



WASHINGTON STATE
DEPARTMENT OF
E C O L O G Y

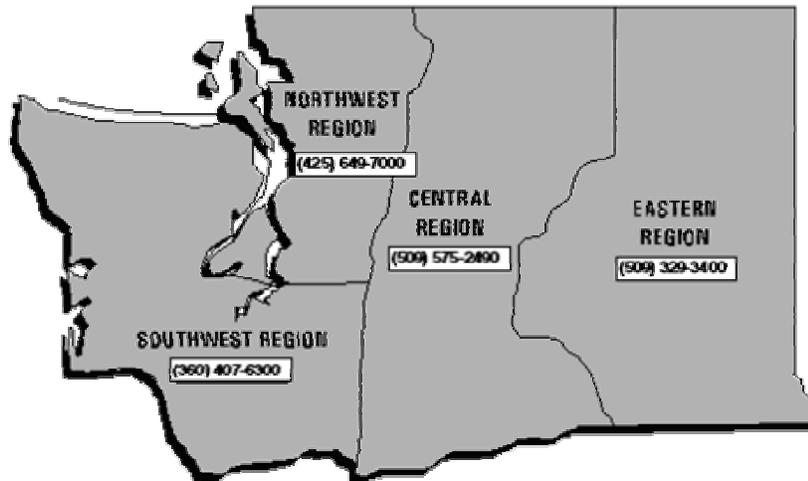
Hazardous Waste Annual Summary Report

For **2001** Reported Data



Washington State Department of Ecology
Publication Number 03-04-024
October 2003

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Executive Summary

This report summarizes hazardous waste generation and management in 2001. Trends in generation and management from 1995 to 2001 are also discussed. The information is extracted from Annual Dangerous Waste Reports (annual reports) that are submitted by business and government facilities that generate and/or manage regulated quantities of recurrent and non-recurrent hazardous waste.

Annual reports are submitted to the Department of Ecology (Ecology) in March of the year following waste activity. Ecology staff carefully review reported data for accuracy, completeness and compliance with the State's *Dangerous Waste Regulations* prior to making it available for public use. As October 2003, Ecology staff are completing their review of 2002 reported data.

It should be noted that this report differs from another Ecology report entitled "Reducing Toxics in Washington," which only addresses recurring types of waste for measuring progress towards the state's waste reduction goals.

Approximately 7,000 businesses submit annual reports to Ecology. Of these businesses, only two groups; Large Quantity Generators and Medium Quantity Generators report actual waste generation information. Information is currently limited on waste generation from Small Quantity Generators and other businesses that fall outside the scope of the *Dangerous Waste Regulations*.

Report data shows a decline in waste generation from approximately 15 billion pounds in 1996 to approximately 14 million pounds in 2001. This decline can be attributed to a number of factors that include:

- Successful implementation of Ecology's Pollution Prevention Program that encourages voluntary reductions in the use of hazardous substances and generation of hazardous waste.
 - Adopted changes to the State's *Dangerous Waste Regulations* that have reduced the volume of hazardous waste reported, and;
 - Economic slowdowns that affected the aluminum industry and aircraft manufacturers.
- A significant decrease in waste generation occurred in 1998 due to a regulatory change that no longer required businesses to count and report a select type of waste water.

Waste generation by Industry Sectors is discussed. Using the North American Industrial Classification System (NAICS) seven industry groups (sectors) are identified that generate large amounts of waste; Chemicals, Primary Metals, Military, Transportation, Petroleum, Pulp & Paper, and "Other." Each group's top waste streams are discussed along with waste generation trends dating from 1995.

Mercury, a toxic chemical of high interest, is discussed. Since 1995, the generation of this type of waste appears to be fairly stable. The hazardous wastes that contain mercury come from a variety of sources that include mining, coal plants, and various manufacturing sources. The top ten 2001 waste streams that contain Mercury are also reviewed.

On-Site and Off-Site Waste management is discussed. The management of hazardous waste either occurs on-site (where it was generated) or off-site (after transportation to a Treatment Storage Disposal Recycling Facility (TSDR)).

This summary report describes the different types of waste management options available and looks at trends regarding on-site and off-site management. In 2001, more waste was managed off-site than on-site.

- **On-Site Waste:** In 2001, 192 million pounds of waste was managed on-site by approximately 200 businesses; 49% categorized as “disposal” where waste is either placed in landfills or discharged as waste waters. 27% categorized as receiving treatment, 20% recycled and 4% placed into storage.
- **Off-Site Waste:** Washington State currently has about 33 active TSDR facilities and used oil processors where generators can send their waste. Of the 224 million pounds of waste that were managed off-site in 2001, 29% of the waste was managed at in-state TSDR facilities with the remaining balance of 71% going out-of-state for management (either to another state or a foreign country). 45% of all waste processed out-of-state goes to the Arlington, Oregon landfill, due to it’s proximity to Washington. In reverse order, Oregon sends more waste into Washington than any other state or foreign country. 31% of the waste imported into Washington in 2001 came from Oregon.

Chapter 1: Introduction

Purpose of this Report

This report summarizes the generation and management of hazardous wastes in Washington State during 2001 and examines trends in specific waste activities over a seven year period, from 1995 through 2001. The waste information contained in this report is a snapshot of the hazardous waste information, as reported to Ecology at the time of publication. This information is subject to change as new data becomes available and is verified.

Program Overview

The mission of Ecology's Hazardous Waste and Toxics Reduction (HWTR) Program is to prevent pollution and promote safe waste management. The HWTR Program is comprised of two primary program functions; Toxics Reduction and Compliance. Toxics Reduction staff provide businesses with advice and consultation for reducing hazardous waste and substance use. Compliance staff assist businesses to identify and correct waste management problems.

Waste reduction is the top priority of the HWTR Program followed by ensuring safe management of generated waste streams. Within the HWTR Program, the Toxics Reduction and Compliance staff manage the priorities described below:

- Toxics Reduction staff provide businesses with advice and consultation on techniques for reducing waste and hazardous substance use. Certain hazardous waste generators and hazardous substance users are required to prepare Pollution Prevention Plans for voluntary waste reduction. Technical assistance specialists help facilities prepare or modify their pollution prevention plans, executive summaries, and annual progress reports and provide technical assistance to implement waste reduction opportunities.
- Compliance staff help businesses identify and correct waste management problems. Enforcement actions are generally only taken when a waste management problem poses an imminent threat to human health or the environment or if it remains uncorrected on a continuing basis. This group includes criminal investigators who pursue environmental crimes, such as deliberate, illegal dumping of hazardous materials or intentional generation of waste or release of hazardous substances not authorized by law or regulations.

In 2001, about 400 million pounds of hazardous waste was created by about 1,300 businesses and government facilities. If improperly managed, these wastes can cause severe hazards to public health and the environment and cost millions to clean up. The objectives of the HWTR Program include prevention of improper waste handling and disposal, and the mitigation of potential long-term risks from improperly managed waste streams.

Dangerous Waste Regulations

In May 1980, the Environmental Protection Agency (EPA) established federal hazardous waste regulations under the Resource Conservation and Recovery Act (RCRA). RCRA, a law designed to help prevent and track pollution, required EPA to develop nationwide standards for controlling hazardous waste handling, transportation, treatment and disposal. It also allows states to operate their own hazardous waste programs in place of the federal program, if they adopt state standards that meet or exceed federal requirements.

In 1980, Ecology was given federal authorization from EPA for the state's hazardous waste program. Ecology developed the state's *Dangerous Waste Regulations*, Washington Administrative Codes (WAC) 173-303, to be at least as stringent as federal RCRA standards. The Washington program is broader in scope (regulates more waste) and more stringent than EPA's. In broad terms, the purpose of Washington's *Dangerous Waste Regulations* is to set out a system for safely managing and disposing of dangerous waste.

What is Hazardous and Dangerous Waste?

The terms hazardous waste and dangerous waste are used interchangeably; hazardous waste is a federal term and dangerous waste a state term. Both terms refer to the same thing, namely solids, liquids, gases, or mixtures of waste materials that contain certain chemicals or have properties that make them dangerous to human health and the environment.

In Washington State, hazardous wastes are regulated under Chapter 173-303 WAC of the state's *Dangerous Waste Regulations*. The process of determining whether or not a material meets the definition of dangerous waste is referred to as "designation" and is defined in the regulations.

Information Sources

The information for this summary report comes from data supplied by generators and waste management facilities. Businesses and government facilities that generate hazardous waste in quantities sufficient to be "fully regulated" must submit annual reports to Ecology. An annual report is a detailed summary of the hazardous waste activity that occurred at each site. All generators and waste management facilities with active RCRA Site Identification Numbers (ID#) are required to complete and submit an annual report each year.

The annual report is organized into two main sections; Generation and Management (GM) and Waste Received (WR). The GM portion of the annual report collects information from individual companies on types and quantities of hazardous waste generated and how it was managed (on-site or off-site). The WR portion of the annual report collects information from RCRA permitted facilities that treat, store, dispose and/or recycle hazardous waste (referred to as TSDR's). The TSDR facilities report information about the types and quantities of hazardous waste they received from off-site generators and how it was managed (i.e., recycled, fuel blended, stored, etc.). Ecology uses the data collected in the annual reports to:

- determine state pollution prevention fees
- target state waste reduction performance and compliance activities
- meet EPA biannual reporting requirements
- produce a yearly summary report on waste generation and management within the state
- fill public information data requests

Data collected through the annual reporting process is dynamic in nature, types and amounts change from year to year. Generators and waste management facilities are required to notify Ecology if corrections are needed to previously submitted data. Technical assistance visits and compliance inspections of businesses by Ecology staff and internal report review often help identify incorrectly reported waste information. While review procedures are taken to ensure high data quality in the annual reports, data changes and corrections can occur at any time. The data used in this summary was current as of December 31st, 2002. It is anticipated that some changes will occur in Ecology's data system and future hazardous waste summary reports may vary from what is presented here.

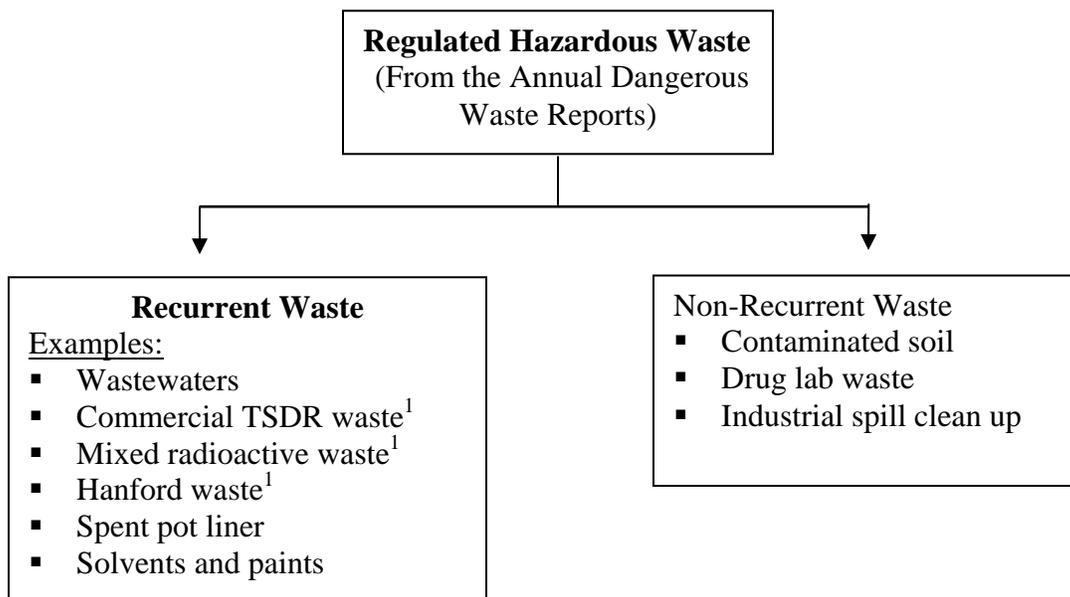
Waste Generation

Waste generation is the process or act that produces a hazardous waste. Generation refers to hazardous wastes produced by businesses and industries as part of their operations, accidental acts such as chemical spills, and discarding of unusable products that have hazardous constituents.

Businesses in Washington State are responsible for knowing what and how much dangerous waste they generate. The *Dangerous Waste Regulations* define the characteristics or properties that cause a waste to be considered dangerous and what amounts of waste cause them to be regulated. The generation of hazardous waste is broken into two main types, based on the origin of the waste:

- Recurrent hazardous wastes are those that are derived from a production process, service activity, or a routine cleanup. The generation of recurrent waste is closely monitored by Ecology. This type of waste is generated on a continual basis and is where Ecology directs its waste reduction efforts. It is also used for assessing pollution prevention planning and fee requirements.
- Non-recurrent hazardous wastes are the result of a spill, equipment decommissioning, or other remedial cleanup activity. These types of waste streams are not generated on a continuous basis and do not have to comply with pollution prevention planning and fee requirements, however they must meet other applicable regulations.

Figure 1: Types of Hazardous Waste



Waste Management

After a dangerous waste is generated it has to be managed; either on-site where it was generated, or off-site, after transport to a TSDR facility.¹ Facilities that treat, store or dispose dangerous waste are required to have a permit that is approved by both Ecology and EPA. While recycling is not an activity that requires a permit, it is subject to minimum operating standards administered by Ecology. Most facilities that treat, store and/or dispose of waste often conduct recycling activities as well.

There are approximately 33 actively operating TSDR facilities and Used Oil Processors in Washington State. They are owned and operated by private companies for commercial purposes, by private companies to handle their own wastes (non-commercial), or by government agencies like the military. Ecology is currently assessing the state and federal requirements that apply to TSDRs. Recent facility closures have left behind unmanaged dangerous wastes. The economic liabilities for required cleanup are then the responsibility of property owners, former customers and the public. Refer to Ecology's 2002 publication *Hazardous Waste Management Facilities in Washington State – Problems & Options*, #02-04-028 for further information regarding TSDR assessments.

¹ Pollution prevention plan and fee requirements are based on recurrent waste generation amounts minus specialized sources of waste from the US Department of Energy Hanford Facility, commercial treatment storage disposal recycling facilities (TSDR's) and special categories of waste that fall outside the scope of Chapter 173-303 WAC such as mixed radioactive waste and most waste waters.

Chapter 2: Waste Generators

Waste Generators in Washington State

Each year, all sites within the state that have active RCRA Site ID# are required to submit annual reports. Types of reporters include generators, transporters, transfer facilities and TSDRs. Businesses are required to report and furnish information as to volume and types of hazardous waste generated and/or managed (either on-site or off-site), the source of the waste, and the final destination of the waste and how it was managed.

Businesses that submit annual reports each year consist of the following groups:

XQGs (No waste generated.) are sites that have an active ID#, but did not generate dangerous waste within the reporting year. This group consists of intermittent generators of hazardous waste, transporters and transfer facilities, and protective filers (those who have an active ID# in case of an accident or spill). *(Note: XQGs and SQGs are not subject to the full dangerous waste regulations and are not required to have an active ID#. Their disposal options include municipal landfills, TSDRs, and local government collection facilities. If they choose to keep their ID# active, they must submit annual reports to Ecology but they do not provide waste volume information.)*

SQGs (Small Quantity Generators) are sites that generate small amounts of hazardous waste that fall below the regulated threshold. These sites generate less than 220 pounds of waste per month and do not reach or exceed 2,200 pounds of waste accumulation in the calendar year.

MQGs (Medium Quantity Generators) are sites that generate 220 or more pounds, but less than 2,200 pounds of waste each month and accumulate less than 2,200 pounds of waste within 180 days.

LQGs (Large Quantity Generators) are sites that generate 2,200 or more pounds of waste per month and accumulate 2,200 pounds or more within 90 days. *(Note: MQG's and LQG's report waste volumes generated and managed in their Annual Reports.)*

TSDRs (Treatment Storage Disposal and Recycling Facilities) are sites that are permitted to treat, store, dispose and/or recycle hazardous waste. These sites are also generators of hazardous waste. A TSDR may be a captive facility that manages its own waste or it may be a commercial facility that accepts waste from other businesses. *(Note: TSDRs report waste volumes received from other generators and the management methods used in their Annual Reports. Most TSDR's are also classified as LQGs.)*

Figure 2 (below) depicts the number of active generators who submitted annual reports to Ecology for years 1995-2001. This includes the four groups of XQGs, SQGs, MQGs, and LQGs. While the number of businesses who report to Ecology remains fairly stable, there is turnover each year as new businesses become regulated and others drop out, either through business closure or waste reduction.

Figure 2: Annual Dangerous Waste Reports Received

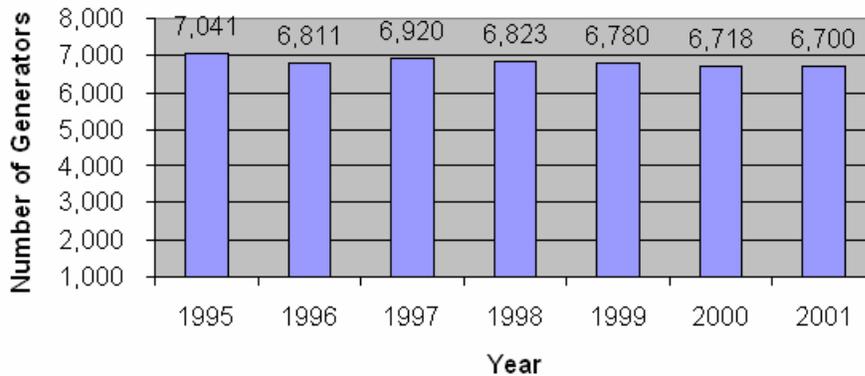


Table 1: 2001 Categories of Hazardous Waste Reporters

Generator Status	Number of Reporters	Percent of Waste
XQG	1,876	0
SQG	3,484	unknown
LQG/TSDR's	603	99%
MQG	737	1%
Total	6,700	100.0%

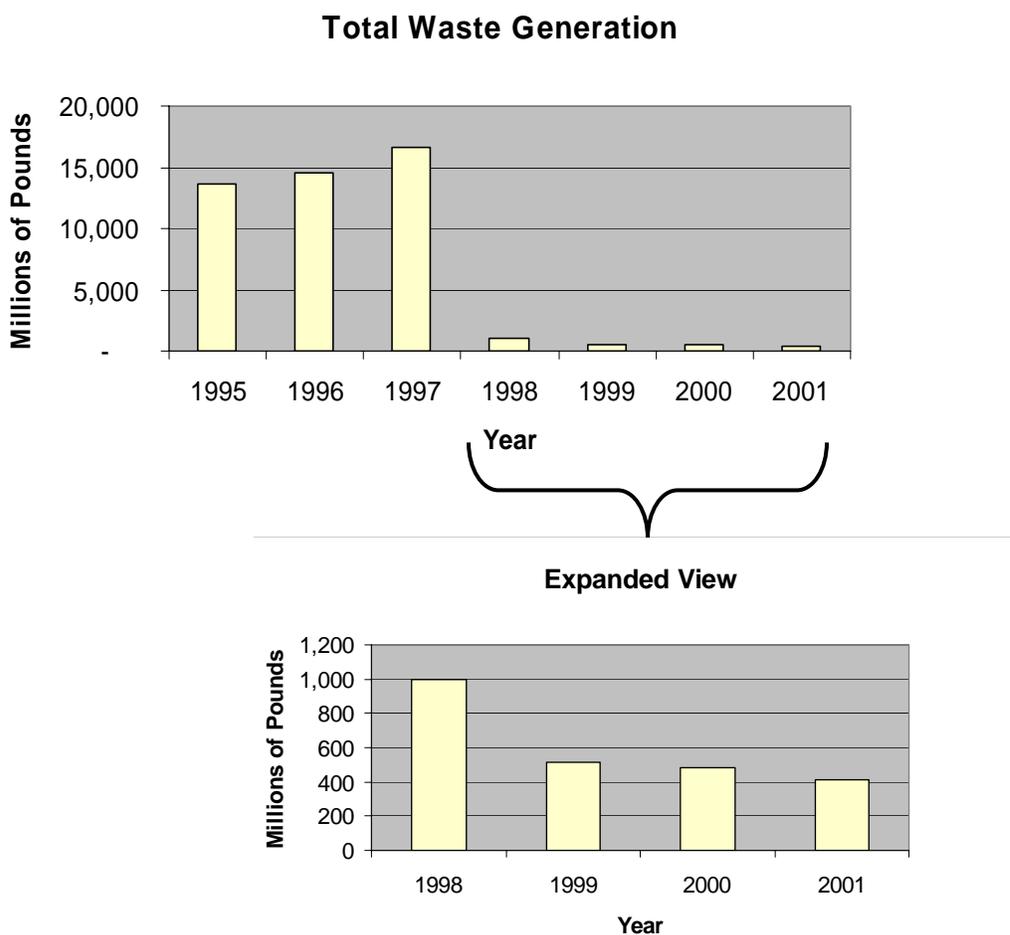
Table 1, above displays the number of hazardous waste generators by their 2001 reporting groups and their respective waste volumes. It's interesting to note that 99% of the waste generated in 2001 came from only 9% (603) of the companies. Since SQGs are not required to report waste generation amounts to Ecology, little is known about the volumes of waste generated by this group. Additionally, SQGs are not required to have active ID#'s. The number of SQG reporters shown above is a small subset of the actual number of companies that fall into this category.

Chapter 3: Waste Generation

Waste Generation

Hazardous wastes are divided into two main groups: recurrent and nonrecurrent wastes. The generation of recurrent waste is on-going and related to business production. Non-recurrent waste generation usually results from unplanned events and is mostly associated with cleanup of contaminated soils and ground waters. Over time, recurrent waste generation averages around 90% with nonrecurrent making up the balance of 10%. It's normal to see some fluctuations in these amounts as economic conditions either encourage or discourage industrial production. For purposes of this report, the two waste types of recurrent and nonrecurrent are analyzed together. For more information on the generation of recurrent waste, refer to Ecology's *2000 Reducing Toxics in Washington Report*, #02-04-034.

Figure 3: Total Waste Generation



Since 1997, two factors caused a significant decrease in the amounts of waste reported to Ecology:

1. **Pollution Prevention Projects:** Ecology established the Pollution Prevention Program in 1990 to encourage voluntary reduction in the use of hazardous substances and reduction in the generation of hazardous waste. Through technical assistance, Ecology assists facilities to achieve the greatest reduction in hazardous waste that is economically feasible and technically practicable. Refer to Ecology's *2000 Reducing Toxics in Washington* (#02-04-034) report for information on pollution prevention work being conducted by the agency.
2. **Changes to the *Dangerous Waste Regulations*:** Since the formation of the State *Dangerous Waste Regulations*, Ecology has periodically reassessed regulated hazardous wastes and their associated risks to the public. Waste types found to present less risk can be exempted from the regulations or be given special exclusions to exclude them from annual reporting. Reasons for exempting and/or excluding a waste type include the following:
 - availability of new recycling options
 - waste has a low toxicity
 - waste is covered under other regulatory system(s)

Table 2: Regulatory Exemptions and Exclusions Since 1997

Year	Description of Regulatory Changes
1998	Waste that is immediately recycled on-site is no longer reported as dangerous waste.
1998	Permit-by-Rule waste waters that are immediately managed are no longer reported as dangerous waste.
1998	Universal Waste Thermostats and Batteries – if recycled/managed properly are no longer reported as dangerous waste
1998	Antifreeze that is recycled is no longer reported as dangerous waste.
2000	Universal Waste Lamps – if recycled/managed properly are no longer reported as dangerous waste

The significant waste decrease that occurred in 1998 is primarily attributed to regulation changes that no longer require the reporting of "Permit-by-Rule" waste waters which are a type of hazardous waste that contains small amounts of hazardous constituents and large concentrations of water. Most waste water treatment plants are able to treat these waste streams and render them non-hazardous.

Throughout this report, the various graphs showing trends in waste generation noticeably display this large decrease in Permit-by-Rule waste waters. While the waste stream is no longer reported to Ecology, it continues to be generated as an industrial pollutant.

Largest Waste Streams

When the types and volumes of hazardous waste reported to the state are examined, large industries and the military are the largest generators. **Table 3** below shows that in 2001, 53% of all the reported waste generation consisted of nine very large waste streams.

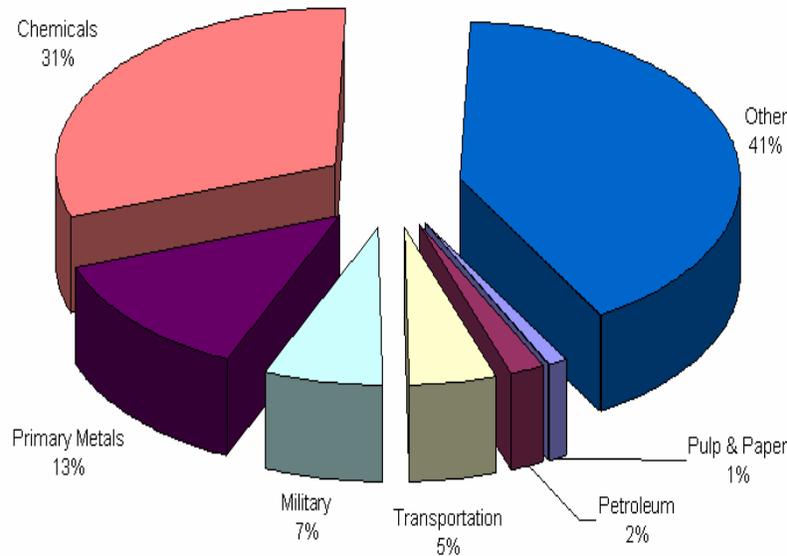
Table 3: 2001 Largest Waste Streams

Generators Name	Waste Stream Description	Total Pounds	% of 2001 Total Waste	Cumulative % of 2001 Waste
Framatome ANP Richland Inc	Discharge of Lagoon 5A solution to Richland POTW	73,481,111	17.8%	17.8%
Noveon Kalama Inc.	By-Product Tar	34,211,869	8.3%	26.1%
Nucor Steel Seattle Inc.	K061 emissions dust from primary manufacture of steel	22,133,534	5.4%	31.5%
US Dept.of Energy Hanford Facility	Alkaline aqueous solutions contaminated with metals and spent solvents	19,830,557	4.8%	36.3%
US NAVY PSNS Bremerton	De-fueled decommissioned reactor compartment disposal packages (mixed radioactive waste)	19,685,052	4.8%	41.0%
Weyerhaeuser Dupont 1	Hazardous waste solid - Dinitrotoluene	17,366,998	4.2%	45.3%
US Dept of Energy Hanford Facility	Evaporator process condensate contaminated with trace spent solvents	13,448,182	3.3%	48.5%
Framatome ANP Richland Inc	UO2 conversion waste	11,124,687	2.7%	51.2%
Longview Aluminum LLC	Underflow solids	7,367,679	1.8%	53.0%

Waste Generation by Industry Sector

Identifying businesses by their Industry Sector is a helpful way to understand where the waste was generated in Washington State. Using the North American Industry Classification System (NAICS) code, we have identified the industry groups that generate large or significant amounts of waste.

Figure 4: 2001 Waste Generation by Industries

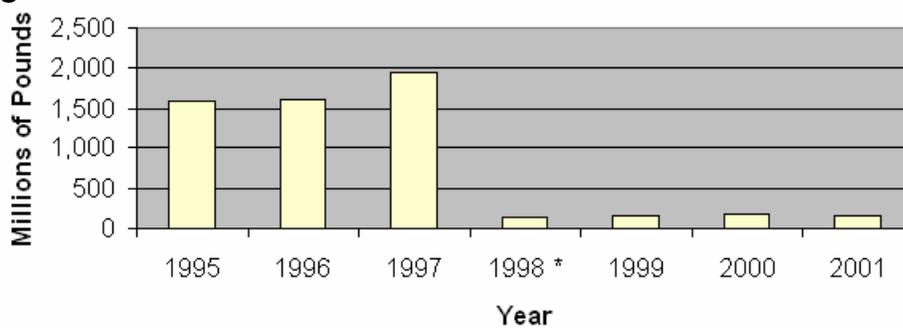


This pie chart compares waste generation among the various industry groups in 2001. While the group labeled “Other” appears as the largest industry sector, it is actually comprised of dozens of industry types that, individually, are small in waste volumes. A detailed discussion on each industry sector follows.

Other Sector (41% of waste generators)

There were 967 businesses that reported waste generation in this group in 2001. This group consists of businesses that did not fall into the other identified sectors and includes forestry and logging, county and government, schools, ports, auto repair, film processors, circuit board manufacturers, and TSDR facilities. As shown in **Figure 5** (next page), waste amounts reported appear fairly stable during recent years.

Figure 5: Waste Generated in “Other” Sector



**NOTE: the 1998 drop in waste generation is primarily attributed to the regulatory change that no longer requires the reporting of most Permit-by-Rule waste waters.*

Table 4: 2001 Top 5 Generators in the “Other” Group

Generators	Total Pounds	%
US Dept of Energy Hanford Facility	39,675,891	24%
Weyerhaeuser Dupont 1	23,574,645	38%
Burlington Environmental Inc Georgetown	22,742,723	52%
Burlington Environmental Inc Tacoma	13,848,854	60%
Burlington Environmental Inc Kent	12,938,597	68%

**Accumulative*

The Department of Energy, Hanford Facility, is the largest waste generator in this group. While much of their activity centers on radioactive wastes, they also generate and report to Ecology their generation and management of hazardous waste and mixed radioactive waste. Radioactive waste that is not mixed with hazardous waste is regulated by the Nuclear Regulatory Commission and is not included in this waste report.

Weyerhaeuser's facility located in Dupont, Washington reported the removal of soil contaminated with lead and arsenic. The contaminated soil originated from a company called Dupont Devers who manufactured explosives and ammunition in WWII. This waste removal is part of a cleanup project that began over ten years ago. The site is currently under a Consent Decree with Ecology for the cleanup of contaminated soil.

Included in the top five generators in this group are the Burlington Environmental facilities which operate as commercial TSDRs and are permitted to receive and manage waste from other businesses. The process of managing waste (i.e., treatment, recycling etc.) usually results in generation of hazardous residuals. Most of the waste generated by TSDR facilities is this type of secondary waste generation.

Chemical Sector (31% of waste generation)

The chemical sector group consists of companies that produce basic chemicals (such as acids, salts, and organic chemicals) and companies that manufacture products through chemical processes. There are three categories of manufactured chemical products:

1. chemical products for use in further manufacturing, such as synthetic fibers, plastics, and pigments;

2. chemical materials or supplies for other industries, such as paints, fertilizers and explosives; and
3. finished chemical products such as drugs, cosmetics, and soaps.

In 2001, 17 companies reported in this industry sector.

Figure 6: Waste Generated in the Chemical Sector

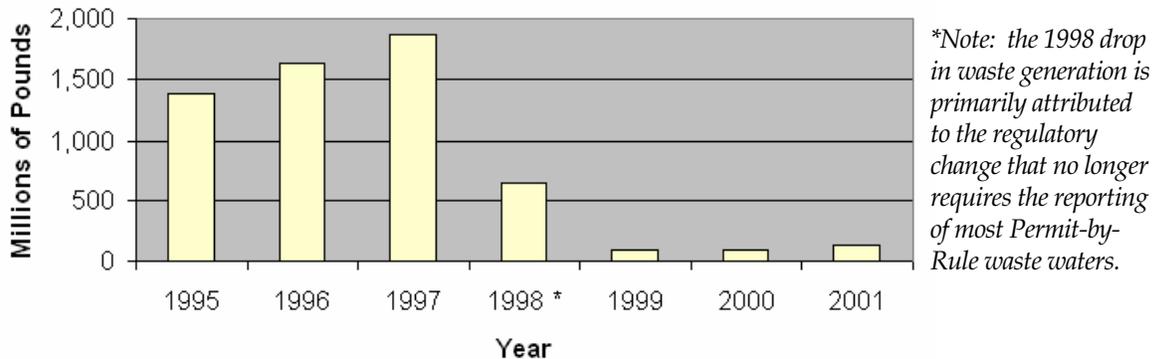


Table 5: 2001 Top Generators in the Chemical Sector

Generators	Total Pounds	% ⁺
Framatome ANP Richland Inc	89,763,936	70%
Noveon Kalama Inc	36,385,168	99%
Specialty Minerals Longview	928,445	99%
Moses Lake Industries Inc	475,682	100%
ATOFINA Chemicals Inc (Tacoma)	183,843	100%

⁺Accumulative

As shown in the chart on page 11, Framatone ANP in Richland, Washington accounted for 17.8% of the total statewide 2001 hazardous waste generation and 70% of the total generation within this industry sector. Of the total amount of waste they reported in 2001, 73 million pounds was mixed radioactive and dangerous waste waters that were rendered nonhazardous after a series of chemical processes and eventually discharged into the City of Richland's Publicly Owned Treatment Plant (POTW).

The second largest generator in the chemical sector group was Noveon Kalama Inc, formally known as B.F. Goodrich-Kalama Chemical. They are a manufacturer of chemicals for food and cosmetic industries. In 2001, their largest reported waste stream was 34 million pounds of waste described as "By-Product Tar."

Primary Metals (13% of waste generation)

The primary metals sector group includes companies engaged in smelting and refining ferrous and nonferrous metals and the manufacturing of metal-based products. It includes aluminum smelters and metal/steel manufacturers. In 2001, 22 companies reported waste generation in this industry group.

Figure 7: Waste Generated in the Primary Metals Sector

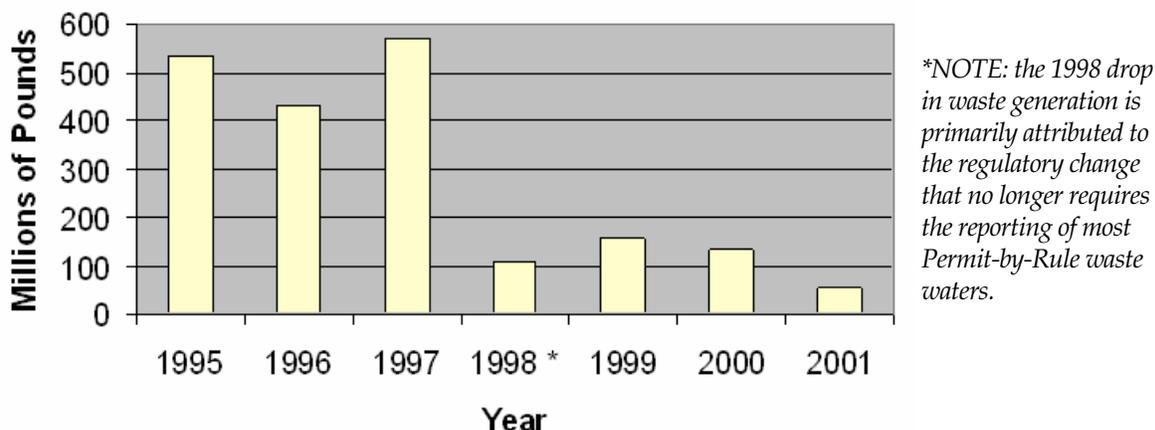


Table 6: 2001 Top 5 Generators in the Primary Metals Group

Generators	Total Pounds	% ⁺
Nucor Steel Seattle Inc	22,133,534	40%
Longview Aluminum LLC	9,949,477	58%
Goldendale Aluminum Co	9,172,595	75%
Northwest Alloys Inc (Addy)	6,658,909	87%
Alcoa Inc Wenatchee Works	4,298,105	95%

⁺Accumulative

Nucor Steel, in Seattle, formerly known as Birmingham Steel Corporation, was the largest waste generator in the Primary Metals group. Their largest hazardous waste stream was described as “Emissions Dust from Primary Manufacture of Steel.” In 2001, this was the only waste stream they reported.

The overall decrease in waste generation for this sector in 2001 is attributed to reduced waste generation from the aluminum smelters. Smelters either shut down or severely curtailed production in 2001 due to skyrocketing electricity prices and low prices for aluminum. This industry group is expected to report varying amounts of waste generation in the coming years as aluminum smelters are expected to go out-of-business and dismantle their industrial equipment.

Military Sector (7% of waste generation)

The military sector consists of military bases, operations and hospitals operated by the U.S. Navy, U.S. Army and U.S. Air Force, as well as the Washington Army National Guard. In 2001, this group had 29 sites reporting hazardous waste generation. These facilities provide infrastructure to support the armed services and much of their support activities that generate hazardous waste are industrial in nature.

Figure 8: Waste Generated in the Military Sector

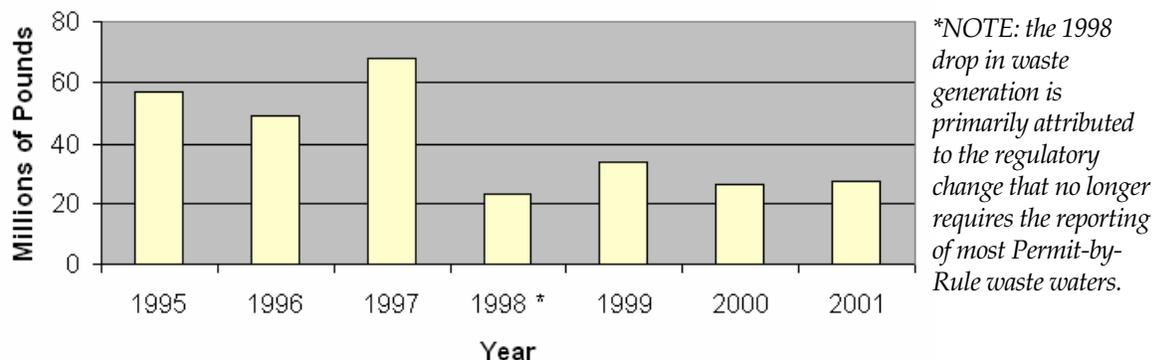


Table 7: 2001 Top 5 Generators in the Military Sector

Generators	Total Pounds	% ⁺
US NAVY PSNS Bremerton	24,351,981	89%
US ARMY HQ I Corps & Fort Lewis	649,067	91%
US NAVY Submarine Base Bangor Silverside	622,834	94%
US NAVY Air Station Whidbey Island Ault	447,719	95%
US NAVY Keyport OU1	445,053	97%

⁺Accumulative

The Puget Sound Naval Shipyard located in Bremerton, Washington is by far the largest waste generator in this group, accounting for 89% of this group’s total generation in 2001. The shipyard is responsible for building, decommissioning and renovating naval vessels. A large percentage of their reported waste consists of decommissioned reactor components from submarines, ballast waters containing chrome and lead, and construction/demolition debris.

A sampling of hazardous wastes coming from the various other military installations includes fuels, absorbent pads, paints, solvents, corrosive solutions, and wash waters.

Transportation (5% of waste generation)

This group includes companies that manufacture equipment for transportation of passengers and cargo by land, air, and water and it includes suppliers, vendors and manufacturers. In 2001, 78 companies in this sector group reported waste generation.

Figure 9: Waste Generated in the Transportation Sector

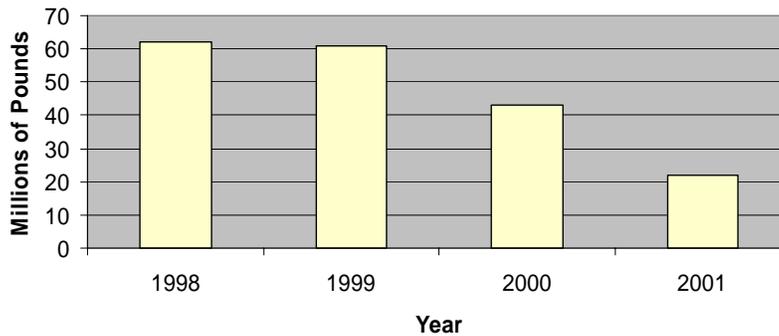
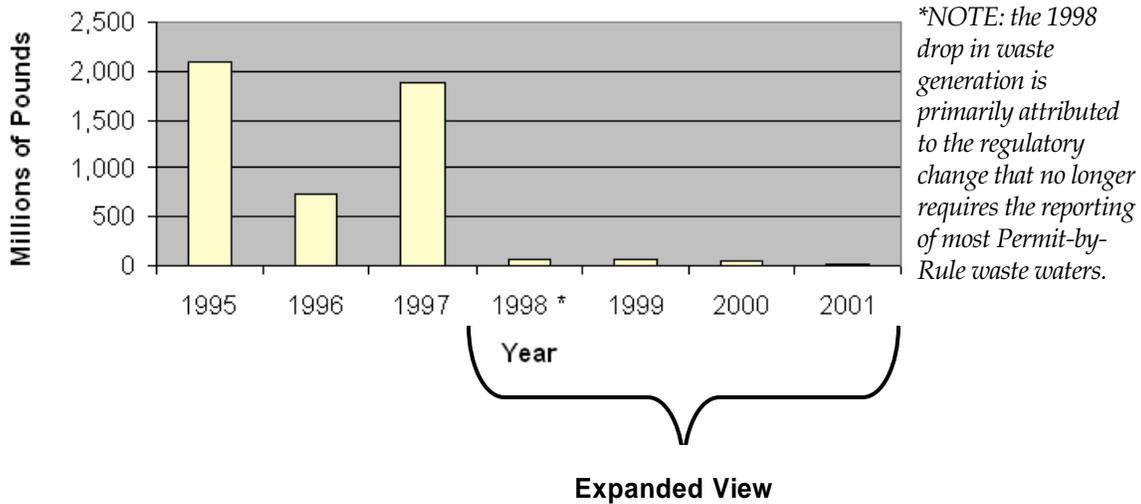


Table 8: 2001 Top 5 generators in the Transportation Sector

Generator	Total Pounds	% ⁺
Goodrich Corporation Hangers 1 & 3	3,613,542	17%
Boeing Auburn	3,314,229	32%
Boeing Frederickson (Puyallup)	2,971,466	45%
Boeing Everett	2,746,734	58%
Boeing Renton	2,124,738	68%

⁺Accumulative

This group is primarily dominated by the Boeing Corporation in waste generation. They are a major manufacturer of airplanes and aerospace equipment. The decrease in waste generation seen in the last few years is largely attributed to production decreases and waste reduction measures. As with the metals industry group, there is uncertainty as to future volumes of waste generation from them due to the downturn in the economy and other lingering effects of September 11th on the airline industry.

The Goodrich Corporation hangers in Everett, Washington were also a major contributor. In 2001, they generated over 3 million pounds of waste waters that did not meet the Permit-by-Rule waste water reporting exclusion causing them to be the largest generator in this group. The other types of waste they generated are primarily paint-related.

Petroleum (2% of waste generation)

The petroleum group includes facilities primarily engaged in petroleum refining, the manufacture of paving and roofing materials, and the compounding of lubricant oils and greases from purchased materials. In 2001, this group had eight sites reporting hazardous waste generation.

Figure 10: Waste Generated in the Petroleum Sector

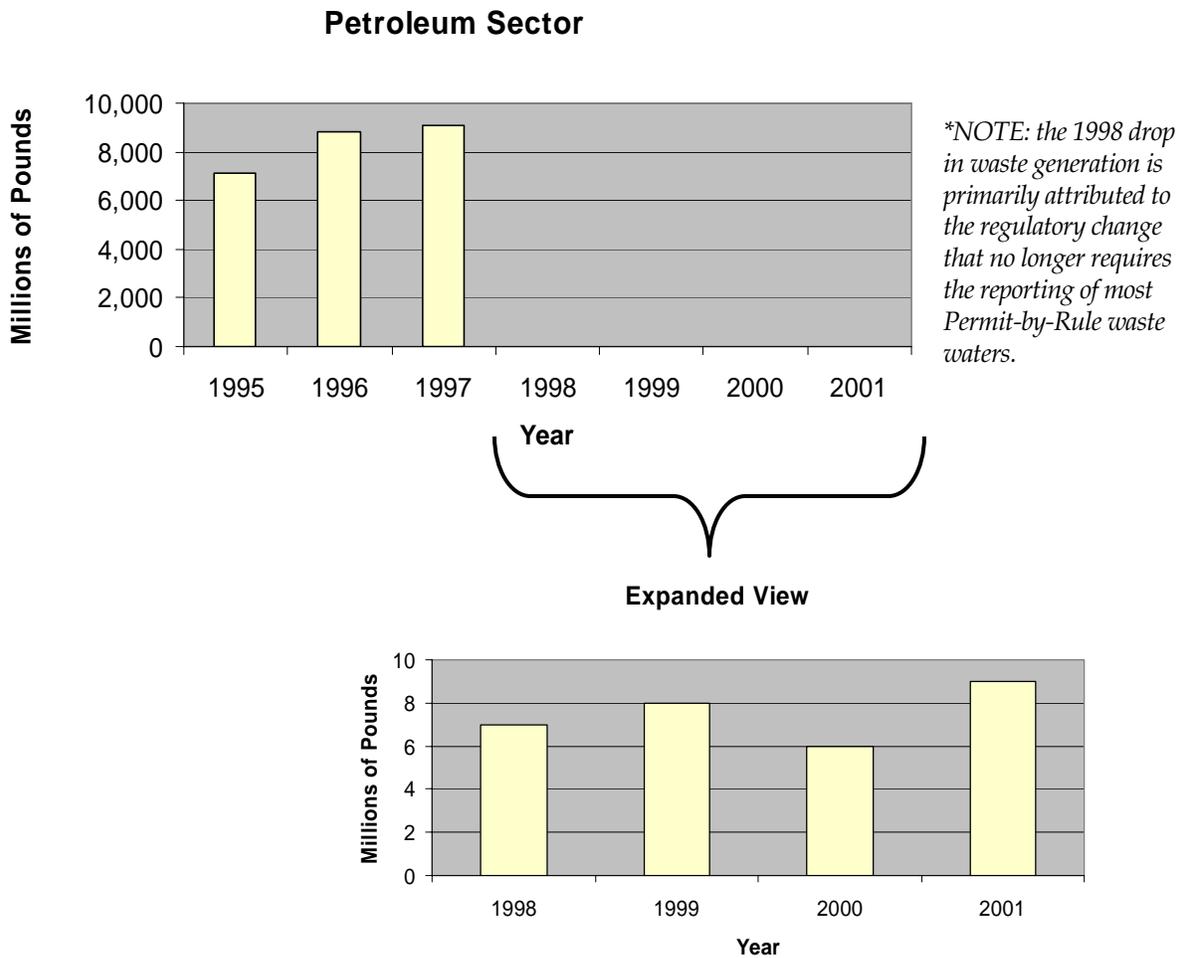


Table 9: 2001 Top 5 generators in the Petroleum Sector

Generator	Total Pounds	% ⁺
Shell Oil Products US Puget Sound Refine (Anacortes)	3,229,709	35%
US Oil & Refining Co (Tacoma)	2,774,949	65%
BP Cherry Point Refinery (Blaine)	1,419,160	80%
Phillips 66 Co Ferndale Refinery (Ferndale)	1,063,637	91%
Tesoro Northwest Co (Anacortes)	706,312	99%

*Accumulative

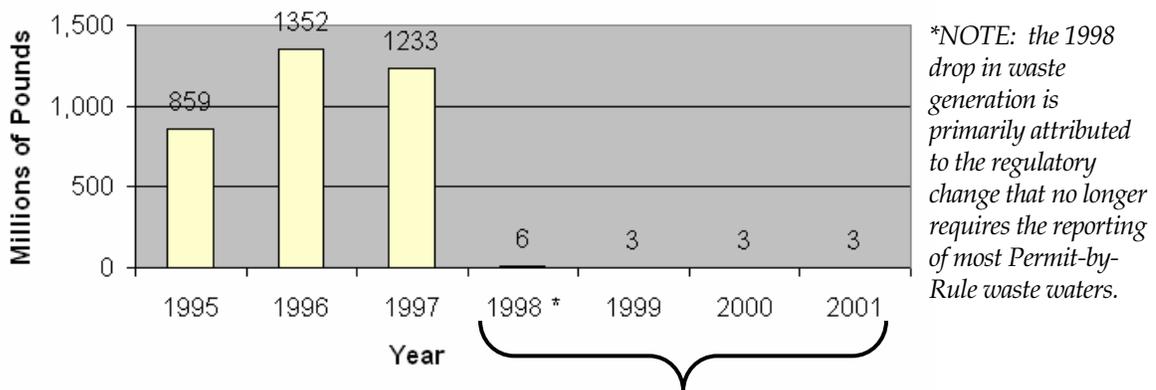
The large petroleum refineries in Washington State produce fuels. Most of the hazardous waste they generate consists of contaminants removed from crude oil, spent catalyst from the refinery processes, waste from the periodic or routine maintenance of refinery tanks and equipment, sludge from treated waste water and waste removed from plant sewers during periodic cleaning.

As shown in Figure 10 on page 18, petroleum refinery waste quantities can fluctuate from year to year. Much of the fluctuation can be attributed to periodic maintenance projects called “refinery turnarounds” where process equipment is replaced or dismantled, cleaned, repaired and placed back into service. Turnarounds occur once every few years on a given refinery process and generate relatively large quantities of hazardous waste.

Pulp and Paper (1% of waste generation)

The pulp and paper sector consists of companies that are primarily engaged in manufacturing pulp from wood (or other materials such as rags, wastepaper, etc.) and paper from wood pulp. The pulp and paper mills are relatively small hazardous waste generators by volume, but are the state’s largest releaser of permitted toxic chemicals into the air, land and water. Elevated public concern with this industry has given them a high environmental profile in the air and water arenas. Refer to Ecology’s publication *Chemicals in Washington State Summary Report 2001 (03-04-020)* for more information.

Figure 11: Waste Generated in the Pulp & Paper Sector



Expanded View

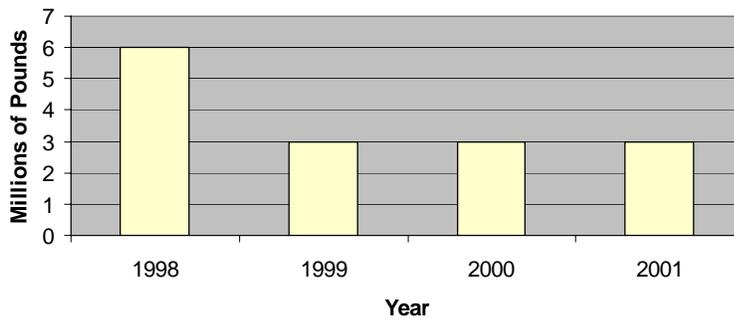


Table 10: 2001 Top 5 generators in the Pulp and Paper Sector

Generator	Total Pounds	% ⁺
Georgia Pacific Corp (Bellingham)	2,246,168	73%
Boise Cascade Paper Division Wallula	610,576	93%
Kimberly Clark Corp (Everett)	38,184	94%
Fort James Camas Mill	35,635	95%
Weyerhaeuser Co Cosmopolis Pulp Mill	27,181	96%

⁺Accumulative

Most pulp and paper mills generate two main hazardous waste streams; solvents and paint waste from plant maintenance operations and alkaline-type wastes generated from lime kiln operations. Over the past few years, there has been a growing trend with the mills to recycle their solvent and paint wastes and/or to switch to materials that do not produce hazardous waste.

Special Interest Waste – Mercury

In Washington State there is increased interest in several toxic chemicals referred to as Persistent, Bioaccumulative Toxins (PBT's). Mercury is one of these PBT chemicals. The mercury pollution in Washington State comes from a variety of sources including mining, petroleum combustion, coal-powered plants, various manufacturing sources, refineries, the dental industry, municipal sewage plants, and the landfilling and incineration of a variety of consumer products.

It's important to note, as you review the graphs on the following page, mercury is not the only constituent in the waste stream. Most often, mercury is found mixed with other things such as water, fuel and solvents. The volume of mercury in the waste stream is generally a small fraction of the overall waste amount.

Figure 12: Waste Containing Mercury

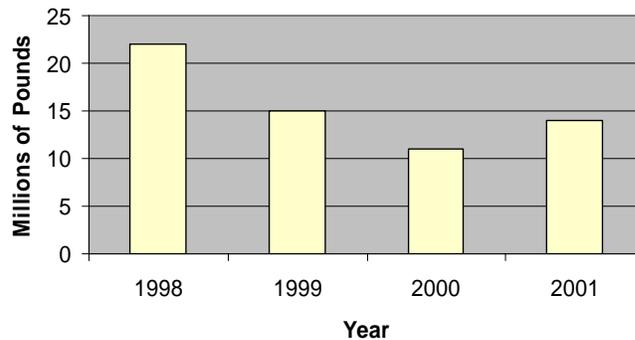
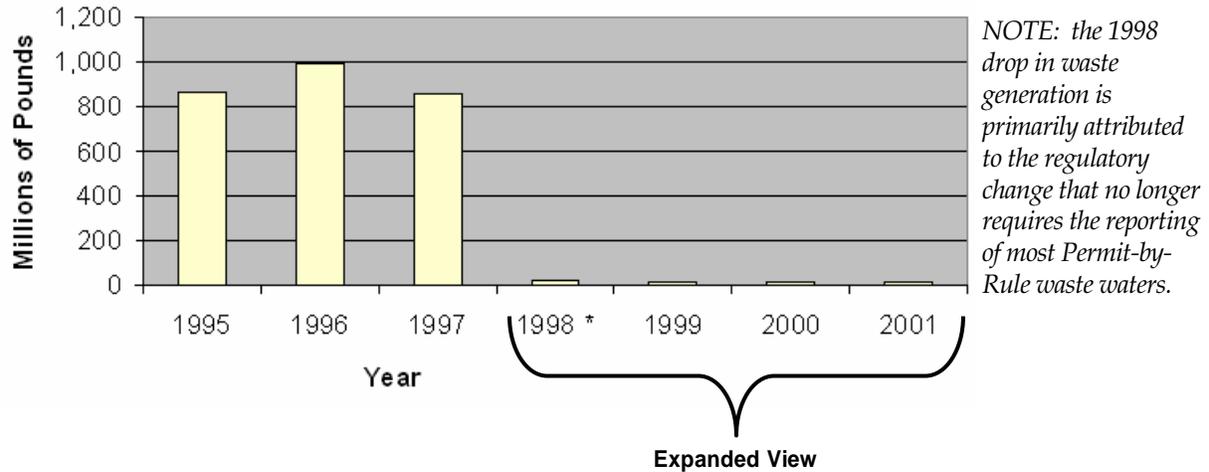


Table 11: Top 10 Waste Streams Containing Mercury (2001)

Generator	Waste Stream Description	Pounds	% ⁺
Burlington Environmental Inc Tacoma	Waste waters with metals	4,924,248	34
Burlington Environmental Inc Kent	Hazardous waste derived fuel	2,194,119	49
Burlington Environmental Inc Tacoma	Neutralized acids/alkalines	1,312,457	58
Burlington Environmental Inc Kent	Industrial hazardous waste derived fuel	1,158,949	66
Georgia Pacific Corp	Mercury contaminated debris	1,113,234	74
Burlington Environmental Inc Tacoma	Hazardous waste derived fuel	509,867	77
Burlington Environmental Inc Tacoma	Neutralized acids/alkaline sludges	320,311	80
Pliant Corp (Kent)	Spent solvent from printing process	273,384	82
Noveon Kalama Inc	Benzyl alcohol waste	200,102	83
Noveon Kalama Inc	T-1117 Waste (a concentrated aqueous solution)	147,401	84

⁺Accumulative

In 2001, 185 companies reported the generation of waste containing mercury in 339 waste streams. 84% of this waste came from the largest reported waste streams shown in table 11, above.

Six of the largest waste streams were generated by two **Burlington Environmental** TSDR facilities. These TSDR facilities accept and manage (treat, recycle, etc.) waste from other generators. These large waste streams are not newly created waste streams but rather secondary generation from their management of mercury-containing wastes. In 2001, mercury-containing waste streams accounted for 53% of the total waste generation at the Tacoma facility and 29% at the Kent facility.

Georgia Pacific Corporation in Bellingham, WA falls into the pulp and paper industry sector discussed earlier in this chapter. Almost 50% of their 2001 total waste generation consisted of “Mercury-contaminated Debris.” This waste was identified as a non-recurring waste stream that came from the discontinued use of process equipment.

Pliant Corporation, a plate manufacturer located in Kent, WA falls into the “Other” industry sector. In 2001, their mercury-containing waste was identified as recurring waste from a solvent recovery process. This mercury-containing waste stream accounted for 28% of their total waste generation in 2001.

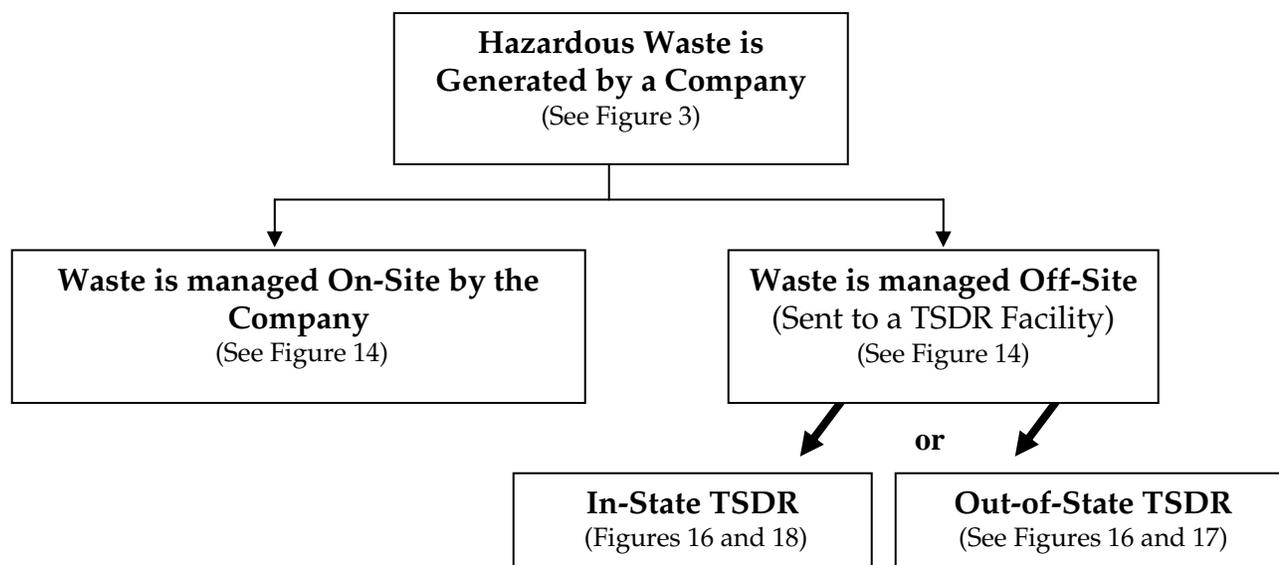
Noveon Kalama Inc. falls into the chemical industry sector as a manufacturer of chemicals. In 2001, they reported 11 individual waste streams as containing mercury. Their largest two mercury-containing waste streams are included in Table 11, on page 21. These 11 waste streams are identified as recurring type wastes coming from processes such as the discarding of off-spec materials, product distillation, cleanup of spill residues, and laboratory wastes. These mercury-containing waste streams accounted for 2% of their total waste generation in 2001.

Refer to Ecology’s Mercury Chemical Action Plan web site for more information.
www.ecy.wa.gov/programs/eap/pbt

Chapter 4: Waste Management

After a hazardous waste is generated, it must be managed in a safe manner, as required by the *Dangerous Waste Regulations*. The management can take place on-site (where it was generated) or off-site (transported to a TSDR facility). This chapter discusses the various types and quantities of waste that are managed within Washington State and elsewhere. The following diagram shows what happens to hazardous waste once it is generated.

Figure 13: Waste Management



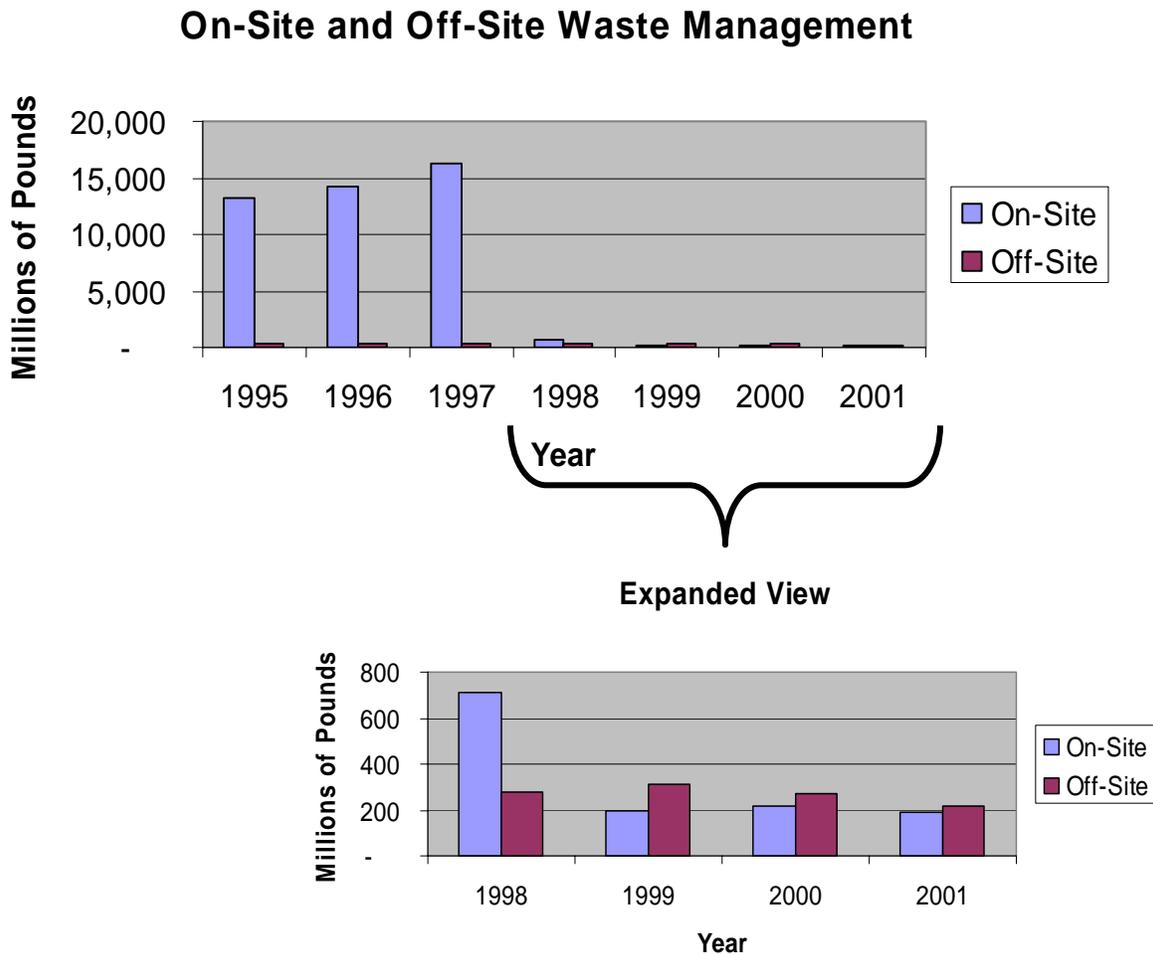
The term “waste management” refers to the following activities:

1. **Treatment** means the physical, chemical, or biological processing of a hazardous waste to make the waste non-dangerous or less dangerous, safer for transport, amenable for energy or material resource recovery, or to reduce the volume for storage. An example of waste treatment is neutralization of an acid.
2. **Storage** means the holding of a hazardous waste for a temporary period. This includes wastes that are temporarily stored and then transferred (storage/transfer) to another location.
3. **Disposal** means the discharging, discarding, or abandoning of hazardous wastes or the treatment, decontamination, or recycling of such wastes once they have been discarded or abandoned. This includes the discharge of any dangerous wastes into or on any land, air or water. Landfilling hazardous wastes and waste water discharges are examples of waste disposal.
4. **Recycle** means to use, reuse or reclaim a material. Solvent distillation is a common form of recycling. Burning for energy recovery is not considered recycling.

On-Site vs. Off-Site Management

The following chart shows trends regarding hazardous waste management. As mentioned in the preceding chapter, there have been significant decreases in the amount of hazardous waste reported to the State (see page 10). In particular, the discontinued reporting of Permit-by-Rule waste waters starting in 1998 play an important role as we look at the shifts from on-site to off-site waste management.

Figure 14: On-Site and Off-Site Waste Management

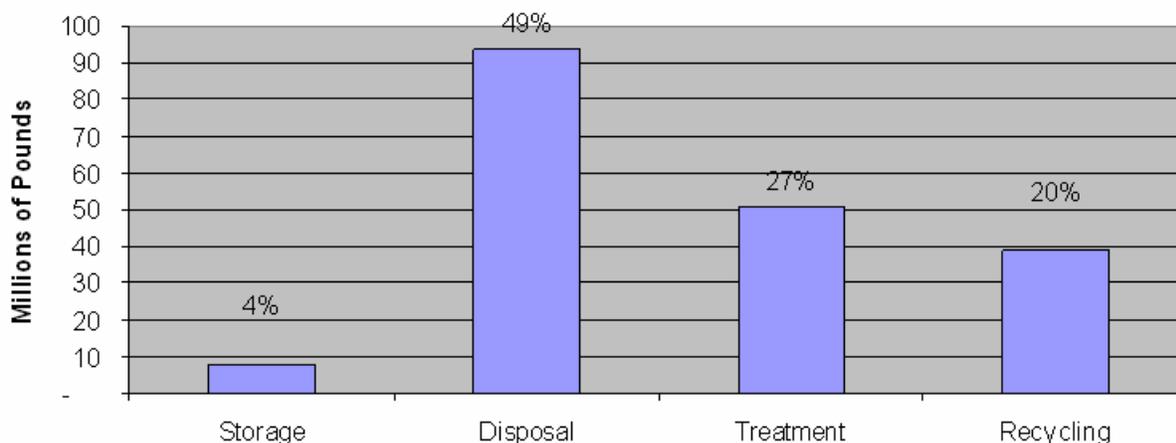


The management of Permit-by-Rule waste waters almost always occurs on-site, usually by neutralization followed by discharge to a local POTW, otherwise known as “sewage treatment plants.” Starting in 1998 most previously reported Permit-by-Rule waste waters were no longer required to be counted or reported. This explains the drop in the amounts of on-site managed waste in 1998 as most companies discontinued their reporting of it. Since that time, the amount of waste managed on-site appears fairly stable, while off-site managed waste amounts show slight variance.

On-Site Waste Management

The management of on-site waste usually occurs shortly after generation. After waste is generated, it must be managed (i.e., treated, stored, disposed, recycled) within a limited period of time; LQGs have 90 days following generation in which to manage their waste, and MQGs have 180 days. This limited time period is required in the state's *Dangerous Waste Regulations* to help ensure wastes are properly managed in a timely manner.

Figure 15: 2001 On-Site Waste Management



In 2001, about 190 million pounds of waste were managed on-site by these methods:

Storage and Disposal: These categories consist of placing waste in landfills, discharging waste waters to sewers/POTW's, storage for an extended period of time, and storage/transfer where waste is temporarily held before being transported off-site for ultimate management.

In 2001, on-site storage and/or disposal were performed by eight companies. In general, it is the large generating sites such as the US Department of Energy (Hanford), some of the aluminum smelters and Boeing that are allowed to do this. While the number of companies that store and/or dispose of waste is low, the volume of waste that was managed in this manner accounts for more than half of the 2001 on-site managed waste streams.

On-Site Storage and Disposal (2001)

- ▶ *Eight companies (2% of the generators) conducted this activity*
- ▶ *53% of on-site waste was managed this way*

Treatment and Recycling: These are more common types of on-site waste management. In 2001, about 200 companies performed on-site treatment and recycling, accounting for 47% of the waste volume that was managed on-site. These types of activities do not require special permits and are encouraged by the Ecology as ways to safely reduce hazardous constituents in waste and allow the reuse of materials.

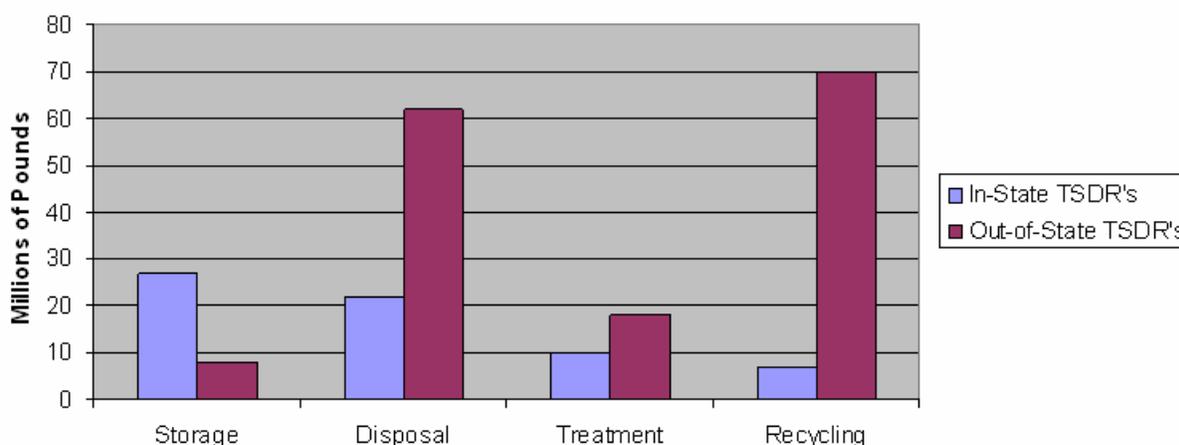
On-Site Treatment and Recycling (2001)

- ▶ *200 companies (7.4% of the generators) conducted this activity*
- ▶ *47% of on-site waste was managed this way*

Off-Site Waste Management

There are many companies (waste generators) in the state who send their hazardous waste off-site to commercial TSDR facilities. These facilities are specially permitted to receive hazardous waste for treatment, storage, disposal and/or recycling. Washington State currently has around 33 active TSDR facilities and used oil processors² where generators can send their waste. Generators can also choose to export their waste to TSDR facilities in other states and foreign countries. In 2001, approximately 224 million pounds of wastes were managed off-site with more waste going out-of-state for management than sent to in-state TSDR facilities.

Figure 16: 2001 Off-Site Waste Management



In-State TSDR Management: As shown in Figure 16, above, storage and disposal are the primary methods of managing waste at In-State (Washington) TSDRs. The wastes that fall into the storage group include both extended storage where waste is stored for 2 or more years and storage/transfer where waste is sent to a TSDR facility who holds it for a short time and then transfers it on to another TSDR facility, either in or out-of-state. Of the 2001 wastes, 99% of the waste reported as storage fell into this subgroup of storage/transfer. It is important to note that we do not know the ultimate fate of storage/transfer waste. For reporting purposes we track waste to its first off-site destination. In 2001, approximately 66 million pounds of wastes were sent to in-state TSDR facilities.

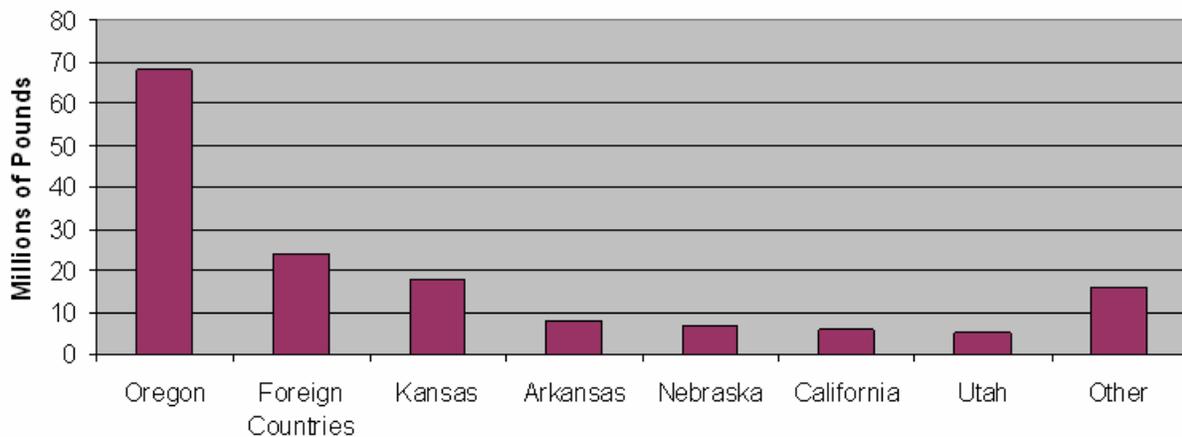
Of the waste reported for disposal, 90% was mixed radioactive “Defueled Decommissioned Reactor Compartment Disposal Packages” waste coming from the Puget Sound Naval Shipyard in Bremerton. This large waste stream is landfilled at the Hanford Nuclear Reservation in Central Washington. Most of the remaining disposal

² Ecology has formed a committee and is currently studying the designation process for used oil. The outcome will be an amendment to the *Dangerous Waste Regulations* outlining testing and documentation needed to show that used oil meets on-specification requirements. The amendment will ensure no mixing of dangerous waste is occurring and cleaner oil is produced for re-use and re-refining. Adoption of the amendment is anticipated for late summer 2004.

was sent to the Burlington Environmental Kent TSDR facility where it was either discharged to a sewer or POTW (under Permit-by-Rule) or was sent on to another TSDR facility (much like storage/transfer) where it is eventually placed in landfills. Further discussion on Washington State TSDRs follows in Chapter 5.

Out-of-State TSDR Waste Management: Generators typically choose to send their wastes out-of-state either because the out-of-state facility receiving their waste might offer management methods not available in Washington or to save money. In 2001, approximately 150 million pounds of waste were sent to out-of-state TSDR facilities.

Figure 17: 2001 Waste Going Out-of-State



Oregon receives the lion's share of Washington waste. This is due, in part, to their close proximity to Washington and their large hazardous waste landfill located in Arlington. In 2001, 99% of waste sent to Oregon was disposed of in Arlington's Chemical Waste Management landfill. The remaining 1% going to Oregon went primarily to Safety Kleen Systems in Clackamas for solvent recycling. Of the waste that is sent to foreign countries, 98% of it went to either Mexico or Canada for recycling.

Chapter 5: Commercial (TSDR) Waste Management

This chapter examines the commercial Treatment Storage Disposal Recycling (TSDR) waste management facilities in Washington and the type of operations they perform. In 2001, there were eight actively operating TSDR facilities that received and managed regulated hazardous waste from generators. Aside from commercial TSDR's, there are also non-commercial TSDR facilities who handle only their own waste, such as Hanford and the military (their waste management is included in Chapter 4) and TSDR facilities that manage non-regulated hazardous wastes such as used oil and wastes from small businesses.

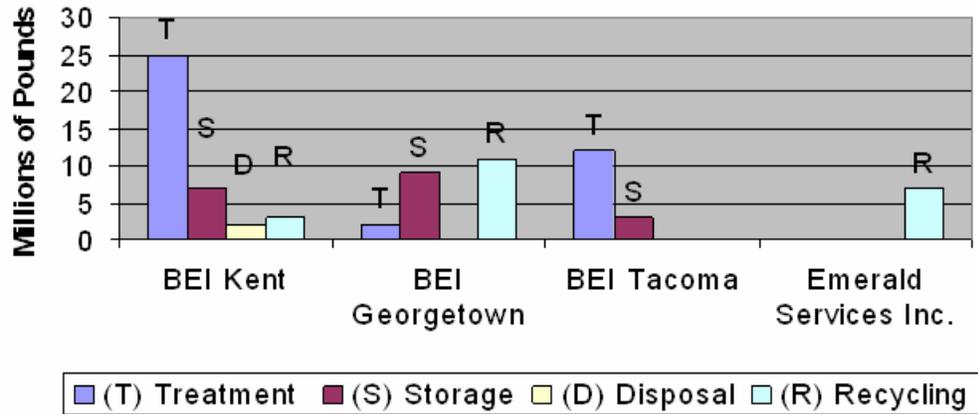
Table 12: 2001 Commercial TSDR Facilities

2001 Commercial TSDR Facilities	City	% of Waste Received
Burlington Environmental Inc (BEI) Kent	Kent	45%
Burlington Environmental Inc (BEI) Georgetown	Seattle	27%
Burlington Environmental Inc (BEI) Tacoma	Tacoma	18%
Emerald Services Inc	Tacoma	9%
Applied Technology Group (ATG) Richland	Richland	1%
McClary Columbia	Tacoma	<1%
HRC Recycling (A Divison of Hallmark Refining Corp)	Mt Vernon	<1%
Hallmark Refining Corp	Mt Vernon	<1%

Commercial TSDR facilities report the types and volumes of hazardous waste they receive from all generators (in-state, out-of-state, and foreign countries) and the management methods they perform. The volumes of waste reported as “received” at Washington State TSDR facilities exceeds the amounts Washington generators report as sent. The reason for this difference is that TSDRs also report waste received from other states, other countries and waste from small quantity generators.

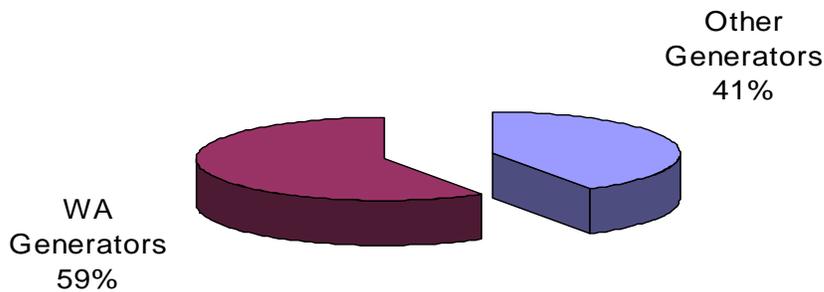
As shown in Table 12, above, Burlington Environmental and Emerald Services Inc. account for 99% of Washington State’s commercial waste management in 2001. Figure 18, on the next page, displays the different waste management methods performed at these facilities during 2001.

Figure 18: 2001 TSDR Waste Management Methods



Just as Washington Generators send their waste to TSDR facilities in other states and foreign countries (see Figure 16, on page 26), the Washington TSDR facilities receive waste from them. In 2001, 41% of the waste managed at the eight commercial TSDR facilities was from other states and foreign countries.

Figure 19: 2001 Sources of Waste Sent to WA TSDRs



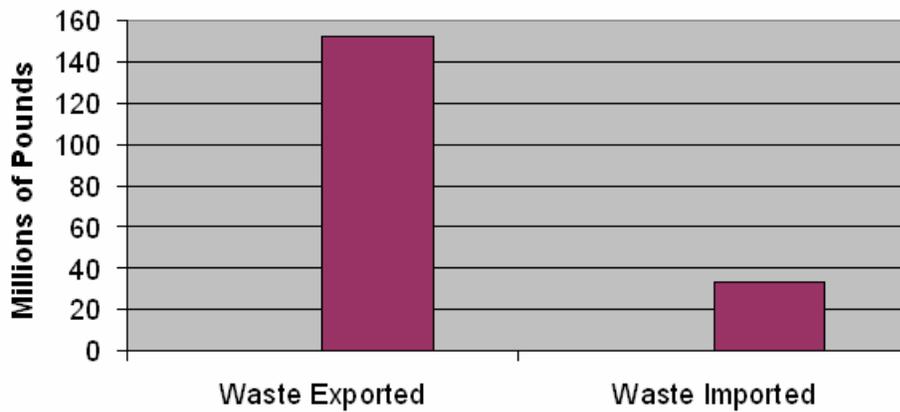
There are three assumed reasons why other states and foreign countries send their waste into Washington for management; 1) close proximity, 2) particular waste management methods not available in their home state, and 3) potentially lower costs.

Figure 20: 2001 Imports from Other States and Foreign Countries



The net balance of what Washington State exports out-of-state exceeds what is imported.

Figure 21: 2001 Imports vs. Exports



For more information on TSDR facilities in Washington, see the 2002 Report to the Legislature titled "Hazardous Waste Management Facilities in Washington State – Problems & Options," (#02-04-028).