



Reducing Hazardous Wastes and Hazardous Substances in Washington

1994 Annual Progress Report

Washington State Department of Ecology
Hazardous Waste and Toxics Reduction Program
December, 1995
Publication #95-428

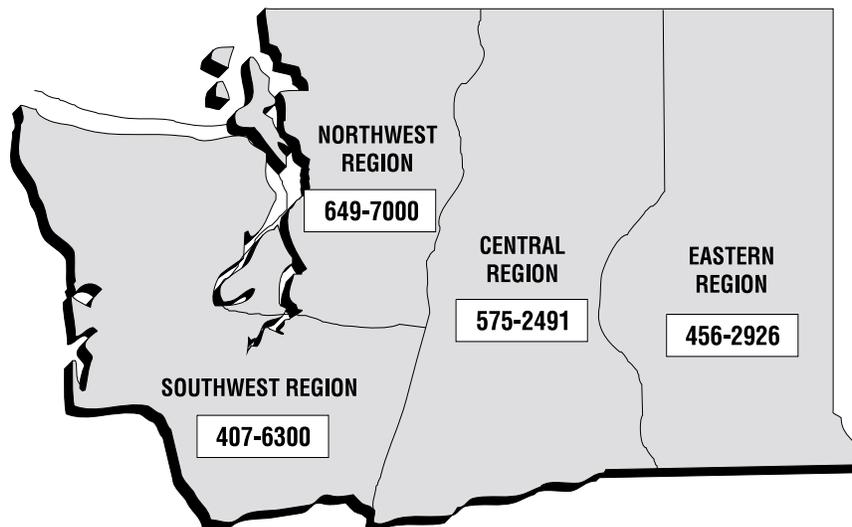


printed on recycled paper

For a copy of this document, please contact:

Department of Ecology
Publications
P.O. Box 47600
Olympia, WA 98504-7600

Please include your street address for UPS delivery



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

If you have special accommodation needs or require this document in alternative format, please contact the Hazardous Waste and Toxics Reduction Program at (360) 407-6700 (Voice) or (360) 407-6006 (TDD).

Ecology's telecommunications device for the deaf (TDD) number is (360) 407-6006. Regional TDD numbers are:

CRO (TDD) (509) 454-7673
ERO (TDD) (509) 458-2055

NWRO (TDD) (206) 649-4259
SWRO (TDD) (360) 407-6306

Reducing Hazardous Wastes and Hazardous Substances in Washington

1994 Annual Progress Report

Washington State Department of Ecology
Hazardous Waste and Toxics Reduction Program
December, 1995
Publication #95-428



printed on recycled paper

Contents

List of Figures	IV
Executive Summary	1
Chapter 1 — Introduction	3
Chapter 2 — Overview of Washington's Pollution Prevention Planning Program	4
Planning Requirements	4
Planning Universe	4
Chapter 3 — Measuring Pollution Prevention Progress	5
Progress Towards Planning Targets (Goals)	5
Progress Towards the 50% Policy Goal	8
Other Measures of Progress	10
Trends in Statewide Toxic Releases	11
Industrial Sectors Project	12
Fiberglass Reinforced Plastics	12
Printed Circuit Boards	14
Electroplaters	14
Summary - Sectors Project	15
Chapter 4 — Is Planning an Effective Tool	16
Study Design	16
Results of Washington State's Planning Effectiveness Study	17
Study Conclusions	18
Other Perspectives on Pollution Prevention Planning	19
Chapter 5 — Conclusions	20

List of Figures

Figure ES1 Progress Toward the 50% Waste Reduction Goal	1
Figure 1 Pollution Prevention Targets (Goals)	5
Figure 2 Progress Towards Hazardous Substance Use Reduction Target	6
Figure 2 Progress Towards Hazardous Waste Reduction Target	6
Figure 4 Progress Towards Recycling Target	7
Figure 5 Progress Towards Hazardous Waste Treatment Target	7
Figure 6 Progress Towards the 50% Waste Reduction Goal	9
Figure 7 Washington Toxics Chemical Releases by Environmental Media	5

1994 Annual Progress Report, Executive Summary

Purpose of the Report

This annual progress report provides information on the progress being made in reducing hazardous wastes and hazardous substances in Washington. The report is mandated by the Hazardous Waste Reduction Act, Chapter 70.95C of the Revised Code of Washington (RCW) and is intended to update the appropriate legislative environmental standing committees and other interested parties.

Overview

In adopting the 1990 Hazardous Waste Reduction Act, the Washington State Legislature recognized that disposal of hazardous waste can be harmful to the environment and costly to those who must dispose of the waste. The Legislature set a statewide policy goal of reducing the amount of hazardous waste generated by 50% by 1995.

The primary method used to achieve this goal is to require certain hazardous waste generators and hazardous substance users to prepare pollution prevention plans. Implementation of the plans is voluntary.

Pollution Prevention Progress

To estimate progress toward the 50% goal, Ecology used hazardous waste generation data for the years 1990-1994. These data were "normalized" for the years 1991-1994 by adjusting the waste generation levels to account for the changing economy. Using the normalized data, waste generation was down 12% in 1994 compared to the 1990 base year and 22% compared to 1992. 1992 represents the highest year of waste generation in the last five years and is the first year of pollution prevention plan implementation.

In addition to the above analysis, a waste generation level was estimated for 1999. This is the year when the pollution prevention plans received to date will be fully phased-in. This level was projected by assuming all waste reduction specified in the pollution prevention plans actually occurs. The projected hazardous waste generation level in 1999 represents a 32% reduction in waste generation compared to the 1990 base year.

Progress Toward the 50% Waste Reduction Goal

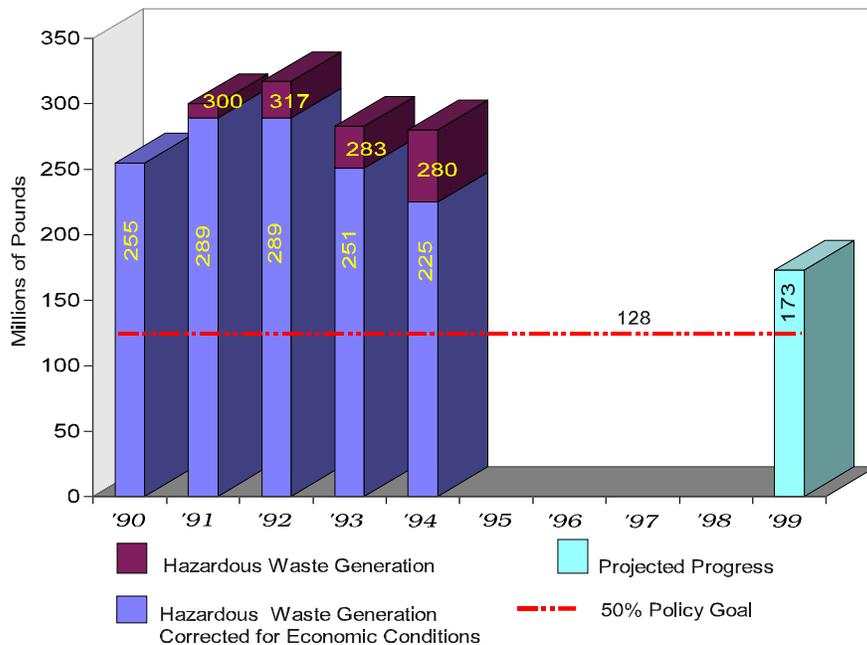


Figure ES1

Using data from pollution prevention plans and annual progress reports that planning facilities submit give other measures of progress. These facilities set goals to reduce hazardous substance use by 77.6 million pounds. The annual progress reports indicate that reductions of 102.2 million pounds have been achieved.

Ecology undertook a more in depth look at three industry sectors during 1995. Sectors chosen for this pilot project were Fiberglass, Printed Circuit Boards, and Electroplating.

Pollution prevention information compiled from within each sector will be shared with businesses comprising the sectors. This effort will provide each business with actual pollution reduction achievements from similar businesses.

Planning Effectiveness

During 1995, Ecology initiated a study to assess the effectiveness of the pollution prevention planning requirement. This was done by communicating with facilities participating in the process. The consulting firm of Ross and Associates was hired to conduct this research. The report concluded that the planning law did result in increased attention to pollution prevention and more systematic environmental management, as well as adoption of many new pollution prevention measures.

The evidence is particularly strong that the subset of facilities that had undertaken little or no actual pollution prevention activities prior to 1990 have made significant strides since undertaking planning in response to the law.

Conclusions

The information presented in this report supports a number of conclusions:

- ❖ Washington facilities are preparing pollution prevention plans and annual progress reports as required. They are setting significant performance goals to reduce hazardous substance use and hazardous waste, and they are making significant progress toward these goals.
- ❖ The statewide policy goal to reduce hazardous waste by 50% by 1995 will not be met. However, a reduction trend has been evident since 1992. Progress is being made. Reductions in toxic releases have been reported continuously since 1989.
- ❖ An evaluation of the pollution prevention planning program provided evidence that it can be an effective tool for facilities in identifying and implementing pollution prevention projects. The study also indicated that planning has further potential to drive pollution prevention activities.

Chapter 1 — Introduction

1995 was an important year for the pollution prevention planning program. It was the target year for reaching a 50% statewide reduction in hazardous waste generation, a goal established in the 1990 Hazardous Waste Reduction Act. This report documents progress through calendar year 1994 and reports on status in achieving the 50% goal.

When pollution prevention planning first became law in 1990, the term was relatively new in the fields of waste management and environmental regulation. Much has changed in the last five years. Increasingly, pollution prevention is recognized as a key strategy to protect the environment. Pollution prevention has become a focus for the Department of Ecology. Ecology is currently engaged in an ongoing effort to structure and apply environmental regulations in a way which emphasizes preventing pollution rather than end of pipe management.

The emphasis on avoiding pollution through partnerships has been reflected on the federal level as well. The Environmental Protection Agency initiated several voluntary programs to encourage industrial pollution prevention, including Green Lights for energy efficiency, the 33/50 project, and Design for the Environment. EPA administrator Carol Browner stated on Earth Day in 1993, "EPA is fundamentally shifting U.S. environmental protection strategy towards pollution prevention. Twenty years of end of pipe regulation has taught us that the best way to clean up the environment is to prevent environmental deterioration in the first place."

Emphasis on pollution prevention coincides with a shift by regulatory

agencies to multi-media approaches to regulation. Agencies strive to assure that pollution control regulations do not shift pollutants from one medium to another. Ecology is in the forefront of this effort with single industry technical assistance campaigns and a pilot project to test the feasibility of multi-media permits.

How does pollution prevention planning fit into this changing regulatory environment? In some ways, the concept is even more relevant now than when the law was first passed in 1990. Key features of the pollution prevention planning program, such as voluntary implementation, cooperative approach between Ecology and facilities, and addressing pollution problems at the source, are all areas of increasing emphasis by Ecology in interactions with industry.

While certain features of the planning program are clearly successful, a question remains to be answered about the effectiveness of the planning requirement in reducing pollution. This report provides insight into this question. It begins with an overview of the planning law in Chapter 2. Progress in preventing pollution is discussed in Chapter 3. In this chapter, a number of data sources are examined, and we evaluate progress not only in reducing hazardous waste generation, but also in reducing all contaminant releases to the air, land, and water.

The report also addresses the contribution of planning to pollution prevention progress. Chapter 4 describes the results of a special study which draws on the experience and opinions of facility representatives themselves to help answer this question. Chapter 5 presents observations and conclusions.

Chapter 2 — Overview of Washington's Pollution Prevention Planning Program

Planning Requirements

The 1990 Hazardous Waste Reduction Act, Chapter 70.95C RCW, requires certain facilities to prepare pollution prevention plans. 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 Title III of the Superfund Amendments and Reauthorization Act (SARA), are subject to this law.

Pollution prevention plans must include:

- ❖ inventories of hazardous substances used and hazardous wastes generated;
- ❖ an identification of opportunities to prevent pollution;
- ❖ an analysis of the feasibility of these prevention opportunities, according to the state's waste management hierarchy;
- ❖ reduction, recycling and treatment targets for the opportunities selected for implementation; and
- ❖ a five-year implementation schedule.

Following plan submittal, facilities must report annually on progress towards their established targets. Opportunities

implemented during the prior year are identified in the annual progress report, as are the volumes of substances and/or wastes reduced, recycled and treated.

Plans cover a five year period, then are to be updated. While preparing plans and progress reports is mandatory, plan implementation is voluntary.

Planning Universe

To date, 624 facilities have been notified of the requirement for a pollution prevention plan. These plans are due in "waves." The first wave was comprised of 261 of the largest hazardous waste generators and hazardous substance users, and had plans due by September 1, 1992. The second, third and fourth waves consisted of 127, 111 and 46 facilities, with plans due in September 1993, 1994 and 1995 respectively. A fifth wave containing an additional 79 facilities has plans due in September, 1996. While inclusion in one of the first three waves was based on the volume of waste generated, the fourth and fifth waves are businesses reporting waste generation above the planning threshold level for the first time. The number of planning facilities in a given wave at any point in time is dynamic. As companies go out of business, become part of an interrelated facility group (one plan covers several facilities that operate in a similar manner), achieve inactive status (no longer have opportunities to achieve pollution prevention), or achieve reductions that take them below the planning threshold, their planning status changes.

Chapter 3 — Measuring Pollution Prevention Progress

Progress Toward Planning Targets (Goals)

There are a variety of ways to measure pollution prevention progress. One of the most direct is to look at the information provided by the facilities required to prepare pollution prevention plans. Within their plans, facilities are asked to establish targets for reducing hazardous substance use and hazardous waste generation, and for the amounts of wastes that will be recycled or treated. These targets are normally based on the anticipated results of implementing pollution prevention opportunities that were identified during the planning process. The targets for these four categories, as established by the facilities that have submitted plans determined to be adequate through September, 1995, (476 out of the 545 facilities with plans currently due) are illustrated in Figure 1.

Seneca Foods Corporation of Prosser recently met and surpassed the goals they set for themselves in their five year pollution prevention plan, which began in 1991. They switched from a hazardous to a non-hazardous parts cleaner, improved the preventative maintenance of their ammonia system (reducing fugitive air emissions), and instituted a process safety management plan to better educate and prepare their employees in case of an emergency. Over the last three years, Seneca has reduced hazardous substance use by 64% and reduced hazardous waste generation by 67%, all while significantly increasing their production.

Pollution Prevention Targets (Goals)

For facilities with approved plans through 1995

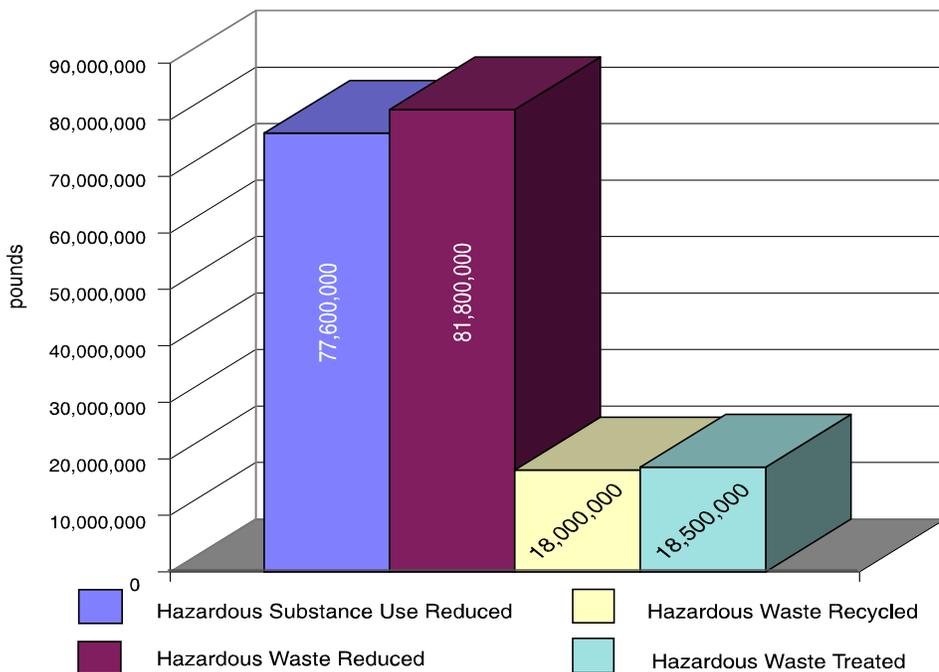


Figure 1

Planning facilities are also required to submit annual progress reports, which describe the achievements made during the prior calendar year. The information provided includes the amounts and types of substances and wastes that are being avoided, as well as the amounts being recycled and treated. A comparison of these achievements to established targets is used as an indicator of progress. The numbers reported are not normalized. As a result, they do not reflect any changes in levels of production, reporting techniques or other conditions that may affect hazardous waste generation or hazardous substance use.

At this printing, 320 of the annual progress reports due in 1995 have been reviewed and found adequate. As achievements reported in a given year are assumed to be "sustainable" (which is not always true), the achievements reported for 1994 are added to those reported in prior years. Figures 2 through 5, therefore, compare the achievements reported for calendar years 1992, 1993 and 1994 to the targets established through 1994.

Progress Toward Hazardous Substance Use Reduction Target

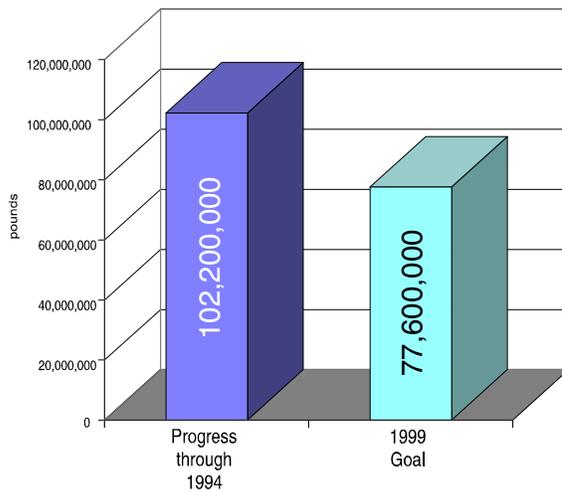


Figure 2

Progress Toward Hazardous Waste Reduction Target

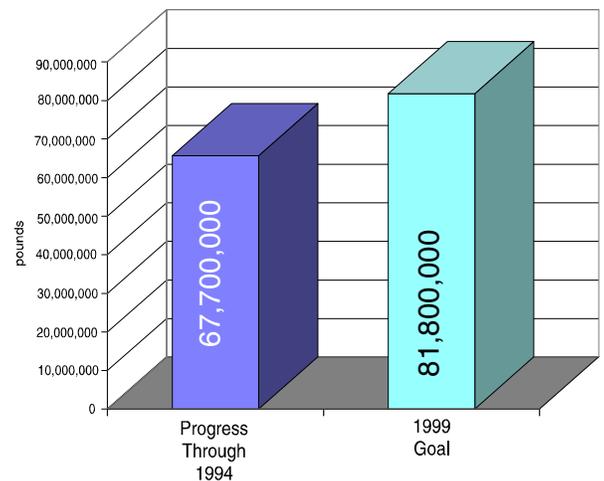


Figure 3

Progress Toward Recycling Target

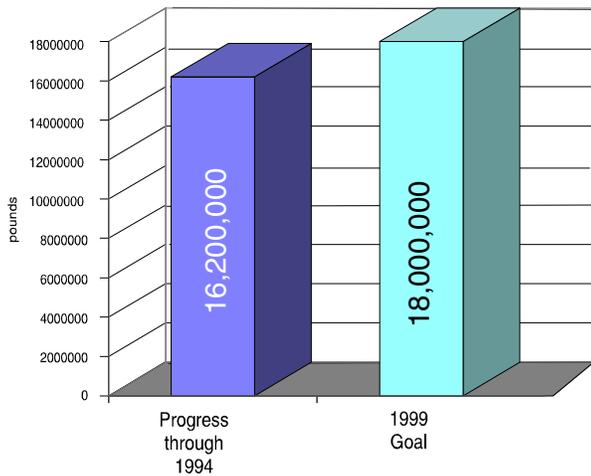


Figure 4

Progress Toward Hazardous Waste Treatment Target

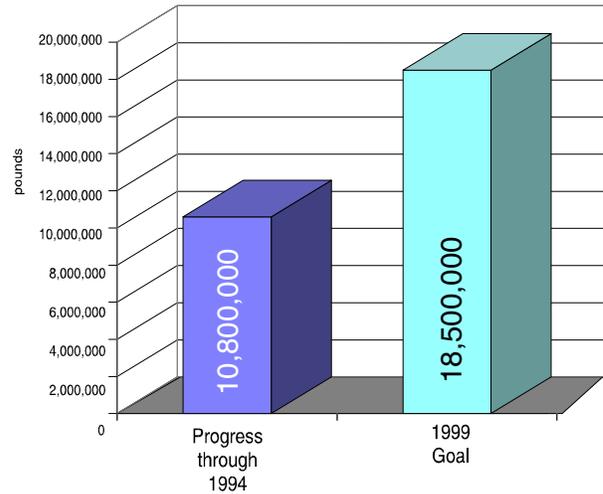


Figure 5

Pounds of waste reduced or pounds of hazardous substances not used provides some insight into possible trends and provides a tangible, quantifiable measure. But it does not fully capture the nature or extent of progress made by implementing pollution prevention strategies. A "pounds reduced" measure does not embrace improvements in operating practices and awareness of compliance issues that create a foundation for continued success. And it does not capture results that may take place over long periods of time. Due to these other factors, pure "pounds reduced" measures must be viewed within the limited scope of their use. Other measures can help account for these alternative successes and are discussed elsewhere in this report.

Progress Toward the 50% Policy Goal

The Hazardous Waste Reduction Act contains a statewide policy goal to reduce hazardous waste generation by fifty percent by 1995. While expectations were that one of the primary ways to achieve waste reduction was through the pollution prevention planning program, this goal was not mandatorily applied to individual planning facilities. The most direct measure of progress toward the fifty percent goal, therefore, is to compare total hazardous waste generation in the state in 1990, considered to be the base year, with succeeding points in time.

Data are dynamic, and it is critical to recognize this when comparing data over time. The amounts of hazardous waste reported in annual generation reports, for example, can be amended in subsequent years to correct errors or incomplete reporting. Also, analysis of the data can lead to discovery of information that causes certain waste streams to be counted or not when it comes to standardizing the identification of continually generated waste over time. Thus, the historic data presented here have been adjusted from last year's report. In addition to the corrections for amended reports, it was discovered that prior data included the submarine reactor hulls shipped to Hanford for disposal. These hulls are classified as mixed radioactive waste, not continually generated waste, and have been removed from this data set.

It is also a fact that economic conditions change over time, which normally results in changing levels of production. As this occurs, the generation of hazardous waste will fluctuate accordingly. Therefore, by adjusting annual hazardous waste generation data by an index derived from a normalization factor such as gross business income, a more accurate picture of pollution prevention progress results.

Shields Bag & Printing installed distillation equipment at their facility in late 1994. They are now reclaiming an average of 11,000 lbs. of solvent (mostly N propyl alcohol) per month from approximately 13,750 lbs. of waste ink and solvent. The recycled solvent is used primarily for press cleaning during changeovers. Previously they sent their waste solvent and ink off site for recycling at a 60-65% efficiency rate. Their on-site efficiency averages 80%.

Lamson, a Redmond manufacturer of fly fishing reels recently changed to an new, non-chlorinated coolant for their mills and lathes which reduced waste and saved an estimated \$10,000 to \$15,000 a year in waste handling costs. This action also benefited the company by changing the company's reporting status from a large to a small quantity generator and eliminated burdensome regulations.

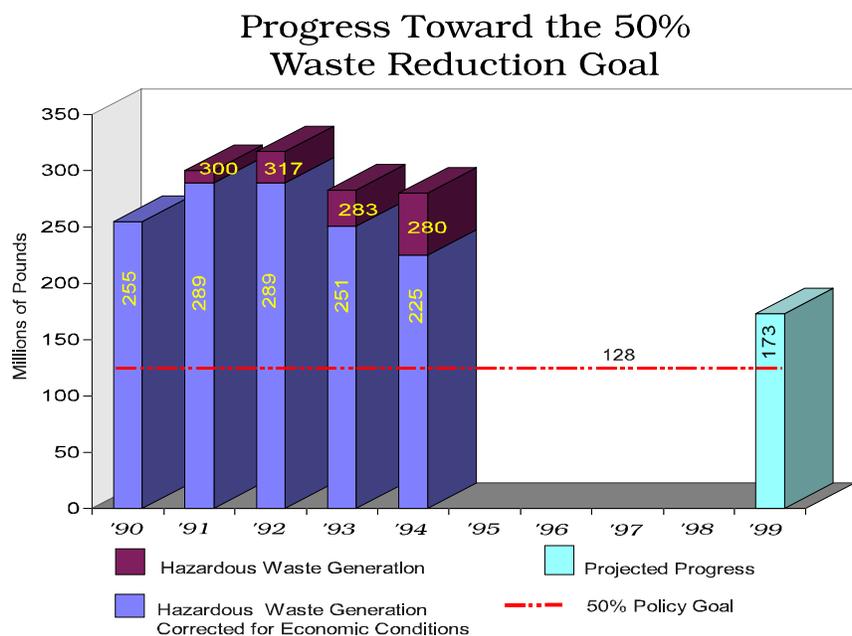
Foss Maritime, a Puget Sound Company with primary operations in marine transportation and shipyard repair, switched to longer lasting paints and citrus-based solvents to reduce wastes and eliminate hazardous substances. These changes resulted in a 24% reduction in hazardous substance use and 49% reduction in generated wastes.

Figure 6 displays progress toward the goal. The data come from Annual Dangerous Waste Generation Reports for the years 1990 through 1994. The generation amounts are from all generating facilities except commercial treatment, storage and disposal facilities, which manage wastes generated by other entities. Permit by rule waste waters, wastes from clean-up projects and mixed radioactive wastes are also excluded.

The graph in Figure 6 also shows the data adjusted for the changing economy. With 1990 being the base year, the years 1991 through 1994 show estimated levels of waste generation assuming that the economy remained constant. The adjustment factors were calculated from information provided in the "Washington Economic and Revenue Forecast, September, 1995" and the Department of Revenue. Gross business income from all Washington businesses was the normalization measure used. Other measures were looked at, and while they produced different results, the trends were similar for all of them.

The goal of 128 million pounds is 50% of the 255 million pounds generated by all facilities in 1990. Figure 6 also shows a projected generation level in 1999 (173 million pounds) that will occur if the planning targets of the first, second and third wave planning facilities (82 million pounds) are met. This achievement would equate to a 32% reduction, compared to the 1990 base year. Looking at the normalized data, the reduction in 1994 equates to a 12% reduction compared to the 1990 base year and 22% compared to 1992. (1992 represents the year of highest waste generation over the last five years and is the first year of pollution prevention planning implementation.)

Figure 6



Several additional caveats must be recognized when interpreting these data.

- ❖ The “universe” of hazardous waste changes over time, with some wastes being listed and others delisted since the goal was established. Spent potliner from aluminum smelters, for example, was listed, delisted, and relisted as a federal waste during the 1980’s, then listed as a state only waste in 1991. The large volume of this waste stream has a significant impact on waste generation totals. The data are not “normalized” to reflect these changes.
- ❖ There are several waste types that are only generated and reported on an intermittent or cyclic basis. This causes peaks and valleys when looking at waste generation volumes over time.
- ❖ The largest waste generators in the state are required to do plans (planners generate approximately 96% of the hazardous waste generated on an ongoing basis), but the results of plan implementation were not first seen until 1993 since the first plans were not due until September, 1992. Although this year, 1995, is considered to be the “goal year,” less than half of the plan implementation and reporting cycles for the five waves of planners identified to date have elapsed.

Questions have surfaced about the continued value of the legislative 50% waste reduction goal, and whether it might be appropriate for Ecology to consider establishing its own internal goal or goals. Factors that contribute to these questions include the implementation dynamics of the staggered planning “waves” and their reporting periods, issues about alternative ways to measure progress, and reporting accuracy and data

interpretation. As we move toward the five year plan update time frame of September, 1997 for first wave planners, it may be appropriate to establish new goals. These goals, which could include hazardous substance use reduction as well as hazardous waste reduction, could serve as model targets for facilities doing their plan updates. As Ecology moves toward completing its study of the effectiveness of the pollution prevention planning program, discussed in Chapter 4, it is likely that revised goals will be identified and adopted.

Other Measures of Progress

While the Hazardous Waste Reduction Act establishes a 50% goal for hazardous waste reduction, pollution prevention is important not only for hazardous waste, but also for contaminants in wastewater and air emissions. A truer measure of progress in preventing pollution through planning would address reductions in all environmental media.

Unfortunately, no mechanism exists for consistent collection of these types of data across a broad spectrum of industries. Data collected through the Toxics Release Inventory (TRI) provides one of the best indicators because it measures, or at least estimates, releases to air, land and water. Even though the TRI universe captures only a portion of industries statewide, it nonetheless yields worthwhile observations about statewide trends.

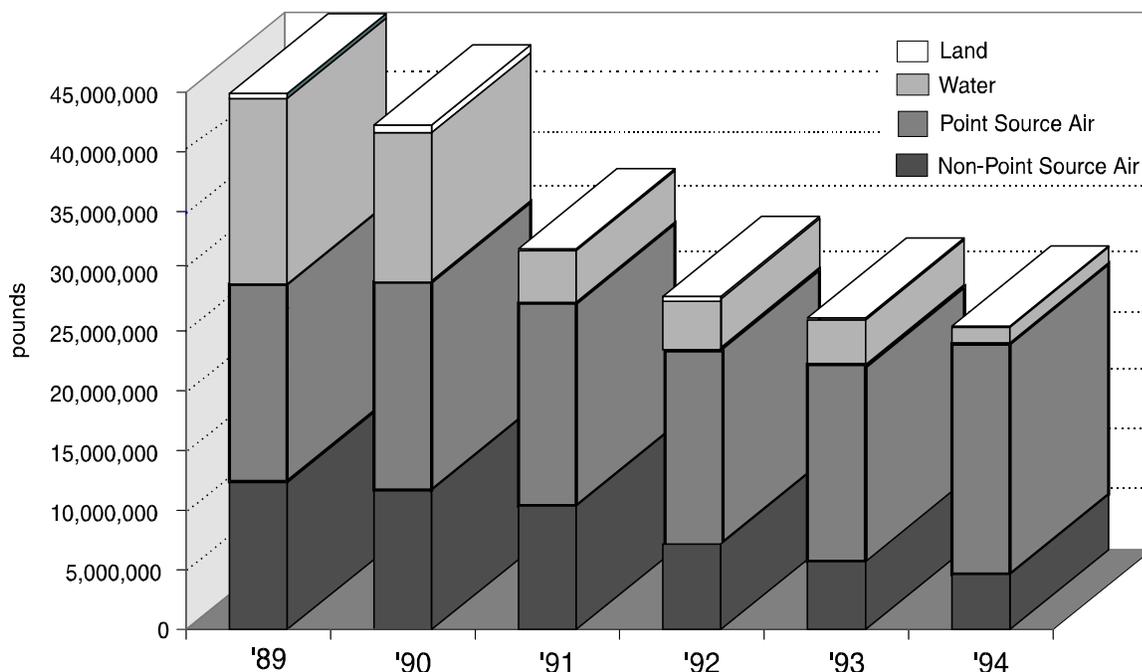
An additional source of information is also available - reports from in-depth Ecology studies of three different industrial sectors. These provide additional insights into the question of pollution prevention in industry, and are discussed later in this chapter.

Trends in Statewide Toxic Releases

Ecology has recently compiled a statewide summary report from 1994 TRI data. The report identifies chemical releases by reporting facilities during calendar year 1994 for over 315 chemicals identified by EPA as “toxic”. The report indicates where these releases occur (i.e., air, land or water) and amounts transferred off-site. Facilities are also required to report their source reduction and recycling activities for these chemicals.

The number of facilities required to file TRI reports declined by six percent, from 320 in 1993 to 301 in 1994. The decrease indicates that fewer facilities were required to report because they no longer exceeded reporting thresholds for chemical use, in some cases the result of pollution prevention activities. Total quantities of chemicals released have also decreased. Figure 7 shows releases for 1989 through 1994 and depicts where the releases occurred. The data show a healthy nine percent reduction in releases for the last two years.

Figure 7
Washington Toxics Chemical Releases By
Environmental Media 1989 — 1994



Industrial Sectors Project

In 1995, Ecology began experimenting with developing profiles of major industrial sectors. "Sectors" refer to "types" of businesses; for instance, electroplating facilities. There were two primary purposes for conducting this project. First, to focus on an industry sector to more closely examine progress in meeting the legislative policy goal of reducing hazardous waste generation by fifty percent by 1995. Second, to provide more detailed information to the industry sector and Ecology about successful prevention measures, barriers to implementing pollution prevention opportunities, and how best to target our efforts in the future to maximize pollution prevention.

Three industry sectors were chosen for this pilot project: fiberglass reinforced plastics (39 companies); electroplating (23 companies); and, printed circuit boards (11 companies) were examined. Findings about the pollution prevention progress of each of the three sectors follows.

Fiberglass Reinforced Plastics

The results of the Fiberglass Reinforced Plastics sector review demonstrated that these facilities are implementing pollution prevention opportunities and conducting further study into additional opportunities. In their pollution prevention plans, the sector targeted three primary processes and identified 74 unique reduction opportunities. Most of these opportunities were implemented by more than one facility.

The five most commonly selected opportunities, chosen for implementation or further study, include:

Opportunity	% of Fiberglass Reinforced Plastics Businesses Targeting Opportunity ¹
Improved worker training and awareness	55%
Install on-site distillation units	52%
Use low styrene resin	45%
Use emulsifier in place of acetone	42%
Ration solvent or other material	36%

¹ 33 FPR facilities implementing or selecting opportunity for further study.

Per pound reductions cannot be related to each of these opportunities. However, in telephone interviews, Fiberglass Reinforced Plastic facility operators noted several associated benefits. Facilities reported that both internal and external communications have improved, compliance requirements have been reduced, and health and safety issues have improved as a result of implementing these strategies.

In 1994, many Fiberglass Reinforced Plastics facilities reported reduced styrene emissions on their annual Toxics Release Inventory (TRI) Reports. This drop in emissions may be attributable to production down-turn, process modification, or other complicating factors. However, recognizing the industry's move toward alternative resins and other new strategies, it seems reasonable to assume that reductions are at least somewhat tied to pollution prevention initiatives.

Beyond changes in resin use, another significant trend by the Fiberglass Reinforced Plastics sector is their move toward the use of alternative solvents like emulsifiers in their cleaning operations. Since 1990, many Fiberglass Reinforced Plastics facilities have reduced their use of acetone by switching to alternative solvents for some process applications. Eighty percent of the queried facilities used acetone as their primary solvent in 1990, but only 36% of these same facilities used acetone as their primary solvent in 1994.

Fibrex, a Burlington manufacturer of fiberglass pipe and fittings, has implemented a pollution prevention opportunity that reduces styrene emissions by 69,000 pounds a year. To achieve this 50% reduction in styrene emissions, Fibrex began using a resin that contains a styrene suppressant. The suppressant forms a barrier on top of the resin that reduces by half the amount of styrene escaping to the air. Fibrex has also reduced their hazardous waste to levels where they will no longer be required to submit pollution prevention progress reports.

Printed Circuit Boards

A review of the Printed Circuit Board sector pollution prevention data revealed that all eleven facilities examined have implemented substantial opportunities directed at reducing the use of hazardous substances in their manufacturing process. Unfortunately, total hazardous substance use is not currently tracked so a baseline to measure progress against is not available.

The waste generation trends for the Printed Circuit Board sector are mixed, but generally show an increase from 1990 to 1994. When looked at strictly from that viewpoint it appears that pollution prevention planning is having a negligible effect at best. However, overall waste generation masks the trend that shows the generation of Extremely Hazardous Waste going down while the generation of less hazardous Dangerous Waste is increasing. Also hidden are individual facility waste reduction innovations.

The overall increase in waste generation is partially due to an annual growth rate of between five and eighteen percent since 1990 for this industry sector. That increased demand for printed circuit boards combined with fast changing technologies in the industry, rigorous customer specifications and improved environmental reporting have resulted in an overall increase in reported waste generation.

The attention on growth in this fast evolving industry has left many pollution prevention opportunities waiting to be implemented. The Printed Circuit Board industry involves several processes that are particularly waste intensive, but as technology continues to improve this industry could show large reductions in waste generation.

Electroplaters

Examining the twenty-three facilities in the Electroplating sector produced results similar to that of the Printed Circuit Board sector. Nineteen of the twenty-three facilities studied had implemented at least one opportunity for pollution prevention with the majority of those opportunities focusing on parts cleaning and the solvents/wastes involved. The most significant trend in this industry is that many facilities have switched from hazardous substances such as solvents to less hazardous aqueous cleaners. Of the facilities still relying on solvents, many have implemented solvent recycling.

Overall, hazardous waste generation in the solid form for the Electroplating sector has increased since 1991. A major factor of this increase during the pollution prevention planning years is that production rates for these facilities increased an average of sixteen percent over that period. Once again, the emphasis on meeting customer demand was a higher priority than pollution prevention. However, hazardous wastewaters, which are reported as a separate category due their extremely large volume, showed a healthy thirteen percent decrease over the same period. Wastewater is the major component of the total wastes generated by electroplaters (98%) and as such it receives a lot of attention from the industry.

Another positive trend in the Electroplating sector is the decrease in the reported release of Toxic Release Inventory (TRI) chemicals. Particularly notable is the dramatic (74%) decline in the volume of total releases for methyl ethyl Ketone (MEK) and trichloroethane (TCA).

Summary - Sectors Project

A review of the annual progress reports submitted by companies included in the Sectors Project revealed that 62 of the 73 facilities (85%) either implemented, or selected for future implementation, opportunities from their pollution prevention plans. Of the remaining eleven facilities, eight had implemented pollution prevention opportunities prior to preparing their plans. This qualitative assessment of pollution prevention progress indicates that positive measures are being taken to reduce hazardous substance use and hazardous waste generation within the fiberglass, electroplaters, and printed circuit board sectors.

Pollution prevention information compiled from within each sector will be shared with businesses in the sector. This information sharing effort will provide each business with actual pollution reduction achievements from similar businesses. Ecology expects that this will give businesses within each sector new ideas on pollution prevention strategies to implement at their own facilities.

Fluke Corporation, a printed circuit board manufacturer located in Everett, has decreased the amount of hazardous waste generated by 23% and increased the amount recycled by 78%. The company modified or eliminated 18 production processes which used chemicals that depleted the ozone layer or had other toxic properties. Another benefit has been the reduction of water consumption by 87% over a four year period.

Chapter 4 — Is Planning an Effective Tool to Achieve Pollution Prevention?

Study Design

To answer the question “is planning an effective tool to achieve pollution prevention?” we decided to ask the planners themselves. “Planners” refer to businesses required to prepare pollution prevention plans. During 1995, Ecology initiated a study to assess the effectiveness of the pollution prevention planning requirement based on the reported experiences of facilities participating in the process. The consulting firm of Ross and Associates was hired to conduct this research.

The following summary outlines the methodology used and the results of this research. While the results in general indicate that Ecology’s approach to pollution prevention planning has resulted in positive changes within industry, it is also evident that reactions and opinions regarding the program vary among facility representatives. Ecology has initiated a process to study these results carefully and recommend changes as necessary to improve our service and the program’s value to business.

The research design consisted of three segments:

Surveys

183 surveys were returned out of 389 mailed, a relatively high return rate of 47%. Respondents were given the option of confidentiality and were fairly representative of the larger population with respect to geographic distribution, size and industrial sector.

Interviews

Thirteen facility representatives were interviewed by telephone as a follow-up to survey responses. Interviewees were selected from among survey respondents who indicated a willingness to be interviewed. In selecting interviewees from among these candidates, an effort was made to assure a mix of those with positive and negative planning experiences.

Focused Discussion Sessions

Two focused discussion sessions were held; one in Tacoma and one in Seattle. Participants were invited from those volunteering on survey response forms and additional facilities with pollution prevention planning experience identified by Ecology staff. Ecology staff was not present at these discussion sessions in order to encourage an atmosphere conducive to speaking openly about problems experienced.

Results of Washington State's Planning Effectiveness Study

The report from Ross and Associates identifies several major observations and highlights, presented below.

❖ **The planning process contributed to identifying and implementing pollution prevention opportunities.**

A large majority (78%) of facilities reported a fair or great level of accomplishment in implementing pollution prevention activities. Of all respondents, 55% indicated they used less or fewer hazardous chemicals, 66% indicated they generated less hazardous waste, and 50% indicated they recycled more hazardous waste to a fair or great extent as a result of implementing pollution prevention strategies identified in their plan. Facilities that had undertaken fewer pollution prevention activities in the past were most likely to report making gains after planning.

❖ **Planning steps were evaluated.**

The planners were asked about the usefulness of eight of the planning process steps. These included: (1) identifying hazardous products and waste streams; (2) reviewing resources; (3) evaluating identified opportunities; (4) setting performance goals; (5) developing cost accounting procedures; (6) summarizing costs and benefits for opportunities; (7) developing an employee training program; and, (8) using a technical evaluation checklist.

Seventy-five percent (75%) of survey respondents found at least one step useful or very useful in identifying opportunities, and 47% found two or more steps useful or very useful. Importantly, 90% of facilities with no planning experience and little experience implementing pollution prevention found at least one step useful or very useful.

Setting performance goals for pollution prevention opportunities was identified as the step most directly related to generating significant reductions. Businesses reported that "identifying hazardous products and waste streams" was the most valuable step in the process.

Only 17% of the facilities rated the step of developing cost accounting procedures as useful or very useful, the lowest of any of the planning steps.

❖ **Benefits were achieved by implementing pollution prevention measures.**

Sixty nine percent (69%) of facilities experienced one or more specific benefits to a fair or great extent as a result of implementing pollution prevention opportunities identified in their plan. The most commonly cited benefits were:

- improved worker health and safety
- direct cost savings
- reduced non-planning regulatory requirements
- improved process efficiency

❖ **Ecology's technical assistance activities were helpful.**

An overwhelming 96% of respondents indicated they felt they "had adequate assistance from the Department of Ecology in preparing their plan". Nearly all facilities (91%) used some form of direct assistance (phone, on site, or workshop) when preparing their plan, and most types of assistance were viewed very favorably. Interviewees also were generally positive about their interactions with Ecology, nearly unanimously characterizing Ecology as responsive, flexible, and well intentioned.

Some problem areas were identified. Some facilities found Ecology to be either unresponsive or inflexible regarding planning requirements. In addition, there exists confusion arising from Ecology's organizational structure and requirements for "pollution prevention plans" from different programs and agencies. Interviewees believed there was an opportunity for different planning requirements to create a "synergy" if their format could be standardized, and especially if their requirements could be made to be consistent with other emerging initiatives.

During 1994, Ecology staff provided the following technical assistance activities:

- 548 site visits to planners and non-planners
- 2,421 phone consultations to planners and non-planners
- 64 workshops, attended by 1,614 participants
- regular distribution of newsletters and other publications

❖ **Annual progress reports are good "reminders."**

A total of 88% of the facilities reported that they found Annual Progress Reports (APR's) to be useful. Facilities, in general, viewed APR's as reminders to attend to their pollution prevention activities. While most facilities characterized the reporting requirement as a minor nuisance, they acknowledged the APR's usefulness in prompting continued attention to environmental issues. One facility noted that documenting progress produced evidence of cost savings — quantitative data that could then be used in justifying other environmental projects to management.

❖ **Cost Saving motivates action.**

Sixty one percent (61%) of survey respondents indicated that they expected to continue to identify pollution prevention opportunities during the next five years. Facilities also appear to recognize the cost savings associated with pollution prevention. Most interviewees stressed the strong role of cost savings in their decision to implement specific pollution prevention measures.

However, facilities interviewed appeared to have a somewhat limited ability to analyze environmental costs, with several facilities commenting that "environmental costs are very hard to quantify." This perceived difficulty of tracking environmental costs was also reflected in survey responses. Businesses' ability to better quantify environmental costs is expected to provide additional incentive to reduce wastes. This is an area for focus in the future.

Study Conclusions

The consultant's report contained conclusions regarding the effectiveness of the pollution prevention planning tool.

An overall conclusion is that further reductions in hazardous wastes and substance use are possible.

There is a great deal of evidence in the findings that the planning law did result in increased attention to pollution prevention and more systematic environmental management, as well as adoption of many new pollution prevention measures. The initial plan and the annual progress reports have been effective in focussing and perpetuating attention in these areas. Most facilities also reported that they experienced ancillary benefits associated with improved management

systems, including improved materials management and better communications within their organizations.

The evidence is particularly strong that the subset of facilities that had undertaken little or no actual pollution prevention activities prior to 1990 have made significant strides since undertaking planning in response to the law.

Interested parties are encouraged to review the full report, which can be obtained by contacting the Department of Ecology, Hazardous Waste and Toxics Reduction Program, P.O. Box 47600, Olympia, WA. 98504-7600, or by calling (360) 407-6700.

Other Perspectives on Pollution Prevention Planning

In evaluating trends in pollution prevention, it is important to note that planning is only one of several factors accounting for implementing prevention activities. Surveys of facilities conducted by a number of states identify both the range and significance of pollution prevention incentives and, most importantly, the manner in which these incentives interact to achieve implementation.

Surveys indicate that federal and state reporting requirements create a surprisingly strong incentive for pollution prevention. In part, this reflects a public image concern by waste generators. Additionally, it reflects increased awareness of the amount of hazardous waste and the potential for cost savings from reducing or eliminating hazardous waste. Other factors leading to pollution prevention implementation cited in surveys include award programs, the availability of technical assistance, employee pressure, and personal ethics.

Regulatory compliance stands out as a dominant incentive for pollution prevention. While regulations rarely mandate implementation of pollution prevention, they do raise the financial and administrative costs of conventional "end of the pipe" responses to pollution. A high percentage of businesses implementing pollution prevention strategies cite cost savings as a dominant incentive; however, such savings reflect, in large measure, costs imposed by regulation.

An EPA survey of pollution prevention implementation in several Northeastern states provides a useful perspective for relating planning to other pollution prevention incentives. It concludes that successful pollution prevention is characterized by a cluster of factors, of which planning is one, and that planning cannot be considered apart from these other factors. It observes that in two of the eight states participating which have a regulatory requirement for pollution prevention plans, initial skepticism of facilities regarding the value of pollution prevention appears to be changing as a result of the planning exercise. In examining pollution prevention implementation, the key issue is not how pollution prevention planning ranks in relation to other incentives, but the role of planning in identifying and integrating these other factors.

The Weyerhaeuser Company has taken important steps toward its goal of "minimum impact" mills. This year, Weyerhaeuser completed a major modernization project at its Longview Kraft Mill, including the installation of extended delignification to reduce the quantity of bleaching chemicals needed, and a new bleach plant that uses chlorine dioxide and oxygen for bleaching instead of elemental chlorine and sodium hypochlorite. Changes made a few years ago at the Cosmopolis Mill are unique in the dissolving sulfite pulp industry. Oxygen, chlorine dioxide and hydrogen peroxide have replaced the more environmentally-harmful sodium hypochlorite and elemental chlorine for pulp bleaching. These projects have improved process efficiency and reduced overall hazardous substance use as well as reducing production of chlorinated organic compounds including dioxins. Weyerhaeuser began planning these projects in the mid-1980's and incorporated them into the company's pollution prevention plans in 1992. Since 1990, the Longview and Cosmopolis mills have discontinued direct use of elemental chlorine in bleaching, a reduction of nearly 34 million and 16 million pounds per year respectively.

Chapter 5 — Conclusions

The information presented in this report supports a number of conclusions:

- ❖ Washington facilities are preparing pollution prevention plans and annual progress reports as required. They are setting significant performance goals to reduce hazardous substance use and hazardous waste, and they are making significant progress towards these goals.
- ❖ The statewide policy goal to reduce hazardous waste by 50% by 1995 will not be met. However, a reduction trend has been evident since 1992. Progress is being made. Reductions in toxic releases have been reported continuously since 1989.
- ❖ So many factors affect waste generation data that it is difficult to measure progress over time. Qualitative as well as quantitative information is needed to successfully look at progress.
- ❖ Ecology focused effort on three industry sectors this year: Fiberglass, Electroplaters, and Printed Circuit Board businesses. Limitations in data Ecology collects and incorrect reporting were problematic in conducting this work. However, trends in waste generation and hazardous substance use were determined. Consolidated information will be shared among the individual businesses. Ecology will evaluate the value of doing this type of work for other business sectors.
- ❖ An evaluation of the pollution prevention planning program provided evidence that it can be an effective tool for facilities in identifying and implementing pollution prevention projects. The study also indicated that planning has further potential to drive pollution prevention activities.

❖ Ecology's technical assistance program contributes greatly to the success of the pollution prevention planning program.

There is a great deal of debate around the measurement of pollution prevention and about the measurement of progress toward the state's 50% reduction goal. It seems appropriate to recognize that current numerical data provide a limited picture of progress. While it is important to ask the question, "How far have we come?" the numerical data alone do not provide a complete picture of program results.

Ecology is committed to following up on the planning program evaluation. A process is in place to further identify and address policy issues, including the components of the five-year plan update. Another task that will be accomplished at this time will be an analysis of the value of setting internal goals for hazardous substance use reduction and hazardous waste reduction. Parallel efforts will also focus on data management issues related to both pollution prevention measurement and technical assistance. Changes should be in place by the end of 1996.