

# **Pollution Prevention Progress in the Northeast**

**Northeast Waste Management Officials' Association  
(NEWMOA)**

**August 1998**

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## ACKNOWLEDGMENTS

NEWMOA is indebted to the U.S. Environmental Protection Agency Region 1-New England for its support of this project. The Northeast states provided additional in-kind support.

NEWMOA would also like to thank those who provided data, information, advice, assistance, comments, and recommendations, including:

Cynthia Barakatt, Massachusetts Office of Technical Assistance (MA OTA)  
Andy Bray, NEWMOA  
Bob Brown, Connecticut Technical Assistance Program (ConnTAP)  
Rudolph Cartier, New Hampshire Department of Environmental Services (NH DES)  
Tria Case, New York Empire State Development (NY ESD)  
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## **Northeast Waste Management Officials' Association**

The Northeast Waste Management Officials' Association (NEWMOA) is a non-profit, nonpartisan, interstate governmental association. The membership is composed of state environmental agency directors of the pollution prevention, hazardous waste, solid waste, and waste site cleanup programs in Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.

NEWMOA's mission is to help states articulate, promote, and implement economically sound regional programs for the enhancement of environmental protection. The group fulfills this mission by providing a variety of support services that facilitate communication and cooperation among member states and between the states and the Environmental Protection Agency (EPA), and promote the efficient sharing of state and federal resources.

NEWMOA was established by the governors of the New England states as an official interstate regional organization, in accordance with Section 1005 of the Resource Conservation and Recovery Act (RCRA). The organization was formally recognized by the U.S. Environmental Protection Agency in 1986. It is funded by state membership dues and EPA grants.

NEWMOA established the Northeast States Pollution Prevention Roundtable (NE P2 Roundtable) in 1989 to enhance the capabilities of member states environmental officials to implement effective source reduction programs. The NE P2 Roundtable's program involves the following components: (1) managing regional roundtable meetings and workgroups; (2) publishing a newsletter; (3) managing a resource center of books, reports, case studies, fact sheets, notices of upcoming meetings and conferences, and a list of P2 experts; (4) organizing training; and (5) conducting research and publishing reports and other documents. The resource center provides pollution prevention information to state and local government officials, the public, industry and others. Funding for the NE P2 Roundtable is provided by the NEWMOA member states and the U.S. EPA. For more information contact: Terri Goldberg, NEWMOA, 129 Portland Street, 6<sup>th</sup> floor, Boston, MA 02114, (617) 367-8558 x 302 (phone); (617) 367-0449 (fax).

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# **Executive Summary**

## ***Pollution Prevention Progress in the Northeast***

According to *Pollution Prevention Progress in the Northeast*, state and local government programs have helped thousands of companies throughout the Northeast save millions of dollars and reduce pollution. Sixteen state and local programs accomplished this with approximately one percent of the state environmental expenditures. In Massachusetts alone, the net savings reported by companies was more than \$11 million.

*Pollution Prevention Progress in the Northeast* examines in detail the pollution prevention activities of 16 state and local government agencies in the Northeast from 1990 through 1996. This is a first-of-its-kind report that documents, regionally, the activities and accomplishments of government-sponsored pollution prevention programs. This study documents good government in action at the state and local level. The primary conclusion of the report is that pollution prevention programs are succeeding in breaking down the old adage that environmental protection is incompatible with economic prosperity. Quite the contrary, through prevention businesses in the Northeast have strengthened their economic bottom lines while achieving environmental excellence.

State and local environmental programs have been involved with a variety of voluntary and regulatory activities designed to ease the implementation of prevention-oriented activities at companies and institutions and in communities. The programs include:

- ☛ Direct assistance to business
- ☛ Pollution prevention integration into state enforcement and compliance programs and facility planning
- ☛ Innovative voluntary programs

### **Direct Assistance to Business**

Beginning in the late 1980s, environmental protection programs began to focus on preventing emissions and contamination not just controlling or treating them. In the Northeast, government programs involved with these efforts have shown a high level of success in finding ways to help companies reduce pollution, comply with environmental regulations and save money.

State and local pollution prevention programs have conducted a variety of activities to provide direct assistance to business, particularly smaller companies. This assistance has taken many forms, including on-site visits and assessments of the operations at individual facilities, responses to phone requests for information, and mailings of documents and newsletters. The 16 surveyed programs have reached thousands of companies with their assistance.

### **On-site Technical Assistance**

Pollution prevention programs conducted approximately 2,950 visits to individual firms over the six-year period, and approximately 70 percent of these visits were to small businesses. In the



Northeast, these firms received approximately 3 recommendations per site visit on average or a total of approximately 9,000 recommendations. These businesses implemented at least 44 percent or roughly 3,950 of these recommendations. Studies by state programs in the Northeast have also shown that approximately 64 percent of the companies that received onsite assistance from state and local agencies implemented pollution prevention recommendations.

A few state programs could estimate the amount of waste and pollution that companies reduced as a result of assistance visits. The Rhode Island Department of Environmental Management found that onsite assistance helped 125 companies reduce their waste and wastewater by 13,500 tons per year. Another Rhode Island study of 25 process and operational changes recommended by the Department showed a total annual savings for the firms of more than \$342,700 with an average pay back period of 1.3 years. A similar study by the Massachusetts Office of Technical Assistance found that 18 companies saved a total of \$1.85 million and eliminated 1.7 million pounds of toxic pollutants. Interviews conducted by these programs and others have repeatedly shown that companies choose to make pollution prevention changes primarily because they reduced costs.

Pollution prevention programs also help companies achieve compliance with environmental regulations. When pollution prevention programs visit firms, answer their questions on the telephone, or write to them, they frequently address compliance questions and issues. Pollution prevention programs reported that they discussed compliance topics during approximately 67 percent of their on-site visits, and addressed minor compliance violations at nearly 40 percent of the site visits. Addressing compliance requirements through pollution prevention is a win-win solution for the company, the government, and the public. Often the companies save money and comply with regulations more easily, and permanently eliminate or reduce pollution.

### **Educational Programs**

In addition to one-on-one assistance, state pollution prevention programs conducted a wide range of educational activities for businesses and communities from 1990 - 1996. Programs organized more than 600 conferences and workshops with over 36,400 participants. They targeted these sessions toward various audiences, including municipal officials, the general public, and specific types of companies. In the Northeast P2 programs held over 150 workshops for metal finishing, printing, and auto repair shops from 1990 to 1996. Several states have also held annual or semiannual statewide pollution prevention conferences that informed hundreds of businesses and others about pollution prevention technologies, resources and techniques. These events frequently covered a combination of regulatory compliance topics and presentations on innovative pollution prevention technologies and case studies.

### **Information Resource Centers and Publications**

State and local pollution prevention programs manage information resource centers and publish fact sheets, reports, and case studies. These resource centers generally include a library of documents, video tapes and online services that users can access by calling and requesting information or visiting the center. From 1990 to 1996 these resource centers received more than 87,300 phone requests for information and responded by making referrals or sending out documents.

State and local pollution prevention programs published over 540 different P2 documents (other than newsletters and case studies) and distributed more than 334,000 copies to business. These documents include pollution prevention opportunity guides, fact sheets, compliance assistance manuals, annual reports, and brochures. In addition, the programs published over 265 case studies of particular companies that implemented a pollution prevention project; 118 of these documented more than \$39 million in costs savings.

From 1990 to 1995 ten pollution prevention programs published newsletters that reported on program events and accomplishments. During this period of time, they distributed over 108,900 copies of newsletters to businesses and other interested parties. These newsletters helped to keep businesses in the states informed of how to save money, remain competitive and reduce pollution.

State pollution prevention programs have also made grants and loans to individual companies to support their research on pollution prevention or investment in innovative technologies. From 1990 to 1996 state made more than 90 P2 grants totaling approximately \$2.8 million primarily to support projects at small firms. P2 programs often used these grant to create demonstration projects that showcased or tested new pollution prevention approaches or technologies.

#### **Pollution Prevention Integration into State Enforcement and Facility Planning**

Maine, Massachusetts, New York, and Vermont enacted laws that require certain companies to develop a facility plan that evaluates their operations and options for reducing wastes and pollutants. Most of these state laws include mandatory planning/voluntary implementation requirements. Using this approach gives facilities flexibility in determining and prioritizing their pollution prevention investments. These states collect annual data from the reporting facilities on their pollution prevention efforts. A summary of the results of their data analysis is presented below.

#### **Regulatory Integration**

Pollution prevention programs have made substantial strides toward integrating incentives and requirements for waste reduction into routine regulatory activities underway at environmental agencies. These activities include compliance inspections and enforcement of state and federal requirements, permitting, and development of new rules and regulations.

To integrate P2 into regulatory compliance activities, state P2 programs have developed policies and protocols for multimedia prevention-oriented inspections at facilities. There are a number of ways that states have designed and implemented these multimedia inspections. Inspectors have been trained to conduct multimedia inspections for specific industrial sectors or for all facilities. States have organized teams of inspectors that have in-depth knowledge of compliance and regulatory issues for all media to inspect larger more complex facilities. Finally, states have trained inspectors from each media program to conduct screening level inspections in the other media to identify whether there may be noncompliance in other programs. From 1990 to 1996 five programs reported that they conducted approximately 4,190 multimedia facility inspections.

The most widely utilized regulatory approach by the states is Supplemental Environmental Projects, often called SEPs. States design SEP policies to enable companies that are negotiating an enforcement settlement to propose an environmentally-beneficial project, including pollution prevention, in exchange for a penalty reduction. States in the Northeast negotiated approximately 113 SEPs between 1990 and 1996, of which 35 percent were pollution prevention projects. There are many examples of companies that used these SEP opportunities to develop highly effective waste reduction activities. These efforts benefitted the firms in the long term and provided better environmental protection for the public.

### **Facility Planning**

The state analyses of the data submitted by firms involved in pollution prevention planning revealed some remarkable results. The Maine Department of Environmental Protection found that companies that planned reduced hazardous waste generation by approximately 2.9 million pounds or 26 percent from 1989 to 1995. Furthermore, users of extremely hazardous substances in Maine achieved a reduction of 60 million pounds or 9 percent from 1990 to 1995.

Between 1990 and 1996 Massachusetts companies involved in pollution prevention planning reduced their byproduct generation by 34 percent or approximately 37.5 million pounds compared with expected generation. They also reduced their use of toxic chemicals in their production process by 24 percent or nearly 210 million pounds.

Of the 351 Massachusetts firms that responded to a recent survey, 67 percent reported that their pollution prevention activities resulted in direct costs savings. These savings came from improving their use of raw materials, decreasing their waste generation and reducing their operating costs. For the companies that implemented pollution prevention as a result of facility planning, the most frequently reported benefits included cost savings (67 percent of respondents) and employee health and safety (66 percent). The program reportedly cost firms slightly more than \$76 million but saved companies approximately \$88 million for a net savings of \$11.5 million.

New York State found that firms involved in conducting hazardous waste reduction plans decreased their waste generation by more than 17 percent. The New York State Department of Environmental Conservation predicted that firms reduced their aqueous and non-aqueous hazardous waste generation by an estimated 13 million tons comparing 1991 generation rates with 1995 rates.

In 1993 and 1994 hazardous waste generators in Vermont that developed a facility plan reduced their waste generation by more than 3 million pounds, a 20 percent decrease in two years. The data provided by the facilities shows that over 75 percent of this reduction was associated with their pollution prevention activities.

All of the states in the Northeast with planning laws have found dramatic reductions in releases of toxic emissions and generation of hazardous wastes. Many participating companies have found innovative ways to achieve these reductions, and they have reported that the associated cost savings and improvements in environmental compliance continue year after year.

### **Voluntary and Innovative Programs**

Pollution prevention programs have initiated a number of voluntary and innovative programs that cannot be categorized as assistance or regulatory. These include Clean State Initiatives, P2 Partnerships, and Governor's Awards.

#### **Clean State Initiatives**

State environmental agencies have designed Clean State Initiatives to bring state-owned operations and facilities into compliance with environmental requirements and to help them reduce emissions and wastes. Almost all of the states in the Northeast have implemented a Clean State program through either an Executive Order by the Governor or a program initiative. These programs have greatly improved the environmental performance at state agencies. For example, the New York State Department of Environmental Conservation has reported that this program reduced environmental violations at state facilities by 68 percent from 1992 to 1996.

#### **Partnerships**

As small programs with tight budgets, state and local pollution prevention programs have been creative in forming partnerships with other agencies and organizations. These partnerships have enabled state and local programs to leverage other public as well as private resources to effectively promote pollution prevention.

State and local pollution prevention programs in the Northeast have collaborated with industry groups, trade associations, educational institutions, nonprofit and community groups, and other government agencies. For example, trade and industry groups often cosponsored conferences and workshops for businesses. As cosponsors, the groups provided access to their membership and in-depth industry knowledge and expertise, improving the value of these events.

State and local pollution prevention programs have also collaborated extensively with university faculty and students on a variety of projects. In Rhode Island and New Hampshire, these programs have trained many undergraduate and graduate students to work with companies as pollution prevention interns. These win-win collaborations have saved sponsoring companies money and given the students valuable hands-on experience. In New Hampshire, the partnership between the University of New Hampshire and the Department of Environmental Services has resulted in the placement of 40 students at 26 facilities; participating companies saved more than \$1 million between 1993 and 1994.

#### **Governor's Awards**

Governor's awards have become popular ways for state and local agencies to recognize companies, municipalities and nonprofit organizations for preventing pollution. These awards also help the public become aware of pollution prevention accomplishments.

States report that they received more than 450 applications for Governor's Awards in pollution prevention, and 143 companies, organizations and individuals received an award from 1990 - 1996. These award recipients have shown outstanding achievements. Between 1993 and 1996 recipients in four states reported that they reduced over 50 million pounds of hazardous waste

and air emissions, and 1.3 million gallons of wastewater. As a result they achieved annual cost savings of over \$31 million dollars.

The results presented in this report and summarized above demonstrate that by providing direct assistance, planning, regulatory integration, and development of innovative programs, the Northeast has become a cleaner place to live. By focusing the efforts of environmental agencies on prevention strategies, state and local agencies have contributed enormously toward the nation's important goals of clean air, water and land.

# Chapter 1: Introduction

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## Background

Prevention of pollution and waste at the source has emerged within the past ten years as a cost effective environmental management approach and has dramatically shifted the way government and industry have viewed environmental protection. After more than 15 years of command and control environmental programs, state and local governments wanted industry to go beyond simply controlling waste; they wanted companies to reduce their pollution at the source. The regulatory structure that required industry to install end-of-pipe pollution control devices was not focused on encouraging such reductions. This led many environmental policy-makers to promote a new method of environmental management that strives to prevent the generation of waste and pollutants altogether. Thus was born the concept of "pollution prevention."

### What is Pollution Prevention?

"...the use of materials, processes, or practices that reduce or eliminate the creation of pollutants or wastes at the source. It includes practices that reduce the use of hazardous materials, energy, water, or other resources and practices that protect natural resources through conservation or more efficient use."

## What is Pollution Prevention?

The U.S. EPA defines pollution prevention (P2) as "...the use of materials, processes, or practices that reduce or eliminate the creation of pollutants or wastes at the source. It includes practices that reduce the use of hazardous materials, energy, water, or other resources and practices that protect natural resources through conservation or more efficient use" (US EPA 1990).

In 1990 Congress passed the Pollution Prevention Act, which provides a definition of pollution prevention and funding for state and local programs. Essentially five different types of activities are considered pollution prevention:

- |                                       |   |
|---------------------------------------|---|
| <b><u>Input Substitution:</u></b>     | replacing a hazardous substance with a less (or non-) hazardous substance as an input to a manufacturing process to make essentially the same product.                          |
| <b><u>Product Reformulation:</u></b>  | altering the formulation of a product so a hazardous substance is replaced by a less (or non-) hazardous substance; the function and/or appearance of the product might change. |
| <b><u>Efficiency Improvement:</u></b> | changing the production process to use hazardous substances more efficiently, so smaller quantities can produce the same output.  |

**In-Process Recycling:** collecting, separating and/refining waste streams at the process location and recycling the material directly into the same process from which it was generated.

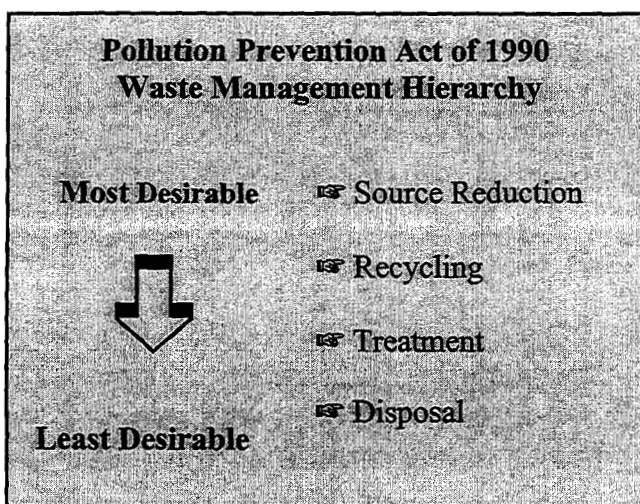
**Housekeeping:** implementing improvements in leak detection, spill prevention, inventory control, and employee training

Several waste management methods are not pollution prevention:

- out-of-process recycling, whether performed on or off site<sup>1</sup>
- waste treatment (e.g., incineration)
- concentration of hazardous or toxic constituents to reduce volume (e.g., dewatering)
- diluting constituents to reduce their hazard or toxicity
- transfer of hazardous or toxic constituents from one environmental medium to another (e.g., collection of air contaminants on filters).

As part of the definition, the Pollution Prevention Act emphasizes a waste management hierarchy that has gained widespread acceptance. This hierarchy places pollution prevention, also known as source reduction and toxics use reduction, at the top as the most desirable method of environmental protection<sup>2</sup> followed by treatment, and lastly disposal.

Virtually all state governments in the U.S. have pollution prevention programs dedicated to reducing institutional barriers to P2, assisting companies with developing P2 programs, integrating P2 into other regulatory activities, and/or promoting P2. In addition, 23 states administer some form of "facility pollution prevention planning" program that require certain facilities to develop pollution prevention plans and report their progress in reducing emissions and wastes (Barwick 1997, p. 6).



<sup>1</sup> The U.S. EPA believes that out-of-process recycling is worthwhile, but does not consider it a P2 strategy because recycling does not encourage a reduction in the manufacture or use of hazardous substances, and waste materials are still generated.

<sup>2</sup> This report uses the terms source reduction and toxics use reduction synonymously with pollution prevention.

Pollution prevention has largely been a voluntary program on the part of government and industry. The Pollution Prevention Act of 1990 helped to create state and local P2 programs but did not mandate any regulatory or command and control approaches to implementing these programs. The state and local P2 programs have been innovative in their efforts with the regulated community. These programs have provided a laboratory for experimentation, and they have learned a great deal about how to institutionalize and promote prevention-oriented activities over the years.

As new government entities, pollution prevention programs have tended to be relatively small, with only a few full time employees in some cases. State and local P2 programs have not had many resources available to extensively document or quantify their activities and, unlike the environmental regulatory programs, have not been guided by federal standards of performance. There are no consistent approaches to evaluating the effectiveness of the state and local P2 efforts or to tracking activities across the region or country.

## **Overview of This Report**

The purpose of this report is to present a summary of state and local pollution prevention (P2) program activities within Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont (the Northeast states) for 1990 through 1996. Chapter 2 presents a description of the methods used for this study and an overview of the P2 program activities in the region and their major funding sources.

Appendix A provides a detailed description of each state and local P2 program that provided data and information for this report. Chapters 3 through 7 describe four major areas of P2 activity, including:

- Assistance
- P2 Regulatory Integration
- Facility Planning
- Voluntary and Innovative Programs

Appendix B presents an overview of several EPA national reports that describe and analyze pollution prevention programs and activities. This regional report has the following features that distinguish it from those national studies:

•**Northeast Region:** This report focuses on eight northeast states and describes the activities of some of the nation's most innovative P2 programs and policies. In addition, this is the first regional study of P2 program activities.

•**Extensive Documentation:** To provide a deeper understanding of Northeast P2 programs, this report describes and quantifies a full range of program activities, outputs, outcomes, and funding. This is the first time such a wide range of program information has been compiled on a regional basis.



**•New P2 Metrics and Protocols:** By providing a qualitative and quantitative description of P2 programs in the Northeast, this report takes a first critical step towards the development of a common set of metrics and procedures to measure and track future P2 program activities.

Appendix C presents a variety of data on emissions of toxic chemicals and generation of hazardous waste to provide a perspective on the overall environmental trends in the Northeast. Appendix D presents the questionnaire used to collect data for this report.

## **Chapter 2: Overview of State and Local Activities**

Starting in 1990, state and local pollution prevention programs in the Northeast initiated regular discussions about evaluating and measuring their activities and impacts. This group, under the auspices of the Northeast States Pollution Prevention Roundtable<sup>1</sup>, regularly shared information on the efforts of individual programs to track and evaluate their environmental performance. In 1994, the group decided to undertake a regional study of pollution prevention program efforts, which has resulted in this report.

To develop a comprehensive understanding of P2 progress in the Northeast, the authors surveyed state and local P2 programs on a wide range of activities underway from 1990 to 1996. During this time, P2 programs provided and conducted technical assistance, regulatory integration, facility planning, and innovative and voluntary initiatives to promote pollution prevention to business and industry. The following sections present the study's methodology, provide an overview of P2 program activities, and describe state and local funding for P2 programs.

### **Methodology and Data Sources**

In 1995 state and local P2 programs in the region developed a questionnaire to compile the data that is presented in this report. Appendix D presents a copy of the questionnaire.

The survey included questions designed to collect quantitative and qualitative results. The quantitative sections asked respondents to provide data on a variety of P2 program outputs and outcomes. The qualitative questions asked respondents to describe P2 activities and provide supplemental information, such as reports and program literature. Supporting literature included P2 newsletters, fact sheets, case studies, training agendas, and progress reports.

The survey was originally sent to 25 state and local P2 programs located throughout the Northeast. Representatives from the following 16 P2 programs responded and provided information for activities underway from 1990 to 1996:

- Connecticut Technical Assistance Program (ConnTAP)<sup>2</sup>
- Connecticut Department of Environmental Protection (CT DEP), Office of Pollution Prevention
- Maine Department of Environmental Protection (ME DEP), Office of Innovation and Assistance

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<sup>1</sup> The Northeast States Pollution Prevention Roundtable is a program of the Northeast Waste Management Officials' Association (NEWMOA). The NE P2 Roundtable was established in 1989 to enhance the capabilities of state and local environmental officials in the northeast to implement effective source reduction programs.

<sup>2</sup> ConnTAP was unable to provide data on 1996 activities because funding for the program was discontinued in 1996, and the program was terminated.

- Massachusetts Department of Environmental Protection (MA DEP), Bureau of Waste Prevention
- Massachusetts Toxic Use Reduction Institute (MA TURI), University of Massachusetts Lowell
- Massachusetts Executive Office of Environmental Affairs (EOEA), Office of Technical Assistance (MA OTA)
- New Hampshire Department of Environmental Services (NH DES), Pollution Prevention Program
- New Hampshire Department of Environmental Services (NH DES), Small Business Technical Assistance Program
- New Jersey Technical Assistance Program (NJ TAP), New Jersey Institute of Technology
- New York Empire State Development (ESD), Environmental Ombudsman Unit
- New York State Department of Environmental Conservation (NYS DEC), Pollution Prevention Unit
- Suffolk County Water Authority (SCWA), Pollution Prevention Program
- Rhode Island Department of Environmental Management (RI DEM), Office of Technical and Customer Assistance, Pollution Prevention Program
- Narragansett Bay Commission (NBC)
- Vermont Agency of Natural Resources (VT ANR), Environmental Assistance Division
- Vermont Small Business Development Center (VT SBDC)

There are a number of important P2 programs that are not covered in this report, including

- New Jersey's Department of Environmental Protection (NJ DEP), Office of Pollution Prevention
- Maine WasteCap
- Massachusetts Executive Office of Environmental Affairs (EOEA), Buzzards Bay Project
- Massachusetts Water Resources Authority (MWRA), Toxics Reduction and Control Department
- Barnstable County Department of Health and the Environment, Pollution Prevention/Hazardous Materials Program
- WasteCap of Massachusetts
- WasteCap of New Hampshire
- Erie County Office of Pollution Prevention (ECOPP)
- New York Industrial Technology Assistance Corporation (NY ITAC)
- New York City Department of Environmental Protection (NYC DEP), Pollution Prevention Unit

After compiling the responses from the survey into a quantitative summary, NEWMOA contacted programs about unclear or missing information and then sent the quantitative results out for review.

## **Data Limitations**

There are a number of important limitations when considering the findings presented in this report, including data consistency, data quality, and the causality between program activities and environmental and economic outcomes.

## **Data Consistency**

The data available for this study was inconsistent from one state to the next. Not all states track the same information. Even in the instances where two or more P2 programs have gathered the same data, the lack of commonly accepted definitions for measurement hinders the aggregation of data at a regional or national level. For example, programs report waste reductions in a variety of incompatible formats, including gallons, pounds, and percentages. Similarly, programs report financial impacts as net costs/savings, gross costs/savings, and annual and/or multiyear costs/savings.

Some states have much more detailed information on both the number of activities supported and the impacts of these activities on preventing pollution. For example, one of the states participating in this study collects detailed data on the number of site visits, records the number of P2 suggestions offered, and follows-through to determine the number and type of P2 suggestions implemented. Other programs, however, track only the number of site visits that occurred. Finally, not all of the survey respondents were able to answer all of the survey questions for all years.

## **Data Quality**

A second limitation of the data presented in the next few chapters is the quality. P2 programs define and count even the most basic P2 activities differently depending on the size, function and funding of the program. For example, some states count each visit to a single facility as a site visit, whereas other states count a series of interactions and visits to a single facility as a site visit. Where possible, in its analysis, NEWMOA reconciled the data to address this problem. Furthermore, survey responses were sometimes estimated or provided as a range. In these cases and in those identified above, the data that are presented in this report represent the lowest or most conservative end of the range.

## **Causality**

State and local P2 programs are only one of a number of factors that can affect a company's behavior and decision to reduce or eliminate pollution and waste. For example, within the past decade, a number of national initiatives have encouraged reductions in the use and release of toxic chemicals. These initiatives include the federal Toxic Release Inventory, EPA's "33/50" program, and the international restrictions on the manufacture and use of ozone depleting chemicals. Furthermore, the introduction of more restrictive environmental regulations (i.e., the Clean Air Act Amendments of 1990) and increasing waste management and disposal costs have also encouraged companies to seek out source reduction options. Finally, a number of industry groups have instituted their own efforts to reduce wastes and pollutants within their sector.

All of these efforts, combined with the technical assistance, regulatory integration, facility planing, and P2 training and workshops activities undertaken by state and local programs have helped contribute to the pollution prevention outcomes that are presented in this report.

Due to the following factors this report presents conservative or lower-bound estimates of the pollution prevented and funds saved by firms in the region:

- Companies that implement P2 projects frequently do not track or report their waste reductions and cost savings to state or local programs.
- Estimates of P2 cost savings are normally based on direct costs, while indirect savings are rarely included.
- While savings from waste reduction accumulate over time, these benefits are normally calculated for only the initial year.
- P2 investments generally contribute to improving a firm's operations and efficiency, unlike investments in end-of-pipe pollution control technologies. However, these benefits are difficult to quantify with the data that are currently available.

Consequently, the outcomes reported by state and local P2 programs do not fully reflect the economic and environmental benefits of their efforts in the region.

Several of the states in the Northeast have developed reporting requirements for the regulated community, which document the amounts of pollution that have been reduced or prevented. However, not all states have instituted these reporting requirements, and there are important differences among the states that have. As a result, drawing conclusions on the regional environmental impacts of state and local P2 programs is not possible at this time. This report presents the data that is available on emission and waste reductions that states have documented.

## **Activity Overview**

While many P2 programs in the Northeast have been providing similar types of P2 services, this report does not compare or rate individual state or local P2 programs. Appendix A presents a detailed description of each of the 16 P2 programs that participated in this study. As shown in the Appendix, programs differ substantially in their size, structure, operation, client base and focus. These programs were shaped by state-specific political, economic and environmental circumstances and developed without the guiding influence of a prescriptive federal law. Some state and local pollution prevention programs were instituted by state laws while others grew out of regulatory agency initiatives.

Between 1990 and 1996, P2 programs in the Northeast states provided and conducted a wide range of technical assistance, regulatory integration, facility planning, and voluntary initiatives to promote pollution prevention to business and industry. The following section describes these types of P2 program activities.

## **Technical Assistance**

Recognizing the inherent value of a system that promotes cost savings and environmental improvement, policymakers began looking for ways to encourage businesses to explore pollution prevention. This interest led a number of state and federal agencies to set up P2 technical assistance programs; the majority of these efforts were started at the policy and planning levels of state and federal environmental agencies and were operated on a pilot basis from 1984 through 1990. As the influence of on-site technical assistance grew, the programs designed other outreach and educational efforts to provide free, voluntary company- and process-specific

information on how to reduce or eliminate the generation of waste. For the vast majority of cases, these technical assistance programs serve small and medium-sized businesses.

Table 2-1 presents a matrix of state P2 activities showing which states support which types of programs. P2 programs in the Northeast have evolved in several directions over the past ten years. How and why they have evolved into these activities and programs is closely related to the mandates established by state laws and the funding requirements of EPA.<sup>3</sup> All of the Northeast states have developed a core set of technical assistance services, as shown in Table 2-1. Many states started with on-site technical assistance and later expanded into other areas, including: publishing documents, establishing resource centers, and conducting conferences and workshops. To reach a wider audience, P2 programs have also introduced a number of innovative outreach and educational initiatives. This expansion has transformed P2 assistance efforts into multiservice agencies and established a core set of technical assistance activities.

**Table 2-1. Activity Matrix**

	CT	ME	MA	NH	NJ*	NY	RI	VT
<b>TECHNICAL ASSISTANCE</b>								
Site Visits	✓	✓	✓	✓	✓	✓	✓	✓
Case Studies	✓	✓	✓	✓	✓	✓	✓	✓
Newsletters	✓	✓	✓	✓	✓	✓	✓	✓
Clearinghouses	✓	✓	✓	✓	✓	✓	✓	✓
Training	✓	✓	✓	✓	✓	✓	✓	✓
Grant/Loan Programs	✓	-	✓	-	✓	✓	✓	✓
<b>REGULATORY INTEGRATION</b>								
Multimedia/P2 Inspections	✓	-	✓	✓	-	✓	-	✓
P2-Oriented SEPs	✓	-	✓	✓	-	✓	✓	✓
<b>FACILITY PLANNING</b>								
Facility Planning Laws	-	✓	✓	-	✓	✓	-	✓
<b>VOLUNTARY INITIATIVES</b>								
Governor's Awards	✓	✓	✓	✓	-	✓	✓	✓
Partnership Activities	✓	✓	✓	✓	✓	✓	✓	✓
Clean State Initiatives	✓	✓	✓	✓	-	✓	✓	✓

\* The P2 Progress Survey included New Jersey's Technical Assistance Program (NJ TAP) but did not include New Jersey's Department of Environmental Protection

<sup>3</sup> These mandates are briefly described in the program descriptions in Appendix A.

Assistance activities are categorized throughout this report, and in Table 2-1, as the following:  
**Site Visits:** on-site technical assistance conducted by a technical assistance provider to analyze production processes and identify P2 options.

**Case Studies:** a P2 publication that describes how a particular company implemented, and benefitted from, P2 projects.

**Newsletters:** newsletters published by P2 programs that usually focus on technical topics, regulatory issues and current affairs.

**Clearinghouses:** a repository of P2 and compliance publications, directories and contact information for program staff, companies, and the general public.

**Training:** conferences, workshops, and training programs designed mainly for the business community, and sometimes for non-business audiences, including agency employees.

**Grant/Loan Programs:** financial assistance programs designed to help companies develop new technologies, evaluate P2 options, or implement P2 projects.

Since 1990, state and local environmental agencies have expanded the scope of their P2 assistance efforts to embrace a number of other approaches, including integration of P2 into regulatory compliance programs, facility planning requirements, and innovative and voluntary programs.

In addition to describing and quantifying P2 program activities, this report describes how P2 programs have included compliance assistance within their technical assistance services. State compliance assistance services provide help and guidance to companies on regulatory requirements, including pollutant release standards and limits, permitting specifications and procedures, and other state or local mandates. Some states offer compliance assistance as a separate service, however, most have integrated compliance and P2 assistance into site visits, clearinghouses, and training programs, as is described in the next chapter.

## **Regulatory Integration**

State agencies began experimenting with ways of integrating prevention into compliance, enforcement and permitting starting as early as 1990. In some states, P2 programs have collaborated with inspectors and permit writers to develop a multimedia prevention-oriented approach to compliance. P2 programs have engaged in a number of regulatory integration efforts that seek to incorporate P2 strategies and benefits into the environmental regulatory structure. P2-oriented Supplemental Environmental Projects (SEP) and multimedia inspections represent two promising and increasingly popular areas of regulatory integration.

Regulatory integration is categorized throughout this report and in Table 2-1 as the following:

**Multimedia/P2 Inspections:** facility inspections based on a whole-facility approach that simultaneously considers all aspects of a facility's environmental impact on air, water and land.

**P2-Oriented SEPs:** negotiated enforcement agreements that allow companies the option of implementing P2 projects to address compliance violations and/or reduce penalty payments.

## **Facility Planning**

Many environmental policy makers believe that simply making P2 information available is insufficient to ensuring its implementation. To address this issue, policymakers have adopted a facility planning approach to pollution prevention.

In 1989, environmental policymakers began introducing bills that require generators of relatively large quantities of hazardous and/or toxic pollutants to develop documents detailing how they planned to reduce the amount of waste produced. These initiatives signaled a departure from the traditional approach to environmental protection. Rather than regulating the quantity or toxicity of waste generated at a particular facility, such requirements forced businesses to analyze their polluting practices with a focus on reduction, to keep records of their analyses, and to submit periodic reports of company progress to the state.

**Facility planning** requirements are defined for Table 2-1 and throughout this report as a state law that requires certain companies to conduct a facility assessment and identify P2 options.

## **Innovative and Voluntary Programs**

P2 programs also developed a number of innovative and voluntary programs to improve government's environmental performance, maximize limited resources, and promote P2 to a wider audience. To publicize and promote P2 to a wider audience, P2 programs also launched a number of voluntary P2 initiatives such as Governor's Awards, Clean State Initiatives and a variety of P2 partnership activities. Adopted by the majority of P2 programs, these voluntary efforts reflect the creativity of P2 programs in trying new ways to promote source reduction that do not rely on regulatory mandates.

Voluntary initiatives are categorized throughout this report and in Table 2-1 as the following:  
**Governor's Awards:** award programs that recognize the P2 achievements and leadership of individuals, companies and institutions.

**Partnership Activities:** a wide range of collaborative relationships between P2 programs and industry, trade associations, educational institutions, and government entities designed to promote P2 activities.

**Clean State Initiatives:** state-based efforts to improve the environmental performance of government facilities and their operations by conducting self-audits and implementing prevention strategies.

## **Program Funding**

Every year, American citizens, companies and the government pay more than \$100 billion dollars to cleanup and control environmental pollution, an amount equaling approximately 2 percent of the Gross Domestic Product. About 63 percent of the total is paid for by industry, 26 percent is paid for by government and 11 percent is paid for by the public - most notably through auto emission controls (Goldberg 1993, p. 1).

Of the total environmental bill, about 94 percent is expended on pollution control, about 4 percent on research and development and 2 percent on regulation and monitoring. There are no



available reports that provide a national account of pollution prevention expenditures. The results of the P2 Survey provides a perspective on the financial resources that support the state and local P2 activities in the Northeast.

To collect data on state and local P2 funding and expenditures, the P2 Survey asked the P2 programs to provide budgetary information for 1990 to 1996,<sup>4</sup> broken down by four major funding sources: state or local general funds, the Environmental Protection Agency, other federal funding, and dedicated fees. To provide a perspective on P2 expenditures, the P2 program respondents were also asked to estimate total state environmental expenditures.

### **Data Limitations**

The presentation of P2 and environmental expenditures in the next few sections is limited by the availability and accuracy of the data. Of the 16 participating state and local P2 programs, 14 were able to provide annual budgets. However, the local P2 programs and two state P2 programs were unable to report their agency's total expenditures for all media and regulatory programs.

The P2 program expenditure estimates do not include a growing number of P2 activities undertaken by staff outside of the formal P2 Programs. For example, participation in multimedia task forces or advisory groups, multimedia inspections, P2-oriented supplemental environmental projects and other regulatory integration efforts are often conducted by P2 programs in collaboration with regulatory programs. The expenditures by the regulatory programs on implementing these efforts are not included in this report since data on them were not available.

In some cases, state budgetary reports do not categorize P2 efforts as a distinct funding category. Instead, P2 expenditures are included in a variety of departmental and programmatic budgets. In other cases, financial data was too old to be easily retrieved by the survey respondents. In the cases where financial information was not readily available or sufficiently detailed, the P2 programs provided conservative budget estimates. All financial data presented below have been adjusted to 1992 dollars.

### **Program Expenditures**

The total estimated expenditure for 14 of the P2 programs, from 1990 to 1996, was approximately \$41.5 million. As shown in Figure 2-1, P2 program funding came from three major sources: general state and local government funds, the U.S. Environmental Protection

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<sup>4</sup> The P2 Survey did not request separate budgetary information for the years 1990 to 1993. This information was combined as a single question. This choice complicated the analysis of financial trends. To establish trends for P2 expenditures and funding sources (Figures 2-2 and 2-3), this analysis assumed an annual average for this four-year period.

Agency. and dedicated fees from business and industry. In addition, two P2 programs received a total of \$35,000 from other federal agencies, such as the Department of Energy. Approximately 55 percent of the total P2 budget came from dedicated fees, 25 percent came from general state and local funds, and 20 percent came from EPA.

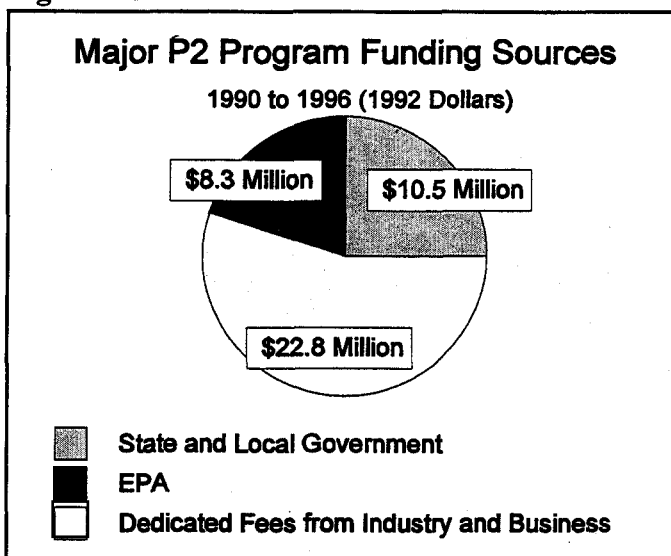
Of the 14 P2 programs, 8 were funded by state or local sources, 12 programs received funding from the EPA, and 11 programs received funding from dedicated fees.

As shown in Figure 2-2, from 1990 to 1996, annual expenditures grew from below \$4.7 million to approximately \$7.6 million. Program funding reached a peak of \$8.1 million in 1995 and decreased by 7 percent in 1996. Increases in the budget were mainly due to rising EPA funding and dedicated fees and charges, while funding from state and local government remained flat and decreased slightly in 1996 to \$1.2 million. This decline is partially due to the elimination of the ConnTAP program.

To provide a perspective on state and local P2 expenditures, the P2 Survey respondents provided data on overall state and local media and regulatory agency expenditures. Although the P2 programs were asked to limit budgetary information to media and regulatory program activities only, a few were unable to exclude other environmental expenses, such as site cleanup and remediation expenditures, due to the state's financial reporting limitations. Nonetheless, the available estimates provide a basis for assessing the relative size of the P2 programs' budgets.

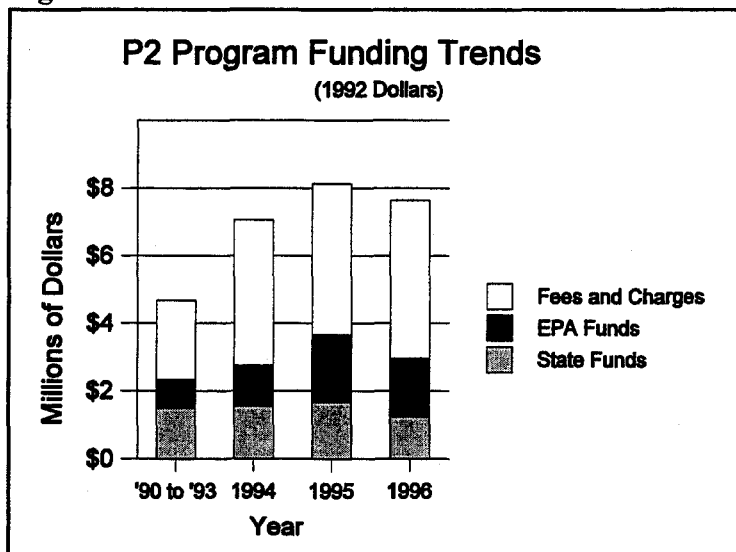
From 1990 to 1996, media and regulatory expenditures for 6 northeast states increased by approximately 22 percent, rising from just under \$490 million in 1990 to approximately \$598

**Figure 2-1**



Source: P2 Survey.

**Figure 2-2**

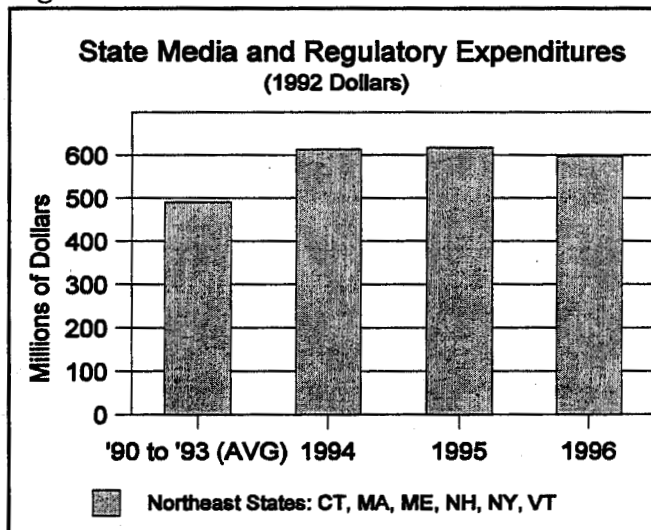


Source: P2 Survey.

million in 1996. However, expenditures reached a high point in 1994 and declined slight in 1995 and 1996.

As shown in Figure 2-3, total estimated environmental expenditures were approximately \$3.8 billion (in 1992 dollars). During this same time period, P2 program expenditures totaled approximately \$41.5 million or 1.1 percent of the total environmental expenditures.

**Figure 2-3**



Source: P2 Survey.

## Chapter 3: Pollution Prevention Assistance

### Introduction

Technical assistance efforts have provided companies with process-specific information on how to reduce or eliminate the generation of pollutants and waste in manufacturing operations. These programs have been staffed by trained technical assistance providers, who visited companies, examined manufacturing operations, identified and assessed P2 opportunities, and provided recommendations. Their primary audience was small businesses in their state or local area.

Pollution prevention assistance programs published and disseminated case studies, fact sheets, newsletters and technical reports. They also managed P2 resource centers, frequently called clearinghouses, which collected publications for use by technical assistance staff, companies, consultants, and students. In addition, P2 programs organized conferences, workshops, and P2 training programs to educate business and non-business audiences about a broad range of technical, financial, and managerial topics. Finally, some P2 programs have established P2 loan and grant programs to help companies finance P2 research or invest in P2 projects.

Although technical assistance programs were not initially designed to address compliance issues, they have understood that regulatory compliance is an important motivator for P2 and that source reduction strategies can alleviate compliance problems. Companies frequently ask P2 assistance programs for advice on environmental regulations and requirements, and commonly discuss compliance concerns and questions with P2 assistance providers during on-site visits. In some states the programs have been to provide information and assistance with an assurance of confidentiality. Facilities that make P2 changes may also encounter new regulatory requirements or issues. To respond, technical assistance providers help facilities to understand the regulatory implications of their P2 recommendations. In addition, P2 publications often review environmental regulations, clearinghouses regularly provide compliance information, and P2 conferences and workshops devote a portion of their time to regulatory matters.

Table 3-1 shows that between 1990 and 1996 P2 programs provided a wide variety of P2 assistance services. Eight states conducted on-site technical assistance, organized workshops and conferences, published case studies and newsletters, and managed clearinghouses. In addition, six states provided P2 grants and/or loans. The following sections describe and quantify each of these categories of assistance activities, including the compliance assistance components.

**Table 3-1. Overview of Pollution Prevention Assistance (1990 - 1996)**

	CT	ME	MA	NH	NJ	NY	RI	VT
<b>On-site Technical Assistance</b>	✓	✓	✓	✓	✓	✓	✓	✓
<b>Workshops &amp; Conferences</b>	✓	✓	✓	✓	✓	✓	✓	✓
<b>Clearinghouses</b>	✓	✓	✓	✓	✓	✓	✓	✓
<b>Grants and Loans</b>	✓	-	✓	-	✓	✓	✓	✓

Source: P2 Survey.

## **On-Site Technical Assistance**

Technical assistance programs have been conducting on-site visits as the most direct way of promoting pollution prevention at the facility level. By reviewing facility operations, completing a P2 assessment, and providing a number of technical recommendations, assistance providers have helped companies to enhance production efficiency, reduce the generation of pollutants, and improve environmental compliance. Between 1990 and 1996, 13 P2 assistance programs conducted approximately 2,952 site visits.

To run an effective on-site technical assistance program, a number of components need to be in place. These include: 1) on-site P2 assessment capabilities, 2) a repository of or access to technical references, and 3) program outreach and marketing capabilities. Individual assistance providers may specialize in a particular industrial sector or environmental media. Assistance staff can work alone or in multi-disciplinary teams. Based on a 1994 study, RI DEM estimated that their on-site P2 assessments required between 2 and 150 hours to conduct (RI DEM 1994, p. 19). MA OTA assessed 40 of their site visits and found that each required an average of 15 person-hours, not including numerous follow-up visits (Greiner, p. 6). On average, P2 program respondents reported that visits to individual firms generally last between four and eight hours, not including the time it takes to prepare for the site visit and develop P2 recommendations. The duration and sophistication of on-site technical assistance depends greatly on the size of the client company and the P2 program's capabilities and resources.

State and local P2 programs generally have served smaller companies, although on-site technical assistance can be applied to companies of all sizes. Typically, small companies lack the technical and/or financial resources to investigate P2 projects and, therefore, need the free technical assistance provided by P2 programs. Larger companies often possess the financial resources, environmental and engineering staff, and consultant support to identify, assess, and implement P2 options without the need for much assistance from state and local government. According to the responses to the P2 Survey, between 1990 and 1996 12 programs from 7 states reported that approximately 71 percent of their site visits targeted small businesses.

Of the 14 programs that offer technical assistance and that participated in the survey, 12 reported that they provided roughly 9,369 suggestions to approximately 2,800 companies as a result of their onsite visits. Although a few programs reported that their technical assistance staff offered as many as ten P2 recommendations per site visit, on average technical assistance personnel provided close to three and a half suggestions per site visit.

A RI DEM survey of site visit clients also found that technical assistance providers have identified multiple P2 opportunities during visits. DEM's analysis showed that "for the 125 companies for which studies have been started, an average of three options are available to consider for each waste stream" (RI DEM 1994, p. 16).

Of the reporting technical assistance programs, eight provided data on the number of technical recommendations implemented by their clients. Their data showed that companies implemented an average of 44 percent of the technical recommendations or 3,555 recommendations out of 8,063 offered. Similarly, ConnTAP reported that surveys of site visit clients have shown that "on average, 50 percent of ConnTAP's suggestions get implemented within one year after the client receives the [technical recommendations] report" (Lomasney 1997).

The P2 Survey also requested data on the number of companies that implemented one or more of the P2 recommendations offered as a result of a site visit. The data from 7 programs showed that 64 percent of the companies that received on-site technical assistance implemented at least one technical recommendation.

P2 programs in Massachusetts and Rhode Island have conducted a total of 3 studies that showed that between 40 and 87 percent of the firms that received technical assistance implemented P2 recommendations. Two Massachusetts studies examined the effectiveness of MA OTA's on-site technical assistance program. A 1995 MA study of 58 companies that received on-site assistance found that over half implemented pollution prevention projects (Reibstein and Barakatt 1995). The results of a 1994 telephone survey of 62 companies that received MA OTA services (e.g., workshops and/or site visits) as part of a targeted outreach program in Central-Massachusetts, reported that 87 percent of the firms implemented toxics use reduction projects (Greiner, p. 9). Finally, a RI DEM survey of 125 Rhode Island companies found that 40 to 50 percent of RI DEM's technical assistance clients implemented source reduction measures (RI DEM 1994, p. 16).

These studies corroborate one of the overall findings of the P2 Survey that 44 to 50 percent of the recommendations have been implemented, and 40 to 87 percent of the companies served have implemented at least one P2 option offered by the assistance programs. If one applies this range to the estimated 2,952 companies that received on-site assistance in the region, roughly 1,181 to 2,568 implemented at least one P2 suggestion as a result of site visits from 1990 to 1996.

The P2 Survey requested data on the degree to which companies adopted an enduring commitment to pollution prevention as a result of site visit activities by a technical assistance program. This commitment usually manifests itself through corporate P2 policies and/or the development of permanent P2 teams or programs. Only two of the technical assistance programs were able to answer these questions on the survey. Using anecdotal data, the first respondent estimated that 10 to 20 percent of the companies they visited exhibited some form of organizational change. The second respondent estimated that half of their site visits resulted in lasting organizational change. Extrapolating from these estimates, roughly 295 to 1,476 companies in the Region made permanent organization changes as a result of the site visits.

### **Environmental and Financial Impacts of Site Visit Programs**

Most of the state and local P2 programs were unable to provide quantitative data on emission or waste reductions associated with their site visit activities. However, programs in Connecticut, Massachusetts, and Rhode Island have surveyed companies on the environmental and financial benefits of their on-site technical assistance. ConnTAP estimated source reduction achievements for their site visit program. Massachusetts OTA surveyed two groups of companies on their waste reductions and net savings. Rhode Island DEM surveyed site visit clients and assessed a group of P2 process changes to determine resulting waste reductions, net savings, and payback periods. These studies are described below.

Between 1990 and 1995, ConnTAP conducted site visits at 113 companies and offered them 372 P2 suggestions for specific wastewater, air emission, and hazardous waste reductions (Lomasney 1997). As stated above, ConnTAP determined that their client companies implement an average of 50 percent of the P2 projects recommended. Using this 50 percent estimate, ConnTAP

estimated the wastewater, air emission, and hazardous waste reductions achieved by the client companies. The results are presented in Table 3-2. The Program estimated average reductions of approximately 500,000 gallons of wastewater, 13,000 pounds of air emissions, and 48,500 pounds of hazardous waste.

**Table 3-2. ConnTAP Waste Reduction Estimates: 1990 to 1995**

<b>Total Estimated Reductions</b>	<b>Average Reduction Per Company</b>
57.5 million gallons of wastewater	508,850 gallons of wastewater
1.5 million pounds of air emissions (VOCs)	13,274 pounds of air emissions
5.5 million pounds of hazardous waste	48,673 pounds of hazardous waste

Source: Lomasney 1997. Based on 113 site visits.

The first MA OTA survey focused on 58 firms in the Massachusetts section of the Merrimack River watershed that MA OTA staff had visited between 1990 and 1994. A telephone survey found that more than half of the companies reported to have successfully implemented pollution prevention, and 18 companies were able to quantify the benefits. OTA found that, "10 companies together eliminated nearly 1.7 million pounds of toxic pollutants, and 18 companies saved a total of \$1.85 million by implementing pollution prevention strategies recommended by MA OTA" (Reibstein and Barakatt 1995, p. 11).

Another initiative took place in central Massachusetts where MA OTA conducted more than 40 site visits between 1989 and 1992. An independent consultant conducted in-depth personal interviews at 28 of these companies to evaluate the firms' toxics use reduction performance and collect additional data on OTA effectiveness. The study found that 20 firms eliminated over one million pounds of chemical use through toxic use reduction modifications (Greiner, p. 9). The mean and median reductions per chemical were 44,612 pounds and 8,321 pounds respectively. "For the 28 companies interviewed, the primary reason for choosing to make a toxics use reduction change, versus no change or a pollution control change, was cost reduction" (Greiner, p. 9). The report also documented annual cost savings at 7 firms and found that, "companies achieved a combined annual cost reduction of \$248,000, or an average annual cost savings of more than \$35,000 per company" (Greiner, p. 9).

In 1994 Rhode Island's Pollution Prevention Program published a report that included a detailed analysis of 125 site visits conducted between 1989 and 1994. According to this report, at least one cost effective P2 opportunity was identified in every facility (RI DEM 1994, p. 16). In addition, 40 to 50 percent of these companies were able to implement source reduction measures, resulting in reductions of more than 13,500 tons of industrial waste and wastewater per year (RI DEM 1994, pp. 14-15).

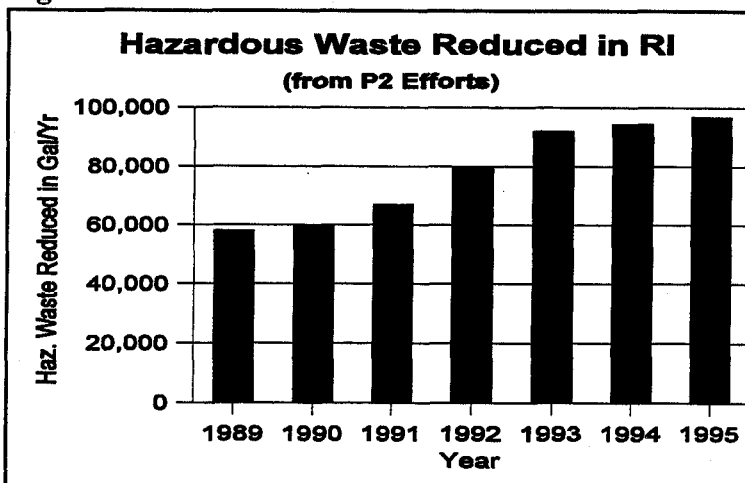
A second RI study focused on 36 P2 process and operational changes conducted by RI DEM's client companies. Of these changes, 25 reduced chemical use and also reduced wastewater discharges from 591,206 gallons per year to 38,244 gallons per year, a 94 percent reduction or 552,962 gallons per year (RI DEM 1994, pp. 28-35). The study also provided information on the costs, savings and payback periods for these 25 projects. As seen in Table 3-3, the projects

achieved a total annual gross savings of \$342,766 and a total annual net savings of \$79,280 (RI DEM 1994, pp. 28-35). While some companies received immediate payback, the average payback period was 1.3 years.

The source reduction activities at RI firms are also reflected in the state's trends in hazardous waste generation. A study conducted by RI DEM shows that hazardous waste generation steadily decreased between 1989 and 1995 from pollution prevention efforts. As shown in Figure 3-1, reductions in

hazardous waste increased from 57 thousand gallons in 1989 to 97 thousand gallons in 1995, a 70 percent increase in reductions totaling 552,438 gallons of hazardous waste.

**Figure 3-1**



Source: RI DEM 1997. These findings assume that production remained constant and they show cumulative reductions.

**Table 3-3. Cost Analysis Summary of 25 P2 Projects in Rhode Island**

Category	Total Cost/Savings for 25 Projects	Average per Project
Capital Costs	(\$237,060)	(\$9,482)
Annual Costs	(\$26,426)	(\$1,057)
Annual Gross Savings	\$342,766	\$13,711
Total Annual Net Savings	\$79,280	\$3,172

Source: RI DEM 1994, pp. 28-35.

## Compliance Assistance

As stated above, technical assistance providers frequently offer advice and guidance on regulatory and compliance issues. In response to the P2 Survey, technical assistance programs reported that they provide assistance to companies with compliance questions or issues for the following reasons:

- The subject of compliance almost always comes up before or during the actual assessment process.
- Most companies are not 100 percent compliant and need some assistance to improve their performance.
- Some companies want to know what is required of them before they pursue P2 opportunities.

On-site assistance staff generally respond to these requests by discussing regulatory requirements in general and explaining to the facility where to get the information and other assistance they may need to address their compliance concerns. The fact that P2 programs do



not initiate enforcement actions and often offer free, confidential assistance helps facilities feel more comfortable speaking openly about sensitive compliance issues.

When technical assistance providers conduct a facility walk-through, they frequently discuss compliance issues with the company personnel. Table 3-4 provides a summary of the data collected from on-site programs on their involvement in compliance-related assistance. According to the P2 Survey results, 10 P2 programs discussed compliance issues at approximately 1,827 site visits, or nearly 67 percent of their site visits. These same P2 programs observed minor compliance violations during 1,168 site visits, or nearly 48 percent of the visits.

**Table 3-4. Assistance/Compliance Overview \***

TECHNICAL ASSISTANCE	
P2 Site Visits	<ul style="list-style-type: none"> <li>→ Approximately 32 percent of site visits originated from regulatory program referrals.</li> <li>→ Technical assistance personnel observed minor compliance problems at approximately 48 percent of their site visits.</li> <li>→ Assistance personnel discussed compliance issues at approximately 67 percent of their site visits.</li> <li>→ Prevention strategies were used to address compliance issues at nearly 40 percent of site visits.</li> <li>→ On average 46 percent of on-site technical assistance staff-time was dedicated to compliance issues.</li> </ul>
P2 Clearinghouses	<ul style="list-style-type: none"> <li>→ Approximately 13 percent of clearinghouse requests are compliance-only.</li> <li>→ Nearly 29 percent of requests involved a mixture of P2 and compliance issues.</li> </ul>
P2 Education and Training	<ul style="list-style-type: none"> <li>→ According to a Vermont DEC survey on preferred P2 workshop topics and speakers, compliance and regulatory topics and staff ranked highest.</li> <li>→ P2 trainers spend approximately 47 percent of their time on compliance issues.</li> </ul>

\* Various survey respondents provided the data presented in the table.

The P2 Survey asked P2 programs to indicate the number of site visits in which compliance violations were addressed by pollution prevention. Seven respondents indicated that compliance issues were addressed at nearly 40 percent of their site visits.

To further understand the extent of the relationship between assistance and compliance, the P2 Survey asked P2 programs to indicate the percent of time that on-site technical assistance staff dedicate to addressing compliance issues with companies. Of the 11 programs that responded, 2 reported spending 5 percent or less of their time, 5 programs reported spending between 20 and 50 percent of their time, and 4 programs reported spending between 75 and 80 percent of their time on compliance issues. On average, these programs reported that approximately 46 percent of their on-site technical assistance staff time was dedicated to compliance issues.

In several northeast states there is a collaborative relationship between assistance programs and regulatory programs, which builds upon enforcement activity to stimulate pollution prevention by referring noncompliant companies to technical assistance programs. According to the P2

Survey, 11 on-site assistance programs received approximately 900 referrals from regulatory programs, accounting for approximately 32 percent of their site visits. This number is supported by MA DEP's findings that for the years 1993, 1994, and 1995 27 percent of the state's technical assistance site visits were triggered by DEP enforcement referrals (MA DEP 1997, p. 6-5).

When the assistance programs receive a referral, they send an introductory letter to the noncompliant facility. In some instances, these letters are sent in conjunction with notices to the company on the results of the inspection. This can be a particularly important way of communicating with firms because most companies read enforcement documents and any accompanying literature.

Although these introductory letters vary in style and content, they usually describe the technical assistance program, highlight the area of noncompliance and explain the connection between P2 and compliance. The letter may include standard and site-specific P2 information, and may even discuss process-specific source reduction opportunities. Whenever possible, the on-site assistance programs make links between compliance problems and P2 opportunities in their correspondence.

Finally, on-site assistance and regulatory programs have developed joint efforts to help businesses and industry improve compliance. These efforts have manifested in a number of forms, including mailings that announce regulatory mandates (e.g., a compliance deadline or standard) and introduce P2 services. The programs have jointly published manuals and fact sheets to promote P2 and explain regulatory requirements in plain language. These joint efforts help companies improve their compliance in a cost-effective manner, thereby reducing environmental risk and saving money.

## **Educational Programs**

State and local programs conducted and participated in a range of P2 conferences, workshops and training programs to educate business, government and other audiences about pollution prevention. Between 1990 and 1996, 16 P2 programs reportedly conducted 606 P2 conferences and workshops for business audiences and 204 workshops for non-business audiences. The total reported attendance for these P2 conferences and workshops was approximately 36,480.

## **Conferences**

Some P2 programs have organized annual P2 conferences consisting of multiple workshops, presentations and demonstrations. For example, since the early 1990s, Rhode Island DEM and the

### **Annual P2 Conference**

In 1996, New York State held its ninth annual Pollution Prevention Conference for 359 registrants and 20 exhibitors. Co-sponsored by the Business Council of New York State and the Environmental Business Council of New York State, the conference provided a comprehensive overview of the status of P2 and related environmental topics. In addition to hosting a P2 Governor Awards ceremony, the conference included plenary sessions, lectures, workshops, tours, and demonstrations, which were available to members of government, industry, environmental, citizen and academic organizations, as well as the general public.

*Source: 1996 Annual Report: Multimedia Pollution Prevention in New York State.*

Narragansett Bay Commission, New Hampshire DES and New York State DEC have sponsored semiannual or annual P2 conferences. These conferences usually consist of workshops, presentations, and exhibits by vendors and service providers. There are a wide variety of P2 topics covered in these conferences, including P2 audits, P2 technologies, financial assessment for P2 projects, multimedia permitting, regulatory integration, and P2 opportunities for Publicly Owned Treatment Works (POTWs), municipalities, and community organizations. Most of the conferences are cosponsored by a variety of groups and agencies, including trade associations, other government agencies, and non-profit environmental groups.

## Workshops

P2 workshops are often small events designed to target specific industrial sectors, production processes, P2 methods, regulations, or program initiatives. Workshops have focused on a variety of audiences from business (i.e., managers, production workers, and consultants), the general public (i.e., non-profit groups, community organizations, students, and educators), and environmental agency staff. P2 programs have created individual workshops or conducted them as part of a wider outreach and educational campaign. As with conferences, businesses and trade organizations have often cosponsored workshops.

The P2 Survey asked programs to supply information about their P2 workshops. Sixteen programs provided information about 387 workshops and training programs conducted between 1990 and 1995. A summary of these educational programs is divided into 21 general topic areas and presented in Table 3-5. According to the survey, the most frequently offered educational programs included workshops on generic pollution prevention (73), auto body/repair (70), and metal finishing/working (61) topics. Workshops on auto body/repair and metal finishing/working were presented in six states, more than any other sectors.

P2 programs have also produced compliance-oriented workshops for the regulated community. For example, MA OTA conducted a series of workshops in 1995, titled "Making Compliance

### **Pit Stops Workshops for Vehicle Repair**

In 1995, Connecticut DEP's Office of Pollution Prevention and the Bureaus of Air, Water and Waste, along with five co-sponsoring trade associations, produced a series of eight workshops and trade shows in four regional locations of the state. The Pit Stops sessions for vehicle repair and body shops were attended by over 400 auto dealers, independent repair and body shop owners, truck fleet managers, bus fleet managers, service technicians, and vendors. Pit Stops speakers presented multimedia pollution prevention and environmental regulatory information tailored to the industry. Attendees were also able to clarify specific regulatory issues through discussions with the regulatory staff.

*Source: NEWMOA, Summer/Fall 1995, p. 3.*

**Table 3-5. P2 Workshop Topics (1990-1995)**

<b>Workshop Topic</b>	<b>Number of Workshops</b>	<b>Number of States</b>
General P2 <sup>1</sup>	73	3
Automotive Repair/Auto Body	70	6
Metal Finishing/Working <sup>2</sup>	61	6
Printers	27	5
Regulatory/Compliance	19	2
Cleaning <sup>3</sup>	15	5
P2 Business Tools <sup>4</sup>	13	2
Dry Cleaning	12	4
Textiles	12	2
Electronics	11	2
Wood Products	11	2
Pesticides	8	1
Photo Imaging	7	2
Plastics	6	2
Paper	6	1
Chemicals	6	1
Hospital/Medical	6	1
Laboratories	5	1
Restaurants	5	1
Non-Business <sup>5</sup>	7	2
Miscellaneous <sup>6</sup>	7	3
<b>Total</b>	<b>387</b>	

Source: P2 Survey.

<sup>1</sup> **General P2:** TURP Courses (27), Other (46)

<sup>2</sup> **Metal Finishing/Working:** Metal Finishing/Coating (45), Metal Working/Machining (15), SCWA Metal (34)

<sup>3</sup> **Cleaning:** Solvent Substitution (11), Miscellaneous Cleaning (4)

<sup>4</sup> **P2 Business Tools:** P2 Finance (5), Green Management (4), Computer and Internet Tools (3), TUR TQEM (1)

<sup>5</sup> **Miscellaneous Workshops:** Marinas (2), Decorating Products (1), Environmental Industry (1), Surface Coating (1), Janitorial Services (1)

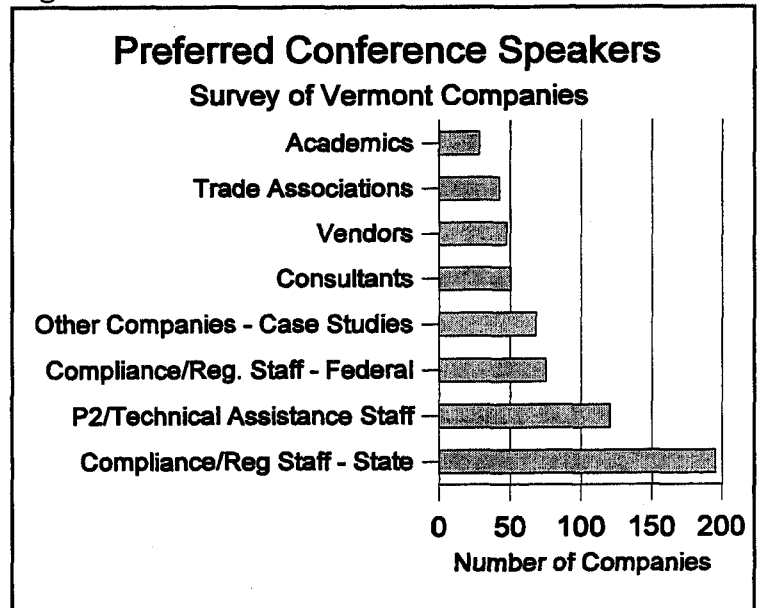
<sup>6</sup> **Non-Business:** POTW (4), Teacher Workshops (2), P2 and Communities (1)

Work for You.” These workshops were designed to help companies incorporate pollution prevention opportunities into their strategies for complying with Clean Air Act requirements.

Compliance issues and questions are also important subjects in P2-focused workshops. Workshop organizers report that compliance questions frequently dominate the content of P2 educational programs. Presenters report that they dedicate nearly half of their time to addressing compliance issues in response to demands from the regulated community. The P2 survey found that, on average, 15 P2 programs spent approximately 47 percent of their time on compliance issues during conferences and workshops.

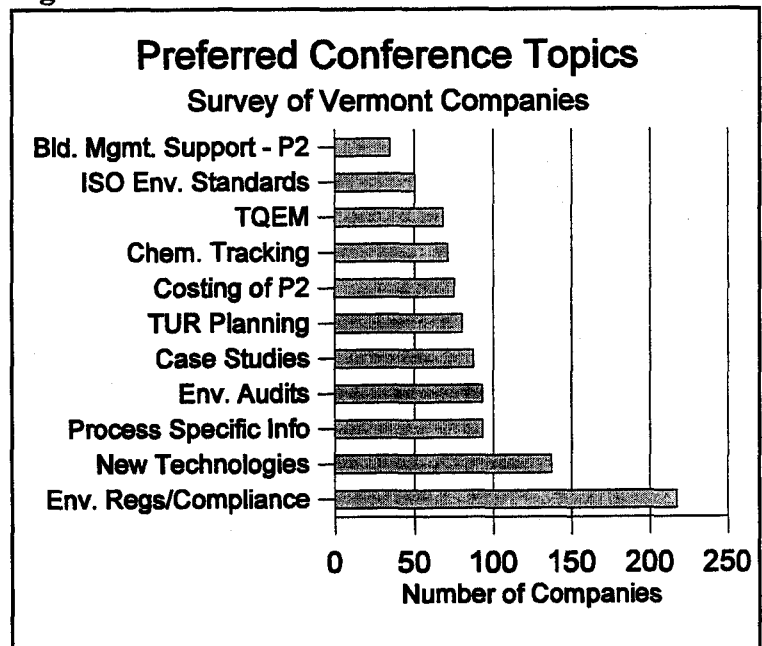
A 1995 study conducted by the Vermont DEC showed that industry placed compliance issues and regulatory speakers at the top of their P2 interests. DEC collected 215 surveys from 6 industrial sectors, including metal fabricating, metal finishing, printing, furniture finishing and wood products, vehicle servicing, and plastics manufacturing. Figure 3-2 shows that state compliance and regulatory staff were the most sought after speakers, followed by P2 and technical assistance staff, and then federal compliance and regulatory staff. As shown in Figure 3-3, the VT DEC found that compliance and regulatory issues were the most desired P2 conference topics, followed by new technologies, process specific information, and environmental audits.

**Figure 3-2**



Source: VT DEC 1995.

**Figure 3-3**



Source: VT DEC 1995.

P2 programs have also designed and organized P2 training and certification programs. For example, MA DEP and TURI offer a 40 hour training course and certificate program that

prepares attendees to review and approve state-mandated facility plans. Between 1990 and 1996 this effort certified approximately 700 Toxics Use Reduction Planners.

Regulatory integration efforts by state and local environmental agencies have spurred the need for P2 training for agency staff. Multimedia inspections, permitting, and P2-oriented Supplemental Environmental Projects often require permit writers, inspectors, and enforcement officials to understand pollution prevention definitions, goals, methods, successes, and barriers. For example, New Hampshire DES offered basic P2 training for agency staff in 1995 as part of their "P2 Orientation Initiative." The training, presented in 13 sessions to more than 400 DES staff, provided an overview of pollution prevention concepts, focusing on P2 in the home and office. The training also reviewed industrial examples of P2. The P2 Survey found that 5 state P2 programs trained approximately 977 inspectors, permit writers, and enforcement staff in pollution prevention concepts and methods between 1990 and 1996.

### **Evaluation Methods and Results**

The P2 Survey asked P2 programs to describe how they have evaluated their conferences and workshops. Twelve programs indicated that they used evaluation forms and questionnaires to elicit feedback from attendees. Some programs also relied on "talk-back" sessions and "post-event surveys" to gather additional information about the event's effectiveness.

The programs that provided information on workshop/conference evaluation results reported that overall the attendees were positive about the content and format of the sessions. Many attendees reported that they benefitted from the technical education and networking opportunities. Other attendees requested additional P2 information and expressed an interest in additional workshops, particularly ones featuring innovative technologies.

New Hampshire DES conducted a post-event evaluation to determine the impact of their 1993 Solvents Alternatives Vendor Exhibition, or "Solvents Bazaar." DES staff interviewed 28 of the 140 people that attended the event. About one-third of those interviewed reported that they implemented at least one solvent alternative displayed at the exhibition. Another one-third of the attendees were in the process of evaluating one or more technologies through trial projects. The final third of the attendees did not plan to implement any new approaches.

### **Pollution Prevention Publications and Clearinghouses**

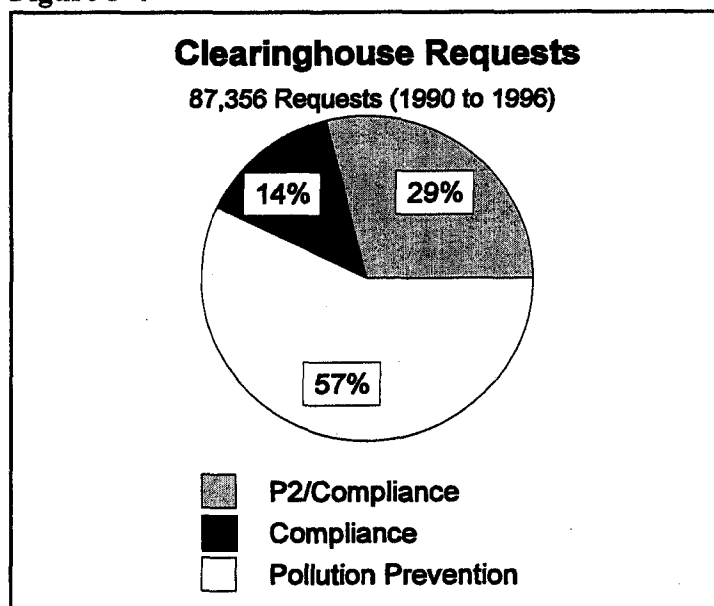
Every state in the Northeast operates some form of information service, usually a repository of P2 and compliance-related publications. These centers are frequently called clearinghouses. To facilitate access to P2 publications, these clearinghouses provided free reference services that rely on computerized information exchange systems that locate P2 publications and documents in-house or at other locations. P2 clearinghouses also provide referrals to libraries, government agencies, hotlines, and various local, state and federal P2 contacts.

From 1990 to 1996 clearinghouse managers handled a mix of P2 and compliance requests and regularly made referrals and sent out materials ranging in size from one page information sheets to full reports. Case studies have been popular sources of information for client firms. They illustrate how an individual business successfully used P2 strategies to reduce operating costs,

avoid regulatory burdens, and improve operation efficiency and product quality. In addition to a discussion of P2 technologies and methodologies, case studies regularly include information on cost savings, investment payback periods and waste reductions. All eight Northeast states also published fact sheets, technical reviews, training materials, conference proceedings, and newsletters from 1990 through 1996.

The P2 survey found that 14 programs received 87,356 requests for information. As shown in Figure 3-4, P2 Clearinghouses reportedly received a substantial number of compliance information requests. Of the total number of requests, approximately 14 percent were compliance-related, approximately 57 percent were P2-related and approximately 29 percent were pollution prevention and compliance-related.

**Figure 3-4**



Source: P2 Survey.

Survey results showed that 11 programs distributed approximately 38,562 documents in response to approximately 48,520 requests for information. Some programs sent out multiple documents for each information request, while other programs responded to the majority of information requests over the phone and sent literature less frequently.

The survey results showed that 15 state and local programs published 548 different P2 documents other than newsletters or case studies. Of these 15 programs, 12 reportedly distributed more than 330,000 of these P2 documents to businesses. These P2 documents include P2 opportunity guides and brochures, fact sheets, compliance assistance manuals, and annual reports to state legislatures.

From 1990 to 1996, 11 P2 programs in the Northeast published at least 265 case studies. Of these programs, 4 provided 118 case studies that documented more than \$39 million in cost savings. This is an average of approximately \$333,000 in cost savings per case study.

Finally, the survey respondents report that 10 P2 Programs published and distributed nearly 109,000 copies of newsletters, primarily for their business clients. Of these 10 programs, 8 consistently published newsletters between 1992 and 1996.

## **P2 Grants and Loans**

The grants and loans section of the P2 Survey focused on the amount of money provided by state and local P2 programs for activities that promote P2 by companies. According to descriptions provided by seven P2 programs, the majority of P2 grants and loans have been used to promote innovative P2 technologies, provide technical assistance, and train company employees. In a few

## **Examples of P2 Case Studies**

### **Southern Maine Industries Corp. (ME DEP)**

Reductions: Reduced water use from 54,000 to 815 gallons per day (a 99 percent reduction) and eliminated wastewater discharges. Savings: Annual cost savings of \$100,000.

### **Elimination of TURA Chemical Reporting at the Robbins Company (MA OTA)**

Reductions: Eliminated use of Freon, trichloroethylene, ammonia, sodium hydroxide, and sulfuric acid. Sludge generation was cut by 99.8 percent. Savings: Annual cost savings of \$100,000.

### **Metal Reduction in a Tubbing Water Recycle Stream of a Die Casting Operation (NBC)**

Reductions: Closed-loop ultrafiltration system virtually eliminated wastewater discharges. Savings: Achieved \$12,000 annual savings from avoided sewage bills and \$16,000 from reduced chemical use.

### **MARKEM Corporation (NH DES)**

Reductions: Eliminated 500,000 lbs/year of organic solvents, 200,000 lbs/year of hazardous waste, and 34,000 lbs/year of emissions. Savings: Annual cost savings of \$300,000.

### **Hazardous Waste Reduction: Carrier Corporation (NYS DEC)**

Reduction: Reduced hazardous acidic and alkaline waste liquids by 54 percent. Savings: Approximately \$700,000 per year.

### **Electroplater Replaces 1,1,1-trichloroethane Used in Vapor Degreasing with an Ultrasonic Aqueous Cleaning System (RI DEM)**

Reductions: Reduction of 1,800 gallons per year of spent 1,1,1-trichloroethane. Savings: Annual operational, waste management, energy, and feedstock savings of over \$38,440.

### **Process Modification/Substitution at Metal Fabrication and Finishing Company (VT DEC)**

Reductions: Elimination of VOCs and 98 percent reduction of toxic material use and waste generation. Savings: Annual material, maintenance, and labor savings of \$42,500.

cases, grants also have been provided to communities for local P2 projects and to educational institutions for research and reports.

P2 programs used technology-oriented grants and loans to encourage the development, implementation, and evaluation of innovative P2 technologies. P2 demonstration projects were also funded to facilitate the transfer of innovative technologies by showcasing successful installations. A number of these grants were offered exclusively to smaller manufacturers. To secure a serious commitment from private sector participants, some of the P2 grants required a 50 percent match. Technical assistance grants were also made to local agencies, consultants, and trade organizations for conducting P2 workshops and providing direct P2 assistance.



According to the results of the P2 Survey, between 1990 and 1996, 7 programs provided 90 P2 grants, totaling \$2,877,400. Of these, 63 were between \$5,000 and \$15,000, 25 were between \$40,000 and \$60,000, 1 was for \$390,000, and 1 was for \$500,000. In addition, one program, ConnTAP, made a P2 loan for \$75,000.

## Summary

State and local P2 programs conducted a large number of on-site technical assistance and P2 educational and outreach activities from 1990 through 1996. All but two states offered financial assistance for businesses, consisting mainly of P2 grants.

The P2 Survey found that 13 P2 programs conducted 2,952 site visits and that 12 of these programs offered 9,369 technical recommendations to their client businesses (or close to 3.5 technical recommendations per site visit). Approximately 70 percent of these firms were small business. The survey also found that companies implement 44 to 50 percent of the recommendations provided by technical assistance providers and that between 40 and 87 percent of all the companies that received site visits implemented at least one technical recommendation. Furthermore, anecdotal data suggests that between 10 and 50 percent of companies receiving site visits permanently incorporated P2 activities into their corporate policies and facility operations.

Educational and outreach efforts were also popular areas of P2 activity. Sixteen P2 programs conducted more than 600 P2 conferences and workshops for business audiences and more than 200 workshops for other audiences. The total reported attendance for all of these P2 conferences and workshops was nearly 36,500. The survey also found that 14 programs received more than 87,000 requests for information through clearinghouses. Eleven programs published 265 case studies and distributed more than 38,500 documents. In addition, 7 P2 programs administered 90 grants, totaling \$2,877,400, given to businesses seeking to implement P2 projects and/or develop and implement innovative P2 technologies.

The Survey found that compliance assistance is deeply connected with P2 technical assistance and outreach efforts. P2 programs reported that an average of 46 percent of their on-site technical assistance staff time was spent discussing compliance issues with firms. Similarly, compliance topics and speakers drew crowds at P2 educational events, where compliance issues occupied approximately 47 percent of the time during the workshops. Finally, approximately 43 percent of clearinghouse requests included some compliance assistance.

Although most of the participating assistance programs were unable to provide quantitative information on waste reductions associated with their technical assistance activities, the handful

### Examples of P2 Grants

"Industry Matching Grants - Feasibility Studies and Technology Demonstrations for Innovative TUR Technologies," TURI

"Bradley P2 Matching Grants" - Given to small manufacturing businesses in NJ for the best P2 concepts, NJ TAP

"Small Business/Technical Assistance Projects" - PPIS funds provided for P2 technical assistance, NYS DEC

"Grant to PINE for On-site Training and P2 Assistance for Printers," VT DEC

*Source: P2 Survey.*

of programs that had conducted studies on P2 outcomes reported that their efforts resulted in substantial waste reductions and cost savings.

## Chapter 4: Regulatory Integration

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In the past few years state and local environmental agencies have investigated ways to integrate pollution prevention approaches into regulatory and enforcement programs. The methods used to achieve P2 integration include multimedia prevention-oriented permits, inspections and enforcement. Multimedia, in this context, means that the focus of the regulatory programs is on all of the wastes and emissions from a single facility, rather than separate approaches to air emissions, wastewater discharges, and hazardous waste management, which is often called a single media approach.

Environmental agencies have begun to adopt more multimedia approaches to environmental protection because they have found that a single media focus can cause shifts in wastes and pollutants from one part of the environment to another without any net reduction in releases. For example, air emission control devices move pollutants from smoke stack gases to a solid or liquid waste, which is often hazardous. Similarly, stringent effluent guidelines may improve end-of-pipe water quality, however the contaminated wastewater treatment sludge, which is land disposed or incinerated, can contaminate groundwater or air. Even within facilities, the focus on one waste stream may increase the volume or toxicity of other waste streams, leading to a "toxic shell game," where pollution moves from one medium to another without being fully addressed or eliminated.

This Chapter describes how environmental agencies have begun to incorporate multimedia prevention-based strategies into inspections, permitting, enforcement, and rulemaking. The Chapter particularly focuses on multimedia inspections and innovative enforcement programs, which are the major areas where regulatory integration has taken place.

### Regulatory Integration

Regulatory integration can increase the awareness and acceptance of P2 strategies by the regulated community and can improve the performance and effectiveness of regulatory agencies.

With support by the institutional and legal clout of the regulatory programs, pollution prevention efforts can take on a more compelling profile. As reported in EPA's *Study of Industry Motivation for Pollution Prevention*, environmental regulatory programs are "almost unrivaled in making business decision makers aware of their environmental obligations" (EPA 1997, p. ES-3). By incorporating P2 into regulatory activities, environmental agencies encourage companies to consider the costs and impacts of pollution and assess the economic and environmental benefits of source reduction.

#### Definition of Multimedia

According to New York State DEC, "Multimedia (M2) refers to the simultaneous identification and evaluation of all aspects of the 'media' (air, water, land) that compose the physical environment, and which are the subjects of ongoing or anticipated impacts or changes."

Source: NYS DEC 1997, p. 1.

Table 4-1 provides an overview of regulatory integration activities for seven Northeast states. The Table shows that MA and NY are involved in all of the various types of regulatory integration activities that are listed. Other states are also involved in a variety of integration activities. All of the states are integrating P2 into inspections, and five of the seven states are

**Table 4-1. Overview of State P2 Regulatory Integration Activities in the Northeast\***

	CT	ME	MA	NH	NY	RI	VT
<b>Inspection</b>	✓	✓	✓	✓	✓	✓	✓
<b>Permitting</b>	✓	-	✓	✓	✓	-	✓
<b>Rulemaking</b>	-	-	✓	✓	✓	✓	✓
<b>Enforcement/ P2 SEPs</b>	✓	-	✓	✓	✓	✓	-
<b>Reorganization</b>	N/A	✓	✓	N/A	✓	✓	✓
<b>Other</b>	-	P2 Training	Measures of Success	P2 Training (Staff)	P2 Training	EPA Incentives	Clean State Initiative

Source: NEWMOA 1996.

\* NJ DEP was not included in this survey.

integrating P2 into permits, rules, and enforcement. Although the exact nature of regulatory integration efforts varies somewhat between states, in general the activities can be defined as the following:

**Inspections:** Inspectors have played a leading role in pollution prevention in two ways: by encouraging companies to explore P2 opportunities and/or by conducting multimedia prevention-oriented inspections. In the first instance, inspectors have pointed out general pollution prevention opportunities while conducting inspections, distributed literature about P2 methodologies and resources, and suggested that companies contact a technical assistance program for further assistance. On a more involved level, environmental agencies have experimented with multimedia, prevention-oriented inspections that involve individual inspectors or teams of inspectors assessing a facility's environmental compliance with more than one media program. Frequently inspectors use checklists, which help them cover the compliance issues and recognize the sources of the wastes and pollutants.

**Permitting:** States are beginning to incorporate pollution prevention approaches into permits. Through this approach, facilities are required to develop a pollution prevention plan or implement pollution prevention projects. At least two states in the Northeast have experimented with the creation of "full-facility" permits that cover the permitting requirements of more than one media program.

**Enforcement:** States have adopted innovative enforcement initiatives that allow companies that are negotiating an enforcement settlement in good faith to engage in environmentally beneficial activities as a means of addressing compliance violations in exchange for reductions in penalties.

These are usually called Supplemental Environmental Projects (SEPs). The environmental benefits of source reduction projects make them an attractive choice for SEPs.

**Rulemaking:** To support the integration of P2 into regulatory programs, policymakers are beginning to write P2 into new regulations.

**Program Reorganization:** To address the limitations of single-media environmental approaches, environmental agencies have begun to restructure their programs to include air, water and waste regulatory programs within a single agency subdivision.

**Other Activities:** Other integration efforts include a variety of P2 staff training, outreach and promotion efforts.

### **Challenges to Integration**

Despite their growing success, regulatory integration efforts face considerable challenges. State policymakers are trying to introduce prevention strategies into regulatory systems that were designed around managing, controlling, or treating wastes and pollutants after their generation. According to a recent analysis, "one of the most significant barriers toward furthering P2 activities in compliance programs has been policies that measure the success of regulatory programs based solely on the number of enforcement actions," rather than decreased waste and pollution generation (Helbrecht 1994, p. 335).

A variety of institutional and technical obstacles to pollution prevention have arisen from the pollution control-oriented regulatory framework. According to a report by the EPA, the fundamental obstacles include:

- the lack of incentives for interoffice (multimedia) coordination in planning and budgeting,
- the piecemeal nature of the statutory framework,
- challenges to promoting P2 process changes and innovative technologies,
- the lack of understanding about cross-media impacts,
- the lack of resolution about collecting source reduction data through industry surveys, and
- unclear roles for sharing leadership among all parts of the agencies on various aspects of P2 (EPA 1996, Executive Summary).

The P2 Survey found that states have been the most successful thus far in establishing multimedia inspection programs and SEPs. Efforts to integrate P2 into permits, regulations and policies have been slow to make progress in part because of the obstacles listed above. The following sections present the activities and results reported by states on their multimedia inspections and SEPs.

### **Multimedia and P2-Oriented Inspections**

To address environmental limitations of single media inspections, regulatory programs have begun to experiment with multimedia approaches to facility inspections. The primary incentive for developing multimedia inspections is to address the problem of cross-media contamination generally being overlooked by the single media approach.

As an illustrative example, a study conducted by VT DEC found that regulatory crossover existed throughout its media programs. As shown in Figure 4-1, a study of 6 media program databases revealed that between 21 and 57 percent of regulated facilities were also regulated by at least one other program.

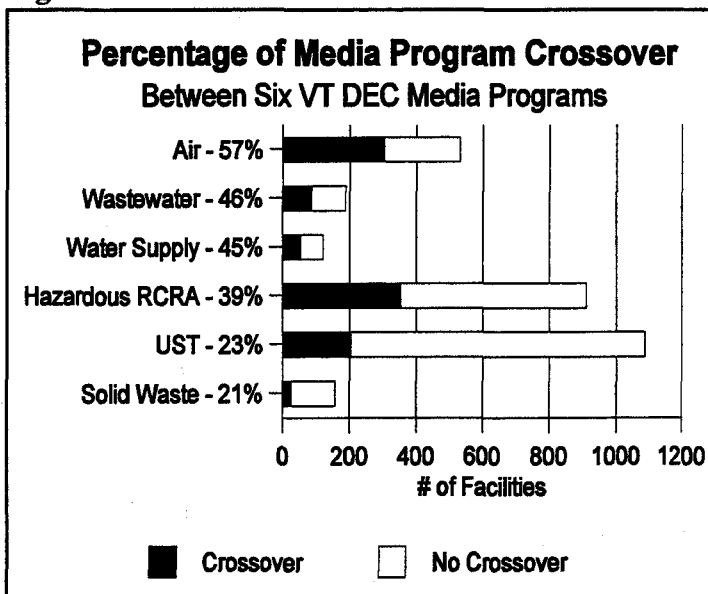
A closer examination of individual media programs shows how certain programs share varying degrees of regulatory crossover. As shown in Figure 4-2, the VT DEC study found that of the 531 facilities regulated by VT DEC's Air Pollution Control Division, 303 facilities or 57 percent share regulatory requirements with other media programs.

An added benefit of a "whole facility" approach is that it identifies an increased number of violations and uncovers unregulated and unpermitted activities that "fall through the cracks" of a single media approach. MA DEP documented that on average 40 percent of facilities with violations in 1996 had them in more than one program (MA DEP, 1997, pp. 2-20). While a single media inspection would have revealed a violation in one media, multimedia inspections provide a more effective and reliable method of identifying a range of media violations.

Furthermore, 12 percent of the multimedia inspections conducted by MA DEP in 1996 found unregulated or unpermitted activities (MA DEP 1997, p. 2-19). This demonstrates the effectiveness of a "whole facility" approach to inspections.

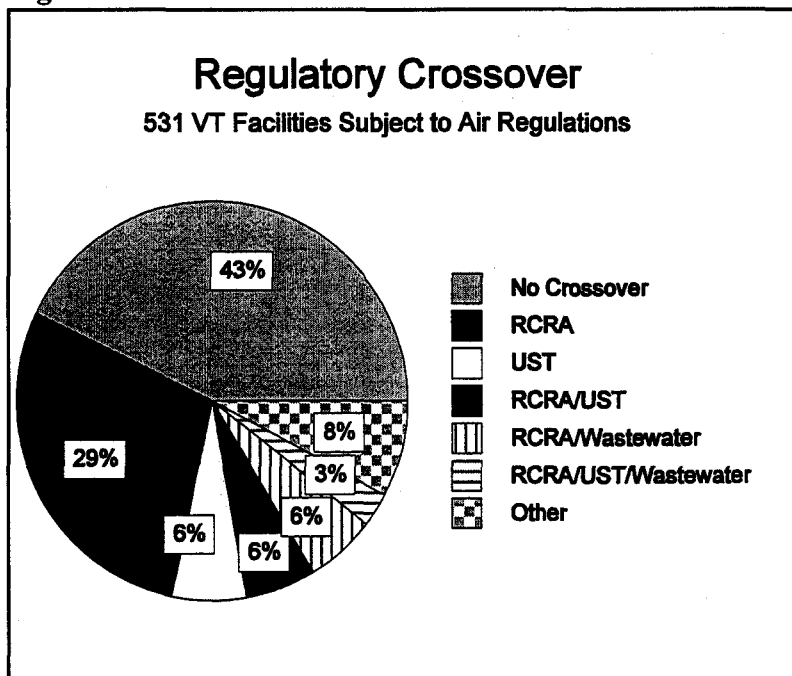
Some environmental programs have pointed out that single media approaches can lead to

**Figure 4-1**



Source: VT DEC April 1994, p. 2.

**Figure 4-2**



Source: VT DEC 1994, p. 28.

redundant program activities that burden inspectors and industry alike. This is especially true for companies that fall under multiple reporting and compliance regulations. These facilities contend with the paperwork burden and expense of managing a different permit for every relevant medium (Bergeson 1994, p. 221).

Pollution prevention is multimedia by nature, concentrating on the source of pollution rather than its physical form. Consequently, a number of P2 programs choose to link the approaches under multimedia pollution prevention (M2P2) programs. By combining P2 methodologies with multimedia analysis, M2P2 can reduce management costs and environmental risks by preventing pollution and minimizing cross-media pollution transfers. Using the M2P2 approach, state and local programs are developing environmental strategies designed to be more flexible, incentive-based, comprehensive, multimedia, and preventive.

There are a number of ways to design and implement multimedia inspections. Inspectors can be trained to conduct multimedia inspections for specific industrial sectors or for all facilities. Regulatory programs may organize teams of inspectors that have in-depth knowledge of compliance and regulatory issues for all media (US EPA 1993, p. 3). Inspectors from each media program can be trained to conduct screening level inspections in the other media to identify whether there may be noncompliance in those other programs.

In response to the P2 Survey, 5 programs reported that they conducted approximately 4,190 multimedia facility inspections between 1990 and 1996. Sometimes these inspections were conducted by two inspectors that each focus on a particular media program. In these cases, the target facility was usually considered to be a major source of pollution for more than one media program. In other cases, an inspector from an individual media program conducted a thorough inspection of a facility considered to be a major source of pollution and used a checklist to conduct a screening inspection for other, less prominent media considerations.

A notable example of a multimedia and P2-oriented inspections is MA DEP's Environmental Results Program (ERP). This "cutting edge" initiative replaces thousands of conventional permits for small and mid-sized companies with performance-based, annual self-certification. Initiated in 1995, the program has worked with printers, dry cleaners, photo-processors, and auto body shops to develop comprehensive performance standards that allow facilities the flexibility to adopt pollution prevention measures without the restrictions of individual permits. ERP's multimedia approach is an important program component that addresses the problem of cross-media contamination generally overlooked by single media permits.

By providing training, technical support, and a user friendly approach, ERP has been able to reach a wider audience of small and medium-sized businesses and improve compliance rates. For example, under the ERP Demonstration project, 18 participating firms were given the chance to make operational changes without the need for new or modified permits for one year (August 1996 through August 1997). According to the Demonstration Project evaluation, there was a dramatic improvement in compliance rates based on a comparison of "before" and "after" inspections. The post certification compliance rate of 78 percent is significantly better than both the pre-certification rate of 33 percent and the average industrial compliance rate of 42 percent (NEWMOA 1998, p. 2). As a result of ERP, MA DEP anticipates that photo processors will decrease silver discharges to wastewater by 99 percent, dry cleaners will reduce their

perchloroethylene emissions by 43 percent, and printers will reduce VOCs by at least 50 tons per year (Walsh 1998, p. 2).

## Supplemental Environmental Projects

Supplemental Environmental Projects (SEPs) provide companies with increased flexibility when negotiating enforcement settlements. Although the EPA has long allowed companies to engage in "mitigation projects" and "alternative payments" in exchange for penalty reductions, the recent introduction of "environmentally beneficial expenditures" (EBEs) allows companies to pursue environmental activities, including pollution prevention initiatives, to address environmental violations and reduce penalties.

### Supplemental Environmental Projects

SEPs are negotiated enforcement settlements that allow companies the option of engaging in environmentally beneficial expenditures (EBE) to address compliance violations and/or reduce penalty payments. Increasingly, companies are choosing P2-oriented SEPs because of their financial and environmental benefits.

Although P2-oriented SEPs are relatively new, EPA has identified several types of situations that favor the use of pollution prevention conditions in enforcement settlements. These include:

- Recurring patterns of violations that are unlikely to be corrected by additional add-on controls or improved by operation and maintenance, and that are most likely to be resolved by elimination or substitution;
- Proposed solutions that do not create environmental problems in other media;
- Effluent emissions or discharges for which technically and economically feasible pollution prevention options have been identified; and
- Violations that involve one or more chemicals from the target list of seventeen chemicals that EPA emphasizes in implementing its pollution prevention strategy (Bergeson 1992/93, p. 88).

Depending on the negotiated settlement, P2-oriented SEPs can involve a variety of activities ranging from broad-based administrative measures to specific operational changes. The P2 Survey found that 7 P2 programs in 6 Northeast states negotiated a total of 113 SEPs between 1990 and 1996. Of these SEPs, 40 or 35 percent included pollution prevention provisions. In addition, two P2 programs provided data on the amount of money spent by the firms in excess of the fine for the P2-oriented SEPs. These two programs reported that between 1994 and 1996, SEPs encouraged the participating companies to spend a total of \$114,000 over their initial enforcement penalty. The following examples of P2 activities illustrate some of the measures that have been negotiated in P2-oriented SEPs:

### Administrative Measures

- Development of a pollution prevention policy
- Training plant employees on pollution prevention policies and methods
- Development of an inventory control system to minimize the amount of hazardous materials on-site at any given time



- Assessment of the environmental and economic costs of waste-producing technologies
- Assessment of P2 opportunities

### **Operational Changes**

- Implementation of an on-site solvent recycling system
- Implementation of a baffle collection system for paint overspray
- Implementation of improved paint collection systems

### **Production Process Improvements**

- Improvements in the efficiency of an electrostatic sprayer and hand-held spray guns through parts replacement and equipment adjustments
- Continual training of painters and operators in efficient painting techniques

### **Material Substitutions**

- Purchasing and testing an alternative cleaning solution for metal furniture parts
- Continual monitoring of water-based and other coating developments, to obtain a suitable, cost effective alternative

Companies have, by and large, welcomed SEPs for several reasons. First, SEP penalty reductions can be anywhere from 45 percent to 75 percent (Bergeson 1992/93, p. 89). Second, SEPs generally are capital expenditures that can be amortized over several years. Thus, they have tax advantages that penalty payments lack. Third, the implementation of P2 projects provides companies with a variety of economic, environmental, and human health benefits. Finally, P2 projects help companies realize long-term solutions to enduring environmental problems.

## **Summary**

Between 1990 and 1996 environmental agencies pursued a number of innovative regulatory integration efforts to improve their inspection and enforcement activities. Many of the participating states have experimented with multimedia inspections and SEP, which are the most widespread regulatory integration programs and are the only efforts to date for which there are any quantitative results.

The P2 Survey found that five state environmental programs conducted a total of 4,190 multimedia facility inspections between 1990 and 1996. These inspections were either jointly conducted by two inspectors that each focused on a particular media program or an inspector from an individual media program conducted a thorough inspection of a facility.

The P2 Survey found that 7 P2 programs in 6 Northeast states negotiated 113 SEPs between 1990 and 1996. Of these SEPs, 35 percent or 40 included pollution prevention provisions. In

### **Supplemental Environmental Project Case Study**

Seekonk Lace Company of Barrington, Rhode Island, was found in violation of EPCRA 313 for failure to report emissions of acetone. The proposed penalty was \$25,000; however Seekonk negotiated a credit of \$10,000 by agreeing to eliminate its use of acetone. The company introduced a mechanical method for separating nylon and acetate threads, eliminating more than 250,000 pounds of acetone per year. The total cost of the project was estimated to be \$95,000

*Source: Wigglesworth 1993, p. 71.*

addition, 2 P2 programs reported that between 1994 and 1996, SEPs encouraged participating companies to spend a total of \$114,000 over their initial enforcement penalty.

## Chapter 5: Facility Planning

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States have enacted facility planning laws to encourage companies to identify, evaluate, and pursue P2 opportunities. In 1989, Oregon and Massachusetts were the first states in the country to enact facility planning laws. By 1993, 20 states had enacted planning legislation, including Maine, New York, and Vermont (Style and Foecke 1994, p.19). This chapter describes facility planning efforts in the Northeast and presents the findings of facility planning studies by the National Pollution Prevention Roundtable, Maine, Massachusetts, New York, and Vermont.<sup>1</sup>

Table 5-1 outlines some of the facility planning provisions of the Northeast states' legislation.

Facility planning legislation has taken different forms in states across the country. In spite of some important variations, planning requirements typically have four basic components (Foecke and Style 1992, p. 480):

- 1) **Facility Review:** All facility plans must contain a comprehensive review of industrial processes that use, generate, or release toxic or hazardous waste. Some states (i.e., MA, ME and VT) focus on the use of toxic and hazardous chemicals, while others (i.e., NY) focus on the release of targeted wastes.
- 2) **Identification of Efficiency Opportunities:** All plans must contain a list of pollution prevention opportunities or alternatives for each process analyzed.
- 3) **Option Ranking:** Planners must conduct a technical and financial evaluation that ranks P2 options and proposes an implementation schedule for the feasible ones. Some states (i.e., MA) require planners to document their rationale for accepting or rejecting each option.

### State Reduction Goals

States P2 planning laws established a variety of use, toxic release and hazardous waste reduction goals.

**Maine** set a 30 percent reduction goal for toxic releases and hazardous waste generation by 1998 relative to 1990 levels.

**Massachusetts** set a 50 percent reduction goal for toxic waste or byproduct generation between 1987 and 1997.

**New York** established a goal to reduce the State's hazardous waste generation by 50 percent by the year 2000.

**Vermont** set a statewide goal of reducing the use, release, and generation of toxic materials and hazardous waste.

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<sup>1</sup> New Jersey Department of Environmental Protection (DEP) has conducted an analysis of the results of their P2 Planning requirements. However, this analysis has not been included in this report because NJ DEP did not participate in the P2 Survey.

**Table 5-1. Facility Planning Programs**

	Maine	Massachusetts	New York	Vermont
<b>Initial Plan Filing Date</b>	7/1/94	1/1/93	7/1/92	7/1/92
<b>Period Covered by the Plan</b>	2 years	2 years	2 years	2 years
<b>Number of Reporting Facilities</b>	600	200	400	600
<b>Scope of Coverage</b>				
TRI	✓	✓*		
LQGs	✓	✓	✓	
SQGs			✓	
Other				✓
<b>Chemicals Addressed</b>				
RCRA	✓	✓	✓	✓
SARA	✓	✓		✓
<b>Focus of Planning</b>				
"Multimedia"	✓	✓	✓	✓
Source Reduction	✓	✓	✓	✓
Toxics Use Reduction	✓	✓		✓
<b>Reporting Requirements</b>				
Mandatory Facility Plans	✓	✓	✓	✓
Progress Reports		✓	✓	✓
Plan Summaries		✓		✓
<b>Confidentiality</b>				
CBI Protected From the State	✓			
CBI Protected From the Public	✓	✓	✓	✓
<b>Planning Fees</b>				
TRI Reporters Pay	✓			
Reporting Fee Per Listed Chemical	✓	✓		
LQGs Pay				✓
SQGs Pay			✓	

Source: Style Winter 1993-1994, pp. 64-65.

\* Massachusetts TURA's definition of Large Quantity Toxic Users (LQTUs) roughly follows the requirements and thresholds of TRI.

**4) Implementation:** Planners must document any implementation and include some measures of progress. This often means filing reports to the state comparing actual progress to the projections outlined in their original plan.

State planning legislation gives regulators the authority to require companies to submit facility plans, however, in most states this authority does not extend to requiring that companies implement the source reduction activities outlined in their plans.<sup>2</sup> Although companies may not always be required to implement the P2 opportunities identified in their plans, the planning process may identify incentives for firms to implement them voluntarily.

To ensure that companies are committed to the planning process, the planning regulations generally include a statement signed by corporate or facility management, verifying the accuracy and completeness of the plan and the firm's commitment to implementing it. Massachusetts takes the verification process one step further by requiring that a trained Toxics Use Reduction Planner review and certify plans.

State environmental agencies support planning efforts by offering technical assistance to companies, particularly small businesses. Technical assistance programs assist companies with plan development and other related activities.

## **Facility Planning Components**

State facility planning programs differ in their scope, focus, reporting requirements, confidentiality agreements, and funding. Table 5-1 relates the following components to the facility planning programs in the four Northeast states (US EPA 1997, pp. 144-146).

**Scope of Coverage:** Planning requirements apply to facilities already subject to hazardous waste regulations or TRI reporting requirements. Some states limit the planning requirement to larger businesses (e.g., RCRA large quantity generators) while others require planning by smaller entities.

**Chemicals Addressed:** Facility planning laws generally address toxic chemicals, as listed under EPCRA Section 313, or hazardous wastes, as defined under RCRA or state hazardous waste laws. However, planning requirements may go beyond the scope of particular lists of substances or wastes to encourage prevention and to discourage shifting waste across environmental media.

**Focus of Planning:** While all of the planning processes emphasize pollution prevention, some focus specifically on reducing the use of toxic or hazardous substances or reducing the generation of waste and pollution. Some programs emphasize recycling as well as prevention.

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<sup>2</sup> New York State has the authority to review and approve hazardous waste reduction plans submitted by companies. The plans are enforceable, and New York can require implementation of P2 options that the facility selects in their plan. Maine's P2 law has facility level goals of 30 percent for reducing hazardous wastes and extremely hazardous chemicals. If facilities do not meet their goals, ME DEP can investigate their efforts.

**Reporting Requirements:** Developing a facility plan is mandatory. The plans are usually stored at the facility. P2 programs are allowed to review them at their site. Plan summaries and progress reports are generally filed with the state agencies and are available to the public. The summaries and reports might include numeric reduction goals, information on wastes generated and released, and schedules and progress made toward attaining plan objectives.

**Confidentiality:** The planning process usually preserves the confidentiality of certain documents. Except for New York State, plans or the assessments that underlie the plans, are kept on-site and are available to some environmental agency staff to read at the facility. Whereas plan summaries, annual reports, or planning goals are typically submitted to the state for review and analysis.

**Planning Fees:** Facility planning laws may rely on a variety of funding sources, including fees from TRI reporters, large quantity generators, and small quantity generators.

## **Facility Planning Results**

Success in pollution prevention planning often relies more on managerial commitment than on the technical quality of the plan. The following factors appear to lead to excellence in facility planning:

- top management support and commitment,
- environmental goals are part of the company culture,
- commitment to planning, and
- commitment to environmental cost-accounting systems (Rozell and Brower 1993, p. 280).

Facility planning studies by the National Pollution Prevention Roundtable (NPPR), Massachusetts, Maine, New York and Vermont have found that facility planning requirements have had a significant impact on the regulated community. Massachusetts, Maine, New York, and Vermont evaluated data from their facility reporting requirements to determine the extent of industry source reduction efforts. These studies are summarized below.

## **National Pollution Prevention Roundtable**

The National Pollution Prevention Roundtable's Facility P2 Planning Workgroup reviewed a number of state program evaluations in *Facility Pollution Prevention Planning Requirements: An Overview of State and Program Evaluations*. The review, which examined evaluations from Massachusetts, Minnesota, New Jersey, Oregon, Texas, California, and Washington concluded that a majority of the programs found that pollution prevention planning processes and programs:

- successfully identify pollution prevention opportunities,
- improve environmental management,
- reduce waste generation, and
- result in cost benefits (Barwick 1997, p. 16).

These findings are corroborated by the analyses conducted by states in the Northeast, as described below.

## Maine

Maine DEP's Office of Pollution Prevention (OPP) has analyzed the industrial generation of hazardous waste and the use of extremely hazardous materials from 1990 to 1996. ME DEP's OPP reviewed hazardous waste reports for 110 companies between 1989 and 1995, representing 96 percent of the regulated community. According to their study, the regulated community achieved a 26 percent, or 2.9 million pound reduction in the generation of hazardous waste.

A study of Maine's pollution prevention planning law assessed reports from 80 companies between 1990 and 1995, representing 65 percent of the regulated community. According to this study, the regulated community reduced their use of extremely hazardous substances by a 60 million pounds or 9 percent.

## Massachusetts

Since 1990, approximately 600 Massachusetts industrial facilities have reported to Massachusetts DEP on their use of toxic chemicals and generation of hazardous byproducts. An analysis of this data was included in an in-depth study of Massachusetts industry, published by the Toxic Use Reduction Institute at University of Massachusetts Lowell in a 1997 report, *Evaluating Progress: A Report on the Findings of the Massachusetts Toxic Use Reduction Program Evaluation*.

The study found that the Toxics Use Reduction Act (TURA) encouraged companies to institute chemical tracking and P2 assessment activities. Table 5-2 shows that the 434 facilities participating in the MA TURI survey reported that the TUR planning requirements dramatically increased a variety of planning activities. When companies were asked about their reason for pursuing source reduction, the survey found that 89 percent of the respondents felt that TUR planning contributed to the implementation of TUR as opposed to other P2 promoting factors, such as the Emergency Planning and Community Right to Know Act (EPCRA) Section 313, the EPA's 33/50 Program, and the Montreal Protocol (Becker and Geriser 1997, p. 42).

More significantly, the TURA study found a connection between TUR implementation and reductions in byproduct<sup>3</sup> generation and toxic chemical use. When companies were asked if their facility net byproduct generation and toxic chemical use per unit of production had increased, decreased or remained unchanged since 1990, the researchers found the following:

- Of the facilities that said they **have implemented or will implement** at least a few of the projects identified in their TUR plans, 61 percent reported that they have *decreased* their byproduct generation since 1990, and 67 percent reported that they have *reduced* their toxic chemical use during the same time frame.
- Of the firms that **have not implemented** any of their identified TUR projects: 61 percent reported that byproduct generation has *increased or remained unchanged* since 1990, and 66 percent reported that toxics use has increased or remained unchanged during the same time frame.

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<sup>3</sup> "Byproduct" is defined as all non-product outputs of a TURA reportable substance generated by a production unit prior to handling, transfer, treatment and release.

Massachusetts industries are making progress in toxics use reduction. Figures 5-1 and 5-2 show several important trends in toxic chemical use and byproduct generation in MA. The Figures illustrate how TUR implementation resulted in significant reductions in toxic chemical use and byproduct generation for a "Core Group" of TURA listed chemicals and filers.<sup>4</sup>

According to an analysis of 1990 through 1996 TURA data, Massachusetts' industries made quantifiable progress in the reduction of toxic chemical use and hazardous waste generation.

**Table 5-2. Change in Toxics Use Reduction Activities\***

Activities	Percentage of Respondents "Very Involved" in Activity**		
	Before 1990	1996	Percent Change
Tracking quantities of wastes generated	49%	89%	82%
Tracking quantities of chemicals used	48%	90%	88%
Establishing a corporate or facility environmental team	24%	68%	183%
Setting goals for waste reduction	24%	73%	204%
Reviewing changes in production processes for their environmental, health and safety impact	30%	76%	153%
Allocating environmental costs to process products	21%	52%	148%
* Total number of facilities = 434, Survey administered June-July 1996. ** Note: only "very involved" responses shown. Other responses were: "somewhat involved" and "not at all involved."			

Source: Becker and Geiser 1997, p. 12.

<sup>4</sup> To create a meaningful comparison of TUR data from year to year, the TURA program defined a "Core Group" of industries and chemicals that were consistently subject to reporting from 1990 to 1996. The Core Group includes the majority of the chemicals and facilities reporting in each year, both in terms of the number of forms received and the quantities of chemicals reported.

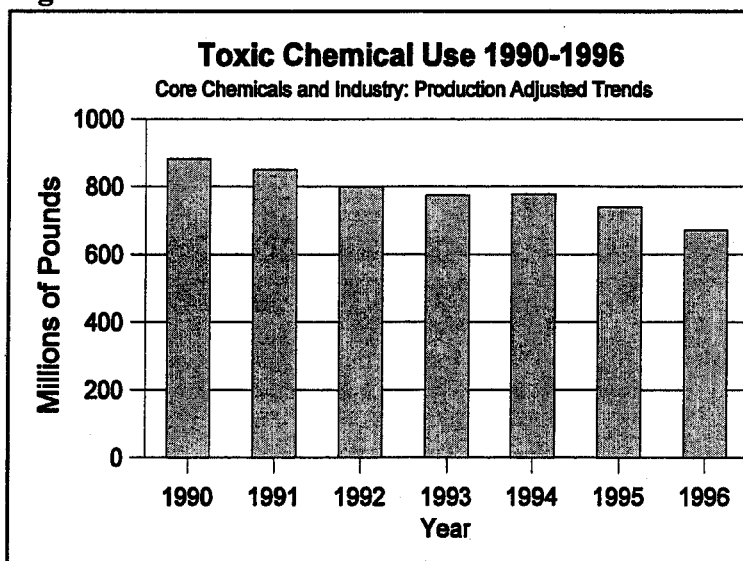


Between 1990 and 1996, toxic chemical use declined by 24 percent or 209.8 million pounds compared to expected toxic chemical use without TUR (Cain, Bizzozero and Harriman 1998, p. 26). Similarly, byproduct generation dropped by 34 percent or 37.5 million pounds compared to expected byproduct generation without TUR (Cain, Bizzozero and Harriman 1998, p. 26). These figures have been normalized to take into account changes in levels of production.

According to a study of 1990 to 1995 TURA data, 60 percent of facilities decreased their use of toxic chemicals and 55 percent decreased their byproduct generation per unit of production (Becker and Geiser 1997, pp. iii-iv). During the same time period, a total of 67 percent of 351 TURA filers claimed that their P2 activities resulted in direct cost savings from improved material use, decreased waste generation, and decreased operating costs (Becker and Geiser 1997, p. 26). The study also estimated net savings for industry by comparing the monetized costs of implementing the TURA program with savings in operating costs attributed to TUR for the years 1990 through 1997. The study identified total program costs of \$76.7 million and total savings of \$88.2 million for a net savings of \$11.5 million (Becker and Geiser 1997, p. vi). As shown in Table 5-3, the study examined compliance costs, capital investments, and operating savings associated with TUR activities.

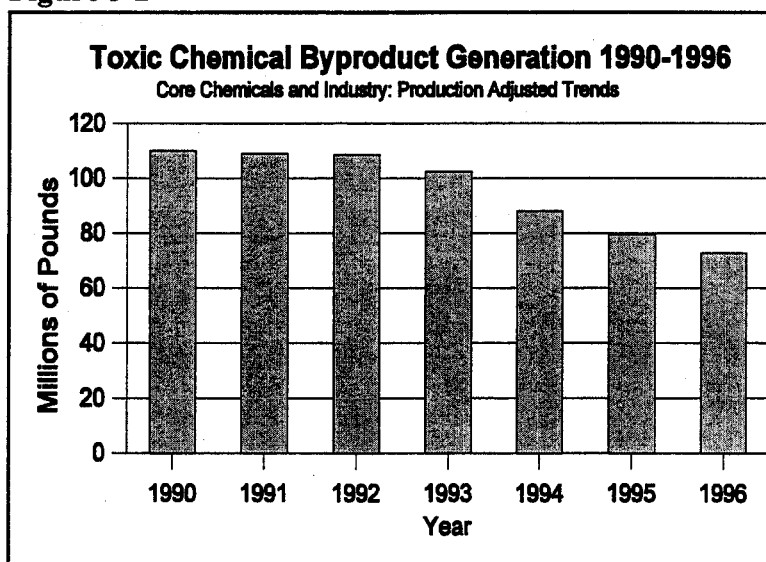
Reducing waste generation and toxic chemical use can provide a number of important benefits to companies and communities that are difficult to isolate and

**Figure 5-1**



Source: Cain, Bizzozero and Harriman 1998, p. 26.

**Figure 5-2**



Source: Cain, Bizzozero and Harriman 1998, p. 26.

measure. Nonetheless, companies involved in the TURA analysis acknowledge the value and importance of these less tangible benefits, including:

- reduced regulatory compliance requirements,
- improved worker health and safety,
- reduced long term environmental liability,
- improved managerial performance (i.e., materials accounting),
- enhanced green marketing opportunities,
- improved environmental image, and
- improved community relations.

**Table 5-3. Monetized Costs and Benefits of TURA (1990 through 1996)**

Costs in Millions*			Benefits In Millions	
<b>Compliance Costs</b>			<b>Savings in Operating Costs</b> (i.e., net operating cost changes)	<b>\$88.2</b>
- Form S** preparation	\$9.9			
- TUR plan preparation	10.1			
- Form S filing fees	29.1			
- Other TURA fees	0.3			
Subtotal		\$49.4		
<b>Capital investments</b>	\$27.1	\$27.1		
<b>Total monetized TURA costs</b>		<b>\$76.6</b>	<b>Total monetized TURA benefits</b>	<b>\$88.2</b>

Source: Becker and Geiser 1997, p. 40.

\* 1995 dollars

\*\* Form S is the TUR data filing form.

Companies involved in TUR planning reported experiencing a number of qualitative improvements as a result of their 1994 toxics use reduction plans (Becker and Geiser 1997, p. 26). Table 5-4 shows that more than 50 percent of the respondents reported seeing improvements in health and safety, and approximately 45 percent reported experiencing reduced compliance burdens.

## New York

New York state's analysis of hazardous waste reduction plans found significant hazardous waste reduction progress in the state. The New York Hazardous Waste Reduction and RCRA Conformity Act was signed into law in July 1990. This law requires that subject facilities prepare and implement Hazardous Waste Reduction Plans (HWRPs); that each hazardous waste generator transporting hazardous waste certify on each manifest to the Department that it has a program in place to reduce the volume and toxicity of its waste streams; and that each operator of a permitted hazardous waste treatment, storage, or disposal (TSD) facility has a program in place to reduce the volume and toxicity of its hazardous waste" (NYS DEC 1996, p. L-1).

In 1996, 480 facilities submitted HWRPs to the Department. NYS DEC has also received 666 Annual Status Reports and 430 Biennial Updates for review and acceptance. After evaluating the data received in the 1996 Annual Status Reports and comparing current waste generation rates to

**Table 5-4. Qualitative P2 Benefits Experienced by Massachusetts Firms**

Qualitative Benefits	Percent of Respondents That "Actually Saw" Benefit
Improved worker health and safety	66
Reduced regulatory compliance requirements	45
Improved environmental image	38
Marketing advantage	27

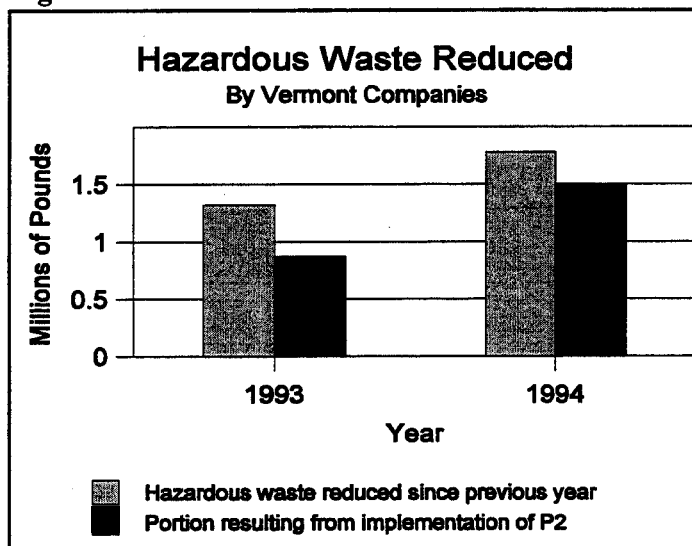
Source: Becker and Geiser 1997, p. 26.

the initial rates reported in the 1991 HWRPs, NYS DEC estimated a 17.7 percent decrease in the amount of hazardous waste generated as a result of reduction activities implemented between 1990 and 1995 (NY DEC 1996, p. L-1). For 1995, NYS DEC calculated that New York generators reduced their generation of hazardous waste by approximately 13,000,000 tons as a result of Hazardous Waste Reduction Planning requirements (NYS DEC 1996, p. L-1).<sup>5</sup>

## Vermont

Vermont's P2 Planning law initially required 600 large and small quantity hazardous waste generators to submit pollution prevention plans that focused on hazardous waste reduction. The plans included an identification of all hazardous wastes and toxic chemicals, an evaluation of P2 methods, and an implementation schedule for all technically and economically feasible pollution prevention opportunities. By 1995, 90 percent of the large quantity generators and 80 percent of the small quantity generators complied with plan development and reporting

**Figure 5-3**

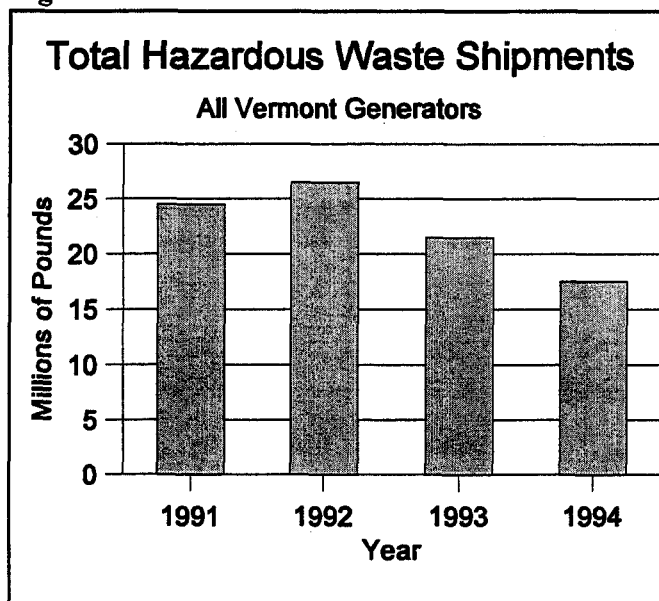


Source: VT DEC 1996, Figure 2.

<sup>5</sup> The NYS DEC estimated these reduction by analyzing the quantity of aqueous and non-aqueous hazardous waste that firms would have generated in 1995 if they had continued with the same rate as in 1991.

A study of hazardous waste reduction progress in Vermont indicates how pollution prevention plans have lead to reduced waste generation. In 1993 and 1994 reporting facilities reduced their generation of hazardous waste by more than 3 million pounds, representing a 20 percent decrease in hazardous waste generation over a 2 year period (VT DEC 1996, p. 4). Figure 5-3 shows that pollution prevention efforts accounted for more than 75 percent of the reductions in hazardous waste generation at reporting facilities. A downward trend in hazardous waste generation is also reflected by statewide hazardous waste shipment data. As shown in Figure 5-4, after a peak in 1991 and 1992, hazardous waste shipments have decreased by approximately 25 to 30 percent or by 5.8 to 7 million pounds (VT DEC 1996, p. 4).

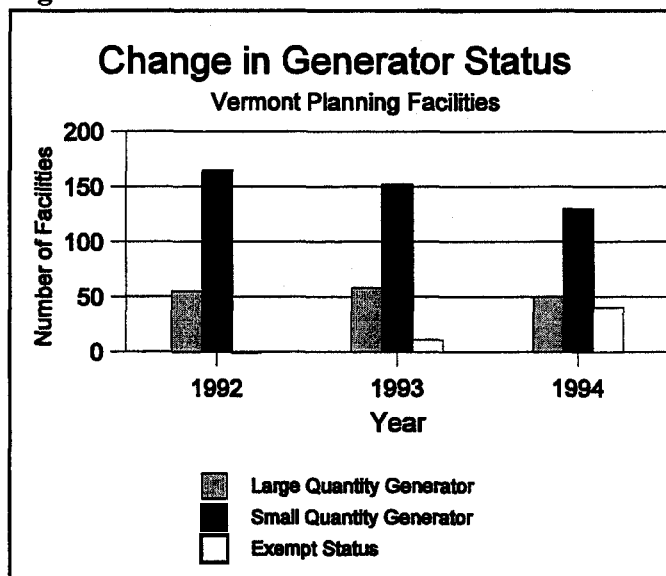
Figure 5-4



Source: VT DEC 1996, Figure 3.

Source reduction can place companies below permitting thresholds, which is an effective way to reduce and avoid reporting requirements and other regulatory burdens. Vermont analyzed data from the state planning law to track trends in large, small, and exempt generator status. Figure 5-5 presents the results. There was a reduction in the number of large quantity generators and an increase in the number of exempt companies between 1992 and 1994. Initially there were more than 220 facilities subject to planning requirements. As facilities planned for and reduced hazardous waste generation, a total of 40 companies (18 percent) moved below planning thresholds and became exempt from planning requirements by 1994 (VT DEC 1996, p. 3).

Figure 5-5



Source: VT DEC 1996, Figure 1.

## Summary

Analyses of four facility planning programs in the Northeast show that these programs have substantially improved the environmental performance at many companies throughout the region. These programs have identified many cost-effective methods of reducing the use of toxic chemicals and the generation of byproducts at companies. With incentives for planning,

companies can find these methods and implement them, thereby improving the region's environment and its economic vitality.

According to a Maine DEP study, companies required to develop pollution prevention plans achieved a 26 percent, or 2.9 million pound reduction in the generation of hazardous waste. These firms also reduced their use of extremely hazardous substances by 60 million pounds, or 9 percent.

In Massachusetts companies significantly reduced byproduct generation and toxic chemical use. Between 1990 and 1995 byproduct generation declined by 30 percent and toxic chemical use dropped by 20 percent. Furthermore, 55 percent of facilities decreased their byproduct generation and 60 percent decreased their use of toxic chemicals per unit of production. A recent study estimated total program costs for participating firms of \$76.7 million and total savings of \$88.2 million for a net savings of \$11.5 million.

New York State DEC estimated that there was a 17.7 percent decrease hazardous waste generation as a result of reduction activities at firms required to complete a hazardous waste reduction plan. For 1995, the Agency estimated that these companies reduced their generation of hazardous waste by approximately 13,000,000 tons assuming a 1991 rate of manufacturing production.

A study of hazardous waste reduction progress in Vermont found that in 1993 and 1994, reporting facilities reduced their generation of hazardous waste by more than 3 million pounds, representing a 20 percent decrease in hazardous waste generation over a 2-year period. Pollution prevention efforts accounted for more than 75 percent of the reduction in hazardous waste at the reporting facilities. Overall, hazardous waste shipments have decreased in Vermont by approximately 25 to 30 percent, or 5.8 to 7 million pounds.

## **Chapter 6: Voluntary and Innovative Programs**

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State and local P2 programs conduct and support a number of P2 activities that cannot be categorized as technical assistance, regulatory integration, or facility planning. These activities include Clean State projects, P2 partnerships, and Governors' Awards. Clean State Initiatives make state-owned and operated facilities more environmentally responsible through environmental assessments and technical assistance, which help these facilities to comply with and surpass regulatory standards. P2 partnerships promote P2 assistance, education and outreach efforts by establishing collaborative projects between P2 programs, industry, trade associations, educational institutions, nonprofit organizations, and various government agencies. P2 Governors' Awards honor the companies, organizations, and individuals that use innovative approaches to reduce or eliminate the generation of pollution and waste at the source. These three P2 activities exemplify the creative ability of P2 programs to maximize limited resources, improve environmental performance, and promote P2 to a wide audience.

### **Clean State Initiatives**

State and local governments own and manage a large number of properties and facilities that generate hazardous waste, wastewater, and air pollution. These properties include office buildings, residential housing, hospitals, prisons, educational institutions, public parks, roads, highways, and maintenance and service facilities. To improve the environmental performance of state and local governments, governors and state legislatures have instituted a number of laws and programs, generally referred to as "Clean State Initiatives." While the names and structure of these initiatives vary from state to state, the goals of these state-based efforts are essentially the same:

- to help state agencies meet and exceed environmental compliance standards,
- to reap the environmental and economic benefits offered by source reduction, and
- to provide environmental leadership for the public and private sectors.

Environmental audits of state facilities have highlighted the need for improved environmental performance. For example, New York State's annual Environmental Audit Report indicated that 1,131 instances of non-compliance occurred at 17 of its 49 state agencies and public benefit corporations (NYS DEC 1996, p. J-1). The report estimated the cost of remediating the identified violations at \$179,714,541. Using this information, New York State DEC took immediate steps to improve compliance and reduce environmental problems.

Similarly, Massachusetts' DEP conducted inspections of state and local facilities from 1995 to 1996. DEP found that more than half of these inspections resulted in notices of violation (MA DEP 1997, pp. 1-21 and 2-14). As a result of these inspections, MA DEP and MA OTA have increased their efforts to improve compliance at these facilities through P2.

The environmental performance of many state facilities, as described above, has compelled several governors in the Northeast to institute a variety of Clean State Initiatives. For example,

New York State passed the State Agency Environmental Audit Law requiring state agencies and authorities to report on their environmental compliance activities. Massachusetts Executive Order 350 created a Clean State program that established agency-wide policies and environmental teams to improve the environmental performance of state operations.

Although Clean State Initiatives have a variety of environmental objectives, source reduction is promoted as the primary method of achieving environmental compliance, cost savings, and worker health and safety improvements. Consequently, P2 programs are relied upon to provide regulatory and technical guidance to state and local agencies, departments, and authorities. For example, the NYS DEC Pollution Prevention Unit is responsible for conducting annual audits of state facilities. The Massachusetts Office of Technical Assistance supports the Clean State Initiative by assessing procurement practices, identifying and finding ways to overcome institutional barriers, advising on safe ways of managing stored hazardous materials, and identifying pollution prevention opportunities (TURI 1994, p. 4). MA OTA has also organized P2 workshops for colleges and universities, state-run hospitals, and the agencies that manage landscaping and swimming pools.

The P2 Survey found that 11 P2 programs contributed resources and expertise to the implementation of Clean State Initiatives. The P2 programs helped state and local governments achieve and surpass environmental standards by conducting facility inspections, environmental audits, and P2 workshops. P2 programs provided logistical and technical support to help agencies implement environmentally beneficial projects that included source reduction, recycling, and energy efficiency. In general, P2 program support for Clean State Initiatives falls into three categories: education and outreach, regulatory and policy assistance, and technical assistance. The following provides some examples of P2 program assistance in these three areas.

### **Education and Outreach**

- Invited local government officials (mostly town garages) to participate in seminars focused on automotive repair and maintenance
- Conducted workshops to help small businesses and local government to identify environmental compliance problems, environmental requirements, P2 opportunities, and to obtain technical and environmental regulatory assistance

### **Regulatory and Policy Assistance**

- Assisted with the development of Clean State and P2 policies
- Developed a model sewer use ordinance that included a strong P2 and education component
- Created a model municipal P2 program
- Developed materials purchasing plans to “green” government purchasing

### **Technical Assistance**

- Assisted various state facilities to develop “clean facility plans”
- Conducted site visits to state agencies
- Promoted on-site composting, ride-sharing, and toner and ink jet cartridge recycling programs

- Conducted “courtesy” inspections to assist the Departments of Transportation with their environmental compliance.

P2 programs also supported Clean State Initiatives by conducting environmental audits and monitoring environmental progress. New York and Massachusetts have analyzed some of the results of these efforts.

As stated above, New York State DEC’s Pollution Prevention Unit prepares an annual report of ranked compliance data from all agencies. The Unit also tracks progress of state agencies in addressing all violations reported, including those remedied by using pollution prevention methods. Their annual reports show that the Clean State Initiative has reduced the number of noncompliance violations by 68 percent from 1992 to 1996 (NYS DEC 1996, p. J-1). These environmental audits have provided New York with an effective way to track environmental performance and encourage the implementation of P2 projects at state facilities.

Guided by a strong prevention ethic, Clean State Initiatives have helped state and local governments to improve their environmental performance by identifying environmental costs and liabilities and implementing P2 projects. Clean State Initiatives provide an example of environmental leadership by the public sector.

## **Partnership Activities**

P2 programs frequently establish collaborative projects with industry, trade associations, educational institutions, nonprofit organizations, and various government agencies. These collaborations help P2 programs leverage resources and establish crucial relationships to promote P2 assistance, policy/regulatory development, research, outreach, and education.

Analysis of the P2 Survey results showed that 14 programs have participated in partnership activities. The following sections provide some examples of these public/private collaborative efforts.

### **Partnerships with Businesses and Trade Associations**

By collaborating with businesses and trade associations, P2 programs have tapped into a wealth of technical expertise and gained access to targeted audiences that otherwise would be difficult to reach. Co-sponsorship of conferences and workshops, which is the most popular means of collaboration, has enabled P2 programs to tailor their educational programs to specific industrial sectors. For example, New Hampshire DES has worked with an automotive dealers association to develop a P2 and compliance manual for auto repair, distribute an automotive P2 poster and video/slide show, and conduct a series of five workshops targeted for small automotive shops and dealerships.

These public/private collaborations have led to changes in state policies and the development of P2 research and information projects. For example, MA DEP and MA OTA have collaborated with a printing trade association to develop a program of straightforward regulations that incorporate P2. The Massachusetts Toxics Use Reduction Institute established a research laboratory that evaluates alternatives to chlorinated solvents as a result of discussions and



meetings with companies in the state. MA TURI has also collaborated with a business organization to create an industry-oriented P2 web site that provides up-to-date information about local P2 activities as well as links to on-line P2 resources.

By collaborating with P2 programs, business organizations have helped their members comply with environmental requirements, minimize environmental liabilities, increase efficiency and reduce waste management and disposal costs.

### **Partnerships with Educational Institutions**

By teaming up with educational institutions, P2 programs have created valuable educational opportunities for students and improved technical assistance for businesses. At least three state and local P2 programs have worked with universities to establish innovative P2 internships that place engineering students with sponsoring companies. To support these efforts, some P2 programs have acted as an intern referral service while other programs payed a portion of the intern's stipend. This win-win collaboration saved sponsoring companies thousands of dollars in technical research costs, and gave students hands-on experience helping companies to assess P2 opportunities. For example, New Hampshire DES and the University of New Hampshire Pollution Prevention Partnership established a statewide internship program. This program placed almost 40 students at 26 facilities, saving participating companies more than \$1 million between 1993 and 1996. P2 programs have also collaborated with vocational schools to develop P2 curriculums and to promote environmental education.

#### **Sample of Business Associations Involved in P2 Partnerships in the Northeast**

- American Chemical Society
- American Electroplaters and Surface Finishers Society
- Auto dealers associations
- Chemical Industry Council
- Environmental Business Council
- Korean Dry Cleaners Associations
- Metal products associations
- Metal finishing associations
- Neighborhood Dry Cleaners Associations
- Pesticide applicators associations
- Printing industry associations
- State business groups, councils and chambers of commerce

### **Partnerships with SBDCs and EDCs**

State and local P2 programs have formed partnerships with Small Business Development Centers (SBDCs) and Economic Development Corporations (EDCs). These partnerships have resulted in the development of P2 workshops and technical assistance for local businesses. For example, Vermont DEC has worked with the state's SBDCs to manage a small business technical assistance program staffed by retired engineers.

### **Partnerships Within Government**

State and local governments have established collaborative efforts among environmental agencies and between environmental and other state agencies. Technical assistance programs and regulatory programs frequently conduct joint workshops for regulators and the regulated community. Other partnership efforts have focused on the development of P2-oriented

regulatory policies, enforcement strategies, and compliance programs. Similarly, local and state P2 programs have established joint projects to support P2 training, outreach and technical assistance.

P2 programs collaborate with other public agencies, including municipalities and state transportation, economic development, and public works agencies. For example, Maine's P2 program organized the Androscoggin River P2 Project, a partnership of 12 municipalities formed to protect one of the state's major watersheds.

## **Partnerships Among States**

The state and local P2 programs in the Northeast have collaborated on a regional basis since 1989 through the Northeast Pollution Prevention Roundtable. This is a program of the Northeast Waste Management Officials' Association, a nonprofit interstate governmental association whose membership is composed of state environmental agency directors of the pollution prevention, hazardous waste, solid waste, and waste site cleanup programs. The mission of the NE P2 Roundtable is to enhance the capabilities of the state and local environmental officials in the Northeast to implement effective source reduction programs. The NE P2 Roundtable's program has involved four components:

- managing the regional roundtable activities, including holding meetings and publishing a newsletter three or four times per year;
- managing a resource center of information on pollution prevention, including technical data, reports, case studies, a list of upcoming meetings and conferences, and a list of P2 experts;
- conducting training sessions for state and local officials on source reduction policies, strategies, and technologies;
- researching source reduction strategies and techniques and publishing reports; and
- facilitating interstate collaboration on the development of policies and programs.

The NE P2 Roundtable newsletter, *Northeast States P2 News*, has been sent to more than 1,500 state and local environmental agencies, businesses, consultants, and others throughout the region and country.

The NE P2 Roundtable has also established active workgroups that facilitate collaboration on P2 information dissemination, training, or policy development for specific industry sectors or policy issues. Between 1990 and 1996 NEWMOA managed workgroups of state and local P2 program representatives that targeted numerous issues, including outreach and assistance for auto repair shops, assistance to the printing industry, industry compliance with air quality regulations through P2, P2 training programs, and strategies for reducing mercury deposition in the region.

## **Governor's Awards**

P2 Governor's Award programs were developed to showcase successful P2 projects and efforts conducted by individuals, industry, and institutions from the private and public sectors. In addition to publicizing the benefits of P2, award programs provide some incentives for improved environmental performance at companies.

P2 award applicants must demonstrate that they have successfully implemented innovative approaches that reduce or eliminate the generation of pollution and wastes at the source. These approaches include the use of new technologies, the substitution of nontoxic materials for toxic materials, changes in production processes or procedures, and educational or promotional programs that result in pollution prevention.

Award recipients are usually determined by a panel of representatives from industry, environmental organizations, academia, and government. Prior to this panel review, P2 program staff and management often evaluate projects to ensure their merit, based on their technological and environmental significance, cost savings, health and safety benefits, and transferability. The environmental agencies also check applicants' compliance status and history prior to recommending them for a P2 Governor's Award. An applicant's commitment, leadership, and environmental record are important factors in determining whether they will receive an award.

### **Xerox's P2 Governor's Award**

Xerox received a New York P2 Governor's Award for adapting a carbon dioxide cleaning technology (traditionally used to clean jet engines) to remove grease, dirt, and oil from used equipment. This technology sprays carbon dioxide onto equipment in a pelletized form that penetrates the dirt layer, lifting it away from the substrate. By using this equipment cleaning process, approximately 120,000 pounds of 1,1,1-trichloroethane have been eliminated and citrus-based cleaner usage has been reduced by 40 percent or 71,830 pounds per year. The annual costs savings are estimated at \$500,000.

*Source: NYS Governor Awards, 1994.*

In response to the P2 survey, 8 P2 programs from 7 states reported that they received 454 applications for their Governor's Award programs and presented awards to 143 companies, organizations and individuals. Four of these programs (ME DEP, MA TURI, NYS DEC, and VT DEC) provided detailed information about the environmental and economic achievements of 55 Governor's Awards recipients. Between 1993 and 1996, the award recipients reported reductions of more than 50 million pounds of hazardous waste and emissions and 1.3 million gallons of wastewater while achieving annual savings of more than \$31 million attained through pollution prevention efforts. Table 6-1 provides more details on these reductions and savings.

In addition to providing source reduction results for their Governor Award recipients, MA TURI also tabulated waste reduction and cost savings information for all Governor Award entrants for 1994 and 1995. As shown in Table 6-2, this group of 45 companies achieved reductions in chemical use, hazardous waste and wastewater. They also saved more than \$11 million by reducing chemical purchases, water use and regulatory burdens.

While these cost saving and waste reduction figures are substantial, they represent only a portion of the P2 benefits reaped by award candidates in the Northeast region. Incomplete information and inconsistencies between award publications prevent a full accounting of the benefits award applicants and recipients have realized. For example, many award recipients described their reductions and savings in percentages rather than in dollars, pounds and/or gallons.

**Table 6-1. Select Governor's Awards Results from P2 Survey (1993 to 1996)**

<b>Reported Reductions and Savings</b>	<b>Total Reductions</b>	<b>Number of Companies Reporting</b>	<b>Average Reductions/Savings Per Recipient</b>
Hazardous Waste Reductions (lbs.)	21,695,326	28	774,833 lbs.
Emission Reductions (lbs.)	29,213,016	17	1,718,413 lbs.
Wastewater Reductions (gals.)	1,371,490	4	342,873 gals.
Annual Cost Savings	\$31,534,938	38	\$829,866

Source: P2 Survey.

**Table 6-2. Results from 45 Entrants for a Massachusetts Governor's Award (1995 and 1996)**

<b>Categories</b>	<b>Total Reductions and Savings</b>	<b>Number of Entrees Reporting</b>	<b>Average Reduction/Saving Per Entree</b>
Reduction in toxic chemical use (lbs.)	8,026,332 lbs.	45	178,363 lbs.
Reductions in hazardous waste generation (lbs.)	7,187,875 lbs.	45	159,731 lbs.
Reduction in water use (gals.)	433,327,915	45	9,629,509 gals.
Savings from reduced chemical purchases	\$6,367,704	45	\$141,505
Savings from reduced compliance fees and waste management costs	\$2,580,520	45	\$57,345
Savings from reduced water use	\$2,053,456	29	\$70,809

Source: Massachusetts Administrative Council on Toxic Use Reduction, Fiscal Year Annual Reports for 1995 and 1996.

Although many Governor's Award recipients participate in P2 program activities, there is currently no way to determine if reductions at these firms are directly associated with state or local P2 program activities. Consequently, applicants and recipients for Governor's Award may overlap other data presented in this report.

## **Summary**

Clean State initiatives, P2 partnership activities, and Governor's Award programs exemplify how P2 programs have implemented innovative projects to maximize resources and promote P2. By introducing P2 to new audiences, these innovative and voluntary activities have helped to establish source reduction as a preferred environmental strategy.

Clean State Initiatives have improved government's environmental performance through increased awareness and active source reduction efforts. Eleven P2 programs contributed resources and expertise to implementing Clean State Initiatives. The P2 programs helped state and local governments achieve and surpass environmental standards by conducting facility inspections, environmental audits, and P2 trainings. P2 programs also provided logistical and technical support to help agencies implement environmentally beneficial projects that included source reduction, recycling, and energy efficiency.

Partnerships between P2 programs and trade associations, business groups, universities, nonprofit groups, and other government entities have improved environmental awareness and promoted prevention strategies in the Northeast. Fourteen P2 programs have participated in numerous partnership activities. These partnerships have helped P2 programs leverage resources and build connections needed to reach their intended audience and improve their services and activities.

Governor's Award programs highlight successful P2 projects for others to emulate. In response to the P2 Survey, 8 P2 programs states reported that they received 454 applications for their Governor's Award programs and presented awards to 143 companies, organizations, and individuals. Four of these programs reported that between 1993 and 1996, the award recipients reported reductions of more than 50 million pounds of hazardous waste and emissions and 1.3 million gallons of wastewater while achieving annual cost savings of over \$31 million. In Massachusetts alone 45 Governor's Award candidates achieved reductions in chemical use, hazardous waste, and wastewater while saving more than \$11 million.

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# **Appendix A**

## **Overview of State and Local Programs**

# **Description of P2 Survey Participants**

## **Connecticut Technical Assistance Program (ConnTAP)**

ConnTAP was established in 1988 by the Connecticut legislature as a quasi-public, nonregulatory organization. Associated with the hazardous waste program of the Connecticut Hazardous Waste Management Service, ConnTAP provided technical assistance to state businesses. ConnTAP also sponsored conferences with the CT Department of Environmental Protection (DEP) and provided pollution prevention training to DEP staff, however, ConnTAP worked independently from the state regulatory program. ConnTAP's staff of nine consisted of a program manager, a technical specialist, a site visit program administrator, a communications specialists and five site visit representatives. Failing to secure funding, ConnTAP was discontinued in 1997.

## **Connecticut Department of Environmental Protection (CT DEP), Office of Pollution Prevention**

The Connecticut DEP Office of Pollution Prevention was established in 1993 through a Pollution Prevention Incentives for States (PPIS) grant from the Environmental Protection Agency (EPA) to the Department's Bureau of Waste Management. The Office coordinates the development of inter-agency technical assistance projects to targeted facilities. The Office also coordinates a multimedia internal response to pollution prevention opportunities with P2 contacts located in the agency's environmental quality bureaus. Presently, the Office consists of six staffpeople and one supervisor.

Although there is no current statutory authorization for a nonregulatory program within the CT DEP, pollution prevention staff investigate opportunities and barriers to institutionalizing pollution prevention approaches within the regulatory framework of the Department's activities. On occasion, the Office conducts nonregulatory technical assistance outreach for specific projects. In the future, CT DEP's pollution prevention office will coordinate technical assistance outreach with ConnSTEP, the state's manufacturing extension agency.

The OPP relies on input from an intra-agency P2 Workgroup, representing all bureaus within the Department. The OPP is guided by the CT Pollution Prevention Plan, which was developed by the P2 Workgroup, an Advisory Committee and staff and published in 1996. The DEP Policy Committee on P2, which includes the chiefs of all DEP Bureaus, provides on-going guidance to the Office's P2 programs and activities.

## **Maine Department of Environmental Protection (ME DEP), Pollution Prevention Program**

Established in 1991, the Maine P2 Program is located in the Office of the Commissioner at the Maine DEP. The P2 Program relies on two groups for guidance and development; 1) an internal P2 Task Force made up of members from all media programs and 2) an external P2 Advisory Committee, whose membership includes representatives from industry, environmental organizations, health and labor groups, and the public. Both groups play important roles in resolving program issues and providing guidance on future activities.

Presently, there are five core staff; two are directly assigned to the Program from the Air and Reduction programs respectively, and a third is granted funding through the EPA PPIS. DEP's

Water, Air, and RCRA Programs have also assigned a significant portion of their technical staff to P2 efforts through grant-flex. These staff are assigned on a temporary basis for the life of a particular project.

The Program is situated within the same agency as the media regulatory programs. This proximity allows for greater interaction between the media programs and P2 staff, which facilitates a timely response to business and program needs. Although the P2 Program bears regulatory responsibilities, Maine's Reduction Law allows for some enforcement discretion by staff when working on a technical assistance project.

### **Massachusetts Department of Environmental Protection (MA DEP)**

Since 1989 MA DEP has been charged with a number of responsibilities under the Massachusetts' Toxics Use Reduction Act. These include:

- developing and maintaining specific toxics use reduction planning and reporting regulation,
- managing the planning and reporting data,
- collecting and distributing fees from the regulated community,
- establishing and managing a program for certification of toxics use reduction planners,
- establishing a bias towards TUR as a preferred means of protecting the environment,
- incorporating a multimedia focus into its regulatory programs, and
- working with other TURA agencies to implement and improve the TUR program.

In addition to managing a portion of the TUR program, MA DEP, specifically the Bureau of Waste Prevention, conducts a number of multimedia regulatory, planning, and outreach activities. The Bureau's staff of more than 30 works in one of three divisions, including the Planning and Evaluation Division, Business Compliance Division, and the Consumer and Transportation Division.

### **Massachusetts Toxics Use Reduction Institute (TURI)**

The Institute was established by the Toxic Use Reduction Act of 1989, and works in conjunction with the MA Department of Environmental Protection and the MA Office of Technical Assistance. TURI is a multidisciplinary research, education, and technical support center located at the University of Massachusetts Lowell. The Institute was created to promote reductions in the use of toxic chemicals or the generation of toxic by-products in industry and commerce in the state of Massachusetts.

The Institute has 16 full-time and 5 half-time staff. The half-time staff are graduate student interns. The organization is structured around four functional clusters: training, research, technical support, and administration. TURI is a nonregulatory organization.

### **Massachusetts Executive Office of Environmental Affairs, Office of Technical Assistance (MA OTA)**

The Office of Technical Assistance (OTA) was created by the 1989 Toxics Use Reduction Act (TURA) to work cooperatively with industry in order to meet the official statewide goal of a 50 percent reduction in toxic wastes by 1997, and to make continued progress thereafter.

OTA and its 30 member staff are administered by a Director who reports to an Assistant Secretary in the Executive Office of Environmental Affairs (EOEA). Two assistant directors are responsible for outreach policy and technical services. The professional staff includes: six technical assistance teams, five of which are assigned to a region of the state and one that is tasked with special projects. Each team includes three members with extensive chemical and/or engineering experience in industry, and an intern. OTA staff also includes a health and safety expert, a financial analyst, three special project coordinators, a computer and information management specialist, and an information coordinator.

OTA operates with a legislative guarantee of confidentiality in its client relationships. DEP and other environmental inspectors and enforcement personnel regularly offer referrals to OTA, sometimes as part of a notification of noncompliance.

### **New Hampshire Department of Environmental Services (NH DES), Small Business Technical Assistance Program (NHSBTAP)**

The mission of the NHSBTAP is to encourage small businesses to operate in a manner that is environmentally compliant yet economically effective. The assistance provided includes regulatory issue identification and compliance techniques as well as practical advice on pollution avoidance and control. The SBTAP consists of three main functions:

- Technical Program

The technical program provides direct compliance and pollution prevention assistance through brochures, documents, hotlines and on-site visitations.

- Ombudsman

The function of the Ombudsman is to act as an advocate for small businesses on issues concerning environmental laws, rules or regulations that could adversely affect business operations.

- Compliance Advisory Panel

The Compliance Advisory Panel reviews the activities and materials prepared for small businesses to ensure the assistance is timely, accurate and appropriate.

The NHSBTAP is administratively attached to the New Hampshire Department of Environmental Services Air Resources Division, with the Ombudsman reporting to the DES Commissioner and the Program Manager reporting to the Air Resources Director.

The Primary funding for the Program operations is obtained through air emissions fees. Some funding has also been obtained through competitive grant programs on a project specific basis. The Program is managed and staffed by the Small Business Ombudsman.

### **New Hampshire Department of Environmental Services (NH DES), Pollution Prevention Program**

Established in 1991, the New Hampshire Pollution Prevention Program, or NHPPP, provides pollution prevention and compliance assistance to small to medium-sized businesses. Although the NHPPP is physically located within the confines of the NH DES' Waste Management Division, its services are nonregulatory and confidential from the regulatory programs. The

NHPPP's has a high level of support from the Office of the Commissioner and excellent working relationships, which provides an unique opportunity to integrate P2 into the daily operations of the regulatory programs and elsewhere. The NHPPP has unencumbered access to the media programs' regulatory files, which allows for the program to target assistance to businesses with regulatory issues, and allows the NHPPP to interact with the regulatory process when desired.

Program personnel are state employees responsible to the Waste Management Division as well as the Office of the Commissioner (P2 Coordinator). From 1991 to 1994 the NHPPP relied primarily on federal funds through the Hazardous Waste Capacity Assurance Planning process and the PPIS competitive grant program. From 1994 to July 1996 the NHPPP relied fully upon the PPIS grant program for its funding with the exception of the P2 Coordinator, who was funded through a combination of PPIS funds and other EPA grant funds. In July 1996 the Pollution Prevention Bill was passed in NH, formally recognizing the NHPPP and establishing the NH DES' first state-funded Pollution Prevention Coordinator position. The Pollution Prevention Bill also provided a new state funding source through the NH Hazardous Waste Cleanup Fund, effectively lessening the NHPPP's reliance of the PPIS grant program. Seventy percent of the P2 Program funding comes from state funds, with 30 percent from PPIS grants. Currently, the NHPPP has one full-time manager and two part-time staff. The Pollution Prevention Coordinator is an additional full time staff member in the Office of the Commissioner.

#### **New Jersey Technical Assistance Program for Industrial Pollution Prevention (NJTAP)**

NJTAP is an environmental pollution prevention extension service located at the New Jersey Institute of Technology. NJTAP delivers technical assistance to New Jersey firms, landfills, publicly owned treatment works, and economic development authorities. Its mission is to: a) provide outreach in the form of pollution prevention opportunity assessments, b) act as an information clearinghouse for P2 and associated subjects, and c) offer P2 education and training.

NJTAP receives baseline funding through a contractual agreement with the New Jersey Department of Environmental Protection, authorized by a provision contained in the New Jersey Pollution Prevention Act (1991).

NJTAP staff consists of a director, seven full-time staff (including chemical, environmental and industrial engineers and computer scientists), and five retired engineers. The full-time staff is supported by a host of part-time undergraduate and graduate level student assistants.

#### **Empire State Development (ESD), Division for Small Business Environmental Ombudsman Unit**

Created in 1992 in response to the Clean Air Act's federal mandate (Section 507), the Small Business Ombudsman Unit provides companies with environmental compliance assistance. The Unit is a nonregulatory program, housed within New York's Empire State Development program, which offers business clients complete confidentiality. The Unit receives its funding from the state, and employs a staff of five full-time employees with backgrounds in law, engineering and finance. Although the Unit does promote source reduction as an option for achieving environmental compliance, all requests for technical support are referred to the state's Small Business Assistance Program.

### **New York State Department of Environmental Conservation (NYS DEC), Pollution Prevention Unit**

The Pollution Prevention Unit was established in 1992 to carry out multimedia pollution prevention (M2P2) planning, coordination, information management, and technical assistance within the New York State Department of Environmental Conservation (DEC). The Unit also carries out a broad technical assistance program that focuses its efforts on helping small business learn about and implement P2.

The Pollution Prevention Unit consists of two sections, which are staffed by eight engineers, two research scientists, three environmental program specialists, two environmental analysts, one environmental technician, and one administrative assistant. The unit is supported by a mix of federal and state grant funds. An M2P2 coordinator is also assigned in each of the nine regional offices to assist with on-site pollution prevention program activities. In addition to the core funding, the Unit has applied for and received a number of federal grants that have supported a variety of pollution prevention projects.

### **Suffolk County Water Authority's (SCWA) Pollution Prevention Program**

The SCWA was created by the Suffolk County Board of Supervisors in 1937 and operates by virtue of the Public Authorities Law. The Authority is a nonprofit, public benefit corporation, a state agency with a local focus. The SCWA is the largest purveyor of groundwater in the United States, providing drinking water to a population of 1.2 million. The Authority currently operates 401 wells and maintains 4,405 miles of water mains.

The Suffolk County Water Authority's Pollution Prevention Program is a nonregulatory public outreach program. The Program's objectives are to provide technical assistance to local business and industry in the areas of pollution prevention, waste reduction, waste management, recycling and water conservation. In addition, the Program incorporates a multimedia focus into its outreach efforts.

### **The Rhode Island Department of Environmental Management (RI DEM), Office of Technical and Customer Assistance**

The Rhode Island Department of Environmental Management's Office of Technical and Customer Assistance (formerly called the Pollution Prevention Program) was established in 1987 to assist in DEM's efforts to reduce the use and disposal of toxic and hazardous materials. DEM's Office maintains a cross-media perspective and is devoted to providing nonregulatory technical assistance and education to Rhode Island industry. The Pollution Prevention Section of DEM's Office of Technical and Customer Assistance is staffed by eight people, exclusive of clerical and undergraduate engineers.

### **Narragansett Bay Commission (NBC), Pollution Prevention Technical Assistance Program (PPTAP)**

The Narragansett Bay Water Quality Management District Commission owns and operates the State of Rhode Island's two largest municipal wastewater treatment plants. In order to assist industrial users in meeting pollutant discharge standards, the NBC initiated a Pollution Prevention Technical Assistance Program in September 1991. The NBC encourages P2 through its nonregulatory technical assistance program and its regulatory pre-treatment program. By incorporating pollution prevention into the regulatory pre-treatment program and offering a



nonregulatory technical assistance program, NBC hopes to gain positive returns in the form of increased compliance with discharge standards and improved relationships with the industrial community.

The NBC's Pollution Prevention Program is a section within NBC's Division of Policy, Planning, and Regulations. The P2 Program staff consists of a professionally licensed chemical engineer and a chemist.

#### **Vermont Small Business Development Center (SBDC)**

The SBDC is a nonprofit partnership of government, education, and business, which was organized to help small business succeed. Housed at each of the twelve of Regional Development Corporations throughout the state, full and part-time SBDC business counselors provide free information, individual counseling, and other assistance on a wide range of business subjects to start-up ventures and existing business clients. These subjects include business planning, capital formation, financial management, taxes, accounting, record keeping, and marketing. The SBDC offers a broad range of affordable business related seminars and workshops throughout the state. The SBDC also provides a nonregulatory onsite technical assistance to small- and medium-sized companies.

The SBDC is partially funded by the U.S. Small Business Administration, Vermont Department of Economic Development, and the Vermont State College system.

#### **Vermont Department of Environmental Conservation (VT DEC), Environmental Assistance Division**

The Vermont Environmental Assistance Division (formerly the Pollution Prevention Division) was established in 1991 with the passage of Act 100, which requires industrial facilities to develop a Toxics Use Reduction and Hazardous Waste Reduction Plan every three years. In addition, Act 100 requires businesses to report progress yearly on implementing technically and economically feasible methods for reducing toxic substance use and hazardous waste generation.

The Act established the Pollution Prevention program as a non-regulatory entity within the Department of Environmental Conservation to oversee the plan requirements and to provide technical assistance to business and industry. The Division has developed a range of technical assistance programs including site visits by retired engineers and business professionals, seminars, workshops, and conferences on pollution prevention.

The Division receives funding from the state, EPA, and dedicated fees. The Division's staff includes five pollution prevention personnel.

**Table A-1. Overview of P2 Progress Survey Respondents (1990 - 1996)**

<b>P2 Program</b>	<b>Number of Full-time Staff</b>	<b>Non-Regulatory Status</b>	<b>Technical Assistance</b>	<b>Year P2 Program Established</b>
<b>ConnTAP<sup>a</sup></b>	9	✓	✓	1988
<b>CT DEP, Office of Pollution Prevention</b>	1	✓ <sup>b</sup>	✓	1993
<b>ME DEP, Pollution Prevention Program</b>	5		✓	1991
<b>MA DEP, Bureau of Waste Prevention</b>	6 <sup>c</sup>			1989 <sup>d</sup>
<b>MA Toxics Use Reduction Institute</b>	18	✓	✓ <sup>e</sup>	1989
<b>MA Office of Technical Assistance</b>	30	✓	✓	1989
<b>NH DES Small Business Technical Assistance Program</b>	1		✓	1992
<b>NH DES, Pollution Prevention Program</b>	<3	✓	✓	1991
<b>NJ Technical Assistance Program</b>	12	✓	✓	1991
<b>ESD, Division for Small Business Environmental Ombudsman Unit</b>	5	✓		1992
<b>NYS DEC, Pollution Prevention Unit</b>	18		✓	1992
<b>Suffolk County Water Authority</b>	5	✓	✓	1987
<b>RI DEM, Office of Technical and Customer Assistance</b>	2 <sup>f</sup>	✓	✓	1987
<b>NBC, Technical Assistance Program</b>	2	✓	✓	1991
<b>VT Small Business Development Ctr.</b>	9	✓	✓	1992
<b>VT DEC, Environmental Assistance Division</b>	5	✓	✓	1992

- a. ConnTAP failed to acquire funding in 1996. The program has since been discontinued.
- b. While CT OPP's nonregulatory status is unclear, the office conducts nonregulatory technical assistance outreach for specific projects.
- c. While MA DEP's Waste Program Planning group (a subdivision of the Bureau of Waste Prevention) directly supports TURA planning and reporting responsibilities, the Bureau's staff of 30 inspectors and permittees also advance TUR goals by conducting multimedia inspections and permitting.
- d. Although MA DEP has been in existence long before 1989, that is the year it acquired specific P2 responsibilities under Massachusetts Toxic Use Reduction Act.
- e. While TURI operates a P2 Technology Transfer Center, provides P2 training, runs a model facilities program, and manages a Surface Cleaning Laboratory, it does not provide on-site technical assistance.
- f. Through a collaborative agreement, the University of Rhode Island provides graduate students to support P2 efforts in the Rhode Island's Environmental Assistance Division.



# **Appendix B**

## **Review of Prior EPA Studies**

## Review of Prior EPA Studies

Numerous reports from the Environmental Protection Agency, state and local governments, universities and environmental organizations document a wide range of pollution prevention efforts, illustrating the positive economic and environmental effects of source reduction. The following sections provide a summary of key findings that have been published.

There are four recent U.S. Environmental Protection Agency (U.S. EPA) reports that examine pollution prevention activities from a national perspective. *Pollution Prevention 1997: A National Study* (1997) describes P2 activity undertaken by federal agencies, industry, state governments, tribal lands, universities, communities, and nonprofit organizations. *Pollution Prevention Incentives for States (PPIS) Grant Programs Assessment Study* (1996) focuses exclusively on P2 activity supported by PPIS grants and provides detailed information about specific program activity and finances. The *Prototype Study of Industry Motivation for Pollution Prevention* (1996) discusses the factors that influence industrial pollution prevention decisions and provides a model for the following national study. The *Study of Industry Motivation for Pollution Prevention (Peer Review Draft)* (1997) examines how environmental issues influence core business decisions involving production process operations and pollution prevention.

*Pollution Prevention 1997: National Study* points out that “state activities have shifted over the last six years, from legislation – in 1992 over half of the states had passed some form of legislation promoting pollution prevention – to implementation issues, integrating of pollution prevention into existing regulatory programs, and attempts to measure progress in pollution prevention” (EPA 1997, p. 7).

The report found that a large number of states are involved in a wide range of P2 activities including technical assistance and outreach, facility planning, regulatory integration and voluntary programs. At least 40 states offer confidential, on-site pollution, and waste assessments for small, and sometimes larger, businesses. Over 30 states operate information clearinghouses on pollution prevention, and 30 states have some form of pollution prevention facility planning program. Other information services provided by state programs are telephone hotlines, research on pollution prevention techniques and technologies, workshops and training seminars, and publications. Some states also provide grants and loans for P2 projects, particularly to small businesses. States are also incorporating pollution prevention into regulatory activities such as enforcement settlements, permitting, and compliance inspections. This report also describes pilot projects in Massachusetts, Ohio, New Jersey, and Illinois (EPA 1997, pp. 7-8).

According to this report, “as state pollution prevention programs look ahead, they face two primary challenges. The first is to evaluate and measure the effectiveness of their technical assistance and outreach efforts, in terms of actual pollution prevention results at the company level. The second is the ongoing need to integrate pollution prevention into state regulatory programs” (EPA 1997, p. 8).

The ***Pollution Prevention Incentives for States (PPIS) Assessment Study*** documents how states used EPA PPIS funds to stimulate and enhance pollution prevention awareness and initiatives throughout the country. From the inception of this grant program in 1989 through 1993, EPA awarded approximately \$24 million to 124 organizations. Grant recipients and other partners, such as local governments and industry, supplied more than \$16 million in matching funds for a total funding amount of approximately \$40 million for the 5-year period. State environmental and health agencies received the most funding; their 5-year total reaches close to \$18 million, or 71 percent of all PPIS funds awarded during that time. Some of the reports key finds are listed below. (EPA 1996, pp. 11-12)

PPIS grant monies funded nearly 5,000 pollution prevention assessments, more than 850 workshops, and the development of 370 pollution prevention case studies. PPIS grantees' efforts reached companies in 35 targeted industry sectors, including automotive, printing, and dry-cleaning. According to the report, many grantees believe that educating industry about stopping waste generation at the source is the key to pollution prevention (EPA 1996, p. 17).

Grantees explained how PPIS grants helped businesses operate more cost effectively. By educating businesses about more efficient production technologies and encouraging them to use pollution prevention equipment as a way to proactively avoid compliance costs, state pollution prevention programs helped industry recognize the economic benefits of source reduction. For example (EPA 1996, p. 17):

- Kentucky Partners helped businesses save approximately \$3 million annually through implementing P2 measures,
- Florida's Waste Reduction Assistance Program (WRAP) helped businesses save \$3.7 million, and
- Iowa WRAP helped businesses save more than \$1.5 million annually.

In terms of environmental benefits, such as pollution avoided or waste reduced, some PPIS grantees identified significant results. Examples include (EPA 1996, p. 18):

- Rhode Island reduced 3.4 million pounds of liquid waste and 20,000 pounds of solid waste,
- Tennessee showed a decrease in toxic releases of up to 42 percent, and
- West Virginia experienced a 53 percent decrease in toxic releases.

The ***Prototype Study of Industry Motivation for Pollution Prevention*** compiled and analyzed information from the employees of 42 industrial facilities on their pollution prevention decisions and on the factors that affected their decisions. The study gathered information from a wide range of industrial firms and examined several different potential motivators of industrial pollution prevention.

Pollution prevention assistance, planning, regulatory integration efforts, and other innovative programs constitute a variety of "tools" that have been available to state and local government agencies to promote P2 to business and industry. The Prototype Study found that some

businesses support each of these major types of state and local pollution prevention activities. "This is not surprising given that every business is unique in some way, by design or fortune. Each business differs from its neighbor in its products, production methods, service, marketing strategy, access to input materials and information, and methods of managing internally. Because of this, each business has its own strengths and weaknesses. One may excel technologically, but lack information about the least expensive input material; another may produce top-notch product, but provide its customers only fair customer service. Such strengths and weaknesses will also be found in the businesses' environmental management programs. One business may consider environmental excellence a civic responsibility, another may feel obliged only to comply with the minimum requirements of the law, and another may feel driven by competition to pollute even in possible violation of the law"(Hehassi et al 1996, p. 15).

This study also reports that different businesses react differently to the same policy approach. For example, some industry respondents found technical assistance invaluable, while others found technical assistance of little value. Some respondents felt planning requirements helped identify pollution prevention options, and others regarded them as regulatory paperwork exercises. An explanation for these varied responses is the fact that P2 policy approaches support businesses at different stages in the implementation of P2: 1) initially considering P2 as an environmental management option, 2) assessing P2 opportunities or 3) implementing P2 projects. The study investigated some of the issues involved in each of these phases (Hehassi et al 1996, p. 15-16).

Respondents to the EPA survey mentioned both top management support and internal champions as important for initially drawing their facility's attention to pollution prevention. "Some respondents suggested that end-of-pipe standards, required facility planning and reporting requirements, enforcement actions, voluntary programs, and award programs gave latent pollution prevention champions and their managers the excuse they needed to implement P2 activities. Some respondents also suggested that certain regulatory requirements distracted facility staff from pollution prevention projects that could provide more effective environmental protection" (Hehassi et al 1996, p. 16).

Onsite technical assistance, one means by which government helps business identify and investigate their options, was discussed by respondents. "This service had more value to respondents at facilities with relatively unsophisticated in-house environmental staff than to respondents at facilities that had environmental professionals on staff. Respondents from companies with strong environmental staffs reported having developed their projects in-house, using vendors and internal engineering staff when needed" (Hehassi et al 1996, p. 16).

Respondents indicated that management commitment eased implementation of pollution prevention projects, partly by influencing the relative importance of cost and payback in the decision to implement projects. Some respondents also reported that their companies implemented P2 projects primarily to improve production efficiency. In addition, some respondents said that regulatory requirements provided the impetus for implementation (Hehassi et al 1996, p. 16-17).

The *Study of Industry Motivation for Pollution Prevention (Peer Review Draft)* analyzed the responses of more than 1,000 business people to learn how environmental issues are incorporated into core business decisions including pollution prevention. Anonymous interviews included 520 randomly-selected lithographic printing companies (most of which were small businesses) and 516 randomly-selected production managers representing larger manufacturing companies reporting to the Federal Toxic Release Inventory (TRI). The survey reported that (Roy and Jehassi 1997):

- Pollution prevention activities are practiced widely by printers and large manufacturers. Approximately 64 percent of printers and 85 percent of large manufacturers reported implementing pollution prevention activities.
- Technical assistance has a significant influence on a firm's pollution prevention activity.
- Government programs that require pollution prevention planning are very influential.
- Regulatory programs are almost unrivaled in making business decision makers aware of their environmental obligations.

For the past several years, P2 programs have grown in size and sophistication, developing a better understanding of how to help companies achieve source reduction. They have learned that there is no single P2 approach that will serve all their clients, rather a variety of P2 services and policies are needed to encourage companies to investigate pollution prevention as an environmental management strategy, assess P2 opportunities, and implement P2 projects.



# **Appendix C**

## **Environmental Trends**

## Environmental Trends

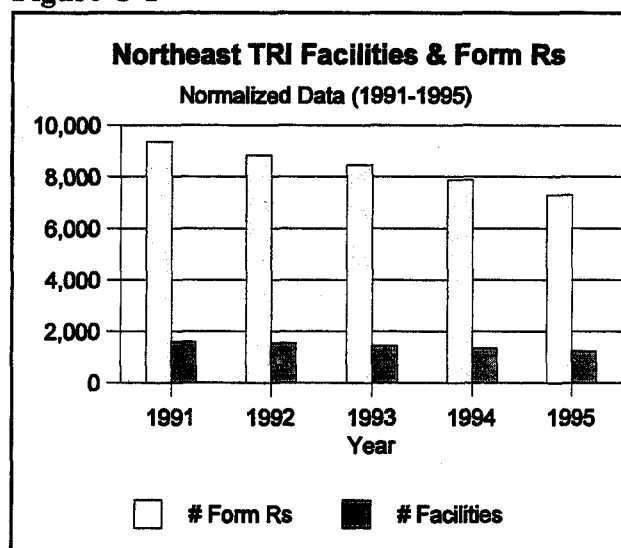
Generation rates of wastes and pollutants by manufacturers and other businesses are related to a number of factors, including their level of productivity, environmental regulations, and the availability of cost effective pollution prevention technologies. These are important issues to consider when evaluating the efforts of state and local pollution prevention programs. A variety of environmental data for the years 1990 to 1995 is presented below to provide a clearer understanding of the overall environmental performance in the Northeast. Where possible environmental trends are presented with national information to provide a basis for comparison.

### Environmental Trends

From an environmental perspective, the number of large quantity hazardous waste generators and their levels of waste generation is a reflection of economic and environmental activity, including progress by firms in preventing pollution. An examination of Toxic Release Inventory (TRI) data and Resource Conservation and Recovery Act (RCRA) Biennial Reporting System (BRS) data provides some indication of environmental trends regarding the generation and release of hazardous and toxic pollutants. A review of this information reveals that between 1990 and 1995, the overall release of toxic chemicals and the generation of hazardous waste has declined in the Northeast along with the number of TRI reporting facilities and hazardous waste generators. In addition, reductions in TRI and BRS wastes and pollution outperformed the rest of the nation.

TRI and BRS data, however, should not be correlated directly with the activities of the state and local pollution prevention programs. There are numerous factors that influence the amount of TRI chemicals released and hazardous waste generated. These include pollution prevention, recycling onsite, closing of facilities, and reductions in product output. Nevertheless, in reviewing the activities of the state and local P2 programs, the overall environmental trends in the region are important to understand.

Figure C-1



Source: EPA Region 1.

### Toxic Release Inventory

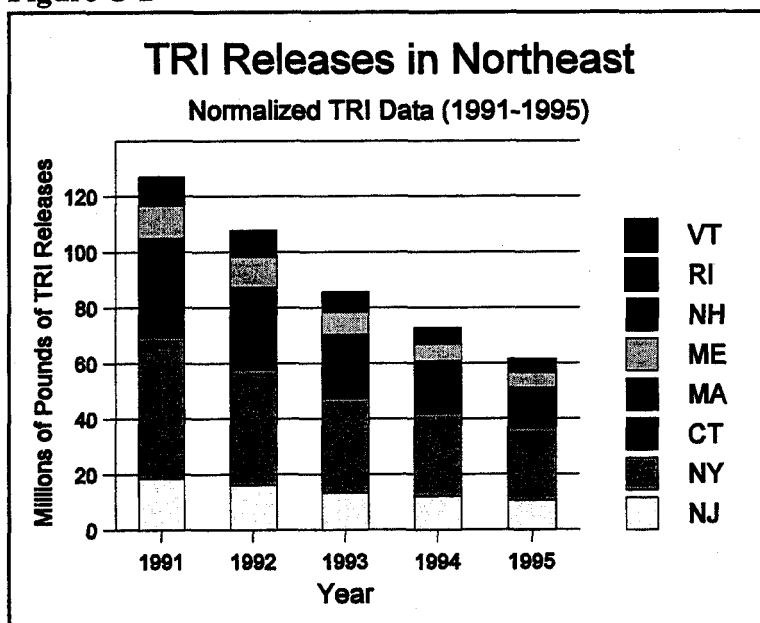
The Toxic Release Inventory (TRI) is a database of information about releases and transfers of

certain toxic chemicals.<sup>1</sup> TRI data is reported by individual facilities that send their reports to EPA every year. These reports are filled out on a questionnaire called "Form R." Facilities complete one Form R for each TRI listed chemical that they use and release that meet EPA's reporting thresholds. Because the universe of reportable TRI chemicals changes from year to year, normalized data are presented in Figures C-1, C-2, C-3, and C-4, and they do not include chemicals that were delisted or added in 1994 and 1995.

As shown in Figure C-1, the number of TRI reporting facilities and Form Rs decreased steadily in the Northeast between 1991 and 1995. Overall, the number of TRI facilities decreased 29 percent, from 1,599 to 1,232. The number of Form Rs submitted to EPA also declined from 9,356 to 7,292 or 22 percent.

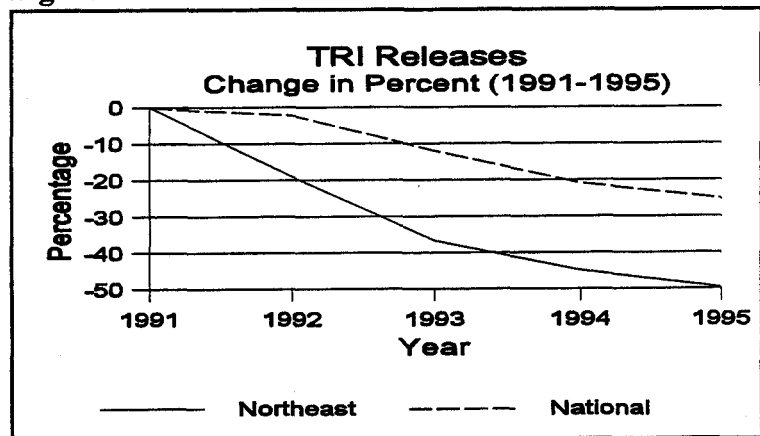
The Toxic Release Inventory also provides data on the total releases of listed toxic chemicals to the environment. Figure C-2 illustrates how the trends in total releases of TRI chemicals in the Northeast decreased from over 126 million pounds to 60 million pounds between 1991 and 1995 for a 50 percent reduction.

Figure C-2



Source: EPA Region 1.

Figure C-3



Source: EPA Region 1.

<sup>1</sup> Approximately 350 toxic chemicals or chemical categories are listed under TRI. Facilities are required to their releases of a toxic chemical to TRI if they: 1) are a manufacturing facility whose primary SIC code is 20 -39; 2) have the equivalent of 10 or more full-time workers; 3) manufacture/process more than 25,000 pounds or "otherwise use" more than 10,000 pounds of a TRI chemical within a year.

Meanwhile, national TRI releases decreased from 2.14 to 1.61 billion pounds for a 25 percent reduction. As shown in Figure C-3, the Northeast rate of TRI reductions outpaced the national average by approximately 100 percent.

TRI also provides data on the amount of waste generated at reporting facilities. The definition of "production-related waste" includes all waste associated with TRI listed chemicals that are treated, recycled, used for energy recovery, disposed, or released into the environment.

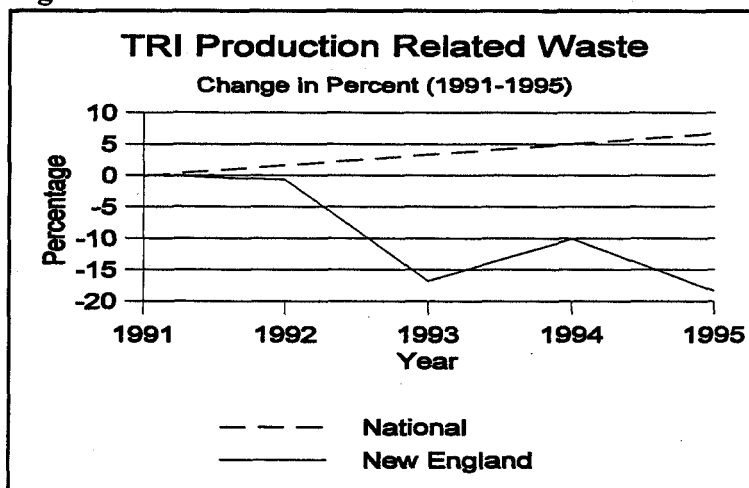
While production-related waste in New England decreased by over 105 million pounds between 1991 and 1995, national quantities increased by 1.25 billion pounds. As shown in Figure C-4, production related waste increased by 6.8 percent (1995 Toxic Release Inventory, p. XV) nationally and decreased in New England by over 18 percent.

### Biennial Reporting System

The Biennial Reporting System (BRS) is one of EPA's primary tools for tracking the generation and management of hazardous wastes.

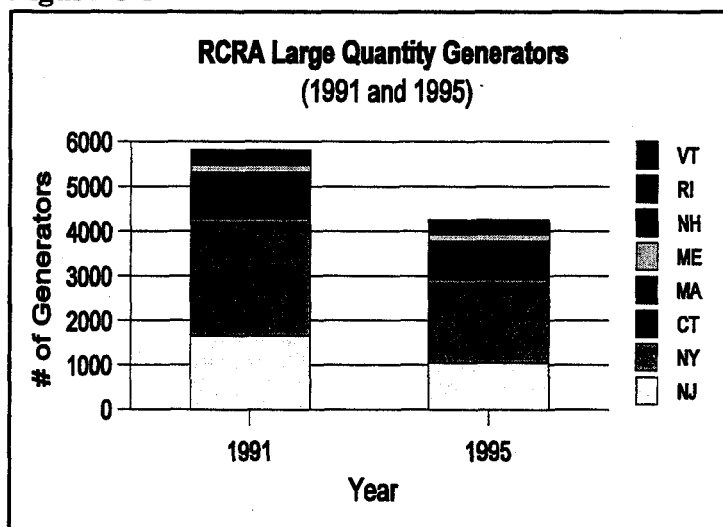
The BRS collects data on the generation, shipment, and receipt of waste. It contains data from the hazardous waste reports that large quantity generators (LQGs) must file every two years to comply with the RCRA.<sup>2</sup>

**Figure C-4**



Source: EPA Region 1 and 1995 TRI Public Data Release (1997), p. 119.

**Figure C-5**



Source: National Analysis: The Biennial RCRA Hazardous Waste Reports (1994 and 1997).

<sup>2</sup> Hazardous waste and the waste generation cut offs for reporting and regulatory compliance are defined in detail in the regulations that EPA has promulgated under RCRA. Facilities must report their activities involving hazardous waste to the BRS if they fulfill one of two criteria: 1) they are a LQG of hazardous waste, or 2) they treated, stored, or disposed of hazardous waste on site in units subject to RCRA permitting requirements. The simplified definition of a LQG is any facility that generates more than 2,200 pounds of hazardous waste in a single month, accumulates more than 2.2 pounds of acute hazardous waste in a single month, or accumulates more than 220 pounds of spill cleanup material contaminated with acute hazardous waste in any month.

As shown in Figure C-5, there were 5,814 LQGs of hazardous waste in the 8 Northeast states in 1991. By 1995, this number declined by nearly 27 percent to a total of 4,255. New York and New Jersey accounted for over 87 percent of this reduction, with 1,361 fewer reporting facilities in 1995. On a national level, between 1993 and 1995, the number of LQGs decreased from 24,362 to 19,908, an 18 percent reduction. The Northeast region outpaced the national decline by nearly 10 percent.

As shown in Figure C-6, between 1991 and 1995, the amount of hazardous waste shipped in the Northeast decreased from 3,437 to 1,229 tons, for a total reduction of 37 percent. Nearly 77 percent of this reduction can be attributed to the reduction in shipments by firms in Connecticut. On a national level, shippers reported a 11 percent decrease in the amount of RCRA waste shipped. The overall decline in waste shipped from the Northeast was more than twice the national rate.

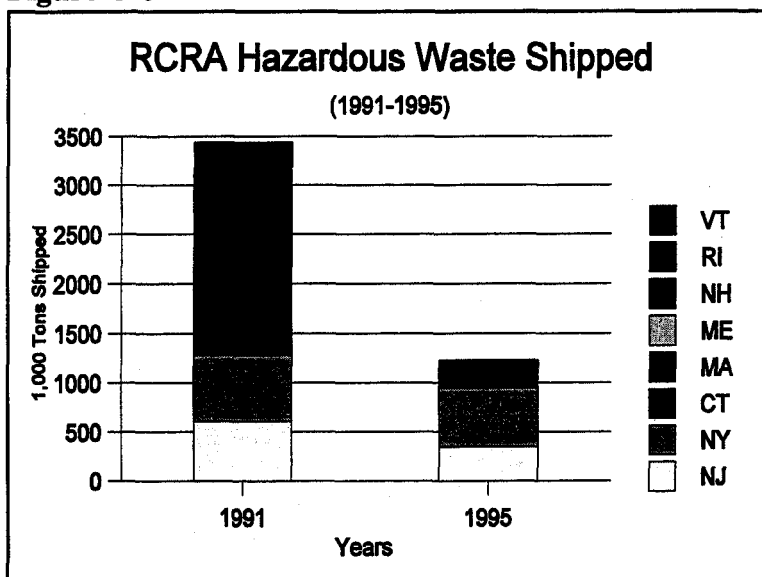
### Pollution Abatement Costs

Changes in the amounts of waste generated are also reflected in capital expenditures and operating costs required for the management and disposal of industrial wastes. As shown in Figure C-7, between 1990 and 1994, northeastern manufactures reported a 5 percent or \$35 million reduction in "pollution abatement costs" while costs for the rest of the nation increased by 22 percent or \$360 million.

### Summary

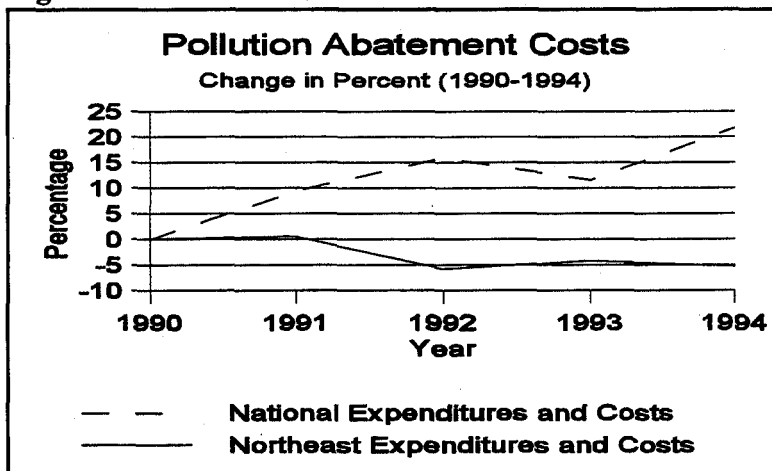
In summary, the overall trend in hazardous waste generation and toxic releases in the Northeast shows a substantial downward trend from 1990 through 1995. These declines in the Northeast

**Figure C-6**



Source: National Analysis: The Biennial RCRA Hazardous Waste Reports (1994 and 1997).

**Figure C-7**



Source: US Department of Commerce, 1994, pp. 14-19.

greatly outpaced the national average for reductions in hazardous waste generation and toxic emissions.

# **Appendix D**

## **P2 Progress Questionnaire**

## P2 Progress Questionnaire

This is a condensed version of the original questionnaire that was sent to state and local P2 programs. Although the text is unaltered, the space for written responses has been omitted. An asterisk (\*) precedes the questions that required descriptive answers.

### Measuring State and Local P2 Program Activities: Northeast Region

#### A. P2 Site Visits

1. How many site visits did your program conduct in 1990-1993\_\_ ; 1994\_\_ ; 1995\_\_ ; 1996\_\_?
2. Approximately what percent of those site visits were to small businesses (<100 employees) in 1990-1993\_\_ ; 1994\_\_ ; 1995\_\_ ; 1996\_\_?
3. Approximately how many P2 suggestions, recommendations or ideas were made as a result of those site visits in 1990-1993\_\_ ; 1994\_\_ ; 1995\_\_ ; 1996\_\_?
4. How many of those suggestions/recommendations were implemented in 1990-1993\_\_ ; 1994\_\_ ; 1995\_\_ ; 1996\_\_?
5. Of the companies receiving site visits, how many implemented P2 suggestions in 1990-1993\_\_ 1994\_\_ ; 1995\_\_ ; 1996\_\_?
6. If available, approximately how many site visits resulted in the development of a P2 policy or other organizational changes (e.g. formation of teams or programs) in 1990-1993\_\_ ; 1994\_\_ ; 1995\_\_ ; 1996\_\_?
7. If available, how much money was saved from site visits in 1990-1993 \$\_\_ ; 1994 \$\_\_ ; 1995 \$\_\_ ; 1996 \$\_\_?
8. How many companies did your program visit as a result of compliance problems (e.g., referrals from inspectors) in 1990-1993\_\_ ; 1994\_\_ ; 1995\_\_ ; 1996\_\_?
9. Approximately what percent of sites visits observed regulatory violations in 1990-1993\_\_ ; 1994\_\_ ; 1995\_\_ ; 1996\_\_?
10. Approximately what percent of site visits involved some discussion of compliance issues with firms in 1990-1993\_\_ ; 1994\_\_ ; 1995\_\_ ; 1996\_\_?
11. Can your program estimate how many of these violations were addressed as a result of site visits in 1990-1993\_\_ ; 1994\_\_ ; 1995\_\_ ; 1996\_\_?
12. Approximately what percent of staff time is usually spent on compliance issues (e.g., explaining regulatory requirements, pointing out minor violations, or indicating where to get more regulatory information) during site visits? \_\_%
- 13.\* Please explain (question 12).
14. Has your program written an evaluation of the environmental impacts (e.g. tons of waste reduced, tons of air emissions eliminated, etc.) of the site visits? \_\_Yes, \_\_No.
- 14a. If so, please attach a copy of that evaluation to this questionnaire so that we can include the material.
- 15.\* Provide up to two examples with brief descriptions of how your P2 program provides compliance assistance.



**B. Workshops/Conferences**

1. How many P2 workshops/conferences for businesses did your program conduct in 1990-1993\_\_\_\_; 1994\_\_\_\_; 1995\_\_\_\_; 1996\_\_\_\_?
2. How many P2 workshops/conferences for non-businesses audiences (e.g., regulators, environmental groups, public and others) in 1990-1993\_\_\_\_; 1994\_\_\_\_; 1995\_\_\_\_; 1996\_\_\_\_?
3. How many people attended those workshops/conferences in 1990-1993\_\_\_\_; 1994\_\_\_\_; 1995\_\_\_\_; 1996\_\_\_\_?
4. Approximately what percent of these workshops was spent on compliance issues: \_\_\_\_%
- 5.\* Please, list the business sectors (i.e., SIC codes or industrial categories) and number of sessions for which your program conducted workshops/conferences from 1990-1996.
- 6.\* Please describe (i.e., purpose, audience and topics) two major P2 assistance workshops/conferences that your program organized from 1990-1996.
- 7.\* How did your program evaluate the impacts of those workshops/conferences?
- 8.\* What were the overall results of those evaluations, if they were available?
- 8a. Please provide examples of those results.
- 9.\* Please describe one or two examples of how the business audiences at these sessions said that they benefitted from participating.

**C. Clearinghouse Requests (no text)**

1. How many hotline/phone/e-mail requests for P2 or compliance information did your program receive in 1990-1993\_\_\_\_; 1994\_\_\_\_; 1995\_\_\_\_; 1996\_\_\_\_?
2. How many documents from your P2 clearinghouse did your program disseminate in 1990-1993\_\_\_\_; 1994\_\_\_\_; 1995\_\_\_\_; 1996\_\_\_\_?
3. Approximately what percent of these requests were compliance-oriented \_\_\_\_%; strictly P2 oriented \_\_\_\_%; or both \_\_\_\_%
4. The number of P2 requests is automatically calculated using C3 percentages and the total number of requests in C1.

**D. Case Studies**

1. How many case studies did your program produce in 1990-1993\_\_\_\_; 1994\_\_\_\_; 1995\_\_\_\_; 1996\_\_\_\_?
- 1a. Please attach a copy of these case studies so that NEWMOA can tabulate total amount of pollution reduced.
2. What was the total amount of money saved for all of the case study facilities that your program documented for 1990-1993 \$\_\_\_\_; 1994 \$\_\_\_\_; 1995 \$\_\_\_\_; 1996 \$\_\_\_\_?

**E. Newsletter, Fact Sheets, Pamphlets and other Documents**

1. Please check the years that your program published a newsletter for businesses on P2 and compliance in 1990-1993\_\_\_\_; 1994\_\_\_\_; 1995\_\_\_\_; 1996\_\_\_\_?
2. If applicable, how many businesses and others received P2 newsletters in 1990-1993\_\_\_\_; 1994\_\_\_\_; 1995\_\_\_\_; 1996\_\_\_\_?
3. How many different fact sheets/pamphlets/other documents did your program produce in 1990-1993\_\_\_\_; 1994\_\_\_\_; 1995\_\_\_\_; 1996\_\_\_\_?
4. How many different fact sheets/pamphlets/other documents were disseminated to businesses in 1990-1993\_\_\_\_; 1994\_\_\_\_; 1995\_\_\_\_; 1996\_\_\_\_?

- 5.\* Please briefly describe (i.e., audience, purpose and topics) three fact sheets, pamphlets or other documents that your program produced and disseminated to the regulated community from 1990-1996.

#### **F. Governor's Award**

1. Check the years in which your program made P2 governor's awards: 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
2. How many applications for governor awards did your program receive in 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
3. How many awards did your program make in 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
- 3a. Please attach a copy of the award descriptions so that NEWMOA can tabulated the total amount of pollutants reduced by award recipients.
4. What was the total annual dollar savings for the P2 award recipients for 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?

#### **G. Grant & Loan Program**

1. If applicable, how many grants for P2 activities did your program award in 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
2. What was the total amount of these awards in 1990-1993 \$\_\_\_; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?
3. What was the average award amount in 1990-1993 \$\_\_\_; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?
- 4.\* Briefly describe up to three grant programs funded by your program from 1990-1996.
5. If applicable, how many loans for P2 investments did your program award in 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
6. What was the total amount of these loans in 1990-1993 \$\_\_\_; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?
7. What was the average amount of these loans in 1990-1993 \$\_\_\_; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?

#### **H. Other Assistance Activities**

1. Did your program conduct other P2 assistance activities from 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
- 2.\* If so, please describe briefly (attach additional paper if necessary):

#### **I. Partnership Activities**

1. Describe briefly at least three examples of partnership projects between your program and businesses and trade associations, non-environmental agencies or community/environmental group in your state or local area from 1990-1996.

#### **J. Funding**

1. Approximately what was your program's total P2 budget (including support for all P2 activities, including matching dollars and PPIS funding) in 1990-1993 \$\_\_\_; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?
2. Approximately how much of those funds were from the general budget of the state in 1990-1993 \$\_\_\_; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?

3. Approximately how much of those funds were from EPA sources in 1990-1993 \$\_\_\_ ; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?
4. Approximately how much of those funds were from other federal sources (e.g., DOE) in 1990-1993 \$\_\_\_ ; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?
5. Approximately how much of those funds were from dedicated fees in 1990-1993 \$\_\_\_ ; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?
6. What was the total budget for environmental protection programs in your state/county or local agency in 1990-1993 \$\_\_\_ ; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?

#### **K. Environmental Trends**

1. Check the years your program has analyzed TRI trends in your state 1990-1993\_\_\_ ; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
- 1a. If available, please attach a copy of your program's analysis of TRI trends.
2. Check the years your program has analyzed biennial report or other hazardous waste data in your state 1990-1993\_\_\_ ; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
- 2a. If available, please attach a copy of your programs analysis of the biennial report.
- 3.\* If available, please provide data or examples of reductions in toxic constituents in sludges and wastewater effluents as a result of P2 assistance and other activities.
- 4.\* If applicable, how did your program use the results of the data analysis (e.g., determine program priorities, identify environmental trends)?

#### **L. Facility Planning**

1. Does your state have a mandatory facility planning law? \_\_\_Yes, \_\_\_No.
2. If applicable, please check the years that your program has implemented a facility P2 planning requirement 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
3. For the years that your facility planning law has been in effect, please check those for which your program has collected facility level P2 data: 1990-1993\_\_\_ ; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
- 3a. If available, attach a copy of your program's analysis of facility planning data.
4. Has your program conducted an analysis of the effectiveness of your facility planning law? \_\_\_Yes, \_\_\_No.
- 4a. If available, attach a copy of a report or analysis of the effectiveness of your facility planning law.

#### **M. P2 Regulatory Compliance & Enforcement**

1. Approximately how many inspectors, permit writers and enforcement staff and management were trained in P2 in 1990-1993\_\_\_ ; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
2. Approximately, how many multi-media P2-oriented inspections did your state or local agency conduct in 1990-1993\_\_\_ ; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
3. Approximately, how many multi-media P2-oriented permits were issued in 1990-1993\_\_\_ ; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
4. Has your program documented the impacts of these new inspection and permitting programs? \_\_\_Yes; \_\_\_No.

- 5.\* If so, briefly describe the overall environmental and economic impacts of new inspection or permitting programs.
6. How many Supplemental Environmental Projects (SEPs) has your agency negotiated in 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
7. Approximately how many of these projects were P2-oriented in 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
8. Approximately how much money was spent on P2 projects above the fine in 1990-1993 \$\_\_\_; 1994 \$\_\_\_; 1995 \$\_\_\_; 1996 \$\_\_\_?
- 9.\* Briefly describe two P2-oriented SEP projects negotiated by your agency.

#### **N. Clean State Initiative**

- 1.\* Briefly describe any activities that your program has initiated or assisted with that helps to improve the environmental compliance and P2 performance of state/local government agencies and programs from 1990-1996.
- 2.\* What have been the documented accomplishments of these Clean State programs?

#### **O. Other Environmental or Economic Impacts**

1. If available, how many companies no longer needed environmental permits as a result of P2 assistance and other activities in 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
2. If available, how many companies have transitioned from large quantity generator status to a small quantity generator status as a result of P2 assistance and other activities in 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
3. If available, how many companies have gone from a significant industrial user to minor user status as a result of P2 assistance and other activities in 1990-1993\_\_\_; 1994\_\_\_; 1995\_\_\_; 1996\_\_\_?
- 4.\* Briefly describe other economic or environmental impacts that your program has documented from your program's efforts.
- 5.\* Briefly describe the methods that your program currently uses to evaluate its activities and successes.

#### **P. Contacts for P2 Testimonials**

- 1.\* If appropriate, please suggest individuals at companies, trade associations, environmental groups and others that we should contact for testimonials and comments on the effectiveness of your P2 program.

#### **Q. Additional Comments or Information**

- 1.\* Provide additional comments that NEWMOA should include in the regional report.
2. Provide P2 materials (reports, pamphlets, etc.)