



Reducing Hazardous Waste and Hazardous Substances in Washington

1997 Annual Progress Report

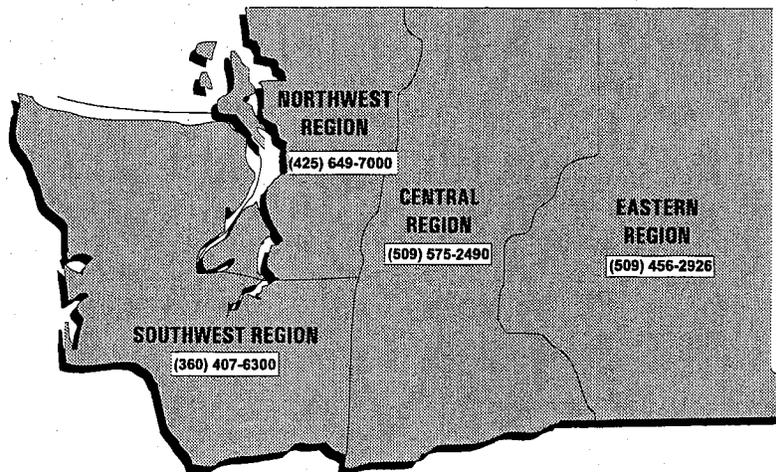
*Washington State Department of Ecology
Hazardous Waste and Toxics Reduction Program*

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Chapter 1 — Introduction

Purpose of the Report

This annual report provides information on the progress being made in reducing 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 1997.

Program Overview

The 1990 Hazardous Waste Reduction Act established a goal to reduce hazardous waste generation by 50%. The primary means for achieving this goal is through implementation of a pollution prevention planning program, also established in the Act. Facilities that generate in excess of 2,640 pounds of hazardous waste per year, or who are required to report under the Toxic Release Inventory (TRI) of the Emergency Planning and Community Right to Know Act of 1986, are subject to this law. Some 703 facilities in Washington currently participate in this planning program. Because 124 of these participate in 36 "Interrelated Facility" groups, Ecology currently deals directly with 579 individual facilities or groups of facilities that are responsible for Pollution Prevention Plans. Interrelated facilities are those that are owned or operated by the same person. To qualify for an Interrelated Facility group, all the facilities in the group must use similar equipment and materials, generate similar hazardous wastes and produce similar products or services.

Pollution prevention planning is an activity that involves:

- ❖ inventorying hazardous substances used and hazardous waste generated;
- ❖ identifying opportunities to prevent pollution;
- ❖ analyzing the feasibility of these prevention opportunities; and
- ❖ setting goals for hazardous substance use reduction and hazardous waste reduction, recycling and treatment.

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 3.

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% Policy Goal

The Hazardous Waste Reduction Act contains a statewide policy goal to reduce hazardous waste generation by 50%. This goal was directed toward all hazardous waste generators, not just planning facilities. The goal equals 128 million pounds, which is 50% of the 255 million pounds generated by all facilities in 1990. Annual Dangerous Waste Reports, filed by all 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% goal.

Figure 1 charts hazardous waste generation levels for 1990 through 1997. The amounts shown are from all generating facilities except commercial treatment, storage and disposal facilities, which manage wastes generated by others. Most waste waters, wastes from clean-up projects and mixed radioactive wastes are also excluded.

The graph in Figure 1 also shows the data adjusted for the changing economy. The adjustments are intended to show estimated levels of waste generation assuming the economy remained constant. This process, called “normalizing” data, makes waste totals more comparable from year to year. The adjustment factors were calculated from information provided by the Department of Revenue. Gross business income from all Washington businesses was the normalization measure used.

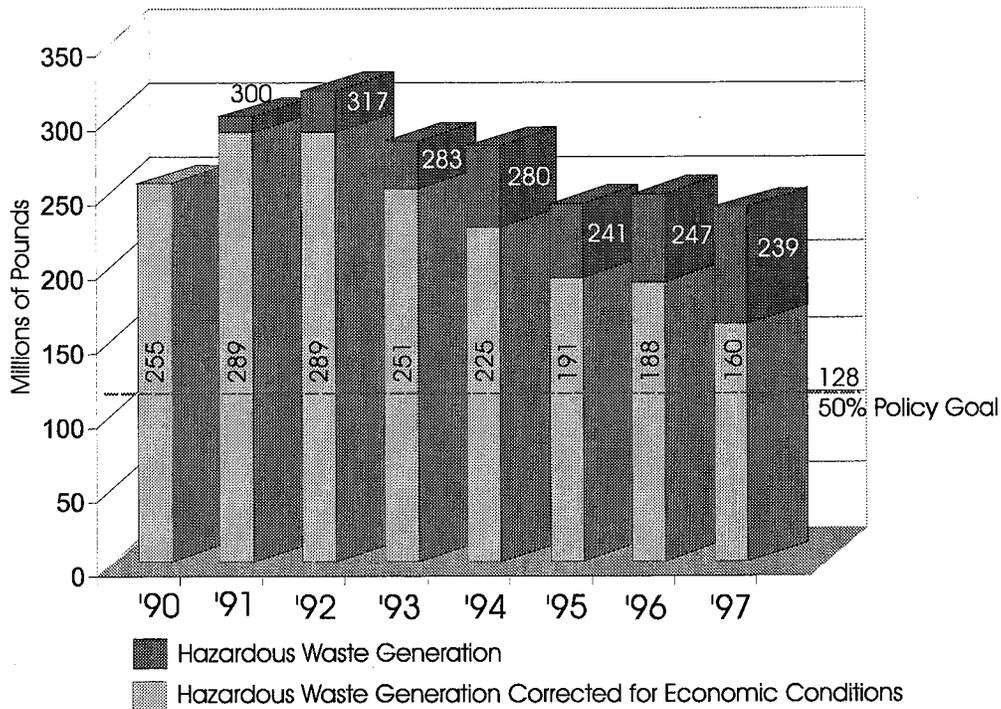
In figure 1, generation data show a decrease of 8 million pounds from 1996 to 1997, while normalized data show a decrease of 28 million pounds. Generation data by itself does not show how changing levels of production or service can drive changes in waste generation. Growth in business from one year to the next will result in more waste being generated, assuming all other factors remain the same. Normalizing the data for increases or decreases in business levels gives a more meaningful picture of generation trends. **In this case, the normalized level of 160 million pounds in 1997, compared to 289 million pounds in 1992, equates to a 44% reduction.** The year 1992 is used as a comparison year because it was the year of highest waste generation and the first year facilities were required to conduct pollution prevention planning.

Decreases (or increases) in generation amounts from year to year can be attributed to several factors; intermittent management of certain waste streams for individual facilities, (e.g. 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 3 directly result in pollution prevention. While it's difficult to quantify their exact contribution, these site visits, workshops, consultations, publications, sector studies, etc. all have a positive influence.

Another indication that pollution prevention plays a significant role may be that in 1997 there were 117 fewer Large Quantity Generators (LQGs) and 742 fewer Medium Quantity Generators (MQGs) submitting dangerous waste reports than in 1994. These facilities were able to downgrade their generator status or they were able to quit reporting entirely.

Rudd Company, a manufacturer of wood door, cabinet and floor finishes in Seattle, reduced their hazardous waste disposal by 54% between 1991 and 1997, achieving the goal they set in their Pollution Prevention Plan. They reduced hazardous substance use by 32% over the same time.

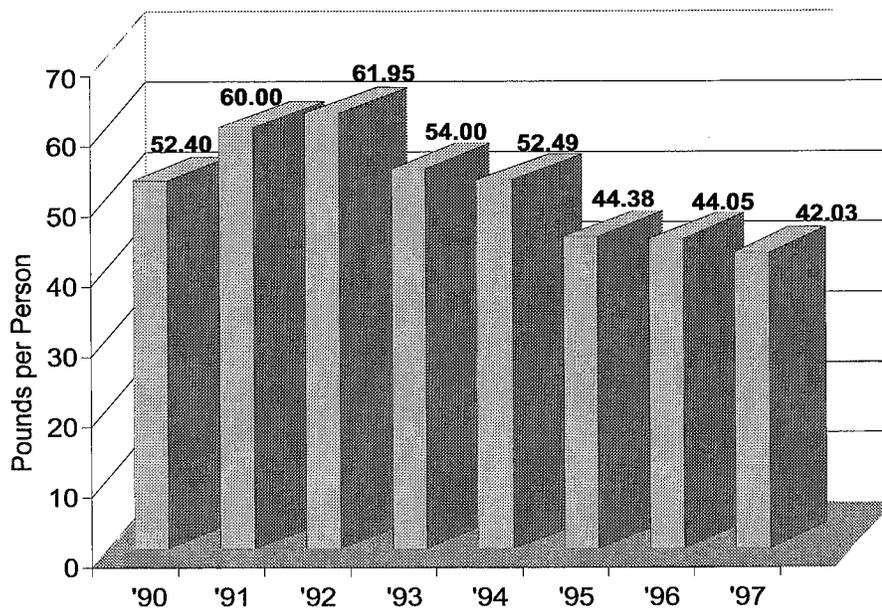
Figure 1—Progress toward the 50% Goal



Other Measures of Progress

A comparison of hazardous waste generation on a per capita basis, over time, is a good way to view progress. Figure 2 uses the same annual generation amounts as Figure 1, divided by Washington's population numbers as provided by the Office of Financial Management. The 1997 per capita amount of 42.03 lbs. per person can be compared to prior years. When compared to 1992, the year of highest waste generation, we see a 32% reduction.

Figure 2—Per Capita Hazardous Waste Generation

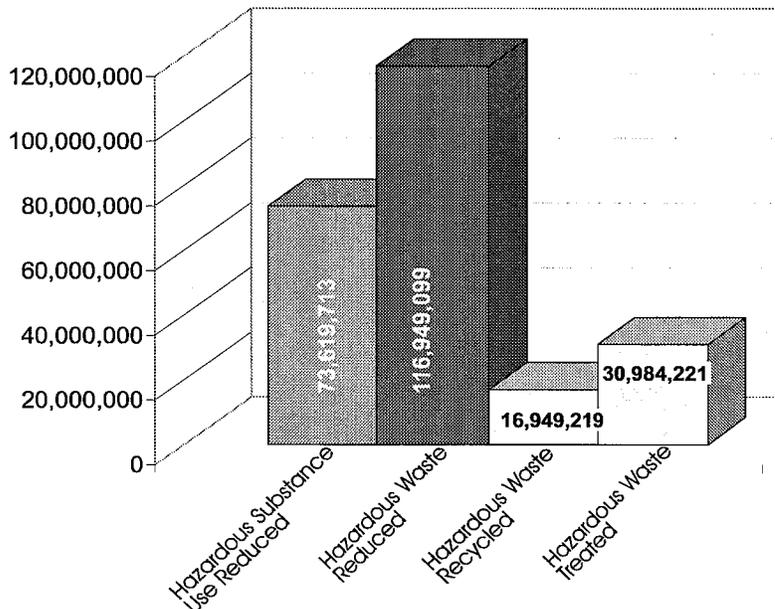


Another way to measure progress is to look at the information provided by facilities required to prepare pollution prevention plans. Facilities are asked to establish numerical goals for hazardous substance use reduction and hazardous waste reduction, and for the amounts of waste that will be recycled 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. Facilities that establish goals provide a clear indication that they are committed to implementation.

Figure 3 displays cumulative goals for facilities submitting plans and Annual Progress Reports from 1992 through 1997.

Figure 3—Pollution Prevention Facility Goals



Annual Progress Reports provide another measure of pollution prevention performance. The 1997 Annual Progress Reports submitted to date tell us that 275 facilities implemented 900 individual pollution prevention projects during 1997. These actions resulted in 1,820 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 1997, implementation of Pollution Prevention Plans generated the following benefits to Washington's environment and economy:

<i>Categories Being Benefited / Effected by Implementing 900 Projects</i>	<i>No. of Benefits Reported</i>
Reducing hazardous substances used	460
Reducing hazardous waste generated	554
Increased recycling of waste	199
Increased treatment of waste	67
Reduced air/water emissions	218
Cost savings	322
Total	1,820

Chapter 3 — 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:

- ❖ Help conduct reviews of hazardous substance use and hazardous waste generation.
- ❖ Help overcome technical, economic and regulatory barriers to implementing pollution prevention projects.
- ❖ Help businesses safely manage hazardous waste.
- ❖ Assist with cost analysis of pollution prevention opportunities.
- ❖ Share ideas and techniques on alternative process technologies.

During 1997, technical assistance was provided in several ways:

- ❖ 510 site visits to planners and non-planners
- ❖ 6,587 phone consultations to planners and non-planners
- ❖ 40 workshops, attended by 1,697 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. Last year Ecology was involved with several successful efforts in this area.

Paint and Coatings Manufacturing Sector

In 1997-98, the Washington Department of Ecology's Hazardous Waste and Toxics Reduction Program conducted a statewide technical assistance project for the paint and coatings manufacturing industry sector. The project was conducted in consultation with the Operating Committee of the Northwest Paint Council (NWPC), a trade association for paint and coating manufacturers. The project focused on pollution prevention (P2) and hazardous waste regulatory compliance, but it also addressed issues related to air quality, water quality, and solid waste management. Ecology's Paint Sector Team sought input on the project's goals and objectives from the industry representatives on the NWPC Operating Committee.

The scope of the project included:

- ✓ Researching industry-specific pollution prevention practices.
- ✓ Conducting P2/regulatory compliance site visits at a cross-section of Washington's paint manufacturing facilities.
- ✓ Identifying P2 and waste management issues that could and should be addressed consistently in the paint manufacturing sector.
- ✓ Highlighting and providing resources for future P2 actions.

Dowty Aerospace in Yakima reports that they have substituted a new machine coolant with a useful life of 12 months, compared to the previous product, which needed changing once per month. This is reducing the need for evaporative treatment of spent coolant as well as waste disposal costs. They have also installed an aqueous parts washer to do a lot of the cleaning formerly done with their vapor degreaser. The vapor degreaser is now used only for cleaning parts prior to final assembly and/or painting.

Developing a technical assistance strategy for Ecology's follow-up technical assistance efforts.

Site visits to a selection of nine paint manufacturing and two distribution facilities resulted in several observations:

- ❖ The paint and coatings manufacturing industry is already doing a significant amount of pollution prevention. For example, most facilities reuse their wash solvent and wash waters in subsequent formulations, use dedicated equipment to reduce the need for cleaning, and are actively reformulating products to reduce their toxicity.
- ❖ Even though nearly all the facilities indicated that they employed efficient materials management techniques, it was found that there was a range of effectiveness in this area. Improved materials management could be a fruitful area for future waste reduction for most facilities.
- ❖ For the most part, dangerous waste was stored, managed and disposed of appropriately. In the report, Ecology provides clarification on pertinent dangerous waste regulations. Counting recycled solvent is an area that needs particular clarification.
- ❖ Most manufacturers reincorporate process water into subsequent batches. In the few cases where more wash water was generated than could be reworked, the facilities either evaporated the wash water or sent it for off-site disposal.

Melcher Manufacturing, a Spokane area builder of truck loading ramps, has reduced their acetone usage from 17,000 lbs. per year in 1991 down to 350 lbs. per year, a 98% reduction. This effort combined with purchasing low-styrene resins and using a flow chopper gun has taken this facility about as far as they can feasibly go to reduce hazardous waste and hazardous substance use.

Several technical assistance follow-up efforts were identified that could be of value to the industry:

- ✓ Establish a paint and coatings-specific materials exchange.
- ✓ Establish a paint and coatings manufacturing environmental/P2 web-site.
- ✓ Provide paint industry briefings for dangerous waste inspectors.
- ✓ Provide technical assistance visits to the remaining coatings manufacturers.
- ✓ Assist facilities in disseminating compliance and P2 information from this project to their production workers.

Complete information about this project is provided in the Paint and Coatings Manufacturing Sector Report, publication #98-410, available from the Department of Ecology.

Tesoro's Anacortes Refinery reduced API sludge generation by 407,000 pounds, a 77% reduction. While this waste stream is somewhat variable from year to year, process improvements contributed to this reduction.

National Security Facilities Sector

Twenty-two national security facilities reside in Washington. Twelve of these generate large quantities of hazardous waste - in 1997 over 11 million pounds. These facilities all have potential for pollution prevention, and a demonstrated commitment to achieve it. For these reasons they were chosen as a sector project.

A number of initiatives have been carried out as part of the focus on National Security facilities:

- ✘ Ecology pollution prevention staff visited a number of military facilities across the state with the objective of helping those installations set and/or achieve a broad array of pollution prevention goals.
- ✘ Staff are helping military bases share pollution prevention information through EPA Region 10's Federal Facilities Pollution Prevention (F2P2) Workgroup. The F2P2 workgroup is currently working on Environmental Management Systems, Purchasing, Contracts and Technology Transfer.
- ✘ Two Naval facilities used the Environmental Management System Alternative to meet their pollution prevention planning requirement. This systematic approach will allow the facility to use existing data to address pollution prevention implementation rather than spending unnecessary funds on report writing and submittal.
- ✘ At the request of the Washington Army National Guard, staff visited all of the Washington Army National Guard facilities in the state to provide technical assistance. Ecology provided both regulatory compliance information and pollution prevention assessments at each of their 14 facilities that generate hazardous waste.

- ✘ To facilitate technology transfer from within and outside of military installations, a website was created that is linked to the Department of Defense's home page. Our facilities supply pollution prevention opportunities that have been implemented to the website. Ecology anticipates the information will be applied in military and industrial settings.

- ✘ A pollution prevention implementation project is in process with the Whidbey Island Naval Air Station to minimize a 500,000 lb./year waste stream associated with parts cleaning rinsate, paint stripping rinsate and wastes from chemical conversion coating final rinsing.

- ✘ Ecology participated on the planning committee for the 1997 Federal Facilities Environmental Conference (FFEC). We provided presentations on Environmental Management Systems and Pollution Prevention Information on the Web. For the 1998 FFEC, Ecology will be providing a presentation on the EMS Annual Performance Reports for both Naval facilities, the US Postal Service and other facilities in both the public and private sectors.

In Washington, National Security facilities have taken pollution prevention very seriously, and have collectively achieved a 50% reduction in hazardous waste from 1990 to 1997.

***Betz Dearborn,**
a chemical
blending
company in
Washougal,
reported a 71%
reduction in
hazardous
waste during
1997. This
translates to
275,650 pounds
or 33,090
gallons of
hazardous
wastes no
longer being
generated.*

EMS Planning Alternative

Ecology now offers a new alternative to facilities required to prepare a five-year update to their original Pollution Prevention (P2) Plan. 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 five-year plan update. The facility must document how their system meets a set of pre-defined pollution prevention criteria, and agree 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.

This alternative to traditional P2 Planning was designed in part to accommodate facilities that have a highly developed environmental management system and/or are pursuing certification through ISO 14001. If these facilities can adequately demonstrate how their system meets the P2 criteria, it eliminates the need to prepare what would likely be a redundant P2 Plan. One of the hallmarks of environmental management systems is the emphasis on continuous improvement. A facility must demonstrate an ability to achieve continuous improvement in identifying and implementing pollution prevention opportunities to have Ecology accept their application for this alternative planning approach.

In 1998, Ecology conducted an informal evaluation of this program in order to assess how well it was meeting initial goals. The methodology consisted of interviews with the 15 facilities accepted to the program in 1997, reviews of their environmental performance and discussions with staff assigned to the project. The evaluation concluded that the program holds value for both facilities and Ecology and that it should continue to be offered. Participating facilities felt that while in some cases preparing an application took more time than a traditional update, the benefits of developing a systematic approach to environmental management and pollution prevention far outweighed the costs. Cited benefits of this program as compared to a traditional P2 plan update included greater involvement of non-environmental staff and management in environmental issues, the fact that P2 goals and targets are better integrated into routine business decisions, an emphasis on continuous improvement, and consideration of environmental impacts to all media.

Ecology staff also benefited through better relationships with facility staff, more thorough understanding of how environmental management fit into overall facility management and increased understanding of specific tools for continuous improvement. Finally, a review of environmental information for these facilities indicated that facilities continued to perform well under this alternative. Recommendations for improvement include clarification on the level of detail needed in applications and more outreach to facilities on environmental management systems in general and specifically on this program.

Sea-Tac International Airport has made substantial pollution prevention progress in the last few years while production has remained about the same. From 1995 to 1996, there was a 63% decrease in waste generation. In 1997, they generated 12,721 pounds of hazardous waste - a 55% reduction from 1996 numbers. The goal of achieving Medium Quantity Generator status identified in their Pollution Prevention Plan was achieved one year early.

Chapter 4 — New Initiatives

Ecology continues to implement new programs and target specific industrial sectors for technical assistance. Work is underway with the Metal Fabricators sector, and an important new initiative concerning bioaccumulative chemicals will carry over into the new millennium.

Metal Fabricators

Metal Fabricators have been selected as the focus of Ecology's next Industry Sector Project. This industry was selected due to the number of Pollution Prevention Planners, hazardous waste generation, TRI reporting and the number of violations. In addition, this sector has a high potential for pollution prevention.

Coordination with other agencies will be central to the project. These include King County Health Department, the Pollution Prevention Resource Center, and Labor and Industries. They have all done impressive work with health concerns in this industry.

There are a number of regulatory issues which affect this industry, including EPA Air and Water Quality standards, Labor and Industries' health concerns and Ecology's proposed used oil regulations, due to be finalized in late 1999. This sector project will be a great opportunity to work with this affected industry before finalizing the rules.

The main goals for the project are to compile and analyze pertinent information in this sector, evaluate current industry practice against best achievable environmental performance, educate the agency on pollution prevention issues and opportunities in this sector and share these findings with the industry. The project is scheduled for January through August 1999.

PBT Initiative

Ecology recently launched a new initiative to eliminate persistent, bioaccumulative and toxic chemicals (PBTs) by the year 2025. PBTs are of concern in the environment for the following reasons:

- ✓ They **persist** in the environment for a long time without breaking down;
- ✓ They build up in the tissues of humans, fish and animals ("**bioaccumulative**"); and
- ✓ They have **toxic** effects (including cancer and other health problems) on living organisms, including humans.

PBTs include some of the heavy metals such as mercury and cadmium, some organic substances such as the dioxins and polychlorinated biphenyls, as well as the polycyclic aromatic hydrocarbons. These contaminants can be transported long distances in the atmosphere and some can move readily between land, air and water. Many of the substances are man-made and have existed for only a relatively short period of human history. A few of the substances, such as mercury and cadmium, exist naturally in the environment; but when they are refined and concentrated at the hands of humans, they create human health and environmental problems.

Impacts from these chemicals are not the same for each chemical. Health affects for fish and wildlife can include decreased fertility, abnormal sexual development, decreased offspring survival, and impaired immune functions. For humans, the problems may include reproductive disorders, various cancers, immune system suppression, and neurological disorders.

There are many sources of PBTs including:

- ✓ historical application of pesticides
- ✓ consumer products
- ✓ industrial practices
- ✓ combustion (open burning, automobiles, incinerators)
- ✓ waste products such as waste derived fertilizer
- ✓ natural events such as forest fires

Ecology sponsored a symposium in December, 1998 to spur discussion about PBTs and strategies for eliminating them. Public workshops are being held early in 1999 to involve the public and other interested parties in fashioning a strategy. Ecology's Hazardous Waste and Toxics Reduction Program will be an integral part of these efforts in its ongoing work with waste derived fertilizers and in its pollution prevention efforts. The Program is also studying ways to implement the recent recommendations of the dioxin source assessment study conducted by the Department.

Chapter 5 — Pollution Prevention Successes

Many facilities tell us about the success 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.

Boston Scientific Corporation in Redmond said this about their recent pollution prevention planning effort: "Preparing our Pollution Prevention Plan was a very productive experience. It has helped us carefully review our processes and realize the potential benefits in reducing the amount of hazardous substances we use, and wastes we generate. Implementing the pollution prevention opportunities we have identified should provide significant cost savings, reduce our regulatory burden, increase production efficiency, improve worker safety, and contribute to the environmental quality of our community."

Foamex LP, a foam manufacturer in Kent, reduced methylene chloride use by nearly 300,000 pounds in 1997 from 1996 levels by means of system acquisitions and process improvements - even though they had a 10% increase in production.

In their first five-year Pollution Prevention Plan, **Fort James Corporation**, a manufacturer of folding cartons for the food and beverage industry in Redmond, eliminated the use all hazardous inks, coatings and process glues. They reduced flammable waste by almost 25% and eliminated two hazardous waste streams.

Industrial Plating in Seattle went from 81,376,000 pounds of hazardous waste water in 1996 to 37,675,000 pounds in 1997. Their water/wastewater bill went from \$80,000/year to \$42,000. Their F006 sludge decreased from 116,220 pounds to 83,200 pounds. They have achieved 88% of their waste reduction goal.

Genetic Systems Corporation in Redmond continued their successful Thimersal (an organo-mercury preservative) reduction and recycling program. In 1997 they reduced its use by 56,000 pounds and recycled 37,000 pounds. They saved \$35,200 in 1997, adding to their savings of \$160,000 in previous years.

With the purchase of an efficient chop gun, **Cambridge Industries** in Auburn was able to reduce styrene emissions by 49% in 1997, or 39,168 pounds even after increasing production by 60%. They manufacture fiberglass and composite parts for the transportation and marine industries and employ 185 people.

Technical assistance given to **Metallic Arts**, a Spokane decorative sign manufacturer, helped close the loop for their alkaline cleaning process and should save them approximately \$3,500 per year in monitoring costs, reduced water bills and chemical losses. The assistance was provided in cooperation with the City of Spokane's wastewater treatment facility.

Sunfair Chevrolet in Yakima recently dropped below the P2 Planning hazardous waste threshold due to reduced waste generation resulting from improved process management:

- ❖ Automatic paint gun washers are used for all gun cleaning. The gun washers have resulted in much less solvent being used for this cleaning process as well as reducing employee exposure to the solvents.
- ❖ Computerized paint mixer equipment was installed in 1996 and has greatly reduced waste paint by allowing accurate matching and mixing of the exact quantity for each job.
- ❖ An aqueous "spin-jet" parts washer was installed in 1997 and is used for large parts such as valve covers and cylinder heads. It replaced an old manual (sink type) parts washer and has eliminated a lot of solvent-based cleaning.

Apollo Spas in Spokane demonstrated a new

fiberglass molding process that greatly speeds production, saves money and results in a reduction of approximately 84% in styrene emissions. The company reports that the new process generates a completely cured spa in ½ hour as opposed to the previous curing time of 30 hours. Apollo Spas plans to convert their entire line of products to this process in the near future.

Cascade Analytical, Inc., located in Wenatchee, reports that:

- ❖ A combustion method for the analysis of organic matter in soil was implemented in May 1997. The combustion method takes the place of the chromium reduction method, which used potassium dichromate and concentrated sulfuric acid. The combustion method uses no chemicals and produces no new waste stream.
- ❖ A procedure to redistill the hexane used in the Hexane Extractable Materials (HEM) in Water method was implemented in April 1997. Although some lots of used solvent were still unusable after redistillation and some solvent is lost through evaporation, a significant reduction in flammable waste is being observed.

Pacific Northwest National Laboratory (PNL) in Richland reported the following P2 implementation progress:

- ❖ Distillation and reuse of formalin, xylene, methanol, and other alcohols reduced waste by 3.5 metric tons and saved \$28,850 in 1997.
- ❖ PNL's Chemical Redistribution Center collected and redistributed chemicals throughout the laboratory, reducing waste by 400 pounds and saving \$6000 in 1997.

Georgia Pacific completed an Oxygen delignification pre-bleach stage, reducing annual chlorine use by 245,000 lb/year at their Bellingham mill. They also began recycling

134,000 lb/year of lime slaker grits as raw material for a cement kiln.

ARCO's Cherry Point Refinery installed a silica trap in their naphtha hydrodesulfurization unit. This slows contamination of their nickel/moly catalyst with silica. After the first year of operation, the run-time on the catalyst was extended from 6 to over 12 months (they estimate it'll last 18 months), waste catalyst generation was reduced by 178,000, and tests run on the catalyst indicate that, when taken out of service, it'll probably not designate as a Dangerous Waste. The project also reduced catalyst purchase (i.e. hazardous substance use) by 150,000 lb/year, and saved \$385,000 in the first year *over* the initial cost of \$714,000.

Vanalco, Inc. reduced HF emissions from aluminum reduction by 26% in 1997. They have also steadily reduced spent potlining generation by increasing potlife. (Vanalco was the recipient of an award from the Association of Washington Businesses for significant environmental improvements at an older facility.)

The Bonneville Power Administration Ross Complex, in Vancouver Washington, provides a wide variety of services that used more than 2,000 different products. Using new materials tracking procedures, BPA initiated an Approved Products List. They examined each of the products in use, and reduced the total number of products by nearly 50%. Sixty percent of the eliminated products contained hazardous materials.

Columbia Machine, Inc., located in Ridgefield, is a metal fabricator. They have reduced use of toluene by 40% by educating their employees on proper chemical use and handling techniques. In addition, they use less solvent-based paints, thinners, and degreasers. Columbia Machine has switched to a non-hazardous (non-solvent) degreasing material. With these actions, they have changed status from a Medium Quantity Generator to a Small Quantity Generator. They are no longer required to file a Pollution Preven-

tion Plan and yearly updates. Columbia Machine is now a much safer place to work, and they have saved a substantial amount of money.

Weyerhaeuser Technology Center in Federal Way went from approximately 18,000 pounds of hazardous waste generated in 1991 to 1,800 pounds generated in 1997. 38% of the 1997 total was recycled whereas none was recycled in 1991. These efforts allowed them to go from large quantity generator to medium quantity generator status.

In 1997, **Nichols Brothers Boat Builders** on Whidbey Island ceased all water discharges to Holmes Harbor. This was accomplished by the construction of a storm water/wastewater management system. This was the first permitted system for shipyards in the state. The infiltration system is located on company property adjacent to the production area, surrounded by wetlands and a salt marsh. They will make it accessible for use as an outdoor classroom to educate their employees and visitors on the importance of protecting the environment.

During their first five year pollution prevention plan, **Capital Industries, Inc.**, a metal fabricating company in Seattle, eliminated the use of trichloroethylene in favor of aqueous metal parts cleaners reducing their air emissions from 176,000 pounds

in 1990 to 64,000 pounds in 1997. They also reduced the use of metal coatings containing zinc, chromium and lead by over 90%.

Lilly Industries is a coatings manufacturer for the wood finishing industry in Seattle. In 1997 they decreased hazardous substance use by 331,650 pounds when they switched to low HAP formulations. They also saved \$165,800 in the switch out. They exceeded their original P2 Plan goal by twenty times. As an explanation, they stated they had set a conservative goal, and customers were not only receptive, but were actually requesting low HAP products. Production was up 20% in 1997.

The Boeing Renton, North Boeing Field and Thompson facilities targeted methyl ethyl ketone and toluene for reduction in 1997. They reduced these hazardous substances by nearly 200,000 pounds and substantially reduced their air emissions. This success was achieved while production was up 50% over their 1996 base year.

Foss Maritime Company has a Seattle based marine transportation facility. They stated that between 1992 and 1997 they achieved reductions in the following areas: 37,545 pounds of hazardous substance use, 11,791 pounds of hazardous waste disposal, and they recycled 42,793 pounds of substances. They are targeting these areas again in their new pollution prevention plan and they will be investigating a new, non-hazardous, anticorrosive ship paint.