WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Reducing Toxics in Washington

1999 Annual Progress Report

Department of Ecology
Hazardous waste and Toxics Reduction Program
June 2001
Publication Number 00-04-003

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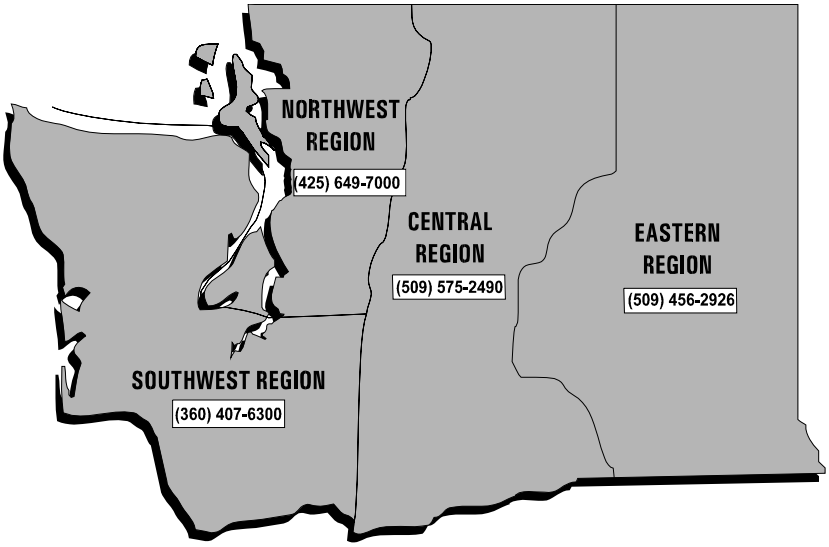

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Reduce Waste

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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 1999 annual report gives an overview of waste reduction efforts in Washington State and progress towards achieving the fifty-percent reduction goal.

The Pollution Prevention Planning Program has made progress. The 1999 data shows a 46 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 economic growth factors from one year to the next.

In 1999, after several consecutive years of decreases in hazardous waste generation, 1,280 facilities statewide reported hazardous waste generation of 255 million pounds, an increase of 42 million pounds since 1998. When normalization factors are applied, this increase equates to 18 million pounds.

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

Most increases in waste generation were found in two industry sectors. Metals, primarily aluminum smelters that generated spent potliner waste, had a 48 million pound increase in 1999. They also accounted for 59 percent of the total 1999 recurrent hazardous wastes generated in the state. Organic/Inorganic Chemicals accounted for 16 percent of the total 1999 hazardous waste generation. Overall, they had a slight reduction in hazardous waste generation from 1998. Aircraft & Transportation, Pulp & Paper, and the All Others sectors have decreased hazardous waste generation each year beginning in 1997.

Facilities that generate greater than 2,640 pounds of recurrent hazardous waste per year 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 672 facilities are Pollution Prevention Planners. These facilities design and implement Pollution Prevention Plans. Each year they submit an Annual Progress Report to Ecology. In 1999 planners reported implementing 1,218 projects that resulted in 2,476 benefits 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 State. 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 1999.

Program Overview

The 1990 Hazardous Waste Reduction Act established a goal to reduce hazardous waste generation by fifty percent. The primary means for achieving this goal is through implementation of the Pollution Prevention Planning Program as established in the Act.

What is pollution prevention?

Pollution prevention means reducing hazardous emissions, and substances 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 672 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.

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.

For facilities that have in place an effective environmental management system (EMS), and meet specified pollution prevention criteria, Ecology offers an alternative to the traditional Pollution Prevention Plan or 5-year plan update. A properly prepared Environmental Management System Alternative to Pollution Prevention Planning is environmentally equal to, and can outperform, a traditional P2 plan. On an EMS, a facility documents 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 Alternative facilities are still required to prepare an annual performance report to Ecology, which will report on progress towards achieving pollution prevention goals. To date, Ecology has approved the use of the EMS planning alternative for 19 facilities.

Ecology also promotes pollution prevention through initiatives other than planning. Several projects 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 projects is provided in Chapter 4, Program Highlights.

Pollution prevention is 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 Toward 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 equals 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. Generation trends, particularly when adjusted for changing economic conditions, provide a measurement of progress toward the 50 percent goal.

Figure 2.1 on page 12 charts "pollution prevention" hazardous waste generation levels for 1990 through 1999. 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 1, recurrent wastes are 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.

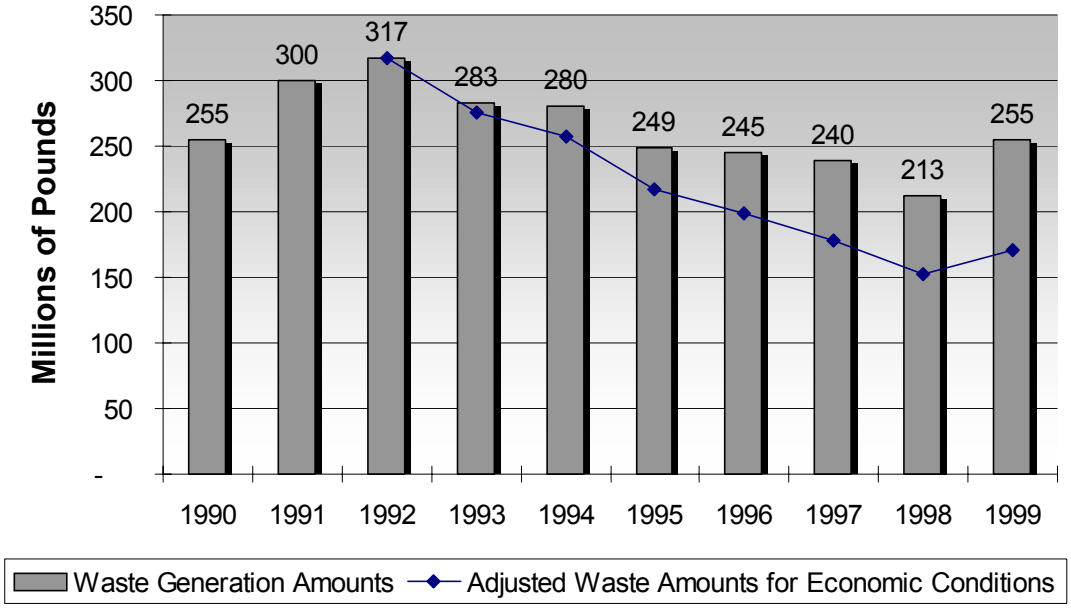
The line bar in Figure 2.1 shows waste generation levels, adjusted for economic conditions. This process, called "normalizing" data, makes waste totals more comparable from year to year by accounting for variations in economic activity. The adjustment factors were calculated from information provided by the Department of Revenue. Annual gross business income from all Washington businesses was the normalization measure used.

Hazardous waste generation increased in 1999. In Figure 2.1, generation data show an increase of 42 million pounds from 1998 to 1999, while normalized data show an increase of 18 million pounds. 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 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. For example, the normalized level of 153 million pounds in 1998, compared to 317 million pounds in 1992, equates to a 52 percent reduction.

With the adjusted amount at 173 million pounds in 1999, a 46 percent reduction since 1992 is indicated. 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 sectors outreach all have a positive influence.

Figure 2.1
Progress Toward the 50 Percent Waste Reduction Goal

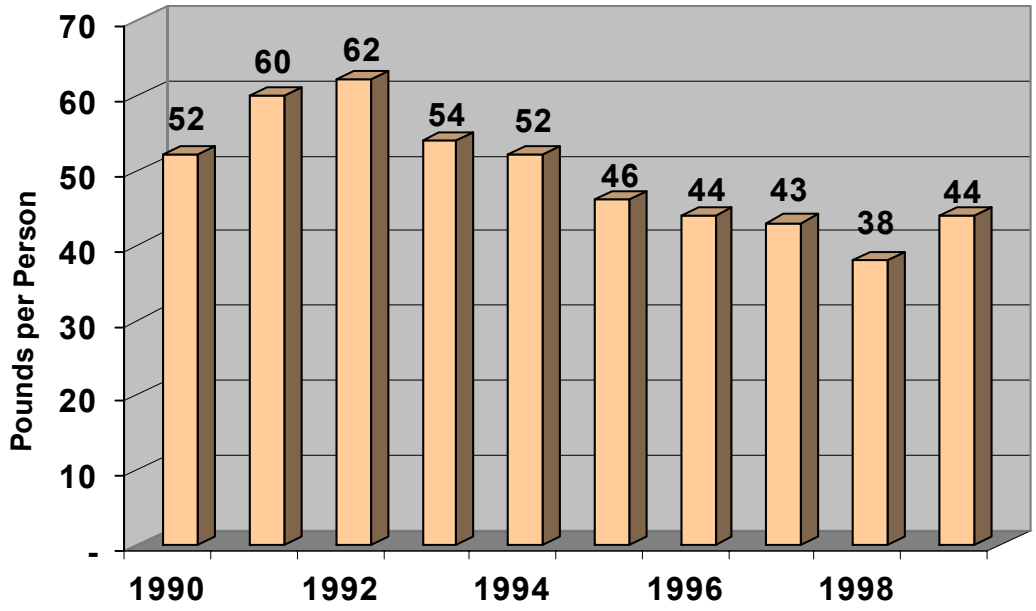


Other Measures of Progress

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 2.2 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 1999 per capita amount of 44 pounds is a decrease of 29 percent since 1992. In 1998 the per capita amount was 38 pounds.

Figure 2.2
Per Capita Hazardous Waste Generation

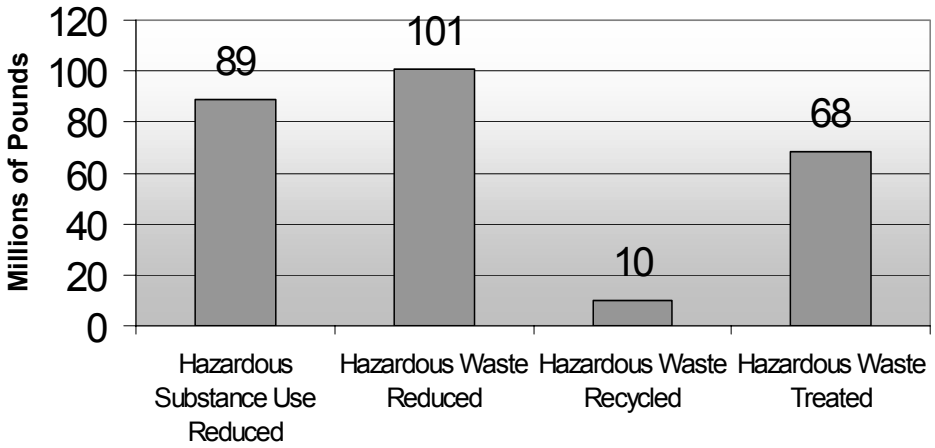


Pollution Prevention Facility Goals

Another way to measure progress is to look at the information provided by facilities required to prepare pollution prevention plans. Facilities are asked to establish numerical goals for hazardous substance use reduction 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.

It should be noted that while planning is mandated, plan implementation is voluntary on the part of the planning facilities. Figure 2.3 displays cumulative goals for facilities submitting plans and Annual Progress Reports, as required by the Hazardous Waste Reduction Act, from 1992 through 1999. Establishing numeric goals enables planning facilities to chart progress made each year by the implementation of planning opportunities.

Figure 2.3
Pollution Prevention Facility Goals (1992 – 1999)



Annual Progress Report Projects

In Figure 2.4, Annual Progress Reports provide measure of pollution prevention performance. The 1999 Annual Progress Reports submitted to date tell us that 349 facilities implemented 1,218 individual pollution prevention projects during 1999. These actions resulted in 2,476 separate beneficial effects being reported within the six categories listed below. 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 1999, implementation of Pollution Prevention Plans generated benefits to Washington's environment and economy as shown below.

Figure 2.4
Annual Progress Report Projects (1999)

Categories Being Benefited/Effected by Implementing 1, 218 Projects	Number of Benefits Reported
Reducing hazardous substances used	562
Reducing hazardous waste generation	753
Increased recycling of waste	267
Increased treatment of waste	116
Reduced air/water emissions	289
Cost savings	489
Total	**2,476**

Pollution prevention planning by facilities has achieved significant results in the first ten years of the program. A total of 136 facilities have become non-regulated generators by conscientiously implementing pollution prevention planning opportunities and therefore are no longer required to submit plans.

Generator Status vs. Planner Status

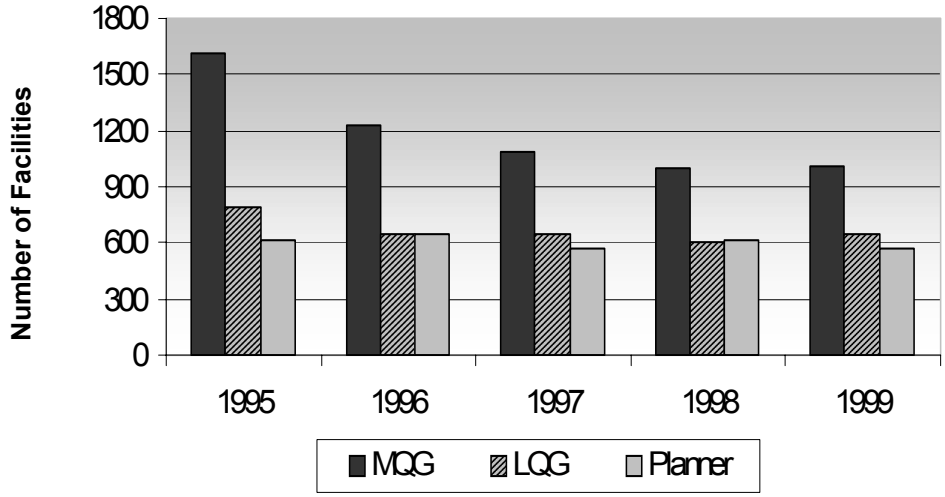
The comparison of medium and large quantity generators of hazardous waste and those who, due to their waste amounts, are also required to prepare pollution prevention plans is another way to measure progress in pollution prevention. A facility's generator status is determined by the amount of hazardous 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 are those who generate and/or accumulate between 220 and 2,200 pounds of hazardous waste in a month.
- Large quantity generators are those who generate and/or accumulate greater than 2,200 pounds of hazardous waste in a month.
- Facilities that prepare pollution prevention plans 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.

The data displayed in Figure 2.5 shows the number of large quantity generators and planners to be very close (i.e., most large quantity generators are also planners). Large quantity generators account for approximately 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.

Medium quantity generator numbers show a steady decrease from 1995 to 1998 and start to level off in 1999. The decrease in the number of medium quantity generators over this time period is explained by the facilities implementing better waste management techniques, pollution prevention efforts such as using less toxic products, and by changes in the dangerous waste regulations. Incentives are available for companies to drop below the medium quantity generator limit and become small quantity generators. They have less regulatory oversight, they can participate in free or reduced cost local county hazardous waste disposal, and they have an extended waste accumulation time period which helps them reduce their hazardous waste management costs.

Figure 2.5
Generator Status versus Planner Status

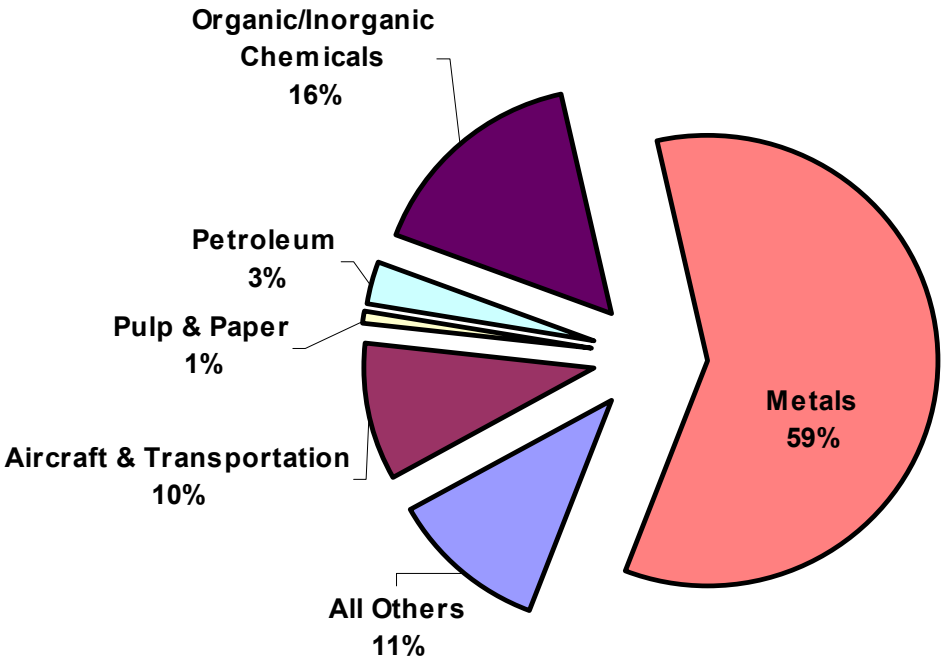


Chapter 3
Waste Generation by Industry Sectors

To better understand where the waste generated in Washington State comes from, we have identified the industry groups that generate large or significant amounts of waste (namely metals, organic/inorganic chemicals, aircraft and transportation, petroleum, pulp and paper and all others). The amounts of waste generated by these industry groups have been compiled for the years 1995 through 1999 to help identify trends and fluctuations in waste generation.

The pie chart below compares 1999 waste generation among the various industry groups. A detailed discussion on each of the industry groups follows.

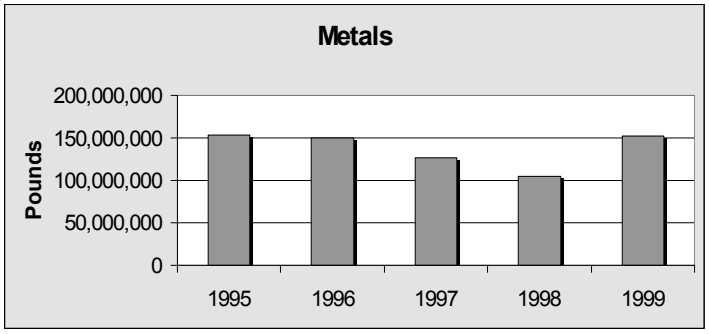
Figure 3.1
1999 Waste Generation by Industry Sector



Metal Industries (59%)

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
1995 – 1999 Waste Generation



Top 1999 Waste Generators:

- *Reynolds Metals Longview*
- *Goldendale Aluminum Co.*
- *Birmingham Steel Corp.*
- *Alcoa Wenatchee Work*
- *Kaiser Aluminum Tacoma*

(This group consists of 19 facilities)

Between the years of 1995 and 1999, this industry sector generated 57 percent of all waste in the pollution prevention-planning universe. While waste volumes are high, this industry group is fairly small in numbers, consisting of just 19 facilities in 1999.

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 amount of spent potliner waste generated fluctuates over time, depending upon when and how often pots are rebuilt and how often they are shut down and restarted. Reynolds Metals, Goldendale Aluminum, Alcoa Wenatchee Works and Kaiser Aluminum are the largest 1999 waste generators in this group.

The aluminum industry, through design and operation changes to their 100-year old technology, have been working on ways to extend the life of potliner, thereby reducing hazardous waste generation over the long term. In the short term, we are seeing 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 management method for spent potliner waste is to landfill it. 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 landfilling of spent potliner is subject to federal treatment standards and is relatively inexpensive for aluminum smelters.

The Reynolds Metals facility in Longview, WA stands out in the aluminum smelter industry group because they use wet scrubbers (rather than the dry scrubbers used by other Washington smelters) as their primary control of potline air pollutant emissions. The Reynolds Metals wet scrubbers produced 39 million pounds of extremely hazardous waste in 1999. This quantity is large and variable due to changes in system operation and sludge de-watering. We see this wet scrubber waste increasing due to improved air emission control systems and operational changes to meet stricter federal air toxic emission standards. Even though Reynolds Metals is looking at ways to recycle usable constituents in their wet scrubber waste, they currently land dispose it in Oregon.

With the drastic effect of Northwest power prices, the amounts of hazardous waste generated by aluminum smelters is expected to vary greatly in 2001 and the coming years. In 2000, we already saw smelters reduce and/or stop operations. As mentioned earlier, turning pots off and then on again shortens the life of the potliner and eventually leads to increased waste generation. We expect to see continued fluctuations of waste generation with the aluminum smelters. Some smelters are using shutdown periods to rebuild their pots, generating large quantities of waste when there is little or no aluminum production.

Metal and Steel Manufacturers

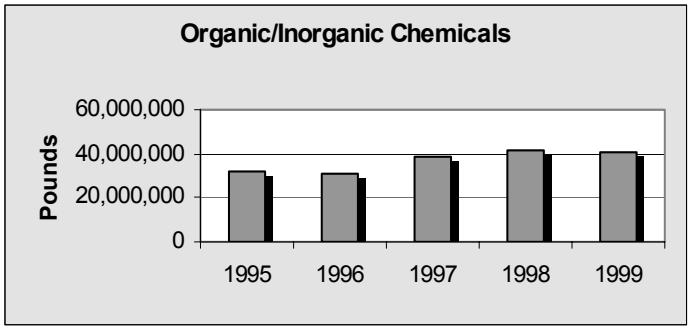
Other businesses in this industry group include the metal and steel manufacturers. Northwest Alloys is a company that mines dolomitic lime and processes the ore to produce magnesium metal. In processing the large quantities of ore, various waste streams of off-specification material and dross (waste impurities) are produced. They designate as dangerous waste due to high pH and/or toxicity. The quantity of these waste streams is quite large and variable. Northwest Alloys is permitted to dispose of some of this waste in on-site landfills and use it to produce fertilizer and soil amendments. Northwest Alloys has continually worked to develop and market agricultural products from their wastes which differ little from other commercial agricultural products because the raw materials originated as by-products from metals production.

Birmingham Steel is a company that recycles scrap steel by melting and adding alloys to raise the quality to acceptable levels. Melting operations generate a slag (a non-hazardous product sold as a construction base) and a hazardous waste dust which is collected by a bag house control system. Using the EPA approved High Temperature Metals Recovery method Birmingham Steel was able to recycle 100 percent of their hazardous waste dust in 1999. They have also reported steady decreases over the years in lead concentration in their scrap steel. Over the past five years, Birmingham Steel has managed to slightly decrease their waste generation, while maintaining the same level of production. Their efforts were rewarded by being selected as a winner of the 1999 Governor's Award for Pollution Prevention.

Organic/Inorganic Chemical Industries (16%)

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
1995 – 1999 Waste Generation



1999 Top Waste Generators:

- *BF Goodrich-Kalama Chemical*
- *Wasser High Tech Coatings*
- *Valspar Corporation*
- *Hollister Stier Laboratories LLC*
- *Parker Paint Manufacturing Co.*

(This group consists of 37 facilities)

Hazardous waste generation from the organic/inorganic chemical sector is dominated by one facility, B.F. Goodrich-Kalama Chemical in Kalama, WA. Between the years 1995 to 1999 Kalama accounted for over 98 percent of the total hazardous waste generated by this industry group. As shown in Figure 3.3, waste generation fluctuated between 1995 and 1997, and then leveled off in 1998 and 1999. The fluctuations can be explained by looking directly at 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. They also added a new fragrance process line that increased their waste amounts by approximately one to two million pounds.

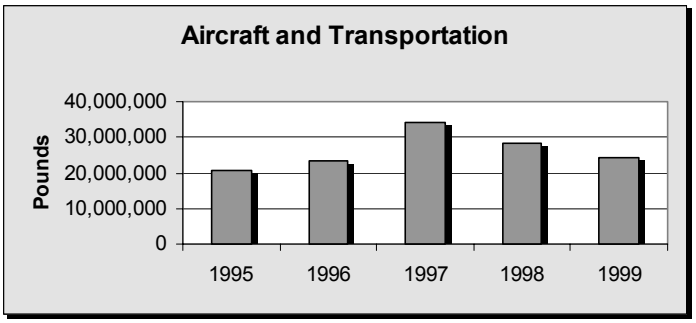
The Parker Paint Manufacturing Company, located in Tacoma has instituted many waste reduction activities since the beginning of Ecology's pollution prevention program. They began to re-use much of their solvent waste by using it as a product substitute in their paint formulations. They have been gradually reducing their manufacturing of oil-based products and have made facility improvements that include storm water management, bulk storage of toxic chemicals, reuse of water, and an efficient material tracking system.

Even with all the progress Parker Paint has made in pollution prevention, it's important to note that since 1998, there has been a substantial increase in the amount of hazardous waste they generate due to a government contract for manufacturing oil-based paint. This paint product is made only occasionally, so normal operations of using solvent waste to wash batching tanks cannot be utilized. Instead of re-using the solvent in this manner, they have to manage it as a hazardous waste, which accounts for over 70 percent of their total waste.

Aircraft and Transportation Industries (10%)

This group includes companies that manufacture equipment for transportation of passengers and cargo by land, air and water.

Figure 3.4
1995 – 1999 Waste Generation



Top 1999 Waste Generators:

- *Boeing Auburn*
- *Boeing Frederickson*
- *Boeing Everett*
- *Boeing Renton*
- *Kenworth Trucking Co.*
- *Boeing Plant 2*

(This group consists of 66 facilities)

The fluctuations in waste amounts generated by this industry sector are largely attributed to production increases and waste reduction measures implemented by the large waste generators, namely Boeing and Kenworth Trucking.

In 1998, Boeing had a record year for aircraft sales. They stated in their 1998 Annual Report, *"We got largely back on track in 1998 and delivered a record 559 jetliners, up from 374 in 1997 and 269 in 1996."* This alone represents a 200 percent production increase over two years in their commercial aircraft division and may help to explain the 1997 waste peak in this industrial sector. Also in 1998, Boeing aggressively pursued their "Lean Manufacturing" goals. Lean Manufacturing, according to Boeing, *"relies on the experts – employees on the factory floors who actually do the physical work — to change their work areas and processes to maximize efficiency, improve quality and safety, and eliminate unnecessary motion and inventory."*

In 1999, the Boeing Auburn plant reported achieving nearly 100 percent of their reduction goals two years ahead of schedule while the production of parts and subassemblies for other divisions increased. They voluntarily implemented a record number of 45 pollution prevention opportunities originally identified in their Pollution Prevention Plan in 1997 and they amended their pollution prevention goals upward for the rest of their five-year plan.

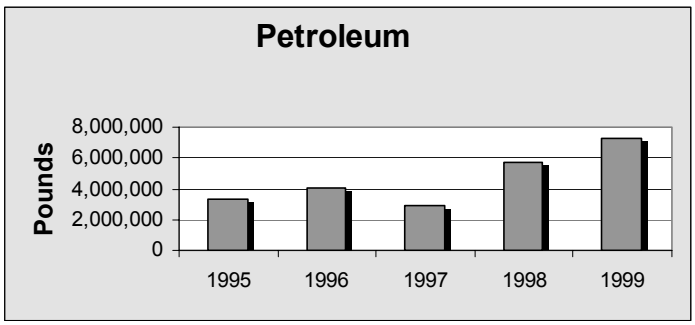
The Kenworth Truck Company – Renton facility (a division of PACCAR) builds custom diesel trucks, tractors and parts for domestic and export markets. In 1999, they reported a 70 percent increase in production over their 1995 base year. By implementing a number of pollution prevention measures, including outsourcing painting to vendors, upgrading their solvent sink, requiring vendors to paint components, and eliminating their paint cleaning oven, they reduced hazardous substance use by over 22,000 pounds and reduced hazardous waste generation by over 6,000 pounds for these processes. These changes represented savings of nearly $30,000 in 1999.

In 1998, the Kenworth Seattle Plant was remodeled for truck production, which started late that year. Trucks were produced through mid-2000 when they closed the main line due to low orders. A total of 4,342 trucks were built in 1999. They continue to build off-highway trucks and fabricate parts to support their other plants. Their largest waste streams, wastewater and sludge, increased nearly 40 percent to over a million pounds from 1998 to 1999. They anticipate their production schedule will change in 2001 and the amount of waste will significantly decline with the shutdown of their water wash paint booths.

Petroleum Refining and Related Industries (3%)

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

Figure 3.5
1995 – 1999 Waste Generation



Top 1999 Waste Generators:

- *Arco Petroleum Cherry Point*
- *Equilon (formerly Texaco)*
- *Tesoro Northwest*

(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.

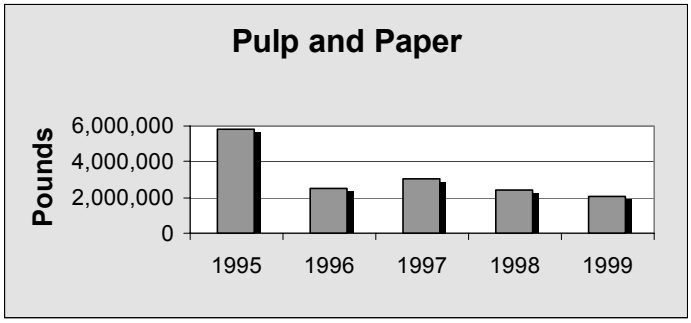
Some spent catalysts are sent to reclaimers for precious metals recovery. Oils from oily sludges are recovered and put back into the refinery process. Solid residues from wastewater treatment are either sold to cement kilns as low-grade fuels or, at the Arco and Equilon refineries, processed into coke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

As shown in Figure 3.5, 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.

Pulp and Paper Industries (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 3.6
1995 – 1999 Waste Generation



Top 1999 Waste Generators:

- *Georgia Pacific Corp*
- *Boise Cascade Paper Division*
- *Fort James Camas Mill*
- *Weyerhaeuser Longview*

(This group consists of 17 facilities)

In 1999, the pulp and paper industries accounted for nearly 40 percent (over 10 million pounds) of the toxic chemical releases reported in the state[1]. 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 3.6.

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 recycle their solvent and paint wastes and/or to switch to materials that do not produce hazardous waste.

[1] *Referenced from Ecology's "Chemicals in Washington State Summary Report, 1999 – A Toxic Release and Hazardous Chemical Inventory." Publication Number 01-04-012, March 2001.*

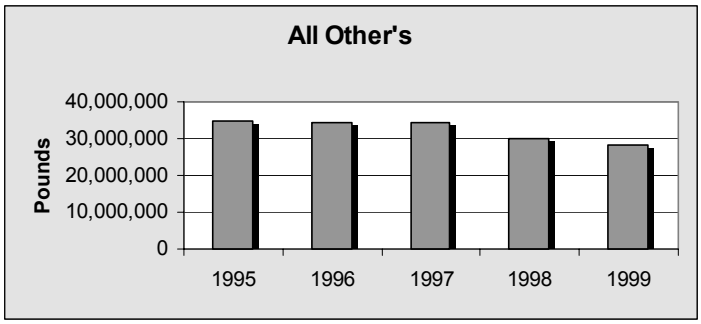
Alkaline-type wastes are generated when kraft mills recover pulping chemicals from their lime kilns. Some mills are able to use their alkaline wastes in place of feed stock for cement plants or as soil amendments. As a product substitute, the alkaline material is no longer considered a waste and therefore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

Until mid 1999, the Georgia Pacific pulp mill in Bellingham operated as both a pulp mill and chlorine plant. They operated the chlorine plant to supply the mill with chlorine for bleaching. As restrictions on chlorine bleaching tightened, demand for the product diminished until it was no longer needed and the plant closed. Because Georgia Pacific operated both a mill and a chlorine plant at the same facility, the waste from the chlorine plant is included in this pulp and paper industry sector study (normally, chlorine plant waste would be counted as generation in the organic/inorganic industrial sector).

All Other Industry Groups (11%)

The industries not covered in the previous groups are represented here. In 1999, 91 percent of the generators in Washington State fell into this category with waste production that accounted for only 11 percent of the total hazardous waste generated that year.

Figure 3.7
1995 – 1999 Waste Generation



Top 1999 Waste Generators:

- *USN PSNS Bremerton*
- *USAFB McChord*
- *Wafer Tech LLC*
- *USN Bangor Submarine Base*

(This group consists of 1,136 facilities)

Making up the "All Other Industry Groups" is a variety of large and small businesses and military bases in Washington State. In 1999, approximately 20 military facilities reported waste generation amounts, and together this waste type accounts for close to 20 percent of the hazardous waste produced in this industry group.

Ecology's technical assistance resources focus 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 3.7 on page 27 shows that even during recent economic growth 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 from facilities statewide. This assistance saves businesses significant amounts of money each year, reduces waste, increases their regulatory compliance rates, and decreases their liabilities. Some examples of the type of assistance provided include:

- Reviewing business practices of hazardous substance use and hazardous waste generation
- Assisting businesses overcome technical, economic and regulatory barriers to implementing pollution prevention projects
- Developing techniques for the safe management of hazardous waste
- Assisting with cost analysis of pollution prevention opportunities
- Sharing ideas and techniques on alternative process technologies

During 1999, technical assistance was provided in the following ways:

- 423 site visits to planners and non-planners
- 5,360 phone consultations to planners and non-planners
- 21 workshops, attended by 1,177 participants
- Regular distribution of newsletters and other publications

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 - Rainier Ballistics [2]

Ecology's Toxics Reduction Engineer Efficiency (TREE) team uses engineering analysis to reduce environmental impacts, facility costs, and regulatory requirements. 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 significant pollution prevention.

[2] *Additional information can be found in the Ecology publication "Pollution Prevention & Compliance Successes Through Technical Assistance." Publication # 00-04-009, March 2000 revision.*

The TREE team helped Rainier Ballistics, a company located in Tacoma, reduce their hazardous waste generation. Rainier Ballistics manufactures copper-jacketed bullets. The copper jacket protects the user from lead emissions. TREE's efforts with Rainier Ballistics focused on improving their copper plating operation.

Implementation of opportunities identified by the team will reduce the company's hazardous waste by over 20,000 pounds each year and will save about $30,000 annually after all the required equipment is paid off. The payback period for the identified equipment is 2.8 years. However, half of the opportunities have payback periods of less than six months so the team suggested that Rainier Ballistics implement these first and then collect savings to pay for implementing the remaining opportunities.

It took only one month for Rainier Ballistics to begin to implement TREE's suggestions and they have scheduled all remaining suggestions for implementation over the next two years! Rainier wrote a letter thanking Ecology for the help they received from the TREE team. The letter contained praise for the TREE team and the resulting report. Rainier Ballistics plant manager wrote "my comfort and confidence grew with each day" and "they helped show us ways to save money while reducing hazardous waste at the same time."

1999 Governor's Pollution Prevention Award Winners[3]

On September 20, Governor Gary Locke presented awards to the winners of the 1999 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.

[3] *Additional information can be found in the Ecology publication "Pollution Prevention & Compliance Successes Through Technical Assistance." Publication # 00-04-009, March 2000 revision.*

The winners were:

- Apollo Spas, Spokane
- Birmingham Steel Corporation, Seattle
- Canyon Creek Cabinet Company, Monroe
- Eden Advanced Pest Technologies, Lacey
- Elliott Bay Marina, Seattle
- EnviroStars Cooperative, King, Snohomish, Kitsap & Whatcom Counties
- Hytek Finishes Company, Kent
- Omega Pest Management, Bremerton

New Initiatives

Compliance Targeting and Wet Process Sector Project

In some cases, facilities generating large amounts of hazardous waste use similar "wet processing" operations. That is, they have tank "baths" to clean and coat parts. Together, they generated over 1.2 billion pounds of dangerous waste in 1998, of which 97 percent was Treatment-by-Generator/Permit-by-Rule (TBG/PBR) waste. The facilities are Electroplating/Metal Finishing, Aerospace/Parts Manufacturing, and Printed Circuit Boards. Facilities in these industrial sectors will receive compliance inspections and many will benefit from developing low-cost techniques for minimizing waste from their process baths. Focusing resources on these industries will allow Ecology to increase consistency and address environmental priorities.

Our experience shows that many wet process manufacturing operations can significantly reduce water use and waste volumes through implementing pollution prevention opportunities. The plan is to increase the efficiency of these three industry sectors by initiating a corporate challenge where Ecology provides technical assistance and will coordinate training for line staff and water treatment operators.

The technical assistance program will have two phases. The first phase consists of gathering information, assessing training needs, and grouping facilities into three "Tiers." In the second phase, tier groups are invited to participate and benefit from Ecology sponsored training.

This project is both timely and appropriate since many of these facilities have their second Five-year Update to their Pollution Prevention Plans due in September, 2002.

Wet Sector Goals:

- Improve compliance assurance in priority industrial sectors
- Reduce waste from these facilities by 10 and 25 percent
- Meet annual program hazardous waste reduction goal of 2 percent generated by all regulated facilities, and 7 percent adjusted for economic conditions

Chapter 5
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.

GM Nameplate creates signs and specialty advertising from their Seattle facility. In 1999, 14 of the top 15 hazardous substances they use decreased from 1998 levels. In fact, hazardous substance use decreased 28 percent overall, and hazardous wastes decreased 25 percent. This was achieved while sales increased over the same period.

Bartell Drugs has photoprocessing equipment in several stores around the state. Since submitting their 1997 Pollution Prevention Plan, they have purchased eighteen high efficient machines and reduced their hazardous wastes. The machines also have silver recovery units.

Genie Industries at the Redmond plant manufactures long-reach and high-lift equipment. One of their planning goals was to reduce the use of methyl ethyl ketone (MEK) in painting. MEK use in 1999 was down 21 percent compared to 1998.

Haworth Inc. – Lunstead Operations in Kent is a high-quality wood furniture manufacturer with 250 employees. In 1999, they saved over $52,000 by reducing solvents containing Hazardous Air Pollutants (HAP's), purchasing Ultra Violet finishing equipment, and training personnel regarding the environmental aspects of their work.

The Environmental Protection Agency Region 10 and Department of Ecology laboratories occupy the same site in Manchester, Kitsap County. Collectively they perform over 50,000 analyses per year. The pollution prevention opportunities they implemented in 1999 allowed them to reduce the use and resultant waste from methylene chloride and acetone. They went beyond our planning requirements to become the first "net metered" Photovoltaic Array system in the Northwest. As a result, they use solar energy and feed surplus energy back to the utility's power grid. By doing so, this actually slows and reverses the direction of the electrical meter. They also installed a new water-cooling tower resulting in a 66 percent reduction in water use and costs.

King County Metro Transit provides transportation to over 75 million passengers annually. In 1999 they eliminated 36,000 pounds of solvent waste, or 95 percent of their pollution prevention goal for this waste stream. They attained this while maintaining 240 bus routes over 4,600 miles of road. Their Vehicle Maintenance facility employs 650 people servicing a fleet of 1,235 buses, vans and trolleys.

The Fluke Corporation in Everett has reported impressive pollution prevention results and cost savings year after year. They reported savings of over half a million dollars in 1999 and nearly four million dollars since they began Pollution Prevention Planning. After adjusting the figures for production, 42 percent of their hazardous waste, 25 percent of their solid waste, and 26 percent of their water use/wastewater was reduced from 1991 to 1999.

The laboratory at **Harborview Medical Hospital** in Seattle implemented a new Formalin treatment program in mid-1999 with the willing participation of lab staff. Formalin contains formaldehyde, a known carcinogen in animals. Harborview has shown they can reduce disposal by 40 percent, and save money in the process. They report, "implementation of the Pollution Prevention Plan has helped keep the cost of waste disposal from growing as fast as the facility."

Coastal Manufacturing, Inc. in Everett manufactures sheet metal products for commercial, aerospace, and medical electronic industries. As they increased production 20 percent, they reduced their hazardous waste by 40 percent from 11,594 pounds in 1996 to 7,207 pounds in 1999, thereby saving $18,000. This reduction was achieved by converting many customers from solvent-based painting to powder coating. The company continues to investigate ways to eliminate solvent use by switching to aqueous paints or low VOC paints for customers who cannot convert to powder coatings. This conversion is expected to decrease the amount of solvents used and reduce air emissions.

Spectra Lux Corporation (SLC) in Kirkland manufactures display and switch panels of aluminum and Plexiglas. Even though production was up 45 percent in 1999, they reduced their hazardous paint waste substantially by training their painters, improving inventory management, and converting to laser-etched products whenever possible. SLC also got employees involved by rewards for good waste reduction ideas and work habits. They posted signs saying "SLC's Number 1 enemy – waste."

Bio-Rad Laboratories Inc. in Redmond is involved in the research, development, and manufacture of bio-medical diagnostic kits for the detection of human diseases in the healthcare industry. They reported in 1999, that the amount of hazardous wastes they generated were 4.5 percent of the amount in their 1993 base year, even though production had increased. Most of this success was attributed to the replacement of an organo-mercury preservative with a safer alternative. Bio-Rad also reported savings in these areas of $390,000 since 1993. They said progress has been excellent and better than originally planned.

Final Phase Finishing Inc. in Redmond treats and paints metal and plastic parts for the manufacturing industry. In 1999, they reported that since 1997 they reduced their still bottoms to 880 pounds from 4,237 pounds while production remained level. They said, "the implementation of Final Phase Finishing's pollution prevention actions has had a positive effect on the reduction of the amount of hazardous waste disposed of by this facility."

McChord AFB in Tacoma reduced aircraft wash waters by 1,051,898 pounds between 1997 and 1999. This waste stream reduction is due to reduced wash operations in Building 1178, and improved water conservation measures and resulted in annual cost savings of $73,633. A new aircraft wash water filtration system was completed in 2000, and is expected to be fully operational in 2001 which will further enhance the program. In addition, 54,230 pounds of paint booth wastewater has been conserved at a savings of an additional $3,796.

In 1999, the **US DOE Bonneville Power Administration, Ross Complex** in Vancouver provided their employees with awareness training to develop and implement an Approved Products List (APL) for the Ross Complex. A web version of the APL was developed and brought online. The web page provides a searchable database allowing employees to search the APL prior to making purchases to easily determine if a product is approved for use. Awareness levels were kept up through all-employee e-mail distributions, a feature article in the employee newspaper, and thorough employee training via staff and safety meetings. In addition, chemical purchasing requirements were reviewed with each shop during an annual audit.

Washington State Department of Agriculture Chemical and Hop Laboratory in Yakima, is constantly searching for micro-analytical methods that reduce and/or remove hazardous solvent usage, thus reducing the amount of dangerous waste generated. In 1999, an analytical method utilizing methylene chloride was replaced. This change produced a 72 percent decrease in methylene chloride usage, from 20 pounds in 1998 to 6 pounds in 1999.

This lab also made great progress toward reducing the number of high-pressure gas cylinders managed on-site. When the lab moved to a new site late in 1998 and early 1999, they centrally located all the cylinders and linked them to a gas manifold with regulators at the point of use. The number of cylinders was reduced from 75 to 25. The new system is clean, and virtually leak-free. In addition, employee time spent monitoring the cylinders was cut by approximately 70 percent. Worker safety was greatly improved by reducing exposure to the high-pressure cylinders.

Energy Northwest in Richland, successfully met the five-year pollution prevention goals for both hazardous substance usage and dangerous waste reduction within the first two years of their planning cycle. They exceeded the hazardous substance usage goal by 13 percent. They also exceeded the dangerous waste reduction goal by 1 percent. Both goals were met by implementing an on-site solvent distillation unit and by substituting use of halogenated and/or flammable solvents for non-hazardous cleaning and degreasing solutions. With the reduction, Energy Northwest reduced employee exposure to dangerous wastes and received a significant savings in disposal costs.

Severn Trent Laboratories (STL) in Richland implemented a newly approved analytical method that uses fewer reagents and reduces dangerous waste by approximately 500 ml per sample. The method change lowered the total amount of generated dangerous waste by 1,400 pounds between July and December 1999.

This site also examined their acidic decontamination rinse on analytical glassware. Tests were conducted in 1999 using a variety of different aqueous solutions, concentrations, soak times, and pre-soak procedures to obtain data on either eliminating or reducing the nitric acid aqueous solution. The outcome was that the concentration of the Nitric Acid solutions could be reduced from 25 percent to 12.5 percent. Even though this change does not reduce the volume of generated dangerous waste, it does offer the following benefits:

- Reducing employee exposure to concentrated acidic solutions;
- Reducing the 16 Molar nitric acid product inventory by an estimated 25 percent; and
- Reducing the volume of solid waste from empty reagent bottles by an estimated 360 bottles annually.

Steel Scape (formerly BHP Steel), a cold rolling, steel company in Kalama, switched to a non-hazardous metal working fluid. The non-hazardous synthetic fluid costs approximately three times more than the original fluid but has a much longer life span and reduced the need to clean the steel after use. As a result, Steel Scape has reduced their hazardous waste sludge generation by 100,000 pounds per year and saved over 250,000 gallons of metal working fluid.

Washougal's **Betz Dearborn** generated 987,811 pounds of dangerous waste in 1996, all of which was sent off-site for treatment/disposal. Most of this was rinsate. In 1999, the facility reduced their hazardous waste to 1,247 pounds. They achieved this by applying rinse reduction opportunities, such as reusing rinsate in subsequent batches, minimizing rinsing frequency by limiting how many different chemical blends they made in any given day, and using dedicated totes that are refilled with the same product without rinsing, and other rinse reducing methods. Because of these efforts, they have dropped below the pollution prevention planning threshold and are no longer required to file a plan.

Persistence paid off at **ST Services** in Vancouver **(**formerly GATX Terminals). The company had a waste stream of phenol in an alkaline solution. ST Services tried for two years to find a company that could use this waste. It looked like they would never find someone who could use this waste. However, in 1998 they found an industry that could use phenol as a raw material in a manufacturing process. ST Services went from approximately 32,000 pounds of hazardous waste in 1995 to about 5,000 pounds of hazardous waste in 1998.

Smith Chrome Plating in Walla Walla was honored by Ecology for environmental excellence by reducing their water consumption from 10,000 gallons per day to approximately 150 gallons per day.

Costco Inc. in Spokane recently installed new silver recovery equipment in two Spokane Costco stores. The silver recovery equipment meets the tight discharge limits of the local wastewater treatment plant and satisfies the requirements of the *Dangerous Waste Regulations*. Hard plumbing of the silver recovery equipment to the photo processing equipment in conjunction with documented proper management of equipment enabled these Costco Stores to go from medium to small quantity generators of dangerous waste.

S.E.H. America, in Vancouver, is a silicon wafer manufacturing company employing over 1,650 people. They instituted significant programs that reduce their environmental impact. Silicon sludge is their primary waste stream, and they have diverted 90,000 pounds of sludge from disposal per month by finding recycling opportunities for this material. In addition, S.E.H. invested over $1,000,000 in equipment that recovers approximately 46,000 pounds of coolant and silicon grit for reuse each month. This reduces the amount of virgin material that must be purchased. The coolant and grit recovery operation saves S.E.H. over $100,000 per month in disposal and purchase costs. These two efforts result in diverting nearly 3 million pounds of silicon waste on an annual basis.

By reducing water consumption S.E.H. not only protects a natural resource, it reduces the amount of process wastewater that must be treated and discharged to the environment. Water conservation projects implemented by the company included installing a new reclaim water system that recovers an average of 50 gpm of clean rinse water; replacing scrubber water makeup with reclaimed water for a savings of 35 gpm; reusing once-through pump seal water for cooling tower makeup to save 32 gpm; and using non-contact cooling water and reverse osmosis reject water for irrigation instead of well or city water. The results were impressive – the average monthly city water consumption dropped from 773 gpm to 606 gpm, a 22 percent reduction.

Inflation Systems, Inc. in Moses Lake
This company makes cartridges that inflate airbags in cars. One of their pollution prevention opportunities was to reformulate their fuel/accelerant which inflates the bags to eliminate the use of sodium azide. They managed to do so last year and have reduced their sodium azide use by 96 percent, with plans to eliminate it completely in a few years. The project saves the company money as well, because with the new accelerant they no longer have to manage their former hazardous wastes and the new alternative is cheaper than sodium azide.

In recent maintenance activities, **Grant County PUD #2** of Moses Lake, created a large amount of sand blast waste which designated for lead from the high-lead content paint on the flood gates. More than 76,000 pounds of lead waste was diverted from the waste stream by sending it to a Pennsylvania company who reclaimed the lead for use in batteries.

Grant County avoided another waste stream by removing waste chlorinated solvents. The facility instituted the use of dry ice (CO_2) pellets to "sand blast" off the carbon build-up on the turbine windings. It is safer for the workers, safer for the environment, less labor intensive and the only waste is the powdered carbon, which can be vacuumed up. This eliminates the production of ten barrels of waste solvent and 50 barrels of solvent soaked rags per year, which were formerly used to clean the contacts and windings on the large power-generating turbines.

Inland Pacific Stamp Co. in Spokane had a screen-cleaning machine, which at its peak produced 3,800 pounds of waste solvent annually. The machine was also messy and not very efficient. The manager and production manager got together and researched pollution prevention alternatives. They developed a process modification which eliminated the cleanup step altogether. This allowed them to surplus the cleaning machine.

DeWils Industries in Vancouver has focussed their pollution prevention opportunities on reducing VOC (Volatile organic compounds) and HAP (hazardous air pollutants). Since starting the program in 1994, they have reduced their VOC by 80,800 pounds, and their HAP by 44,100 pounds. They achieved this success story by working with their supplier to reformulate products. They continue to work with manufacturers of alternative finishes, like water-borne finishes and ultraviolet finishes, which have the potential to eliminate VOC and HAP.

Precision Machine Works has been making steady progress in reducing pollution. Since 1994, Precision has reduced its dangerous waste by 97 percent. In 1999, the dangerous waste was down to 2,195 pounds from an original total of 74,241 pounds. The company, located in Tacoma, aggressively pursued these P2 opportunities by using a heat treatment and filtering process as treatment steps for their cutting oil, which significantly reduced their hazardous waste.

Trail Wagons in Yakima decreased waste disposal by 5,024 pounds between 1998 and 1999, a 42 percent decrease. The company recycled 55 percent of paint gun waste in the fiberglass shop and the paint shop. Trail Wagons achieved this while increasing their production.