



A Pollution Prevention Primer for Law Teachers

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Pollution prevention is a new alternative to traditional media-specific environmental policy. Pollution prevention is defined by the United States Environmental Protection Agency (EPA) as "the use of materials, processes, or practices that reduce or eliminate the creation of pollutants or wastes. [It] includes practices that reduce the use of hazardous materials, energy, water or other resources . . . through conservation or more efficient use."¹

Pollution prevention reduces pollution generation at its source, reducing the need for treatment and subsequent disposal of treatment by-products. Pollution prevention creates a cleaner environment because reduced treatment and disposal result in less waste entering environmental media (land, water, and air). Pollution prevention also benefits industry because reduced pollution generation means lower waste disposal costs, decreased environmental liabilities, an improved environmental public image, and more efficient manufacturing operations.

Pollution prevention legislation has been enacted at both the federal and state levels. On October 27, 1990, Congress passed the Pollution Prevention Act of 1990,² which established pollution prevention as the nation's primary pollution control strategy. The Act states that:

(1) pollution should be prevented or reduced at the source whenever feasible;

- (2) pollution that cannot be prevented or reduced should be recycled;
- (3) pollution that cannot be prevented or reduced or recycled should be treated . . . ; and
- (4) disposal or other release into the environment should be employed only as a last resort.³

As of April 1, 1991, a majority of states had passed some form of pollution prevention law.⁴ Some of these states require industry to develop facility-wide pollution prevention plans,⁵ others simply declare that pollution prevention is the preferred method for dealing with hazardous waste.⁶

Despite the proliferation of federal and state pollution prevention legislation in recent years, industry has not widely adopted pollution prevention. Part I of this paper examines the reasons for this frosty reception. It begins by examining traditional environmental policy and discusses the shortcomings of the current media-specific regulatory scheme. Part II discusses pollution prevention as an alternative to traditional media-specific environmental policy. It analyzes the controversy surrounding mandatory versus voluntary planning in pollution prevention statutes. Part III presents pollution prevention's economic benefits, as well as the institutional and attitudinal barriers that thwart its wide-scale adoption. Part IV concludes by providing examples of successful industry pollution prevention programs.

¹ U.S. EPA, Pub. No. EPA-21P-3003, POLLUTION PREVENTION 1991: PROGRESS ON REDUCING INDUSTRIAL POLLUTANTS 4 (Oct. 1991) (citation omitted).

² 42 U.S.C. §§ 13101-13109 (1991).

³ See *id.* § 13101(b).

⁴ U.S. EPA, *supra* note 1, at 72.

⁵ As of April, 1992, the following states require industry to develop pollution prevention plans: Arizona, California, Georgia, Louisiana, Maine, Massachusetts, Minnesota, Mississippi, New Jersey, New York, Oregon, Tennessee, Texas, Vermont, and Washington. See WRITAR, STATE LEGISLATION RELATING TO POLLUTION PREVENTION (April 1992).

⁶ Alaska, Colorado, Connecticut, Delaware, Florida, Illinois, Indiana, Iowa, Kentucky, North Carolina, Rhode Island, and Wisconsin have enacted pollution prevention legislation that provides technical assistance and grants to encourage companies to voluntarily adopt pollution prevention programs. *Id.*

I. Traditional Environmental Policy: Controlling Pollution After its Generation

A. Traditional Environmental Laws Are Media-Specific

The EPA was established in 1970 to integrate protection of public health and the environment.⁷ Programs from four agencies⁸ were consolidated to form the EPA. Over the next 20 years, however, the EPA subdivided into separate, independent bureaus, largely as a result of the fragmented evolution of media-specific environmental laws.⁹ These statutes were Congress' response to discrete, publicized environmental disasters, such as the toxic contamination of Love Canal.¹⁰ Because media-wide problems were not politically visible, they were overlooked.

The EPA is responsible for seven major environmental laws,¹¹ each of which protects a separate environmental medium from a different set of pollutants by mandating specific regulatory tasks, separate reporting and enforcement practices,¹² and strict implementation deadlines.¹³ Burdened by each law's regulatory requirements and pressured by Congress and environmental organizations for their timely implementation, the EPA divided into subagencies to meet each law's respective requirements.¹⁴

B. Media-Specific Laws Are Ineffective at Reducing Environmental Pollution

Media-specific environmental laws regulate the amount of pollutants that companies can discharge into each environmental medium — air, water, or land.

They do not regulate the total amount of pollution entering the overall environment through all sources. Problems such as global climate change, ozone depletion, and toxic contamination cross media boundaries and thus cannot be solved in the traditional, media-specific way.

1. Media-Specific Laws Increase Cross-Media Pollution

Media-specific environmental laws have been referred to as a toxic "shell game,"¹⁵ because they remove pollutants from one environmental medium and shift them to another for disposal. For example, the Clean Air Act (CAA)¹⁶ sets discharge limits for various air pollutants. To meet those limits, companies often install scrubbers and similar air pollution control devices to filter out the pollutants. Scrubbers concentrate pollutants in a toxic ash that is generally disposed of in a landfill.¹⁷

All waste treatment, whether wastewater treatment, incineration, or landfilling, is likely to increase cross-media pollution. Despite more than 20 years of regulation, data show that the volume and hazards of toxic chemical releases into the environment continue to grow as the nation creates and uses more toxic chemicals.¹⁸

2. Media-Specific Laws Are Not Comprehensive

Media-specific environmental laws emerged in response to specific environmental problems, and Congress has been lax in amending legislation to reflect advances in scientific knowledge. For example, when the Clean Water Act (CWA)¹⁹ was enacted, industrial and municipal point sources were seen as the major causes of water pollution; thus, they were

⁷ David Clarke, *Chasing Rainbows: Is an Integrated Statute the Pot of Gold for Environmental Policy?*, 22 ENVTL. L. 281, 284 (1992).

⁸ Those agencies were the Departments of Agriculture, Interior, and Health, Education, and Welfare, and the Atomic Energy Commission.

⁹ See, e.g., The Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. §§ 136-136y (1989); The Federal Water Pollution Control Act (commonly known as the Clean Water Act), 33 U.S.C. §§ 1251-1376 (1988); The Safe Drinking Water Act, 42 U.S.C. §§ 300f-300j-26 (1989); The Resource Conservation and Recovery Act of 1976, 42 U.S.C. §§ 6901-6992k (1991); the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. §§ 9601-9675 (1989); the Marine Protection, Research and Sanctuaries Act of 1972, 33 U.S.C. §§ 1401-1445 (1989); and the Clean Air Act, 42 U.S.C. § 7401-7661f (1990).

¹⁰ See generally MICHAEL BROWN, *LAYING WASTE: THE POISONING OF AMERICA BY TOXIC CHEMICALS* (1980) (describing extensive problems caused by chemicals dumped in Love Canal in Niagara Falls, New York).

¹¹ See *supra* note 9.

¹² Frances Irwin, *An Integrated Framework for Preventing Pollution and Protecting the Environment*, 22 ENVTL. L. 1, 11 (1992).

¹³ Clarke, *supra* note 7, at 285.

¹⁴ *Id.* at 285-86.

¹⁵ G. LaBar, *Reducing the Flow*, OCCUPATIONAL HAZARD, Nov. 1990, at 32, 35.

¹⁶ 42 U.S.C. §§ 7401-7661f (1990).

¹⁷ Stephen Johnson, *From Reaction to Proaction: The 1990 Pollution Prevention Act*, 17 COLUM. J. ENVTL. L. 153, 154 n. 5 (1992).

¹⁸ *Id.* at 156.

¹⁹ Section 319 of the Clean Water Act attempts to include agricultural run-off in its regulatory scheme. However, it only requires states to prepare plans to control nonpoint sources of water pollution; it does not mandate their control. See 33 U.S.C. § 1329.

the CWA's primary targets for regulation. Non-point source pollution, such as agricultural runoff (which contains herbicides, pesticides, and fertilizer), was not perceived as a threat to the nation's waters and therefore was exempt. It is now known to be a major contributor to water quality degradation,²⁰ yet it is subject to minimal regulation.

3. Media-Specific Laws Are Reactive

Media-specific laws regulate only the amount of pollution that companies can discharge into specific environmental media. By focusing on pollution after its generation, they fail to address a major cause of environmental problems: our society produces too much waste.

C. Media-Specific Laws Are Inefficient

1. Media-Specific Laws May Necessitate Superfluous Treatment

By encouraging waste management practices that transfer pollutants between environmental media, media-specific environmental laws may result in double, or even triple, treatment of pollutants. For example, sludge from scrubbers can be disposed into a river or piped into a lagoon to dry and then incinerated or landfilled. Prior to its eventual disposal, however, this sludge may require additional treatment because water and solid waste disposal laws²¹ may mandate further treatment.²² If the sludge is landfilled, it may leach into the groundwater, requiring further cleanup.

2. Media-Specific Laws Are Costly, Burdensome

Media-specific laws have also created a huge, costly bureaucracy. Each of the seven major laws²³ regulating waste discharges into the environment contains separate regulation, reporting, and enforcement provisions. Environmental regulations currently occupy more than 10,000 pages of the Code of Federal Regulations. Companies are increasingly hiring full-time environmental managers to monitor environmental compliance.²⁴ According to EPA estimates, the total cost (measured in 1986 dollars) of implementing environmental mandates increased from \$27 billion in 1972 to \$85 billion in 1987.²⁵

The Administrator of the EPA, recognizing the deficiencies of a media-specific approach, has reorganized enforcement activities from media-specific offices to one main enforcement office.

D. Media-Specific Laws Encourage Industry Conservatism

1. Media-Specific Laws Focus On End-Of-Pipe Controls and Encourage Industry Dependence on Treatment

Media-specific laws, such as the CWA and the CAA, set end-of-pipe²⁶ discharge limits in specific environmental media and encourage companies to apply treatment technology²⁷ to achieve those limits. Companies have reacted to these laws by investing hundreds of millions of dollars in treatment technologies rather than exploring pollution prevention alternatives.²⁸ As a result, many companies believe that treatment is the only way to ensure environmental compliance.

²⁰ The largest remaining source of water quality impairment is runoff from farms, cities, forests, and construction sites. EPA estimates that non-point sources are responsible for 60% of current water quality standard violations and that agricultural sources contribute 80% of that total. See Claudia Copeland, *Comprehensive Clean Air and Clean Water Permits: Is the Glass Still Just Half Full?*, 21 ENVTL. L. 2135, 2169 (1991).

²¹ See 42 U.S.C. § 6924 (RCRA restrictions regarding the land disposal of hazardous wastes).

²² Lakshman Guruswamy, *Integrated Environmental Control: The Expanding Matrix*, 22 ENVTL. L. 77, 87 (1992).

²³ See *supra* note 9.

²⁴ E. Harrison, *Plowing New Ground in Environmental Affairs*, PUBLIC RELATIONS J., April 1991, at 32.

²⁵ Clarke, *supra* note 7, at 289 (citing OFFICE OF POLICY PLANNING AND EVALUATION, U.S. EPA, COST OF A CLEAN ENVIRONMENT (1990)).

²⁶ "End-of-pipe" controls include end-of-stack controls. Both terms refer to pollution control methods that focus on controlling a pollution stream after it has been generated and at the point where the stream leaves the industrial facility and enters the environment, i.e., at the end of the discharge pipe for water discharges or at the end of the smoke stack for air emissions.

²⁷ For example, the Clean Water Act requires companies that discharge pollutants into navigable waters to implement increasingly better technology (initially "best conventional control technology, then "best available control technology") to achieve its discharge limits. 33 U.S.C. § 1314(b).

²⁸ Johnson, *supra* note 17, at 155.

2. Media-Specific Laws Discourage Adoption of Innovative Waste Practices

Media-specific laws also inhibit the adoption of innovative waste practices such as pollution prevention.²⁹ Typically, these laws have discharge limits that designate a certain level of pollution generation as “legal”³⁰; the laws provide no incentives for companies to reduce their pollution beyond that authorized amount.³¹ Thus, laws reinforce traditional waste management practices.

Many companies believe that adopting innovative pollution control methods, such as pollution prevention, will cost them money. Some fear that pollution prevention may increase their operating costs, putting them at a competitive disadvantage.³² Others fear that once pollution prevention methods are adopted for particular industries, they will be required by the government even though they may be more expensive than current pollution control methods.³³

II. Pollution Prevention: Reducing Pollution at its Source

Pollution prevention is based on the idea that reducing the amount of pollution generated is economically and environmentally preferable to controlling it after generation.³⁴ Pollution prevention’s main goal is to reduce or eliminate the use and release of hazardous substances across all environmental media — land, water, and air.

A. Pollution Prevention Defined

1. Waste Minimization

Initially, pollution prevention was understood to mean *waste minimization*.³⁵ Waste minimization is defined as any source reduction or recycling activity undertaken by a generator that results in either: (1) a reduction in total volume of hazardous waste; or (2) a reduction in quantity or toxicity of hazardous waste that is either generated or subsequently treated, stored, or disposed.³⁶

This definition of pollution prevention was controversial, however, because technically it could encompass treatment and off-site recycling. Although treatment and off-site recycling can reduce waste’s toxicity and volume, they do not necessarily result in less waste entering the environment because both methods generate waste residuals that ultimately require disposal.

2. Source Reduction

Because of the controversy surrounding waste minimization, pollution prevention was subsequently defined to include only *source reduction*, thus excluding treatment and off-site recycling.³⁷ *Source reduction* is defined as any practice which: (i) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and (ii) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.³⁸

Toxic chemical use substitution is a form of source reduction that occurs when toxic chemicals are replaced by less harmful chemicals in industrial processes.³⁹

²⁹ Lois Ember, *Strategies for Reducing Pollution at the Source are Gaining Ground*, CHEM & ENG’G NEWS, July 8, 1991, at 7, 8.

³⁰ Johnson, *supra* note 17, at 154.

³¹ By establishing a market-based trading scheme for certain acid rain pollutants, The Clean Air Act Amendments, 42 U.S.C. §§ 7661-7661f (1991) (enacted Nov. 15, 1990), attempt to encourage voluntary reductions in air discharges. See *id.* § 7651b. For a discussion of the market-based approach of Title IV, see generally Norman Fichthorn, *Command and Control vs. The Market: The Potential Effects of Other Clean Air Act Requirements on Acid Rain Compliance*, 21 ENVTL. L. 2021 (1991).

³² Copeland, *supra* note 20, at 2171.

³³ Alan Miller, *Cleaning the Air While Filling Corporate Coffers: Technology Forcing and Economic Growth*, 1990 ANN. SURV. AM. L. 69, 78.

³⁴ Johnson, *supra* note 17, at 153.

³⁵ Waste minimization was first proposed as a pollution control method in the Hazardous and Solid Waste Amendments of 1984 (HSWA), Pub. L. No. 98-616 (codified as amended in scattered sections of 42 U.S.C.).

³⁶ U.S. CONGRESS, OFFICE OF TECHNOLOGY ASSESSMENT, SERIOUS REDUCTION OF HAZARDOUS WASTE: FOR POLLUTION PREVENTION AND INDUSTRIAL EFFICIENCY 160 (1986) (citation omitted).

³⁷ Although pollution prevention is not defined in the Pollution Prevention Act of 1990, the Act’s definition of source reduction makes it clear that treatment and off-site recycling are not intended to be pollution prevention techniques. 42 U.S.C. § 13102(5).

³⁸ Pollution Prevention Act of 1990, 42 U.S.C. § 13102(5)(A).

³⁹ U.S. EPA, *supra* note 1, at 7.

B. Pollution Prevention Techniques

Pollution prevention techniques reduce the volume and toxicity of pollution generated by encouraging changes in materials selection, product design, and manufacturing processes.⁴⁰ Five techniques are used to reduce hazardous waste generation in industrial operations:

- 1) equipment or technology modifications, such as equipment modernization, to ensure clean, efficient operation;
- 2) process or procedure modifications, such as materials reuse within a manufacturing process;
- 3) reformulation or redesign of products, such as eliminating the need for toxic chemicals in a manufacturing process;
- 4) substitution of raw materials, such as substitution of nontoxic chemicals for toxic chemicals (toxic chemical use substitution); and
- 5) improvements in housekeeping, maintenance, training, or inventory controls, such as preventative equipment maintenance, that produce more efficient operations and improved materials handling.⁴¹

C. Federal Pollution Prevention Policy

1. The Hazardous and Solid Waste Amendments of 1984

Federal pollution prevention legislation first emerged in 1984 when the Hazardous and Solid Waste Amendments (HSWA) were enacted.⁴² The amendments created a "land ban," which restricted the disposal of certain hazardous materials. The land ban indirectly encouraged pollution prevention by increasing the cost of hazardous waste disposal.⁴³ HSWA also added Section 3002(a) to the Resource Conservation and Recovery Act (RCRA).⁴⁴ This section requires hazardous waste generators who ship waste off-site to certify:

(1) that they have a hazardous waste minimization program in place to reduce the volume and toxicity of their waste "to the degree determined by the generator to be economically practicable;" and (2) that the proposed method of treatment, storage, or disposal of their waste is that practicable method currently available to the generator "which minimizes the present and future threat to human health and the environment."⁴⁵ HSWA also requires hazardous waste generators to file biennial reports stating the efforts they have made to reduce the volume or toxicity of hazardous waste generated and the changes in volume or toxicity actually achieved.⁴⁶

HSWA's pollution prevention initiatives, although innovative, did not successfully encourage industry to adopt pollution prevention. HSWA did not impose affirmative duties on hazardous waste generators to commit to specific degrees of pollution reduction or use specific pollution prevention techniques.⁴⁷ In addition, compliance with the certification requirements was discretionary, because the generator determined what was "economically practicable" without EPA review.⁴⁸

2. The Pollution Prevention Act of 1990

EPA's most aggressive pollution prevention initiative was the Pollution Prevention Act of 1990. The Act established:

- A pollution prevention hierarchy which declared pollution prevention to be the nation's primary strategy for dealing with pollution.
- A Pollution Prevention Office, located within the EPA and independent of the media-specific programs, to develop and implement a strategy to promote source reduction.
- A grant program which enables states to obtain EPA matching grants for providing source reduction technical assistance to businesses.
- A Source Reduction Clearinghouse to compile information on source reduction and make it available to the public.

⁴⁰ Irwin, *supra* note 12, at 15.

⁴¹ Pollution Prevention Act of 1990, 42 U.S.C. § 13102(5)(A). See also Johnson, *supra* note 17, at 157.

⁴² Pub. L. No. 98-616 (codified as amended in scattered sections of 42 U.S.C.).

⁴³ Hazardous waste treatment and disposal costs have risen as much as 300% over the past decade because of RCRA's ban on land disposal of hazardous waste, minimum technology requirements for hazardous waste units, and limited treatment and disposal capacity. U.S. EPA, *Pollution Prevention Strategy*, 56 Fed. Reg. 7849, 7853 (Feb 26, 1991) [hereinafter *Strategy*]

⁴⁴ 42 U.S.C. §§ 6901-6992k (1991).

⁴⁵ *Id.* § 6922(b).

⁴⁶ *Id.* § 6922(a)(6)(C)-(D).

⁴⁷ Johnson, *supra* note 17, at 168.

⁴⁸ *Id.* at 167-68.

The Pollution Prevention Act's main objective is to encourage industry to voluntarily adopt pollution prevention programs. The Act also contains mandatory source reduction reporting requirements. For example, Section 7 requires each owner and operator of a facility that is required to file a toxic chemical release form under Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA)⁴⁹ to report information regarding the source reduction and recycling activities it has undertaken in the previous year for each such toxic chemical.⁵⁰ The EPA makes this information available to the public through the Pollution Prevention Information Clearinghouse (202-260-1023). This public notification procedure is intended to pressure companies into voluntarily adopting pollution prevention measures.

3. EPA's Pollution Prevention Strategy

The EPA has established new pollution prevention initiatives since the Pollution Prevention Act's enactment. On February 26, 1991, the EPA published its Pollution Prevention Strategy, which is a "blueprint" for implementing the Act.⁵¹ Like the Pollution Prevention Act, the Strategy focuses is on encouraging industry to voluntarily adopt pollution prevention measures. For example, the Strategy introduced the Industrial Toxics Program (33/50 Program) that attempts to commit companies to voluntarily reduce their emissions of 15 to 20 toxic chemicals by 33% by the end of 1992 and 50% by the end of 1995.⁵² The Strategy indicates that the EPA intends to integrate pollution prevention into its media-specific programs through techniques such as:

- incorporating pollution prevention into administrative and civil settlements;⁵³

- allowing "credit" for early reductions of toxic air emissions under the CAA;⁵⁴
- promoting cost-effective alternatives to conventional treatment alternatives in negotiated or reissued permits;⁵⁵
- using regulatory flexibility to encourage pollution prevention's adoption, such as streamlining the regulatory and administrative procedures for testing and applying pollution prevention technologies;⁵⁶ and
- examining the federal procurement process so that product specifications foster products and processes that incorporate pollution prevention.⁵⁷

The Pollution Prevention Office will also work with EPA's media-specific offices to coordinate a review of existing statutes, regulations, guidances, and policies to determine whether the programs encourage pollution prevention. The Office intends to substitute programmatic and regulatory incentives in their place when appropriate.⁵⁸

D. State Pollution Prevention Policy

A majority of states currently have some form of pollution prevention legislation in place.⁵⁹ Many of these programs are voluntary and provide only technical assistance and grants. Other programs, however, require companies to conduct pollution prevention planning.

1. Voluntary Pollution Prevention Programs

Connecticut's Environmental Assistance to Business Act,⁶⁰ enacted in 1991, is typical of most state pollution prevention programs. Its goal is to "establish the practice of pollution prevention" as state policy.⁶¹

⁴⁹ 42 U.S.C. §§ 11001-11050 (1992). Toxic chemical release forms are required by § 11023.

⁵⁰ 42 U.S.C. § 13106.

⁵¹ *Strategy*, *supra* note 43.

⁵² As of November, 1992, participation had risen to over 1,000 companies, including Amoco Chemical, Bayer, BASF, Dow Chemical, DuPont, Monsanto, Occidental Chemical, and Union Carbide. U.S. EPA, *POLLUTION PREVENTION NEWS*, at 5, Jan.-Feb., 1993.

⁵³ For example, on August 7, 1990, a consent order was approved in a TSCA administrative enforcement action which required the respondent company to pay a \$30,000 civil penalty and implement a pollution prevention program. The company agreed to purchase and install a solvent recycling system at its manufacturing facility that is intended to reduce more than 50% of its emissions of an unregulated ozone-depleting substance and a probable carcinogen. The company further agreed to implement a leak detection program for tracking fugitive emissions of these two solvents. *Strategy*, *supra* note 43, at 7860.

⁵⁴ Industrial sources can obtain a six-year extension from compliance with Maximum Achievable Control Technology standards under the Clean Air Act if they: (1) achieve reductions of 90-95% below a baseline year before such standards are proposed, or (2) enter into enforceable commitments to achieve such reductions by January 1, 1994. *Id.* at 7859.

⁵⁵ *Id.*

⁵⁶ *Id.*

⁵⁷ David Stephan & John Atcheson, *The EPA's Approach to Pollution Prevention*, *CHEM. ENG'G PROGRESS*, June 1989, at 53, 55.

⁵⁸ *Id.*

⁵⁹ See WRITAR, *supra* note 5.

⁶⁰ CONN. GEN. STAT. ANN. APP. Pamphlet, P.A. 91-376 (1992).

⁶¹ WRITAR, *supra* note 5, at 10.

To that end, the Act establishes an Environmental Business Assistance Program to provide businesses with technical assistance in pollution prevention. It also establishes an Environmental Assistance Revolving Loan Fund that will provide loans to businesses interested in adopting pollution prevention.⁶² However, the Act does not contain mandatory pollution prevention planning requirements, and, like the federal Pollution Prevention Act, it encourages companies to adopt pollution prevention only by providing grant money and technical assistance.

2. Mandatory Pollution Prevention Programs

In addition to establishing technical assistance and grant programs,⁶³ other states have enacted aggressive pollution prevention statutes that mandate facility-wide pollution prevention planning or set specific state-wide source reduction goals. Some of these programs are described below.

Washington

Washington has one of the most aggressive state pollution prevention statutes.⁶⁴ Large-quantity hazardous waste generators and users were required to prepare a plan by September 1, 1992, for voluntarily reducing their hazardous waste generation and hazardous substance use.⁶⁵ The plans were to contain a number of items, including:

- a description and analysis of current reduction techniques;
- options to be implemented;

- specific performance goals for the reduction or elimination of hazardous substance use and generation;
- documentation of current or completed reduction practices; and
- a summary of further reduction or treatment opportunities and impediments to their implementation.⁶⁶

These plans must be updated every five years and progress reports must be filed each year.⁶⁷ The Washington Department of Ecology (DOE) may review the plans for compliance and impose penalties if they are deficient.⁶⁸ Washington's statute is noteworthy because it allows any ten people living within ten miles of a hazardous user or generator to petition the DOE to review the adequacy of a facility's plan.⁶⁹ The Act also provides businesses with technical assistance.⁷⁰

Oregon

Oregon also requires all toxics users to develop facility-wide pollution prevention plans and file annual reports.⁷¹ Its statute requires companies to examine their hazardous substance usage and hazardous waste generation, and identify opportunities for pollution prevention.⁷² A company must also develop a schedule for implementing waste reduction options and set specific performance goals for hazardous waste reduction and use.⁷³ After plans are submitted, companies are required to file annual reports, documenting their progress toward each performance goal.⁷⁴ The Oregon Department of Environmental Quality may review the plans and progress reports for adequacy, order a schedule for compliance, and convene a public hearing if the plans are insufficient.⁷⁵ The Act also provides businesses with technical assistance.⁷⁶

⁶² *Id.*

⁶³ As of April, 1992, fifteen states had enacted mandatory pollution prevention statutes that required facility pollution prevention planning. See *supra* note 5 (listing states).

⁶⁴ Hazardous Waste and Substance Reduction Act, WASH. REV. CODE § 70.95C.010-.240 (1992) (effective March 21, 1990).

⁶⁵ WRITAR, *supra* note 5, at 67-68.

⁶⁶ *Id.* at 68.

⁶⁷ *Id.* at 69.

⁶⁸ *Id.*

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ Toxics Use Reduction and Hazardous Waste Reduction Act, OR. REV. STAT. §§ 465.003 to .037 (1991). See generally Fred Hansen, *Pollution Prevention Planning: A New Mandate for Oregon's Environment*, ENVTL. FORUM, Sept./Oct. 1989, at 30.

⁷² WRITAR, *supra* note 5, at 50.

⁷³ *Id.*

⁷⁴ *Id.*

⁷⁵ *Id.* at 51.

⁷⁶ *Id.*

Massachusetts

The Massachusetts' Toxics Use Reduction Act⁷⁷ requires large-quantity toxics users to report their toxic substances use and to develop a toxics use reduction plan.⁷⁸ The statute sets a state-wide goal of fifty percent reduction in toxic waste generation by 1997.⁷⁹ Companies are required to plan their toxics use reduction by 1994.⁸⁰ Like the Washington legislation, the Massachusetts' statute allows any 10 residents living within 10 miles of a facility to petition for a review of facility's toxics use reduction plan.

New Jersey

New Jersey's Pollution Prevention Act also established a state-wide goal of 50 percent reduction in hazardous substance use, hazardous substance discharges into the air and water, and hazardous waste generation over five years.⁸¹ The Act creates an Office of Pollution Prevention in the State Department of Environmental Protection to administer the Act. The Act is unique because it plans to integrate air pollution, water pollution, and hazardous waste management programs by linking facility pollution prevention planning with integrated, cross-media permitting.⁸²

E. Arguments For and Against Mandatory Pollution Prevention Programs

Differences among various statutes reflect disagreements over specific content of pollution prevention legislation. The greatest controversy, however, concerns the issue of whether pollution prevention's adoption should be mandatory, as in Washington, or whether it should remain voluntary, as in the federal Pollution Prevention Act.⁸³

1. Arguments Against Such Statutes

Opponents of mandatory pollution prevention statutes argue that ignorance is the greatest barrier to pollution prevention's adoption and once industry learns about

pollution prevention's economic benefits, it will voluntarily adopt pollution prevention on a wide scale.⁸⁴ In their view, pollution prevention statutes should focus on educating industry about pollution prevention's economic benefits through technical assistance and grant money.

These opponents insist that pollution prevention statutes should not mandate adoption of pollution prevention, arguing that mandatory pollution programs will:

- enable the government to dictate industrial production decisions that should be left to industry;
- allow government regulators, who may lack technical expertise, to prescribe specific pollution prevention techniques for specific companies, significantly curtailing industry's waste management options;
- allow competitors to access trade secret information because agency files and enforcement proceedings may be subject to public review;⁸⁵
- be burdensome and expensive for both industry and the government because of compliance and enforcement;⁸⁶
- further impair the poor relationship that currently exists between industry and government environmental agencies, resulting in more resentment and less cooperation; and
- postpone pollution prevention's wide-scale adoption because companies will wait to adopt pollution prevention until mandatory statutes are enacted.⁸⁷

2. Arguments for Such Statutes

Proponents of mandatory statutes argue that educating industry about pollution prevention's economic benefits is not sufficient because the institutional and attitudinal barriers that thwart pollution prevention's wide-scale adoption can only be overcome through mandatory pollution prevention requirements. In this view, mandatory statutes promote wide-scale adoption by

⁷⁷ MASS. ANN. LAWS, Ch. 211, §§ 1-23 (Law. Co-op Supp. 1992).

⁷⁸ WRITAR, *supra* note 5, at 31.

⁷⁹ *Id.* at 30.

⁸⁰ *Id.* at 31.

⁸¹ N.J. STAT. §§ 13:1D-35 to -50 (West 1991). See generally WRITAR, *supra* note 5, at 39.

⁸² WRITAR, *supra* note 5, at 40-42.

⁸³ For a good discussion of the debate concerning mandatory versus voluntary pollution prevention programs, see Johnson, *supra* note 17, at 182-89.

⁸⁴ See *id.* at 183.

⁸⁵ *Id.* at 193.

⁸⁶ Stephan & Atcheson, *supra* note 57, at 53.

⁸⁷ *Id.*

requiring all similarly-situated companies to explore pollution prevention simultaneously⁸⁸ and forcing most companies to adopt some form of pollution prevention.

Proponents claim that mandatory programs would not force companies to adopt specific production changes. Rather, they argue that mandatory statutes would only force companies to consider pollution prevention alternatives. Individual companies would be free to choose the specific pollution prevention techniques adopted. Proponents also argue that statutes could include safeguards that protect companies' trade secrets from disclosure to their competitors. For example, all pollution prevention plans that contain sensitive proprietary information could remain on file at the company, not at the government agency and, therefore, out of the public domain.

Proponents of mandatory pollution prevention statutes also argue that companies do not take voluntary pollution prevention statutes seriously. Proponents claim voluntary statutes fail to give companies the incentive or impetus to adopt or even consider pollution prevention alternatives. Because voluntary statutes lack "teeth," they indirectly reinforce continued reliance on the pollution control techniques imposed on companies by traditional media-specific environmental statutes.

III. Pollution Prevention: Benefits and Barriers

The decision to adopt a corporate pollution prevention program remains voluntary under federal and most state legislation. Why should a company voluntarily adopt pollution prevention?

A. Pollution Prevention Benefits

1. Reduced Disposal and Regulation Costs

Pollution prevention proponents claim that the greatest incentive for adopting pollution prevention is the high cost of waste disposal.⁸⁹ Land disposal, which once cost as little as \$10 per ton, has increased to \$240 per ton.⁹⁰ Companies that prevent pollution at the source can avoid increased waste handling, shipping, and disposal costs as well as the burden of complying with the increasingly complex array of confusing and often conflicting environmental regulations.

2. Reduced Environmental Liabilities

Pollution prevention minimizes a company's potential environmental liability because reduced waste generation means less waste is transported, treated, stored or disposed, decreasing the risk of botched disposal and resultant civil and criminal liability.⁹¹

3. Improved Environmental Image

Proponents claim that pollution prevention can improve a company's environmental image with an American public that is increasingly becoming aware of companies' environmental records or products' environmental impacts.⁹² Companies are subject to public scrutiny, and environmental "blacklisting" can significantly affect their sales.⁹³ Pollution prevention also may enable a company to deflect public criticism should future environmental problems arise.⁹⁴

4. Improved Operating Efficiency

Pollution prevention techniques, by focusing on production processes, materials use, and maintenance changes to reduce the volume or toxicity of pollution that is generated, often result in a more efficient use

⁸⁸ Gail Achterman, *Strategies for Minimizing Hazardous Wastes In Oregon*, 18 ENVTL. L. 901, 907 (1988); John Hodges-Copple, *The Economic Advantages of Preventing Pollution*, BUS & ECON. REV., July-Sept. 1990, at 38.

⁸⁹ LaBar, *supra* note 15, at 33.

⁹⁰ U.S. EPA, WASTE MINIMIZATION: ENVIRONMENTAL QUALITY WITH ECONOMIC BENEFITS, April 1990, at 3.

⁹¹ See Johnson, *supra* note 17, at 160; W. Clearwater & J. Scanlon, *Legal Incentives for Minimizing Waste*, 10 ENVTL. PROGRESS, Aug. 1991, at 169.

⁹² Gallup surveys conclude that more than 75% of U.S. consumers include environmentalism in their shopping decisions. Art Kleiner, *What Does it Mean to Be Green?*, HAR. BUS. REV., July-Aug. 1991, at 38, 39. A July 1989 poll taken for the Michael Peters Group, the world's largest design firm, found that 89% of Americans are concerned about the impact on the environment of the products they purchase, 53% declined to buy a product over the past year out of concern for the effects the product or its packaging might have on the environment, and nearly 80% are willing to pay more for a product that is packaged with recyclable or biodegradable materials. J. Schorsch, *Are Companies Playing Clean With Green?*, BUS. & SOC. REV., Fall 1990, at 6, 8.

⁹³ See G. LaBar, *Totaling Up the Toxics*, OCCUPATIONAL HAZARDS, July 1991, at 27, 31-32.

⁹⁴ See Johnson, *supra* note 17, at 161.

of raw materials and reduced operating expenses for handling, shipping, and disposal.⁹⁵ More efficient production processes can make companies more competitive in both domestic and global markets.⁹⁶

B. Barriers to Adoption of Pollution Prevention

Institutional and attitudinal barriers have resulted in only five percent of American companies voluntarily adopting pollution prevention programs to date.⁹⁷

1. Current Environmental Policy

Media-specific laws foster a "single-pipe culture"⁹⁸ that encourages companies to segregate their environmental activities from their production activities. Compliance staff are often assigned to separate environmental media to ensure compliance with media-specific laws.⁹⁹ These compliance people often do not interact with the production people who are in charge of the production processes that generate the waste. Even in small firms, where one person may be responsible for all environmental compliance, he or she may know more about discharge pipes and legal requirements than production processes. The separation of production people from compliance people makes it very difficult for a firm to adopt pollution prevention because prevention almost always involves modifications in production processes.

2. Industry Distrust of Environmental Agencies

Companies currently distrust federal and state environmental agencies. Companies fear that government will use pollution prevention information obtained

through pollution prevention statutes to mandate specific process changes or to tighten current discharge limits.¹⁰⁰ In addition, costs of complying with the Pollution Prevention Act's reporting requirements are expected to be substantial,¹⁰¹ increasing industry's opposition to government-initiated pollution prevention.

3. Industry Inertia

Companies continue to depend on end-of-pipe control methods because these methods: (1) tend to achieve compliance with environmental laws and satisfy government regulators; (2) represent a significant capital investment¹⁰²; and (3) are already in place and do not require production changes. In addition, companies can pass their increased waste disposal expenditures, environmental liabilities, and raw material costs on to their customers.¹⁰³ Pollution prevention, on the other hand, appears risky. To many companies, the initial investment in pollution prevention does not appear to outweigh its long-term benefits. Experience indicates however, that the pay-back period for pollution prevention programs is often less than one year.¹⁰⁴

Some firms may resist incorporating pollution prevention techniques into their production processes because it could alter their standard operating procedures. For example, in companies where production people are segregated from environmental compliance people, pollution prevention may be seen by production people as a challenge to their "turf."¹⁰⁵ Companies may also resist adopting pollution prevention because it might necessitate product changes that could affect their products' quality, integrity, or marketability. Companies that contract with the government may

⁹⁵ See Hodges-Copple, *supra* note 88, at 38.

⁹⁶ For example, Japan's Clean Japan Center, a government-sponsored waste control institute, coordinates various industrial efforts in pollution prevention. France's Environmental Ministry is considered to be the world leader in promoting waste reduction efforts. Since its inception in 1979, it has provided subsidies for developing and installing waste reduction technologies. N. Baska & D. Vagi, *Waste: An Ounce of Prevention*, CHEM. ENG'G, Aug. 15, 1988, at 34. A 1982 survey of 200 French companies with waste reduction programs showed energy savings in 51% of the companies, raw material savings in 47%, and improved working conditions in 40%. Hirschhorn & Oldenburg, *supra* note 24, at 15.

⁹⁷ Approximately 5% of American companies have comprehensive pollution prevention programs in place. LaBar, *supra* note 15, at 32, 35.

⁹⁸ Manik Roy, *Pollution Prevention, Organizational Culture, and Social Learning*, 22 ENVTL. L. 189, 235-38 (1992).

⁹⁹ *Id.*

¹⁰⁰ E. Lynn Grayson, *The Pollution Prevention Act of 1990: Emergence of a New Environmental Policy*, 22 ENVTL. L. Rep. 10392, 10395 (June 1992).

¹⁰¹ It is estimated that the compliance cost to industry of reporting pollution prevention information will be \$49.5 million the first year and more than \$36 million in subsequent years. *Id.* at 10396.

¹⁰² J. Hirschhorn and K. Oldenburg, *Preventing Pollution is No End-of-Pipe Dream*, ACROSS THE BOARD, June 1987, at 13.

¹⁰³ See Johnson, *supra* note 17, at 163.

¹⁰⁴ The average payback time for 168 waste reduction projects begun in the last three years by Dow Chemical in Midland, Michigan, has been less than one year. For a \$30 million capital investment, over 100 million pounds of waste per year have been eliminated. G. Parkinson, *Reducing Wastes Can Be Cost Effective*, CHEM. ENG'G, July 1990, at 30, 31.

¹⁰⁵ John Sheridan, *Pollution Prevention Picks Up Steam*, INDUSTRY WEEK, Feb. 17, 1992, at 40.

be blocked from adopting pollution prevention if their contracts require compliance with production specifications that conflict with pollution prevention production techniques.¹⁰⁶

4. Industry Ignorance

Ignorance is perhaps the greatest barrier to pollution prevention's wide-scale adoption.¹⁰⁷ Many companies are simply not aware of pollution prevention and its potential economic benefits. This ignorance is reinforced by business and accounting practices that undervalue environmental costs such as bad public relations, long-term liability, or the cost of future regulatory changes.¹⁰⁸

IV. Examples of Pollution Prevention Programs

A handful of U.S. companies have voluntarily instituted pollution prevention programs. For the most part, these companies are large corporations that have the resources to adopt pollution prevention despite the significant barriers that thwart its wide-scale adoption.¹⁰⁹ Successful programs include the following.

Dow Chemical

- Dow instituted its *Waste Reduction Always Pays* (WRAP) program in 1986.
- Toxic chemical releases were reduced by 21%, from 12,252 tons in 1987 to 9,659 tons in 1989. Off-site waste transfers were reduced by 15%, from 2,855 tons in 1987 to 2,422 tons in 1989. Dow's air emissions declined 54% from 1984 levels.¹¹⁰

- In 1990, Dow approved 115 WRAP projects, at a cost of \$13.2 million. First-year savings were estimated at \$18 million with a 125% return on investment. Of the 115 projects, 53 were specifically pollution prevention projects. Those projects had a 109% return on investment.¹¹¹
- In Dow's Pittsburg, California plant, a waste reduction team discovered a way to control a reactant used in the production of agricultural products, eliminating 2.5 million pounds of waste a year and, at capacity production levels, saving an estimated \$8 million a year in raw materials and waste treatment costs.¹¹²
- In 1990, Dow recognized five projects for outstanding pollution prevention achievement. The net savings in raw materials and disposal costs from those five projects was estimated at \$10.5 million.¹¹³

3M

- 3M has operated a pollution prevention program, *Pollution Prevention Pays* since 1975.
- Total savings have been approximately \$530 million from 3,000 projects.¹¹⁴
- Pollution releases and energy use have both been reduced by 50% since 1975¹¹⁵
- An expanded waste reduction effort called 3P Plus was introduced in 1988. 3P is a set of voluntary goals, including a 90% reduction in air, water, and land releases by the year 2000 as well as a 50% reduction in all waste generation.
- 3P has so far eliminated 120,000 tons of air pollutants, 15,600 tons of water pollutants, 410,000 tons of sludge and solid waste, and 1 billion gallons of waste water.¹¹⁶

¹⁰⁶ Larry Edelman & David Rozell, *Oregon's Toxics Use Reduction and Hazardous Waste Reduction Act: A Bellweather for Pollution Prevention Regulation*, 20 *Env'tl. L. Rep.* 10093, 10095 (1990) (quoting U.S. CONGRESS, OFFICE FO TECHNOLOGY ASSESMENT, FROM POLLUTION TO PREVENTION: A PROGRESS REPORT ON WASTE REDUCTION, OTA-ITE-3117 (June 1987).

¹⁰⁷ Johnson, *supra* note 17, at 163-64.

¹⁰⁸ Ember, *supra* note 29, at 15-16.

¹⁰⁹ Small companies are least likely to be able or willing to spend the time and money necessary to adopt pollution prevention; however, they are the companies most likely to benefit from such a program. Johnson, *supra* note 17, at 164.

¹¹⁰ EPA, *supra* note 1, at 59.

¹¹¹ Ember, *supra* note 29, at 12.

¹¹² Sheridan, *supra* note 105, at 37.

¹¹³ *Id.* at 43.

¹¹⁴ Ember, *supra* note 29, at 12.

¹¹⁵ *Id.*

¹¹⁶ Sheridan, *supra* note 105, at 45.

DuPont

- DuPont adopted a pollution prevention program, the *ReSource* program, in 1985.
- Its program reduced DuPont's plastic-waste disposal by fifty million pounds per year through more efficient equipment and process controls and by finding buyers for its off-spec materials.¹¹⁷
- Its Antioch, California plant received an EPA award for reducing hazardous waste by 95% since 1985, resulting in annual waste disposal savings of over \$5.8 million.¹¹⁸

Chevron

- Chevron initiated a program, entitled *Save Money and Reduce Toxics* (SMART) Program, in 1987.
- In its first year, hazardous waste disposal dropped 44%, from 135,000 to 76,000 tons, saving the company \$3.8 million.¹¹⁹
- Its Richmond, California plant received an EPA award for reducing hazardous waste generation by 82% between 1984 and 1989. Chevron's cost savings from the reduction were more than \$1 million.¹²⁰

Union Carbide

- Union Carbide switched from slaked lime to caustic soda to neutralize wastes from one of its silicone plants. This substitution and other pollution prevention measures resulted in a reduction in organic wastes by 50%, a reduction in sludge volume by 75%, and annual savings of approximately \$500,000 per year.¹²¹

Cleo Wrap

- Cleo Wrap replaced organic solvent-based inks with water-based inks in its Memphis, Tennessee, plant, eliminating nearly all hazardous wastes and saving approximately \$35,000 per year in disposal costs.¹²²
- The reduction also enabled the company to eliminate its underground storage tanks, reducing its fire insurance premiums.¹²³

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¹¹⁷ Parkinson, *supra* note 104, at 31.

¹¹⁸ EPA, *supra* note 1, at 51.

¹¹⁹ *Strategy*, *supra* note 43, at 7853.

¹²⁰ *Id.*

¹²¹ Parkinson, *supra* note 104, at 31.

¹²² Hirschhorn & Oldenburg, *supra* note 102, at 12.

¹²³ *Id.*

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