1999 Oklahoma

TRI Toxics Release Inventory

Summary Report

Contents

Executive Summary

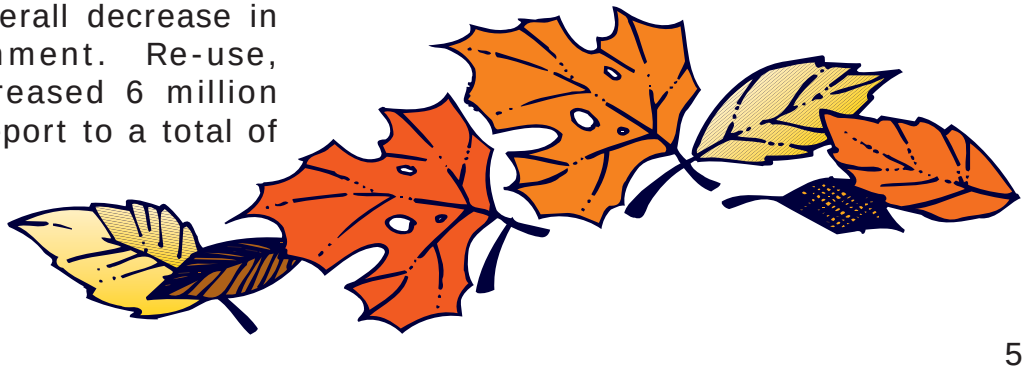
Toxics Release Inventory (TRI) figures for Reporting Year 1999 show that recycling has increased in Oklahoma. This information reflects legal emissions, transfers, and treatment of over 600 toxic chemicals used by the 323 facilities required to report in Oklahoma. Permits issued by state and federal agencies regulate these releases and transfers of chemicals used in the manufacturing of a wide variety of products. Not all industries are required to report under TRI. Industries must have at least 10 full time employees and be of specific types including manufacturing, coal-fired electric power generating, commercial hazardous waste disposal, bulk petroleum terminals, and solvent recovery.

This is the thirteenth year the DEQ has compiled this information. The U.S. Environmental Protection Agency (EPA) collects the TRI information on a national basis. The EPA data was released in February. Releases include those chemicals emitted directly into air, water, or onto land. Transfers include chemicals going into public sewers, off-site landfills or other disposal facilities. Re-use figures include figures for chemicals recycled or used for energy recovery. Treatment numbers include both on-site and off-site treatment that destroys the toxic chemical. When summed, the figures reflect total production-related wastes generated.

Oklahoma companies reported 32.8 million pounds released, a decrease of close to 6 million pounds from last year's report. Reductions in air releases accounted for 5 million pounds of the overall decrease in releases to the environment. Re-use, primarily recycling, increased 6 million pounds over last years report to a total of 69.5 million pounds. Oklahoma encourages re-use of toxic chemicals because it reduces both the amount of the chemical produced and its subsequent release into the environment. In addition, 2.2 million pounds of chemicals were transferred off-site for proper disposal and 38.5 million pounds of chemicals were destroyed by treatment.

The total of all these activities reflects the total production related waste generated in the State. For 1999, that total was 143 million pounds, an increase of 13 million pounds over 1998. The entire amount of this increase can be accounted for in EPA's reinterpretation of the criteria used for reporting nitrate compounds. These compounds were not released or treated in greater quantities than reported in previous years, but rather EPA made the rules for reporting these compounds clearer, and this clarification resulted in increased reporting. The program, known as the Nitrate Reporting Initiative, targeted Reporting Year 1999.

Even with the new interpretation for nitrate compounds and the addition in 1998 of seven new reporting industry sectors, the total production related waste for 1999 was 1 million pounds lower than that reported in 1997. The trend, over time, for production related waste in Oklahoma is decreasing. This decrease is more dramatic when expansions in the program to include more industries and more chemicals are considered. This is the second annual summary report analyzing these trends that DEQ has published.



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 uptake of chemicals from water and from ingested food and sediment residues.

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

DEQ- Oklahoma Department of Environmental Quality

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.

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.

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

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

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

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.

Glossary

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

RCRA- Resource Conservation and Recovery Act

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

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

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

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

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

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

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

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

Toxic- A substance that produces or causes a systemic damage to an organism.

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.

Background

In 1984, a release of deadly methyl isocyanate gas in Bhopal, India resulted the deaths of thousands. Soon after, a serious, although not fatal, chemical release occurred at a similar plant in West Virginia. These incidents coupled with the need for communities to be informed of hazardous materials in their midst prompted the United States Congress to pass Title III of the Superfund Amendments and Reauthorization Act (SARA), also known as Emergency Planning and Community Right-to-Know Act (EPCRA) on October 16, 1986. The fundamental purposes of the Act are to provide the public with information about toxic chemicals used and stored within communities, thereby raising public awareness of potential chemical hazards encouraging local planning for chemical emergencies. Section 313 of this Bill requires that specified facilities which manufacture, process or otherwise use listed toxic chemicals report releases of these chemicals to the federal Environmental Protection Agency (EPA) and to states on an annual basis. By mandate, the information contained in the Toxics Release Inventory (TRI) is available to the public.

Facilities covered by TRI report total quantities of wastes generated, as well as the maximum amounts of listed toxic chemicals present on-site during the calendar year. Releases of chemical wastes are reported according to the media into which they are released: air, water, land or underground injection. Additionally, figures for off-site transfers of waste chemicals to separate facilities for treatment, disposal, or reuse are reported. The Pollution Prevention Act of 1990 required additional information regarding reductions in the use of toxic chemicals and in waste streams to be reported in the TRI. These changes highlight the importance of pollution prevention and encourage the development and implementation of measures for reducing wastes. Since 1991, TRI has contained information on the re-use of chemicals, including the quantities of chemicals recycled or combusted for energy recovery. Treatment numbers include both on-site and off-site treatments to neutralize or reduce the effects of the toxic chemical. The total of release, transfer, and re-use numbers yields a value for the total production-related wastes generated annually.

The Oklahoma Department of Environmental Quality receives TRI report forms annually from Oklahoma industries covered under Section 313, compiles and maintains a TRI database, reconciles it to the EPA database and analyzes the data. In 2000, DEQ received 1,013 reports for the 1999-reporting year. The information is made available by DEQ to emergency managers, fire departments, Local Emergency Planning Committees, emergency medical services, law enforcement and the general public. These local entities can use the data to identify potential chemical hazards and plan for chemical emergencies, allowing faster and more efficient responses. Because the intent of the Toxics Release Inventory is to provide information for the public, it frequently is the first set of data supplied to

Background

and examined by citizens or citizen workgroups in the resolution of complaints against a specific facility. In addition, dissemination of TRI data can encourage dialogue between citizens and industries and be used as a measurement of the progress facilities or industries make in waste reduction. Schools, hospitals and others can use the information in making site decisions as well.

Additional copies of this report or more in depth information about TRI reporting or other EPCRA programs may be obtained by contacting the Oklahoma DEQ Customer Services Division/SARA Title III Programs at 405-702-1000 or at 1-800-869-1400 or by visiting the DEQ website at:

http: www. deq.state.ok.us

Limitations of TRI Data

TRI reports information on the quantities of specified toxic chemicals released and managed by facilities covered under Section 313 of SARA Title III. As such, TRI provides the most comprehensive overview available of chemical releases and waste management techniques. Responsible use of this information can enable the public to identify and better understand potential hazards in the community. From there, communities 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.

Releases reported in the TRI are regulated under permits issued by State and Federal agencies. 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 the current reporting year, only manufacturing facilities were required to report to the TRI. Although the 1998 additions expand TRI reporting, not all sources of toxic materials are covered. For example, neither transportation emissions nor releases from small facilities are reported.

TRI expanded for reporting year 1995 to double the number of covered chemicals or chemical groups. At present, 604 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. Reportable chemicals vary widely in individual toxicity and persistence in the environment. For example, the release of a small quantity of a highly toxic material, which may fall below the reporting threshold, could pose a more serious health or environmental hazard than a larger release of a less toxic one. TRI provides information on chemical releases, not exposure levels to the public of those chemicals. Quantities in the TRI database are yearly totals; peak concentrations or accidental discharges are not specifically sited. The different media into which toxic chemicals are released greatly affect exposure levels and the means of exposure, (inhalation, dermal absorption or ingestion). Therefore, health assessments or environmental risks/exposures based solely on TRI data are not valid.

Facilities are required to base TRI reports on monitoring data when available. However, if actual measurements are not available, TRI data can be based on estimates. In fact, much of the data generated 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. The production level of a facility may change from year to year and consequently affect the quantities

Limitations of TRI Data

of chemicals released. Productivity ratios are provided by facilities for each chemical released and can be used to compare quantities released from year to year. This assumes a direct linear relationship between production levels and wastes generated. 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 should be considered when reviewing TRI figures.

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

1999 TRI Overview

Forty-eight of seventy-seven Oklahoma counties contain industrial facilities that meet threshold requirements for TRI reporting, and a total of 323 facilities reported in 1999. (Figure 1) In eight counties, the total of releases from all TRI facilities exceeded one million pounds. These counties include the major metropolitan areas of Oklahoma City and Tulsa, counties accessing the Port of Catoosa and counties with major wood processing/paper manufacturing facilities or major treatment, storage and disposal sites. Further information on releases in individual counties can be found in Table A on page 18.

Oklahoma continues to see a real decline in the quantities of toxic chemical wastes generated, when the addition of new industrial categories and the reassessment of nitrate reporting are considered. Total production related wastes were 143 million pounds in 1999 compared to 144 million pounds in 1997 before these changes were in effect. (Figure2)

For 1999 Oklahoma companies reported:

- 32.8 million pounds released
- 2.2 million pounds transferred for disposal
- 69.5 million pounds reused
- 38.5 million pounds treated

Total releases were:

- 18.2 million pounds released to air
- 8.9 million pounds released to land or permitted landfills
- 2.6 million pounds disposed of in underground injection wells
- 3 million pounds discharged to surface waters.

(Figures C-F)

Releases

Total air releases are the sum of permitted stack releases and fugitive air releases that result largely from the natural volatility of some chemical compounds. The increase in total air releases for 1998 compared to 1997 was due to the first time reporting by industries added for 1998, especially coal-fired electrical plants. Therefore, the figures reflected an increase in the number of facilities reporting rather than an increase in actual air emissions in the State. These facilities, some that utilize coal for start-ups only, account for the majority of electrical utilities in the State. Yet even with the significant increase in the number and size of facilities reporting in 1998, total air releases dropped back to the 1997 levels for 1999. (Figure 7) This demonstrates that the goal of cleaner air in the State is being addressed, and is an indication of the continued success between DEQ sponsored pollution prevention programs and the industries that participate in them.

Total on-site releases to land include surface impoundments, land application, use of permitted landfills or other release to land within the boundaries of a facility, and these continued to increase in 1999. However, the changes in reporting requirements, especially that requiring industrial waste handlers to report for the first time along with the Nitrate Initiative (see “Chemicals Released in 1999”) resulted in improved reporting and,

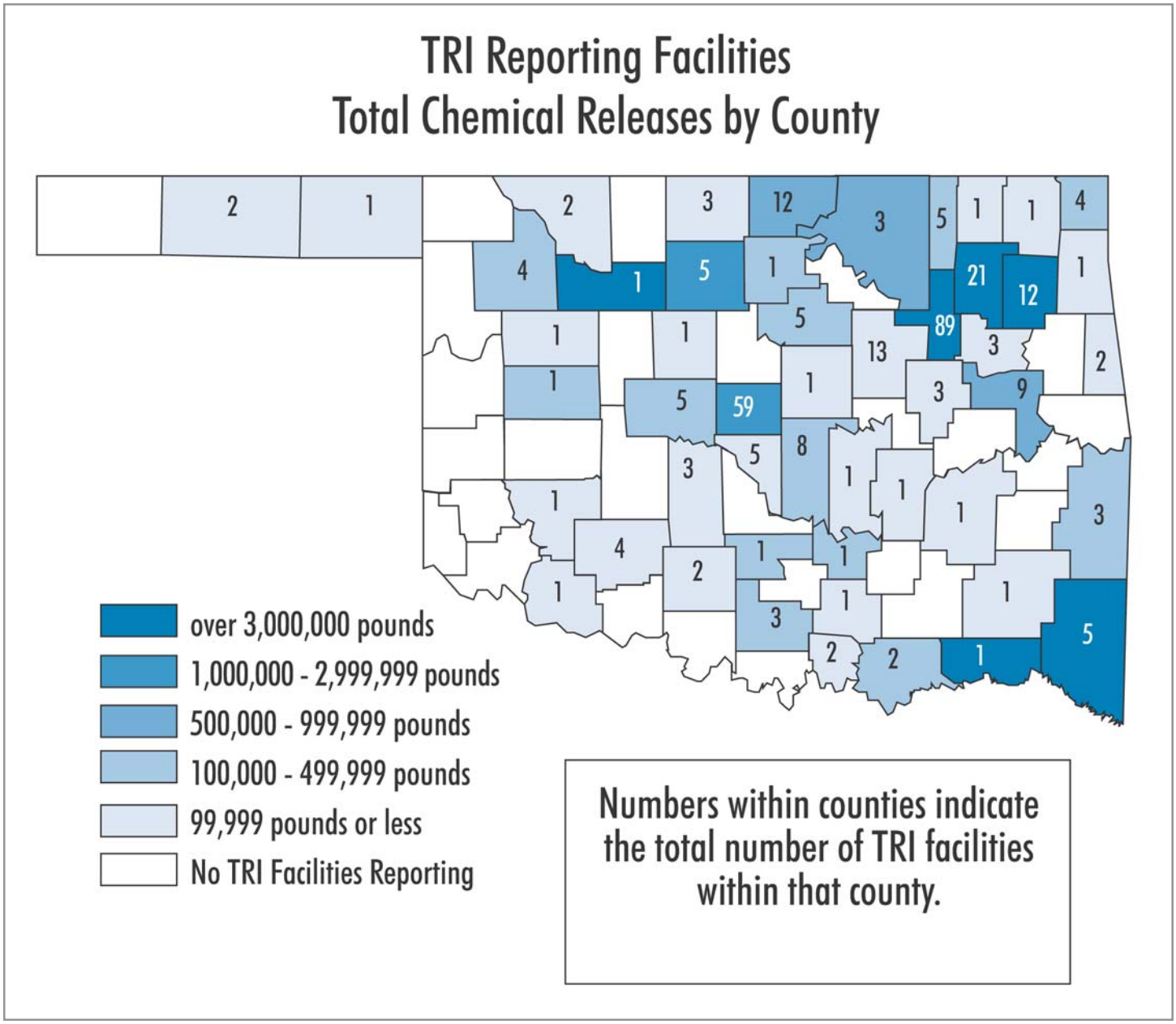


Figure 1

consequently, higher quantities of releases were reported. (Figure 8) A frequent medium for disposal of nitrate compounds is release to surface impoundments or total retention lagoons. Oklahoma treatment, storage, and disposal facilities received transfers from both in-state and out-of-state companies. In 1999, industries in forty-one states utilized Oklahoma facilities permitted under RCRA Subtitle C for the safe management of toxic wastes.

Another medium for waste disposal that continues to decline in total releases is permitted injection wells. This is especially significant as this type of waste management is used frequently for disposal of nitrate compounds. (Figure 9) While disposals to deep underground injection wells are considered releases under TRI, this type of waste management has an extremely low potential for human exposure or contact with the environment.

EPA's reinterpretation of reporting water dissociable nitrates, the Nitrate Initiative, targeted 1999 and was the sole cause for the dramatic increase in total surface water releases. (Figure 10) The Nitrate Initiative was not a function of new or changed legislation regarding these compounds, but rather its objective was to address under reporting or non-reporting of nitrates. Certain facilities reported nitrate compounds releases for 1999 that were several times greater than the quantities reported the previous year. Additionally the total number of facilities reporting nitrates increased by fifty percent from 1998 to 1999. The figures represent improvement in the reporting of these chemicals and should not be construed as an actual increase in the quantities released. While the Nitrate Initiative impacted the reporting of environmental releases in several key ways, the overall volume of releases declined in 1999. (Figure 11)

Transfers

Transfers made to off-site facilities for disposal also continue to decline in Oklahoma, even with the inclusion of industrial categories added in 1998. (Figure 12) Releases to Publicly Owned Treatment Works, (POTW), consist of water discharges made into sanitary drains and sewers that then are received and treated by waste water treatment plants. As such, releases to POTW's are counted as transfers for treatment rather than releases, with the exception of metals and metal compounds. The Nitrate Initiative impacted figures for POTW releases as a particular focus of the program was nitrate compounds formed by the neutralization of nitric acid. (Figure 13) Municipalities usually require this pretreatment prior to discharges into a sanitary sewer. Additionally, as industrial productivity continues to rise, the quantities of releases to POTW's continue to increase.

Reuse

As quantities for total production related wastes and off-site transfers continue to diminish through source reductions and related programs, recycling methods on- and off-site account for greater percentages of post-use waste management. In 1999, recycling of listed chemicals made up forty-nine per cent of all waste management. (Figure 14) On-site recycling along with voluntary reductions in the quantity and toxicity of chemicals used are important ways industries across Oklahoma are working with the DEQ to reduce the total volume of chemical releases.

TRI data can be used for targeting facilities or industries or specific chemicals for Pollution Prevention efforts. The DEQ Pollution Prevention Program established and maintains a waste exchange list that promotes the use, reuse, or recycling of industrial waste streams. Industrial waste handlers utilize this method as well. This type of recycling not only reduces the quantities of toxic chemicals that ultimately find their way into the environment for disposal, but also in many instances, reduces the need to manufacture some of these chemicals, thus eliminating other potential wastes. (Figure 15)

Treatment

Post-production treatment, both on- and off-site, neutralizes or destroys toxic chemicals in the waste stream. Frequently some type of on-site treatment is required before wastes can be discharged or transferred for disposal. A common example of this is the neutralization of spent acids in an aqueous waste. Another example of on-site treatment is the bio-degradation of organic compounds in retention ponds due to bacterial action. Industrial waste handlers are responsible for the majority of off-site treatment of wastes containing toxic chemicals. As with on-site treatment, off-site treatment frequently is a requirement prior to disposal.

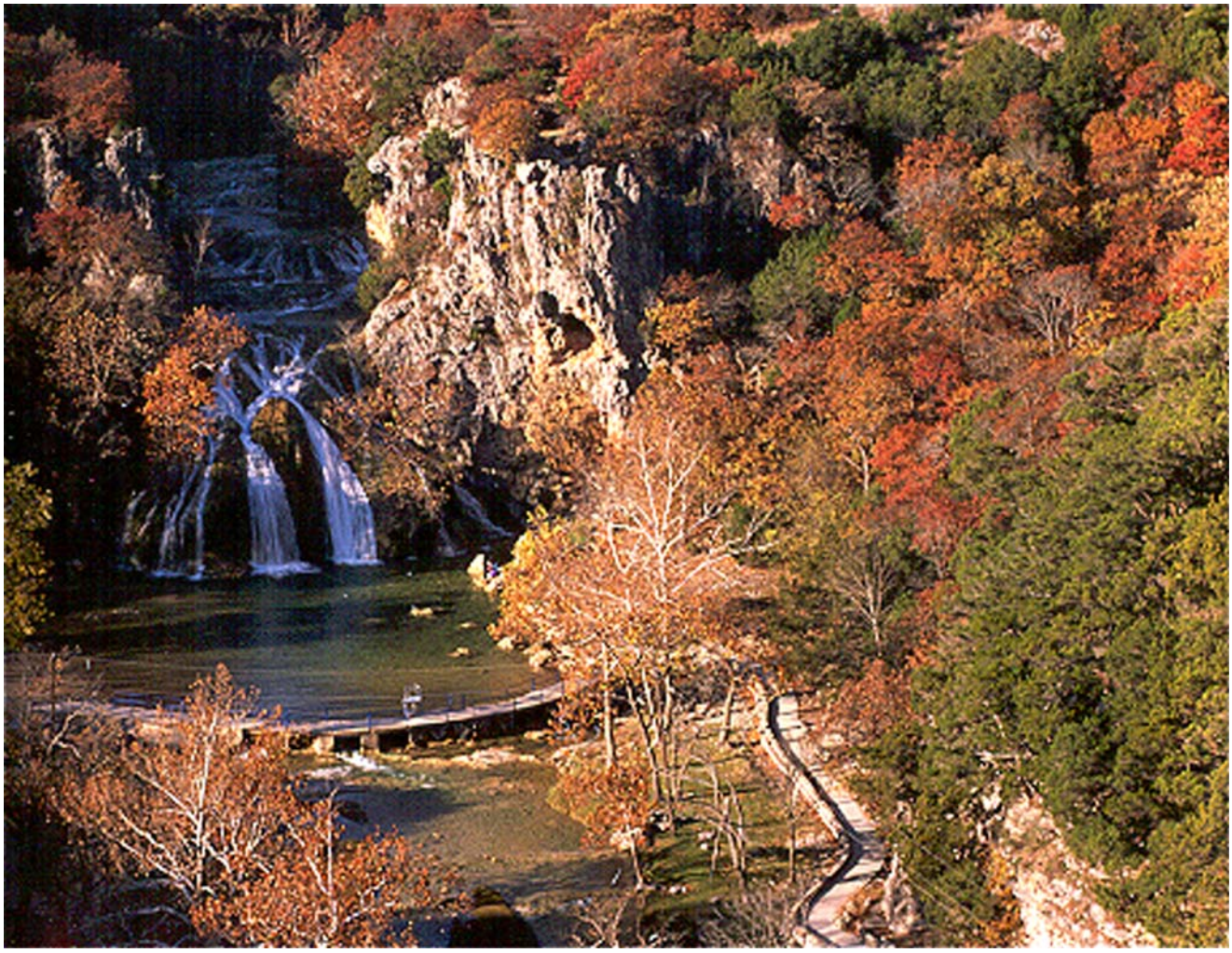
EPA's Nitrate Reporting Initiative resulted in an increase in the 1999 data for total treatment. (Figure 16) Again, this reflects an improvement in the accuracy of the numbers reported to TRI rather than an increase the quantity of wastes treated.

The 1999 Oklahoma TRI report reflects the success of voluntary pollution prevention programs sponsored by DEQ and cooperation from industries. The Toxics Release Inventory looks at the total picture of releases, transfers as well as reuse activities; analysis of the data can be used as an index of the success of prevention measures. Nationally, the figures for total production related wastes have increased for several years. Often states report a reduction in total wastes while reporting a corresponding increase in off-site transfers. This waste management system transfers toxic wastes from one location to another rather than generating less waste. Oklahoma continues to see its total releases diminish along with a decrease in off-site transfers, indicating that the total amount of toxic wastes in the State actually is decreasing.

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

http: www.deq.state.ok.us/P2intro.htm

1999 TRI Overview



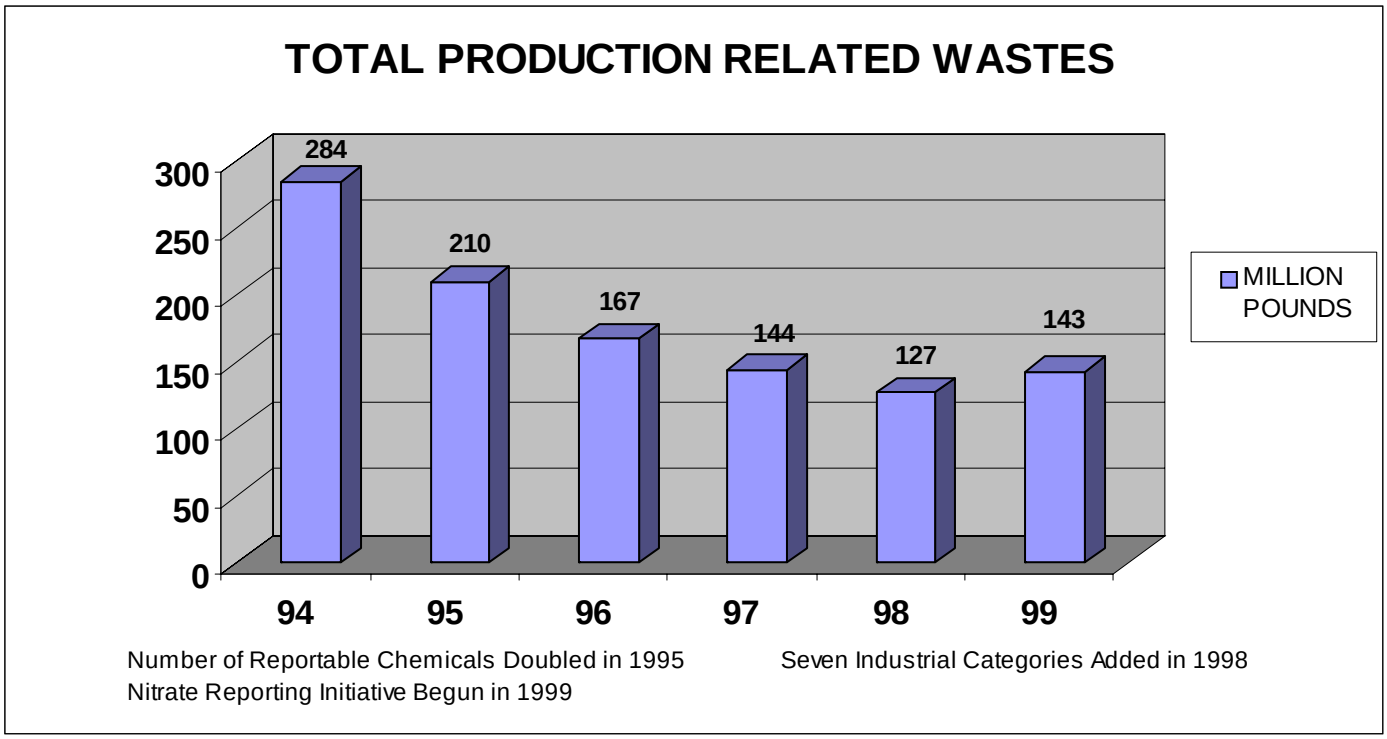
1999 TRI Overview

COUNTY	# TRI FACILITIES		TOT. LBS. RELEASED
Adair	2	97,714	99,999 pounds or less
Alfalfa	-	-	No TRI Facilities Reporting
Atoka	-	-	No TRI Facilities Reporting
Beaver	1	16,865	99,999 pounds or less
Beckham	-	-	No TRI Facilities Reporting
Blaine	-	-	No TRI Facilities Reporting
Bryan	2	245,133	100,000 - 499,999
Caddo	-	-	No TRI Facilities Reporting
Canadian	5	102,192	1,000,000 - 2,999,999
Carter	3	437,440	100,000 - 499,999
Cherokee	-	-	No TRI Facilities Reporting
Choctaw	1	347,515	100,000 - 499,999
Cimarron	-	-	No TRI Facilities Reporting
Cleveland	5	5,948	99,999 pounds or less
Coal	-	-	No TRI Facilities Reporting
Comanche	4	34,970	99,999 pounds or less
Cotton	-	-	No TRI Facilities Reporting
Craig	1	-	99,999 pounds or less
Creek	13	14,583	99,999 pounds or less
Custer	1	133,913	100,000 - 499,999
Delaware	1	-	99,999 pounds or less
Dewey	1	-	99,999 pounds or less
Ellis	-	-	No TRI Facilities Reporting
Garfield	5	2,218,959	1,000,000 - 2,999,999
Garvin	1	152,247	100,000 - 499,999
Grady	3	77,293	99,999 pounds or less
Grant	-	-	No TRI Facilities Reporting
Greer	-	-	No TRI Facilities Reporting
Harmon	-	-	No TRI Facilities Reporting
Harper	-	-	No TRI Facilities Reporting
Haskell	-	-	No TRI Facilities Reporting
Hughes	1	-	99,999 pounds or less
Jackson	-	-	No TRI Facilities Reporting
Jefferson	-	-	No TRI Facilities Reporting
Johnston	1	13,180	99,999 pounds or less
Kay	12	740,803	500,000 - 999,999
Kingfisher	1	26,520	99,999 pounds or less
Kiowa	1	-	99,999 pounds or less
Latimer	-	-	No TRI Facilities Reporting
LeFlore	3	197,419	1,000,000 - 2,999,999
Lincoln	1	25,024	99,999 pounds or less
Logan	-	-	No TRI Facilities Reporting
Love	-	-	No TRI Facilities Reporting

Table A

1999 TRI Overview

COUNTY	# TRI FACILITIES		TOT. LBS. RELEASED
Major	1	6,267,659	over 3,000,000 pounds
Marshall	2	96,057	99,999 pounds or less
Mayes	12	4,463,197	over 3,000,000 pounds
McClain	-	-	No TRI Facilities Reporting
McCurtain	5	3,337,668	over 3,000,000 pounds
McIntosh	2	18,819	99,999 pounds or less
Murray	-	-	No TRI Facilities Reporting
Muskogee	9	933,468	500,000 - 999,999
Noble	1	291,053	100,000 - 499,999
Nowata	1	-	99,999 pounds or less
Ofuskee	-	-	No TRI Facilities Reporting
Oklahoma	59	2,120,758	1,000,000 - 2,999,999
Okmulgee	3	346	99,999 pounds or less
Osage	3	955,806	500,000 - 999,999
Ottawa	4	217,993	100,000 - 499,999
Pawnee	-	-	No TRI Facilities Reporting
Payne	5	155,063	1,000,000 - 2,999,999
Pittsburg	1	51,253	99,999 pounds or less
Pontotoc	1	332,263	100,000 - 499,999
Pottawatomie		8	104,122 100,000 - 499,999
Pushmataha	1	14,155	99,999 pounds or less
Roger Mills	-	-	No TRI Facilities Reporting
Rogers	21	3,992,831	over 3,000,000 pounds
Seminole	1	500	99,999 pounds or less
Sequoyah	-	-	No TRI Facilities Reporting
Stephens	2	925	99,999 pounds or less
Texas	2	25,090	99,999 pounds or less
Tillman	1	27,615	99,999 pounds or less
Tulsa	89	3,781,359	over 3,000,000 pounds
Wagoner	3	255	99,999 pounds or less
Washington	5	178,116	100,000 - 499,999
Washita	-	-	No TRI Facilities Reporting
Woods	2	30,000	99,999 pounds or less
Woodward	4	434,643	100,000 - 499,999



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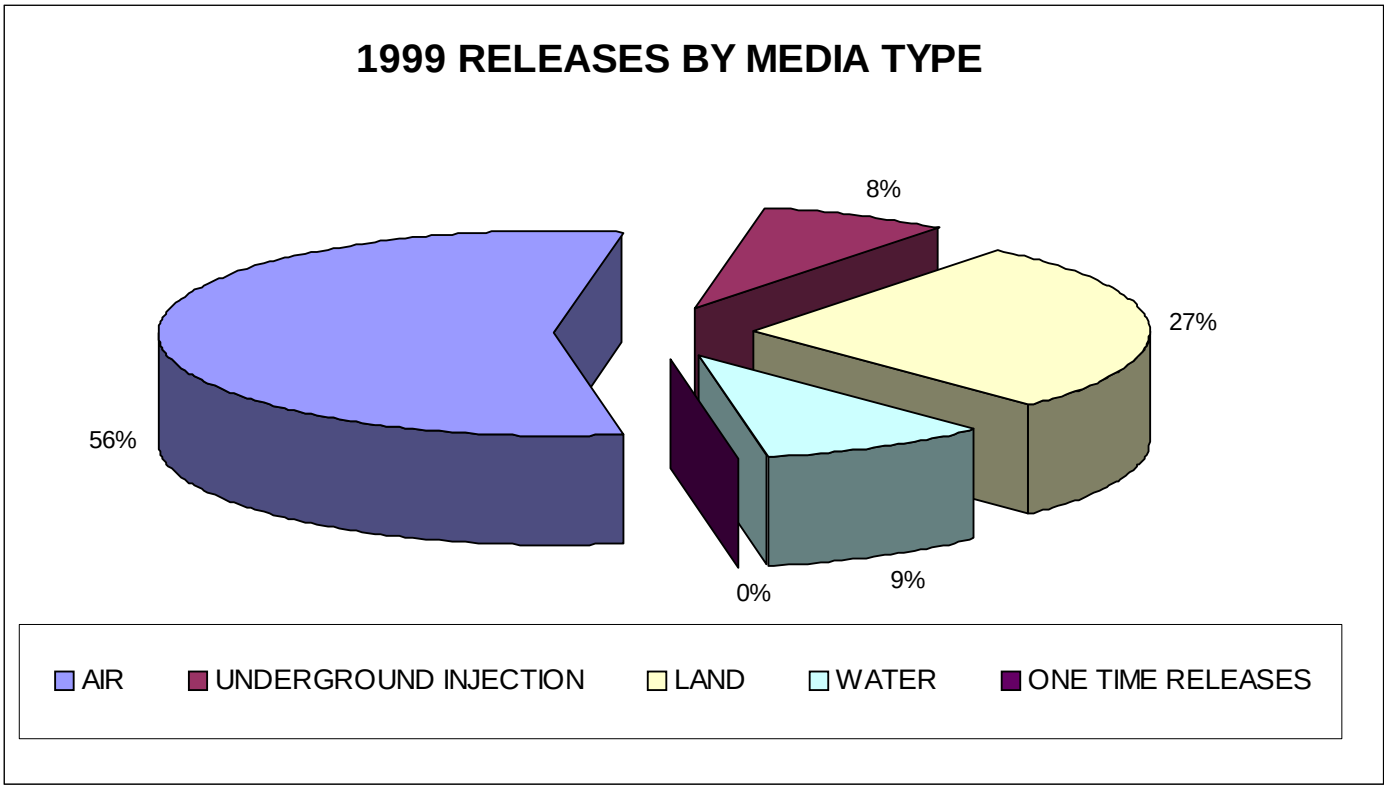

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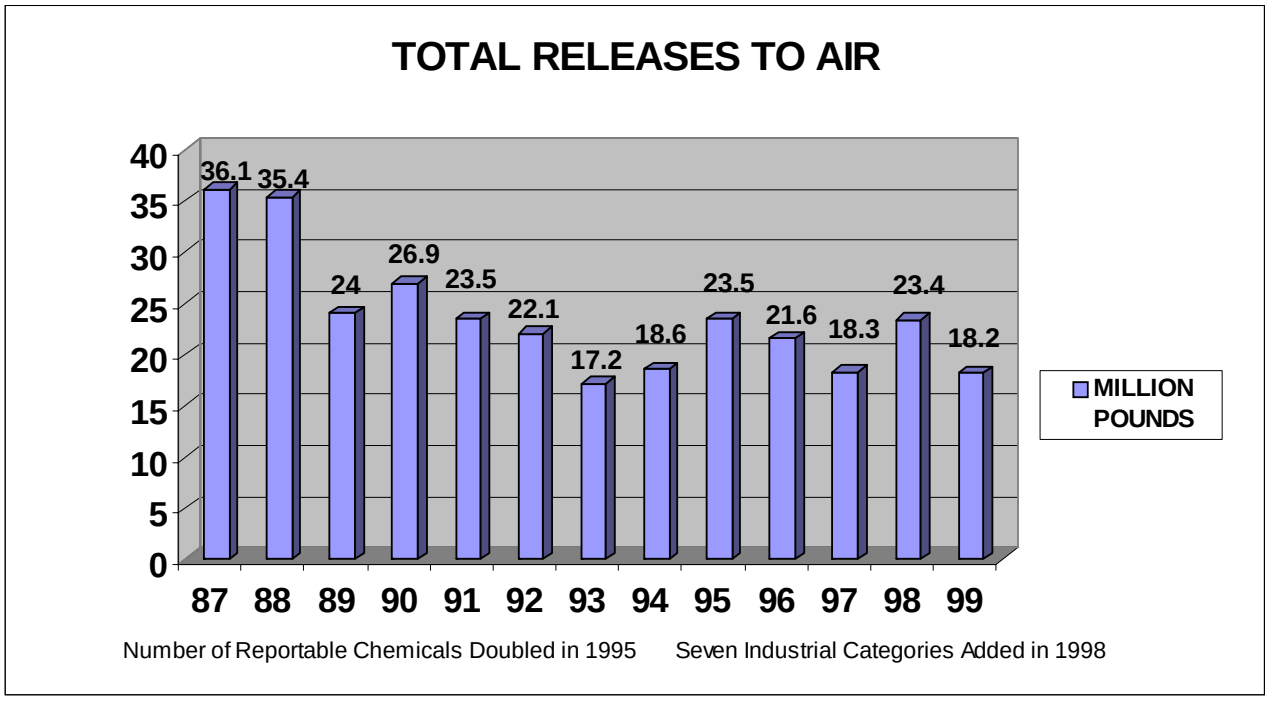

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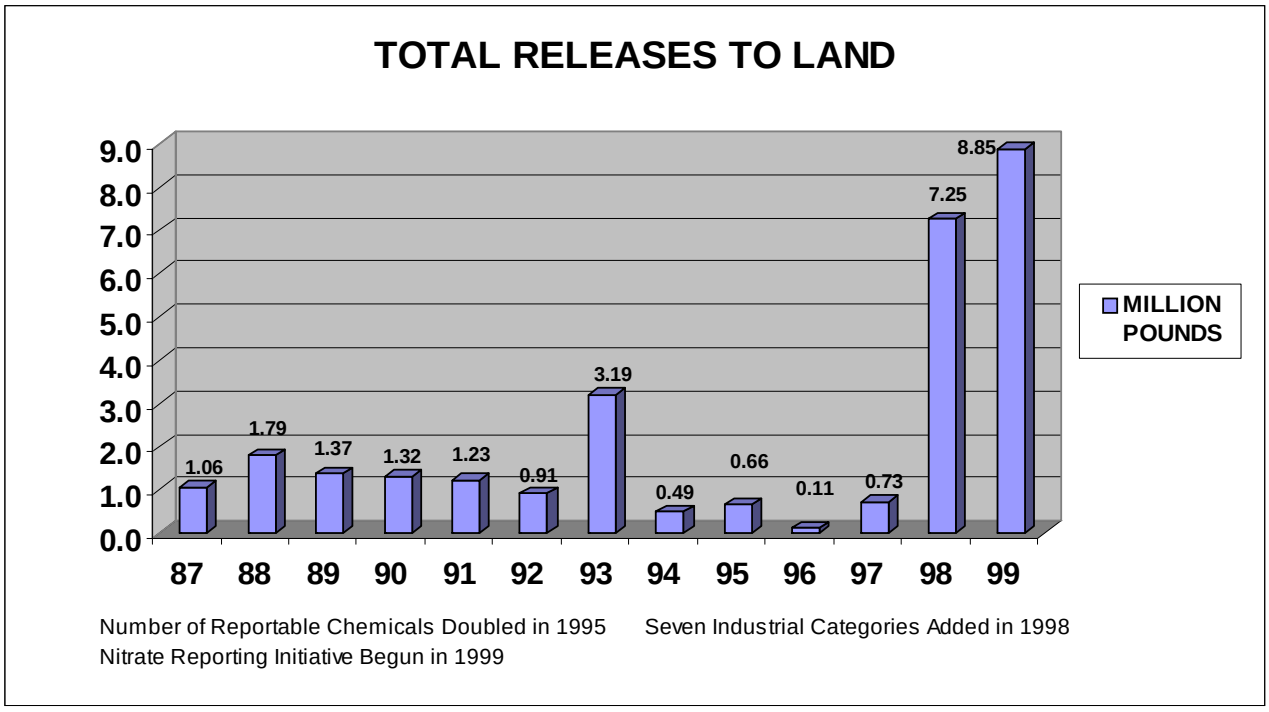

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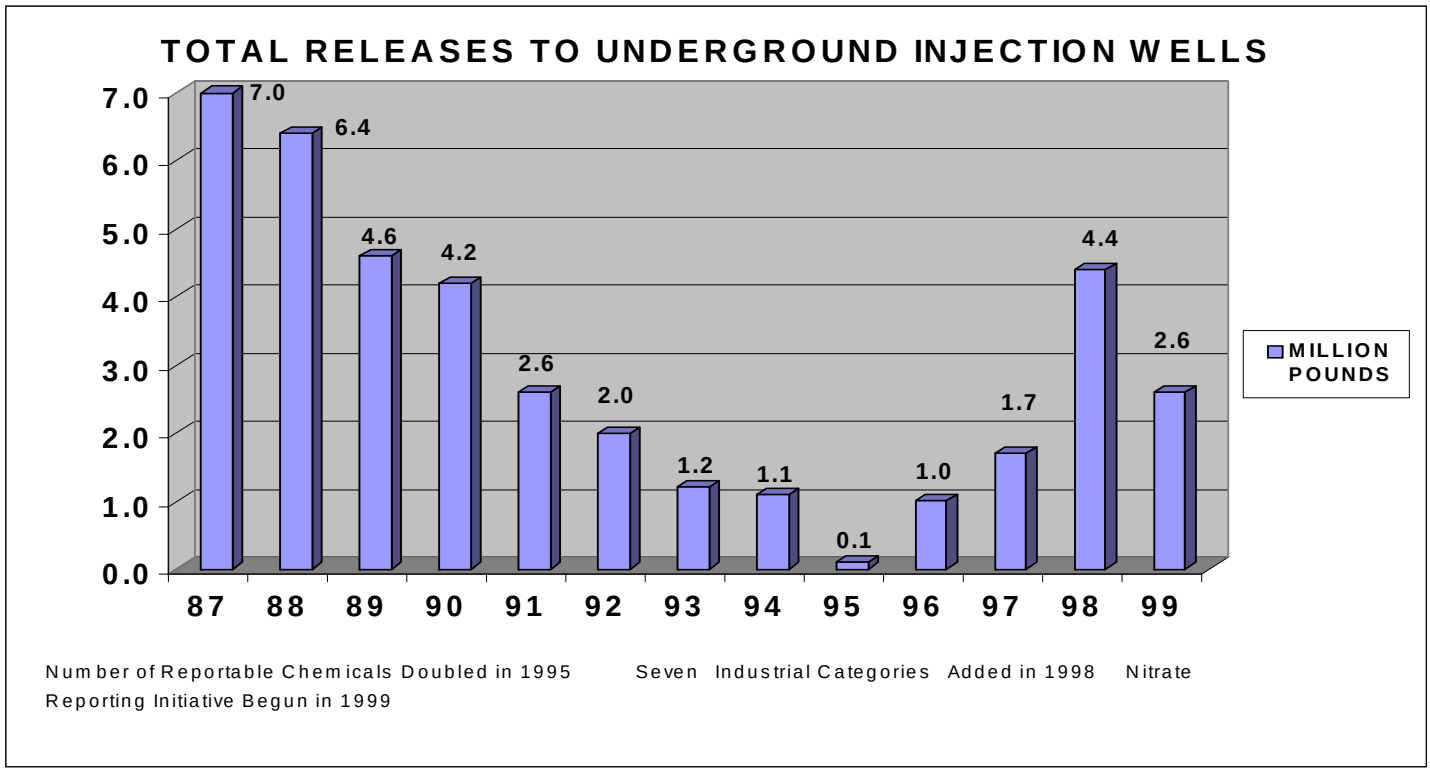

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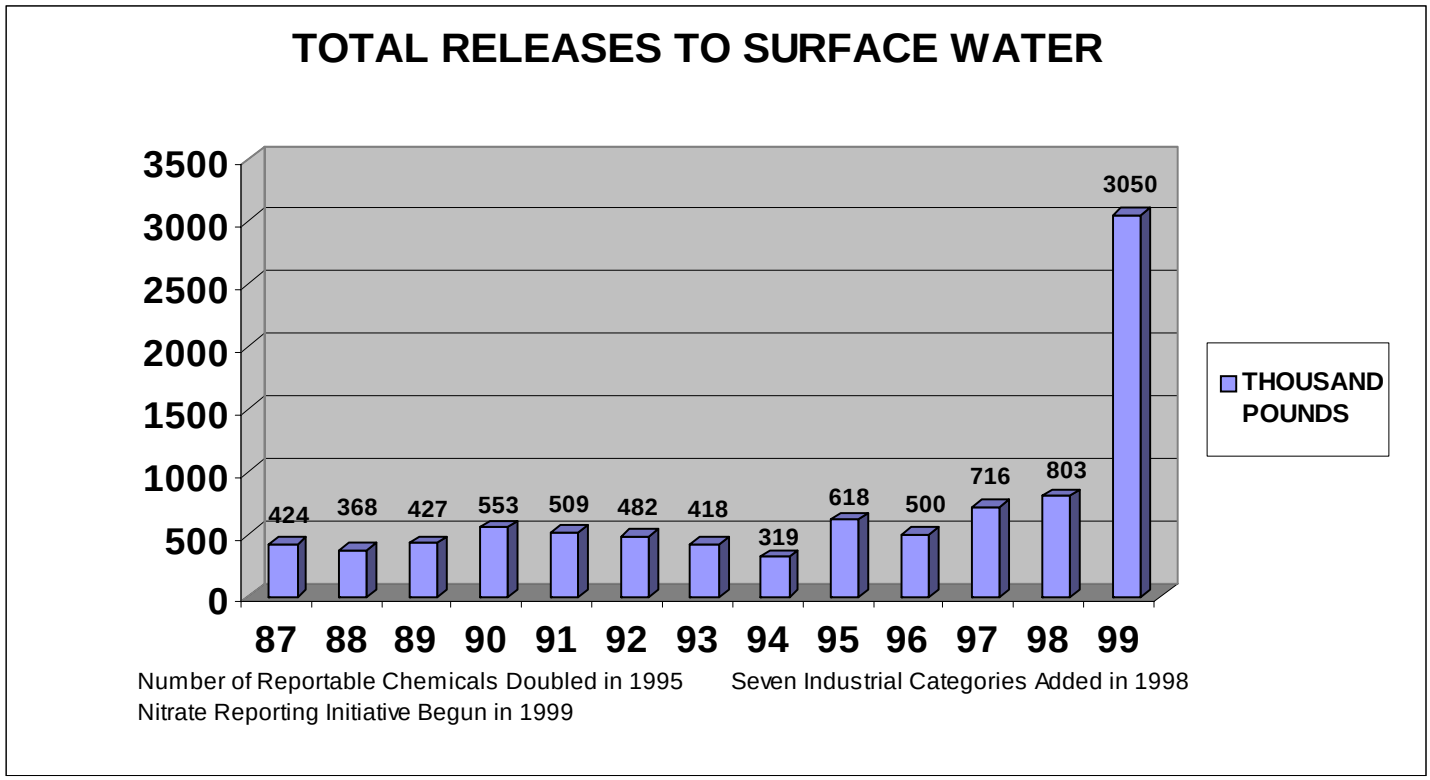

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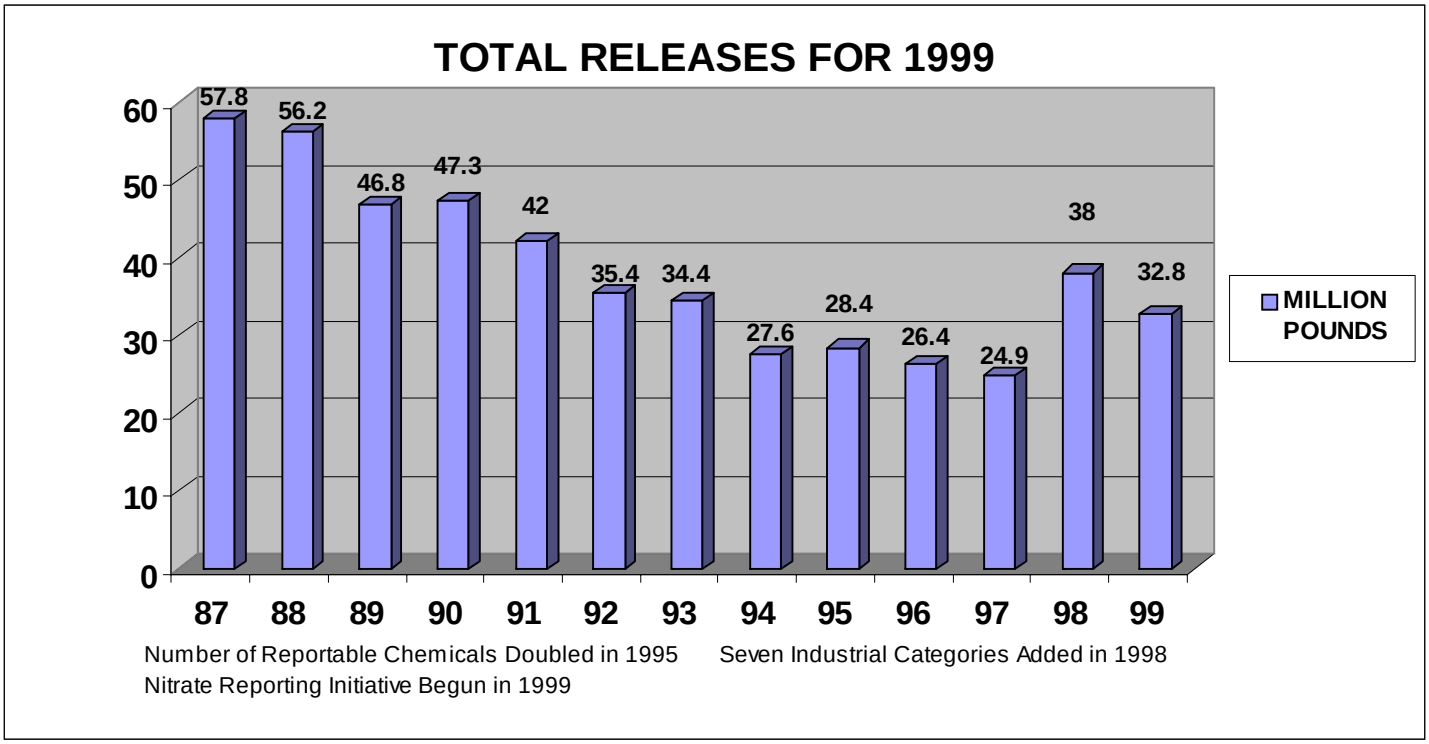

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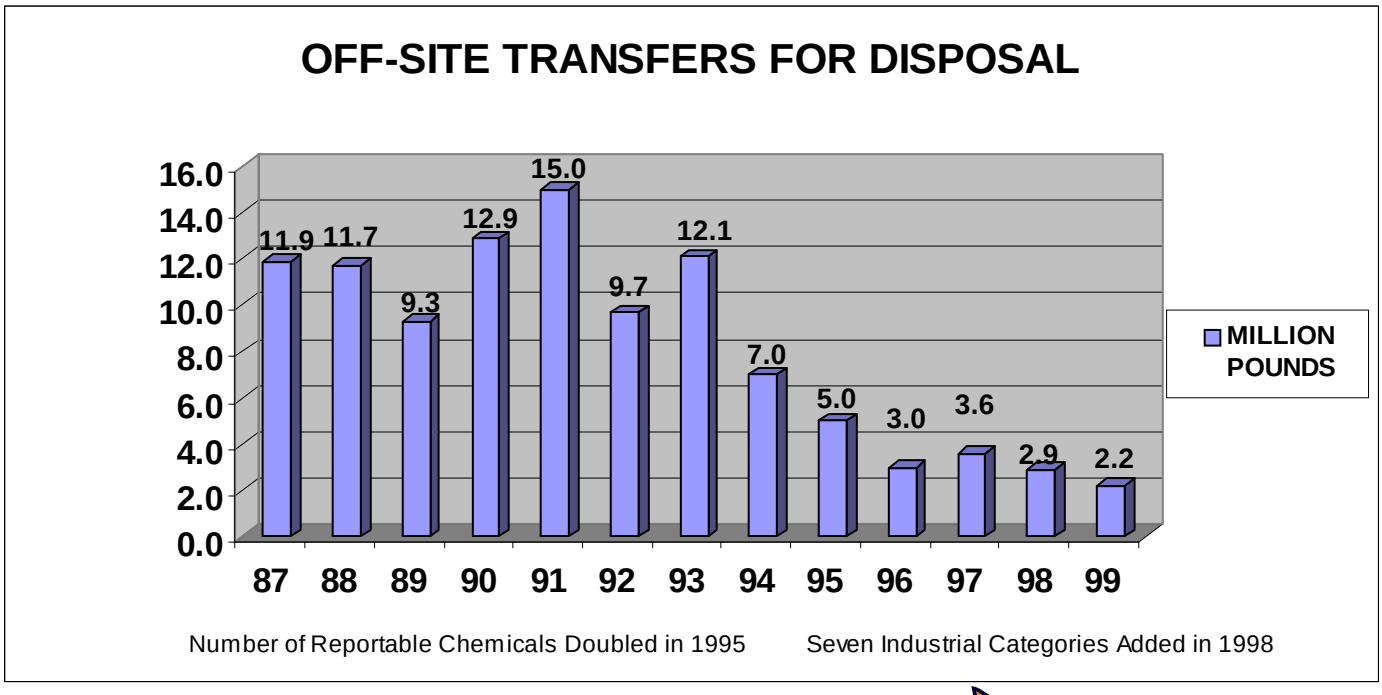

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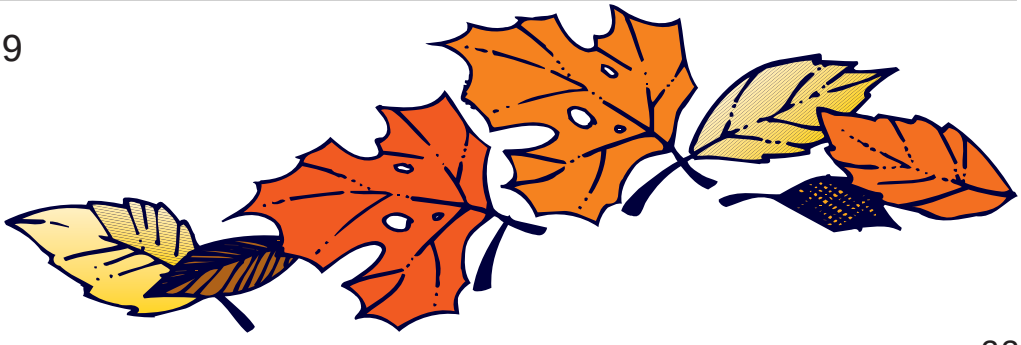
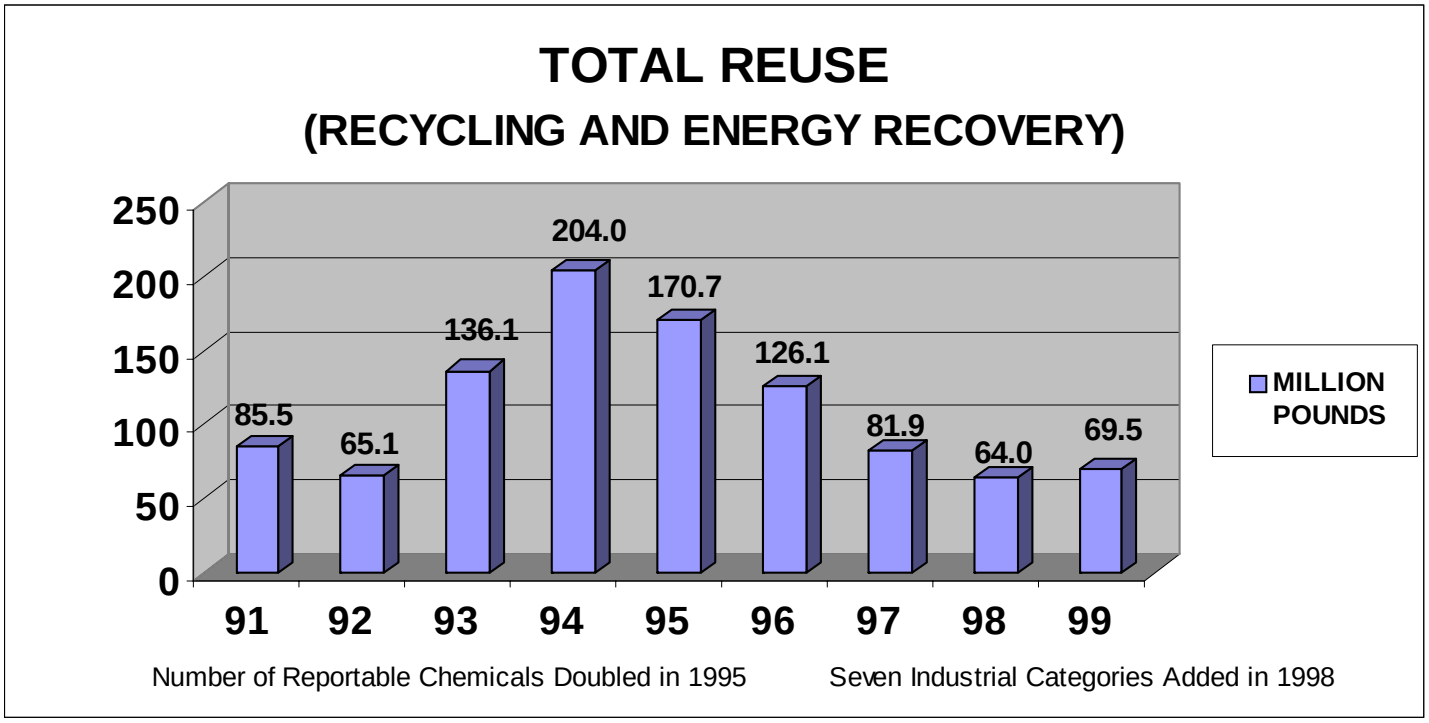


Figure 10



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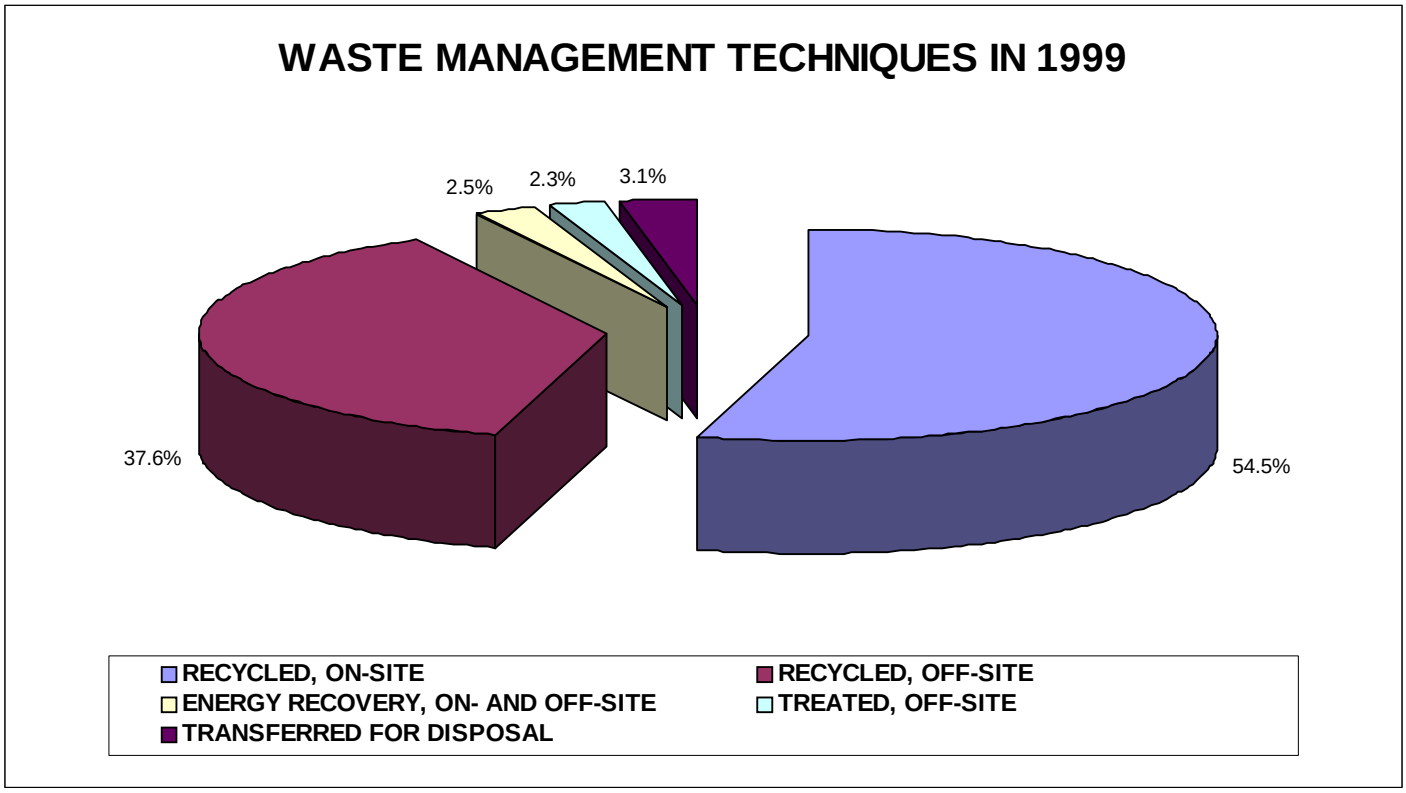


Figure 12

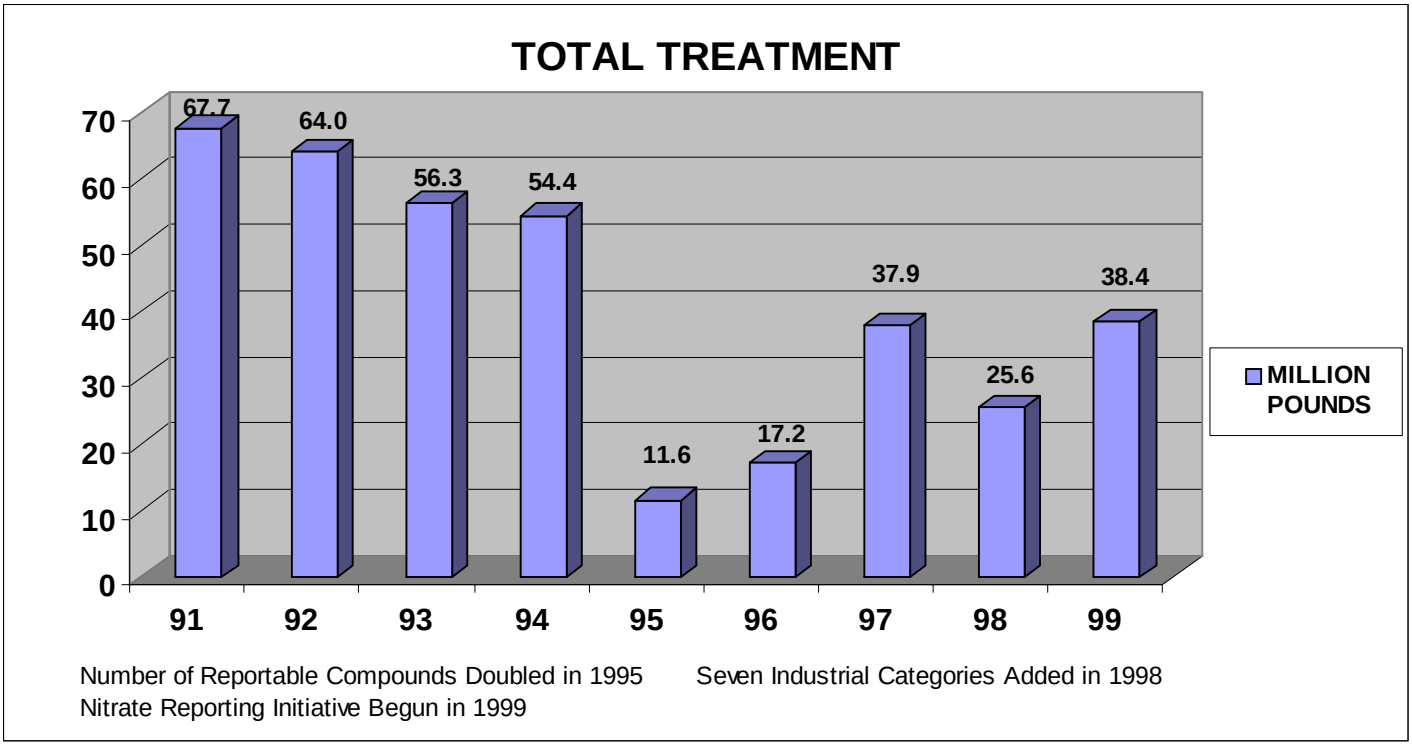


Figure 13

TRI Reporting Requirements

Industrial Sector	SIC Code
Manufacturing	2000- 3999
Metal Mining	1000's (except 1011, 1081 and 1094
Coal Mining	1200's (except 1241)
Electrical Utilities	4911,4931 and 4939, limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce
Treatment, Storage and Desposal facilities	4953, limited to RCRA Subtitle C permitted or interim status facilities
Solvent Recovery Services	7389, limited to facilities primarily engaged in solvent recovery on a contract or fee basis
Chemical Distributors	5169
Petroleum Bulk Terminals	5171

Table B Standard Industrial Classifications Subject to Section 313

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

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

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

- Manufactures, imports, processes or otherwise uses any of 603 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. In 1995, the number of reportable chemicals doubled, and the list may change again in the future.

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

A facility may need to report if it has one or more of the listed chemicals, even if it has no releases, because reporting requirements are based on the quantities of chemicals manufactured, processed or used rather than discharges to the environment.

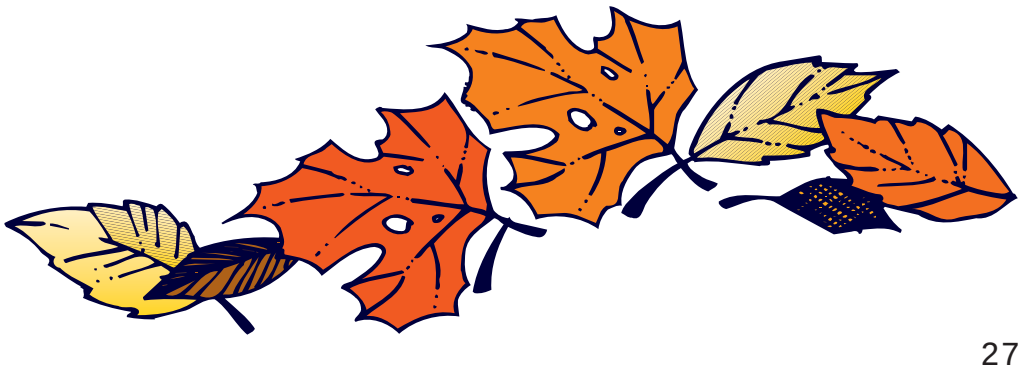
Exemptions to the requirements for reporting under Section 313 are designed to reduce the burden associated with comparatively small quantities of chemicals used and apply in limited circumstances. The de minimis concentration exemption allows reporting of a specific chemical to be exempt if it comprises less than 1 per cent (<1%) of a mixture even though the total amount of the chemical exceeds the reporting threshold. However, if the Occupational Safety and Health Administration (OSHA) also defines a listed chemical as carcinogenic, the de minimis concentration drops to less than 0.1 per cent (<0.1%). The de minimus concentration exemption does not apply to

TRI Reporting Requirements

wastes that are processed or otherwise used. Owners of leased property may not be required to report to TRI, nor are the majority of activities in analytical laboratories. Toxic chemicals that are parts of the structural components of a facility as well as chemicals used for janitorial or facility maintenance are exempted from reporting even if percentages exceed threshold requirements. Freon used in air conditioners that are solely for employee comfort is exempt, as is chlorine used to treat on-site potable water. Chemicals used in the maintenance or refueling of motor vehicles need not be reported provided the vehicles are used only by the facility. The article exemption applies to any item that is already manufactured and whose end use is dependent to some extent by the shape or design of the item, with the provision that no 313 chemicals are released during the normal processing or otherwise use of the item at the facility. For more information about the article exemption and other exemptions, general TRI reporting and threshold quantities, contact the EPA Region 6, the Oklahoma DEQ, or visit the following website:

http://www.epa.gov/tri/general.htm

Reporting Year 2000 will be the first year for implementation of the rule for Persistent, Bioaccumulative and Toxic (PBT) chemicals. Thresholds for these chemicals are far lower, no distinction is made in the reporting thresholds between manufacture, process or otherwise use, and the article exemption will not apply. A table listing PBT chemicals and a general description of the program is included in the section “Chemicals Reported in 1999” in this report.



Facilities Reporting in 1999

For Reporting Year 1999, 323 Oklahoma facilities reported to TRI, operating under 128 primary SIC Codes. EPA expanded TRI in reporting year 1998 with the addition of seven industrial categories. The added categories are linked to manufacturing by providing energy, managing products or managing wastes from the manufacturing sector.

Manufacturing facilities continue to be the majority of TRI reporters, comprising 307 of 323 facilities that reported in 1999. (Table D) Fourteen facilities reported for the first time in 1999 with only one plant falling under an industrial sector added in 1998. However, the recently added industries continued to impact the data for Oklahoma. Coal-fired electrical plants and permitted commercial hazardous waste management facilities are two of the categories added in 1998 and together accounted for forty-four percent of all TRI releases in Oklahoma in 1999. Five of the ten facilities with the largest total releases for 1999 reported the first time for under the 1998 changes and all five of these were operational prior to 1998. (Table E) Together the five industrial classifications reporting the largest total releases account for 73 percent of all TRI releases in the State. (Figure 17)

Industrial waste handlers utilizing landfills permitted under RCRA Subtitle C appear to be considerable sources of releases to the environment as reported to TRI. These facilities received over 4 million pounds of waste materials from Oklahoma TRI facilities alone in 1999. Additionally, companies in 33 other states made transfers of wastes to Oklahoma waste management sites that are reportable under TRI. Some quantities of the materials transferred to these facilities will be destroyed through treatment; however, the majority are disposed into highly regulated and monitored landfills. The result is a “double counting” effect in the State’s TRI data, that is, the majority of hazardous chemicals counted as transfers to a treatment, storage and disposal (TSD) site will be counted again in the releases reported by the TSD. Similarly, transfers of chemicals from out-of-state facilities for disposal to RCRA Subtitle C landfills located in Oklahoma are counted in the releases made for this state. Therefore, Oklahoma’s total land releases for 1998 and 1999 rose substantially due to the first time reporting by this sector. While both the toxicity and quantities of chemicals managed by this type of facility are quite large, the risk of public exposure or adverse environmental effects from disposal to a RCRA Subtitle C site should be considered extremely low. Listed chemicals handled in excess of the 10,000 pound reporting threshold and released by the two Oklahoma facilities reporting in this category are represented in Figure 18.

Combustion of coal is a major source of electrical power in the State, and plants that utilize coal as a source for all or part of their energy are the majority of electrical plants here. The first time reporting by this industrial category in 1998 contributed significantly to the rise in Oklahoma’s figures for land releases and air emissions. Five of these facilities reported chemical usage above threshold levels in 1999. The reported chemicals are either components of bituminous coal or formed during its combustion. (Figure 19). Overwhelmingly non-metallic compounds are released through permitted, stack air emissions, and these are greatly reduced through the use of in-line air scrubbers and neutralizers. Comparatively small

quantities of metallic compounds are released through stack air emissions as well, although the bulk of these compounds are found in residual ashes and released into permitted on- and off-site landfills. Total waste management for coal-fired utilities is found in Figure 20.

The use of chemicals necessary to support Oklahoma's strong agricultural base is not reportable under TRI; however, the manufacture of these chemicals and those used to produce them are covered under the program's reporting requirements. Facilities that manufacture nitrogenous fertilizers are the third largest source of releases in the State. These facilities produce hydrogen and nitrogen gases from methane (natural gas) then through a catalytic process produce ammonia which is then condensed to anhydrous ammonia and oxidized to form ammonium nitrate. Methanol is produced a secondary product of this process. Due to the very large quantities of anhydrous ammonia used and stored and the high volatility of ammonia, fugitive air emissions tend to be high. Ammonia accounts for 93 percent of all TRI chemicals used or produced by this industry and, due to the very large quantities of anhydrous ammonia used and stored and the volatility of ammonia, fugitive air emissions are correspondingly high. Figure 21 lists the total releases from nitrogen fertilizer producers as reportable to TRI.

Another industry utilizing large amounts of volatile chemicals is paperboard manufacturing. Pulp paper is formed into various pressed paper products, a process that uses large quantities of ammonia and methanol. Increasingly methanol is used by this sector as an alternative to more toxic organo-chloride compounds. Permitted stack air releases of methanol account for over 80 percent of all releases for this industry in 1999. (Figure 22)

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 (Figure 23) and figures for releases of these compounds were greatly effected by the Nitrate Reporting Initiative, (see "Chemicals Released in 1999"). Increases in the reported quantities of nitrates released by this industry alone resulted in an increase in excess of three times that for all surface water releases in the State combined. This represents an improvement in the accuracy of reporting nitrates rather than an actual increase in discharges of these compounds. Similarly, the industry reported 13.5 million pounds of nitrate compounds treated on-site, a quantity that affected the State's totals for total treatment as well. Currently permits are being rewritten to include the monitoring of nitrate compounds in discharges to surface waters, and it may be expected that the total quantities released of these chemicals will be reduced in the future.

Facilities Reporting in 1999

SIC Code		Pounds
4953	Commercial Hazardous Waste Treatment, Under RCRA Subtitle C	8,854,083
4911	Coal-fired Electrical Utilities	8,255,051
2873	Chemicals- Nitrogenous Fertilizers	5,802,556
2631	Paperboard Mills	2,967,582
2075	Soybean Oil Mills	2,399,896
2911	Petroleum Refining	1,874,237
3341	Secondary Smelting of Non-Ferrous Metals	1,570,135
3711	Transportation Equip.- Vehicles & Car Bodies	1,111,305
3400	Fabricated Metal Products, except machinery and trans. equip.	1,072,514
2869	Chemicals- Industrial Organics	875,522
3000	Rubber and Misc. Plastic Products	627,448
all other		
3300	Primary Metal Industries, except secondary smelting non-ferrous metals	564,681
all other		
3700	Transportation Equip.- except car bodies	485,231
all other		
2800	Chemicals- except nitrogenous fertilizers & ind. organic chem.	444,474
all other		
2600	Paper Mills & Sanitary Paper Products	368,711
3800	Surgical & Related Equip. and Photographic Equip.	311,218
9700	National Security (Armed Forces)	225,882
3500	Industrial Machinery & Computer Equip.	210,138
	ALL OTHER MANUFACTURING CLASSES	548,479

Based on data from Sec. 8.1 B “Quantity Released in the Current Year”

Table C

Facilities Reporting in 1999

RANKING	SIC CODE	FACILITY	COUNTY	TOTAL RELEASES, POUNDS
1	4953	Safety Kleen- Lone Mntn.	Major	6,267,000
2	4911	Western Farmers Electric Coop	Choctaw	3,275,000
3	2873	Terra Nitrogen- Catoosa	Rogers	3,161,000
4	2631	Weyerhaeuser- Valliant	McCurtain	2,968,000
5	4953	Perma-Fix Treatment Services	Tulsa	2,587,000
6	2075	Protein Technologies, Inc.	Mayes	2,400,000
7	2873	Farmland Industries, Inc.	Garfield	2,218,000
8	4911	Grand River Dam Authority (OG&E)	Mayes	1,951,000
9	3711	General Motors SCG- Okla. City	Oklahoma	1,059,000
10	4911	Muskogee Generating Station (OG&E)	Muskogee	1,034,000
11	2899	Baker Petolite- Barnsdall	Tulsa	870,500
12	4911	AES Shady Point	LeFlore	841,000
13	4911	Northeastern Station (PSO)	Rogers	697,000
14	2911	Conoco, Inc.	Kay	623,000
15	3089	Camrose Technologies	Pontotoc	612,093
16	3341	Zinc Corp. of America	Washington	536,000
17	4911	Sooner Generating Station (OG&E)	Noble	458,000
18	2911	TPI Petroleum, Inc.	Carter	444,000
19	2873	Terra Nitrogen- Woodward	Woodward	421,000
20	3341	IMCO Recycling, Inc.	Creek	398,000
21	2621	Fort James Operating Co.	Muskogee	357,000
22	2911	Sinclair Oil Corp.	Tulsa	329,000
23	2911	Sunoco, Inc.	Tulsa	327,000
24	3411	American National Can Co.- Okla. City	Oklahoma	239,000
25	9711	U.S. DOD- Tinker Air Field	Oklahoma	226,000

Table D

Facilities Reporting in 1999

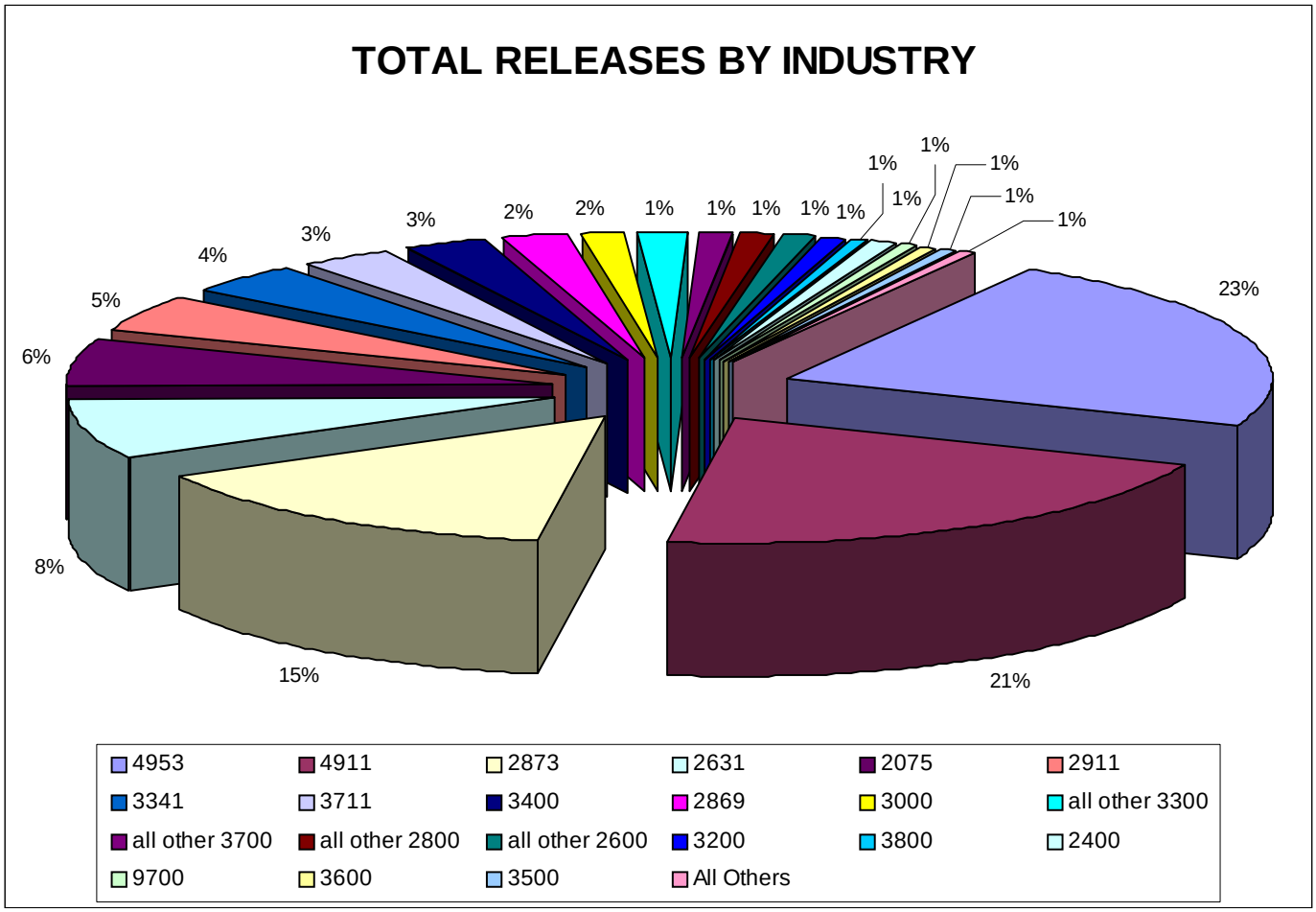


Figure 14

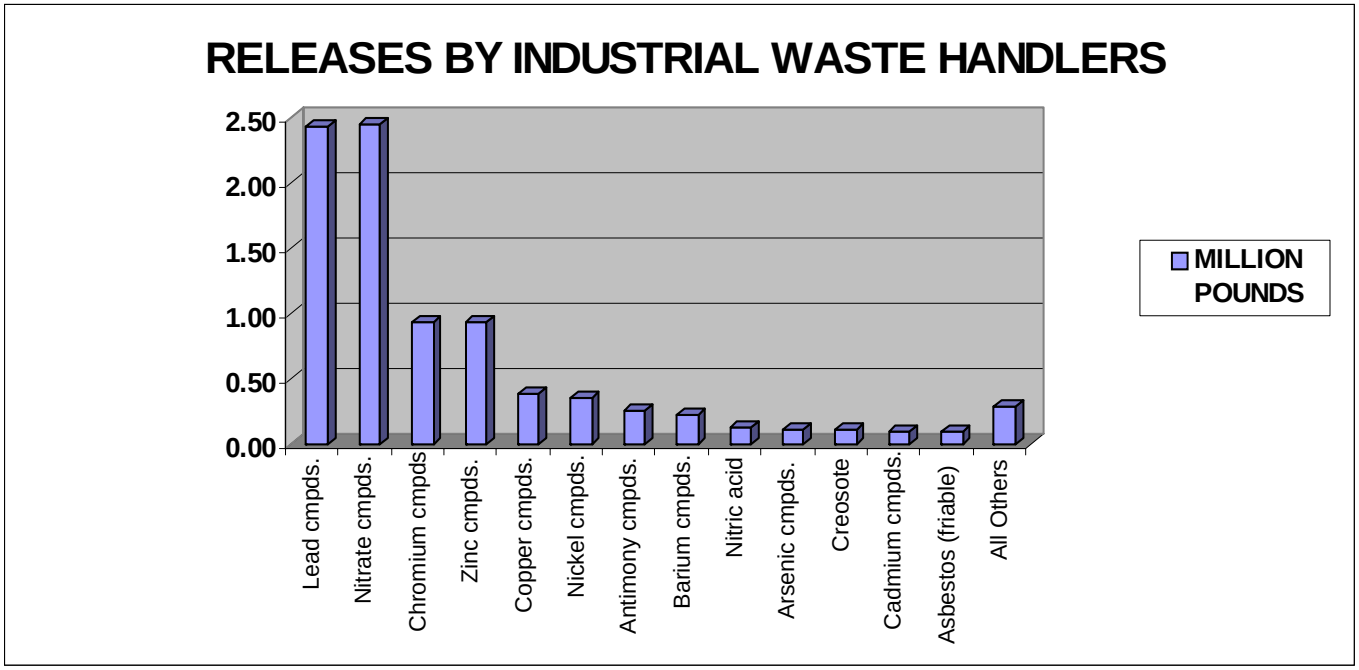
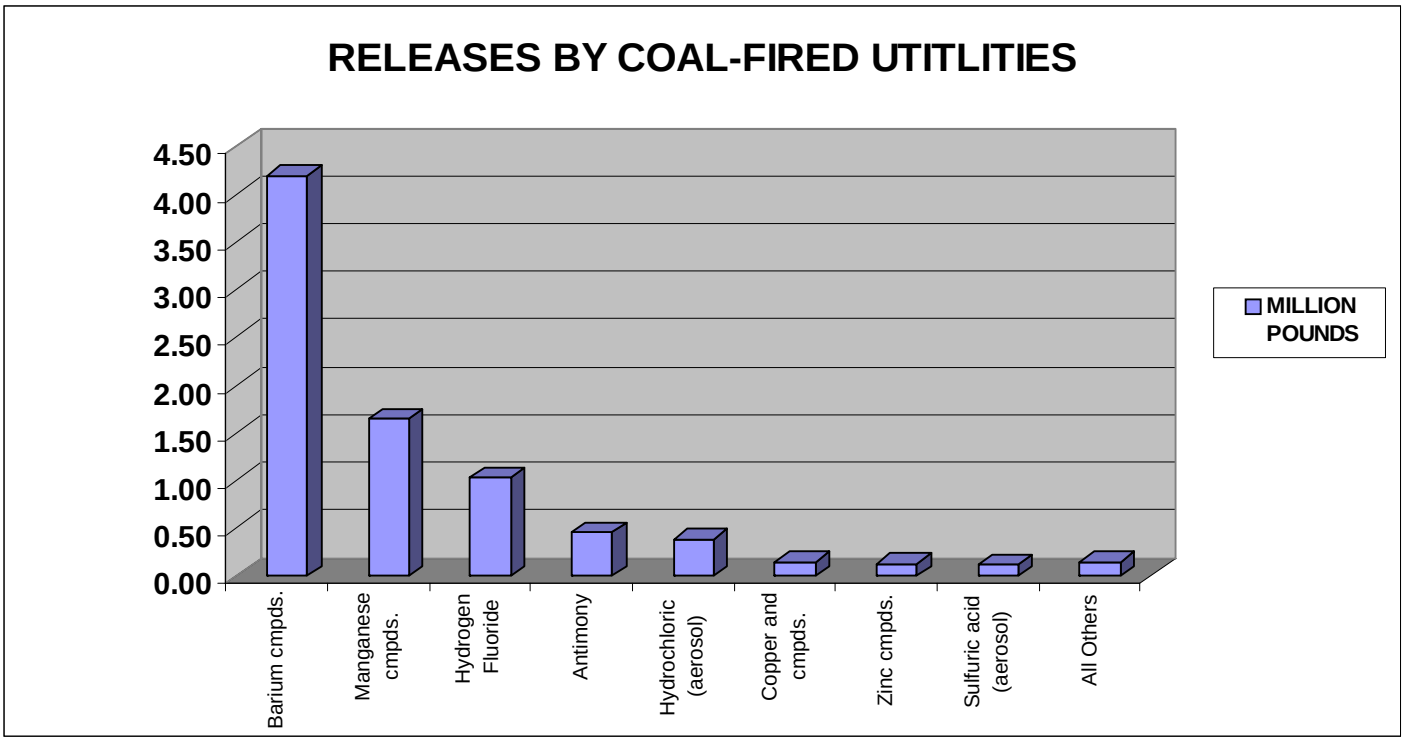


Figure 15

Facilities Reporting in 1999



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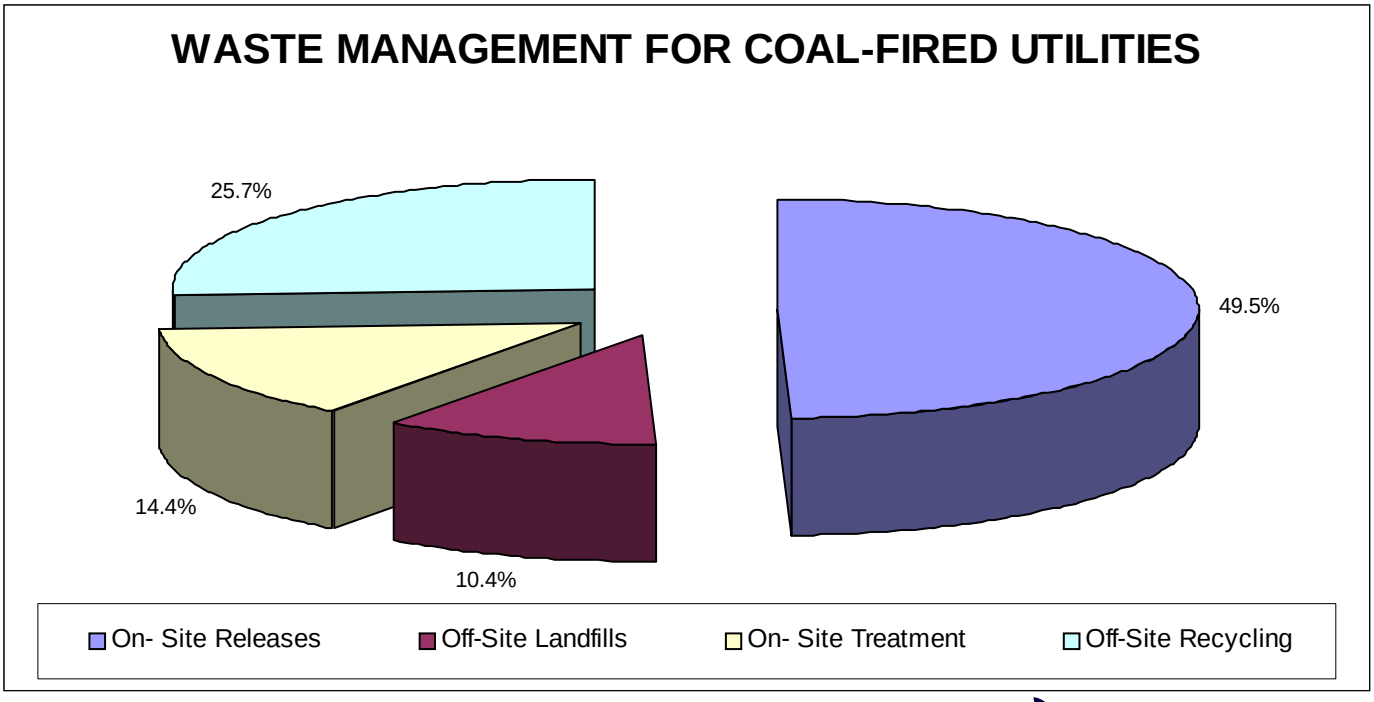

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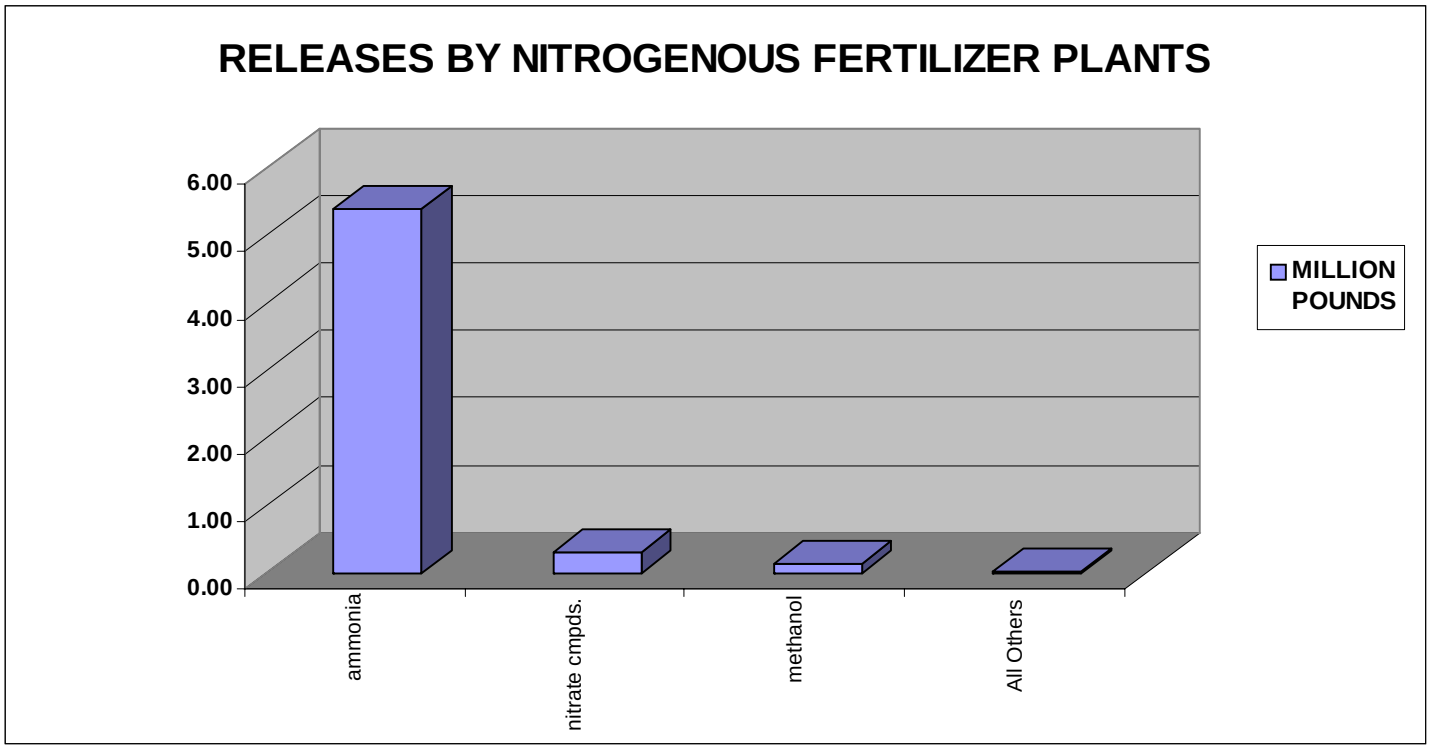

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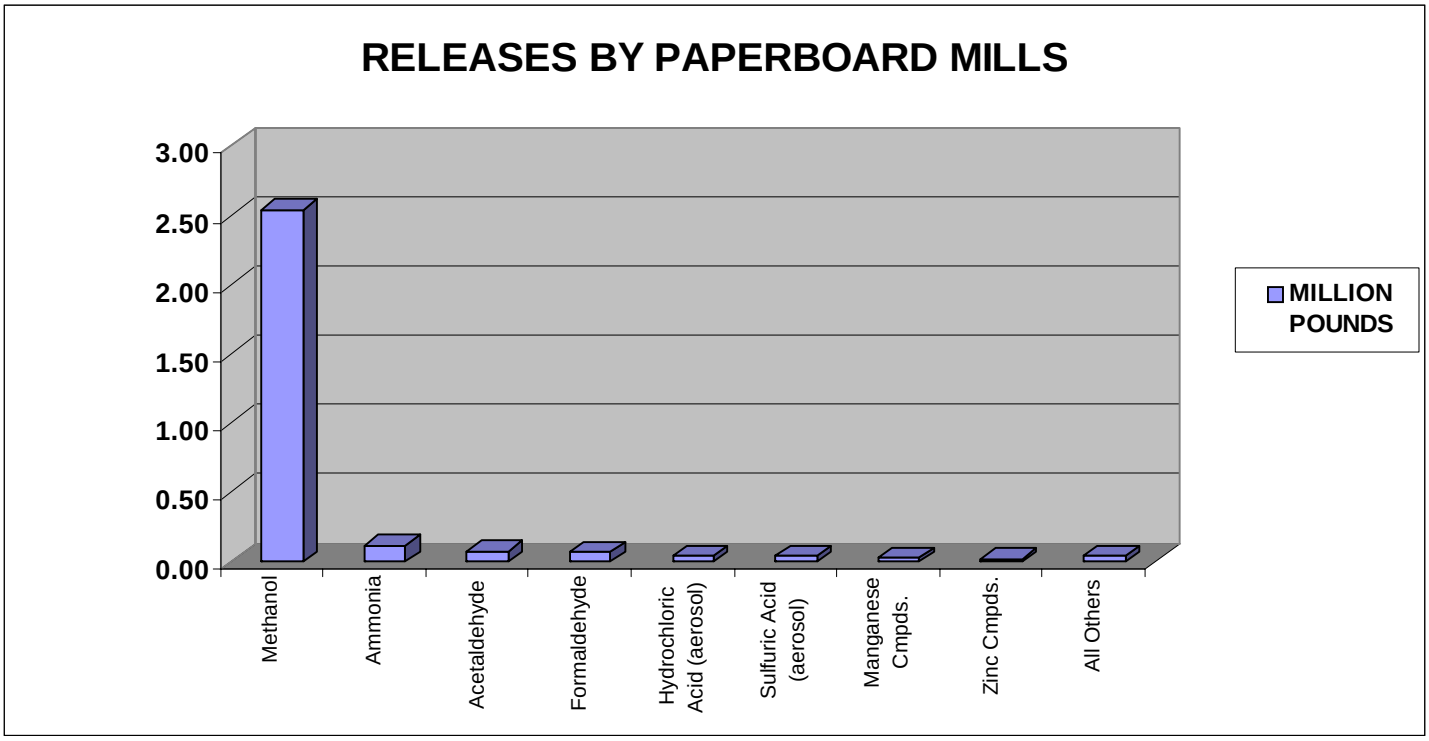


Figure 19

Facilities Reporting in 1999

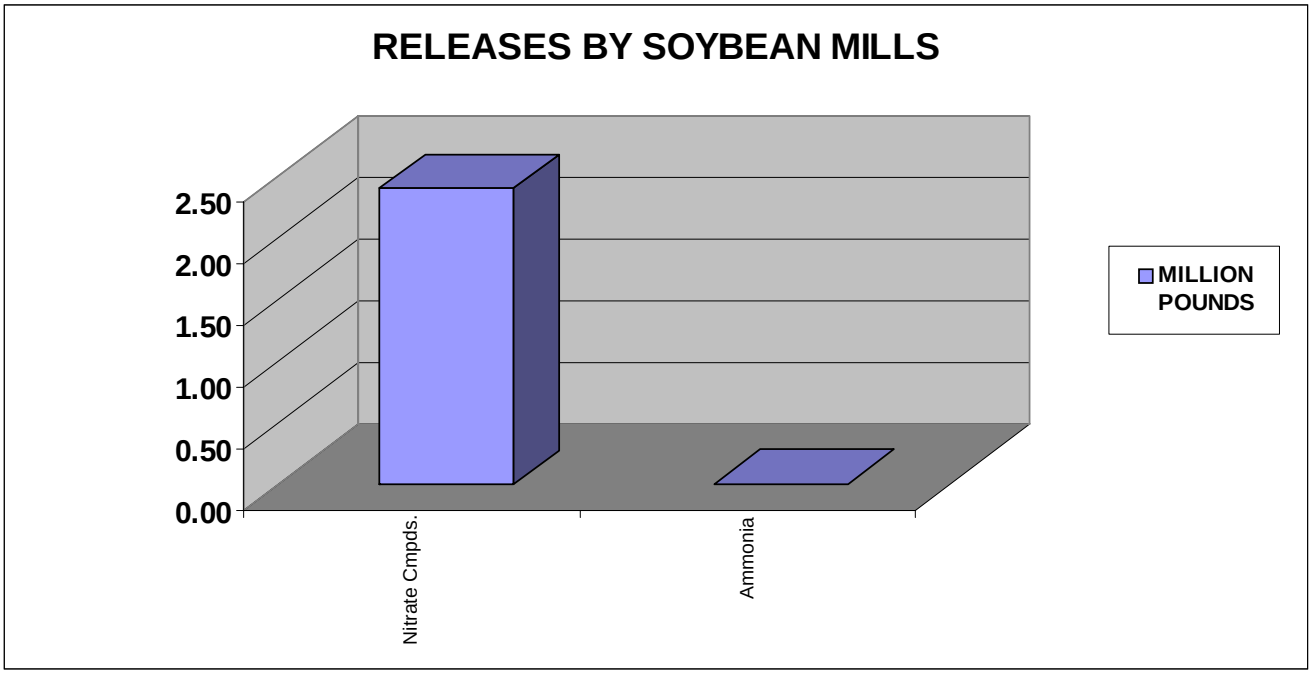


Figure 20

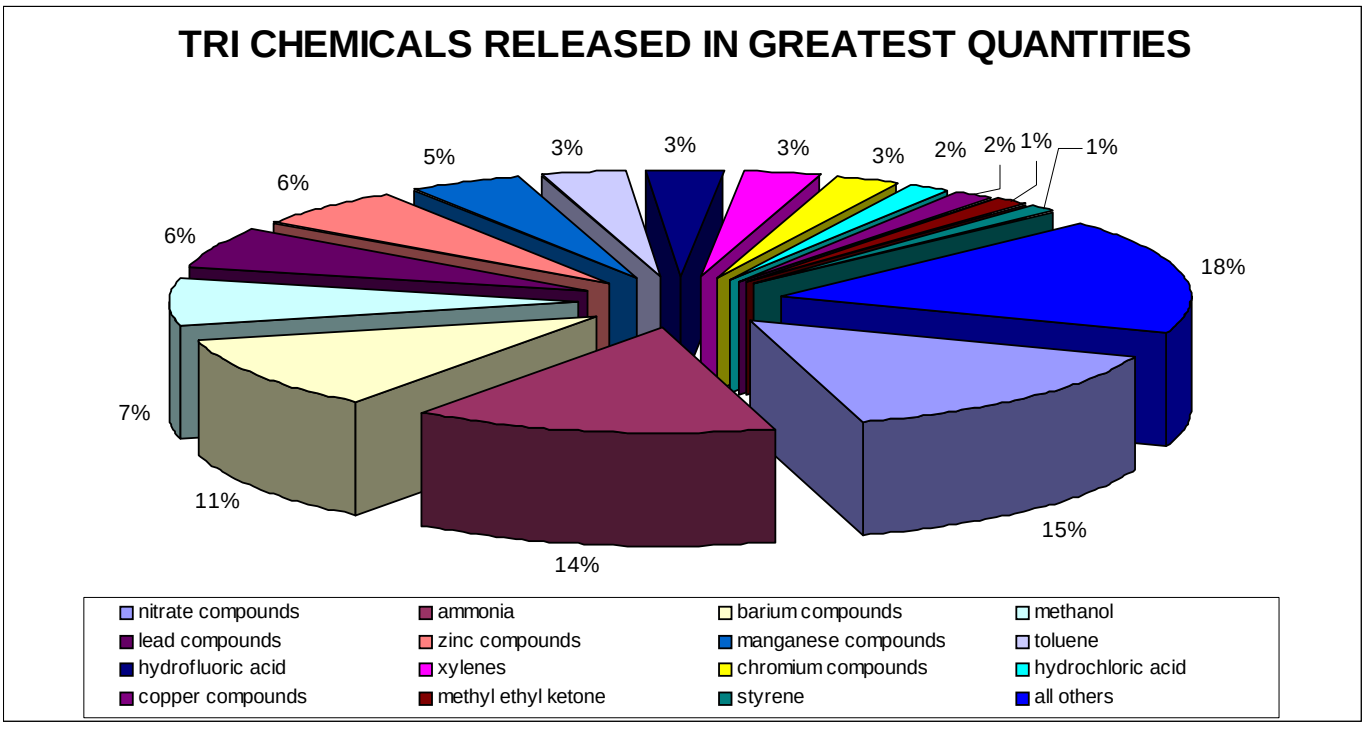


Figure 21

Chemicals Reported in 1999

Oklahoma facilities reported the manufacture, processing or otherwise use of 117 toxic chemicals or chemical groups for 1999. The percentages of these chemicals of total TRI releases are illustrated in Figure 24. The top ten chemicals based on total releases are discussed below, and together nitrate compounds, ammonia, barium compounds, methanol, lead compounds, zinc compounds, manganese compounds, toluene, hydrofluoric acid and xylenes accounted for 74 percent of all chemicals managed, as defined by TRI. (Table F) The chemicals reported in greatest quantities for 1999 are largely a reflection of commerce in the State.

Ammonia and **nitrate compounds** remain the two materials released in the largest quantities in Oklahoma in 1999 as in previous years. These nitrogen-based compounds are components of fertilizers and stock feed stuffs and accounted for thirty percent of all toxic chemicals released in Oklahoma in 1999. The manufacture of agricultural chemicals results in over ninety percent of all ammonia and nitrate compounds released in the State.

Due to its volatility, the majority of ammonia releases are emissions to air. 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. Production of nitrogen fertilizers uses anhydrous gaseous ammonia, which is hydroscopic and therefore extremely damaging to the mucus membranes of the eyes and respiratory tract. Ammonia gas is used by other industries as a refrigerant, while ammonia solutions are used in paper pulping operations and food processing. (Figure 25)

Nitrate releases in 1999 rose significantly in Oklahoma and the rest of the U.S. as a direct result of an EPA enforcement activity known as the Nitrate Initiative. The Nitrate Compounds Initiative activities sought to improve the accuracy of nitrate release figures by addressing the under reporting of water dissociable nitrate compounds. At ambient temperatures, nitrates exist as solid salts containing the nitrate ion, such as sodium nitrate, silver nitrate and ammonium nitrate. However, in aqueous solutions, the form in which most nitrate compounds are used and released, the compounds dissociate to form negatively charged nitrate ions and the corresponding cations. The production of water dissociable nitrates in waste streams, frequently formed by the neutralization of nitric acid, often was excluded from the calculations for numbers reported to TRI. Additional clarification states that nitrate anions formed by the dissociation of any nitrate-containing chemical are reportable, regardless of whether the compound itself is listed under Section 313. As a result, Oklahoma saw a substantial increase in the overall numbers reported for nitrates and a consequential and dramatic increase in the figures for releases to surface waters, POTW's and landfills as well as in treatment figures. Again, the TRI data reflect an improvement in the accuracy of nitrate reporting rather than an actual increase in the quantities of nitrates discharged.

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 type of waste management accounted for over forty per cent of all nitrates released in 1999. (Figure 26) This method of disposal presents an extremely small risk of human exposure. Certain

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

Barium is a naturally occurring metal, and small quantities of barium and barium containing compounds may be present normally in the soils of Oklahoma. Barium and barium compounds have varied industrial uses; however, under TRI requirements and in the State of Oklahoma, both are reported chiefly as non-combustible components of coal found in the ash produced by coal-fired electrical plants. (Figure 27) These chemicals most frequently are disposed to land through the use of permitted sanitary landfills, RCRA Subtitle C regulated disposal facilities and surface impoundments. The ability of barium compounds to create health or environmental hazards is dependent on the water solubility of individual compounds. Generally relatively high concentrations of barium are required to be toxic or hazardous. Ingestion is the most common means of exposure, although the dust of dry barium compounds may pose an inhalation hazard. Potential health effects from exposure to high concentrations of barium or barium compounds are gastric irritation, muscle fatigue, cardiac arrhythmia, and damage to internal organs. Barium sulfate is excluded in TRI reporting.

Methanol, also known as methyl alcohol or wood alcohol, is a common industrial solvent, and was reported by thirty-one facilities for 1999. It is highly volatile and flammable, and virtually all releases of methanol are permitted air emissions. The primary users of methanol in Oklahoma are the pulping and paper production industries. (Figure 28) Methanol also is produced as a secondary product by ammonia fertilizer plants. 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.

Elemental **lead** is a soft, bluish-grey metal and lead compounds are formed chiefly as waste products in manufacturing and in the combustion of fossil fuels. However, these activities factor very minorly as sources of lead and lead containing compounds released in Oklahoma. Ninety-nine percent of all lead and lead compounds managed in the State were disposals to a single hazardous waste landfill, permitted under RCRA Subtitle III. (Figure 29) A separate rule designating lead and lead compounds as PTB's (see below) will become effective with RY 2001.

Zinc and zinc compounds occur naturally in the earth's crust and zinc is a nutritionally essential trace metal in humans. Exposure occurs through ingestion or inhalation. Ingestion of zinc or zinc compounds at levels 10-15 times the Required Daily Allowance (RDA) is deleterious to health. Excess ingestion over a short-term exposure results in gastric disturbances; long time exposure may result in anemia, pancreatic damage, and changes in blood cholesterol levels. Short-term inhalation of zinc fumes or dust can cause a disease called metal fume fever which has flu-like symptoms and is largely reversible. The long-term effect of inhaling zinc or zinc compounds is unknown. Disposal through RCRA Subtitle C landfills is the most common source of releases in Oklahoma. (Figure 30) Zinc is used in dry cell batteries, as coatings to inhibit rust and in alloyed metals. Zinc compounds are widely used in the manufacture of paint and dyes, ointments, wood preservatives and wire coatings and also are present in the residual ash of coal combustion.

Manganese is the twelfth most common element and a component of many common minerals, although it does not occur naturally as a pure metal. Industrial applications for the use manganese-containing compounds are many. (Figure 31) 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.

Ingestion or inhalation of particulates of manganese compounds has much the same toxic effects. The central nervous system is targeted and a combination of mental and emotional disturbances coupled with poor hand and body coordination symptomatic of a disease called manganism may ensue; metal fever may result as well. The symptoms progress with continued exposure eventually causing Parkinson-like tremors and difficulty in walking which are irreversible.

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 produced during petroleum refining, isolated, and back blended into fuels to raise octane levels. Petroleum refining is the largest source in Oklahoma of toluene releases reportable to TRI. Toluene also is a by-product of styrene production. It is a widely used industrial solvent, a component of paints, inks, adhesives and cleaning agents, and used for chemical extractions. (Figure 32) Because of its high volatility, the majority of toluene released to the environment is through stack or fugitive air emissions and inhalation of fumes is the primary means of exposure, although it may be absorbed dermaly as well. Continuous exposure or exposure to higher concentrations may cause unconsciousness and eventual asphyxiation. Long-term exposure eventually results in kidney and brain damage. Toluene is not classified as a known or potential carcinogen; however, it is a possible mutagen and highly flammable.

Hydrogen fluoride is a colorless gas with a sharp, acrid odor. It is hygroscopic and readily dissolves in water to form hydrofluoric acid. In its gaseous state, releases occur to the air and inhalation is the means of

exposure. 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 exposure at high concentrations may cause pulmonary edema, severe burns and cardiac arrhythmia. Hydrogen fluoride is formed during coal combustion and this is the largest source of releases in the State. (Figure 33) Other common uses are as a hardener or catalyst, or and agent to etch glass.

For the purpose of this report, **xylenes** were considered together as a single compound without distinguishing between the three isomers: ortho-, meta-, and para-xylene, (1,2-, 1,3- and 1,4-xylene respectively). In Oklahoma mixed isomer xylenes are most commonly used. These compounds are highly volatile and flammable. Xylenes are aromatic compounds often found in mixtures with ethyl benzene. At ambient temperature and pressure, xylenes are clear liquids with a sweet odor. Mixed xylenes are a widely used industrial solvent with many applications and thirty-eight facilities in the State report its use in quantities exceeding the threshold levels. (Figure 34) It is a component of paints and refined petroleum hydrocarbons. These compounds are highly volatile and flammable. Releases occur to air and inhalation is the means of exposure, although they may be absorbed through the skin. Xylenes are central nervous system depressors causing dizziness, motor disturbances, nausea and loss of consciousness as a result of acute exposure. High concentrations may cause asphyxia. Chronic exposure may damage bone marrow and thereby cause depressed blood cell counts.

The list of chemicals and chemical families reportable under TRI continues to change. Beginning with Reporting Year 1995, the list increased from 313 to over 600. Effective with RY 1999, the scope of this report, phosphoric acid was deleted from the list. The PBT Rule is enacted for RY 2000 . Also effective with RY 2000 vanadium, previously reported as “fume or dust” only, will expand to include any vanadium metal except as contained in alloys. Concerned parties outside of the EPA may petition the agency to add or delete chemicals from the list. Petitions to delete methyl ethyl ketone (MEK), methyl isobutyl ketone (MIBK) and acetonitrile were denied for RY 2000. Chromite ore and unreacted ore components in the processing residue are proposed for deletion with the final rule expected in 2001.

Persistent, Bioaccumulative and Toxic Chemicals

The most significant of these recent changes to TRI list of reportable chemicals was the 1999 final rule on Persistent, Toxic and Bioaccumulative chemicals. Beginning with RY 2000 EPA substantially lowered the thresholds for eighteen chemicals classified as persistent, bioaccumulative and toxic (PBT). Seven PBT chemicals and two chemical families previously not reportable under TRI and were added to the list as part of the final PBT rule. (Table E) A separate rule for lead and lead containing compounds will become effective with RY 2001. Chemicals designated as PBT’s are of

particular concern as they are not only very toxic but persist in the environment and do not tend to degrade, are difficult to destroy and accumulate in the body tissues of humans and wildlife, (bioaccumulate). In lowering the thresholds for these chemicals, the risk of exposure was considered as well.

While the total quantities managed of PBT chemicals should not increase significantly under the new rule, the number of facilities reporting should be expected to be higher. Similarly, no large impact on figures for total production related wastes should be expected due to the lower reporting thresholds for PBT chemicals. Under the requirements for 1999, less than three tenths of one percent (0.3%) of all releases reported in Oklahoma involved a chemical listed under the new rule. Implementation of the PBT rule should be viewed as the first step in addressing one of the chief limitations of TRI data, that is, the wide variability of different chemicals to pose potential hazards. Modifications and additions to the list of PBT chemicals should be expected. As with previous expansions in TRI reporting, future changes in PBT reporting will make the data more representative and thereby better inform the public of chemical risks in the community.

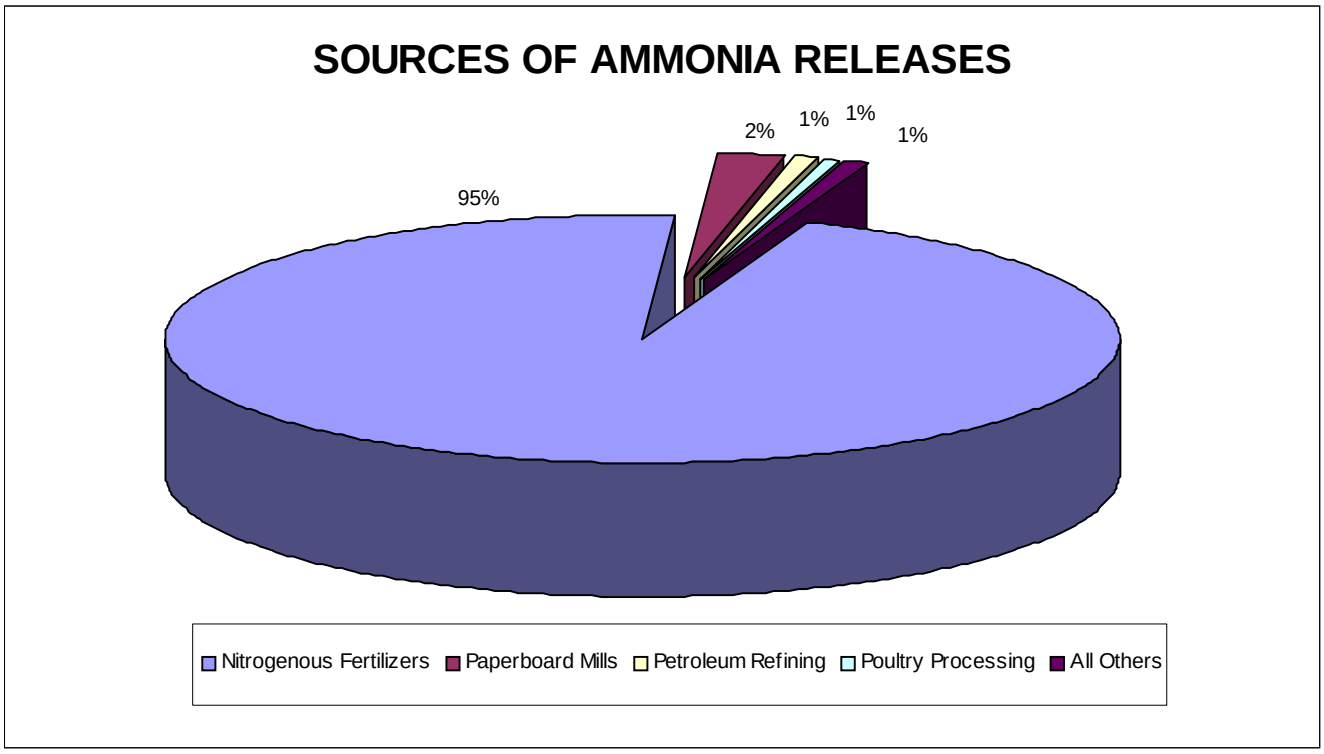


Figure 22

Chemicals Reported in 1999

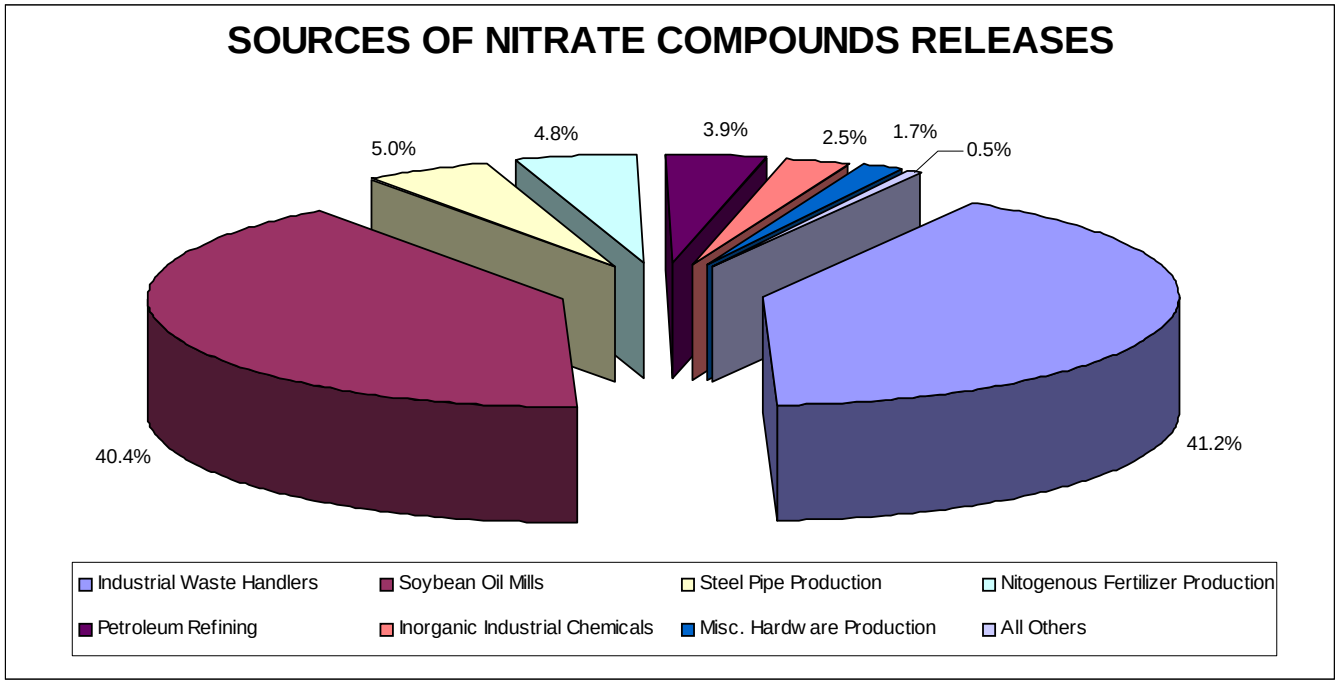
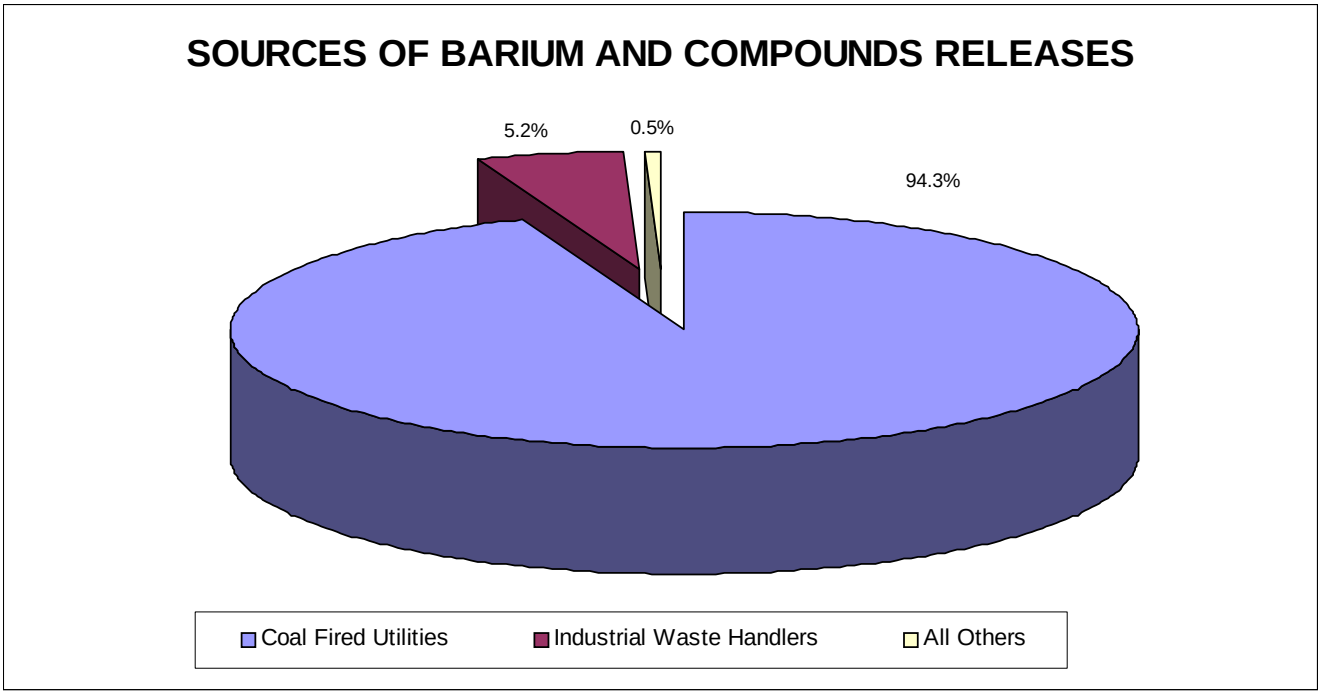


Figure 23



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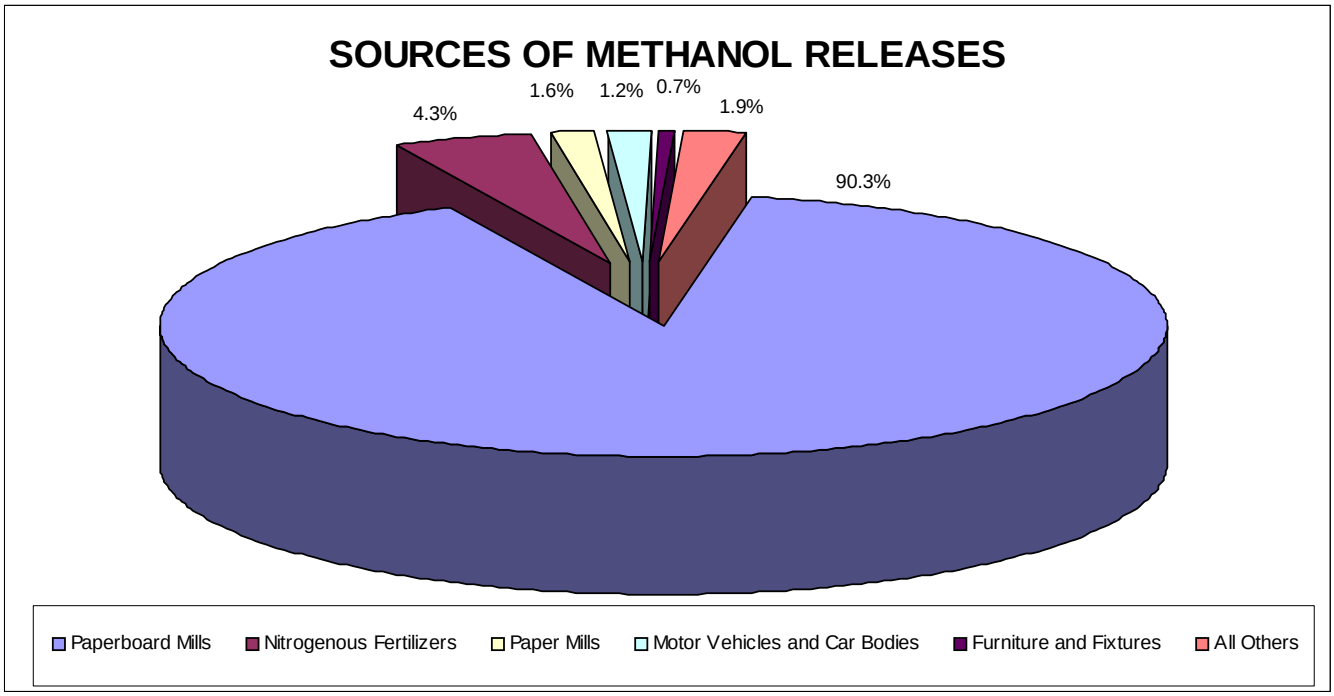

Figure 25

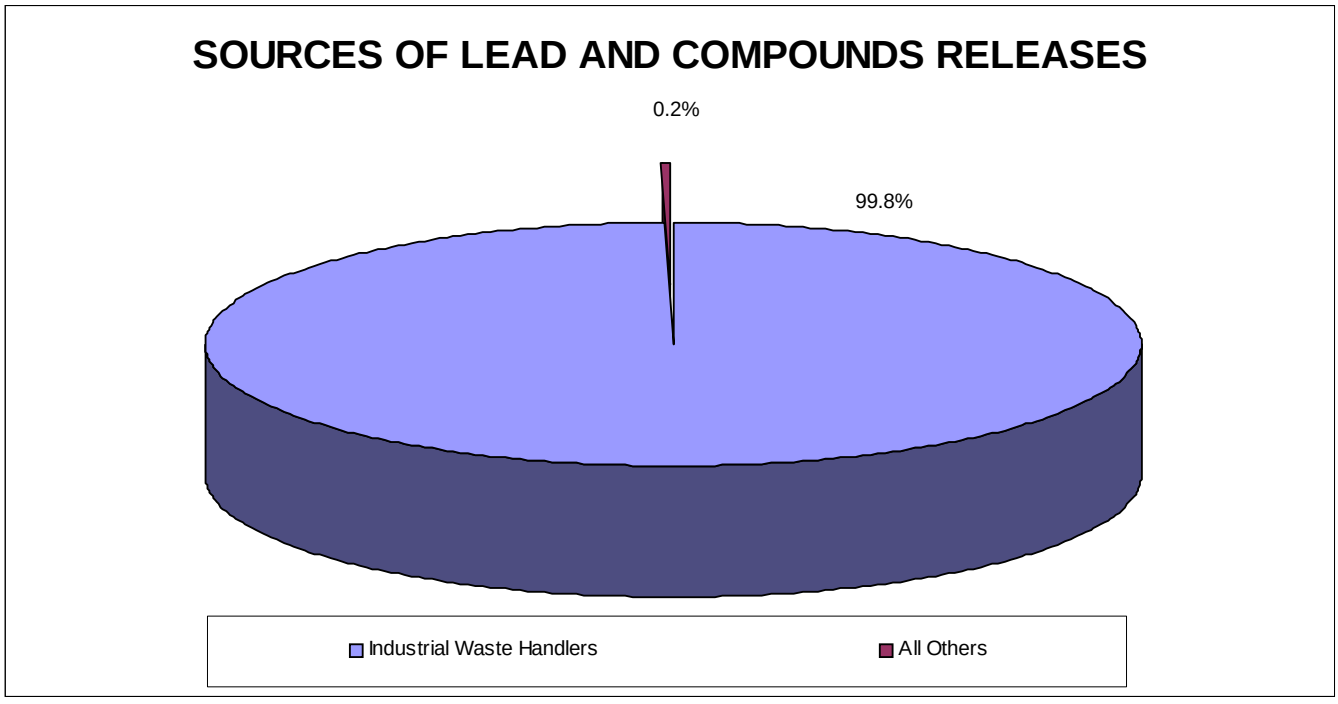

Figure 26

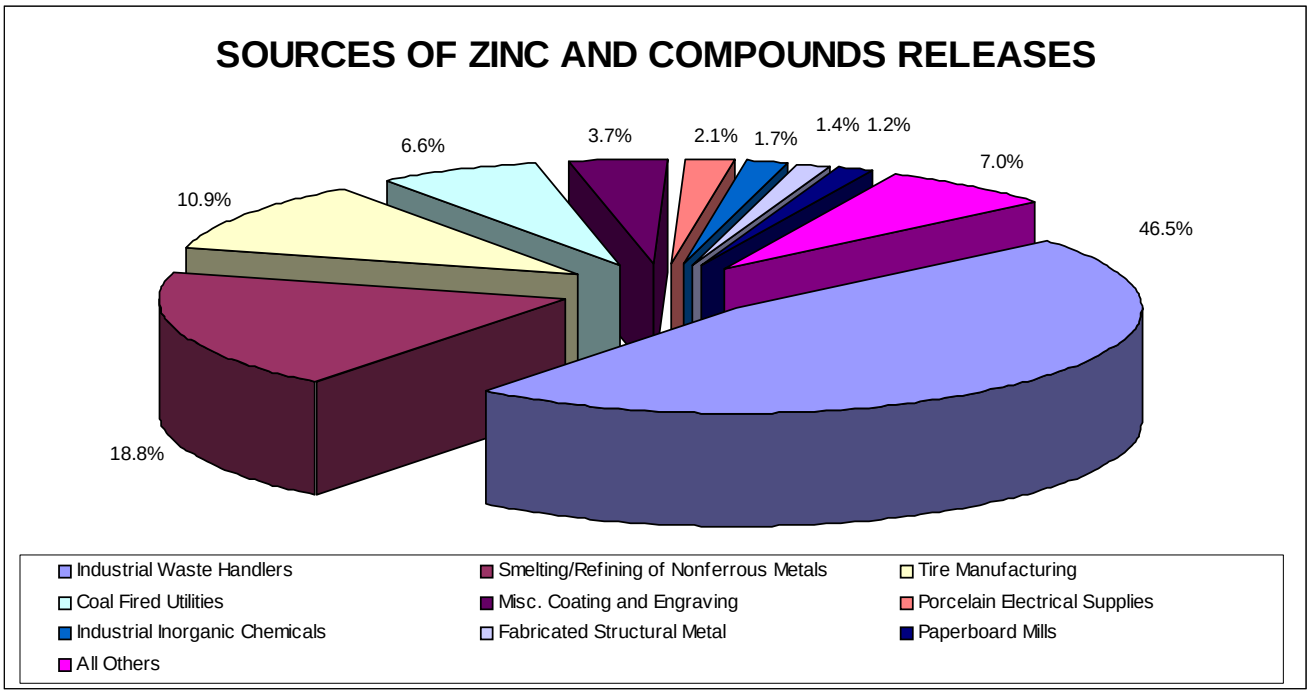

Figure 27

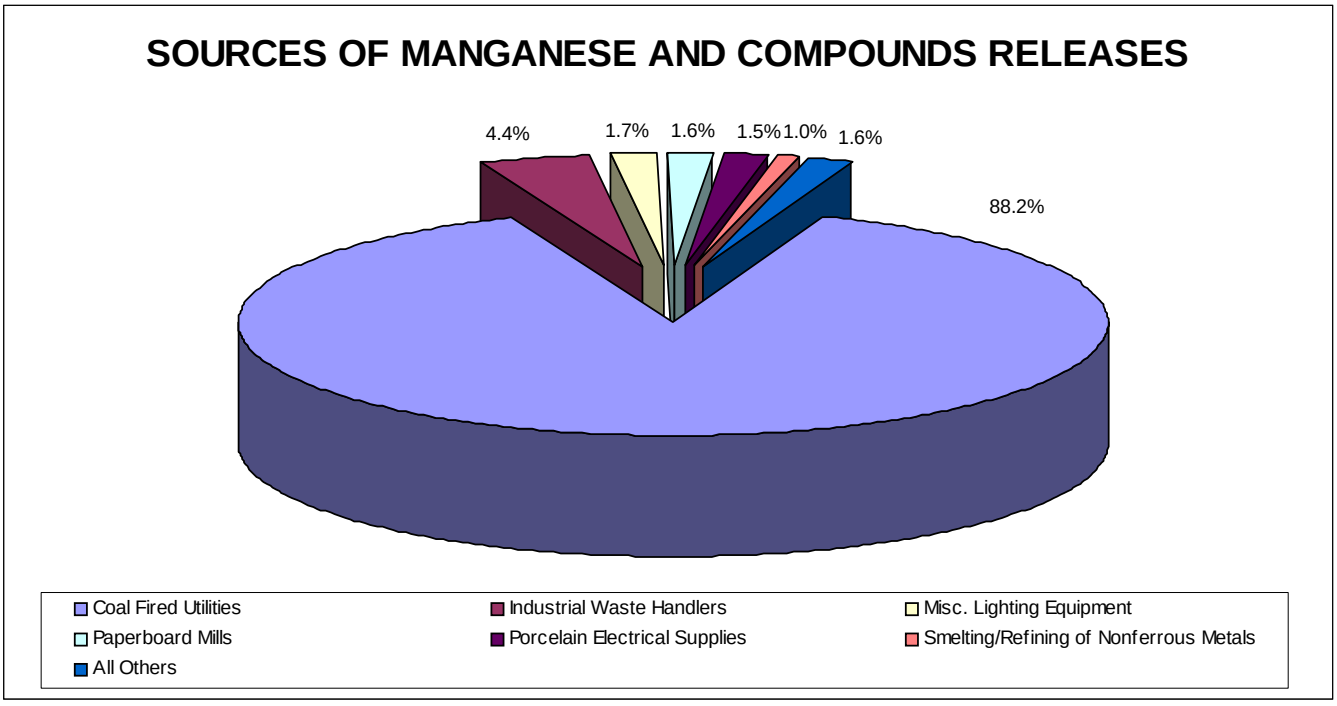

Figure 28

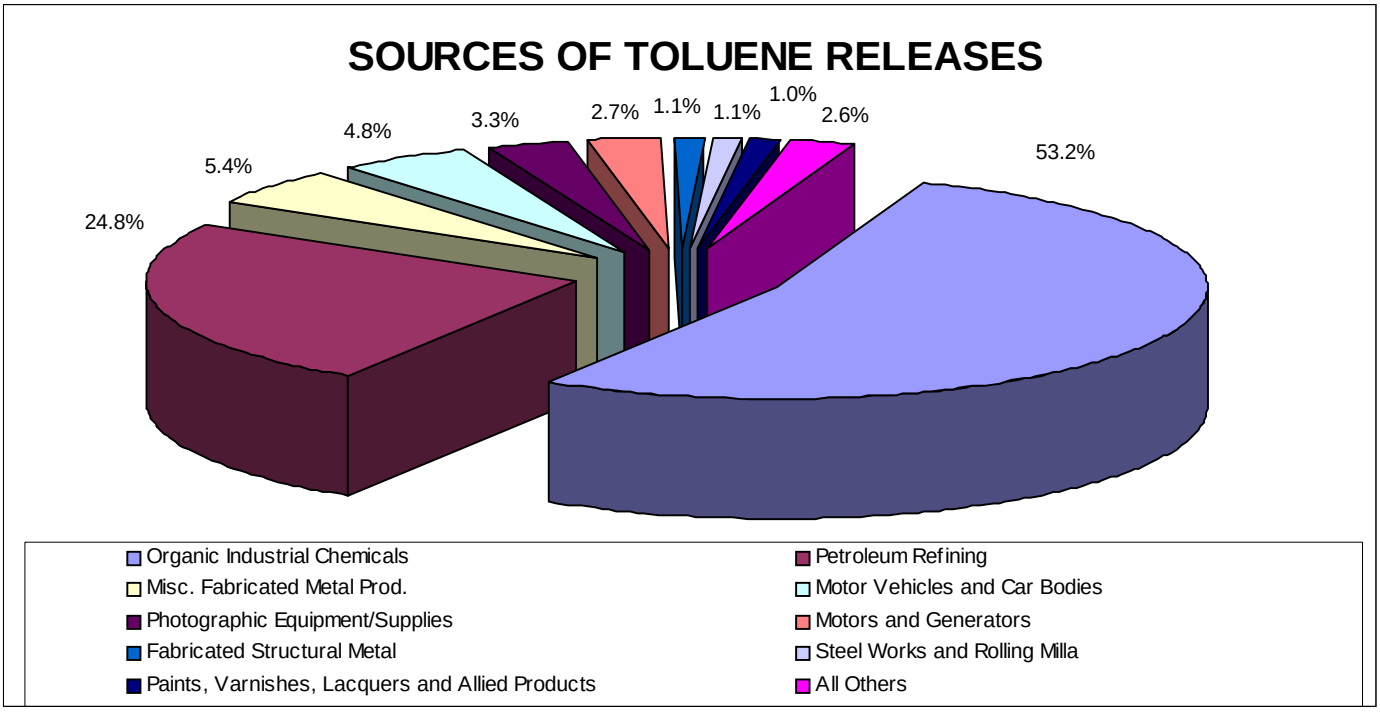

Figure 29

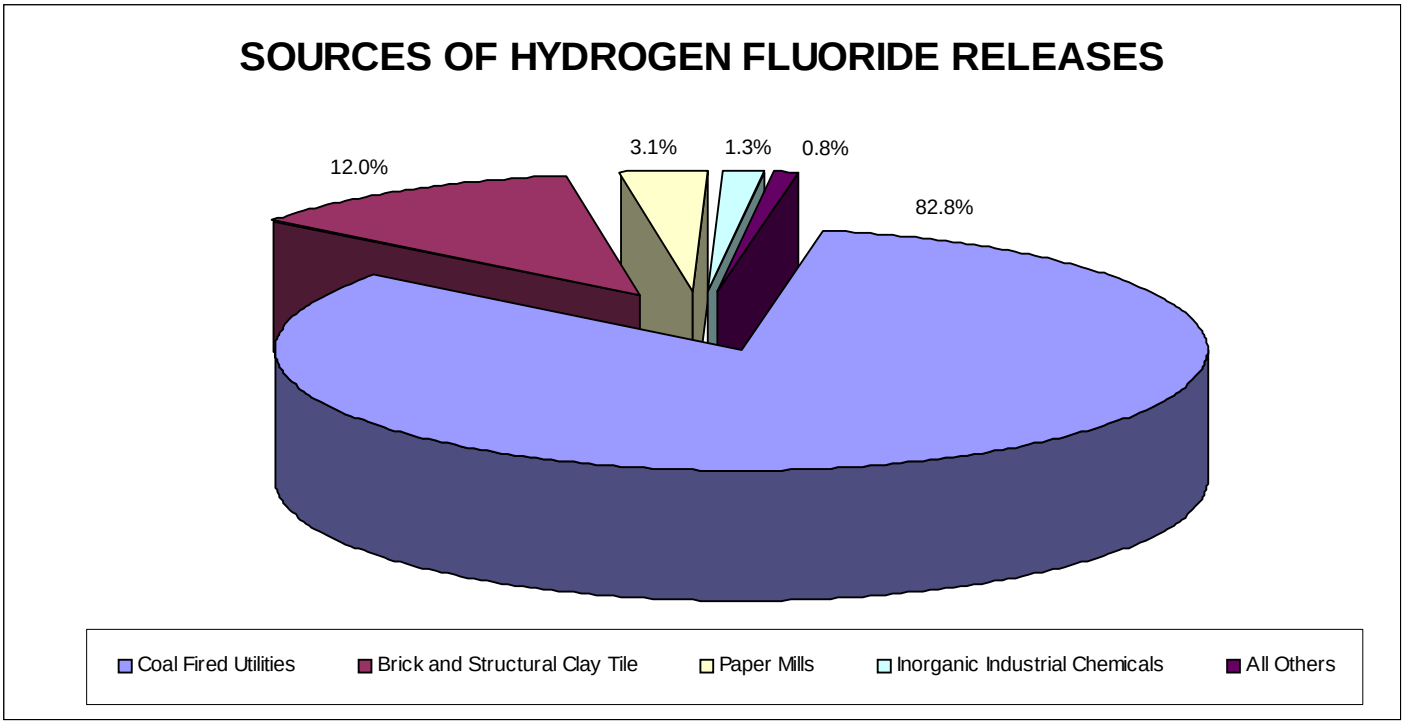

Figure 30

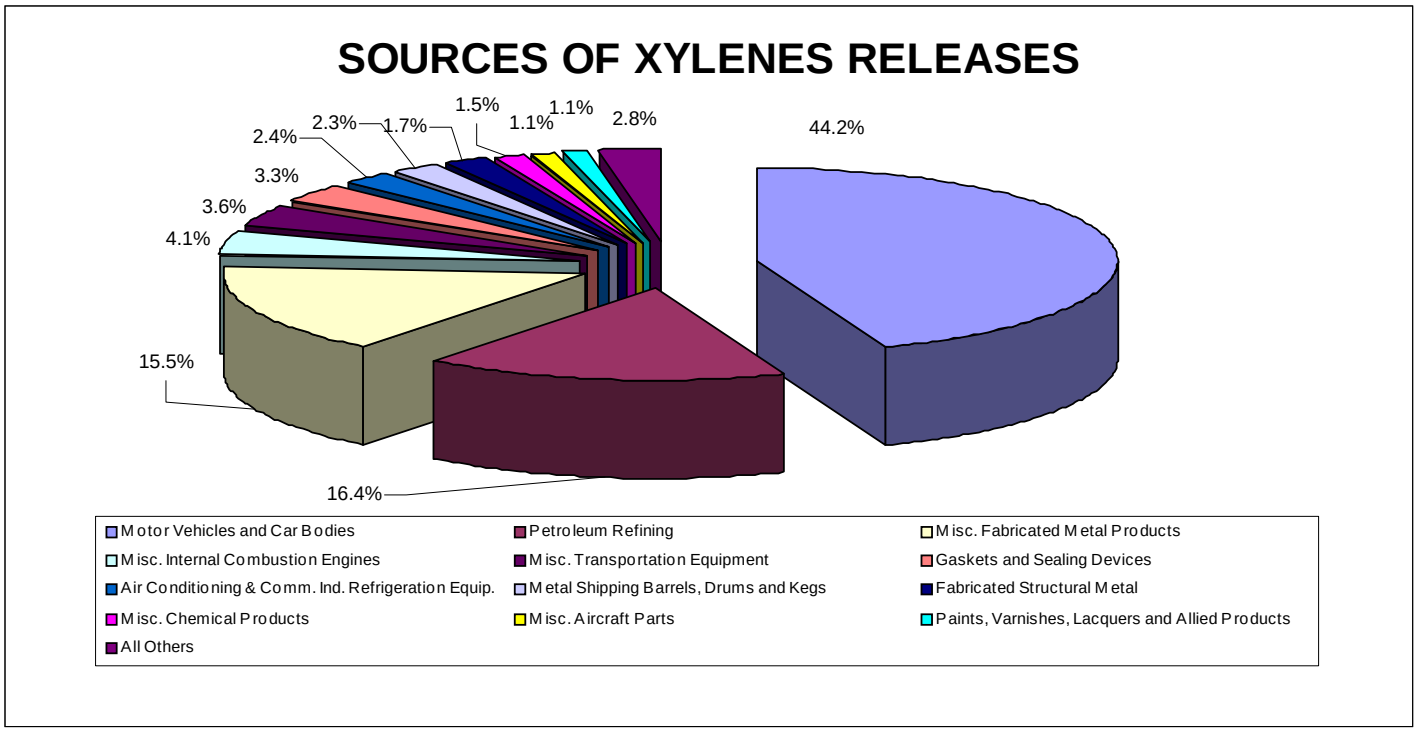

Figure 31

PBT CHEMICALS AND THRESHOLDS

Manufacture, process and otherwise use thresholds

Aldrin	100 lbs./yr.
Methoxychlor	100 lbs./yr.
Pendimethalin	100 lbs./yr.
Polycyclic Aromatic Cmpds.	100 lbs./yr.
Tetrabromobisphenol	100 lbs./yr.
Trifluralin	100 lbs./yr.
Chlordane	10 lbs./yr
Benzo(g,h,I) perylene	10 lbs./yr
Heptachlor	10 lbs./yr
Hexachlorobenzene	10 lbs./yr
Isodrin	10 lbs./yr
Mercury	10 lbs./yr
Mercury Cmpds.	10 lbs./yr
Octastyrene	10 lbs./yr
PCB's	10 lbs./yr
Pentachlorobenzene	10 lbs./yr
Toxaphene	10 lbs./yr
Dioxin and dioxin-like cmpds.	0.1 lbs./yr

Table E