to manufacture plastic pipe, automotive components, tires and reinforced plastic materials. In 2006, over 13 billion pounds of styrene was produced in the U.S. It was reported used by 25 Oklahoma facilities for 2006 and sources of styrene releases are illustrated in **Figure EE**. Because of its volatility, releases occur chiefly to air.

continued on page 42...

Figure CC

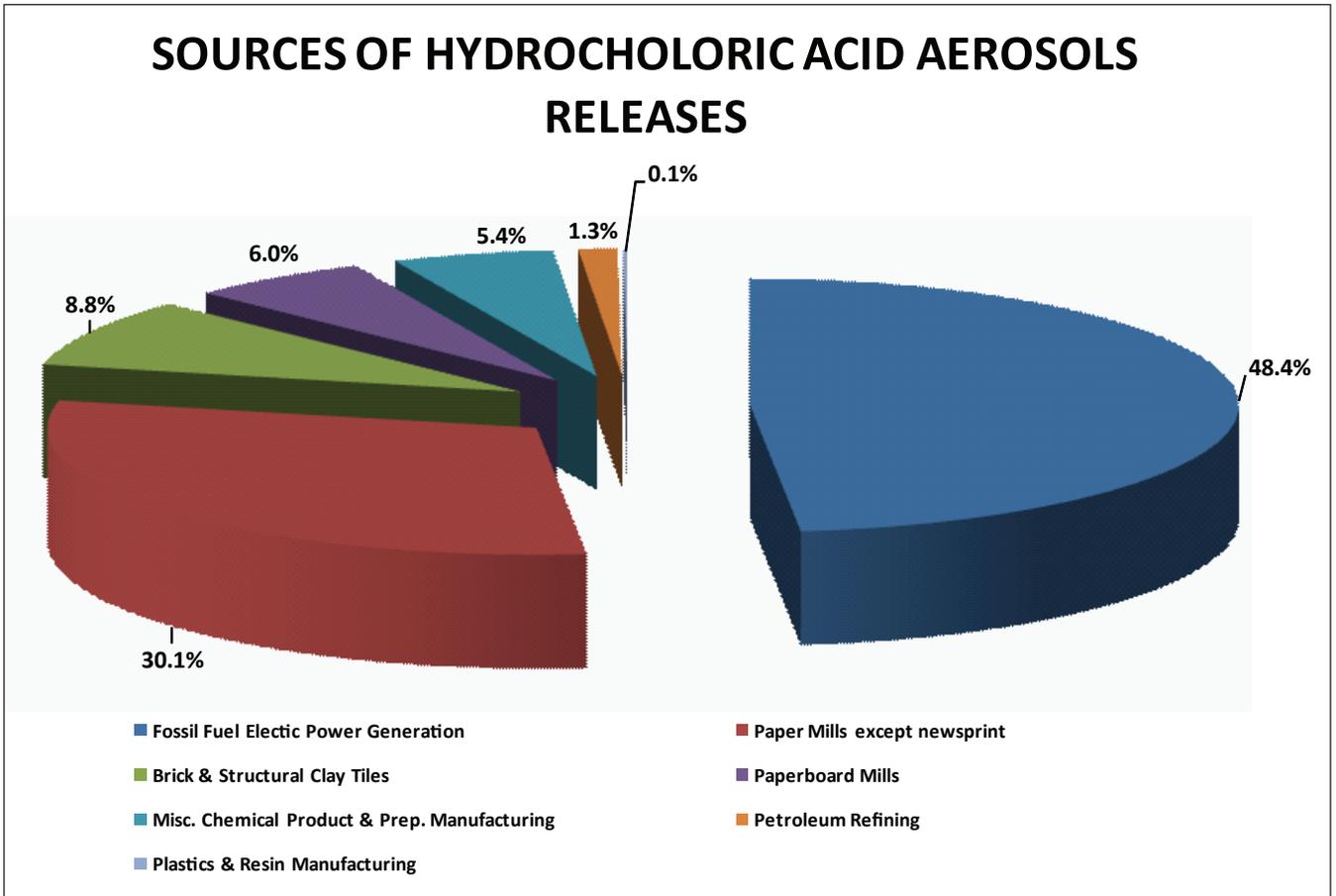


Figure DD

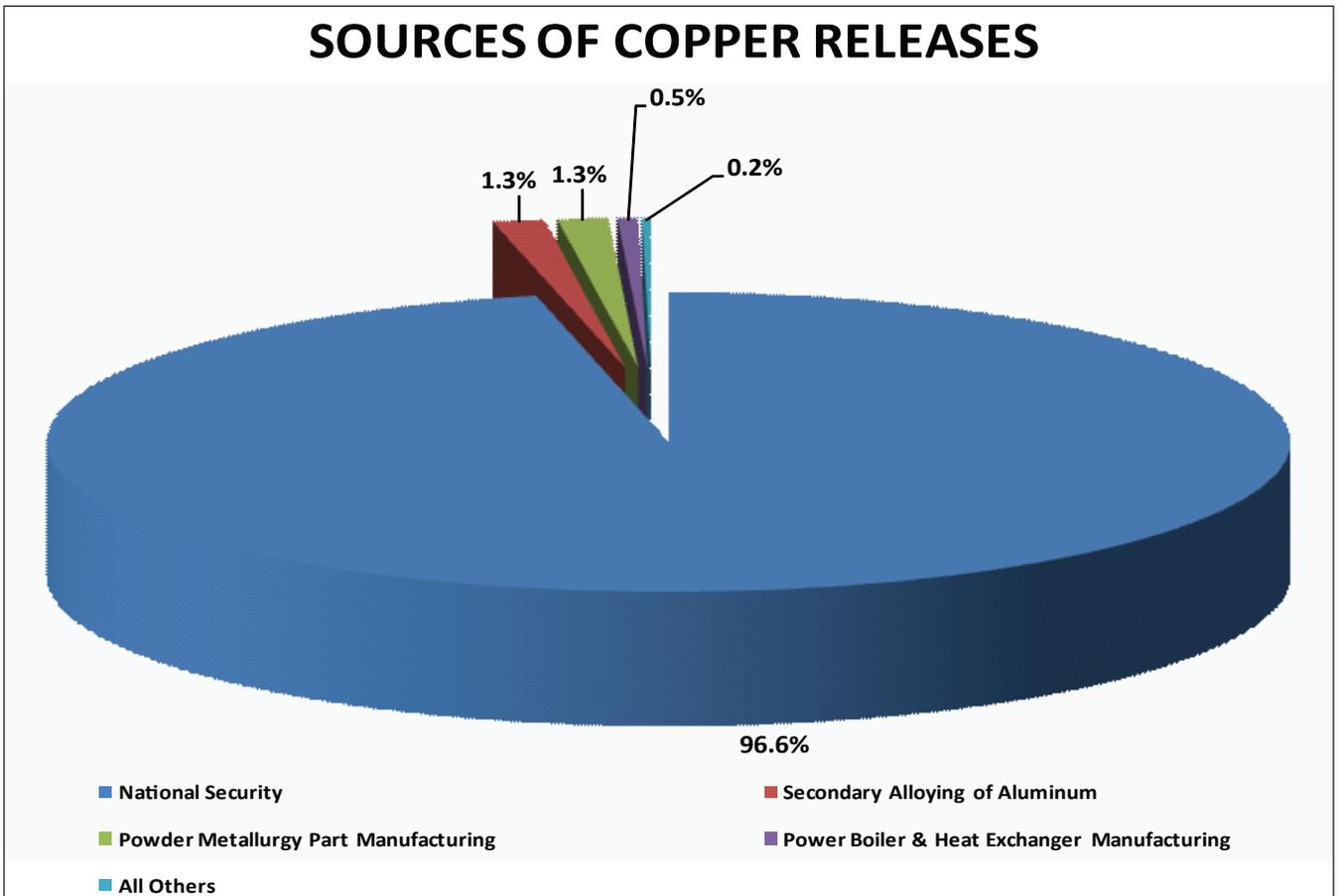


Figure EE

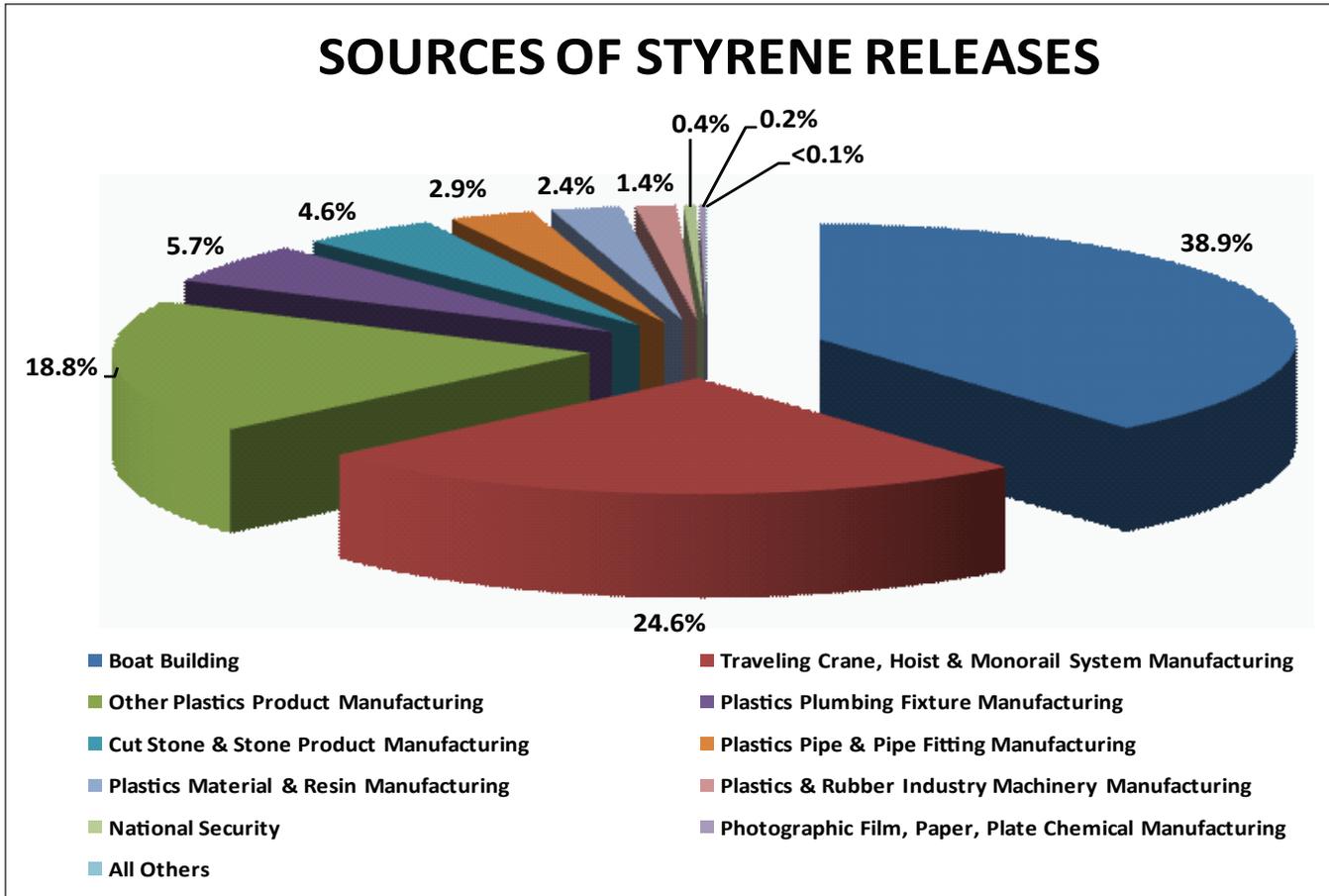


Figure FF

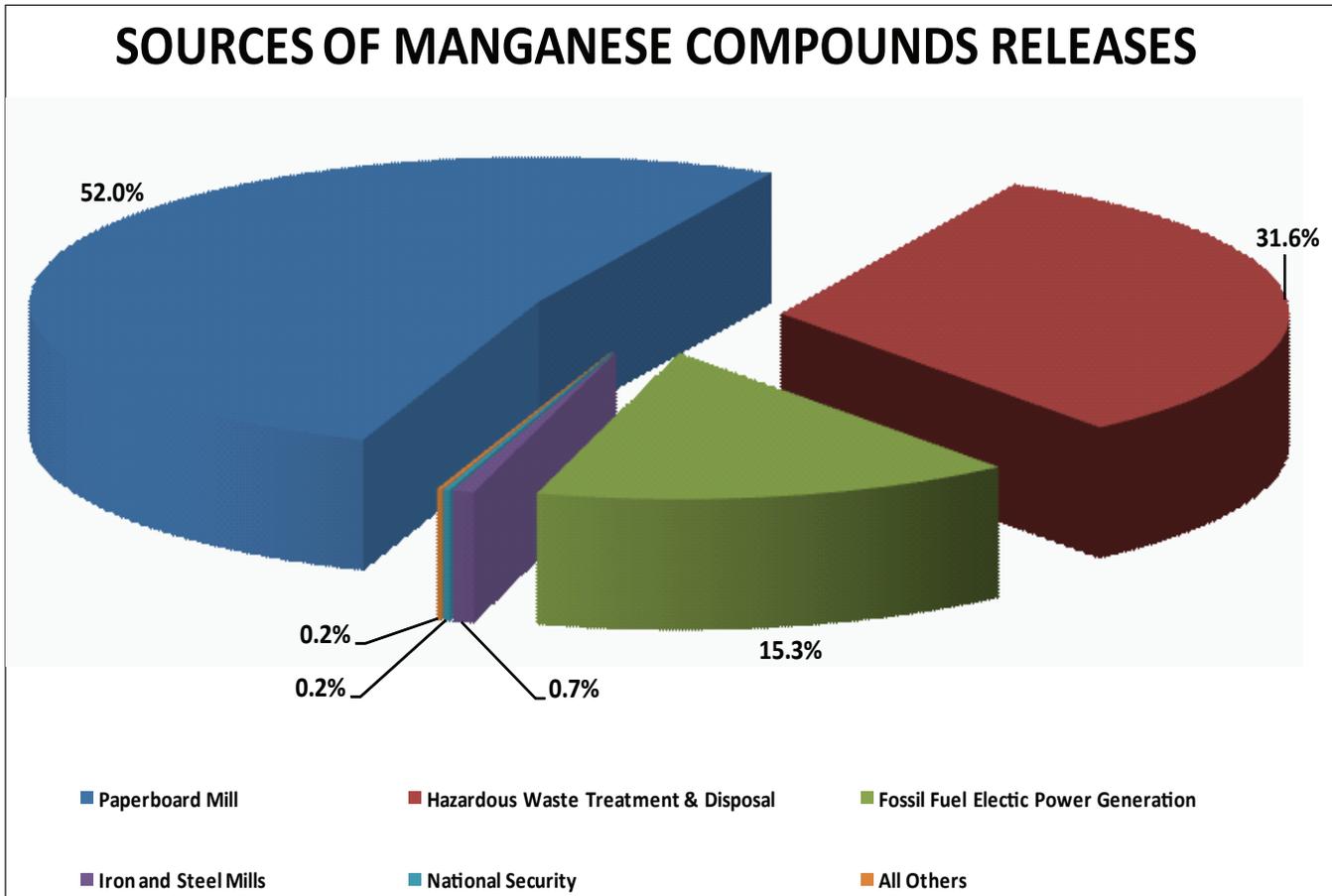


Table 8

Rank	Chemical/Material Reported	2006 Total Stored, lbs.
1	Crude Oil	30,420,300,000
2	Coal	3,508,100,000
3	Cement, Asphalt	2,328,435,321
4	Gasoline	2,036,323,798
5	Diesel	1,661,761,813
6	Fly Ash	1,028,035,754
7	Propane	541,594,616
8	Ammonia	453,070,879
9	Kerosene	426,081,356
10	Methanol	266,700,418
11	Hydrogen Sulfide	250,901,634
12	Toluene	128,918,332
13	Urea	119,350,000
14	Petroleum Coke	75,000,000
15	Ammonium Nitrate	59,644,814
	Total	43,304,218,735

Styrene exposure occurs chiefly through inhalation although it can be absorbed through the skin and ingested as well. Exposure to styrene vapors is irritating to eyes and mucous membranes, causes nausea and inflammatory reactions. Excessive or prolonged exposure may cause neurotoxicity including intoxication, fatigue and impaired memory and attention as well as decreased ability to distinguish colors. Chronic effects of exposure may include hearing loss and liver damage.

Manganese is the twelfth most common element and a component of many common minerals, although it does not occur naturally as a pure metal. **Manganese compounds** ranked tenth as the chemical or chemical group released in greatest quantities statewide in 2006, and was reported by 29 facilities. Industrial applications for manganese-containing compounds are many. **(Figure FF)** Ferromanganese mixtures improve the strength and hardness of carbon steel, stainless steel, high-temperature steel, tool steel, cast iron and alloys and manganese compounds contained in steel account for the largest amount of these chemicals reported to TRI nationally. These compounds also are components of

ash from coal-fired electrical utilities, and in Oklahoma this accounts for the majority releases after disposal to RCRA Subtitle C landfills. Manganese compounds are used in glazes, varnishes and ceramics.

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

The list of chemicals and chemical families reportable under TRI continues to change. Beginning with RY 1995, the list increased from 313 to over 600 chemicals or chemical groups. The PBT Rule went into effect in 2000 (see Persistent, Bioaccumulative, Toxic Chemicals, below). The Final Rule for Lead, which set the reporting threshold for lead or lead compounds at 100 pounds per year, applied for the first time in 2001. Concerned parties outside of the EPA may petition the agency to add or delete chemicals from the list.

The materials reported to Tier II as stored in greatest quantities for 2006 are listed in **Table 8**. Five of the materials reported stored in greatest quantities, crude oil, gasoline, diesel fuel, hydrogen sulfide and butane are directly related to Oklahoma's energy production industries. With the exception of hydrogen sulfide and ammonia, the only EHSs listed, the Tier II reporting threshold for all other chemicals or materials is 10,000 pounds greater.

Ammonia, as with TRI reporting, was by far the EHS stored in greatest quantities due to the production and storage of nitrogenous fertilizers. Hydrogen sulfide from “sour gas” wells at oil production sites was not reported or underreported in previous years. While hydrogen sulfide is reportable under TRI, oil and gas production activities are not covered by that program, therefore hydrogen sulfide from “sour gas” wells at oil production sites is not reported to TRI. Because Tier II covers only storage, chemicals produced as wastes or byproducts such as nitrate compounds frequently are unreported. Chlorine is reportable under both programs, however; significantly greater quantities are reported to Tier II as municipal water treatment plants are not covered under TRI. Hydrofluoric acid also is reportable under TRI and is an EHS. Methanol while not an EHS ranked tenth by total quantities reported under Tier II and was the third TRI chemical released in greatest quantities.

Ammonia, its sources and effects were discussed in the above TRI section. The other EHS reported in greatest quantities under Tier II is considered below.

Hydrogen sulfide as stated is a byproduct of oil and natural gas production, making this industry the greatest source of reported hydrogen sulfide in the State. However, hydrogen sulfide also is produced

naturally as well as from other industrial processes such as sewage treatment plants, swine farms, and pulp and paper operations, petroleum refineries and petrochemical plants, natural gas plants, food processing, and tanneries. Hydrogen sulfide is a poisonous, highly flammable, colorless gas with a characteristic odor of rotten eggs, the unpleasant scent associated with “sewer gases”. Mixtures of the gas and air are explosive. It can be detected by smell at fairly low concentrations in air, however, at high concentrations, the human ability to smell the gas can be lost and causing hydrogen sulfide to be very dangerous. The primary means of exposure is through inhalation although the chemical is irritating to the eyes and mucous membranes. Exposure affects the central nervous system and may result in unconsciousness. Prolonged exposure may result in death. Inhalation of gas may cause pulmonary edema as a delayed effect. Rapid evaporation of the compressed liquid may cause frostbite. Combustion of hydrogen sulfide produces toxic sulfur oxides.

Information provided on the storage of hazardous and potentially dangerous materials to the Hazardous Chemical Inventory 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 under TRI was the 1999 Final Rule on Persistent, Toxic and Bioaccumulative chemicals, (64 CFR 58666). Chemicals designated as PBTs 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 or chemical groups classified as persistent, bioaccumulative, toxic were lowered substantially. With the Final Rule for Lead and Lead Compounds promulgated for RY 2001 (66 CFR 4500), the list was completed to its current form. **(Table 9)** Thresholds take into account both the individual

toxicity of the given chemical and the risks for exposure to it. 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 present PBT list is composed of organo-chlor pesticides, other highly chlorinated or brominated aromatic compounds, chemicals with multiple, linked aromatic rings (polyaromatic compounds), and two heavy metals reported as elements or compounds.

The lowered thresholds apply to all reportable activities, that is, no alternate thresholds for 'otherwise use' are applicable. Use of Form A is disallowed for any PBT chemical. The *de minimus* concentration exemption is not applicable for any PBT chemical, with the exception of lead containing alloys. Persistent, Bioaccumulative and Toxic chemical 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 pound threshold for produce and manufacture and the 10,000 pound threshold for otherwise use remain in effect.

Oklahoma companies reported eleven PBT chemicals for 2006. **(Table 10)** Over one half of TRI facilities in the State reported at least one PBT chemical for a total of 193 facilities. Despite the frequency of PBTs reported, these chemicals nominally affect TRI data for the State. Less than two percent of all TRI releases and only about seven percent of total production related wastes reported in Oklahoma for 2006 resulted from releases, transfers or other management of PBTs.

Lead and lead compounds accounted for almost 96 percent of all PBT releases reported for 2006. Of the 12.87 million pounds of PBTs reported, 11.57 million pounds came from recycling of lead and lead containing compounds. This was the

Table 9

PBT Chemicals and Thresholds

Manufacture, Process And Otherwise Use Thresholds

Aldrin	100 lbs./Yr.
Lead	100 lbs./Yr.
Lead Cmpds.	100 lbs./Yr.
Methoxychlor	100 lbs./Yr.
Pendimethalin	100 lbs./Yr.
Polycyclic Aromatic Cmpds. (PASs)	100 lbs./Yr.
Tetrabromobisphenol A	100 lbs./Yr.
Trifluralin	100 lbs./Yr.
Chlordane	10 lbs./Yr.
Benzo(g,h,i) Perylene	10 lbs./Yr.
Heptachlor	10 lbs./Yr.
Hexachlorobenzene	10 lbs./Yr.
Isodrin	10 lbs./Yr.
Mercury	10 lbs./Yr.
Mercury Cmpds.	10 lbs./Yr.
Octachlorostyrene	10 lbs./Yr.
Polychlorinated Biphenyls (PCBs)	10 lbs./Yr.
Pentachlorobenzene	10 lbs./Yr.
Toxaphene	10 lbs./Yr.
Dioxin And Dioxin-Like Cmpds.	0.1 gm/Yr.

Table 10

	Facilities	Air Releases	Land Releases	UI Releases	Water Releases	One-Time Releases	Total Releases	Transfers	Treatment	Reuse	TPRW
Benzo(g,h,i) Perylene	17	140.0	9.0	0.0	7.0	0.0	156.0	37.0	53.0	70,504.0	70,750.0
Dioxins	20	12.0 gm	13.0 gm	0.0 gm	0.0 gm	0.0 gm	25.0 gm	5.0 gm	0.0 gm	0.0 gm	30.0 gm
Hexachlorobenzene	1	0.0	12.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	12.0
Lead	55	1,670.0	74,069.0	0.0	4.0	14,485.0	90,228.0	73,472.0	0.0	8,881,999.0	9,045,699.0
Lead Compounds	53		365,774.0	519.0	427.0	0.0	366,720.0	103,963.0	0.0	2,692,832.0	3,163,515.0
Mercury	6	278.0	29.0	0.0	1.0	0.0	308.0	96.0	0.0	3.0	407.0
Mercury Compounds	17	1,374.0	3,071.0	0.0	5.0	0.0	4,450.0	601.0	0.0	0.0	5,051.0
Polychlorinated Biphenyls (PCBs)	1	3.0	10,013.0	0.0	0.0	0.0	10,016.0	0.0	0.0	0.0	10,016.0
Polycyclic Aromatic Compounds (PACs)	21	2,280.0	382.0	0.0	9.0	0.0	2,671.0	2,207.0	3,148.0	555,016.0	563,042.0
Tetrabromo-bis-phenol A	1	7.0	0.0	0.0	0.0	0.0	7.0	0.0	7,000.0	0.0	7,007.0
Trifluralin	1	1,903.0	0.0	0.0	0.0	0.0	1,903.0	0.0	0.0	0.0	1,903.0
Totals	193	7,655.0	453,359.0	519.0	453.0	14,485.0	476,471.0	180,376.0	10,201.0	12,200,354.0	12,867,402.0

All TPRW parameters are expressed in pounds except "Dioxins" which are expressed in grams.

fourth year that the 100-pound threshold applied for both lead and lead compounds. While the reported numbers for releases of both increased with the implementation of the 2001 Final Rule, this does not indicate greater quantities of these chemicals were released into the environment but rather is indicative of an improvement in the reporting of these chemicals. It is important to note that those facilities reporting the greatest usage and waste management for lead and compounds use primarily lead containing alloys and therefore continue to report under the higher thresholds.

Fifty-five Oklahoma facilities reported lead releases in 2006. The Armed Forces is the major source of **elemental lead** releases. (Figure GG) Other industrial sectors using lead include the production of inorganic chemicals, miscellaneous chemical products and steel wire drawing.

Industries reporting total releases of **lead compounds** are shown in Figure HH. Over 83 percent of these 'releases' were permitted land disposals at highly regulated RCRA Subtitle C hazardous waste facilities. Releases to these sites have extremely minimal potential for adverse impacts on the environment or human health.

Mercury compounds are trace constituents of coal and crude oil, and are released in minute quantities by the combustion of these fuels. Trace quantities of naturally occurring mercury in native rock also accounts for the production of mercury compounds in hydraulic cement kilns. However, 65.7 per cent of all mercury compounds releases reported in 2006 were permitted land disposals into highly regulated RCRA Subtitle C landfills. (Figure II) Chemicals manufactured and distributed for sole use in industrial processes were the major source of **elemental mercury** releases, (Figure JJ), with petroleum refining, paper mills and cement kilns making up the balance. The health hazards of mercury and compounds are well documented, it is important to keep the scale in perspective. For 2006, only 308 pounds of mercury were reported released throughout the entire State with combined releases of mercury and mercury compounds less than twenty-six thousandths of one percent (.00258%) of total releases reported in Oklahoma for 2006.

Polyaromatic compounds (PACs), also known as polynuclear aromatics (PNAs) or polycyclic aromatic hydrocarbons (PAHs)

continued on page 48...

Figure GG

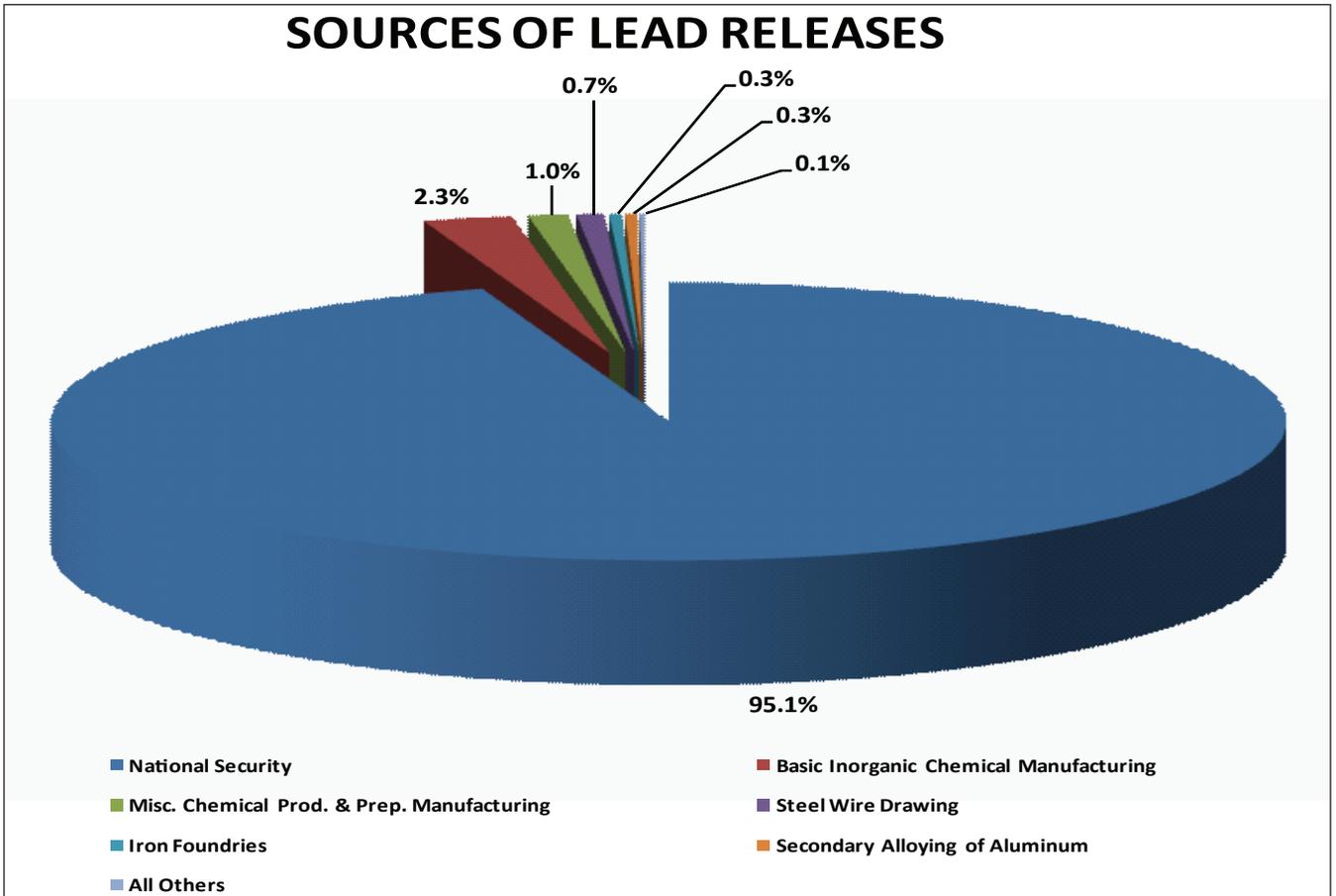


Figure HH

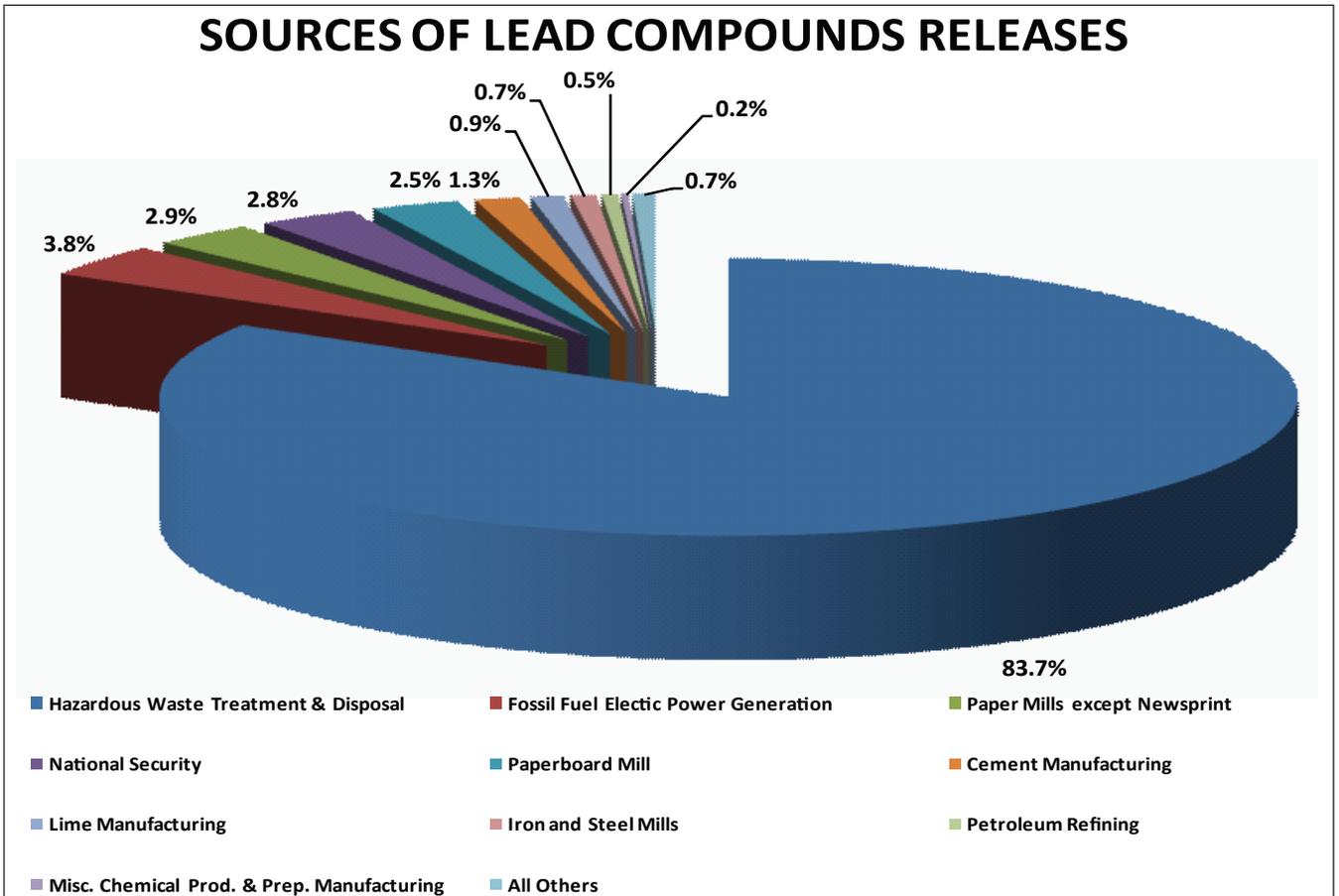


Figure II

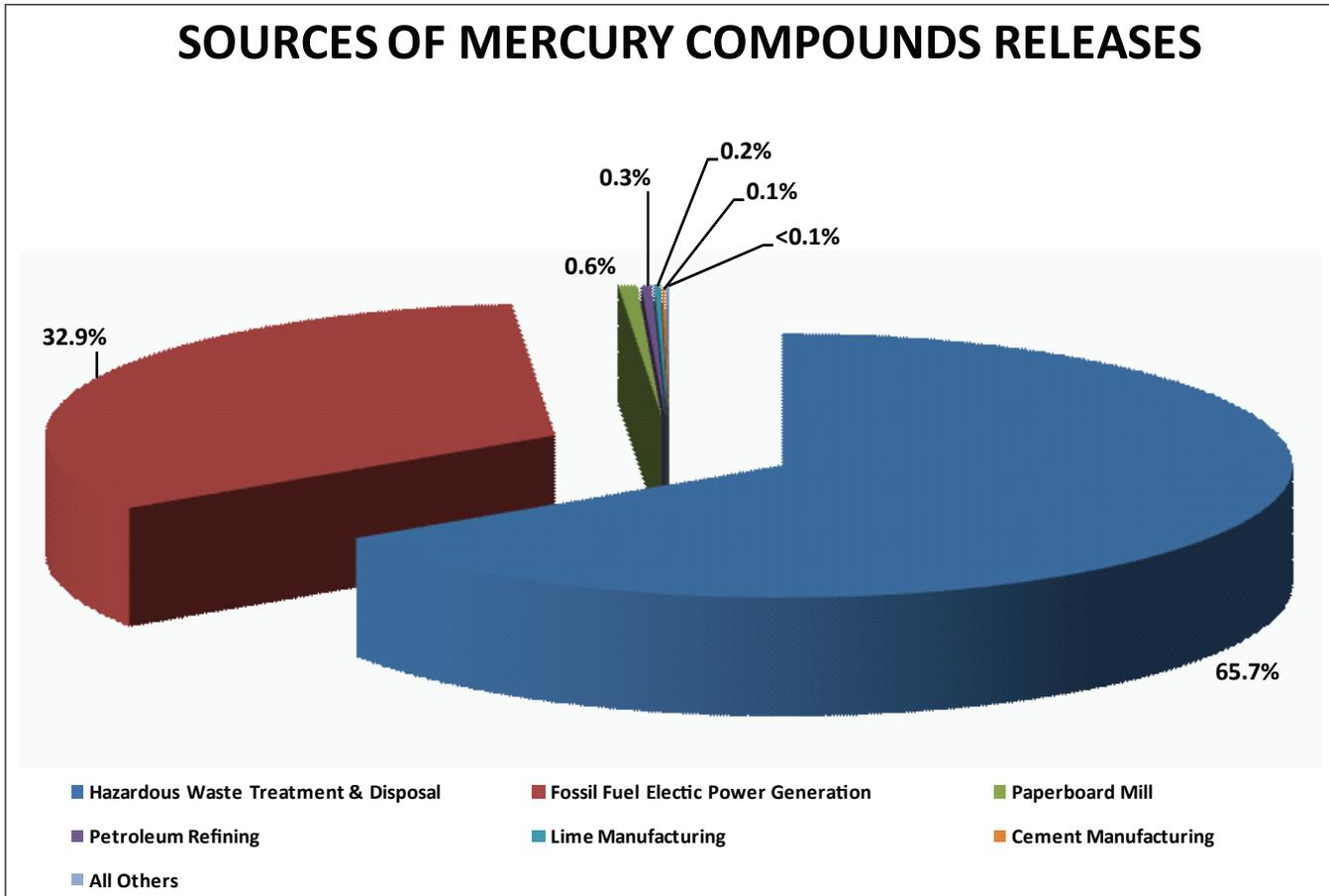
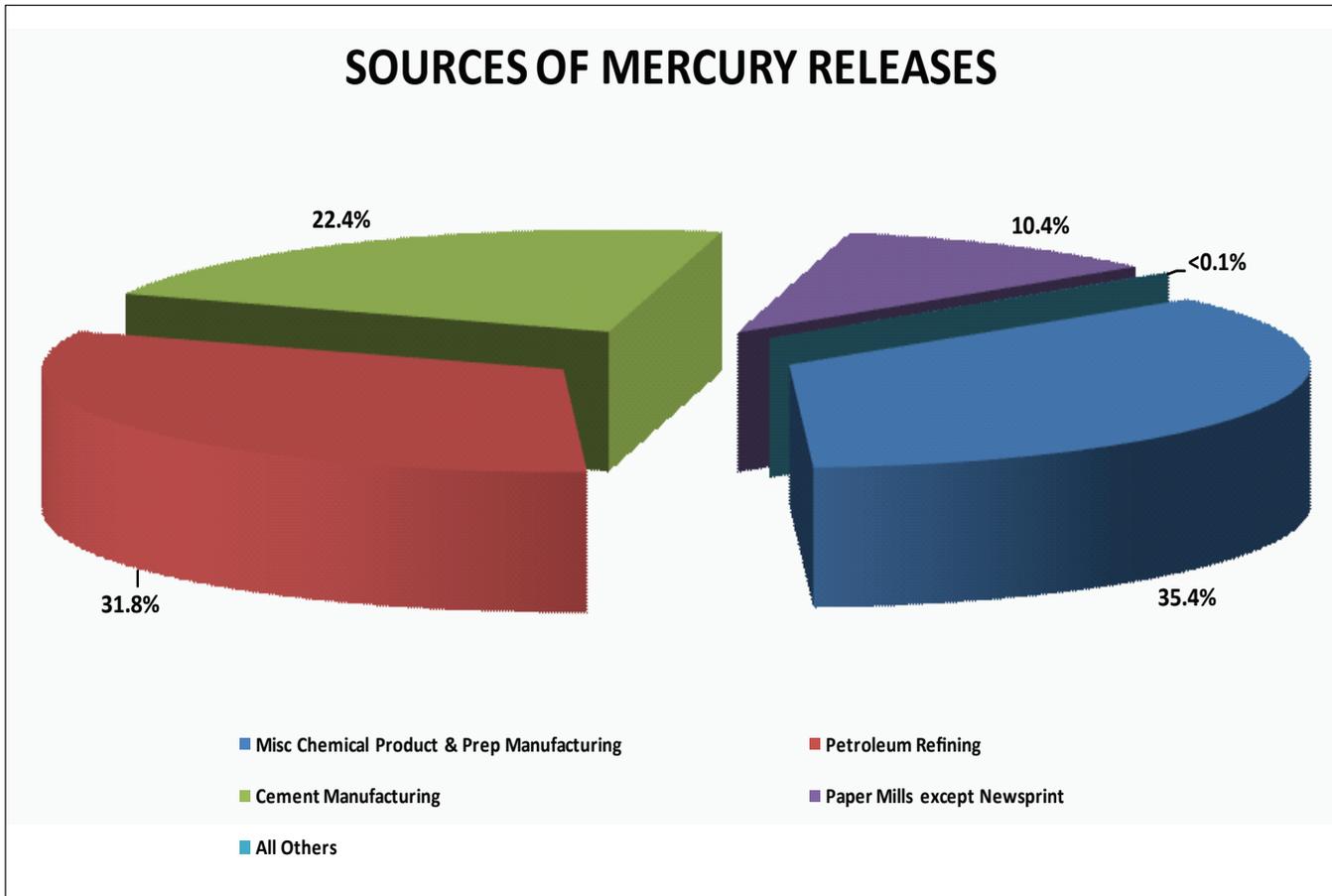


Figure JJ



describe a group of related chemicals that generally occur as complex mixtures rather than as discrete compounds. 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 KK) As major constituents of carbon black, tire manufacturing also is a significant source of PAC releases. While **benzo(ghi)perylene** is a polyaromatic compound, it is the only one of these chemicals listed as a separate PBT. There are no specific commercial uses of benzo(ghi)perylene alone although like other PACs it is produced by incomplete combustion. As would be expected, the largest source of benzo(ghi)perylene releases, petroleum refining, is the same as that for polyaromatics in general. (Figure LL)

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 and pesticides; however, in the past 20 years the only dioxins manufactured for commercial use in the United States are extremely small quantities for research purposes. Dioxins are the only TRI chemicals reported in grams with a reporting threshold of 0.1 gram. Releases of dioxins in 2006 totaled only 25 grams, or 0.053 pounds. No dioxins were reported transferred, treated or reused. 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 MM)

continued on page 50...

Figure KK

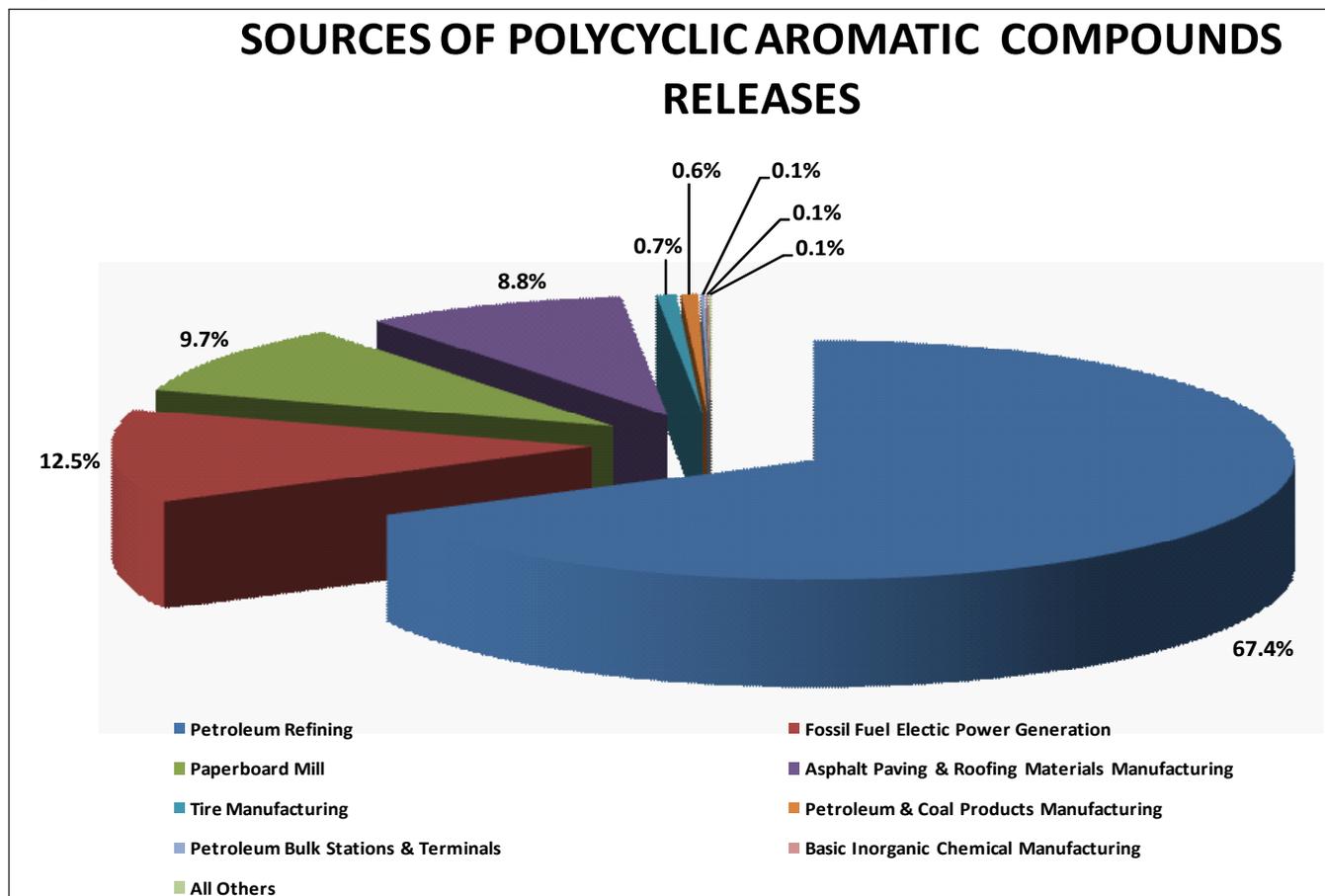


Figure LL

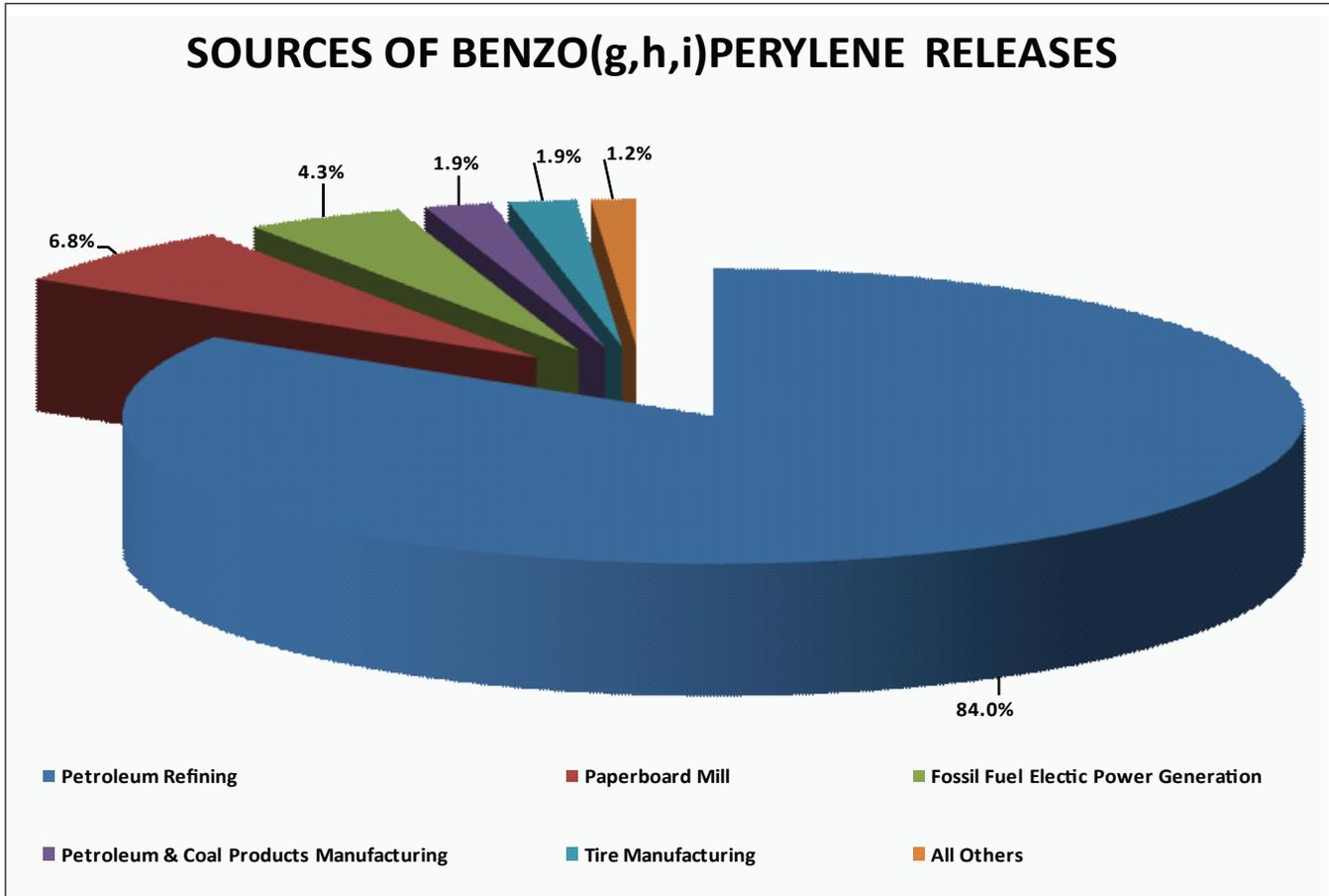
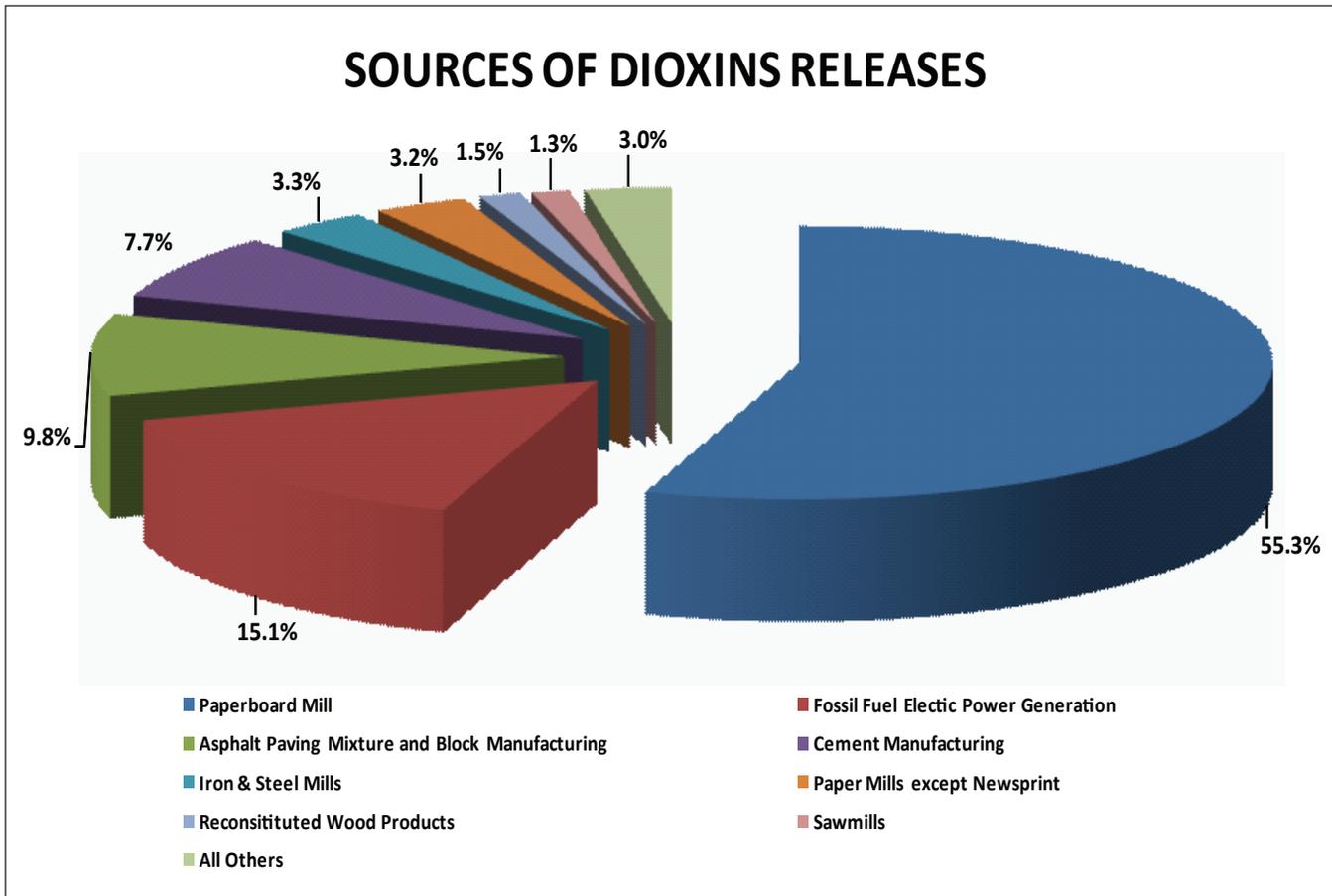


Figure MM



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. Toxic Release Inventory reporting for dioxin and dioxin-like compounds requires the distribution between seventeen of the most chlorinated dioxin compounds be reported as well. Therefore, assumptions concerning the toxicity of reported dioxins require analyzing the distribution of compounds.

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 2006 with total releases of seven pounds.

Reported releases of **polychlorinated biphenyls** (PCBs) in 2006 were by a single landfill permitted under RCRA Subtitle

C, that is, these chemicals were managed by an Oklahoma TSD rather than generated or used by an in-state industry.

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

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.

Chemical Abstract Service (CAS); 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) list 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.

Local Emergency Planning Committee (LEPC); LEPCs are mandated under SARA Title III.

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

North American Industrial Classification System (NAICS)- the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. The NAICS was developed by the Office of Management and Budget and adopted in 1997 to replace the Standard Industrial Classification (SIC) system, and adopted for TRI for RY 2006. Industries in the United States are identified by a six-digit code, the first two digits indicating one of 20 different broad industrial sectors.

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

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

Polynuclear Aromatic Hydrocarbons (PAH), also known as PNAs; 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

Polychlorinated Biphenyls (PCB), 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.

continued on next page...

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)- 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. SIC has been replaced by NAICS for TRI and other reporting and no further revisions to SIC be planned.

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

Tier II- the form for reporting chemical storage under Section 312 of SARA Title III and synonymous 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.



O K L A H O M A
DEPARTMENT OF ENVIRONMENTAL QUALITY

...for a clean, attractive, prosperous Oklahoma