Toxics Release Inventory

2006

energy API

AMERICAN PETROLEUM INSTITUTE

Introduction

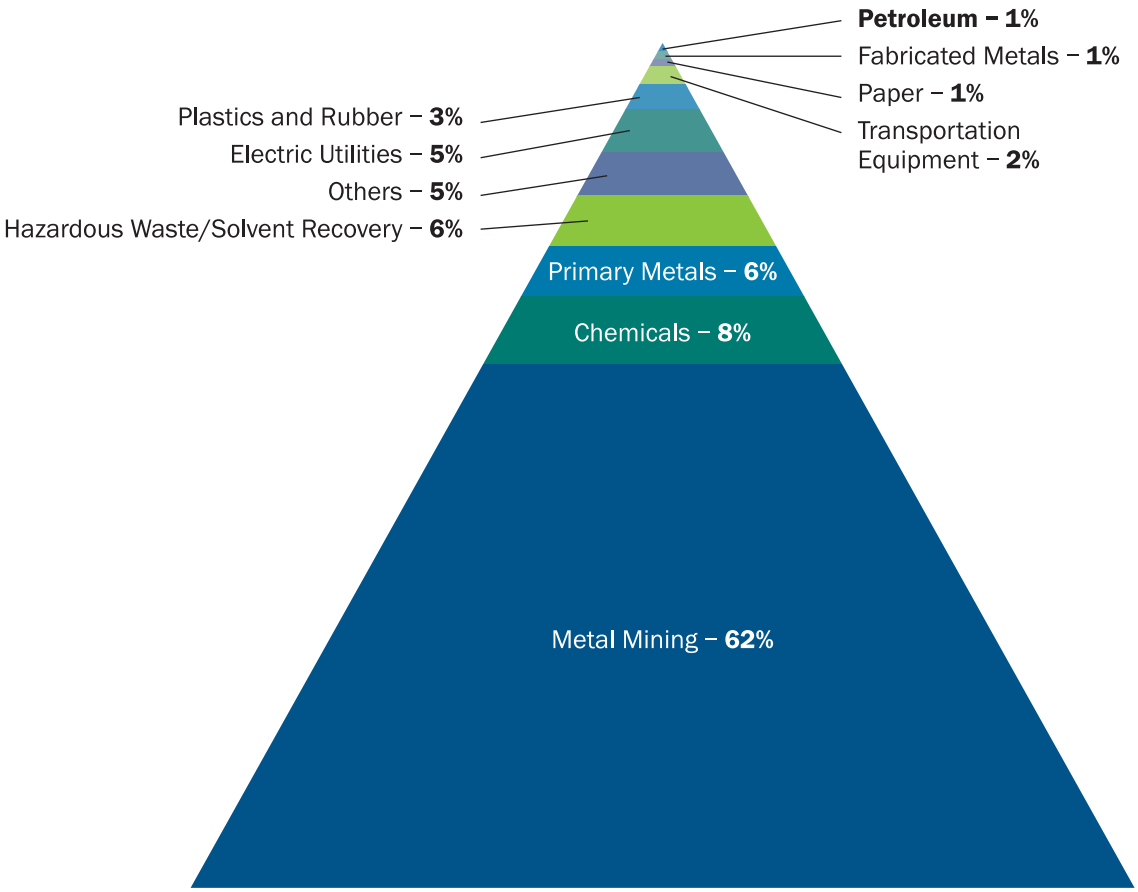
This Report

The petroleum industry is committed to operating in a manner which is not harmful to our workforce, our local communities and our environment. Proper management of chemicals is an integral part of that commitment. This API report, based on the Environmental Protection Agency's (EPA) annual Toxics Release Inventory (TRI), addresses and documents the amount of TRI chemicals properly released to the environment and/or properly disposed of on-site and/or properly transferred to off-site locations by (1) petroleum facilities [NAICS Code 324] and (2) bulk stations and terminal plants [NAICS Code 4247].[1]

Documenting our TRI performance, however, is complicated due to (1) periodic changes in the TRI reporting requirements, (2) periodic changes to the list of TRI chemicals, (3) the addition of seven new industries to the TRI program beginning in the 1998 reporting year and (4) variations in methods of estimating releases and disposals and transfers by petroleum facilities. Therefore, TRI data must be interpreted carefully.

Figure 1

Percentage of TRI Carcinogen Releases, Disposals and Transfers by Industry: 2006

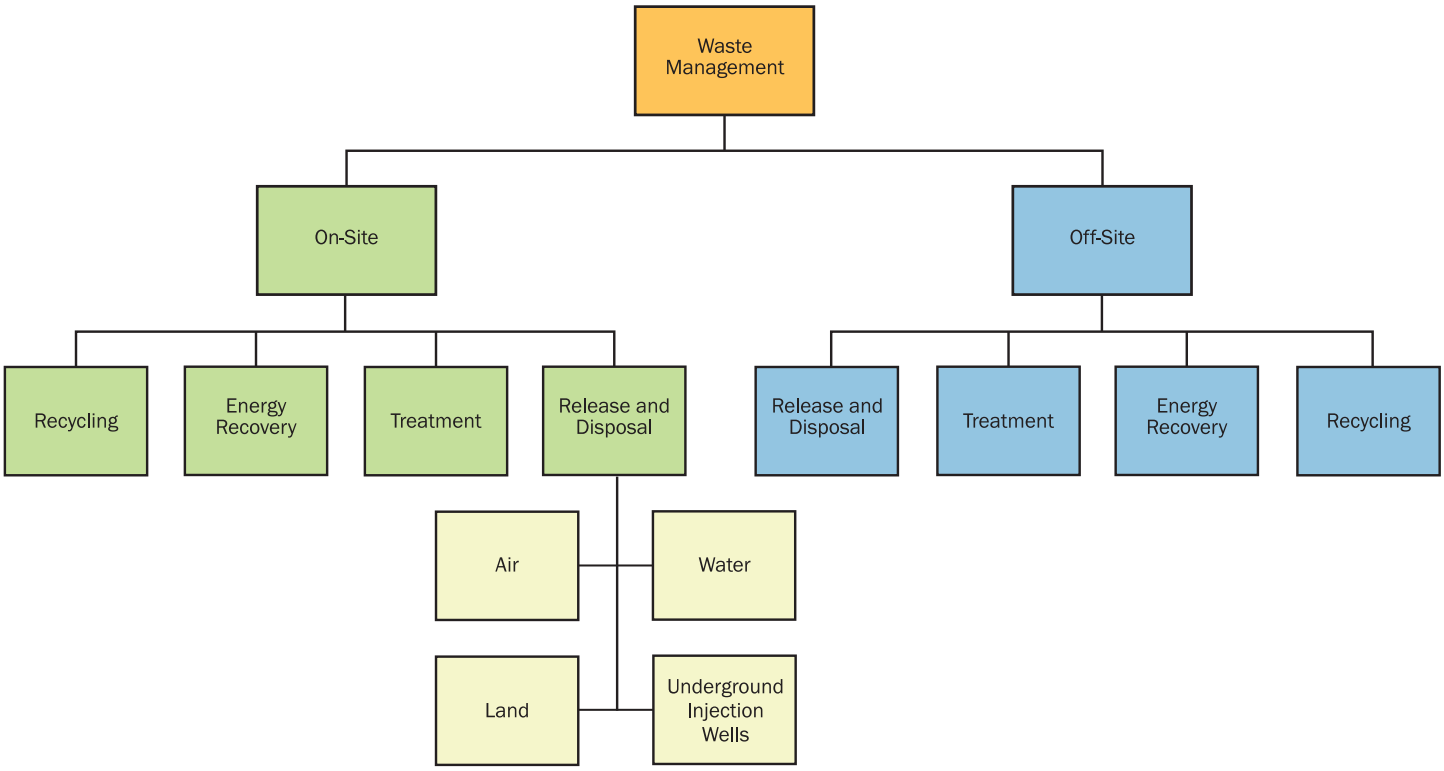


1 NAICS Codes at www.naics.com

Toxics Release Inventory

The Environmental Protection Agency Toxics Release Inventory is a database containing detailed information on nearly 650 chemicals and other chemical categories that over 22,000 industrial and other facilities manage in all 50 states and the U.S. territories. The TRI program was created by the 1986 Emergency Planning and Community Right-to-Know Act to provide the public with information on chemical releases. The data have been collected annually since 1987. It was later expanded by the Pollution Prevention Act of 1990. Together, these laws require facilities in certain industries, which manufacture, process or use toxic chemicals above specified amounts, to report annually on releases, disposals, transfers and other waste management activities related to these chemicals. The data are collected from industries including manufacturing, metal and coal mining, electric utilities, commercial hazardous waste treatment and other industrial sectors.[2]

Figure 2
Total Production Related Waste



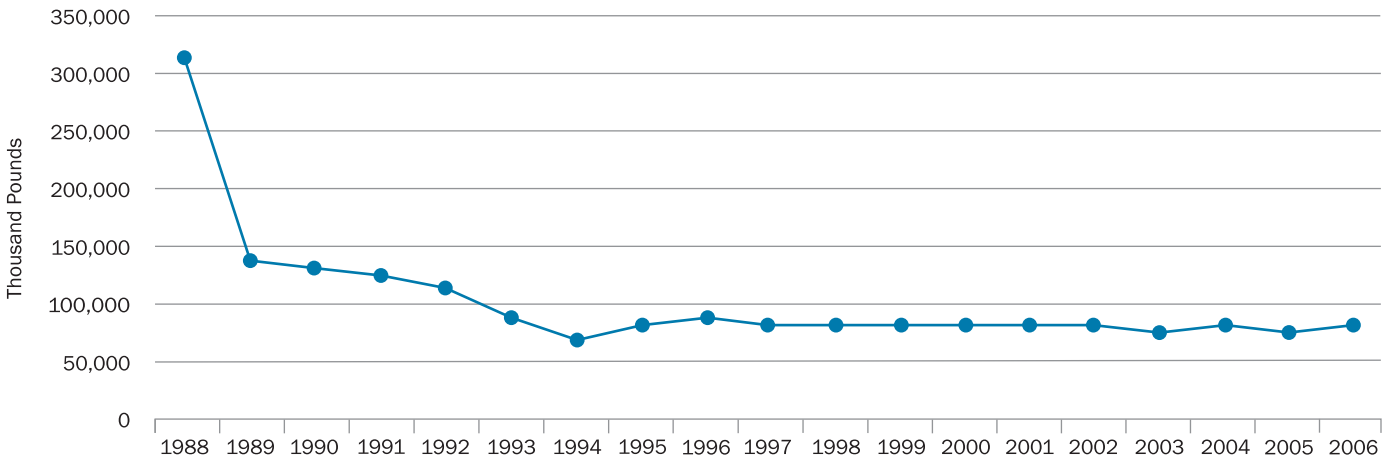
2 www.epa.gov/tri

Petroleum Facilities

Since 1988, petroleum facilities have reduced their releases, disposals and transfers to the environment by 75 percent. For 2006, petroleum facilities reported 78.1 million pounds of TRI chemicals released to the environment and/or disposed of on-site and/or transferred to off-site locations.

Figure 3

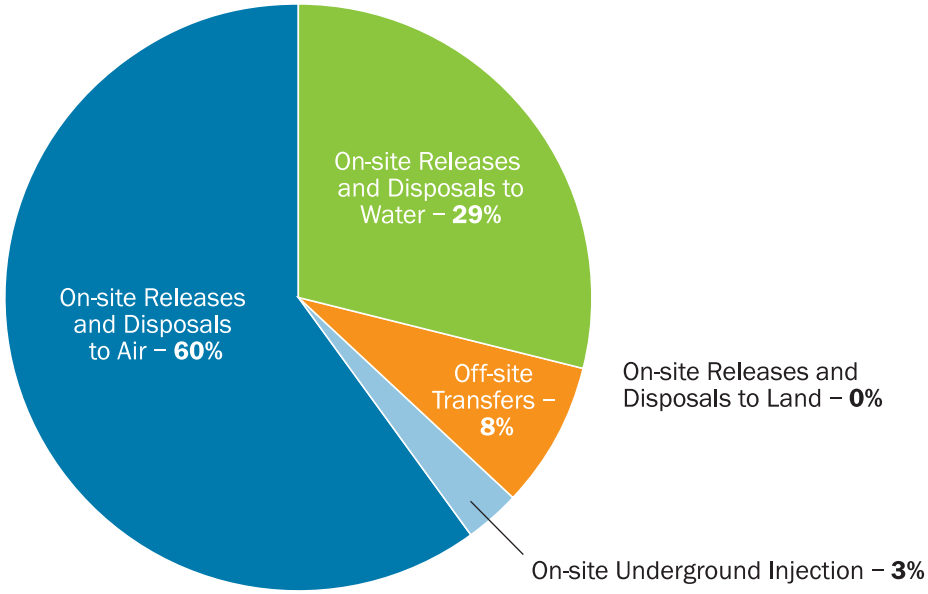
TRI Chemical Releases, Disposals and Transfers for Petroleum Facilities: 1988–2006



92 percent of this total was released to the environment and/or disposed of on-site; 8 percent was transferred to off-site locations.

Figure 4

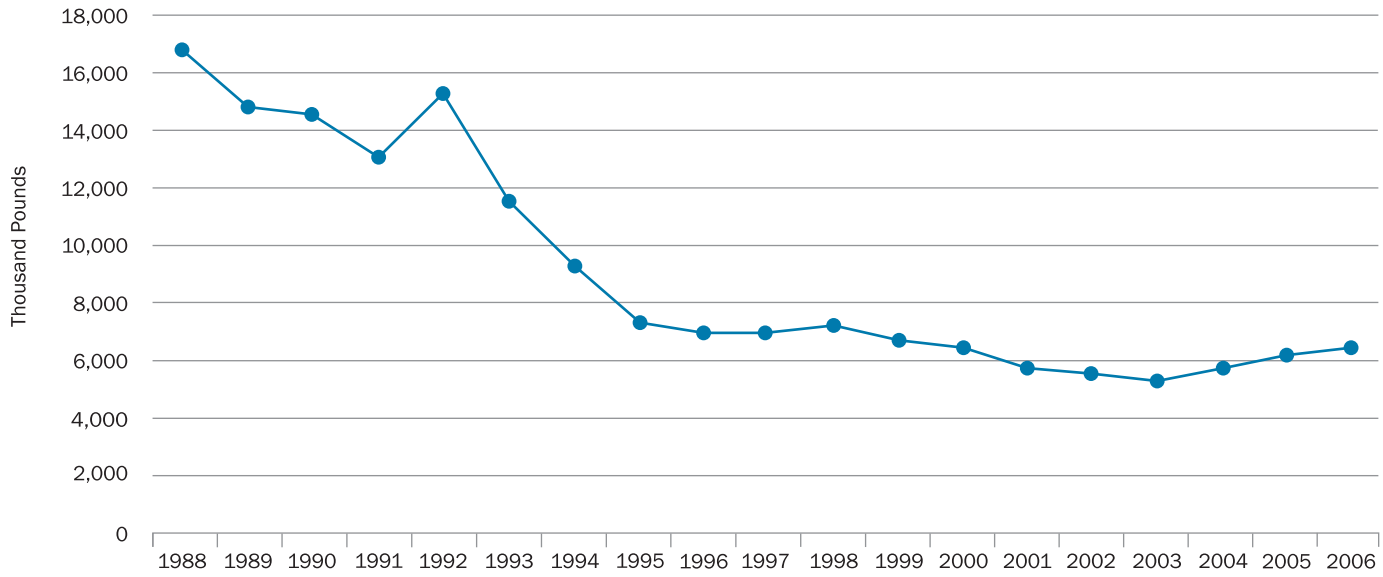
TRI Chemical Releases, Disposals and Transfers by Petroleum Facilities: 2006



The industry's performance is also impressive for the TRI chemicals classified as carcinogens. The petroleum industry's releases, disposals and transfers for all carcinogens decreased 60 percent from 1988 to 2006. For 2006, petroleum facilities reported 6.7 million pounds of TRI carcinogens released to the environment and/or disposed of on-site and/or transferred to off-site locations.

Figure 5

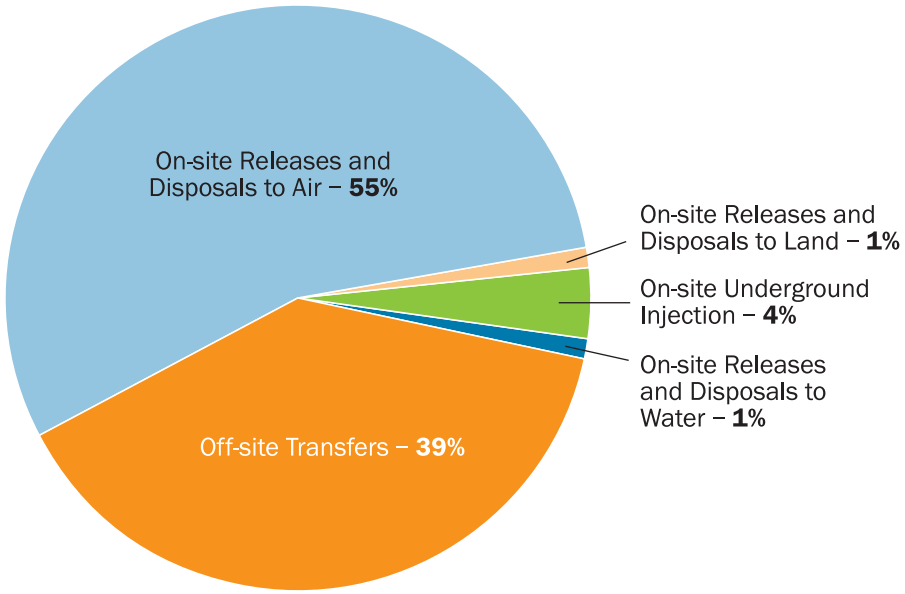
TRI Carcinogen Releases, Disposals and Transfers for Petroleum Facilities: 1988–2006



61 percent of this total was released to the environment and/or disposed of on-site; 39 percent was transferred to off-site locations.

Figure 6

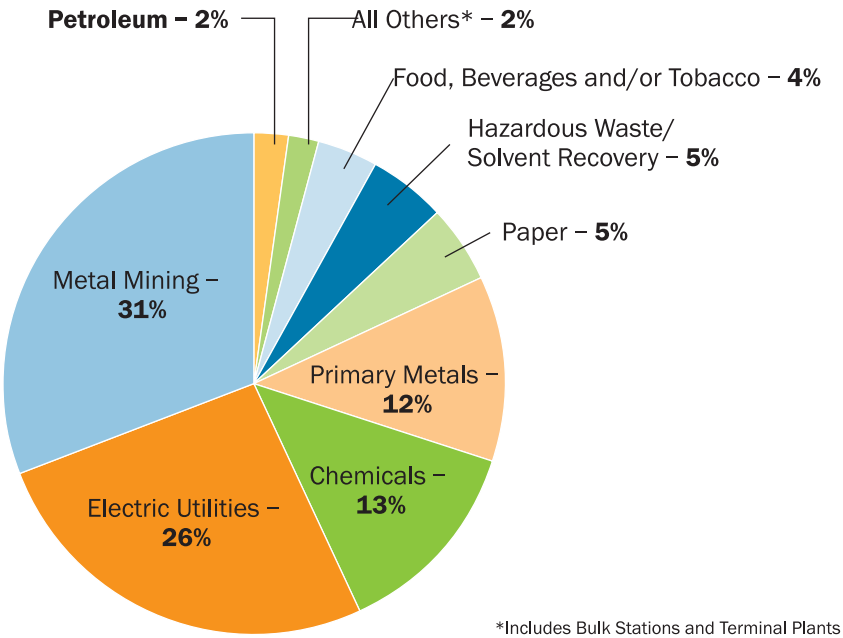
TRI Carcinogen Releases, Disposals and Transfers by Petroleum Facilities: 2006



Among reporting sectors to the TRI in 2006, petroleum facilities were eighth in releases, disposals and transfers of TRI chemicals.

Figure 7

TRI Total Chemical Releases, Disposals and Transfers by Industry – 4.3 Billion Pounds: 2006

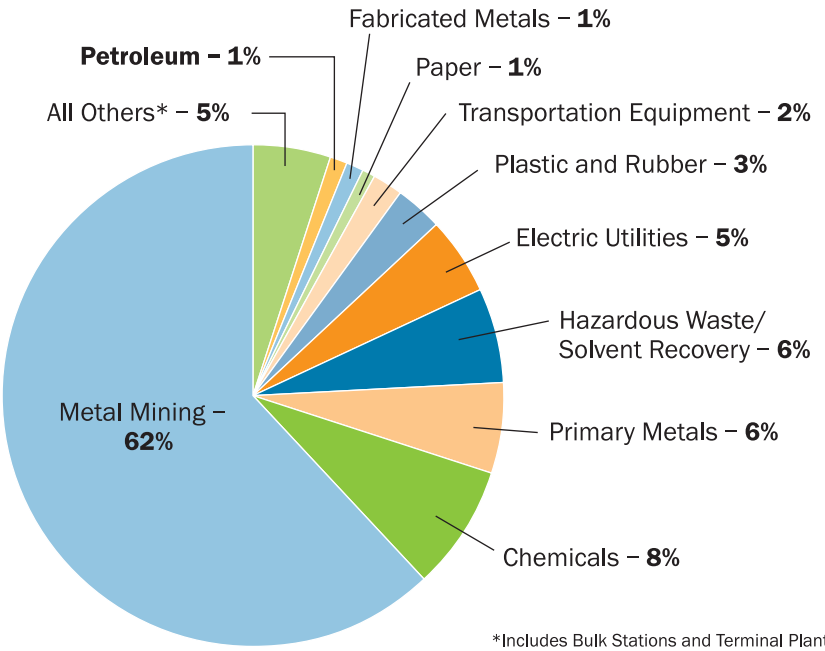


*Includes Bulk Stations and Terminal Plants at 0%

Among reporting sectors to the TRI in 2006, petroleum facilities were tenth in releases, disposals and transfers of TRI carcinogens.

Figure 8

TRI Total Carcinogen Releases, Disposals and Transfers by Industry – 873 Million Pounds: 2006



*Includes Bulk Stations and Terminal Plants at 0%

Petroleum facilities chemical releases, disposals and transfers were at 12.61 pounds per thousand barrels of input in 2006, down 78.8 percent from 1988.

Figure 9

TRI Chemical Releases, Disposals and Transfers by Petroleum Facilities, including Refinery Inputs: 1988–2006

Year	Total Chemical Releases, Disposals and Transfers[1]	Total Refinery Input[2]	Total Releases, Disposals and Transfers[3]
1988	312,847	5,258	59.50
1989	135,726	5,297	25.62
1990	129,433	5,325	24.31
1991	113,053	5,308	21.30
1992	106,993	5,353	19.99
1993	91,610	5,483	16.71
1994	70,284	5,483	12.82
1995	77,216	5,555	13.90
1996	85,765	5,668	15.13
1997	86,260	5,807	14.85
1998	85,624	5,893	14.53
1999	84,800	5,878	14.43
2000	84,451	5,964	14.16
2001	80,809	5,979	13.52
2002	79,016	5,955	13.27
2003	71,813	6,027	11.92
2004	75,299	6,135	12.27
2005	70,305	6,136	11.46
2006	78,132	6,198	12.61

1 Thousands of pounds

2 Millions of barrels; PSA 2008, Volume 1, Refinery Operations, Table 15

3 Pounds per 1,000 barrels

Petroleum facilities carcinogen releases, disposals and transfers were at 1.08 pounds per thousand barrels of input in 2006, down 65.8 percent from 1988.

Figure 10

TRI Carcinogen Releases, Disposals and Transfers by Petroleum Facilities, including Refinery Inputs: 1988–2006

Year	Total Carcinogen Releases, Disposals and Transfers[1]	Total Refinery Input[2]	Total Releases, Disposals and Transfers[3]
1988	16,632	5,258	3.16
1989	14,420	5,297	2.72
1990	14,128	5,325	2.65
1991	12,656	5,308	2.38
1992	14,945	5,353	2.79
1993	11,512	5,483	2.10
1994	9,141	5,483	1.67
1995	7,333	5,555	1.32
1996	6,880	5,668	1.21
1997	6,881	5,807	1.18
1998	7,163	5,893	1.22
1999	6,485	5,878	1.10
2000	6,374	5,964	1.07
2001	5,765	5,979	0.96
2002	5,606	5,955	0.94
2003	5,299	6,027	0.88
2004	5,484	6,135	0.89
2005	6,053	6,136	0.99
2006	6,665	6,198	1.08

1 Thousands of pounds

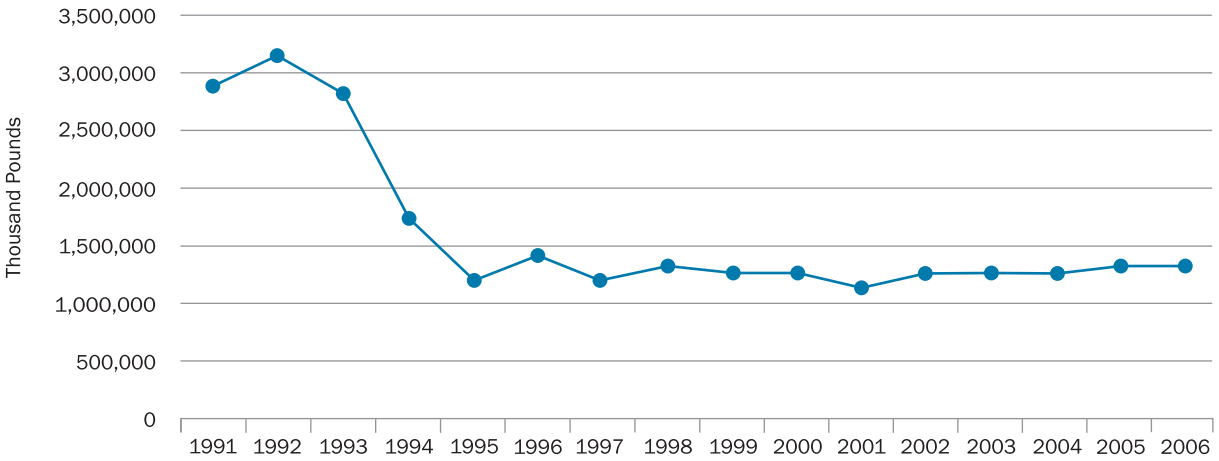
2 Millions of barrels; PSA 2008, Volume 1, Refinery Operations, Table 15

3 Pounds per 1,000 barrels

Petroleum facilities reported managing 1.3 billion pounds of TRI chemicals in wastes during 2006, down 55 percent from 1991, the year waste quantity reporting was added to the TRI program. Of these chemicals, 43 percent were burned for energy recovery on-site and off-site, 41 percent were treated on-site and off-site to reduce volume or toxicity prior to disposal and 10 percent were recycled on-site and off-site. The remaining 6 percent were released to the environment and/or disposed of on-site and/or transferred to off-site locations for disposal.

Figure 11

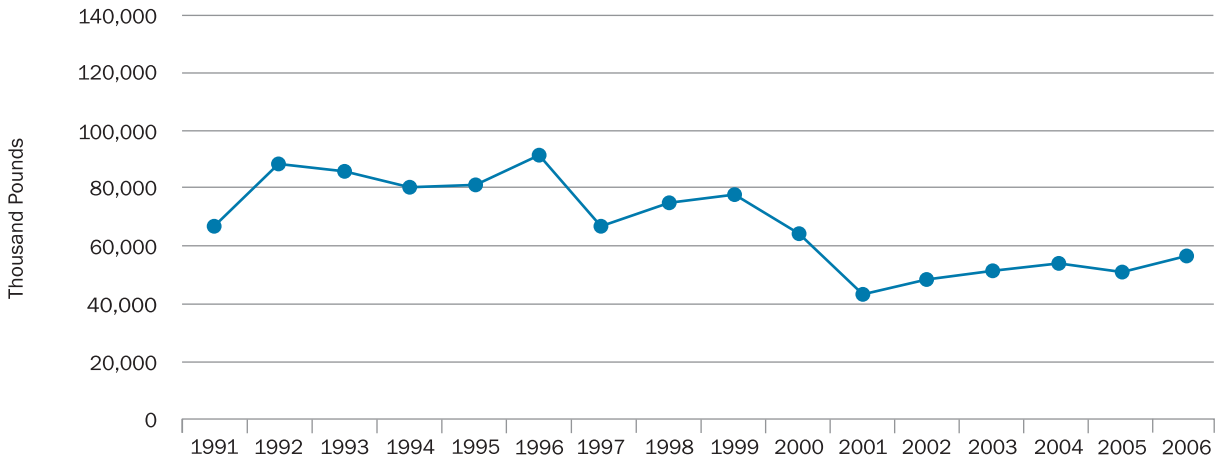
Petroleum Facilities Management On-site/Off-site of All Chemical Waste: 1991–2006



Petroleum facilities reported managing nearly 59 million pounds of TRI chemicals in waste classified as carcinogens during 2006, down nearly 13 percent from 1991, the year waste quantity reporting was added to the TRI program. Of these carcinogens, 42 percent were recycled on-site and off-site, 39 percent were treated on-site and off-site to reduce volume or toxicity prior to disposal and 7 percent were burned for energy recovery on-site and off-site. The remaining 12 percent were released to the environment and/or disposed of on-site and/or transferred off-site for disposal.

Figure 12

Petroleum Facilities Management On-site/Off-site of All Carcinogen Waste: 1991–2006

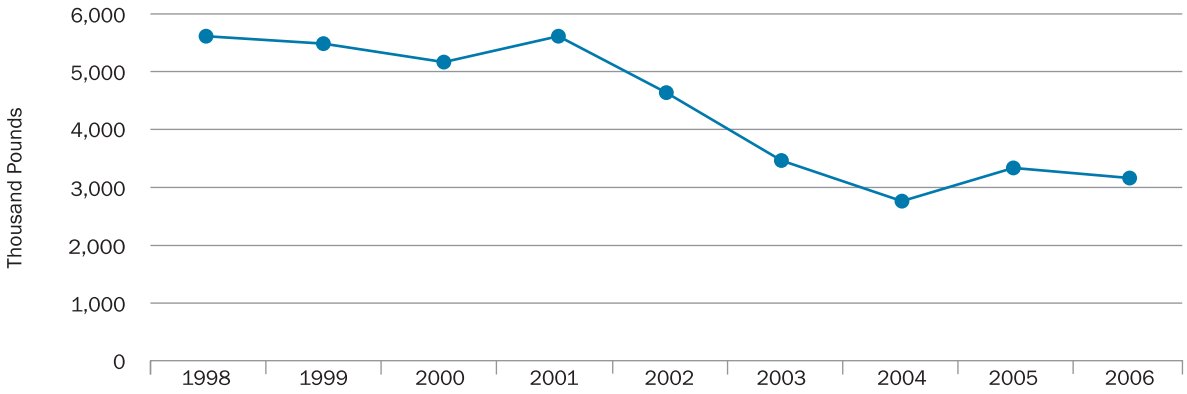


Petroleum Bulk Stations and Terminal Plants

Since 1998 – when they were added to the TRI facility list – petroleum bulk stations and terminal plants have reduced their releases, disposals and transfers by 39 percent. For 2006, petroleum bulk stations and terminal plants reported 3.2 million pounds of TRI chemicals released to the environment and/or disposed of on-site and/or transferred to off-site locations, representing 0.08 percent of all industries' releases, disposals and transfers. 93 percent of this total was released to the environment and/or disposed of on-site; 7 percent was transferred to off-site locations.

Figure 13

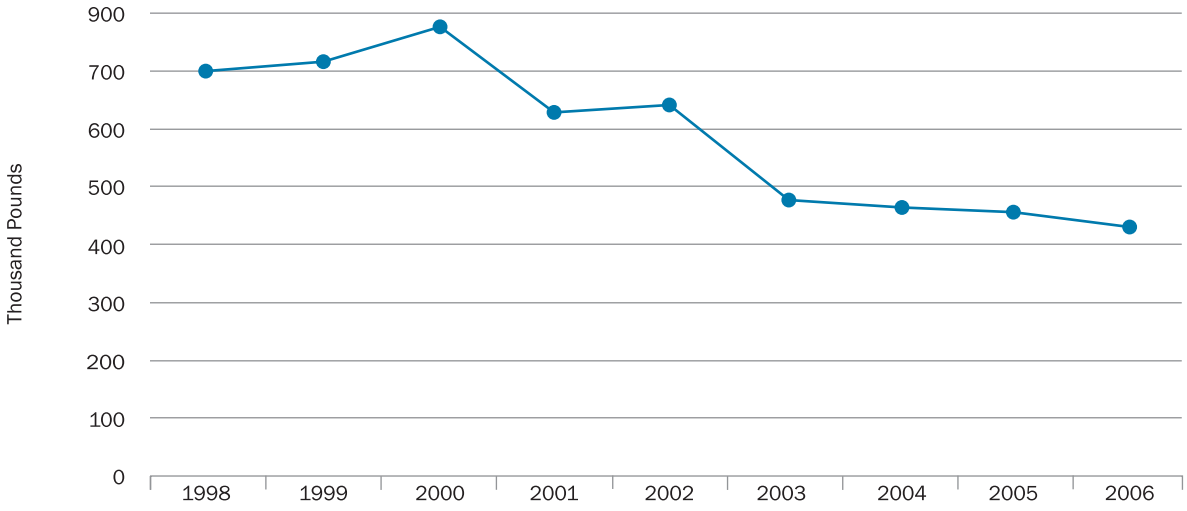
TRI Chemical Releases, Disposals and Transfers for Petroleum Bulk Stations and Terminal Plants: 1998–2006



Bulk Station and Terminal Plant releases, disposals and transfers of all carcinogens for 2006 totaled 419 thousand pounds. This number was down from 1998 levels by just over 40 percent.

Figure 14

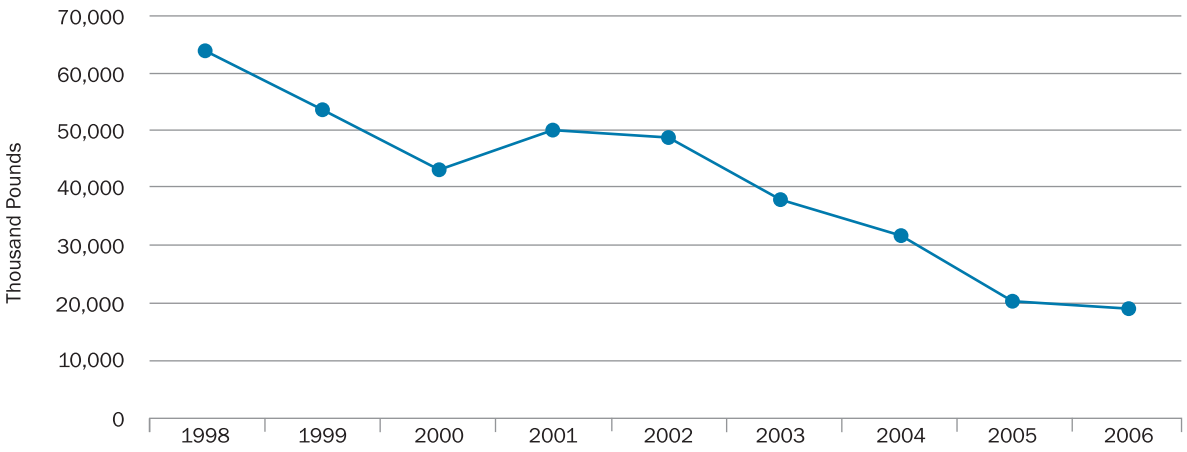
TRI Carcinogen Releases, Disposals and Transfers for Petroleum Bulk Stations and Terminal Plants: 1998–2006



Petroleum bulk station and terminal plants reported managing 18.9 million pounds of TRI chemicals in wastes in 2006, down 70 percent from 1998.

Figure 15

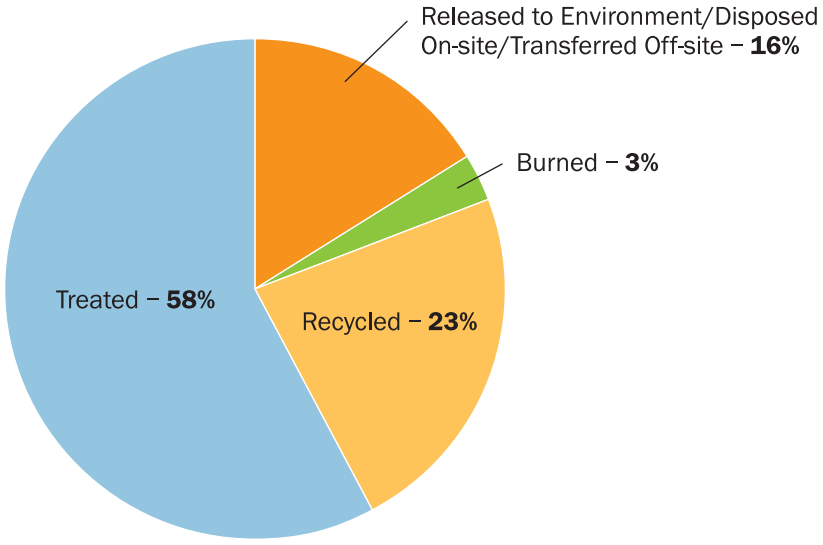
Petroleum Bulk Station and Terminal Plant Management On-site/Off-site of All Chemical Waste: 1998–2006



Of these chemicals, 58 percent were treated on-site and off-site to reduce volume or toxicity prior to disposal, 23 percent were recycled on-site and off-site, 3 percent were burned for energy recovery on-site and off-site and 16 percent were released to the environment and/or disposed of on-site and/or transferred to off-site locations.

Figure 16

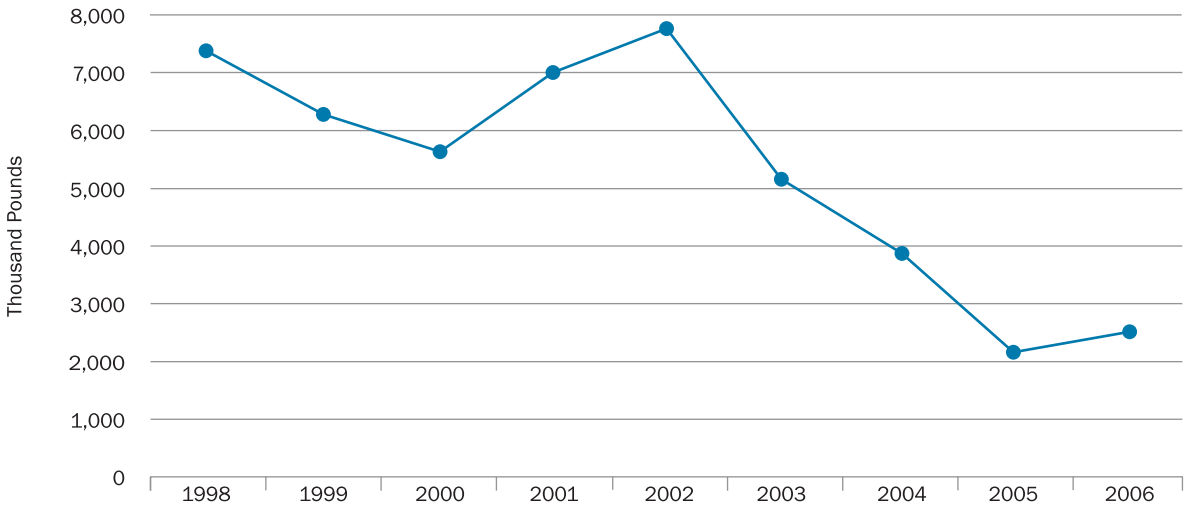
TRI Chemicals Managed by Petroleum Bulk Stations and Terminal Plants: 2006



Petroleum bulk station and terminal plants reported managing nearly 2.4 million pounds of TRI chemicals in waste classified as carcinogens during 2006, down nearly 67 percent from 1998.

Figure 17

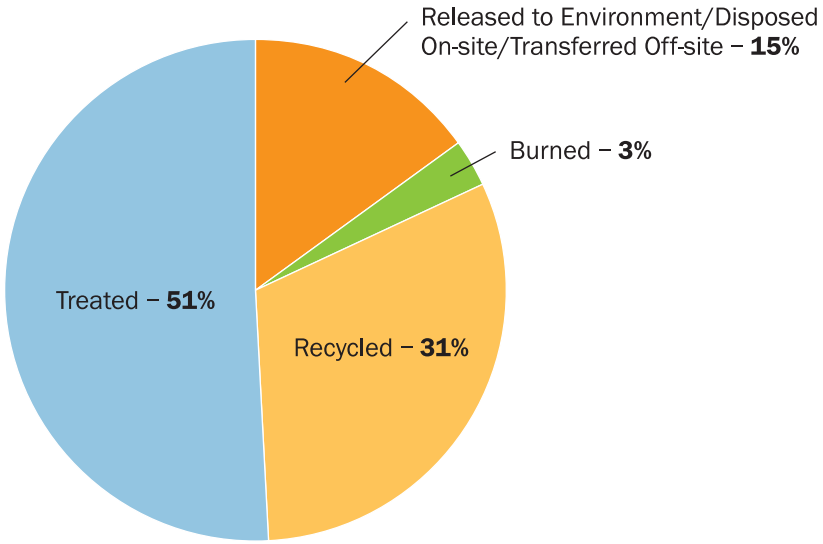
Petroleum Bulk Station and Terminal Plant Management On-site/Off-site of All Carcinogen Waste: 1998–2006



Of these carcinogens, 51 percent were treated on-site and off-site to reduce volume or toxicity prior to disposal, 31 percent were recycled on-site and off-site and 3 percent were burned for energy recovery on-site and off-site. The remaining 15 percent were released to the environment and/or disposed of on-site and/or transferred to off-site locations.

Figure 18

TRI Carcinogens Managed by Petroleum Bulk Stations and Terminal Plants: 2006



Comparison by TRI Industry and Chemical/Carcinogen

Figure 19

Percentage of TRI Chemical Releases to Air by Industry: 2006

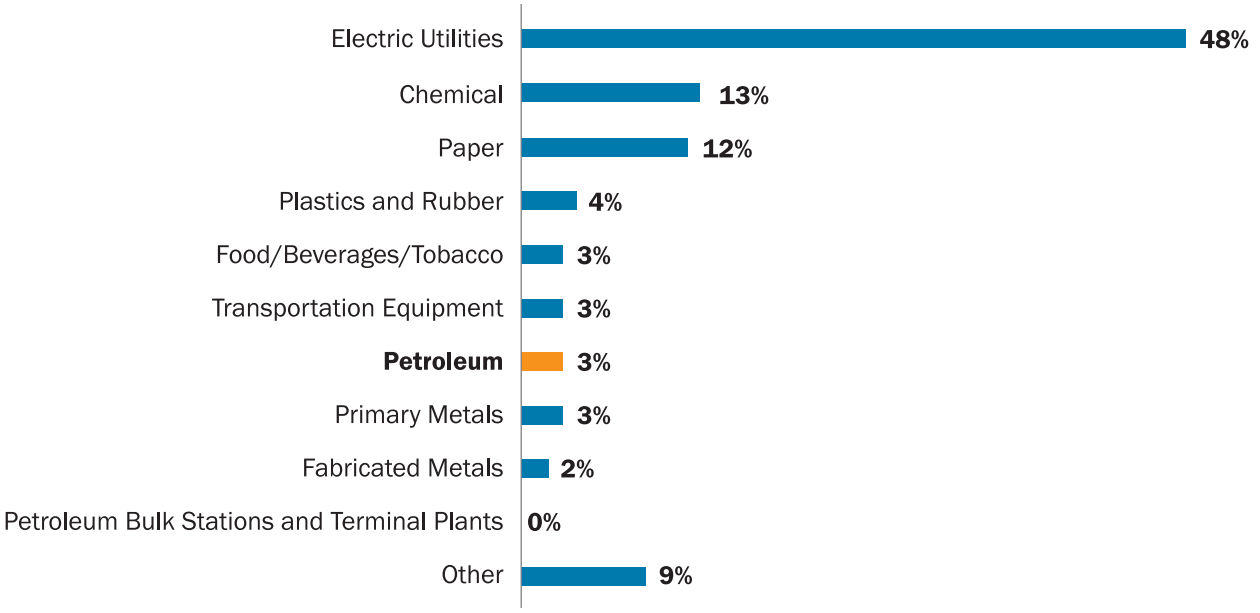
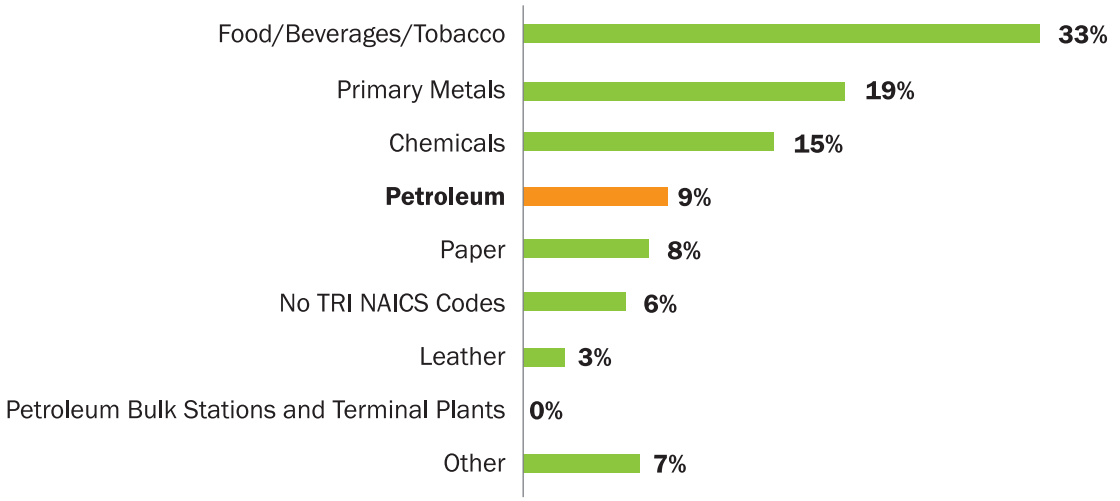


Figure 20

Percentage of TRI Chemical Releases to Water by Industry: 2006



Comparison by TRI Industry and Chemical/Carcinogen

Figure 21
Percentage of TRI Carcinogen Releases to Air by Industry: 2006

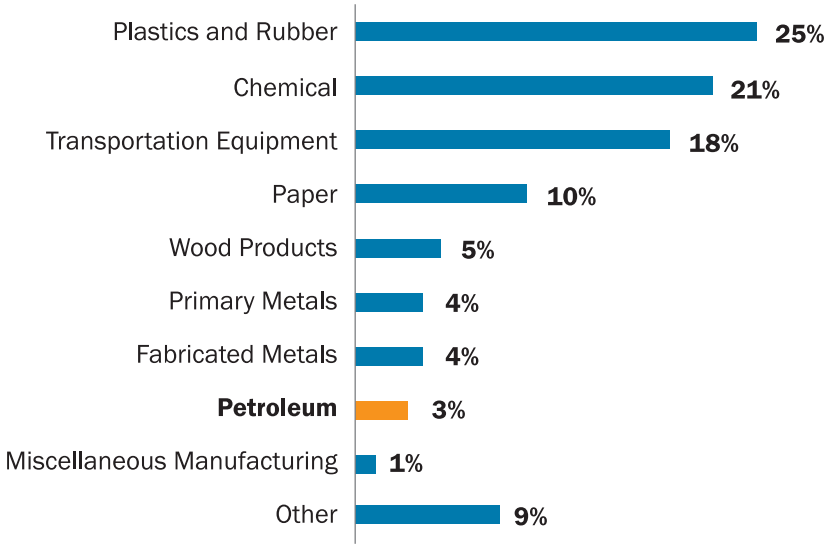


Figure 22
Percentage of TRI Carcinogen Releases to Water by Industry: 2006

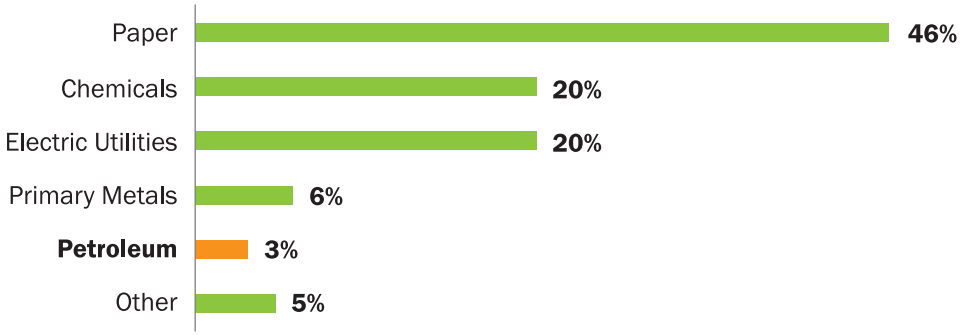


Figure 23

Petroleum Facilities Top 4 TRI Chemical Releases, Disposals and Transfers: 2006

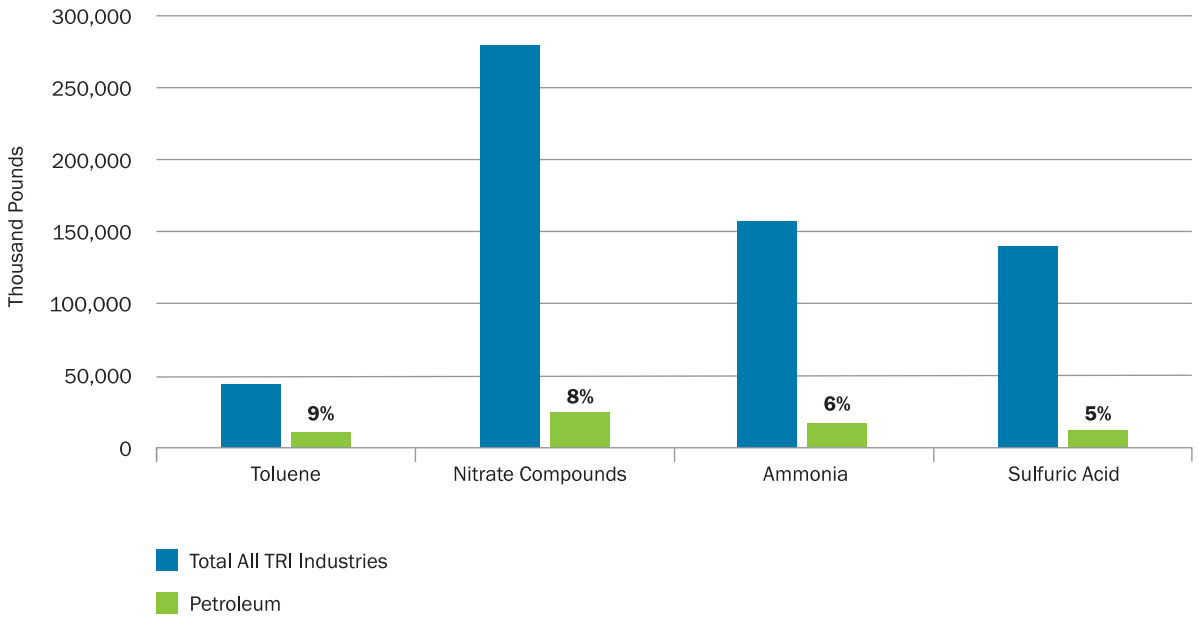


Figure 24

Petroleum Facilities Top 4 TRI Carcinogen Releases, Disposals and Transfers: 2006

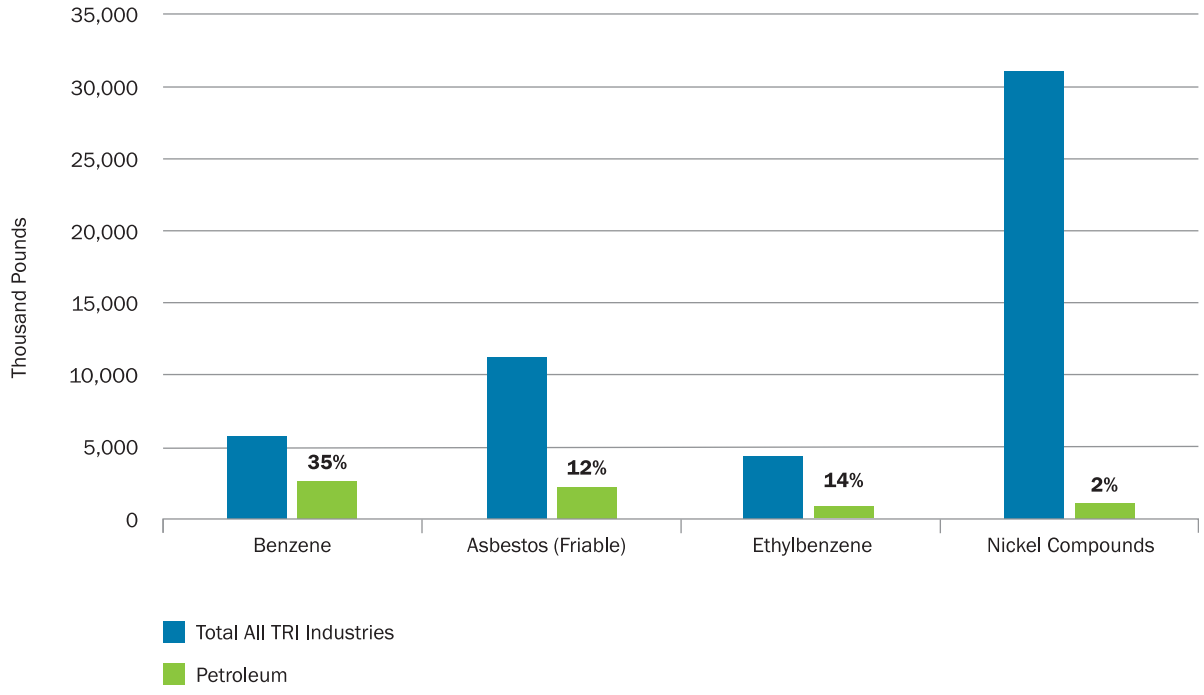


Figure 25

Top 15 TRI Chemical Releases, Disposals and Transfers by Petroleum Facilities: 2006

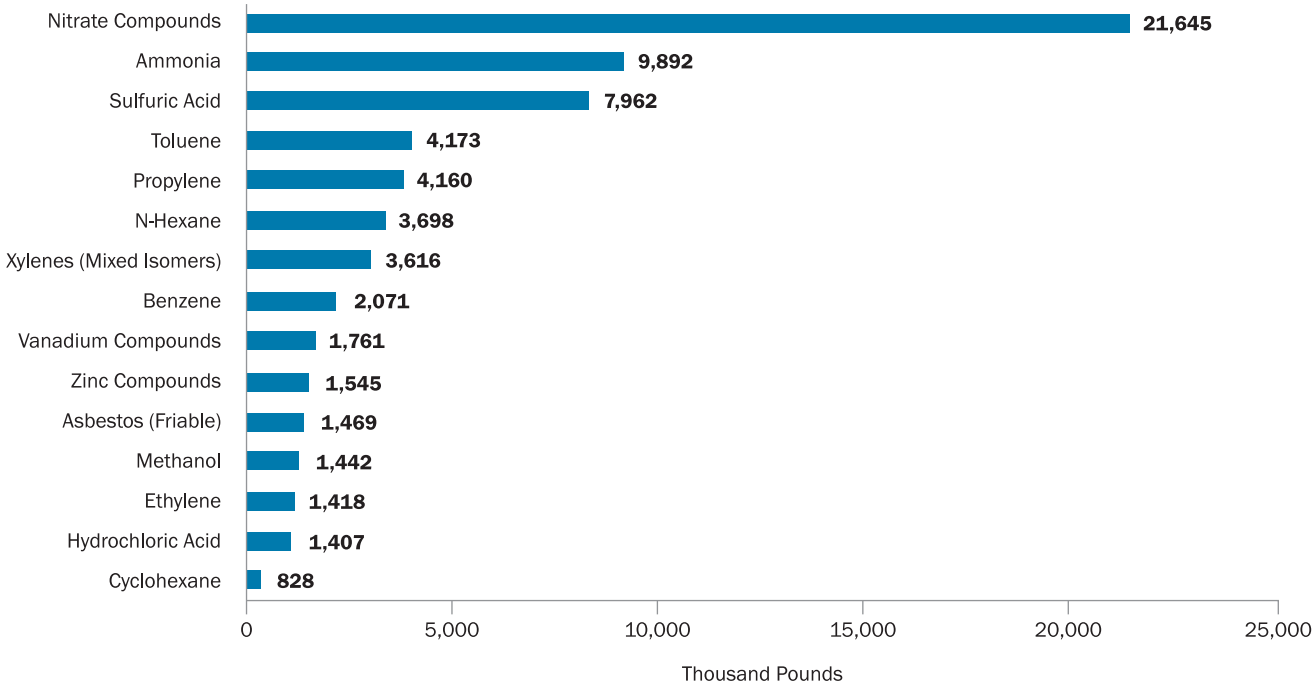


Figure 26

Top 10 TRI Carcinogen Releases, Disposals and Transfers by Petroleum Facilities: 2006

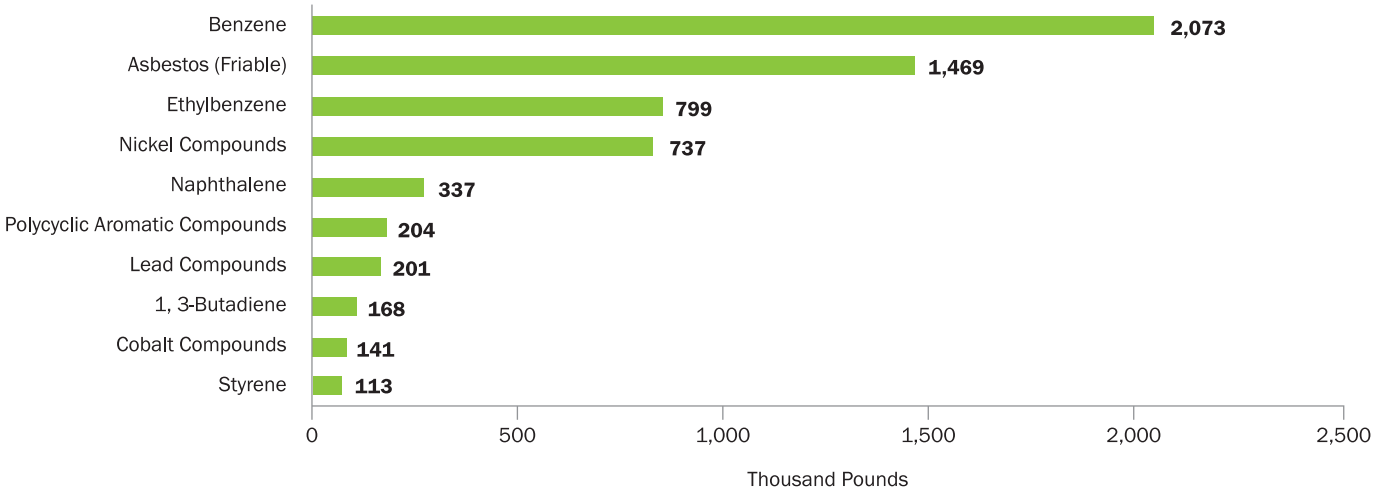


Figure 27

Top 10 TRI Chemical Releases, Disposals and Transfers by Petroleum Bulk Stations and Terminal Plants: 2006

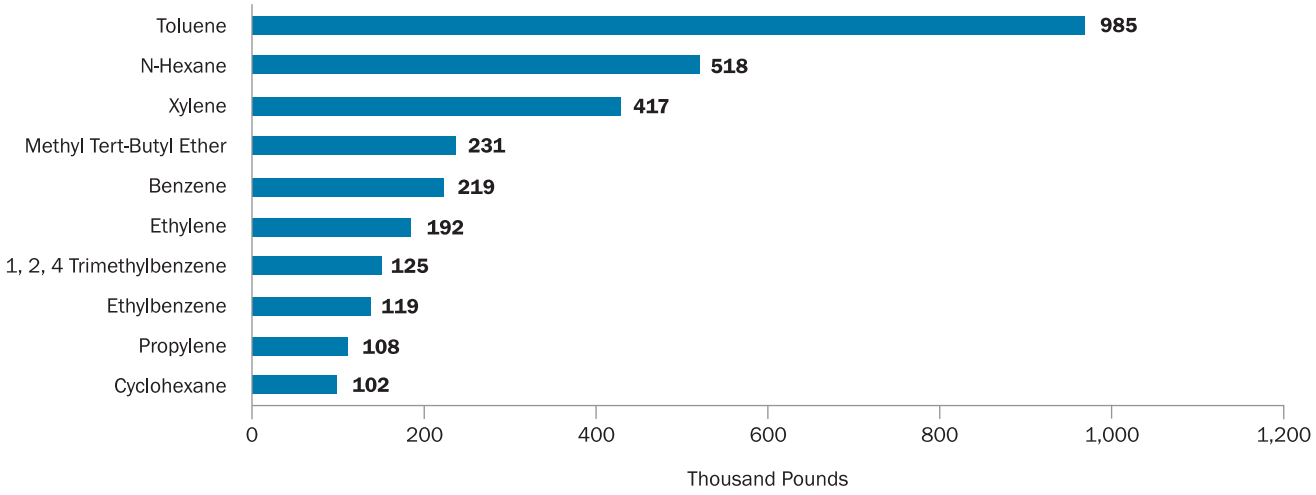
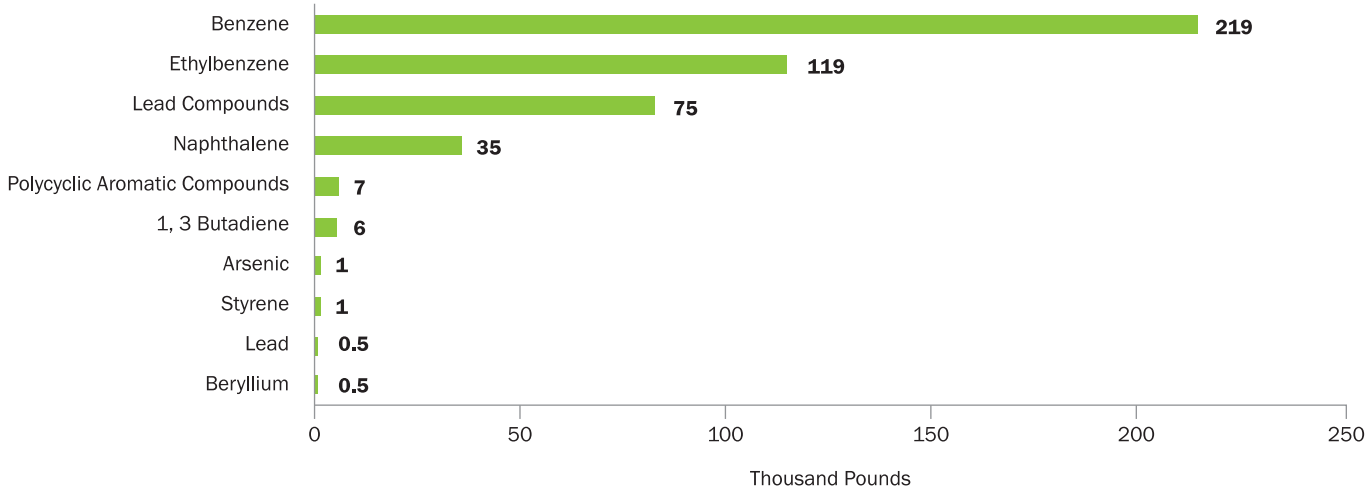


Figure 28

Top 10 TRI Carcinogens Releases, Disposals and Transfers by Petroleum Bulk Stations and Terminal Plants: 2006



API "Releases"

Since 2005, API has examined total petroleum "releases" of TRI chemicals and carcinogens versus EPA's total petroleum "releases" of TRI chemicals and carcinogens using more "appropriate metrics." In both figures below, API's total petroleum "releases" of TRI chemicals and carcinogens examine only data from EPA Form R, Part II, Sections 5.1, 5.2, 5.3, and 5.5.4. They do not include EPA Form R, Part II, Sections 5.4.1, 5.4.2, 5.5, 5.5.1A, 5.5.1B, 5.5.2, 5.5.3A, 5.5.3B, 5.5.4, 6.1, and 6.2 because these sections refer to chemicals "contained" in designated disposal or waste management units and not "released" to the environment. EPA's total petroleum "releases" of TRI chemicals and carcinogens examine data from all EPA Form R, Part II sections.

Figure 29

API vs. EPA Total Petroleum "Releases" of TRI Chemicals: 1988–2006

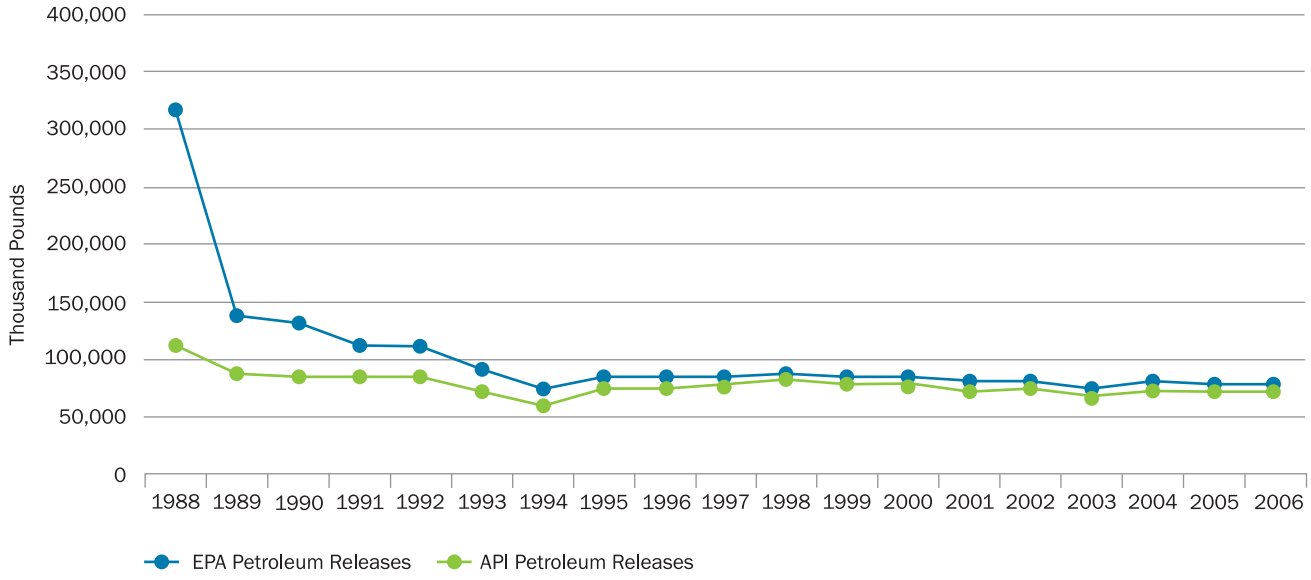
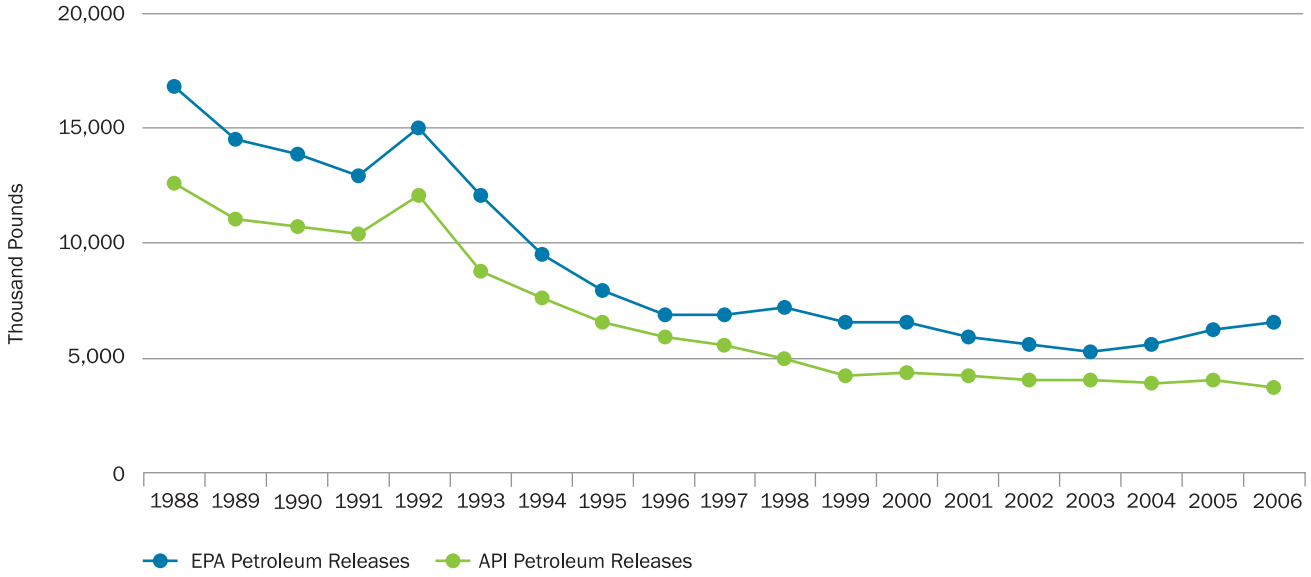


Figure 30

API vs. EPA Total Petroleum "Releases" of TRI Carcinogens: 1988–2006



General Glossary

Air Release
Releases emitted into open air. May come from either "point" or "non-point" sources. Point sources include stacks, vents, ducts, and pipes. Non-point sources (also known as fugitive emissions) include valves, seals, flanges, compressors, building ventilation systems and evaporation from surface impoundments and spills. Air releases are covered under EPA Form R Sections 5.1 and 5.2.

All Industries
Original and new (added in 1998) industries. Find the industry list at www.epa.gov/tri.

Bulk Stations and Terminal Plants
Establishments primarily engaged in the wholesale distribution of petroleum and petroleum products.

Carcinogen
An agent that can cause cancer. Find TRI Chemicals Classified as OSHA Carcinogens list at www.epa.gov/tri.

Energy Recovery
Wastes burned as fuel in furnaces, kilns or boilers.

Land Releases
Releases to land surfaces, as well as chemicals stored or treated on land. They may be sent to landfills, surface impoundments and injection wells. API defines land releases only as releases reported under EPA Form R Section 5.5.4.

New (added in 1998) Industry
Metal mining, coal mining, electrical utilities that combust coal and/or oil, Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste treatment and disposal facilities, chemicals and allied products wholesale distributors, petroleum bulk plants and terminals, and hazardous waste/solvent recovery services.

Original Industry
Food/beverages/tobacco, textiles, apparel, wood products, furniture, paper, printing and publishing, chemicals, petroleum, plastics and rubber, leather, stone/clay/glass, primary metals, fabricated metals, machinery (excluding electrical), electrical equipment, transportation equipment, no NAICS code, computers/electronic products and miscellaneous manufacturing.

Persistent Bio-Accumulative Toxic (PBT) Chemicals
Chemicals that are toxic, persist in the environment and bio-accumulate in food chains and, thus, pose risks to human health and ecosystems. Find the TRI PBT chemical list at www.epa.gov/tri.

Petroleum Facilities
Establishments primarily engaged in petroleum refining, manufacturing paving and roofing materials, and compounding lubricating oils and greases from purchased materials.

Recycling
Recovering materials from wastes for the same or another use. This includes regeneration – restoring the operative properties of solvents, resins and other materials so that they can be reused.

Treatment
Reducing the amount or toxicity of wastes by physical, chemical or biological means. Examples of treatment in refineries typically include wastewater treatment systems or combustion of gases in flares.

Underground Injection
Depositing chemicals underground in strictly regulated wells located on-site and/or off-site.

Water Releases
Releases that enter streams, rivers, lakes, oceans and other bodies of water from pipes, waste treatment systems and storm drains. Water releases are covered under EPA Form R Section 5.3.

EPA TRI Form R, Part II Section Definitions

Section 5.1 TRI Form R – Fugitive Air Emissions
Fugitive air emissions are all releases to air that are not released through a confined air stream.

Section 5.2 TRI Form R – Stack or Point Source Air Emissions
Stack or point source air emissions occur through confined air streams such as stack, vents, ducts or pipes.

Section 5.3 TRI Form R – Surface Water Discharges
Releases to water include discharges to streams, rivers, lakes, oceans and other bodies of water. This includes releases from confined sources, such as industrial process outflow pipes or open trenches. Releases due to runoff, including storm water runoff, are also reportable to TRI under this category.

Section 5.4.1 TRI Form R – Underground Injection On-site to Class I Wells
Underground injection is the subsurface emplacement of fluids through wells. TRI chemicals associated with manufacturing, the petroleum industry, mining, commercial and service industries, and Federal and municipal government related activities may be injected into class I, II, III, IV, or V wells, if they do not endanger underground sources of drinking water (USDW), public health or the environment. Class I wells are industrial, municipal and manufacturing related wells which inject fluids into deep, confined and isolated formations below potable water supplies.

Section 5.4.2 TRI Form R – Underground Injection On-site to Class II–V Wells
Underground injection is the subsurface emplacement of fluids through wells. Class II wells are oil and gas related wells which re-inject produced fluids for disposal, enhanced recovery of oil or hydrocarbon storage. Class III wells are those wells associated with the solution mining of minerals. Class IV wells are those wells which may inject hazardous or radioactive fluids directly or indirectly into USDW, only if injection is part of an authorized CERCLA/RCRA clean up operation. Class V wells, which include all types of injection wells which do not fall under I-IV, may inject only if they do not endanger USDW, public health or the environment. Class V wells are, generally, shallow drainage wells such as floor drains connected to dry wells or drain fields.

Section 5.5.1A TRI Form R – RCRA Subtitle C Landfills
RCRA Subtitle C landfills are those landfills which are authorized under the Resource Conservation and Recovery Act (RCRA) to accept hazardous waste for disposal.

Section 5.5.1B TRI Form R – Other On-site Landfills
Other landfills are those landfills which are not authorized under Subtitle C of the Resource Conservation and Recovery Act (RCRA) to accept hazardous wastes.

Section 5.5.2 TRI Form R – Land Treatment/Application Farming
Land treatment refers to the incorporation of waste into the soil where the waste degrades in the soil.

Section 5.5.3A TRI Form R – RCRA Subtitle C Surface Impoundments
Surface impoundments include natural topographic depressions, man-made excavations and diked areas that primarily are made of earthen materials and which hold liquid wastes. These uncovered areas are commonly used to volatilize and/or settle materials. RCRA Subtitle C surface impoundments are those surface impoundments which are authorized under the Resource Conservation and Recovery Act (RCRA) to accept hazardous waste for disposal.

Section 5.5.3B TRI Form R – Other Surface Impoundments
Other surface impoundments are surface impoundments other than those which are authorized under the Resource Conservation and Recovery Act (RCRA) to accept hazardous waste for disposal.

Section 5.5.4 TRI Form R – Other On-site Land Disposal
Other land disposal is the disposal of the toxic chemical to land at the facility that does not fall into one of the other on-site land release categories found in Sections 5.5.1 through 5.5.3 on the TRI Form R. Other disposal includes such activities as placement in waste piles and spills or leaks.

Section 6.1 TRI Form R – POTWs (Metal and Metal Compounds Only)
Transfers to publicly-owned treatment works (POTWs) of metals and metal compounds only. Because metals are not destroyed by sewage treatment processes, amounts of metals and metal category compounds reported in Section 6.1 are considered transfers to disposal or other releases.

Section 6.2 TRI Form R – Transfers to Storage Only (Code M10)
A toxic chemical sent off-site for storage if there is no known disposal method. The toxic chemical will remain there indefinitely.

Section 6.2 TRI Form R – Transfers to Solidification/Stabilization (Metals Only) [Codes M41 or M40]
Waste solidification/stabilization is a physical or chemical process used to either reduce the mobility of the chemical or to eliminate free liquids in a hazardous waste. A waste stabilization process includes mixing the hazardous waste with binders or other materials and curing the resulting hazardous waste and binder mixture.

Section 6.2 TRI Form R – Transfers to Wastewater Treatment (Metals Only) [Codes M62 or M61]
Transfers to wastewater treatment facilities (excluding to facilities that are publicly-owned treatment works (POTWs) of metals and metal category compounds only.

Section 6.2 TRI Form R – Transfers to Underground Injection Class II-V Wells (Code M71)
Underground injection is the subsurface emplacement of fluids through wells. TRI chemicals associated with manufacturing, the petroleum industry, mining, commercial and service industries, and Federal and municipal government related activities may be injected into class I, II, III, IV, or V wells if they do not endanger underground sources of drinking water (USDW), public health or the environment.

Section 6.2 TRI Form R – Transfers to RCRA Subtitle C Surface Impoundments (Code M72)
Surface impoundments include natural topographic depressions, man-made excavations and diked areas that primarily are made of earthen materials and which hold liquid wastes. These uncovered areas are commonly used to volatilize and/or settle materials. RCRA Subtitle C surface impoundments are those surface impoundments which are authorized under the Resource Conservation and Recovery Act (RCRA) to accept hazardous waste for disposal.

Section 6.2 TRI Form R – Transfers to Other Surface Impoundments (Code M72)
Other surface impoundments are surface impoundments other than those which are authorized under the Resource Conservation and Recovery Act (RCRA) to accept hazardous waste for disposal.

Section 6.2 TRI Forms R – Transfers to Land Treatment (Code M73)
Land treatment refers to the incorporation of waste into the soil where the waste degrades in the soil.

Section 6.2 TRI Form R – Transfers to Other Land Disposal (Code M79)
Other land disposal is the disposal of the toxic chemical to land at the facility that does not fall into one of the other on-site land release categories found in Sections 5.5.1 through 5.5.3 on the TRI Form R. Other disposal includes such activities as placement in waste piles and spills or leaks.

Section 6.2 TRI Form R – Transfers to Other Off-site Management (Code M90)
Chemicals in waste sent to sites where the waste is managed by techniques not specifically listed in Section 6.2.

Section 6.2 TRI Form R – Transfers to Waste Broker for Disposal (Code M91)
Chemicals in waste sent to a broker where the broker sends the waste for disposal, but the facility sending the waste does not know the location of the disposal site and, therefore, reported the name of the waste broker instead.

Section 6.2 TRI Form R – Transfers to Unknown Waste Management (Code M99)
The “unknown” category of disposal indicates that a facility is not aware of the type of waste management used for the toxic chemical that is sent off-site. Therefore, EPA has categorized this method as the least desirable type of waste management (environmentally least desirable) and has included it as a type of disposal or other release for reporting purposes.

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