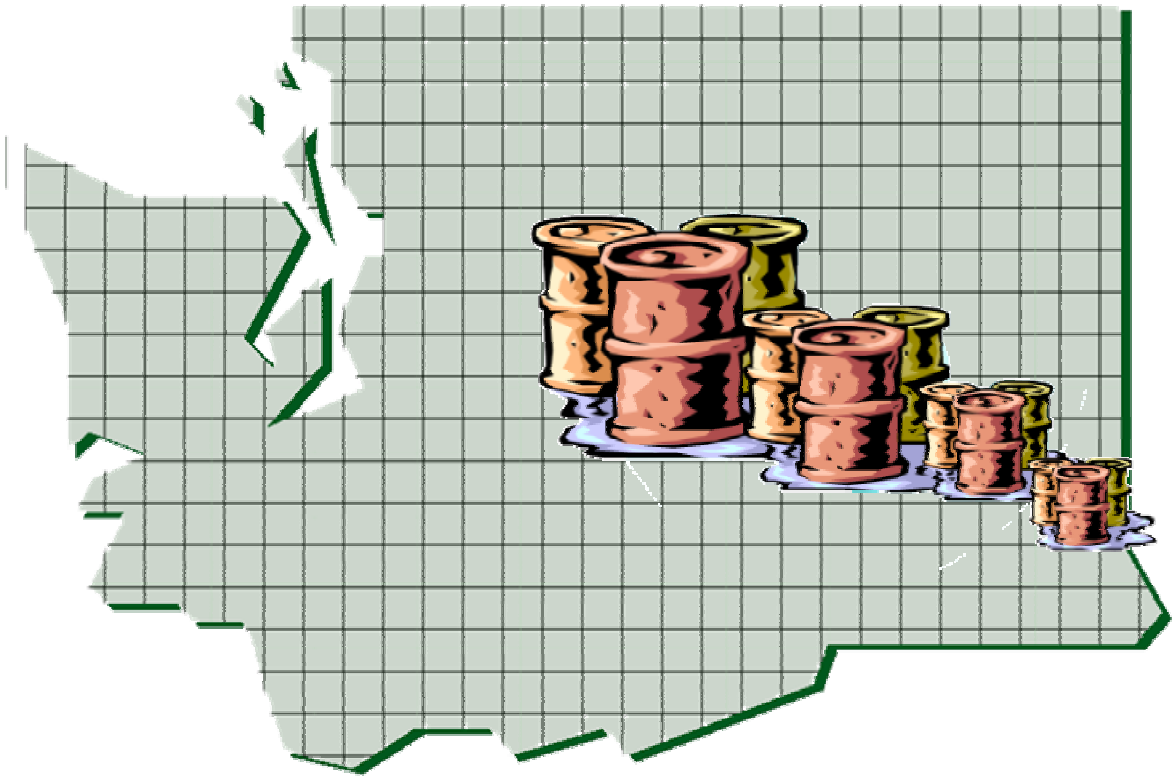
WASHINGTON STATE DEPARTMENT OF ECOLOGY

Reducing Toxics in Washington

2000 Annual Progress Report

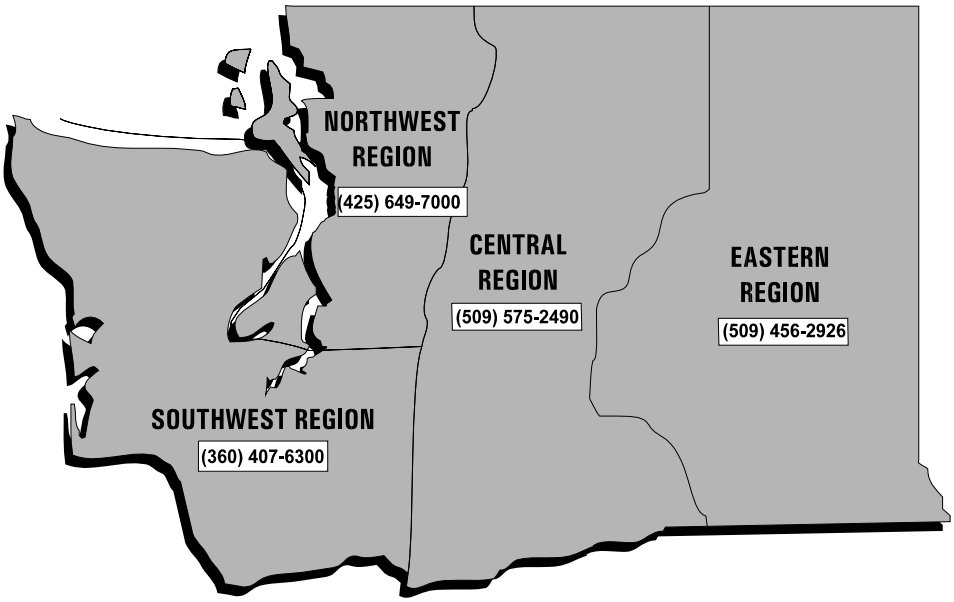


Hazardous Waste and Toxics Reduction Program
Department of Ecology
November 2002
Publication Number 02-04-034

For additional copies of this document, please contact:

Department of Ecology
Publications
P.O. Box 47600
Olympia, WA 98504-7600
Please include your street address for UPS delivery

Or Visit Our Web Site at *http://www.ecy.wa.gov*



The Department of Ecology is an equal opportunity agency and does not discriminate on the basis of race, creed, color, disability, age, religion, national origin, sex, marital status, disabled veteran's status, Vietnam Era veteran's status or sexual orientation.

If you have special accommodation needs or require this document in an alternative format, please contact the Hazardous Waste and Toxics Reduction Program at (360) 407-6700 (voice) or 711 or 800-833-6388 (TTY).

printed on recycled paper using soy-based inks

Reducing Toxics in Washington

2000 Annual Progress Report

Hazardous Waste and Toxics Reduction Program
Department of Ecology
November 2002
Publication Number 02-04-034

Table of Contents

Figures

Executive Summary

The 1990 Hazardous Waste Reduction Act was established to encourage voluntary reduction in the use of hazardous substances and reduction in the generation of hazardous waste. The Washington State Department of Ecology (Ecology), as directed by the Legislature, established the Pollution Prevention Program and adopted, as policy, the goal to reduce hazardous waste generation by 50 percent by 1995. Through technical assistance, Ecology assists facilities to achieve the greatest reduction in hazardous waste that is economically feasible and technically practicable. This 2000 annual report presents an overview of waste reduction efforts in Washington State, which for the first time has achieved the 50 percent reduction goal.

Facilities that generate greater than 2,640 pounds of recurrent hazardous waste per year and/or who are required to report under the Toxic Release Inventory for releases of certain toxic chemicals are required to prepare pollution prevention plans. While planning is mandated, the implementation is voluntary on the part of the facilities. Currently 685 facilities are Pollution Prevention Planners. These facilities design and implement Pollution Prevention Plans.

The Pollution Prevention Planning Program has made progress. The 2000 data shows a 59 percent reduction (after normalization) in hazardous waste generation since the base year of 1992; the first year facilities were required to submit pollution prevention plans. The data have been normalized to account for growth economic factors and growth in businesses from one year to the next.

Hazardous waste generation increased in 1999. However in 2000, 1,129 facilities statewide reported hazardous waste generation of 207 million pounds, a decrease of 44 million pounds since 1999. When normalization factors are applied, this decrease equates to 40 million pounds.

In order to study and understand the fluctuations in waste generation, this year's report has divided facilities into seven sectors for review. The sectors are Metal Industries, Organic/Inorganic Chemicals, Aircraft & Transportation, Petroleum Industries, Pulp & Paper Industries, the Military, and All Other Industries which includes public utilities, medical facilities, and a variety of large and small businesses.

Most waste generation was found in two industry sectors, Metals and Organic/Inorganic Chemicals. Metals, primarily aluminum smelters who generated spent potliner waste, accounted for 56.5 percent of the total 2000 recurrent hazardous wastes generated in the state and 30 million pounds of the state's reduction from 1999 levels. Organic/ Inorganic Chemicals represented 17 percent of the total 2000 recurrent hazardous waste generated and 6 million pounds of the reduction since 1999. Most other industry categories showed a decrease in recurrent waste from 1999; however, waste generated by the military increased by 11 percent from 1999.

Each year they submit an Annual Progress Report to Ecology. In 2000, planners reported 1,041 projects that resulted in 2,275 benefits to both the environment and to planning facilities in six areas including substance use reduction, waste reduction, recycling, treatment, reduced emissions, and cost savings. The report concludes with examples of pollution prevention success stories statewide.

Chapter 1

Introduction

Purpose of the Report

This annual report provides information on the progress being made in preventing pollution by reducing and eliminating hazardous wastes and hazardous substances in Washington. The report is intended to update the Legislature and other interested parties on progress toward implementing the Hazardous Waste Reduction Act, Chapter 70.95C RCW. The report covers progress during calendar year 2000.

Program Overview

The 1990 Hazardous Waste Reduction Act established a goal to reduce hazardous waste generation by 50 percent. The primary means for achieving this goal is through implementation of the Pollution Prevention Planning program as established in the Act. **The 50 percent reduction goal was met in the 2000 reporting year**. Ecology and the business community continue to develop and implement activities designed to achieve further reductions in waste generation.

Frequently Asked Questions

What is pollution prevention?

Pollution prevention means reducing hazardous emissions or wastes at the source, before they are generated. Pollution is the contamination of air, soil, or water by the discharge of harmful substances. Prevention is source reduction and other practices that reduce or eliminate the creation of pollutants through increased efficiency in the use of raw materials, energy, water, or other resources, or protecting resources through conservation**.**

Pollution prevention occurs when raw materials, water, energy and other resources are utilized more efficiently, when less harmful substances are substituted for hazardous ones, and when toxic substances are eliminated from the production process. Source reduction is the practice of reducing hazardous waste by reducing the hazardous constituents in the waste.

By reducing the use and production of hazardous substances and by operating more efficiently, human health is protected, economic well being is strengthened, and the environment is preserved. Source reduction allows for the greatest and quickest improvements in environmental protection by avoiding the generation of waste and harmful emissions. Source reduction makes the regulatory system more efficient by reducing the need for end-of-pipe environmental control by government.

Who participates in pollution prevention planning?

There are currently 685 facilities in Washington State participating in the planning program. Facilities that fall into the following category(s) are required to prepare pollution prevention plans:

- Facilities that generate over 2,640 pounds of recurrent hazardous waste per year; and/or;
- Facilities that are required to report under the Toxic Release Inventory (TRI) of the Emergency Planning and Community Right to Know Act of 1986.

What is hazardous waste?

Hazardous wastes are wastes that contain certain chemicals or have properties that make them dangerous to human health and the environment. In Washington State, hazardous wastes are categorized into two main groups, recurrent and non-recurrent.

- Recurrent hazardous wastes are those that are derived from a production process, service activity, or a routine clean up.
- Non-recurrent hazardous wastes are the result of a spill, equipment decommissioning, or other remedial cleanup activity.

Each year, as required by the Resource and Conservation and Recovery Act, facilities that generate regulated quantities of hazardous waste complete and submit an Annual Dangerous Waste Report that summarizes what they generated and how it was managed. From these reports, the generation of recurrent wastes is measured to determine progress towards waste reduction. Non-recurrent wastes and waste from specialized sources, such as the US Department of Energy Hanford Facility (Hanford) and commercial treatment storage disposal recycling facilities (TSDRs) have been excluded. Also excluded are special categories of waste that fall outside the scope of WAC 173-307 of the Washington State *Dangerous Waste Regulations* such as mixed radioactive waste and most waste waters. In 2000, 1,129 facilities reported total recurrent hazardous waste generation of 207 million pounds.

When is pollution prevention information available to Ecology?

Three sources of information are used by Ecology in pollution prevention assessments; Annual Dangerous Waste Reports, Pollution Prevention Plans and Toxics Release Inventory reports. The following table identifies the timing of events that cumulates the three data sources that are used in this report:

Information Source:	Submittal date to Ecology:	Available for use and public release:
2000 Annual Dangerous Waste Reports	March 1, 2001	September 2001
2000 Toxic Release Inventory Reports	July 1, 2001	December 2001
2000 Pollution Prevention Plans	September 2001	April 2002

What does pollution prevention planning involve?

Pollution prevention planning is an activity that involves the following:

- Inventorying hazardous substances used and hazardous waste generated;
- Identifying opportunities to reduce hazardous substance use and hazardous waste generation, and identifying opportunities to recycle and/or treat hazardous wastes (in that order of priority);
- Analyzing the feasibility of these prevention opportunities; and,
- Setting goals for hazardous substance use reduction and hazardous waste reduction, recycling and treatment.

Ecology offers an alternative to facilities required to prepare a Pollution Prevention (P2) Plan or a five-year plan update. The Environmental Management System (EMS) alternative to P2 Planning allows a facility which has a functioning environmental management system to substitute documentation of that system for preparation of a P2 plan or five-year plan update. A properly prepared EMS is environmentally equal to, and can outperform, a traditional P2 plan. The EMS process requires a facility to document how their system meets a set of pre-defined pollution prevention criteria, and agrees to an on-site visit by Ecology staff before they are approved for this alternative. EMS facilities are still required to prepare an annual performance report to Ecology, which will report on an annual basis, progress towards achieving pollution prevention goals. Essentially these annual reports are new pollution prevention plans each year and

as such, five-year updates are not required by Ecology. To date, Ecology has approved the use of the EMS planning alternative for 22 facilities.

Ecology also promotes pollution prevention through initiatives other than planning. Several campaigns targeting specific industries have been conducted and more are being planned. These campaigns focus on pollution prevention and regulatory compliance assistance, and help target future technical assistance. Information on recent campaigns is provided in Chapter 4, Program Highlights.

Pollution prevention is internationally recognized as a key strategy for protecting the environment. It has become a key business strategy as well, as business, industry and government alike recognize the benefits of prevention rather than end-of-pipe controls. Many factors, including regulatory compliance, cost savings, worker safety and reduced liabilities help validate pollution prevention as an approach to be incorporated into all business practices.

Chapter 2

Measuring Pollution Prevention Progress

Progress Towards the 50 Percent Policy Goal

The 1990 Hazardous Waste Reduction Act contains a statewide policy goal to reduce hazardous waste generation by 50 percent. This goal was directed toward all hazardous waste generators, not just pollution prevention planning facilities. The goal equates to 128 million pounds, which is 50 percent of the 255 million pounds generated by all facilities in 1990. Annual Dangerous Waste Reports, filed by regulated generators, are used to view waste management trends over time. These trends, particularly when adjusted for changing economic conditions, provide a measurement of progress toward the 50 percent goal.

Facilities are required to consider pollution prevention opportunities based on the following priorities: hazardous substance use reduction and hazardous waste reduction, recycling and treatment. While this section concentrates on hazardous waste, it is important to note that many facilities have consistently set goals for reducing hazardous substance at its origin or beginning of the process. Goal data provided over the last eight years shows 65 to 90 million pounds of hazardous substances have been targeted for reduction at the facility level.

Figure 2.1 charts "pollution prevention" hazardous waste generation levels for 1990 through 2000. The chart summarizes the amounts of recurrent hazardous waste generated in Washington State that are measured for Pollution Prevention Planning purposes. As discussed in Chapter One, recurrent wastes are defined as having been generated from a production process, service activity, or a routine cleanup. Specialized sources of recurrent waste such as Hanford and TSDR facilities have been excluded as well as special categories of recurrent waste that fall outside the scope of Chapter 173-307 WAC regulations such as mixed radioactive waste and most waste waters.

The graph in Figure 2.1 also shows the data adjusted for the changing economy. The adjustments show estimated levels of waste generation assuming the economy remained constant. This process, called

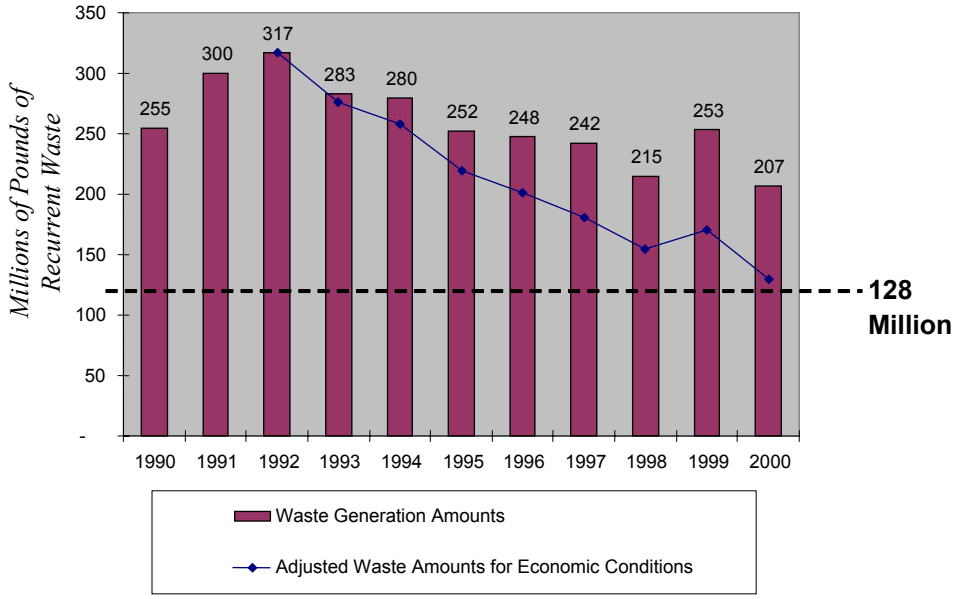
"normalizing" data[1] makes waste totals more comparable from year to year by accounting for variations in economic activity. The adjustment factors were calculated from information provided by the Department of Revenue. Annual gross business income from all Washington businesses was the normalization measure used.

In Figure 2.1, generation data show a decrease of 48 million pounds from 1990 to 2000. Generation data by itself does not show how changing levels of production or service can drive changes in waste generation. Growth in business from one year to the next can result in more or less waste being generated, assuming all other factors remain the same. Normalizing the data for increases or decreases in business levels gives another picture of generation trends. **When adjusted for economic conditions, the amount of waste generated was 130 million pounds in 2000. This represents a 59 percent reduction since 1992's adjusted value of 317 million pounds and a 49 percent reduction from the 1990 target amount.** The year 1992 is used as a base year because it was the year of highest waste generation and the first year that facilities were required to submit pollution prevention plans.

Decreases or increases in generation amounts from year to year can be attributed to several factors. Examples are intermittent management of certain waste streams such as spent potliner at aluminum production facilities, changes in dangerous waste regulations that affect how waste is counted and reported, and actual reductions in waste generation through the implementation of pollution prevention projects. Many of the technical assistance activities discussed in Chapter 4 directly result in pollution prevention. While it is difficult to quantify their exact contribution, these site visits, workshops, consultations, publications, and industrial sector outreach projects all have a positive influence including economic benefits to facilities.

[1] Data is normalized by dividing yearly waste amounts by the Department of Revenue's Gross Business Income (GBI) for that year and multiplying the product by the1992 base year GBI.

Figure 2.1: Progress Towards the 50 Percent Waste Reduction Goal



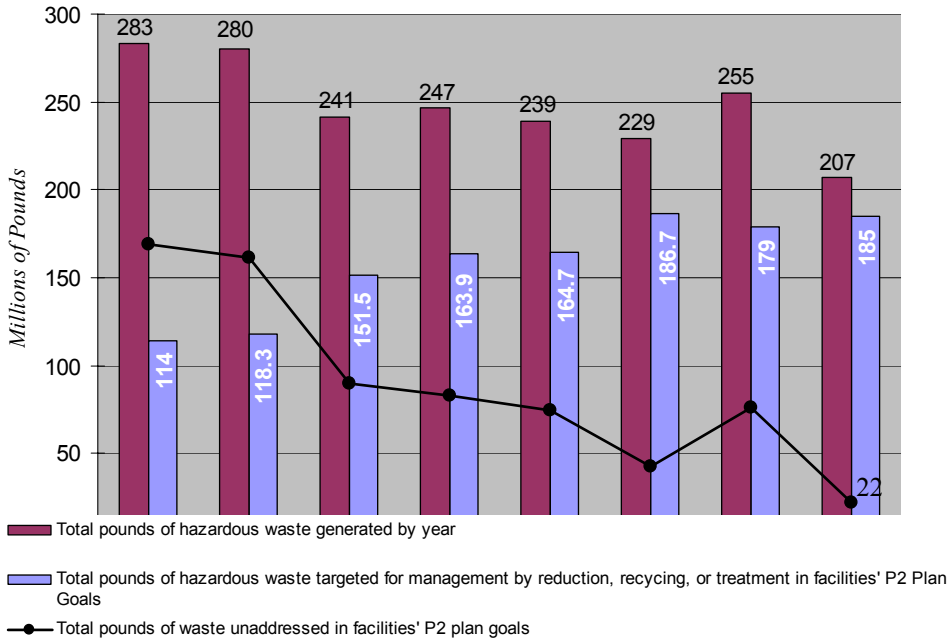
Other Measures of Progress

Pollution Prevention Plan Goals and Hazardous Waste Generation Over Time

Another way to measure progress is to compare information provided by facilities required to prepare pollution prevention plans with hazardous waste generated each year. Facilities are asked to establish numerical goals for hazardous substance use reduction, as mentioned previously, and hazardous waste reduction, and for the amounts of waste that will be recycled and treated. These goals are normally determined by estimating the effects of implementing pollution prevention projects identified as part of the planning process.

Figure 2.2 displays cumulative goals for facilities submitting P2 Plans, Five-year Updates and Annual Progress Reports from 1993 through 2000. These results are reflected in Figure 2.2 in the amount of wastes reduced or managed for each year from 1993 to 2000. It is encouraging to note that hazardous substance use reduction practices, and goals for further reductions in the use of hazardous substances by planning facilities, prevent the generation of hazardous wastes in the first place.

Figure 2.2: P2 Planners' Hazardous Waste Goals Compared to Total Waste Generated



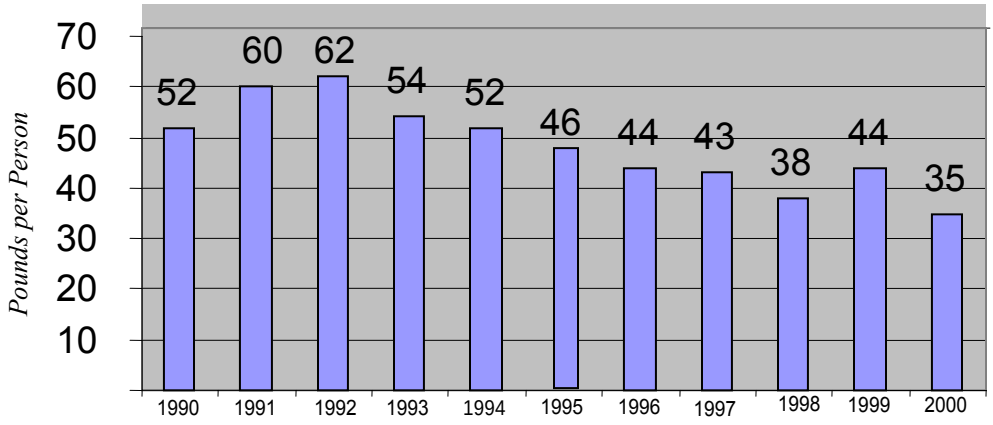
The growth in the amount of hazardous waste goals over the eight years represented in Figure 2.2 can be largely attributed to the growth in the number of facilities required to prepare P2 Plans, particularly in the early years. This number leveled off in 1997 and has remained relatively constant since. It should be noted that while planning is mandated, actual plan implementation is voluntary. Establishing and reporting goals is not a requirement if not practicable, but the facilities that do so provide a clear indication that they are committed to implementing their plans at some future date. What remains is the hazardous waste generated each year where no goals, or intent to reduce, exist. A good example is the year 1999, when a large amount of hazardous waste was generated from one source where no goals existed in their Pollution Prevention Plan. It is significant that, with the exception of 1999, the amount of waste generated that is not addressed in Pollution Prevention Plans has steadily declined.

Per Capita Hazardous Waste Generation

A comparison of hazardous waste generation on a per capita basis, over time, is another way to view progress. Figure 2.3 uses the same annual generation amounts as Figure 2.1, divided by Washington State's population numbers as provided by the Office of Financial Management. The 2000 per capita amount of 35 pounds is a decrease of 44 percent since 1992. In 1999 the per capita amount was 44 pounds.

Between the years 1990 and 2000 the population of the State of Washington has increased 1,027,429 people or 21 percent.[2] At the same time, hazardous waste generation has decreased from 52 lbs. per person to 35 lbs. per person, a 33 percent decrease.

Figure 2.3: Per Capita Hazardous Waste Generation



Annual Progress Report Projects

In Figure 2.4, Annual Progress Reports provide another measure of pollution prevention performance. The 2000 Annual Progress Reports submitted to date illustrate that 389 facilities implemented 1,041 individual pollution prevention projects during 2000. These actions resulted in 2,275 separate beneficial effects being reported within the six categories listed in Figure 2.4. Implementation of a project often results in benefits in more than one category. For example, when a facility substitutes a non-toxic substance for a toxic substance in an industrial process, the results may be recorded as a hazardous substance use reduction, a hazardous waste generation reduction, and a cost savings. In 2000, implementation of Pollution Prevention Plans generated the following benefits to Washington's environment and economy:

[2] U.S. Census Bureau: State and County QuickFacts: http://quickfacts.census.gov/cgi-bin/state_QiuickLinks?53000.

Figure 2.4: Annual Progress Report Projects (2000)

Categories Being Benefited / Effected by Implementing 1,041 Projects	No. of Benefits Reported
Reducing hazardous substances used	527
Reducing hazardous waste generated	655
Increased recycling of waste	296
Increased treatment of waste	92
Reduced air/water emissions	241
Cost savings	464
Total	**2,275**

Pollution prevention planning by facilities has achieved significant results in the first eleven years of the program. A total of 165 facilities have become small quantity generators by conscientiously implementing pollution prevention planning opportunities and therefore are no longer required to submit plans.

Generator Status vs. Planner Status

The comparison of medium and large quantity generators of hazardous waste and those who, due to their waste amounts, are also required to prepare pollution prevention plans is another way to measure progress in pollution prevention. A facility's generator status is determined by the amount of hazardous waste they generate and/or accumulate in a given month. As required under WAC 173-303 of the *Dangerous Waste Regulations*, these facilities report to Ecology each year how much hazardous waste they generated and how it was managed.

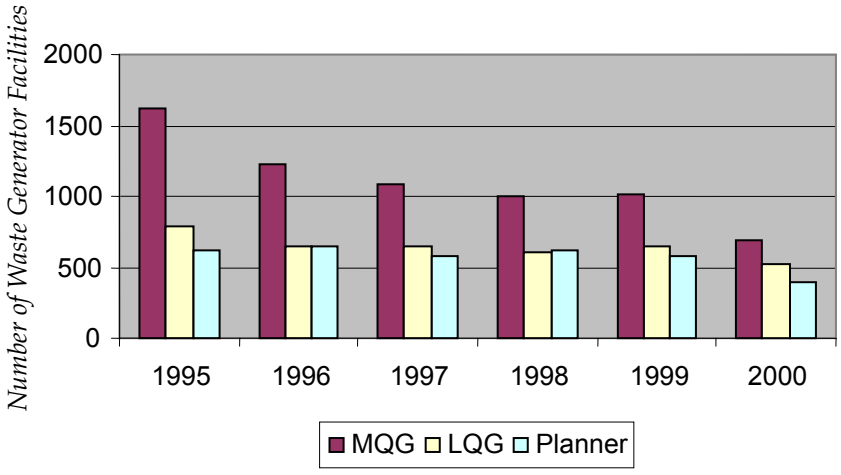
- Medium quantity generators (MQG) are those who generate and/or accumulate between 220 and 2,200 pounds of hazardous waste in a month.
- Large quantity generators (SQG) are those who generate and/or accumulate greater than 2,200 pounds of hazardous waste in a month.
- Facilities that prepare pollution prevention plans (planner) can be either medium or large quantity generators. Facilities that generate greater than 2,640 pounds of recurrent hazardous waste in a year's time are also required under WAC 173-307 to prepare a pollution prevention plan.

As explained in Chapter 1, not all wastes (i.e., waste waters, radio-active and non-recurrent wastes) that are counted in establishing a generator's status are included in this report. A total of 1,213 facilities classified as large and medium quantity generators reported generating hazardous waste in 2000, of which 1,129 generated wastes are covered in this report.

The data displayed in Figure 2.5 shows the number of large quantity generators and planners are almost identical (i.e., most large quantity generators are also planners). Large quantity generators account for more than 90 percent of all hazardous waste generated and reported in Washington. While waste generation amounts in Figure 2.1 have fluctuated over the past five years, the number of large quantity generators has remained fairly stable through 2000.

Medium quantity generator numbers show a steady decrease from 1995 to 2000. The decrease in the number of medium quantity generators over this time period is due to facilities implementing better waste management techniques, pollution prevention efforts such as using less toxic products, and by changes in the dangerous waste regulations. There are incentives for companies to drop below the medium quantity generator limit and become small quantity generators. They have less regulatory reporting, they can participate in free or reduced cost local county hazardous waste disposal, and they can extend their waste accumulation time period which helps reduce their hazardous waste management costs.

Figure 2.5: Generator Status Versus Planner Status



Waste Generation by Industry Sector

To better understand the origins of waste generated in Washington State, Ecology has identified the industry groups that generate large or significant amounts of waste (namely metals, organic/inorganic chemicals, aircraft and transportation, petroleum, pulp and paper). The amounts of waste generated by these industry groups have been compiled for the years 1995 through 2000 to help identify trends and fluctuations in waste generation.

The pie chart (right) compares year 2000 waste generation amongst the various industry groups. The facilities represented in this chapter are the 1,129 individual sites who reported recurrent hazardous waste generation in this same year (see Chapter 1). A detailed discussion on each of the industry groups follows.

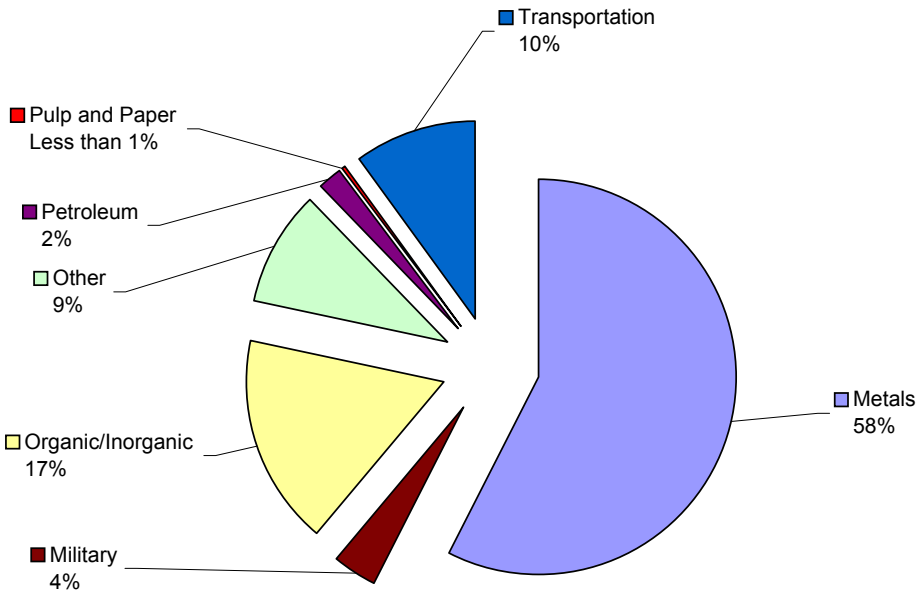


Figure 3.1: 2000 Waste Generation by Sector

The Annual Progress Report for year 2000 has some new features. Ecology now identifies businesses by type using the North American Industry Classification System (NAICS) code. NAICS codes replaced the Standard Industrial Classification (SIC) Code System used in the 1999 report. Some facilities and sector groupings were altered as a result of the corrections and adjustments made in this transition. In addition, military facilities have been identified as a separate sector in this report. In 1999 military facilities were included in the "other facilities" sector.

Metal Industries (58%)

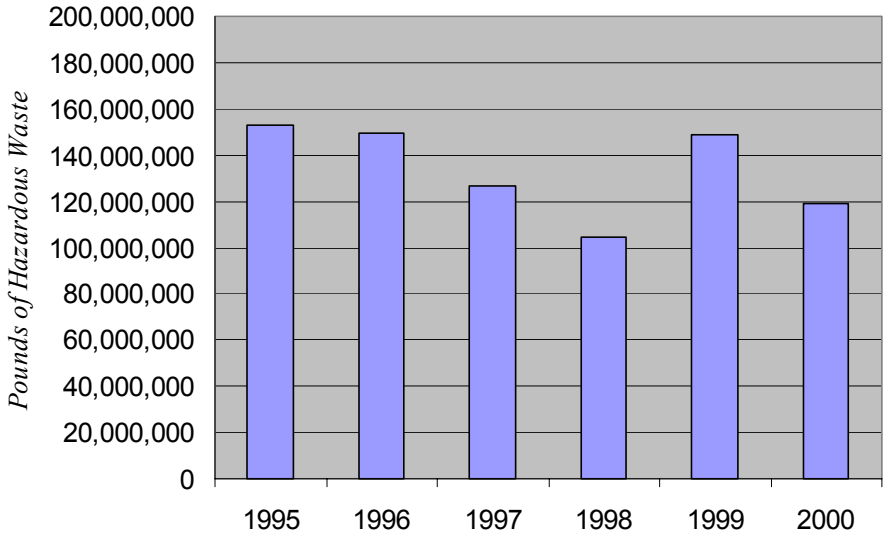
This group includes companies engaged in smelting and refining ferrous and nonferrous metals and the manufacturing of metal-based products. They are the state's largest source of non-nuclear hazardous wastes and they include aluminum smelters and metal/steel manufacturers.

Figure 3.2: Metal Industries

Top Waste Generators in 2000

- Longview Aluminum LLC
- Birmingham Steel Corp Co.
- Goldendale Aluminum
- Alcoa Wenatchee Work
- Kaiser Aluminum Mead Works

(This group consists of 21 facilities)



Between the years of 1995 and 2000, this industry sector generated 56.5 percent of all waste in the pollution prevention planning universe. While waste volumes are high, this industry group is relatively small in number with just 21 facilities in 2000.

Aluminum Smelters

Within the metal industry, aluminum smelters stand out as the largest generators due to the high volumes of spent potlining waste that is generated when failed pots are relined. The amounts of spent potliner waste generated fluctuate over time, depending upon when and how often pots are rebuilt and how often they are shut down and restarted. In 2000, Longview Aluminum (formerly Reynolds Metals), Birmingham Steel Corporation, Goldendale Aluminum, Alcoa Wenatchee Works and Kaiser Aluminum, Mead Works, were the largest waste generators in this group.

The aluminum industry, through design and operational changes to their 100-year old technology, has been working on ways to extend the life of potliner, thereby reducing hazardous waste generation over the long term. In the short term, there have been large fluctuations in the amount of spent potliner being generated.

Re-starting pots after they have been shut down shortens the life of the potliner. Some smelters have chosen to rebuild all of their pots at the same time, thereby leading to periodic increases in spent potliner waste generation.

Currently, the preferred method of managing spent potliner waste is to deposit it in a landfill. Although there is interest in recycling this waste (for uses such as cement kiln fuel, insulation, and mineral surfacing for roofing), no one has come forward to build and operate an economical recycling plant. The disposal of spent pot liner is subject to federal treatment standards and is relatively inexpensive for aluminum smelters.

The Longview Aluminum facility in Longview, Washington stands out in the aluminum smelter industry group because they use wet scrubbers (rather than dry scrubbers as used by other Washington smelters) as their primary method of controlling air pollutant emissions. Wet scrubbers at Longview Aluminum produced 53 million pounds of extremely hazardous waste in 2000. This quantity is large and variable due to changes in system operation and sludge de-watering. Wet scrubber waste is increasing due to improved air emission control systems and operational changes to meet stricter federal air toxic emission standards. Longview Aluminum is looking at ways to recycle usable constituents in their wet scrubber waste, but they currently land dispose of it in Arlington, Oregon.

In 2000, smelters began to reduce and/or stop operations. This eventually led to increased waste generation as some smelters use shutdown periods to rebuild smelter pots, generating large quantities of waste even when there was little or no aluminum production. Ecology expects to see continued fluctuations of waste generation within this sector.

Many aluminum smelters in Washington State are expected to shut down completely or severely curtail production during 2001due to a series of events including skyrocketing power prices in early 2001, low prices for aluminum and an uncertain economy. Therefore, Ecology anticipates the amounts of hazardous waste generated by aluminum smelters to vary greatly in 2001 and the coming years.

Metal and Steel Manufacturers

Birmingham Steel Corporation in Seattle recycles scrap metals by melting and adding alloys to raise the quality of steel to acceptable levels. Melting operations generate a slag (a non-hazardous product) and a dust listed as a hazardous waste collected by a bag house control system. Birmingham Steel has used an EPA-approved method to

recycle 100 percent of their dust for several years now. They have a company policy to not recycle the dust as fertilizer.

In 2000, Birmingham Steel addressed their cooling water use and discharge. Although not a hazardous waste, the opportunity to use groundwater infiltration and reuse cooling water to substitute for fresh city water was viewed as major pollution prevention advancement. Equipment was designed and installed to cool and reuse non-contact water along with a water return system to reuse water in their process. The projected savings was 52 million gallons of water per year for both projects combined. After implementation, cost savings approaching $8,000 per month were realized.

Organic/Inorganic Chemical Industries (17%)

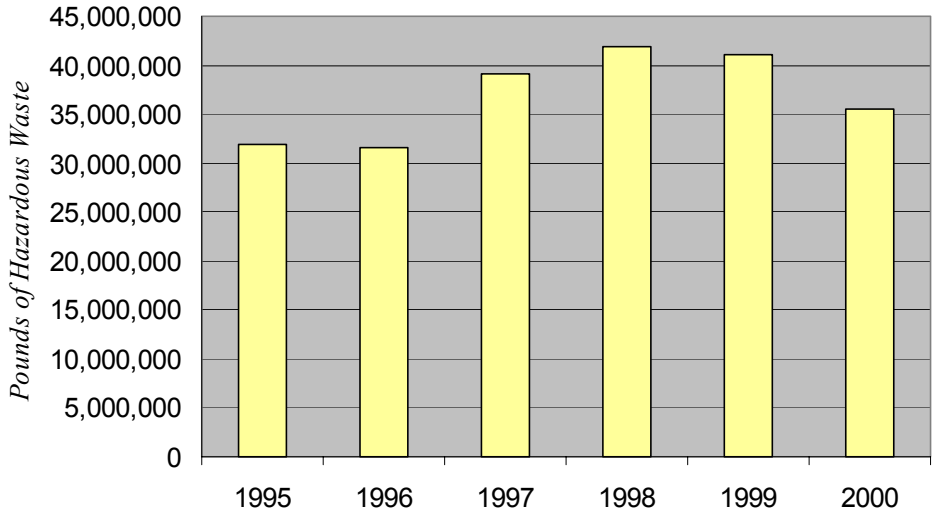
This group consists of companies that produce basic chemicals (such as acids, salts, and organic chemicals) and companies that manufacture products through chemical processes. There are three different categories of manufactured chemical products: 1) chemical products for use in further manufacturing, 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.

Figure 3.3: Organic/Inorganic Chemical Industries

Top Waste Generators in 2000

- Noveon Kalama Chemical
- RSA Microtech
- Tex Enterprises, Inc.
- Valspar Corporation
- Columbia Paint Co., Inc.

(This group consists of 46 facilities)



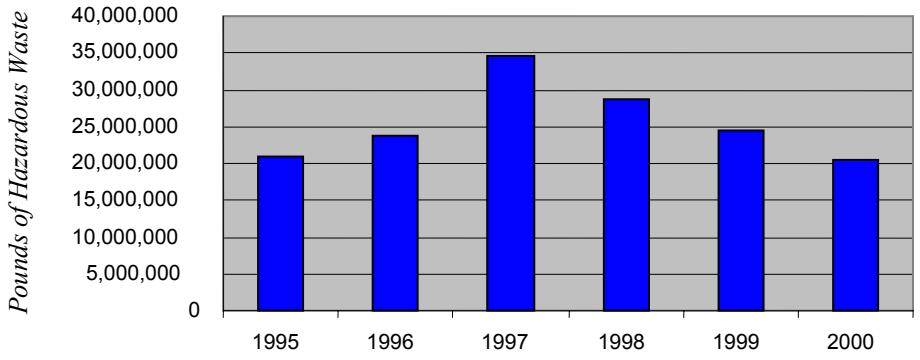
Hazardous waste generation from the organic/inorganic chemical sector is dominated by one facility, Noveon Kalama (formerly B.F. Goodrich-Kalama Chemical). Each year, between 1995 to 2000, Noveon accounted for at least 94 percent of the total hazardous waste generated by this industry group. As shown in the chart above, waste generation for the group increased between 1995 and 1997, leveled off in 1998 and 1999, and decreased by about 5.6 million pounds in 2000. The fluctuations can be explained by looking directly at Noveon Kalama's operations. Between the years 1996 and 1998 they saw over a 7 million-pound increase in their waste generation, primarily due to increases in their production.

Noveon Kalama also added a new fragrance process line that increased their waste amounts by approximately one to two million pounds. In 2000, the decrease in hazardous waste generation at Noveon, of about 6.4 million pounds, is related to both a decrease in production and implementation of reduction opportunities, such as the reduction of benzene wastes by about 500,000 pounds.

Aircraft and Transportation Industries (10%)

This group includes companies that manufacture equipment for transportation of passengers and cargo by land, air and water. In Washington State we have 79 facilities in this group which includes suppliers, vendors and manufacturers.

Figure 3.4: Aircraft and Transportation Industries



Top Waste Generators in 2000

- *Boeing Auburn*
- *Boeing Frederickson*
- *Goodrich Corporation*
- *Boeing Everett*
- *Boeing Renton*

(This group consists of 79 facilities)

The fluctuations in waste amounts generated by this industry sector are largely attributed to production changes and waste reduction measures implemented by the largest waste generator, The Boeing Company. Boeing is the world's largest commercial and military aircraft manufacturer with operations in 27 states and more than 170,000 employees.

In 2000, The Boeing Company experienced a decline in commercial airplane production. They stated in their 2000 Annual Report, *"After a 40 day engineering and technical workers strike, we were back on track in 2000, delivering 489 airplanes."* This is down from the production of more than 600 airplanes in 1999. Overall, Boeing has generated less hazardous waste in each of the last three years.

The Boeing Company's Auburn facility manufactures parts and subassemblies for other Boeing divisions. They purchase paint in large volumes, but mix the paint only as needed to reduce the residual. By modifying their scrubbers with flow restrictors, and installing timers in rinse processes they reduced water usage and sludge generation. In the last five years, these changes, along with other process and procedural modifications eliminated over 300,000 pounds of hazardous material use, and 1.3 million pounds of hazardous waste generation. For 2000, the Auburn plant reported meeting 100 percent of their hazardous substance use reduction, hazardous waste reduction and hazardous waste treatment goals, and 87 percent of their hazardous waste recycling goals in the fourth year of their five-year Pollution Prevention Plan.

The Boeing Company's Fredrickson facility reported meeting 55 percent of their hazardous substance use reduction goal in the second year of their five-year plan, but none of their hazardous waste reduction, recycling or treatment goals to date.

Military (4%)

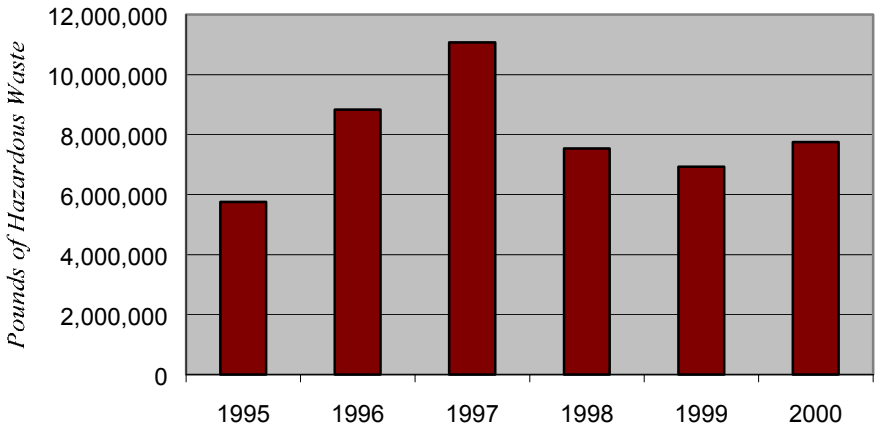
This group consists of the military bases and operations in Washington State. For calendar year 2000, 31 military facilities reported waste generation amounting to 4 percent of the hazardous waste in the state. Waste increased nearly 90,000 pounds, or 11 percent, in 2000 over 1999.

Figure 3.5: Military

Top Waste Generators in 2000

- USN PSNS Bremerton
- USARMY HQ I Corps & Fort Lewis
- USN Keyport OU1
- USN Bangor Submarine Base
- USN Whidbey

(This group consists of 31 facilities)



The Military sector includes the Departments of the U.S. Navy, U.S. Army and U.S. Air Force as well as the Washington Army National Guard and the Washington Air National Guard. Installations range in size from a few acres to thousands of square miles. Many of these installations are the equivalent of small, and sometimes not so small, cities. As a result they often have the entire infrastructure of a city including hospitals, sewage treatment plants, roads and airports. Their missions range from logistics and training to manufacturing and rebuilding aircraft and ships. These facilities provide the necessary infrastructure to support the armed services to accomplish their missions. Much of the support activity that generates hazardous waste is industrial in nature.

Hazardous waste production from the Puget Sound Naval Shipyard (PSNS), the highest generator in this group, is dependent on the type of work assigned by the US Department of the Navy. Their largest waste streams are associated with painting and submarine recycling. Paint waste and emissions significantly increase during years when an aircraft carrier is painted. In 2000, PSNS reported nine projects that reduced solvents, paints and abrasive blast media, resulting in an estimated savings of $375,000. Their new goal, based on the Federal Government Executive Order 13148, is to reduce Toxic Release Inventory releases by 10 percent annually or 40 percent overall by December 31, 2006.

At Fort Lewis, their Annual Progress Report for the year 2000 showed a decrease in hazardous material use, but a slight increase in hazardous waste generation from the previous year. Fort Lewis attributes their increases, due for the most part to a change in their mission, which is reflected in the slight increase in waste generation in the military sector in Figure 3.5. Overall, the trend in reductions at Fort Lewis has been significant since 1994.

Petroleum Refining and Related Industries (2%)

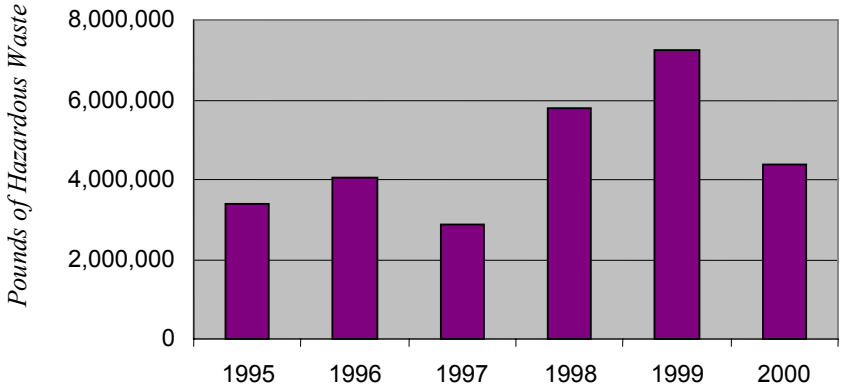
This group includes facilities primarily engaged in petroleum refining, the manufacture of paving and roofing materials, and the compounding of lubricant oils and greases from purchased materials.

Figure 3.6: Petroleum Refining and Related Industries

Top Waste Generators for 2000

- BP Cherry Point
- Puget Sound Refining
- Tesoro Northwest
- Phillips 66 Ferndale
- US Oil & Refinining Co.

(This group consists of 7 facilities)



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 wastewater and waste removed from plant sewers during periodic cleaning.

Some spent catalysts are sent to reclaimers for precious metals recovery. Oils from oily sludges are recovered and put back into the refinery process. Solid residues from wastewater treatment are either sold to cement kilns as log-grade fuels or, at the Arco and Equilon refineries, processed into coke products. "Anode grade" coke is purchased by aluminum plants for use in their smelting processes.

As shown in Figure 3.6, petroleum refinery waste quantities can fluctuate from year to year. Between 1998 and 1999, waste generation increased by approximately 1.5 million pounds. Between 1997 and 1998, the increase was close to 3 million pounds. Much of the increase in 1998 waste generation is attributed to periodic maintenance projects called "refinery turnarounds" where process equipment is replaced or dismantled, cleaned, repaired and placed back in service.

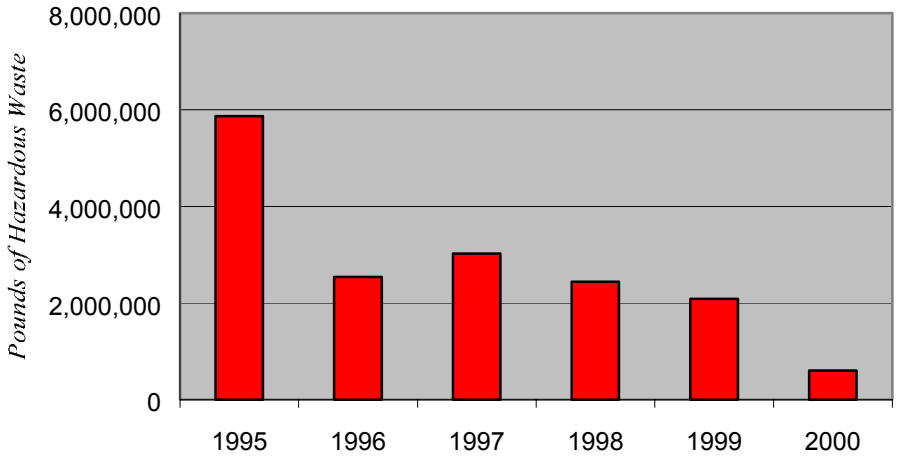
Turnarounds occur once every few years on a given refinery process and generate relatively large quantities of hazardous waste. In 1998, EPA adopted new petroleum refining waste regulations that resulted in stricter waste regulations. Select waste streams that were formerly considered non-hazardous now have to be reported and managed as hazardous waste. This is reflected in the increase in waste generated in 1999. Waste production in 2000 decreased by 2.9 million pounds from the 1999 total.

Further rule changes in 2000 allowed refineries to recycle some of wastes, which contributed to this reduction. In addition, several companies have begun to take advantage of pollution prevention opportunities.

Pulp and Paper Industries (less than 1%)

This group 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.

Figure 3.7: Pulp and Paper Industries



Top Waste Generators of 2000

- Georgia Pacific Corp
- Longview Fibre Co. Longview
- Fort James, Camas Mill
- Dyno Overlays, Inc. *(This group consists of 15 facilities)*

In 2000, the pulp and paper industries accounted for nearly 38 percent (10.2 million pounds) of the toxic chemical releases reported in the state[3]. Operating under environmental regulatory permits, these chemical releases do not violate federal, state or local environmental laws. Since 1995 pulp and paper industries have continued a downward trend by releasing fewer toxic chemicals each year. This downward trend resembles the same declining trend seen with their hazardous waste generation in Figure 3.7.

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 kilns operations. Over the past few years, there has been a growing trend with the mills to

[3] Referenced from Ecology's "Chemicals in Washington State Summary Report 2000-A Toxic Release and Hazardous Chemical Inventory". Publication Number 02-04-020, July, 2002.

recycle their solvent and paint wastes and/or to switch to materials that do not produce hazardous waste. Production of wastes at the state's pulp mills dropped by almost 1.5 million pounds, approximately a 70 percent decrease. Due to the weak market and economy, mills undertook fewer construction/demolition projects and significantly reduced the amount of asbestos wastes over previous years.

Alkaline type wastes are generated when Kraft mills recover pulping chemicals from their lime kilns. Some mills are able to use their alkaline wastes in place of feed stock for cement plants or as soil amendments. As a product substitute, the alkaline material is no longer considered a waste and therefore the generation of this waste is not included in this report.

All Other Industry Groups (9%)

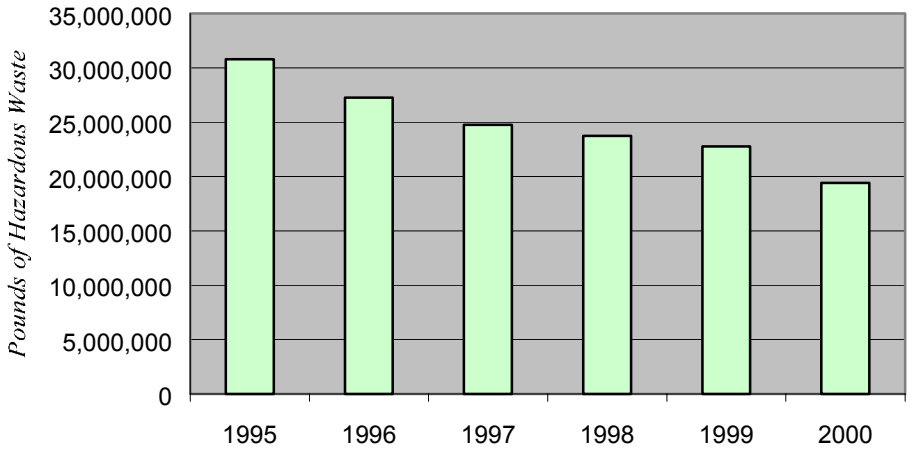
The industries not covered in the above groups are represented here. Making up the "All Other Industry Groups" is a variety of large and small businesses in Washington State. In 2000, 83% of the generators in Washington State fell into this category with waste production that accounted for only 9% of the total hazardous waste generated that year.

Figure 3.8: All Other Industry Groups

Top Waste Generators for 2000

- Wafer Tech LLC
- Toray Composites, America
- Genie Industries, Scissors Div.
- AVX Vancouver Corp.
- TTM Technologies Inc. Burlington

(This group consists of 929 facilities)



Ecology's technical assistance program often focuses on the businesses and facilities in this group. The larger industry groups, discussed previously in this chapter, typically have resources devoted to environmental programs. The smaller companies in this "other" industry group have limited resources and request more technical assistance from Ecology in the development and implementation of pollution prevention plans. The downward trend in hazardous waste generation of this group is attributed, in part, to the implementation of reduction techniques. Figure 3.8 shows that during the period of economic growth in the 90's, there was still a substantial decrease in the amount of hazardous waste generated by the majority of generators in the state.

Chapter 4

Program Highlights

General Technical Assistance

Providing technical assistance to businesses is a major component of the Hazardous Waste and Toxics Reduction Program. Ecology receives many requests for assistance. Help provided to facilities saves them significant amounts of money each year, increases their regulatory compliance rates, and decreases their liabilities. Some examples of the types of assistance provided include:

- Conducting reviews of hazardous substance use and hazardous waste generation.
- Providing assistance to overcome technical, economic and regulatory barriers to implementing pollution prevention projects.
- Assisting businesses manage hazardous waste safely.
- Assisting with cost analysis of pollution prevention opportunities.
- Sharing ideas and techniques on alternative process technologies.

During 2000, technical assistance was provided in several ways:

- 423 site visits to planners and non-planners
- 7,358 phone consultations to planners and non-planners
- Regular distribution of newsletters and other publications
- 15 workshops, attended by 695 participants

Directed Technical Assistance

Additional insights into effective waste management practices surface as Ecology works with specific industry sectors or implements special projects. Focused technical assistance efforts for these sectors and projects provide the opportunity to collect information on how improved management practices can reduce environmental impacts. Ecology initiated several successful efforts in this area during the reporting year.

TREE Project TC Systems

The Technical Resources for Engineering Efficiency (TREE) team is a group of Ecology engineers with expertise in industrial processes and pollution prevention. The team analyzes and finds ways that businesses can reduce their waste, increase efficiency, and save money. The technical assistance is provided at no cost to the company. Ecology started the innovative TREE program in 1997 when the agency realized that general technical assistance was sometimes not enough to help companies achieve pollution prevention. The team earned the Governor's Award for Service and Quality improvement in 1998.

In April 2000, the TREE team helped TC Systems, a company located in Everett, reduce their hazardous waste generation. TC Systems is a metal finisher of aerospace parts. TREE's efforts with TC Systems focused on improving their metal finishing operation by reducing drag-out and optimizing rinses.

Implementation of the opportunities by TC Systems would reduce hazardous waste by over 35,000 pounds each year, save 3 million gallons of water, and reduce wastewater generated by 54,000 gallons per year. In addition the opportunities would save about $44,000 annually after all the required equipment is paid off. The payback period for the identified equipment is about one year.

By the end of 2000, TC Systems had completed one of TREE's suggestions and is currently working on implementing another. TREE found a water usage discrepancy of over 3 million gallons per year between their actual use and billing records from the city. During our evaluation TC Systems was being billed for 7.6 million gallons per year. Since our visit, TC Systems has fixed their water meter and replaced a water valve linking their two buildings. They are now using less than 2 million gallons of water per year!

2000 Governor's Pollution Prevention Award Winners

In September, 2000, Governor Gary Locke presented awards to the winners of the 2000 Governor's Award for Outstanding Achievement in Pollution Prevention. He applauded the facilities for their successful efforts to prevent pollution by reducing the amount of hazardous substances used and the amount of dangerous waste generated.

The winners distinguished themselves by using innovative methods to ensure a clean environment for their employees, their community, and for all the citizens of the State of Washington. The winners are good neighbors, supportive of the community and protective of human health and the environment.

The winners were:

- Aldercrest Auto Rebuild, Lynnwood
- Boeing Aircraft and Missiles Group, Seattle
- Fairchild Air Force Base, Fairchild AFB, Spokane
- GM Nameplate, Inc, Seattle
- Habitat - Spokane Builders Surplus Store, Spokane
- In Harmony, Redmond
- Klickitat PUD (Public Utility District), Goldendale
- RE Sources, Bellingham
- S.E.H America, Vancouver
- Sleeping Lady, Leavenworth
- The McGregor Company, Colfax

New Initiatives

Dairy Manometer Turn-In Program - Mercury Manometer Replacement

This project was initiated as a statewide program to finance replacement of mercury vacuum gauges (mercury manometers) on dairy milking equipment in currently operating dairies with mercury-free gauges and to pay for the disposal of the elemental mercury. The project included removal of mercury vacuum gauges from dairy milking operations that had previously replaced the manometers but still stored them on-site. Mercury is considered a persistent, bioaccumulative chemical being targeted by State and Federal efforts to focus cross media efforts on the highest risk contaminants.

The project coordinated the efforts of the Washington State Department of Ecology (Ecology), Washington State Department of Agriculture (WSDA), Washington State University Cooperative Extension Program (WSU), Yakima County Moderate Risk Waste Program (Yakima MRW), and dairy equipment service providers. The WSU project team member researched and recommended comparable mercury-free alternatives. Ecology, WSU, and WSDA staff established a rebate coupon system that allowed dairies to use the vendors of their choice for replacing the gauges and to arrange with project team members for the removal of the mercury manometers before receiving a rebate of up to $300. The mercury manometers were removed from the dairies and transported to the Yakima MRW collection facility as

per state rules that regulate hazardous waste generated by small quantity generators by a project team member. Yakima MRW managed the waste manometers by separating the liquid mercury and mercury-contaminate debris, storing the waste, and shipping the waste to an acceptable mercury recycling facility.

A total of 55.9 pounds of liquid mercury and 53.4 pounds of contaminated debris were removed from the environment. 83 manometers were replaced with an electronic gauge and 7 manometers were removed because they were no longer in use. There were 3 types of manometers removed: u-shape; j-shaped; and straight-tube. The u-shape and j-shape are both installed with one pound of liquid mercury. The straight-tubes only hold up to 6 ounces when installed. Of the 90 manometers collected: 43 were j-shape; 33 were u-shape; and 14 were straight. The averaged amounts of liquid mercury per type was: 0.74 lbs./j-shape; 0.58 lbs/u-shape; and 0.17 lbs/straight.

Pollution Prevention Successes

Many facilities report successes they achieve by implementing projects identified in their pollution prevention plans. These projects often result in cost savings to the facility, improved worker safety and an improved image as a good neighbor. They always result in helping protect our air, water and soil. We congratulate these facilities on their achievements, and we thank them for sharing their stories.

Boeing Bellevue Shared Services provides diesel powered backup generator maintenance, and facilitates support for general office and computer activities. Since 1998, this facility has gradually begun implementing five changes that collectively save the company around $9,600 each year. Annually, the modifications eliminate 106,000 pounds of hazardous materials used and 8,000 pounds of hazardous waste generated. In 2000, the hazardous waste totals were only 56% of the hazardous waste generated in 1999. Antifreeze, motor oil, diesel fuel, petroleum, naptha, and Ni-cad batteries are among the hazardous substances being conserved or better handled.

The Boeing, **Auburn Facility** manufactures parts and subassemblies for other Boeing divisions. They purchase paint in large volumes, but mix the paint only as needed to reduce the residual. By modifying their scrubbers with flow restrictors, and installing timers in rinse processes they reduced water usage and sludge generation. In the last five years, these changes, along with other process and procedural modifications eliminated over 300,000 pounds of hazardous material use, and reduced the generation of hazardous waste by 1.3 million pounds.

Coastal Manufacturing in Everett is a sheet metal products manufacturer for the commercial consumer, aerospace, and medical electronics industries. By switching to a powder coating Coastal reduced their use of methyl ethyl ketone (MEK) and polyurethane paint. Both the MEK and paint are highly flammable, and cause skin irritation upon exposure. The paint can also cause long-term brain and nervous system damage with prolonged exposure, and the MEK can result in death from suffocation by replacing oxygen in the lungs. The switch eliminates many employee safety and health hazards, and decreases their use of hazardous substances. In the year 2000, they reduced their hazardous substance use by 83 percent from 1999, while

maintaining the same production level. This process change saved 951 gallons of polyurethane paint, and 440 gallons of MEK in the year 2000. In the next few years they intend to reduce emissions further by investigating different equipment and technologies.

Color Tech in Seattle provides a full line of coating services, including painting, dri-film lubricants, Teflon coating, and several others. In 1998 they began selling their used sandblasting and plastic stripping media as a product, rather then disposing of it as a hazardous waste. As a result, Color Tech has been able to eliminate almost 50,000 pounds of hazardous waste and save over $10,000 in the last three years. Additionally, they replaced their wet painting process with powder coating. Powder coating is solvent free, which reduces the impact on air quality and risk of fire. Additionally, it offers a better coating by providing a more uniform thickness covering the product. This change reduced their hazardous substance use over 34 percent between 1996 and 2000, while maintaining similar production levels.

Dynea Overlays in Tacoma manufactures resin impregnated papers for industrial and decorative applications. The resin paper is used in various applications from laminate flooring to kitchen cabinets. During the last 4 years, Dynea's hazardous waste generation dropped by approximately 95 percent. In 1997, Dynea generated 445,988 lbs of hazardous waste and in 2000 only generated 23,755 lbs. This reduction was the result of a production process change that utilizes water base, resin technology, thus reducing hazardous solvent resins.

Kenworth Trucking Company in Renton builds custom Class 8 heavy-duty diesel trucks and tractors. They implemented two major changes in 2000, saving themselves around $97,700. First, by limiting on-site painting of truck cabs and sleepers, Kenworth's consumption of solvent-based paint was reduced by 19,000 pounds. Second, they were able to completely replace the use of lead based paints with a lead-free alternative with similar properties, since three of the topcoat tints contained lead. The change was difficult to implement due to customer concerns about color matching. However, lead is known to have both short-term and long-term health problems associated with it, including effects on the reproductive, blood forming, urinary and nervous systems. Along with the health benefits associated with this accomplishment, it also decreased their hazardous waste production 8,600 pounds each year.

North Creek Analytical in Bothell provides analytical testing according to published methodologies for soils, waters, wastes, sediments and other matrices. They explored and implemented fourteen strategies to reduce material use, reduce waste, emissions, and cost. Due to the completed changes, their overall consumption of

hazardous substances was reduced by 700 pounds, hazardous waste production decreased 1,800 pounds, recycling of hazardous waste was increased 10,000 pounds, and $20,600 was saved through the year.

In 2000, SWRO HWTR and Water Quality staff have been actively incorporating P2 initiatives in water quality permits and implementation projects to reduce water and chemical use. **Pendleton Woolen Mills** is one of the facilities to enact the requirement for a P2 assessment within their NPDES permit. The facility anticipates that the PWM Wastewater Treatment Plant will process between 70 and 80 million gallons of waste water.

Activities of **Precision Engineering, Inc.** in Seattle, include industrial chrome plating, hydraulic component manufacture and repair, precision grinding, horning and lapping, a machine shop and welding, and blade manufacturing. They recently replaced methyl ethyl ketone (MEK) with a non-hazardous solvent in their cleaning process. MEK is highly flammable, causes skin irritation upon exposure, affects the nervous system, and is a teratogen (chemical interfering with the normal development of a fetus). Since 1996 they have been able to eliminate their disposal of rinse water used on chrome parts. This achievement was made possible by a change in work practices and updating their evaporator system. Additionally, self-filtering solvent tanks were installed, increasing the life of solvent, which in turn decreased overall disposal. This implementation resulted in an annual cost savings of $5000.

Sage Manufacturing on Bainbridge Island manufactures fly fishing rods and blanks. Last year, they implemented a recovery system which practically eliminated their consumption of acetone. Also, Sage recently reduced the amount on methylene chloride and methyl ethyl ketone used in their process. In 2000, their hazardous material usage was only 50 percent of that in 1999. In 2001, they hope to reduce this value to only 11 percent of their 1999 value.

The City of Seattle, **Seattle Transportation** (SEATRAN) maintains and improves the transportation system for the safe and efficient movement of people, goods and services. Since 1998 they have reduced their use of pesticides, instituted a policy to reduce the purchase of hazardous materials, established a surplus system to use overstocked items, and initiated better housekeeping procedures in the crew shop. Between 1998 and 1999, SEATRAN reduced the amount of hazardous waste they generated by 20,000 pounds each year. Additionally, between 1994 and 1998 they decreased their solvent usage by 80 percent.

Seattle School District Logistics Center provides the maintenance and operations support for over 100 independent schools and support buildings within the City of Seattle. They have reduced their hazardous material used, hazardous wastes generated, and health and safety risks. Since 1999, approximately 15,000 pounds of hazardous chemicals have been removed from the school science labs, and an additional 40,000 pounds were removed from the schools and support buildings. Many of these chemicals were extremely high risk and were removed without incident. The facility has established good management practices such as regular employee training, restrictions of what chemicals can be purchased, and a program helping to redistribute surplus materials between schools and other companies.

Tiz's Door Sales in Everett manufactures wood doors and frames, window and base moldings, and stair railings. In the year 2000, they reformulated their existing spray stain colors in order to decrease their use of hazardous substances. This small, family business, employing only 60 people was able to reduce their use of the hazardous material by 9,385 pounds during the year.

Trim Systems Operating Co. in Seattle manufactures thermoplastic and thermoset products for the heavy truck and boating industries. In 1998, Trim Systems implemented a substitute for dichloromethane in one of their production processes. Dichloromethane is moderately toxic, a skin and respiratory irritant, a mutagen (chemical in which exposure increases the probability of gene alterations occurring), and a suspected carcinogen (agent which increases the chances of cancer development). Also, their hazardous material use decreased from 21,067 pounds in 1999 to 9,762 pounds in 2000. Production decreased 15 percent from 1999 to 2000, but the company exceeded their hazardous material use reduction goal by 70 percent. Furthermore, they produced only 830 pounds of hazardous waste in 2000 compared to the 3,250 pounds generated just the previous year. Their hazardous waste use is now only 1 percent of that in 1988, and production has increased slightly since that time.

WaferTech is a large dedicated integrated circuit foundry located in Camas. WaferTech has implemented a water recycling program that has significantly reduced their water usage. They recycle, reclaim and reuse more than 51 percent of their water to meet daily production needs. During 2000, production at their facility increased by 100 percent from 1999 levels. As a result of their water recycling program, however, WaferTech only increased actual water use by 35 percent. For the year 2000, WaferTech's water recycling program has saved them $853,828 in water and sewer costs.