

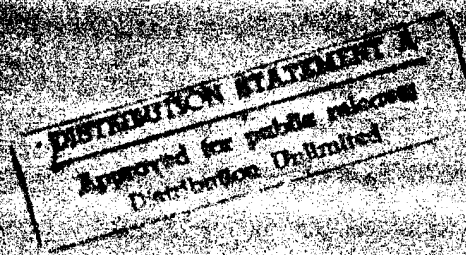
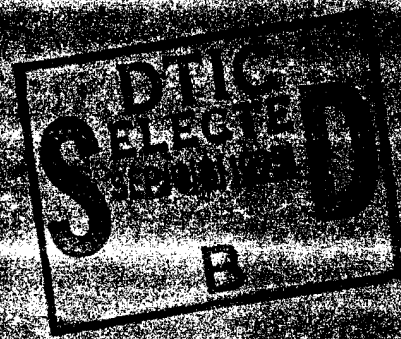
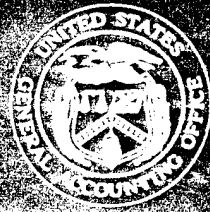


Henry Bonior, House of Representatives

June 1992

# TOXIC SUBSTANCES

## Advantages of and Barriers to Reducing the Use of Toxic Chemicals



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Resources, Community, and  
Economic Development Division

B-248787

June 17, 1992

The Honorable Gerry Sikorski  
House of Representatives



Dear Mr. Sikorski:

Industry releases millions of tons of toxic chemicals into the environment each year. Such releases endanger the environment and human health. The production, storage, transportation, use, and disposal of toxic chemicals similarly pose serious risks to the environment and to the health of workers, consumers, and the public. Although reductions in the use of toxic chemicals in industry and commerce can lower health risks and provide economic and environmental benefits, such reductions can entail costs that industry must consider in deciding whether to reduce the manufacture and use of toxic chemicals. Several states have enacted legislation aimed at reducing the use of toxic chemicals, and recent congressional hearings have addressed the federal role in reducing the use of these chemicals.

As you requested on November 27, 1991, we are examining efforts by industry, the states, and the federal government to reduce the use of toxic chemicals. In May 1992, you requested that we provide you with an interim report on our work to assist in your deliberations in June 1992 on pending legislation that addresses the use of toxic chemicals. As agreed with your office, this interim report furnishes information obtained from state and industry officials and environmental organizations on (1) the environmental and economic advantages of reducing the use of toxic chemicals—known as toxics use reduction, (2) barriers to firms' reducing their use of toxic chemicals, and (3) actions taken by states to encourage firms to reduce their use of toxic chemicals. We have not evaluated the effectiveness of the Environmental Protection Agency's (EPA) efforts to incorporate toxics use reduction into the agency's pollution prevention programs. In a later report, we will address this issue and provide you with information on federal programs that address toxics use reduction and with industry, public interest organization, state, and federal views on actions needed to overcome barriers impeding efforts to reduce the use of toxic chemicals.

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Toxic Substances:  
Advantages of and  
Barriers to  
Reducing the Use  
of Toxic Chemicals*

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## Results in Brief

Reducing the production and use of toxic chemicals could not only lessen the risk of adverse effects on health and the environment resulting from

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exposure to such materials but also benefit some individual industrial firms. In deciding whether to make changes to reduce the use of toxic chemicals, firms will weigh the costs and benefits of any changes before taking action. For example, a firm that decreases the quantity of toxic chemicals that it uses in manufacturing can decrease its costs for controlling and disposing of the waste containing these chemicals. Similarly, a firm that changes its manufacturing processes so that they require fewer toxic chemicals may reduce its costs for raw materials. On the other hand, a firm may incur expenses in changing production processes to improve efficiency or in purchasing substitute chemicals.

Firms have generally endeavored to comply with federal and state pollution control laws by controlling "end of the pipe" releases, rather than by changing production processes or operations to reduce the quantity of toxic chemicals used. A number of barriers have prevented firms from changing their processes or operations. Some firms have not implemented toxics use reduction activities because they have believed either that their processes and operations could not be improved or that efforts to reduce their use of toxic chemicals would require capital investments that would increase costs without increasing profits. Technological and economic barriers have also prevented firms from significantly reducing their use of toxic chemicals. Small and medium-sized firms, in particular, have limited resources for capital investment and research and development to acquire the technology for reducing their use of toxic chemicals.

Although most states have not enacted toxics use reduction legislation, we identified 10 states that have enacted laws promoting toxics use reduction actions. These 10 states, 3 of which we visited, encourage the implementation of measures that they believe are necessary to achieve significant reductions in the use of toxic chemicals. Such measures include (1) developing toxics use reduction plans for industrial facilities, (2) providing technical assistance to help firms identify economically feasible approaches to toxics use reduction, and (3) establishing reporting systems for industrial facilities so that firms' progress in meeting reduction goals can be evaluated. Representatives of states, industry, and environmental organizations whom we interviewed generally agreed on the need for facility planning and technical assistance. While most representatives of states and environmental organizations concurred that reporting by firms is necessary to evaluate progress in reducing the use of toxic chemicals, industry representatives generally were not in favor of external reporting because of their concern about the possible release of proprietary information to competitors and the cost of reporting.

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## Background

According to EPA, traces of toxic chemicals can now be found in nearly every American as a result of exposure to toxic chemicals released into the air, water, and land. Toxic chemicals such as heavy metals and synthetic organic compounds can cause cancer, birth defects, brain damage, and other serious adverse health effects. Reducing or eliminating toxic chemicals in industrial processes and products can directly improve the health and safety of workers, consumers, and the public, as well as reduce the quantity of toxic substances released into the environment.

In the last two decades, the Congress has enacted federal pollution control laws, such as the Resource Conservation and Recovery Act, which is the nation's principal law regulating hazardous waste, and the Toxic Substances Control Act, which regulates toxic chemicals. In addition, title III, section 313, of the Superfund Amendments and Reauthorization Act of 1986 requires some manufacturers to report the release, but not the use, of some 320 toxic chemicals to EPA and the states. The requirement to annually report such releases motivates industry to establish pollution reduction goals. Yet despite federal requirements and related initiatives by most states, millions of tons of toxic chemicals continue to be released into the environment each year. Recognizing the limitations of hazardous waste treatment and disposal, the Congress passed the Pollution Prevention Act of 1990 to encourage industry to prevent or reduce pollution at the source whenever feasible. Any practice that reduces pollutants released into the environment by reducing the amount of the waste at its source is considered to be source reduction.

Recently, toxics use reduction has emerged as a means of achieving source reduction by reducing or eliminating the manufacture and use of toxic chemicals. Toxics use reduction differs from source reduction primarily in its focus. Whereas source reduction focuses on reducing all types of waste at their point of origin, toxics use reduction focuses on reducing or eliminating toxic chemicals in manufacturing and commerce before the chemicals are used to create products and eventually become hazardous waste. Ten states have enacted legislation that clearly focuses on reducing the use of toxic chemicals. Most of these states fund their programs through fees on toxic releases. Some other states have also set limits for toxic chemicals—such as lead, cadmium, and mercury—in packaging and have banned the sale of products whose packaging exceeds these limits.

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## Advantages of Reducing the Use of Toxic Chemicals

Reducing the use of toxic chemicals by changing production processes or operations, or by replacing such chemicals with nontoxic raw materials benefits the public and the environment. As a result of such actions, fewer toxic chemicals are released into the air, water, or land when industrial products are manufactured, used, and disposed of. Toxics use reduction can also benefit industry to the extent that it lowers waste disposal and pollution control costs by eliminating or reducing the use of toxic chemicals.

Toxic chemicals endanger human health not only when they are routinely released as waste into the environment but also when they are handled in the workplace. For example, industrial and agricultural workers are exposed to many toxic substances that can cause cancer and a wide range of other health problems. A 1990 study by EPA's Science Advisory Board attributes 250 work-related cancer cases each year to only four chemicals—formaldehyde, tetrachloroethylene, asbestos, and methylenechloride. However, in June 1991, we reported that EPA's inventory of existing chemicals showed that U.S. industries produced or imported more than 60,000 chemicals.<sup>1</sup> Although some chemicals in the inventory are known to be harmless, the effects of thousands of other chemicals on human health and the environment are not completely understood. Some chemicals, such as asbestos and polychlorinated biphenyls, were in use for years before they were found to cause adverse health effects such as tumors, birth defects, or cancer.

Efforts to reduce the use of toxic chemicals in industrial production hold promise for mitigating some environmental problems. Such problems cannot be remedied solely through pollution control efforts to treat and dispose of the millions of tons of toxic chemicals released into the environment each year. Environmental degradation caused by such releases continues as wastes are treated and moved from one environmental medium—air, water, or land—to another. Such degradation, however, can be avoided or reduced by taking action to prevent pollution at its source—by redesigning production processes, eliminating toxic chemicals, or substituting less toxic for more toxic production materials.

Mounting evidence suggests that industry can also benefit by finding ways to eliminate or reduce toxic chemicals in production processes. We interviewed representatives from 3 states (Illinois, Minnesota, and

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<sup>1</sup>Toxic Substances: EPA's Chemical Testing Program Has Not Resolved Safety Concerns (GAO/RCED-91-136, June 19, 1991).

Oregon); 10 industrial organizations, including 7 manufacturing firms and 3 trade associations; and 2 environmental organizations. The representatives generally agreed that industry can lower costs by reducing its use of toxic chemicals and thereby reducing the need to clean up and dispose of wastes at the end of the production process. For example, EPA's Superfund program has proven that tremendous costs are associated with cleaning up hazardous waste sites. A recent University of Tennessee study estimates that the total cost to industry and other responsible parties associated with cleaning up such sites ranges from about \$100 billion to \$300 billion.<sup>2</sup> Furthermore, according to EPA, industries spend billions of dollars annually to control and abate pollution created through production.<sup>3</sup> Such pollution control costs, according to the representatives of states, industry, and environmental organizations we interviewed, can be lowered substantially through toxics use reduction programs.

Many firms have already realized significant cost savings by reducing their use of toxic chemicals. For example, a medical laboratory in California replaced a toxic organic solvent with a water-based solvent and saved about \$180,000 immediately by eliminating the need for equipment to control emissions of the toxic chemical. A chemical company in New Jersey achieved an annual savings of over \$150,000 by covering holding tanks containing toxic chemicals and thus preventing loss of the chemicals through evaporation. A firm in Oregon that produces parts for computers in the semiconductor industry saves \$300,000 annually and has achieved a 98-percent reduction in waste by spending \$50,000 to implement operational changes and a recycling program. Moreover, a recent study, prepared by a nonprofit research organization, documented that 14 chemical manufacturing plants realized an annual average savings of \$351,000 per source-reduction activity, mostly through changes in processes and operations.<sup>4</sup>

Toxics use reduction may further benefit firms by decreasing the risk of injury, property damage, and legal liability resulting from accidents during the transportation, manufacture, and use of toxic chemicals. For example, in February 1990, a train collision in Montana released toxic chemicals, forcing 3,500 people to evacuate in severe winter weather. In October 1989, a pipeline in Texas carrying toxic chemicals leaked, causing an

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<sup>2</sup>Hazardous Waste Remediation: The Task Ahead, University of Tennessee (Knoxville, Tenn.: Dec. 1991), p. 16.

<sup>3</sup>Environmental Investments: The Cost of a Clean Environment, EPA (Washington, D.C.: Dec. 1990), p. 2-1.

<sup>4</sup>Environmental Dividends: Cutting More Chemical Wastes, INFORM, Inc. (New York, N.Y.: June 1992), p. 19.

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explosion that killed 23 people and caused property damage of over \$500 million. Although major accidents such as these occur infrequently, numerous less catastrophic accidents occur each year, resulting in personal injury, property damage, and legal liability from lawsuits by workers, consumers, and the general public.

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## Barriers Impeding Efforts to Reduce the Use of Toxic Chemicals

U.S. industry legally releases millions of tons of toxic chemicals into the environment each year using the pollution control equipment required by law. Reducing or eliminating the use of these chemicals in industrial processes offers a direct means of reducing the quantity of toxic chemicals released into the environment. However, along with these benefits, costs can be associated with reducing the use of toxic chemicals below currently regulated or actual levels of use. For example, costs can be incurred in purchasing substitute chemicals or changing production processes to improve efficiency. Cost savings occur to industry, therefore, only when the economic benefits to firms, such as reduced costs for purchasing chemicals, exceed the cost increases.

On the basis of our discussions with representatives of states, industry, and environmental organizations, we found that some firms do not take actions to reduce their use of toxic chemicals because they do not believe that such changes are in their best interests. Such firms are reluctant to make capital investments, such as purchasing new equipment that may be needed to make changes in their processes, when the cost-effectiveness of such decisions is uncertain. A study of 29 chemical plants by INFORM, a nonprofit research organization, found that many firms did not pursue waste reduction practices because they did not believe that their processes and operations could be substantially improved or they did not believe that efforts to reduce their use of toxic chemicals would be cost-effective.<sup>5</sup> In testimony before the Subcommittee on Environmental Protection, Senate Committee on Environment and Public Works, the former director of EPA's Office of Toxic Substances stated that such perceptions exist because firms have not examined their operations or performed analyses that could identify ways to improve the efficiency of their processes or operations.<sup>6</sup> Most of the industry representatives we interviewed were also concerned that process changes might adversely affect their product and customer satisfaction.

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<sup>5</sup>Cutting Chemical Wastes, INFORM, Inc. (New York, N.Y.: 1985), p. 139.

<sup>6</sup>Testimony of Warren R. Muir, Ph.D., before the Subcommittee on Environmental Protection, Senate Committee on Environment and Public Works, July 24, 1991.

Furthermore, chemical manufacturing firms may resist changes to reduce the use of toxic chemicals because these firms use toxic chemicals to produce products for resale at a profit. For example, many of the products sold by chemical manufacturing firms for profit, such as many common solvents, are toxic.

Limitations of available technology and technical expertise also create a potential major barrier to firms in reducing their use of toxic chemicals. Although the technology needed to reduce the use of toxic chemicals in some industrial processes may not currently be available, EPA has stated that some firms do not take advantage of available opportunities because they are not aware that technology already exists for eliminating or reducing the use of toxic chemicals.<sup>7</sup> EPA noted that smaller firms, such as garages and dry cleaning operations, are often unaware of their polluting practices and prevention opportunities. State and industry representatives agree that technical assistance is necessary to help these firms overcome such barriers.

## States' Toxics Use Reduction Efforts

According to an April 1992 nonprofit research organization study summarizing state pollution prevention legislation, 26 states now have legislation aimed at preventing pollution.<sup>8</sup> From this study we identified 10 states that have clearly promoted reductions in the use of toxic chemicals as a goal. (App. I lists these states.)

Legislation passed by these states provides measures to help achieve significant reductions in the use of toxic chemicals. Such measures include (1) planning by firms to identify opportunities and establish goals for reducing the use of toxic chemicals, (2) technical assistance programs to help industry—especially small and medium-sized firms—identify and realize opportunities for toxics use reduction, and (3) reporting systems that enable firms and the public to evaluate progress in reducing the use of toxic chemicals. Representatives of states, industry, and environmental organizations to whom we spoke generally agreed that facility planning and technological assistance were needed. As discussed below, state and environmental organization representatives also generally agreed that reporting by facilities was necessary, while industry representatives generally did not endorse external reporting.

<sup>7</sup>U.S. Environmental Protection Agency Pollution Prevention Strategy, EPA (Washington, D.C.: Jan. 1991), p. 19.

<sup>8</sup>Survey and Summaries of State Legislation Relating to Pollution Prevention, Waste Reduction Institute for Training and Applications Research, Inc. (Minneapolis, Minn.: Apr. 1992).

Representatives of states, industry, and environmental organizations told us that requiring firms to plan for reducing the use of toxic chemicals can provide an effective mechanism for identifying toxics use reduction opportunities. Because firms must examine and evaluate their production processes and operations in order to develop plans, firms are likely to identify opportunities for improving their processes and operations and reducing their use of toxic chemicals. For example, most of the firms we visited had identified opportunities for improving their operations through the self-evaluation they had performed in developing such plans.

The representatives of states, industry, and environmental organizations whom we contacted generally agreed that technical assistance, and sometimes financial assistance, is necessary for a successful toxics use reduction program. All 10 of the states with legislation that clearly promotes toxics use reduction have established technical assistance programs to help industry. The state and industry officials with whom we spoke pointed out that small and medium-sized firms often do not have the resources to identify technology that may already exist or to modify processes at additional expense solely to reduce the use of toxic chemicals. Consequently, without technical assistance and, in some cases, financial assistance, such firms are not likely to recognize or implement process or product changes that could reduce their use of toxic chemicals.

Likewise, the representatives of states and environmental organizations told us that requiring firms to report on their progress in reducing the use of toxic chemicals is needed to provide states, firms, and the public with a way to evaluate the actions firms have taken to reduce their use of such chemicals. Representatives of industry generally did not endorse external reporting because of concerns about the possible release of proprietary information to their competitors and the potential cost and burden of reporting.

Our work also shows that some states have recognized the need for regulatory initiatives when market incentives have promoted the production and use of toxic chemicals. Fifteen states fund their pollution prevention programs from fees or fines assessed on firms, including 8 of the 10 states with legislation clearly promoting toxics use reduction. For example, Oregon, one of the three states we visited, assesses fees on the basis of the quantity of toxic chemicals firms use. Several states have also enacted laws setting limits on the amount of toxic chemicals, such as lead, cadmium, and mercury, that can be present in the packaging of products sold to consumers. Other states are considering similar legislation.

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## Observations

Although toxics use reduction offers substantial benefits to human health, the environment, and, in many cases, to industry, firms have been slow to reduce their use of toxic chemicals because of the barriers to change. The information we obtained from representatives of states, industry, and environmental organizations and from studies and reports on toxics use reduction suggests that certain measures can help achieve significant reductions in the use of toxic chemicals. Such measures include (1) developing toxics use reduction plans for industrial facilities and (2) providing technical assistance to help individual firms, especially small and medium-sized firms, identify economically feasible approaches to reducing their use of toxic chemicals. While the representatives of states and environmental organizations we contacted generally agreed that reporting systems are needed so that government agencies and the public can evaluate firms' progress in meeting toxics use reduction goals, industry representatives generally did not favor external reporting. In a later report, we will provide you with information on federal programs that address toxics use reduction and with industry, public interest organization, state, and federal views on the actions needed to overcome barriers impeding toxics use reduction efforts.

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Our work was performed between November 1991 and June 1992 in accordance with generally accepted government auditing standards. The scope and methodology of our review are discussed in appendix II. We discussed the facts in this report with EPA officials knowledgeable about the issues. These officials generally agreed with the information presented, and their views have been incorporated in the letter where appropriate. However, as requested, we did not obtain written agency comments on this interim report.

Unless you publicly announce its contents earlier, we plan no further distribution of this report for 30 days from the date of this letter. At that time, we will send copies of the report to the appropriate congressional committees; the Administrator, EPA; and the Director, Office of Management and Budget. We will make copies available to others on request.

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Should you have any questions, please contact me at (202) 275-6111. Major contributors to this report are listed in appendix III.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Richard L. Hembra".

Richard L. Hembra  
Director, Environmental Protection  
Issues



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## Abbreviations

EPA	Environmental Protection Agency
GAO	General Accounting Office



# State Legislation That Clearly Promotes Programs to Reduce the Use of Toxic Chemicals

<b>State</b>	<b>Date enacted</b>
Arizona	1991
Illinois	1989
Indiana	1990
Maine	1990
Massachusetts	1989
Minnesota	1990
New Jersey	1991
Oregon	1989
Vermont	1990
Washington	1990

Source: GAO presentation of information obtained from an April 1992 nonprofit research organization study that summarizes existing state pollution prevention legislation. We did not review states' pollution prevention legislation.

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# Scope and Methodology

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We performed our work from November 1991 to June 1992 in accordance with generally accepted government auditing standards. Our objectives were to determine (1) the environmental and economic advantages of toxics use reduction, (2) barriers impeding firms' implementation of reduction programs, and (3) actions taken by certain states to encourage firms to reduce their use of toxic chemicals.

To identify the advantages and barriers associated with reducing the use of toxic chemicals in industrial processes, we interviewed pollution prevention program officials in 3 states (Illinois, Oregon, and Minnesota) that had enacted legislation specifically promoting toxics use reduction. We also interviewed officials from 10 manufacturing firms and industry organizations located in 2 of these states (Minnesota and Oregon). In addition, we obtained information on state and industry toxics use reduction programs, actions, and concerns from various sources representing states, industry and environmental groups and from public and private-sector research firms.

To determine significant actions that states have taken to encourage firms to reduce their use of toxic chemicals, we interviewed officials responsible for pollution prevention programs in the three states included in our review. We also reviewed documents detailing these states' programs. In addition, we reviewed studies and reports summarizing state legislation concerning pollution prevention but did not review the legislation itself.

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