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Guides to Pollution Prevention

Municipal Pretreatment Programs

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Municipal Pretreatment Programs

U.S. Environmental Protection Agency

Office of Research and Development
Center for Environmental Research Information
Cincinnati, Ohio

Notice

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Chapter 1
Introduction

With the enactment of the Pollution Prevention Act of 1990, Congress formally established pollution prevention as a national objective, placing it ahead of waste recycling, treatment, and disposal in the hierarchy of environmental management methods. The Act directs the U.S. Environmental Protection Agency (EPA) to integrate pollution prevention concepts fully into all its regulatory programs. A preventive approach to environmental protection can lead to improvements in environmental quality and economic efficiency by reducing harmful pollutants at the source through cost-effective changes in production, operation, and raw material use. This approach changes the focus from managing waste after it is generated to eliminating or minimizing the problem before it occurs.

EPA defines pollution prevention as waste reduction prior to recycling, treatment, or disposal. Recycling conducted within a process, such as closed loop rinsewater recycling, is also considered pollution prevention. Waste recycling, which takes place outside the process, is not considered pollution prevention, although when conducted in an environmentally safe manner it achieves the same goal as pollution prevention by reducing the need for treatment and disposal.

Pretreatment personnel at publicly owned treatment works (POTWS) can broaden their approach to meeting the goals of the National Pretreatment Program by encouraging pollution prevention measures among sewer users. This guide is designed to assist POTW personnel in formulating strategies for promoting pollution prevention as another tool for meeting the goals of municipal pretreatment programs. The main objective is to help pretreatment program personnel educate industrial users about the benefits of pollution prevention and encourage them to assess and implement pollution prevention in their own operations. Pollution prevention can assist industries in meeting sewer discharge limits and protecting POTW worker health and safety.

This guide provides an overview of pollution prevention concepts (Chapter 2), presents a way to identify and prioritize industries as candidates for pollution prevention (Chapter 3), and outlines a broadly applicable approach to integrating pollution prevention concepts into existing pretreatment programs (Chapter 4). Appendix A contains a comprehensive list of pollution prevention resources. Appendix B is a collection of summaries that identify pollution prevention opportunities in industries of particular concern to POTWS.

Why should POTWS encourage pollution prevention?

POTWS are the recipients of a large portion of the nation's industrial wastewater, receiving discharges from an estimated 30,000 significant industrial users. These industrial users discharge the full spectrum of heavy metals, volatile organics, and other contaminants that can degrade environmental quality and pose health and safety risks to POTW workers. Even if there were full compliance with categorical pretreatment standards, EPA estimates that categorical industrial users would continue to discharge 14 million pounds of toxic metals and 51 million pounds of toxic organic pollutants to POTWS each year (U.S. EPA, 1991 c). Small industrial users, commercial establishments, domestic sources, and storm water also contribute to the waste load received by POTWS.

Personnel at POTWS have many opportunities to encourage industries to adopt pollution prevention measures. More than any other public authority, POTW pretreatment program personnel maintain close contact with local sewer dischargers and have an understanding of their specific industrial process operations and waste streams. Through requiring spill prevention plans and toxic organic management plans (TOMPS) and including best management practice (BMP) conditions in permits, POTWS are already involved in promoting pollution prevention. By further integrating pollution prevention concepts into existing pretreatment program activities, POTW personnel can help industrial and commercial facilities identify pollution prevention opportunities, encourage them to assess these opportunities in greater detail, and, in general, heighten their awareness of pollution prevention as another means of meeting their permit requirements.

Pollution prevention offers substantial benefits to POTWS. By further reducing the quantity and toxicity of user discharges, pollution prevention can help POTWS:

- Meet federal and state environmental quality standards, including sludge disposal requirements, current or future toxic air emission requirements, and National Pollutant Discharge Elimination System (NPDES) permit requirements.
- Reduce the transfer of influent contaminants from one environmental medium (e.g., wastewater) to others (e.g., land, surface and ground water, and air).
- Increase POTW worker safety and reduce collection system hazards from toxic or hazardous gases.
- Further reduce the occurrences of interference and pass-through.
- Reduce expensive sludge management costs.
- Reduce the impacts from dischargers that might view sewers as the answer to their own waste management problems.
- Maintain pollutant loads at levels that will satisfy increasing demands for sewer system services from industrial, commercial, and domestic sectors.

How does a POTW promote the benefits of pollution prevention to businesses?

Industrial and commercial facilities also can benefit from pollution prevention. In many cases, pollution prevention might be the least expensive means of reducing unacceptable toxic discharges. Pretreatment personnel can point out the benefits of pollution prevention to their sewer users. Through pollution prevention, companies can:

- Reduce waste monitoring, treatment, and disposal costs.
- Reduce raw-material use, feed stock purchases, and manufacturing costs.
- Reduce operation and maintenance costs.
- Increase productivity and reduce off-specification products.
- Reduce regulatory compliance costs.
- Reduce hazards to employees through exposure to chemicals.
- Reduce costs of environmental impairment insurance.
- Improve public image and employee morale.
- Reduce potential liability associated with toxic waste.

What are some of the impediments to promoting pollution prevention among sewer dischargers?

In implementing the General Pretreatment Regulations, POTWS should have authority to promote pollution prevention in a number of capacities, such as requiring spill control plans and TOMPS. To incorporate pollution prevention planning or other pollution prevention requirements into permitting and enforcement actions, however, POTWS might need to expand their authority. During inspections, POTW personnel can encourage industrial users to conduct pollution prevention assessments or consider specific types of measures, but it is not advisable to recommend or approve specific measures. By recommending a particular pollution prevention measure, POTW personnel may lead the facility to believe that implementing that measure will guarantee compliance. (See Section 4.1.2.3 for a discussion of issues related to giving pollution prevention advice.)

POTWS might also encounter the following impediments:

- Businesses might have assessed and implemented low-cost pollution prevention techniques already as general operating efficiency and cost-control measures. Furthering pollution prevention might involve unfamiliar techniques that require a more intensive evaluation and more capital. Companies might be skeptical of the potential benefits or might be unwilling or unable to invest the necessary funds.
- Businesses may have a predisposition to control technologies because these are familiar and traditional ways of dealing with waste problems; or a firm might have recently made substantial investments in treatment technologies. In these cases, pretreatment personnel can educate business personnel about how pollution prevention alternatives can increase removal efficiencies and reduce operating and maintenance costs of existing treatment systems.
- POTWS might have difficulty persuading municipal officials that activities promoting pollution prevention are integral to meeting the goals of the local pretreatment program and that funding for pollution prevention initiatives is needed to meet these goals. Training resources and additional support will enhance greatly the ability of the POTW to effectively promote pollution prevention among its users.

What are the key elements to successful integration of pollution prevention into pretreatment programs?

As POTWS begin to incorporate the concepts of pollution prevention into municipal pretreatment programs, success will depend on a few key elements. Each POTW will face unique challenges, both internally and externally, as it moves to integrate pollution prevention into its daily program activities. Regardless of the uniqueness of the challenges faced by each POTW, key elements for succeeding will likely be consistent for all POTWS.

POTWS will increase the chances of successful and, more importantly, effective use of pollution prevention concepts by keeping in mind the following:

- Seek to integrate pollution prevention into existing program activities, rather than viewing the adoption of pollution prevention concepts as an additional program requirement. In this manner, pollution prevention will be incorporated into the program in an efficient manner.

. While every effort should be made by POTWS to integrate pollution prevention into ongoing pretreatment program activities, additional time and resources will be needed to modify existing pretreatment program activities and provide assistance and direction to industrial and commercial sewer users. At first, POTW personnel can slowly phase in changes to existing activities. This approach requires minimal new resources and will allow the pollution prevention mindset to take hold through an evolutionary process. POTW pollution prevention efforts may be eligible for grants available at the federal and state level. POTWS should contact their EPA regional office and state pollution prevention programs (see Appendix A) for information on available grants.

- Define goals and measure success in small, attainable increments. This is especially important- during the initial stages of adopting pollution prevention concepts. This can be best accomplished, as described later, with short-term, narrowly focused efforts that can illustrate the benefits of pollution prevention and build support for a more broadly applied program. Guidance has been developed to assist in measuring the success of pollution prevention efforts (U.S. EPA, 1989).

- Provide a wide range of incentives to industrial and commercial sewer users to adopt pollution prevention as part of their environmental control programs. These incentives should cover the wide range of options and use the authorities available to the POTW. Public recognition programs that use some type of “green industry” moniker can be used. In addition, the POTW can use enforcement discretion, which is inherent in a pretreatment program, to provide incentives to pursue pollution prevention projects. Regardless of the nature of the incentives used, they can be effective tools for persuading sewer users to investigate pollution prevention measures.

Chapter 2
Overview of Pollution Prevention Concepts

Pollution prevention encompasses both source reduction and in-process recycling. The Pollution Prevention Act of 1990 defines source reduction as any practice that reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream (including fugitive emissions) prior to recycling, treatment, or disposal, and that reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants. The Act declares that governments, businesses and industries, and individuals should prevent or reduce pollution at its source wherever feasible. Where source reduction cannot be achieved, the Act advocates that responsible parties reuse and recycle to reduce the quantity of hazardous waste requiring treatment. If there are no feasible pollution prevention alternatives, environmentally sound treatment should be applied with disposal used only as a last resort. Techniques that merely transfer contaminants from one medium to another without a net reduction in the quantity and toxicity of hazardous constituents do not meet the definition of pollution prevention. This chapter describes and gives examples of the various pollution prevention measures encompassed in source reduction and recycling. Pollution prevention techniques related to specific industries are described in Appendix B.

2.1 Source Reduction

Source reduction lessens or eliminates the quantity of hazardous and toxic wastes generated and the expense and environmental impacts associated with managing these wastes. In addition, source reduction usually results in significant cost savings realized from raw material conservation. Source reduction encompasses good operating practices, technology changes, input material substitutions, and product changes (see Figure 2-1).

2.1.1 *Good Operating Practices*

In general, industries can realize a high return from a minimal investment by implementing good operating practices. Good operating practices are procedural, administrative, and institutional measures, which include improving inventory control, preventing accidental spills, segregating waste streams, and scheduling production runs that maximize production and minimize waste. Getting management to commit to pollution prevention is a first step toward instituting an effective source reduction program. This commitment might be demonstrated by a written policy statement circulated to company employees and posted in visible locations and by encouraging employees to adopt the principles of pollution prevention. Demonstrating management's dedication to pollution prevention and its importance to company operations can galvanize the work force and help employees view pollution prevention as a priority in their everyday work activities. Other management and personnel practices, such as employee training, incentives, and bonuses, also can encourage employees to reduce waste.

Maintaining an orderly inventory system and proper storage conditions can greatly reduce material waste from deterioration, inefficient use, and spills. For example, an inventory system that employs a "first-in/first-out" management method and keeps a 1- or 2-month supply of materials is less likely to result in material disposal because of product expiration. Implementing a materials tracking system that tracks material use by individual employees or work groups allows managers to identify individuals or production teams with above-average materials use. Using tight-fitting lids and spill-proof containers with spigots, minimizing traffic, and employing proper environmental controls in storage areas also will extend material supplies and prevent spills. Frequent inventory inspections will result in early detection of leaks and spills.

Other good housekeeping practices include containing and reusing materials dripped from parts as they are transferred during a process and providing funnels or other equipment that avoids spills when transferring materials. Regularly scheduled preventative maintenance reduces the occurrence of malfunctions and leaks, which will reduce the volume of wastes discharged to the sewers. Modifying production schedules to minimize required equipment changeovers will reduce the quantity of wastes generated by

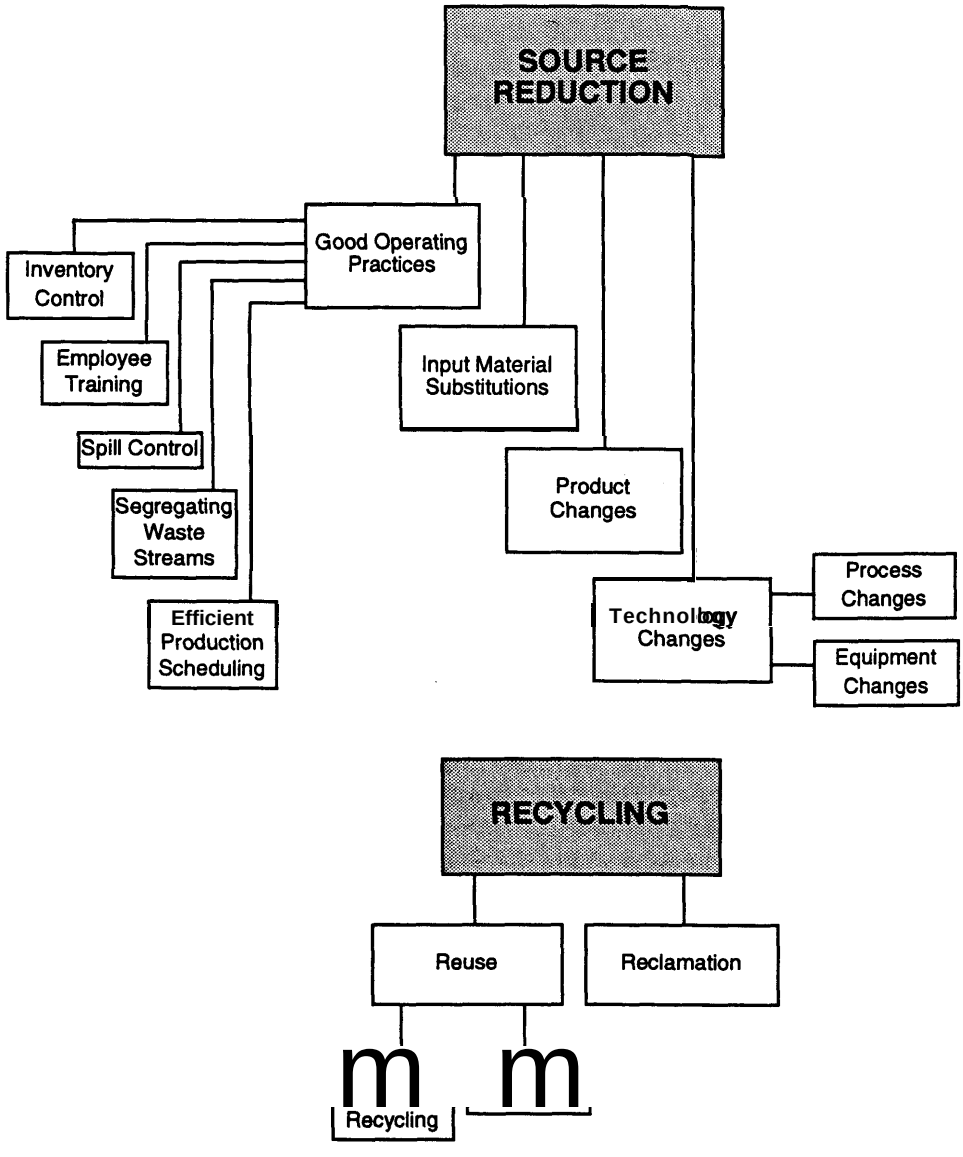


Figure 2-1. Pollution prevention.

equipment cleaning. Segregating hazardous and nonhazardous waste streams avoids making the entire waste stream hazardous and reduces the volume of waste requiring treatment or costly disposal. Also, maintaining separate waste streams can enhance the industry's ability to reuse or reclaim waste materials. For example, by not mixing two different spent solvents, the purity of the waste materials is maintained, making recycling easier.

Another action, often overlooked, is examining the cleaning products (e.g., cleaners, degreasers, and floor finishes) used by a company to determine whether they are contributing to the toxic loadings in wastewater when discharged through sink and floor drains. Cleaning products with toxic constituents can be replaced with substitutes that do not contain harmful elements. A good housekeeping program should include a review of the cleaning products used in house.

Many companies use good operating practices as a first step toward reducing toxic materials use; for example:

A large consumer product company in California adopted a corporate policy to minimize hazardous waste generation. To implement the policy the company created qual`ity circles made up of employees from each area that generated hazardous waste within the plant. With their considerable knowledge of particular manufacturing and administrative procedures, these quality circles were able to suggest a number of institutional changes, such as the adoption of proper maintenance procedures. The teams supervised the implementation of these procedures in their own production areas. The use of proper maintenance procedures alone led to a 75 percent reduction in hazardous and nonhazardous waste generation (U.S. EPA, 1988).

2.1.2 Technology Changes

Technology changes can range from minor modifications to existing processes, to major investments in new manufacturing equipment. Technology changes involve changes in any of the following areas:

- Production processes.
- Equipment, layout, or piping.
- Use of automation.
- Process operating conditions, such as flow rates, temperatures, pressures, and residence times.

Production processes can be modified to eliminate the need to change over equipment if a unit can be dedicated to one process. Mechanical methods can be used in lieu of solvent use for cleaning and stripping parts. Various process changes can be implemented to reduce drag-out of process solutions, including adjusting the speed of withdrawal of the part from the process solution, allowing more time for the part to drip, and positioning the part to maximize runoff of the solution.

Many companies have experimented with technology changes to prevent pollution. Here are just a few examples:

Hill Air Force Base, in Ogden, Utah, strips paints from its aircraft with plastic bead "sand blasting," rather than using more traditional toxic solvents. The Air Force base can use the plastic beads over and over. In 1986, the Air Force base estimated that, for each plane, mechanical stripping saved 302 person hours, $5,076 in raw materials, $935 in disposal costs, $1,485 in wastewater treatment costs, and $104 in energy costs (Sherry 1988b).

In July 1989, Ford Motor Company in Plymouth, Michigan, implemented a cyanide-free, no-rinse chromate coating process for its aluminum parts. The previous chromate coating process produced 14,000 to 17,000 gallons of wastewater per day which was sent to the plant's pretreatment facility The pretreatment process produced waste sludge containing between 0.1 to 0.5 percent total cyanide, which exceeds allowable limits for disposal in landfills. The no-rinse system produces only 3,000 gallons of wastewater per day has eliminated all forms of cyanide from the process and wastewater sludge, and achieves superior coating application results. Ford has realized savings in reduced pretreatment costs and elimination of cyanide-contaminated sludge disposal costs. Ford has since implemented the no-rinse system in three other plants (U.S. EPA, 1991a).

New Dimensions Plating, Inc., in Hutchinson, Minnesota, electroplates a variety of metals with chromium, copper and nickel. Although New Dimensions was meeting current pretreatment regulations, the facility decided to investigate drag-out reduction techniques in order to reduce pretreatment costs. To reduce chromium drag-out, New Dimensions constructed drip bars to allow for greater drip time. The facility also constructed several evaporators to reduce the volume of water in the plating and stagnant rinse tanks to allow all of the spray rinse solution and some of the rinsewater to be returned to the rinse tank each day Recovered drag-out solutions pass through an electropurification module to remove contaminants before returning to the original plating bath. As a result of the new plating system, chromium drag-out has been reduced from 7 pounds per day to 1 pound per day New Dimensions has benefitted from reduced chromium content in pretreatment sludge and savings of $7,000 annually in reduced chromium and treatment chemical purchases (MPCA and WLSSD, 1992).

2.1.3 Input Material Substitutions

This technique involves replacing the input material that contains a problem pollutant with a different material that performs the same function without generating a toxic or hazardous waste. Input material substitutions reduce or eliminate the problem pollutants that enter the production process. Input modifications that avoid the generation of problem wastes during production also fall under this source reduction category. Process changes might sometimes be required to accommodate input material changes. Examples of input material substitution include:

United Piece Dye Works of Edenton, Norfh Carolina, met stringent effluent discharge limits on phosphorous by making chemical substitutions in the production process rather than building expensive treatment systems. The company conducted a detailed evaluation of production processes, process chemistry and the chemicals used to identify sources of phosphorus. It then made process modifications to reduce use of phosphate chemicals by substituting chemicals not containing phosphate. For example, the use of hexametaphosphate was reduced and the use of phosphoric acid was eliminated. These chemical substitutions reduced the level of phosphorus in the company's wastewater from 7.7 mg/l to less than 1 mg/l. This reduction was achieved without any capital expenditures for phosphorus removal (PPIC, 1992).

IBMs Research Triangle Park plant in Durham, North Carolina, established an active program to reduce the generation of waste through material substitutions and process modifications. IBM eliminated the discharge of wastewater containing toxic biocides by using ozone rather than biocides to control algae and bacterial growth in cooling towers. This substitution has eliminated the presence of toxic biocide concentrations

in the plant's *wastewater and hence reduced IBM's* **pretreatment** *costs. IBM estimates it saves $120,000 per year in sludge dewatering costs alone (PP/C, 1992).*

In an effort to reduce chrome concentrations in wastewater Granite State Leathers modified its leather tanning process to accommodate a new tanning agent, which contains roughly two-thirds less chromic oxide than the previous tanning agent. In addition, the need for chrome retanning has been eliminated because chrome retention in the first tanning wash is 10 times better The concentration of chromic oxide in the wastewaters has been reduced from about 10 ppm to less than 1 ppm. Granite State estimates it saves between $40,000 and $50,000 per year in avoided wastewater treatment costs (PPIC, 1992).

Garnkonst Metalworking Company in Landskrona, Sweden, implemented material substitutions in one process to make possible a material substitution in another process. Garnkonst replaced mineral oil-based metalworking fluids with a vegetable oil-based substitute. This substitution allowed the facility to substitute an alkaline detergent solution in place of toxic trichloroethylene and mineral solvents for parts decreasing. The substitutions have reduced trichloroethylene and mineral solvent concentrations in air and wastewater dramatically. The switch to *vegetable-based oil from mineral oil saves $5,000 per year in material costs and the company saves $59,000 annually in avoided trichlorethylene waste-management costs (PPIC, 1992).*

2.1.4 ***Product Changes***

A **final** source reduction technique consists of product modifications. By altering the product in such a way that the problem pollutant is no longer required in the production process, businesses can eliminate generating the problem waste. Product modifications also can reduce environmental releases of problem pollutants related to the use of a particular product. Product change generally falls into one of three categories: product substitution (e.g., an entirely new product); changes in product composition (e.g., minor modification to an existing product); and product conservation (e.g., increasing the working life of an existing product). Examples of product changes include:

The paint manufacturing industry has taken steps to reformulate its products to reduce hazardous constituents. Paint manufacturers have continued to improve water-based paints and find applications for them that were previously dominated by solvent-based paints. Water-based paints do not contain toxic or flammable solvents that contribute to the potential hazards of solvent-based paints. The use of water-based paints eliminates discharge to sewers of volatile organics in rinse water from production-line cleaning operations. In addition, volatile organics are not released to the atmosphere by water-based paints (U.S. EPA, 1988).

In 1988, at its Waltham, Massachusetts, plant, Polaroid began manufacturing batteries without mercury These batteries are imbedded into film packs. Although eliminating the mercury in the batteries reduces s/ightfy the voltage and the she/f life of **the** *batteries, these changes in product attributes do not affect product performance. Polaroid originally made this change to the product at other plants in response to regulations in another country that forced them to remove the mercury. At the Waltham p/ant, mercury in the wastewater from the battery manufacturing process has* **been** *eliminated (MWRA 1992).*

2.2 Recycling

Recycling options involve the reuse and reclamation of spent input materials, such as solvents, detergents, inks, and other chemicals (see Figure 2-1). Reuse substitutes spent input materials for new input materials in the manufacturing process. Reclamation, on the other hand, recovers valuable material from spent input materials for incorporation in some other process or product. Recycling can be integrated within the process through a closed loop system or can be conducted separately, using centralized onsite waste recycling systems or commercial materials recyclers. Waste reprocessed or reclaimed can be used on site or sold or given to other businesses for use in their operations. Some states maintain networks to facilitate waste exchanges (see Appendix A). The following examples illustrate recycling initiatives:

Mao/a Milk and Ice Cream Company in New Bern, North Carolina, recovers ice cream and milk products for reuse in ice cream products and animal feed. Initial reuse activities in 1986 prevented the loss of over 17,000 pounds of milk and decreased 5-day biochemical oxygen demand (BOD_5*) by 17,000 pounds over a 4-month period. Soon after Mao/a began recovering milk and ice cream wastes, the City of New Bern's treatment plant showed a 14.7 percent reduction in* $B0D_5$ *and a 22.8 percent decrease in suspended solids. The recovery and reuse program also has translated into reduced chemical usage, less sludge accumulation, and reduced power requirements for the New Bern treatment plant. In 1988, Mao/a estimated it saved $24,000 per month in wastewater treatment costs and recovered product. Upon full implementation of the reuse and recovery program, Maola hopes to recover as much as 2,410 gallons per day of ice cream ingredient valued at* $480,000 *annually (PPIC, 1992).*

Kinnear DoorlWayne-Dalton Corporation in Centralia, Washington, mills, joins, and glues wood parts for

building products. The primary waste stream of the wood processing plant is wastewater containing glue wash-down. The company analyzed a number of different options to properly dispose of the wastewater including pretreatment in settling ponds and ultimate treatment at the local POTW The company estimated the cost to dispose of the 2,500 gallons of wastewater generated each month would have totaled $10,000 annually Employees at the plant, however determined that the glue wash-down water could be reused in glue formulation. This discovery eliminated the need for constructing a costly pretreatment system and sending a potentially toxic effluent to the local POTW (U.S. EPA, 1991a).

Many industries conserve water in areas of the country where fresh water is in short supply or where local regulations limit the quantity of effluent discharged to POTWS. Industries employing recycling to achieve water conservation might increase effluent concentrations risking noncompliance with concentration-based effluent limits. To encourage water conservation, some POTWs have implemented mass-based limits that allow a certain mass of toxic discharges over a specified period of time. With mass-based, as opposed to concentration-based, limits, businesses can conserve water while maintaining compliance with discharge . requirements. Section 4.2.1.3 discusses the use of mass-based limits.

In summary, this chapter describes several pollution prevention approaches and presents the experiences-of several industrial and commercial facilities that have successfully applied pollution prevention methods. By communicating the benefits of pollution prevention to owners and operators of industrial and commercial facilities, POTW personnel can motivate facility personnel to seek pollution prevention technical information and assistance. The next chapter outlines a strategy POTW personnel can use to effectively focus efforts to promote pollution prevention at industries and commercial businesses to maximize the beneficial effects on receiving water quality, POTW performance, and worker health and safety.

Chapter 3
Targeting Pollution Prevention Efforts

POTW personnel can promote pollution prevention by integrating new concepts and approaches with existing activities. By making industries aware of the advantages of pollution prevention, POTW personnel will start to shift their thinking from treatment and cross-media pollution transfer to multimedia pollution prevention. The benefits of pollution prevention to pretreatment programs is twofold: (1) to assist in addressing current and anticipated compliance problems, and (2) generally to try to encourage opportunities to reduce toxic loadings to the sewers. The first step a POTW should take is to develop a policy statement that affirms the POTWS commitment to promoting pollution prevention in ail its capacities (see Figure 3-1). Then POTWS should target their pollution prevention efforts on problem contaminants and identify the industrial, commercial, or domestic sources of concern. A relatively small-scale effort focused on one problem contaminant provides a well-defined goal for an initial effort. The experience gained from a small-scale effort can provide the foundation for future expanded pollution prevention efforts. This chapter outlines the preliminary steps POTWS should take to set priorities that maximize the usefulness of pollution prevention efforts (see Figure 3-2). These steps are to (1) identify pollutants of concern (see Section 3.1), (2) identify users that are sources of problem pollutants (see Section 3.2), and (3) prioritize sewer users that could reduce the discharge of problem pollutants through pollution prevention (see Section 3.3).

Pretreatment personnel should consult with other local, state, and federal agencies (e.g., local board of health, local planning and fire departments, state agencies governing pollution and hazardous waste management, and EPA regional offices) before embarking on a full-scale effort (see Section 3.4). This will ensure that they:

- Keep pollution prevention goals consistent with other applicable regulations and programs.
- Avoid unnecessary duplication of effort.
- Share information.
- Coordinate dealings with users.

. Fully utilize local, state, and regional technical and financial resources.

This chapter also reviews the types of resources available from federal, state, and local agencies that can assist with POTW efforts to promote pollution prevention.

3.1 Identifying Pollutants of Concern

Pollution prevention provides users with another tool to comply with local limits developed to prevent or remediate problems at the POTW related to specific pollutants in wastewater discharges. Problems related **to specific contaminants can** be divided into three broad categories:

. Environmental permit and disposal requirements
  - NPDES permit limits
  - Clean Air Act permit standards
  - Sludge disposal requirements.

- POTW worker safety concerns.
- POTW operational problems (e.g., an industrial pollutant adversely affects the microorganism population at the plant).

Most often, POTWs target a specific contaminant for pollution prevention because of problems in achieving compliance with their current NPDES permit, or because they anticipate problems in meeting future NPDES permit limits. In general, NPDES requirements will become more restrictive in the future as standards for sewage sludge use and disposal and ambient sediment quality are established, and ambient water quality criteria become more restrictive. Pretreatment coordinators can consider pollution prevention options first when drafting a strategy for achieving compliance with increasingly stringent discharge levels.

For example, investigators in southern Massachusetts believed that elevated levels of copper in surface water and sediments posed unreasonable risks to human health and the environment locally. This finding caused EPA to issue a copper discharge limit of 9 parts per billion (ppb) to the Fall River POTW. Fall River, in turn,

POTW RESOLUTION FOR DEVELOPING A POLLUTION PREVENTION PROGRAM TO REDUCE INDUSTRIAL POLLUTANT DISCHARGES TO THE SEWERS

WHEREAS pollution prevention includes reducing the use of toxic substances, reducing the generation of toxic waste at the source, and recycling toxic waste; and

WHEREAS pollution prevention strategies can substantially reduce toxic pollutant loads to the sewers, without transferring those same pollutants to the air or land; and

WHEREAS pollution prevention saves businesses money by increasing productivity while reducing treatment and disposal costs, sewer fees, long-term liability, and chemical feedstock costs; and

WHEREAS the industrial and commercial pollutants currently discharged to POTWS can work their way into the eiwironment through receiving water pass-through sludge disposal, air evaporation, and collection system leaks, causing potential environmental problems; and

WHEREAS future regulatory pressures and economic growth are likely to increase significantly the current industrial pollutant load to the sewers; and

WHEREAS, due to increasingly stringent state and federal laws, POTWS in the future will have to limit significantly the toxic pollutants in their sludge, receiving water, and air emissions

NOW THEREFORE BE IT RESOLVED that the _____ (name of the POTW) establishes a pollution prevention program to assist area businesses in reducing their toxic pollutant tan d scharge the ewers and

BE IT' FURTHER RESOLVED that the _____ (lead dept. or division) develops and implements this pollution prevention program; and

BE IT FURTHER RESOLVED that in developing this program, the _____ (lead dept. or division):

- identfies specific industrial dischargers and water-borne pollutants for priority attention;
- . sets percentage reduction goals for those water-borne toxic pollutants identified as a priority
- Confers with other local agencies that regulate the same industries and
- . Evaluates the feasibtity of each of the following program options: educational outreach, technical assistance, and regulations; and

BE IT FURTHER RESOLVED that the _____ (lead dept or division] submits a proposed work program to this Board by _____ (date) that identifies the pollution prevention activities selected for implementation, along with a timetable and required financial support; and,

BE IT FURTHER RESOLVED that the _____ (lead dept. or legal division) recommmends to this Board by _____ (date) any changes to the existing sewer use ordinance necessary to implement the pollution prevention program as proposed.

Source: Adapted from Sherry, t 988b.

Figure 3-1. Sample POTW pollution prevention policy statement.

had to tighten its pretreatment standards for copper. Most of the local textile mills indicated that they could not afford copper treatment systems and would have to shut down, thus threatening the local economy. In response, the Fall River POTW aggressively pursued pollution prevention opportunities with the affected textile mills to reduce copper discharges without necessitating enormous capital outlays. Many approaches were evaluated:

- Lowering the speed of cloth movement through the dye baths.
- Being attentive to additives that keep copper in solution.
- Educating textile buyers to accept products with low- or no-copper dyes.
- Educating dyers on the shop floor as to which dyes are copper free.
- Controlling pH, temperature, salt concentrations, and fixatives to increase dye efficiency.
- Replacing part of a metalized dye with nonmetalized dyes.
- Avoiding use of copper sulfate after treatments.
- Avoiding floor spillage.

Copper loadings entering the Fall River POTW have fallen as a result of these measures; however, additional

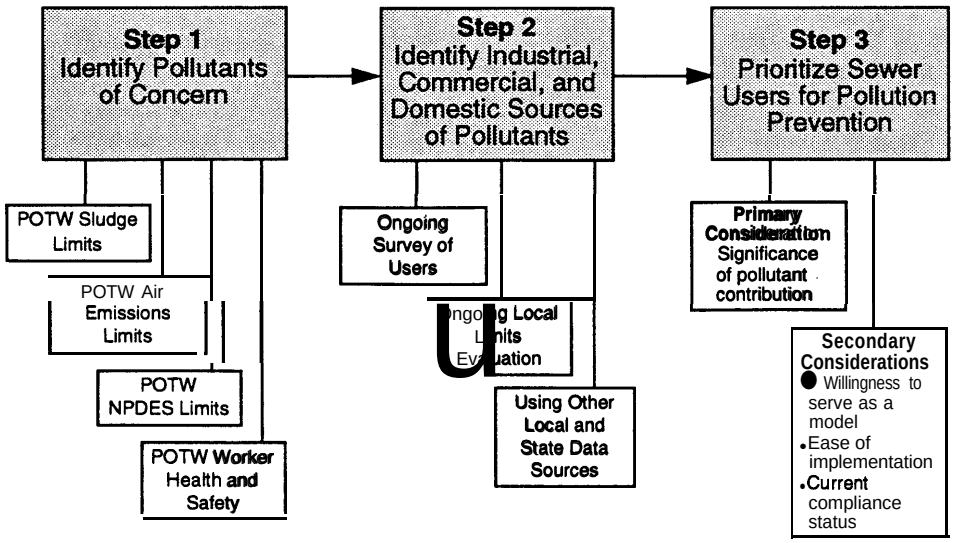


Figure 3-2. Setting pollution prevention priorities.

actions will be necessary to achieve full compliance with the limit.

In another example, the Western Lake Superior Sanitary District (WLSSD) anticipated that it would not meet its future NPDES permit level for mercury. After determining that major industrial facilities do not significantly contribute to mercury loadings, WLSSD focused its mercury abatement efforts on unpermitted commercial establishments and residential users. Investigators determined that discharges from dental offices and laboratories, as well as mercury-containing products in solid waste from commercial and residential sources constituted significant sources of mercury. The local solid waste incinerator's control system uses water to "scrub" volatilized mercuty from air emissions. This scrubber water is discharged to the POTW. The WLSSD formed working groups representing dentists and laboratories, two groups of sewer users believed to be collectively significant generators of mercury waste. The purpose of the working groups is to identify means of reducing mercury discharges through use of BMPs and other measures. Also, a local advisory group is exploring the possibility of implementing a thermostat collection program for local construction and demolition companies to reduce this source of mercury in solid waste that is incinerated. The details of the WLSSD program are presented in Section 4.3.2.

3.2 Identifying Users of Concern

Once a POTW has targeted a particular contaminant for pollution prevention, the POTW must determine which industrial, commercial, and domestic sources discharge the contaminant. It might not be obvious which dischargers are the major sources of the contaminant, especially if the chemical is an integral part of many different industrial and commercial processes, or if it is used primarily by unpermitted users about which the POTW has little information. In ongoing local limit evaluations, pretreatment personnel perform influent toxic-loading studies that can identify significant differences in the influent loadings of toxic pollutants and the known industrial/commercial/domestic loadings to the sewer system. Where there is a significant difference, the POTW will need to resurvey industrial or commercial groups to identify the previously unknown additional sources of toxic pollutants.

3.2.1 *Industrial Users*

The POTW should have a wealth of information on its categorical and other significant industrial users from recent inspections, existing and past permits, and the POTW'S pretreatment program industrial waste surveys. Under the General Pretreatment Regulations, POTWS also should have been notified about the types and volumes of hazardous wastes generated and disposed of by their users (40 CFR 403.12[p]).

Determining which significant industrial users discharge the contaminant of concern should be a relatively simple matter since POTWS routinely collect and receive data on these industrial users. In the Fall River case (see Section 3.1), the pretreatment personnel immediately recognized that its permitted textile mills used copper dyes and hence were likely significant contributors of copper to the POTW.

To help locate new or unknown dischargers, pretreatment personnel generally contact local and state agencies to cross-reference records on water users, new utility connections, and building permits. Observation of changes in local businesses while out in the field also provides information about new users.

3.2.2 Commercial Users

Many POTWS have discovered that commercial dischargers account for a large percentage of the toxic pollutants in a POTWS influent. As the pretreatment program achieves lower levels of toxic pollutants in industrial discharges, commercial and domestic sources will account for a larger percentage of the POTWS total toxic influent load. EPA estimates that 15 percent of all priority pollutants currently entering POTWS originate in commercial and unpermitted small industrial facilities. EPA further estimates that commercial and domestic establishments might eventually account for as much as two-thirds of the toxic metals discharged to POTWS nationwide (GAO, 1991). While the concentration of pollutants in nonindustrial effluent might be relatively low compared to that in industrial effluent, the volume of nonindustrial effluent is approximately six times iarger than the volume from industrial sources at most POTWS (GAO, 1991).

Unfortunately, POTWS often have little information about their commercial dischargers since they do not actively inspect them and might not have included them in the initial waste survey. As a first step, the POTWS could develop a comprehensive list of commercial processes that generate the contaminant in question and what types of commercial establishments employ those processes. For example, if mercury is a particular problem, likely commercial contributors could include dental offices and laboratories. Table 3-1 lists common commercial establishments and the types of pollutants they typically produce.

To define further which commercial establishments produce and discharge the contaminant of concern, the POTWS could. survey commercial establishments in the POTW service area that are likely to be discharging that contaminant. Cross-referencing records of businesses with other agencies will help identify previously unknown or new commercial users to include in the survey. The survey will refine the list of potential commercial contributors, estimate average discharge concentrations and flows from each facility, and provide information about the pollution prevention measures the facilities already employ. A well-defined survey instrument will yield enough data on which to base further actions and assess the potential usefulness of pollution prevention in those commercial establishments. The survey instrument need not be particularity lengthy or complicated. Figure 3-3 is the form used by the Palo Alto, California, POTW in its silver reduction program.

The Palo Alto POTW'S Silver Reduction Pilot Program is an excellent example of using pollution prevention to drastically reduce commercial discharges of a specific contaminant. This POTW discharges to South San Francisco Bay (South Bay), which, over many decades, has become severely polluted by heavy metals. The Palo Alto POTW received permission from the Regional Water Quality Board to conduct a source reduction pilot program targeted at silver, a particular problem in South Bay. At the outset of the program, the Palo Alto POTW discharge concentrations of silver were more than 3.5 times the proposed South Bay limits, and silver concentrations in South Bay clams were many times higher than levels observed in other areas of the Bay.

Initial sampling and mass balance audits conducted by the Palo Alto POTW revealed that small businesses contributed up to 70 percent of the POTWS influent silver loading, regulated industries contributed 25

Table 3-1. Commercial Establishments and Their Potential Discharges of Concern (adapted from U.S. EPA, 1991d)

Type of Facility	Discharges of Concern
Automotive repair and service	Chemical oxygen demand, heavy metals, solvents, paints, surfactants, oil, and grease
Car washes	Chemical oxygen demand, zinc, lead, and copper
Truck cleaners	Chemical oxygen demand, total dissolved solids, cyanide, phosphate, phenol, zinc, aluminum, chromium, lead, and copper
Dry cleaners	Total dissolved solids, chemical oxygen demand, phosphate, butyl cellosolve, N-butyl benzene sulfonamide, Perchloroethylene, iron, zinc, and copper
Laundries	Chemical oxygen demand, ethyl toluene, n-propyl alcohol, isopropyl alcohol, toluene, m-xylene, p-xylene, ethylbenzene, bis(2-ethylhexyl) phthalate, iron, lead, zinc, copper, chromium, phosphate, and sulfide
Hospitals	Total dissolved solids, chemical oxygen demand, phosphate, surfactants, formaldehyde, phenol, fluoride, lead, iron, barium, copper, mercury, silver, and zinc
Photoprocessors	Chemical oxygen demand, ammonia, cyanide, sulfur, phosphates, silver, arsenic, chromium, phenol, and bromide
Laboratories	Chemical oxygen demand, mercury, silver, and toxic organics
Dental offices	Copper, zinc, silver, and mercury`

FACILITY SURVEY OF PHOTOGRAPHIC ACTIVITIES

1. DOES YOUR FACILITY PROCESS ANY PHOTOGRAPHIC MATERIALS ON SITE?

YES_____ NO_____

2. BRIEFLY DESCRIBE YOUR OPERATION.

_____

_____

_____

IF ANSWER TO QUESTION #1 IS "NO" GO TO #8

3. WHICH OF THE FOLLOWING DOES YOUR FACILITY PROCESS ON SITE?

	COLOR	BLACK & WHITE
FILM	_____	_____
PAPER	_____	_____
MOVIE	_____	_____
X-RAYS	_____	_____
OTHER	_____	

4. WHAT IS THE TOTAL VOLUME OF FIXER AND BLEACH_FIX USED PER MONTH?

5____ GALLONS 26-100 G A L L O N S . _ , 500 GALLONS (AMOUNT: _____)

____ 6-25 GALLONS ____ 101-500 GALLONS

5. DOES YOUR FACILITY REMOVE SILVER FROM THESE SOLUTIONS ON SITE?

____ FIX ____ WASHWATER ____ BLEACH-FIX

RECOVERY SYSTEM INFORMATION (IF APPLICABLE):

MANUFACTURER _____

MAKE & MODEL _____

6. DOES YOUR FACILITY SEND EITHER OF THESE MATERIALS OFF SITE FOR SILVER RECOVERY?

_ SPENT CARTRIDGES _____SPENT SOLUTIONS

7. COMMENTS/QUES'IIONS: _____

_____

_____

8. FACILITY CONTACT INFORMATION

BUSINESS NAME: _____

ADDRESS: _____

TELEPHONE _____

CONTACT NAME: _____ TITLE,_____

PLE4SE RETURN TO RWQCP IN THE ENCLOSED ENVELOPE W17HtN 10 DAYS:

REGIONAL WATER QUALITY CONTROL PLANT
2501 Embarcadero Way
Palo Alto, CA 94303

Source: City of Palo Alto, 1992.

Figure 3-3. Example of a commercial facility survey form.

percent, and residential users contributed 5 percent. POTW personnel already had a solid understanding of the nature of the industrial silver discharges and concluded that commercial dischargers deserved their focus. They surveyed 650 businesses in the service area suspected of processing photographic materials, X-rays, and photographic films and negatives—the principal silver-producing commercial processes. More than 50 percent of the establishments that returned the survey indicated that they produced silver-bearing photographic wastes. The affirmative responses were received from many small graphic artists, photoprocessors, printers/publishers, medical facilities, and dental offices. About 80 percent of these facilities indicated that they produced less than 5 gallons per day of silver-bearing photoprocessing wastes. The survey data provided the basis for calculating local limits for commercial photoprocessors and for requiring photoprocessors to implement a variety of pollution prevention measures (see case study in Section 4.2.1.2).

3.2.3 Domestic Users

Households regularly discharge many problem wastes and products, such as used oil, drain cleaners, detergents, paint and paint thinners, and solvents, directly to household drains and storm drains. EPA estimates that households contribute approximately 15 percent of all priority pollutants discharged to the nation's POTWS (GAO, 1991). As with commercial establishments, EPA expects that household sources will account for a larger share of priority pollutant discharges to POTWS as industrial sources come under stricter regulation. Studies have shown that households account for the majority of total discharges for some pollutants (GAO, 1991). Table 3-2 lists consumer products and the problem pollutants they contain.

In the early 1980s, Seattle initiated a program to control domestic sources of toxics in wastewater entering its POTWS. Studies indicated that up to 64 percent of the arsenic in Seattle's sewage sludge comes from households. As much as 40 percent of the arsenic from domestic sources originates in common household powdered laundry detergents, dishwashing soap, and bleach.

Metro, Seattle's POTVV authority, created an independent committee of local environmental and citizen groups and personnel from local and state wastewater, solid waste, and health agencies. The committee developed rating criteria that focused on the near-term toxicity, long-term toxicity, flammability/reactivity, and environmental hazards associated with commercial products. Based on the product's evaluation under each of these categories, the committee assigned the product a color ranging from green, representing the least risk to the environment, to black, indicating the greatest risk. A product's overall rating is based on the least favorable rating it gets in any given category. As of late 1991, the committee had rated more than 250 products and disseminated fact sheets containing these rankings to local retailers and consumers (GAO, 1991).

3.3 Prioritizing Users of Concern

Generally, pretreatment personnel will want to focus on the industrial, commercial, or domestic sourcce contributing the largest share of a given contaminant of concern to the POTW influent. Once the primary sources have been established, they can be prioritized based on secondary considerations:

- Selection of model *facility* Certain industries or commercial groups might be willing to undertake pollution prevention programs as a model for other dischargers. This could provide excellent publicity for all parties while achieving the desired reductions in toxic discharges at a potentially lower cost than pursuing strictly a treatment solution.
- Ease *of implementation.* Pollution prevention opportunities might be more obvious and readily implemented in certain industries. For example, BMPs, which are easily implemented generally, might achieve greater source reduction in some industries, while other industries might need to make more radical process or product changes to achieve a similar level of pollution prevention. Targeting the pollution prevention program at industries that could achieve large reductions from simple pollution prevention measures will provide greater assurance of success, provide valuable experience for approaching more difficult industries, and impose a lesser burden on the POTW and the industry.
- *Current compliance status.* Industries currently out of compliance with pretreatment standards might be excellent candidates for pollution prevention. In many cases, pollution prevention can be incorporated into enforcement agreements. For example, the POTW could consider a company's willingness to implement pollution prevention measures when establishing penalties and developing compliance schedules (see Section 4.2.2).

3.4 Utilizing Pollution Prevention Resources

Pretreatment personnel should consult and coordinate with the appropriate federal, state, and local agencies prior to embarking on a major pollution prevention initiative. Environmental managers for every medium have begun to explore the potential benefits of pollution prevention. A coordinated effort with other federal, state, and local programs could lessen substantially the

Table 3-2. Consumer Products and Their Potentially Toxic or Hazardous Constituents (adapted from URI, 1988)

Product	Toxic or Hazardous Constituents
Antifreeze (gasoline or coolant systems)	Methanol, ethylene glycol
Automatic transmission fluid	Petroleum distillates, xylene
Battery acid (electrolyte)	Sulfuric acid
Degreasers for driveways and garages	Petroleum solvents, alcohols, glycol ether
Degreasers for engines and metal	Chlorinated hydrocarbons, toluene, phenols, dichloroperchloroethylene
Engine and radiator flushes	Petroleum solvents, ketones, butanol, glycol ether
Hydraulic fluid (brake fluid)	Hydrocarbons, fluorocarbons
Motor oils and waste oils	Hydrocarbons
Gasoline and jet fuel	Hydrocarbons
Diesel fuel, kerosene, #2 heating oil	Hydrocarbons
Grease, lubricants	Hydrocarbons
Rustproofers	Phenols, heavy metals
Carwash detergents	Alkyl benzene sulfonates
Car waxes and polishes	Petroleum distillates, hydrocarbons, heavy metals
Asphalt and roofing tar	Hydrocarbons
Paints, varnishes, stains, dyes,	Heavy metals, toluene
Paint and lacquer thinner	Heavy metals
Paint and varnish removers, deglossers	Methylene chloride, toluene, acetone, xylene, ethanol, benzene, methanol
Paintbrush cleaners	Hydrocarbons, toluene, acetone, methanol, glycol ethers, methyl ethyl ketones
Floor and furniture strippers, polishes, and waxes	Xylene, heavy metals
Metal polishes	Petroleum distillates, isopropanol, petroleum naphtha
Laundry soil and stain removers	Petroleum distillates, tetrachloroethylene
Spot removers and dry-cleaning fluid	Hydrocarbons, benzene, trichloroethylene, 1,1,1-trichloroethane
Other solvents	Acetone, benzene
Rock salt	Sodium chloride
Refrigerants	1,12-trichloro-l,2,2-trifluoroethane
Bug and tar removers	Xylene, petroleum distillates
Household cleansers, oven cleaners	Xylenols, glycol ethers, isopropanol
Drain cleaners	1,1,1-trichloroethane, inorganic acids
Toilet cleaners	Xylene, sulfonates, chlorinated phenols
Cesspool cleaners	Xylene, sulfonates, chlorinated phenols
Disinfectants	Cresol, xylenols, phenols
Pesticides (all types)	Naphthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons
Photochemicals	Phenols, sodium sulfite, silver halide, potassium bromide, thiocyanate, ferricyanide, bichromate bleaches, phosphate, ammonium compounds
Printing ink	Heavy metals, phenol-formaldehyde
Wood preservatives	Pentachlorophenols
Swimming pool chlorine	Sodium hypochlorite
Lye or caustic soda	Sodium hydroxide
Jewelry cleaners	Sodium cyanide

financial burden and avoid unnecessary duplication of effort among environmental and public health agencies. In addition, a coordinated effort might be met with less confusion and animosity on the part of targeted industries.

With a statutory mandate to incorporate pollution prevention into all federal environmental programs, EPA has established the Office of Pollution Prevention and Toxics (OPPT) and the Pollution Prevention Information Clearinghouse (PPIC). PPIC functions as a national depository for technical, policy, programmatic, legislative, and financial information on pollution prevention. The PPIC hotline and on-line computerized data base, the Pollution Prevention Information Exchange System (PIES), contain a wealth of readily accessible information on pollution prevention. EPA's Risk Reduction Engineering Laboratory and the Center for Environmental Research Information (CERI), both in Cincinnati, Ohio, also are excellent sources of technical information. Many EPA offices (including OPPT) issue special grants to state and local entities interested in implementing a pollution prevention program. Appendix A provides more information about these and other federal pollution prevention resources.

Also, federal, state, and local organizations sponsor pollution prevention training sessions and workshops. Workshops focus on pollution prevention in general or specific opportunities within certain industries. Often they are open to both industry and regulators and provide an excellent forum for POTW pretreatment personnel to receive input from their users in an informal setting. Personnel can contact the state pollution prevention or hazardous waste office for information about pollution prevention training opportunities in the local area. Pollution prevention conference and training information also can be obtained on line from the PIES.

Many states have an active pollution prevention program that can provide technical assistance to POTWS and industrial and commercial users that wish to learn more about pollution prevention in general or need specific technical pollution prevention advice (see Table 3-3). State programs most often include one or more of the following elements:

- *Pollution prevention or toxics use reduction goals.* States establish goals to reduce toxic discharges in the state by some specified percentage. These goals serve as targets against which to measure progress.
- *Idustty reporting.* Chemical manufacturers and users file annual reports detailing chemical use and existing inventories.
- *Industry planning.* Hazardous waste generators assess their facilities for pollution prevention opportunities and file a detailed pollution prevention plan with the state. In many states these plans are available to state officials and the general public.
- *Technics/ assistance.* Programs provide hands-on technical assistance to firms and state facilities seeking to implement pollution prevention measures and technologies.
- *Research and developrnent.* Some states fund university-based pollution prevention institutes to engage in research, establish pilot and demonstration projects, conduct training, and act as pollution prevention clearinghouses.
- *Grants.* Programs provide pollution prevention grants to localities, state facilities, and firms interested in demonstrating innovative pollution prevention technologies and regulatory programs.
- *Training.* Many state agencies hold workshops and provide training materials on industry-specific pollution prevention technologies.

Various states have been extremely active in assisting POTWS with pollution prevention programs. In California, North Carolina, Minnesota, Connecticut, and Massachusetts, for example, state technical assistance and general programmatic support have been instrumental in helping industrial dischargers achieve significant pollution prevention goals. POTWS in Massachusetts often refer their industrial and commercial dischargers to the Office of Tehnical Assistance (OTA), created with the passage of Massachusetts' Toxics Use Reduction Act (TURA). OTA serves as a technical pollution prevention clearinghouse and often takes part in actual POTW inspections at the request of both the POTW and industry. OTA also has been active in sponsoring pollution prevention workshops and providing pollution prevention training for state and local environmental compliance inspectors.

Minnesota's Tehnical Assistance Program (MnTAP) offers pollution prevention assistance to Minnesota's smaller industries. One of the more innovative aspects of MnTAP is its internship program, which pays a salary to an appropriately qualified engineering student to work with a company in implementing a pollution prevention program or in identifying and assessing a specific pollution prevention technology. As part of its mission, MnTAP also provides technical assistance and training and participates in multimedia inspections.

Many states now require industrial facilities to submit detailed pollution prevention reporting and planning data. For example, Tennessee requires facilities that generate more than 220 pounds of hazardous waste per year to submit pollution prevention plans by 1994. The plans must include:

- A policy statement of management's commitment to pollution prevention.
- Specific goals of the plan, including numeric performance goals.
- Technically and economically practical pollution prevention options and a schedule for their implementation.
- An accounting of hazardous waste management costs.
- A description of pollution prevention training programs for employees.
- A rationale for stated performance goals.

POTW officials could use this type of information to prepare **for site visits and learn** more about industry-specific waste streams and pollution prevention opportunities. Some facility data are considered proprietary, and, depending on state laws, POTW personnel might have access to this information. Table 3-3 shows the states that have either enacted or proposed pollution prevention laws that require hazardous waste generator reporting and pollution prevention planning.

Cooperative ventures between POTWS and state and local solid waste, air, and water agencies are becoming more and more common. The state and federal focus on multimedia transfers has led to a greater integration of specific environmental media programs. Some states now operate multimedia inspection programs in which a team of inspectors from the principal environmental program offices examines an industrial facility for compliance but also with a heightened awareness of multimedia transfers and pollution prevention. Section 4.1.4 discusses multimedia inspections. Teaming up with local public health officials, drinking water treatment personnel, or solid waste management personnel to promote pollution prevention in the community also might be advisable in some cases.

Please refer to Appendix A for a list of federal, state, and local pollution prevention resources.

In summary, to protect against the pass-through of toxic pollutants to receiving waters and to maintain proper treatment plant performance, POTW personnel identify and prioritize pollutants and sewer users for control. Pollution prevention methods have been shown to be the most cost-effective and environmentally sound means of controlling waste management problems. This chapter presents an approach for focusing POTW pollution prevention efforts. The following chapter explains ways pretreatment personnel can encourage indirect dischargers to adopt pollution prevention measures. POTW personnel can accomplish this by integrating pollution prevention concepts into ongoing program activities.

Table 3-3. States with Existing or Proposed Pollution Prevention Technical Assistance and Facility Planning and Reporting Requirements (WRITAR, 1992; PPIC, 1992)

State	Existing Technical Assistance Programs	Existing Facility Planning and Reporting Requirements	Proposed Technical Assistance Programs*	Proposed Facility Planning and Reporting Requirements*
Alabama	✔			
Alaska	✔			
Arizona	✔	✔		
Arkansas	✔			
California	✔	✔		
Colorado	✔			
Connecticut	✔			
Delaware	✔			
Florida	✔			
Georgia	✔	✔		
Hawaii	✔			
Illinois	✔			
Indiana	✔			
Iowa	✔	✔		
Kentucky	✔			
Louisiana	✔	✔		
Maine	✔	✔		
Maryland	✔			
Massachusetts	✔	✔		
Michigan			✔	
Minnesota	✔	✔		
Mississippi	✔	✔		
Nebraska	✔			
Nevada	✔			
New Hampshire	✔			
New Jersey	✔	✔		
New Mexico	✔			
New York	✔	✔		
North Carolina	✔	✔		
Ohio	✔			✔
Oregon	✔	✔		
Pennsylvania	✔			
Rhode Island	✔			
South Carolina	✔			✔
South Dakota	✔			
Tennessee	✔	✔		
Texas	✔			
Vermont	✔	✔		
Virginia	✔			
Washington	✔	✔		
West Virginia	✔			
Wisconsin	✔	✔		
Wyoming	✔			

Note: A list of telephone numbers and addresses of state pollution prevention contacts is supplied in Appendix A.
* Proposed as of March 1992.

Chapter 4
Promoting Pollution Prevention Among Regulated and Unregulated Sewer Users

Once a POTW has identified problem contaminants and prioritized industrial, commercial, and domestic users accordingly, it can focus on how pollution prevention can be incorporated into inspection, permitting, and enforcement activities as a full or partial solution to identified problems. This chapter explores several options for incorporating pollution prevention into existing inspection (Section 4.1) and regulatory activities (Section 4.2). In addition, Section 4.3 suggests some ways a POTW can publicize pollution prevention through public outreach, workshops, forums, user awards programs, and domestic hazardous waste collection programs. Some of these activities are more resource intensive than others, and those that are most appropriate for a given POTW will depend on the types of sources and contaminants the POTW wishes to target and the POTWS available staff and financial resources. In many cases, it might be best to begin with a simple activity and use the experience gained to launch more complex pollution prevention efforts in the future.

4.1 Inspections

One of the most effective ways to identify and promote pollution prevention is to explore opportunities during routine facility inspections. Because a POTW'S staff usually has a close relationship with local industry and commercial establishments, they are in a unique position to educate businesses on the advantages of pollution prevention. POTW personnel that routinely visit industries can heighten a business' awareness of pollution prevention and promote it as a viable alternative to more traditional treatment technologies or more costly disposal.

Incorporating pollution prevention into existing POTW inspections is not a substitute for performing a pollution prevention audit. States may sponsor multimedia audit programs or industries and commercial businesses can conduct their own audits to explore pollution prevention options that affect all facility waste streams. Either way, a pollution prevention audit involves a comprehensive evaluation of a facility's processes and operations. This section presents guidance on how to identify areas in industrial and commercial processes, during routine POTW inspections, where facility owners and operators could further evaluate the potential for applying pollution prevention measures.

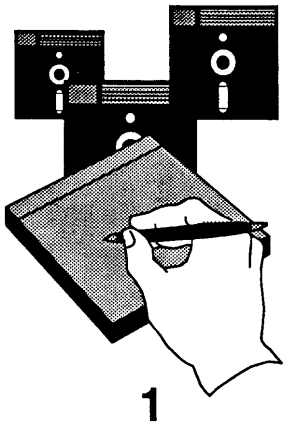
Pollution prevention can be incorporated into POTW facility inspections. By asking investigative questions, disseminating basic pollution prevention information, and offering sources of further technical assistance, POTW personnel can point out pollution prevention opportunities that are mutually beneficial to both parties. This section describes an approach that incorporates pollution prevention into preinspection activities (Section 4.1.1), the inspection itself (Section 4.1.2), and postinspection followup (Section 4.1.3). Figure 4-1 depicts how pollution prevention concepts can be integrated into the three stages of performing facility inspections. Section 4.1.4 discusses the usefulness of multimedia inspections in identifying and promoting pollution prevention.

4.1.1 *Preinspection Activities*

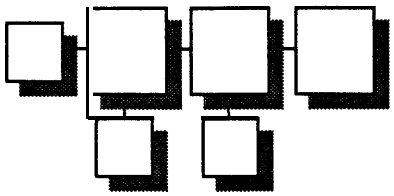
Preinspection activities can be divided into three categories: (1) initial data gathering efforts, (2) identifying specific areas in the process that would benefit most from pollution prevention measures, and (3) assembling information on pollution prevention techniques that seem to be applicable to the facility to be inspected based on the preinspection analysis.

4.1.1.1 Gathering **Facility-Specific Data**

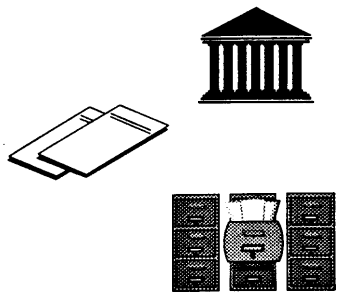
With a solid understanding of many industrial processes, the types of inputs they require, and the waste streams they generate, POTW personnel can help identify potential problem areas and initiate discussions with facility personnel about implementing pollution prevention measures. Much of the required information and data are readily available at the POTW. For example, POTW personnel collect process information and waste stream monitoring data on significant industrial users to develop permits and prepare for traditional user inspections. In addition, the revised General Pretreatment Regulations require dischargers to report to wastewater authorities the types and quantities of certified hazardous chemicals they



1
Data gathering on facility activities

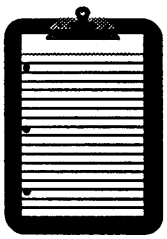


2
Creating & evaluating a process-flow diagram



3
Collecting information on applicable pollution prevention measures from EPA & state technical assistance programs

Preinspection



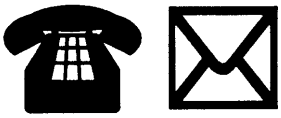
1
During inspection, consider pollution prevention solutions

2
Ask open-ended questions about potential applicability of pollution prevention techniques

Onsite Inspection

1
Supply available information on applicable pollution prevention techniques

2
Refer to sources of additional information on pollution prevention



3
Postinspection followup

Postinspection

Figure 4-1. Using onsite inspection to promote the benefits of pollution prevention.

generate and discharge to the sewer (40 CFR 403.12[p]). With a full picture of the process and the materials used, POTW personnel can better understand how and why a given waste stream is generated and what types of pollution prevention measures would effectively reduce pollutant loads to the sewers. The more POTW personnel know, the more focused the inspection will be.

POTWS interested in inspecting unpermitted industries and commercial facilities might have greater difficulty obtaining current, facility-specific process data. Options in such cases include:

- Reviewing industrial waste survey data.
- Contacting other federal, state, and local environmental and public health program offices that might have collected facility-specific information.
- Requesting process data and information directly from the facility (under the pretreatment program, POTWS have the authority to collect facility-specific information from any discharger).

In addition, POTW personnel can gather information about the process in question from general sources, such as EPA guidance documents and other technical manuals. POTW personnel also can contact the PPIC, state technical assistance offices, and trade groups to find out more about specific industrial and commercial processes and applicable pollution prevention techniques (see Appendix A for a listing of information sources).

For permitted facilities, POTW personnel should review information relating to the facility's compliance history. Compliance data can help POTW personnel focus preinspection information-gathering efforts on pollution prevention options that address the facility's greatest compliance problems. For example, if POTW personnel know that the facility is having or has had problems meeting pretreatment standards for copper, they can make a special effort to investigate pollution prevention measures that have succeeded in reducing copper discharges in similar facilities. POTW personnel also should be aware of any impending pretreatment standards or POTW restrictions that will either require more stringent discharge limits for a particular contaminant or address a previously unregulated contaminant that the facility in question currently discharges. With this knowledge, POTW personnel can advise facilities to start thinking about pollution prevention as a means of meeting future discharge limits.

Knowledge of the facility's present or past pollution prevention activities can help POTW personnel target other areas of the facility that could potentially use improvements. POTW personnel also will have a better understanding of how much facility operators already know about pollution prevention and the types of information the facility might find useful. Acknowledging the facility's current pollution prevention accomplishments can help set the tone for a positive discussion of additional measures the facility could take.

Facilities might have already submitted to state agencies waste minimization plans that POTW personnel can review to obtain relevant information for their inspection. Table 3-3 lists states that currently require such plans. State laws vary as to the level of confidentiality accorded waste minimization plans.

4.1.1.2 Identifying **Areas That Would Benefit from Pollution Prevention Measures**

Drawing on the information gathered from the sources discussed, the following four-step approach will assist in identifying areas of the facility's process where pollution prevention measures could reduce toxic loadings to the sewers:

1. Construct a simple process-flow diagram of the operation. Show all inputs and outputs to the process, including raw materials inputs, product outputs, material recovery, and waste streams.
2. Perform a materials balance assessment to identify significant material losses occurring in the process.
3. Evaluate the sources of identified losses.
4. Identify areas other than process areas, such as storage areas or garages; where losses typically occur.

As the first step, POTW personnel can develop a flow diagram that depicts the sequence and function of all the unit processes and the materials going into and coming out of each unit. This diagram will help POTW personnel define the operation and form the basis for tracking the materials as they go through the process and ultimately end up in the product, recovered materials, or the waste stream. POTW personnel can verify the accuracy of the process-flow diagrams during the inspection. Figure 4-2 is an example of a process-flow diagram for a photoprocessing operation. (This photoprocessing example will be used to illustrate the application of the four steps outlined above).

The next step is to account for the majority of the material flows into and out of the process. Based on the process flow diagram, POTW personnel can track the pollutant of concern from its point of origin in the raw material inputs to the resulting products and waste streams. It is helpful to make a list of all input and output materials. For the photoprocessing example, Table 4-1 itemizes the material inputs and outputs and identifies areas where losses are occurring and wastes are generated. Using raw materials purchasing records,

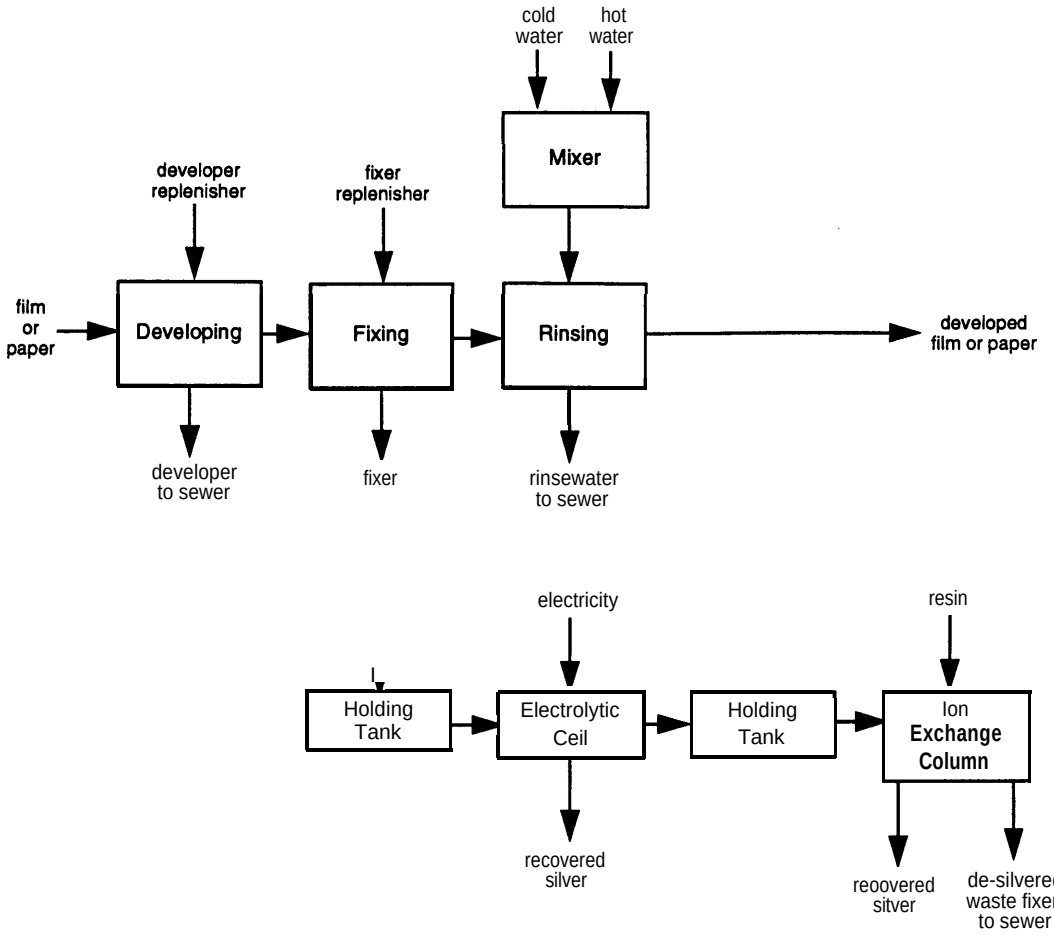


Figure 4-2. Sample flow diagram of photoprocessing operation.

Table 4-1. Sample Materials Accounting List for a Photoprooessing Example

Material Inputs	Material Outputs	Losses/Wastes
Photographic Film	Developed Film and Paper	Waste Developer
Photographic Paper	Recovered Silver	De-silvered Waste Fixer
Developer Replenisher		Waste Rinsewater
Fixer Replenisher		
Stabilizer		
Iron		
Cold Water		
Hot Water		

waste stream monitoring and flow data, and product data, POTW personnel can quantify the mass of materials going through the process. For the photoprocessing example, the tracking of silver mass is illustrated in Figure 4-3. This is similar to, but not as rigorous as, an engineering mass balance exercise. The mass of input materials should approximate the combined mass of materials output in the product, recovered materials, and the waste streams. Although the mass balance will be unequal due to the variability in waste stream sampling and flow data and errors in estimating input and output masses, it should be within an acceptable margin of error. The acceptable margin of error varies with the known precision and accuracy of information used to estimate the material mass at each stage. A substantial difference between materials input and output from the process indicates losses of materials that should be investigated. Figure 4-4 illustrates a material balance calculation tracking the mass of silver going into and out of the photoprocessing example. In this example, the material balance was not exact, but was judged to be within an acceptable margin of error.

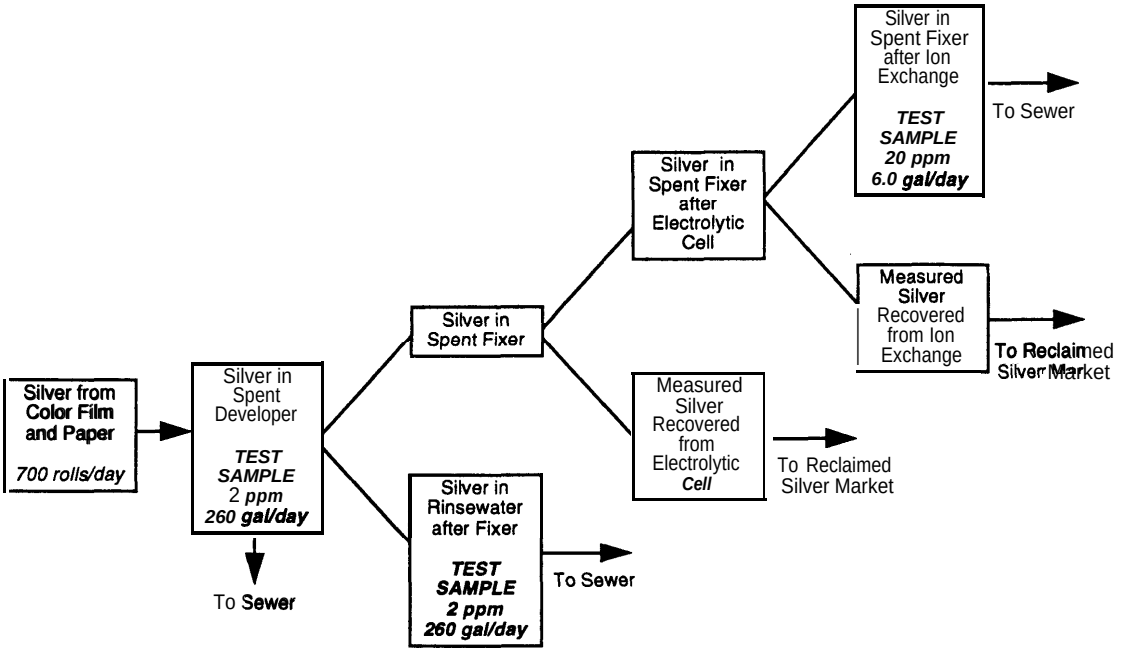


Figure 4-3. Tracking the silver material balance in a color photoprooessing operation.

Losses can occur during the process for several reasons. They can be related to inefficiencies in the production process itself, maintenance procedures, inventory controls, or internal management of waste residuals. POTW personnel can speculate about the sources of losses before the inspection; however, at the inspection, through observing operations and questioning facility personnel, POTW personnel will be better able to draw more informed conclusions regarding the source of and possible pollution prevention solutions to the materials losses.

In addition to the process areas, POTW personnel should investigate the existence of storage areas, pumping stations, laboratories, boiler areas, garages, pollution control equipment, and power generating facilities. These are areas that should be observed during the inspection to determine whether good operating practices are being applied to prevent or minimize the discharge of pollutants to the POTW, especially through floor drains, and whether further improvements in existing practices or other pollution prevention options might be appropriate. In addition, based on knowledge of the industry, POTW personnel can identify any periodic maintenance activities, such as equipment or tank cleaning, boiler blow down, and motor fluid changes, that can periodically generate significant waste streams potentially discharged to the sewer. Improving operating practices for these activities should be encouraged and applying specific pollution prevention measures may also be appropriate.

4.1.1.3 Assembling Information on Applicable Pollution Prevention Techniques

Once a preliminary assessment of materials losses is conducted, POTW personnel should compile a "laundry list" of possible pollution prevention alternatives that would reduce or eliminate losses. Investigators should focus on collecting as much information as possible about the pollution prevention opportunities available for the industry under investigation. The information can be used for the purpose of educating facility owners and operators about the usefulness of pollution prevention measures, supplying available documents and other materials on pollution prevention, and encouraging facility owners to conduct their own pollution prevention assessment of all potentially feasible options. The final decision about the applicability of any pollution prevention measure will be made by the facility based on economic, technical, and feasibility factors.

Many federal, state, local, and private sources provide excellent summaries of known pollution prevention techniques implemented by specific industrial and commercial groups. These sources are listed in Appendix A. To start, POTW personnel should refer to the industry-specific pollution prevention summaries compiled in Appendix B.

POTW personnel also should assemble relevant case study information. Facility owners might be more likely to investigate seriously a pollution prevention technique if they know that a similar facility has realized a savings using the same method. PIES is an on-line source for case study material cataloged by type of pollution

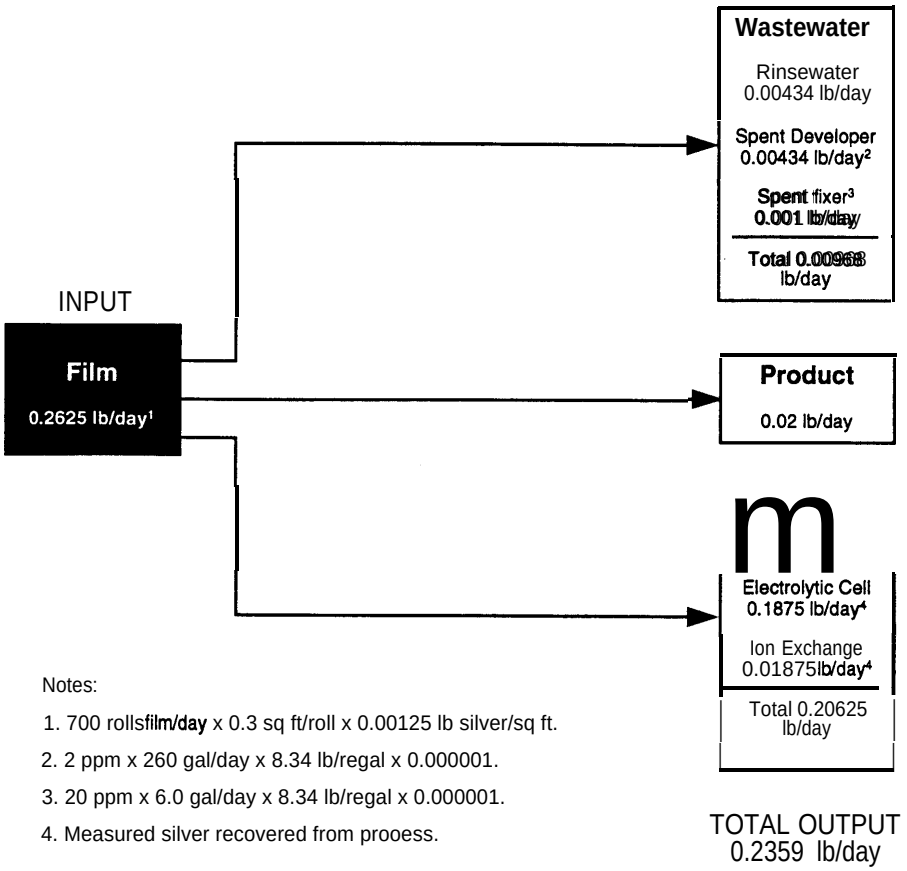


Figure 4-4. Comparing silver input and output in a photoprocessing operation.

prevention technique, industrial process, and industry **group (see Appendix A** for information on how to access PIES). State and federal pollution prevention technical assistance offices also can help POTW personnel with specific pollution prevention questions or information requests. Many of these technical offices sponsor pollution prevention workshops for industry and state personnel interested in learning about pollution prevention opportunities in a given industry.

Table 4-2 lists some potential pollution prevention measures identified for the photoprocessing example illustrated in this chapter. The options are organized according to the major waste streams from the developing and fixing steps and the rinsing unit. There are also some general facility options listed.

4.1.2 *Inspection Procedures*

The inspection provides an opportunity for pretreatment personnel to view facility operations and encourage pollution prevention to the fullest extent. One of the goals of the inspection is to leave an industrial user with a good idea of which areas of the facility can potentially employ pollution prevention measures to help achieve compliance with discharge limits and reduce toxic loadings to the sewer. These goals can be accomplished by (1) setting the appropriate tone, (2) making observations and asking the right questions, (3) giving appropriate advice, and (4) highlighting pollution prevention in the exit meeting.

4.1.2.1 Setting the Appropriate Tone

Most routine facility inspections begin with a meeting. At this time, POTW personnel can inform facility personnel that the POTW is promoting pollution prevention as a means of reducing toxic discharges to the sewers and achieving long-term compliance with pretreatment standards. Topics to cover in the opening meeting include:

- **What** pollution prevention is and why it is important to the POTW. POTW personnel could emphasize how the facility might benefit from increased source reduction and recycling.
- Current and potential future user compliance problems based on existing and anticipated POTW compliance needs and how pollution prevention could help address these problems.
- The types of pollution prevention measures the facility has already adopted and what sort of

Table 4-2. Sample Pollution Prevention List for Photoprocessing Example

Process/Process Step	Opportunity	Option
Developing and fixing steps	Reduce chemical use (to reduce chemical loading to POTW)	1. Adjust replenishment rates. 2. Install silver recovery fixer recirculator. 3. Use squeegees to minimize chemical carryover from developer and fixer. 4. Evaluate recycling fixer. 5. Monitor silver recovery units to ensure maximum operating efficiency. 6. Use low silver-containing rapid access (RA) chemicals. 7. Route fixer overflow drains to silver recovery. 8. Segregate high and low silver-bearing streams to enhance silver recovery. 9. Check storage areas daily for spills. Chemical storage **area could be diked and absorbent pillows** could be made available to contain spills.
Rinsing	Reduce water use (to reduce water use, water heating, and silver discharge to POTW)	1. Install water recirculator. 2. Evaluate recycling rinsewater, including recovering silver. 3. Check storage areas daily for spills. Chemical storage area could be diked and absorbent pillows could be made available to contain spills.
General facility	Good operating practices	1. First-in/first-out inventory control. 2. Inventory inspection for leaks and spills. 3. Use lids or other means to minimize chemical contact with air.

successes and problems the facility has had with those measures.

- The objective of identifying some additional pollution prevention measures that the facility could consider and encouraging the facility to adopt pollution prevention measures wherever feasible.

4.1.2.2 Identifying Pollution Prevention Opportunities Through Observation and Asking the Right Questions

During the inspection, POTW personnel should look for pollution prevention opportunities by examining current administrative, operating, maintenance, and storage practices. POTW personnel can observe the flow of the facility's process, following the train of events that leads to the disposal of contaminants to the sewer and verifying the accuracy of the process flow diagram constructed prior to the inspection. If user or POTW compliance issues were identified prior to the inspection, reducing the sources of problem contaminants very likely will be the primary focus of the inspection. If the materials balance calculations ~ indicated substantial losses of certain materials, identi~ing the sources of these losses and reducing them very likely will be another major focus of the inspection.

Beyond the process itself, controlling spills and leaks, modifying poorly designed storage facilities, improving the efficiency of outdated and poorly maintained machinery, and other pollution prevention opportunities falling under the general category of good operating practices can be observed. These types of opportunities will generally be easier to identify than process-related opportunities because they are somewhat generic to all businesses.

The key to getting facility owners and operators thinking about pollution prevention and how it might work in their facility is to ask open-ended questions about why they use a certain process or input, or why some current practice could or could not be changed. POTW personnel should formulate open-ended questions that solicit thoughtful answers and stimulate further discussion. Ultimately, such discussions might lead to the discovery of a feasible pollution prevention opportunity. Open-ended questions prompt users to think about why they have chosen a given process or input and what prevents them from changing to another process or input. Close-ended, or "yes/no," questions tend to be more accusatory and solicit one-word answers that can effectively end the discussion and might close a potentially promising pollution prevention angle entirely (Greiner and Richard, 1992).

Examples of both types of questions follows:

Open-ended Questions

- What is the company's policy with regard to pollution prevention?
- How are employees trained to perform their jobs?
- What makes this input so valuable? What limits you from using an alternative?
- What leads to the generation of this discharge?
- How could the facility try to recover and purify some of its solvents?

. What would happen if you converted to counter-current rinsing?

Close-ended ***Questions***

- Is management committed to pursuing pollution prevention? Does the company have a written pollution prevention policy statement?

. Can you use a different manufacturing process?

. Have you experimented with other inputs?

- Do you have to use this degreaser?

POTW personnel can use the results of their process-flow analysis as a basis for their questions. In addition, published pollution prevention information (see Appendix A) and the industry-specific pollution prevention summaries in Appendix B can help formulate pollution prevention questions that touch on the facility's major operations. Published pollution prevention checklists can be helpful guides; however, POTW personnel should not be overly reliant on checklists since no single checklist can account **for the variations** in standard processes and operating practices that investigators will encounter in the field. Checklists are generally designed to provide a convenient pollution prevention outline.

4.1.2.3 Giving Advice and Making Recommendations

POTW personnel must be careful about giving pollution prevention advice. In general, investigators should refrain from specifying products or suggesting that if the firm implements a certain pollution prevention measure, it will achieve compliance with pretreatment standards. POTW personnel should give limited, basic advice in an informal manner and provide examples of other companies that have experimented with a given pollution prevention measure. Here are some examples of how and how not to give pollution prevention advice:

Recommended Approach

- 'Drag-out in plating operations is a serious problem for many circuit board manufacturers. Many manufacturers have experimented with lowering the viscosity of their plating baths, which reduces the volume of excess plating material that clings to the circuit board. Others have changed the orientation of the plated part and increased the time they allow for plated parts to drain before rinsing. Another circuit board manufacturing facility I have visited claims that these and other measures have reduced drag-out and increased the life of their plating baths considerably. Here's the number of the state technical assistance office; I'm sure they can tell you more about these and other drag-out reduction techniques."

. "1 was over at another facility the other day and noticed that they use countercurrent rinsing and have installed a rinsewater recycling unit. This has cut their water consumption by over 30 percent, lowered their water and sewer bills, and helped reduce the amount of silver discharged to our POTW. Perhaps you could call the people at the state technical assistance office for more information. It could save you some money and help us meet our NPDES permit limit for silver."

Approach Not Recommended

- "Your silver discharges are quite high and might exceed new pretreatment standards. The ACME Silver Recovery Unit is a great buy. Many local photoprocessors currently use one and make a great return on the recovered silver. You should probably get one."

- "I attended this Pollution prevention workshop for commercial printers a couple of months ago. ACME, Inc., was advertising this new soy-based ink that apparently is just as effective as traditional petroleum-based inks and is entirely biodegradable and nontoxic. Because of your current compliance problems, I would advise you to switch to these new inks."

This does not mean that POTW personnel should refer all questions to a technical assistance office and refrain from discussing a pollution prevention technology altogether. POTW personnel should simply avoid leaving the impression that they are endorsing a given product, service, or technique and that adopting specific pollution prevention measures will somehow ensure compliance. Ultimately, the facility will need to conduct a detailed cost-benefit analysis to determine whether a given pollution prevention measure is a viable option for reducing the generation of problem pollutants.

POTW personnel should be careful about revealing the identity of firms that have implemented pollution prevention measures that seem applicable to other similar facilities. Some of this information might be considered confidential; therefore, POTW personnel should check with facility managers before giving out company names for illustration purposes.

4.1.2.4 Exit Meeting

As part of the usual exit meeting, POTW personnel can summarize preliminary findings with respect to compliance and pollution prevention and receive the facility's initial response to those findings and any comments they might have about the inspection process. At this meeting, POTW personnel might wish to disseminate any applicable published pollution prevention information (e.g., EPA or state industry-specific pollution prevention handbooks, fact sheets, summaries from Appendix B) and inform owners

and operators of state technical assistance offices and other pollution prevention resources such as PPIC and the PIES on-line service. It should be clear that POTW personnel are not making recommendations about specific measures to implement but rather summarizing applicable information based on what was observed during the inspection.

4.1.3 Postinspection Followup

As part of the normal inspection report, the investigator should include observations about pollution prevention measures for the facility to consider and put forward more detailed information about measures that seem particularly promising and suggest some additional contacts and references for more information. POTW personnel also might wish to contact the facility after an appropriate amount of time to see if the facility has given any further consideration to the identified pollution prevention opportunities and to discover what problems or successes, if any, the company has had. This information could be very useful in future inspections.

4.1.4 Multimedia Inspections

As emphasized earlier, pollution prevention using source reduction and recycling is an environmental management method that can help avoid cross-media transfers of environmental contaminants. Multimedia inspections can greatly improve the ability of environmental regulators to recognize cross-media transfers at particular industrial and commercial facilities and identify pollution prevention measures to mitigate such transfers. For example, an onsite wastewater pretreatment system could transfer volatile organics from an open mixing tank to the air. Conversely, air pollution technologies using wet scrubbers to cleanse air emissions of toxic compounds could transfer contaminants to the facility's wastewater. Coordination among local hazardous and solid waste, air, water, and POTW officials through multimedia inspections can often uncover complicated cross-media transfers.

Multimedia inspection programs are generally initiated at the state level, since they require planning and coordination among state and local agencies. In most cases, POTWS will not have the resources to initiate such an inspection program. POTWS can help start a multimedia inspection program, however, by contacting the appropriate regional, state, and local offices to garner support for the concept and suggest the formation of a planning group. POTW personnel should have a strong say in how the inspection program will operate, since they inspect more facilities than most other state and local agencies.

A number of states have initiated multimedia inspection pilot programs. Members of Massachusetts' highly successful multimedia inspection program, the "Blackstone Project," have inspected hundreds of industrial facilities. Industries generally approve of the program, since it reduces the number of inspections they must accommodate each year and often offers sound technical pollution prevention advice that saves them money. Massachusetts' POTWS play an integral role in the ongoing program.

The Western Lake Superior Sanitary District (WLSSD), mentioned in Chapter 3, participates in the Lake Superior Partnership Compliance Assistance Program (CAP) in conjunction with the Minnesota Pollution Control Agency (MPCA), EPA, and industry. To begin with, CAP visited 15 companies discharging to the WLSSD POTW for voluntary multimedia compliance inspections that promoted pollution prevention and the mitigation of cross-media transfers. While the inspections evaluated" companies for compliance with existing permits, CAP hoped to form a strong partnership with permitted facilities to strengthen industry's ability to maintain long-term compliance with state and federal environmental regulations through pollution prevention.

Each inspection begins with a preinspection conference, during which CAP inspectors (including air, water, and hazardous waste officials, and the WLSSD POTW staff) brief facility personnel about the inspection process, the pollution prevention focus, and technical assistance and address any concerns industry staff might have about the inspection. WLSSD also requests that the facility submit a list of pollution prevention activities that the company has either explored or fully implemented prior to the inspection. This helps the inspectors identify and research pollution prevention opportunities that the company has not yet considered and about which the facility might have limited information.

The CAP inspections generally last a full day and are conducted in a manner similar to single-media inspections. Because inspectors represent all environmental media, however, the inspections are more likely to recognize cross-media transfers of environmental contaminants and the need for pollution prevention measures rather than more traditional environmental control technologies. Conflicting answers among various media regulators are resolved immediately, thereby enhancing mutual trust between industry and environmental regulators. The inspections conclude with an exit interview where inspectors comment on the facility's current conditions and areas that need improvement. inspectors also indicate where pollution prevention opportunities might exist and suggest sources of further information. The inspection team submits formal written comments and

recommendations to the company about which pollution prevention opportunities seem worthy of further study.

Overall, CAP has achieved an unprecedented level of cooperation among industry, state environmental regulators, and local POTW personnel and has greatly enhanced the prospects for meaningful pollution prevention in the WLSSD area.

4.2 Encouraging Pollution Prevention Through Regulatory Activities

POTW personnel can encourage pollution prevention through existing regulatory activities. These activities include developing and issuing **user permits (see** Section 4.2.1) and responding to user noncompliance (see Section 4.2.2).

4.2.1 *Issuing User Permits*

POTWS have authority to require users to meet discharge limits and other requirements to prevent pass-through of toxic contaminants and disruptions of normal wastewater treatment operations. In general, setting local limits covering a wide range of contaminants and industrial and commercial sources provides a strong incentive for implementing pollution prevention measures. The cost of treatment generally rises with the stringency of local limits; as this **occurs, pollution prevention** becomes a more desirable means to assist industrial and commercial users in meeting local limits.

POTWS with the appropriate authority, usually established in sewer use ordinances, can use the permitting process as an effective mechanism for instituting pollution prevention as a local requirement for industrial and commercial users. This section discusses three permitting strategies that either directly require facilities to adopt certain pollution prevention practices or create incentive structures that indirectly promote pollution prevention. These approaches are:

. Requiring pollution prevention plans and implementation of BMPs (Section 4.2.1.1).

. Controlling discharges from small industrial and commercial users (Section 4.2.1 .2).

• Employing mass-based local limits (Section 4.2.1.3).

4.2.1.1 Requiring Pollution Prevention **Plans and Implementation of Applicable BMPs**

POTW pretreatment personnel can heighten interest in and awareness of pollution prevention as a means of meeting pretreatment standards by requiring industrial and commercial users to develop and submit pollution prevention plans as part of the permitting process. As stated earlier, POTWS may need to amend or enact sewer use ordinances to provide them with the authority to require submission of pollution prevention plans. Pollution prevention plans contain detailed and systematic assessments of a facility's ability to reduce the volume and toxicity of discharges through pollution prevention activities. A pollution prevention assessment or audit conducted by facility owners and operators can be the single most effective means for identifying technically and economically feasible pollution prevention opportunities capable of achieving long-term reductions in the generation of toxic waste streams.

Many industrial users are already subject to pollution prevention planning requirements. For example, under the current federal pretreatment regulations, some industrial users are required to develop and implement TOMPS and spill prevention plans, which address some types of pollution prevention measures. As part of toxics use reduction legislation, a number of states require certain generators of hazardous wastes to submit pollution prevention or waste minimization plans (see Table 3-3). Also, some Resource Conservation and Recovery Act (RCRA) provisions require certain hazardous waste generators to conduct pollution prevention or waste minimization planning. Pretreatment personnel should contact appropriate state and local agencies to determine whether any of the POTW'S users have filed pollution prevention plans to meet existing federal or state requirements.

If users have not already developed pollution prevention plans that address the waste streams destined for the sewers, a local pretreatment program should consider exploring the possibility of incorporating **a** pollution prevention planning provision into the permitting process. Such a provision could require that a facility interested in renewing an existing permit or obtaining a new permit must submit a detailed pollution prevention plan. Pollution prevention plans should consist of the following elements:

- A process-flow diagram showing where toxic constituents enter and exit the manufacturing process.
- An estimate of the amount of regulated waste generated by each process.
- An assessment of current and past pollution prevention activities, including an estimate of the reduction in amount and toxicity of regulated waste achieved by the identified actions.
- A review of pollution prevention opportunities applicable to the facility's operations.
- Identification of technically and economically feasible pollution prevention opportunities, including **an** assessment of the cost, benefits, and cross-media impacts of the identified opportunities.
- An implementation timetable.

POTW personnel can assist their industrial and commercial dischargers in developing pollution prevention plans by pointing out pollution prevention opportunities during inspections, coordinating meetings between state technical assistance personnel and facility owners and operators, and providing published materials such as EPA's *Waste Minimization Opportunity Assessment Manual, Software and User Manual for the Strategic Waste Minimization Initiative (SWAMI computer program), and Facility Pollution Prevention Guide (see* Appendix A for full references).

New or expanding facilities or those with existing compliance problems are the most likely to benefit from pollution prevention planning. Facilities conducting pollution prevention audits prior to the construction or modification of a facility might find it more feasible to incorporate innovative process and building designs that reduce toxic waste discharges than a more established facility that has already invested in more traditional manufacturing and treatment equipment. Facilities that have failed to meet discharge limits with traditional treatment technologies might be more inclined to invest in pollution prevention planning than a facility that successfully meets pretreatment standards. Of course, any facility is likely to benefit from pollution prevention planning and should be encouraged to do so.

For many years, the Suffolk County, New York, POTW has required its users to identify waste minimization methods when applying for a discharge permit. Engineering reports submitted with permit applications must contain a section outlining the types of pollution prevention actions the facility has considered, along with the outcome of those evaluations. POTW personnel review the pollution prevention statements and suggest additional pollution prevention actions the facility might consider. The POTW reports that, in some cases, pollution prevention plans have identified source reduction opportunities that reduced the toxic discharges of users to levels where a permit was no longer necessary.

POTWS also can require their dischargers to adopt BMPs such as inventory controls, employee training, and basic maintenance and inspection activities (see Section 2.1.1). BMPs generally can be implemented at little or no cost and often can achieve significant reductions in toxic discharges. Most industries have implemented some level of BMPs in an effort to run more efficient operations. Small industrial and commercial facilities, however, may not be aware of these simple steps to cleaner, more efficient operations and could benefit from the POTW'S guidance. The most direct means for achieving widespread implementation of BMPs is to require pollution prevention planning as a precondition for obtaining or renewing a discharge permit.

In an effort to reduce metal and organic contamination in South San Francisco Bay, the Palo Alto POTW recently passed an ordinance requiring BMPs for automotive-related industries (i.e., facilities that repair automobiles, trucks, buses, airplanes, boats, etc.; or that perform services such as parts cleaning, body work, vehicle washing, fuel dispensing, or radiator, muffler, or transmission repair). Palo Alto offered these facilities the option of either sealing floor drains and implementing BMPs or installing treatment systems and meeting local limits. Palo Alto drafted the ordinance with the belief that automotive facilities can virtually eliminate toxic waste discharges by implementing inexpensive BMPs, thereby eliminating the need to apply for permits and install costly treatment systems.

The ordinance stipulates that automotive facilities meet the following requirements:

- No person shall directly or indirectly dispose of vehicle fluids, hazardous materials, or rinsewater to storm drains.
- Spilled rinsewater, hazardous waste, and vehicle fluids must immediately be cleaned up.
- Vehicle fluid removal must take place where spilled fluid will be in an area of secondary containment.
- No person shall leave unattended drip pans or other open containers containing vehicle fluids.
- Vehicle service areas shall be cleaned using methods that ensure that no materials are discharged to sanitary or storm drains except in accordance with pretreatment standards. Facilities that use the following three-step process for cleaning floors will not require a permit:
  1. Clean up spills with rags or other absorbent materials.
  2. Sweep floor using dry absorbent materials.
  3. Discharge dirty water from mopping floors to the sanitary sewer via a toilet or sink.
- Spill prevention and cleanup equipment and absorbent materials shall be kept on hand at all times.
- Owners and operators shall ensure that all employees are trained regarding BMPs upon hiring and annually thereafter.

The Palo Alto POTW took several steps to ensure that automotive facilities were aware of the new ordinance and that facilities had access to technical assistance prior to the effective date of the ordinance. For example, they distributed a handbook describing automotive

facility BMPs that reduce toxic waste discharges (Santa Clara Valley, 1991). If requested by the user, POTW personnel were available to go to the facility to answer questions about the new ordinance and give guidance on the implementation of BMPs. Palo Alto awarded public recognition to automotive facilities that achieved full compliance with pretreatment standards through use of BMPs and other pollution prevention methods by October 1, 1992.

Palo Alto plans to develop similar ordinances in the near future emphasizing BMPs for laboratories, machine shops, and cooling towers.

4.2.1.2 Controlling Discharges from Small Industrial and Commercial Users

Commercial and small industrial dischargers, such as laundries, dental offices, laboratories, hospitals, printing and publishing operations, photoprocessing facilities, wood refinishers, and motor vehicle operations, are sometimes not required to obtain discharge permits. These facilities, however, may represent a significant portion of the total loading of a toxic pollutant entering a POTW. In this situation, a POTW could benefit greatly from imposing local limits on and promoting pollution prevention at commercial and small industrial users. In some cases, a sewer use ordinance alone can provide the necessary control over small industrial and commercial users; however, an ordinance does not allow a POTW to set user-specific requirements that can be incorporated into individual discharge permits.

The Palo Alto POTW has been very active in permitting commercial dischargers. Elevated levels of silver in South San Francisco Bay led the Palo Alto POTW to investigate which of its commercial and industrial users contributed to silver loadings to the POTW (see Section 3.2.2). Based on industrial effluent data and commercial facility survey data, Palo Alto determined that photoprocessors accounted for up to 70 percent of the total silver loadings entering the plant.

In response to this investigation, the Palo Alto POTW decided to impose local commercial and industrial silver limits designed to achieve a POTW effluent NPDES limit of 2.3 µg/l. Along with the new local limits, permitted facilities must also comply with various pollution prevention provisions designed to reduce the use and discharge of silver. For example, affected industrial facilities must now conduct studies identifying pollution prevention opportunities for reducing silver discharges as part of the permitting process. Through onsite inspections and workshops, Palo Alto encourages photoprocessors and industrial generators of silver wastes to adopt pollution prevention methods wherever practicable to achieve compliance with local limits.

The program has been immensely successful. The average silver concentration of POTW effluent has decreased by about 75 percent in the 2 years since local limits were imposed and is now well below the NPDES permit limit of 2.3 µg/l. Palo Alto estimates the cost of the source reduction project to the POTW at about $320 per pound of silver. This is extremely cost effective when compared to the $2,700 per pound cost Palo Alto estimated for an end-of-the-pipe reverse osmosis treatment unit at the POTW.

4.2.1.3 Mass-based Limits

Currently, most POTWS issue pretreatment permits specifying the allowable concentrations of certain contaminants in wastewater discharged to sanitary sewers. Concentration limits are generally expressed in mg/l and are averaged over some specified period of time to allow for normal fluctuations in production. Mass-based limits, an alternative approach, provide dischargers with a specific quantity of a given contaminant (usually expressed as pounds per day) that they can discharge over a specified period of time. The mass discharge rate of a contaminant can be calculated by knowing the flow rate of the waste stream and its average concentration. For example, a waste stream of 10,000 gallons per day, averaging 2.5 mg/l of copper, translates into 0.21 pounds of copper per day:

$$10{,}000 \text{ gal/day} \times 3.785 \text{ l/gal} \times 2.5 \text{ mg/l} \times 1 \text{ lb}/453{,}600 \text{ mg} = 0.21 \text{ lb/day}$$

There are many institutional impediments to applying mass-based limits to industrial users. EPA provides. guidance on the use of mass-based limits in its 1987 *Guidance Manual on the Development and Implementation of Local Discharge Limitations Under* the *Pretreatment Program.*

In terms of pollution prevention, mass-based limits offer an alternative to the more traditional concentration-based limits. Eliminating one part of a waste stream through pollution prevention or reducing water consumption might cause a facility to increase pollutant concentrations, even though the total mass of the pollutant does not increase and might even decrease. For example, in Figure 4-5, a hypothetical facility must comply with a discharge limit of 0.161 mg/l copper. The facility has two waste streams that combine before discharge to the POTW waste stream A discharges 132,100 gal/day containing 0.066 mg/l copper and waste stream B discharges 158,520 gal/day containing 0.228 mg/l copper. Through pollution prevention, the facility eliminates waste stream A entirely and thus has achieved a reduction in the total mass of copper discharged (from 0.37 lb/day to 0.30 lb/day); however, the facility now finds itself exceeding its concentration-based limit. An alternative mass-based

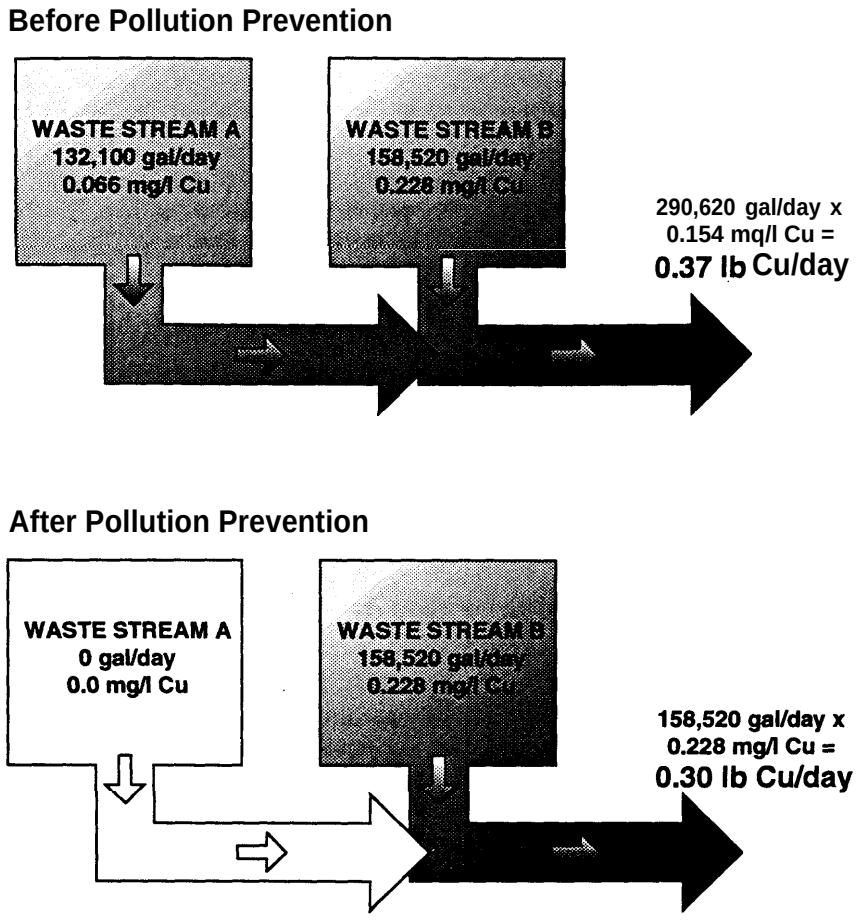


Figure 4-5. Hypothetical waste stream concentrations before and after pollution prevention.

limit of 0.39 lb/day would have provided the same level of protection and allowed for the increase in concentration due to the reduction in flow.'

To monitor facilities accurately for compliance with mass-based limits, POTWS must have reliable data on industrial flow along with the concentrations of pollutants in the wastewater. While reliable concentration data are relatively easy to collect, accurate flow data may be more difficult to obtain. In some cases, flow meters may have to be installed.

4.2.2 *Responding to User Noncompliance*

POTWS can encourage pollution prevention by taking full advantage of their authority to deal with users in noncompliance with pretreatment requirements. As part of the normal program activities of issuing permits and conducting inspections, POTWS can encourage pollution prevention, but they cannot require specific measures beyond those considered BMPs. In response to user noncompliance, however, a POTW can require specific pollution prevention measures as part of a mutually agreed upon compliance schedule with the user.

In requiring the development of a corrective action plan, POTWS can require facilities in noncompliance to conduct pollution prevention planning, to identify cost-effective pollution prevention measures, and to develop an implementation schedule with interim and final milestones. The implementation schedule can then be incorporated into a binding compliance schedule. The user in noncompliance can be required to evaluate pollution prevention options, but should be allowed the flexibility to develop a corrective action plan that includes the most effective mix of pollution prevention measures and traditional treatment options. An example of a compliance schedule that includes pollution prevention and recycling requirements is provided in Figure 4-6.

4.3 Community Education and Outreach

POTWS can play a central role in communicating the need for greater pollution prevention in businesses and

[1] Mass-based limit calculated based on facility flow and current discharge limit of 0.161 mg/l copper: 0.161 mg/l copper x 290,620 gal/day x 8.34 lb/million gal x 0.000001 = 0.39 lb/day copper.

COMPLIANCE SCHEDULE FOR USER IN NONCOMPLIANCE WITH PERMIT LIMITS

A. By July 1, 1992

The user shall submit a preliminary report on corrective action measures to be taken to maintain consistent compliance with permit conditions. At a minimum, the report shall include:

- A detailed process-flow diagram that identifies and characterizes the input of raw materials, the outflow of products, and the generation of wastes.
- Any steps taken to reduce the concentrations and/or mass of regulated pollutants in the user's discharge to the sewer.
- Preliminary findings of corrective action planning, including the identification of any pollution prevention, recycle/reuse, and treatment measures that are being considered for implementation.

B. By August 15, 1992

The user shall submit to the POTW a corrective action plan for its discharge to the sewer system. The plan shall present an implementation schedule that outlines the steps to be taken to bring the user's discharge into consistent compliance with permit conditions by December 31, 1992. In developing the corrective action plan, the user shall evaluate and identify, for implementation, all cost-effective pollution prevention measures. Once developed, and if deemed technically sound by the POTW, the implementation schedule shall be incorporated into this compliance schedule.

Figure 4-6. Example of compliance schedule that incorporates pollution prevention.

the community by educating and directing people to sources of further information. In many cases, simply being made aware of the benefits of pollution prevention techniques is all that is needed to prompt businesses to pursue these options. Pollution prevention education and outreach activities are relatively inexpensive and simple to implement and capable of yielding reductions in toxic discharges to a POTW.

Many POTWS have either initiated or participated in education and outreach programs that stress pollution prevention. POTW pretreatment program personnel may want to collaborate with other state and local agencies to develop outreach programs of this nature. In many cases, programs of this sort may already exist in the POTW'S region, in which case the POTW may want to join in the effort by providing input and support from the wastewater sector. Consider the following education and outreach alternatives.

4.3.1 Sponsoring Workshops and Training

Workshops and training are excellent means for conveying detailed pollution prevention information and can provide opportunities for all parties to discuss pollution prevention in an informal atmosphere. Workshops and training can address pollution prevention in general or can focus on pollution prevention in a specific industry. These might also include exercises in how to identify pollution prevention opportunities and perform cost-effectiveness analyses. Some of these events link industry personnel with companies that manufacture and design recycling and waste minimizing equipment.

A number of POTWS in Massachusetts, including Haverhill and the Massachusetts Water Resources Authority, have sponsored workshops in conjunction with the OTA. These workshops have been designed for both POTW and industry personnel and have covered pollution prevention in general as well as targeted specific industries such as machine shops, photoprocessing operations, and laboratories. A recent OTA conference on reducing the use of solvents included a trade show of solvent recyclers and manufacturers of nontoxic solvent substitutes allowing solvent users to obtain firsthand information about solvent recycling and source reduction.

4.3.2 *Convening Local Polltution Prevention Forums*

A pollution prevention forum might be composed of individuals from diverse groups of interested parties, such as POTWS, regulators, and local businesses, that want to explore the potential for various regulatory and nonregulatory pollution prevention initiatives to achieve reductions in toxic discharges and solve specific environmental problems.

WLSSD was instrumental in obtaining state and federal support for Minnesota's Lake Superior Partnership (LSP) advisory group, which consults with WLSSD and the MPCA on regulatory and nonregulatory initiatives to promote pollution prevention among industries discharging to the Western Lake Superior watershed. The LSP advisory group consists of representatives from industry, commerce, state and local governments, environmental groups, academia, and other interested citizens. The group's function is twofold: (1) to provide feedback to the MPCA and WLSSD regarding pollution prevention initiatives and (2) to serve as a vehicle for the transfer of pollution prevention and other relevant information among its various members. The group

explores issues of mutual interest to its members and makes recommendations about possible pollution prevention programs. The full LSP advisory group meets on a quarterly basis. Members involved in specific projects meet more frequently.

Part of the impetus for the formation of the LSP advisory group was to address mercury contamination in Western Lake Superior. The WLSSD POTW anticipated that it would not meet its future NPDES permit level for mercury without reducing influent mercury loadings to the POTW. WLSSD believed that various unpermitted commercial and domestic sources were contributing to the bulk of the POTWS mercury loadings. WLSSD determined that dental offices, laboratories, mercury thermostats, batteries, and fluorescent light bulbs were the principal sources of mercury contamination. Mercury in municipal solid waste is transferred to the scrubber water from the municipal solid waste incinerator, which in turn is discharged to the POTW.

With the help of the LSP advisory group, WLSSD formed two working groups: the Dental Mercury Work Group, with representatives of the Northeast Dental Society, and the Laboratory Mercury Work Group, with local laboratory staff. WLSSD hopes that the working groups will identify means by which dentists and laboratories can significantly reduce their mercury discharges through implementation of BMPs and other pollution prevention measures and thus avoid the need to directly permit these establishments in the future. In addition, the advisory group has explored the possibility of forming a mercury thermostat collection program for local construction/demolition companies and is investigating the impact of fluorescent light disposal on mercury levels in the POTWS effluent.

4.3.3 *Publicly Recognizing Pollution Prevention Achievements*

Recognizing pollution prevention achievements among the POTW'S dischargers through an award and public announcement provides an incentive for users to voluntarily reduce toxic discharges, improves public relations, and demonstrates the POTW'S commitment to furthering pollution prevention in the community.

The Maine Wastewater Control Association (MWCA), which represents pretreatment POTWS in Maine, awards the MWCA Pretreatment Excellence Award each year to the industrial facility that best demonstrates its commitment to reducing toxic discharges. MWCA judges facilities according to the following criteria:

- Wastewater pretreatment processes used by the facility.
- The percentage of the facility's process water being recycled.
- The percentage of the facility's waste residual material (i.e., sludge) being reused.
- Availability of adequately trained staff and financial resources.
- Innovative ideas the facility has used to reduce pollutants in its wastewater.
- The facility's system(s) for effectively recording and tracking compliance monitoring data.
- The types of spill control procedures/devices (e.g., secondary containment) the facility employs to prevent accidental chemical spills from entering the sewer system.
- Ability of the facility to stay abreast of modifications to applicable environmental laws.
- The environmental and/or economical benefits or successes derived from implementing pollution prevention methods.

As part of its effort to control toxic discharges from automobile-related facilities (see Section 4.2.1.1), Palo Alto instituted the Clean Bay Business Award. Palo Alto publicly recognized automobile facilities in compliance with the new discharge ordinances prior to the required date of October 1, 1992, with the Clean Bay Business Award. Palo Alto hopes that consumers will be predisposed toward businesses that have won the award.

4.3.4 *Compiling and Distributing Pollution Prevention Information*

POTWS can educate industrial, commercial, and domestic users with a range of existing pollution prevention publications from technical documents on specific pollution prevention techniques, to more general pamphlets on BMPs or household hazardous waste management. POTWS also can develop their own materials that address specific concerns in their communities. Many POTWS are active in supplying information resources; here are just a few examples:

- The POTW in Melbourne, Florida, obtains pollution prevention documents from the PIES (see Appendix A for more information on PIES) and distributes them at inspections. The Melbourne POTW has also created its own posters and bumper stickers designed to "spread the word" on pollution prevention throughout the community.
- In addition to distributing pollution prevention information during inspections and periodic mailings to targeted audiences, the Orange County Sanitation District in California operates a pollution prevention library available to its industrial dischargers.

- The Louisville and Jefferson County Metropolitan Sewer District (MSD) in Kentucky publishes its own newsletter entitled Stream *Line.* MSD distributes the newsletter to all of its industrial dischargers and covers pollution prevention as well as other issues pertinent to pretreatment and the POTW.
- The City of Vacaville, California, distributes two, hazardous waste minimization booklets (the California Waste Exchange's Directory of Incfustrial *Recyclers* and *Waste Minimization: Environmental Quality with Economic Benefits)* to wastewater dischargers as a routine part of pretreatment inspections (Sherry, 1988a).
- The Palo Alto Regional Water Quality Control Plant provides guidance on how to improve compliance with pretreatment standards using simple BMPs.

4.3.5 ***Publicizing Household Hazardous Waste Collection Programs and Industrial Waste Exchanges***

Household hazardous waste collection programs have been highly successful in preventing the indiscriminate disposal of hazardous waste by domestic sources. Industrial waste exchanges, which help match industrial waste from one facility with other facilities that can use that waste in another process, have been successful in promoting greater industrial waste reuse. (Appendix-A lists a few existing waste exchanges.) While a POTW may not have the resources to form such programs itself, it can inform its domestic, commercial, and industrial dischargers of the availability of such programs. POTWS also can work cooperatively with other agencies to develop and maintain household hazardous waste collection programs and industrial waste exchanges. The Louisville and Jefferson County MSD, for example, helps several local agencies publicize and staff the local household hazardous waste collection days.

Chapter 5
References

EPA documents with a number that begins with 600 or 625 can be ordered from EPA's Office of Research and Development:

Center for Environmental Research Information
Document Distribution Section (G-72)
26 West Martin Luther King Drive
Cincinnati, OH 45268
513-569-7562 (phone)
513-569-7566 (fax)

When an NTIS number is cited in a reference, that document is available from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
703-487-4650

City of Palo Alto. 1992. Silver Reduction Pilot Program; Palo Alto Regional Water Quality Control Plant. Palo Alto, CA.

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MPCA and WLSSD. 1992. Minnesota Pollution Control Agency and Western Lake Superior Sanitary District. Lake Superior Partnership; Compliance Assistance Program: a multimedia and pollution prevention inspection program. October 1, 1991 through April 30, 1992. Semiannual progress report to U.S. Environmental Protection Agency.

MWRA. 1992. Massachusetts Water Resources Authority. Telephone conversation between Eric Renda, MWRA, and Lynn Knight, Eastern Research Group, Inc. November 11.

PPIC. 1992. Pollution Prevention Information Clearinghouse. PPIC data base. Falls Church, VA.

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Sherry, S. 1988a. Minimizing hazardous wastes: regulatory options for local governments. Sacramento, CA: Local Government Commission.

Sherry, S. 1988b. Reducing industrial toxic wastes and discharges: the role of POTWS. Sacramento, CA: Local Government Commission.

URI. 1988. University of Rhode Island, Department of Natural Sciences. Natural resource facts: household hazardous waste. Factsheet 88-3. Providence, RI: URI.

U.S. EPA. 1992. U.S. Environmental Protection Agency. Facility pollution prevention guide. Washington, DC: Office of Research and Development. EPA/600/R-92/088. NTIS PB92-21 3206.

U.S. EPA. 1991 a. U.S. Environmental Protection Agency. Interim policy on the inclusion of pollution prevention and recycling in enforcement settlements. Memo from James A. Strock, Assistant Administrator. Washington, DC.

U.S. EPA. 1991 b. U.S. Environmental Protection Agency. Environmental research brief: waste minimization assessment for a manufacturer of printed circuit boards. Cincinnati, OH: Risk Reduction Engineering Laboratory. EPA/600/S-92/008. NTIS PB92-I 96344.

U.S. EPA. 1991 c. U.S. Environmental Protection Agency. Achievements in source reduction and recycling for ten industries in the United States. Washington, DC: Office of Research and Development. EPA/600/2-91/051. NTIS PB92-I 3747.

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U.S. EPA. 1989. U.S. Environmental Protection Agency. Pollution prevention benefits manual: vol. 1 the manual, phase 2. NTIS PB93-1 64101. Washington, DC: Office of Solid Waste. October.

U.S. EPA. 1988. U.S. Environmental Protection Agency. Waste minimization opportunity assessment manual. Cincinnati, OH: Hazardous Waste Engineering Research Laboratory, Center for Environmental Research Information. EPA/625/7-88/O03. NTIS PB92-21 6985.

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WRITAR. 1992. Waste Reduction Institute for Training and Applications Research, Inc. Survey and summaries: state legislation relating to pollution prevention. Minneapolis, MN: WRITAR.

Appendix A
Pollution Prevention Resources

Many federal, state, and local agencies have years of experience with the technical and organizational aspects of pollution prevention. POTWS will find these resources invaluable as they initiate or expand pollution prevention in their existing operations. This chapter lists pollution prevention contacts at the federal and state levels and highlights some of the many currently available publications addressing pollution prevention.

Federal Technical Assistance Resources

Pollution Prevention Information Clearinghouse (PPIC)/Pollution Prevention Information Exchange (PIES) Network

PPIC provides technical, policy, programmatic, legislative, and financial information relevant to pollution prevention. Through a computer network and experienced technical personnel, PPIC can assist POTWS and other interested parties in establishing pollution prevention programs; compiling general and industry-specific pollution prevention information; locating and ordering documents; and identifying grant and project funding, pertinent legislation, and upcoming pollution prevention conferences, workshops, and trainings.

The electronic PIES network provides access to a wide range of pollution prevention-related information, including case studies, bibliographies, pertinent state and federal pollution prevention legislation, calendar of events, directory of experts, and topical miniexchanges. PIES also features an on-line document ordering system.

To learn more about PPIC services and how to hook up to the PIES network, phone:

PPIC Technical Assistance Phone: 703-821-4800 (9 a.m. to 5 p.m., EST, Mon. through Fri.), or Fax: 703-442-0584

Pollution Prevention Information Exchange System (PIES): 703-506-1025

RCRA/Superfund Hotline: 800-424-9346

Small Business Ombudsman Hotline: 800-368-5888

Or write:

Pollution Prevention Information Clearinghouse (PPIC)
c/o SAIC
7600-A Leesburg Drive
Falls Church, VA 22043

U.S. EPA Offices

U.S. EPA Office of Solid Waste
Waste Management Division (OS-320W)
401 M Street, SW.
Washington, DC 20460
703-308-8402

U.S. EPA Office of Solid Waste and Emergency Response (0s-100)
401 M Street, SW.
Washington, DC 20460
703-821-4789

U.S. EPA Office of Pollution Prevention and Toxics (TS-792)
401 M Street, SW.
Washington, DC 20460
202-260-3810

U.S. EPA Office of Air and Radiation (ANR-443)
401 M Street, SW.
Washington, DC 20460
202-260-7400

U.S. EPA Office of Water (WH-556)
401 M Street, SW.
Washington, DC 20460
202-260-5700

U.S. EPA Office of Research and Development
Center for Environmental Research Information
26 West Martin Luther King Drive
Cincinnati, OH 45268
513-569-7562

U.S. EPA Office of Research and Development
Risk Reduction Engineering Laboratory
Pollution Prevention Research Branch
26 West Martin Luther King Drive
Cincinnati, OH 45268
513-569-7529

U.S. EPA Regional Offices

Region 1 (CT, MA, ME, NH, Rl, VT)
John F. Kennedy Federal Building
One Congress Street
Boston, MA 02203
617-565-3420

Region 2 **(NJ, NY, PR, Vl)**
Jacob K. Javits Federal Building
26 Federal Plaza
New York, NY 10278
212-264-2657

Region 3 (DC, DE, MD, PA, VA, WV)
841 Chestnut Building
Philadelphia, PA 19107
215-597-9800

Region 4 **(AL, FL, GA, KY, MS, NC, SC, TN)**
345 Courtland Street, NE.
Atlanta, GA 30365
404-347-4727

Region 5 (IL, IN, OH, Ml, MN, Wl)
77 West Jackson Blvd.
Chicago, IL 60604
312-353-2000

Region 6 (AR, LA, OK, NM, TX)
First Interstate Bank
Tower at Fountain Place
445 Ross Avenue, Suite 1200
Dallas, TX 75202
214-655-6444

Region 7 (1A, KS, MO, NE)
726 Minnesota Avenue
Kansas City, KS 66101
913-551-7000

Region 8 (CO, MT, ND, SD, UT, WY)
999 18th Street, Suite 500
Denver, CO 80202-2405
303-293-1603

Region 9 (Amer. Samoa, AZ, CA, NMI, Guam, Hl, Nv)
75 Hawthorne Street
San Francisco, CA 94105
415-744-1305

Region 10 (AK, ID, OR, WA)
1200 Sixth Avenue
Seattle, WA 98101
206-553-4973

State Pollution Prevention Contacts

Alabama

Alabama Department of Environmental Management
1751 Dickinson Drive
Montgomery, AL 36130
205-260-2777

Alaska

Pollution Prevention Office
Alaska Department of Environmental Conservation
3601 C Street, Suite 1334
Anchorage, AK 99503
907-563-6529

Arizona

Pollution Prevention Unit
Arizona Department of Environmental Quality
2005 North Central Avenue
Phoenix, AZ 85004
602-207-4233

Arkansas

Hazardous Waste Division
Arkansas Department of Pollution Prevention and Ecology
P.O. Box 8913
Little Rock, AR 72219-8913
501-570-2861

California

California Environmental Protection Agency
555 Capitol Mall, Suite 235
Sacramento, CA 95814
916-445-3846

Department of Toxic Substances Control
Office of Pollution Prevention and Technology Development
400 P Street
P.O. Box 806
Sacramento, CA 95812-0806
916-322-3670

Colorado

Colorado Department of Health
HMWMD-B2
4300 Cheny Creek Drive South
Denver, CO 80222
303-692-3309

Department of Mechanical Engineering
Colorado State University
Fort Collins, CO 80523
303-491-5317

Connecticut

Connecticut Technical Assistance Program
(CONNTAP)
Connecticut Hazardous Waste Management Service
900 Asylum Avenue
Suite 360
Hartford, CT 06105-1904
203-241-0777

Delaware

Pollution Prevention Program
Department of Natural Resources and Environmental Control
P.O. Box 1401
Kings Highway
Dover, DE 19903
302-739-5071/3822

Florida

Pollution Prevention Coordinators
Waste Reduction Assistance Program
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, **FL 32399-2400**
904-488-0300

Georgia

Municipal Permitting Program
Environmental Protection Division
Georgia Department of Natural Resources
4244 International Parkway, Suite 110
Atlanta, GA 30334
404-656-4988

Hawaii

State of Hawaii Department of Health
Solid and Hazardous Waste Branch
Five Waterfront Plaza, Suite 250
500 Ala Moana Boulevard
Honolulu, HI 96813
808-586-4226

Idaho

Division of Environmental Quality
Idaho Department of Health and Welfare
1410 North Hilton Street
Boise, ID 83706-1290
208-334-5879

Illinois

Office of Pollution Prevention
Illinois Environmental Protection Agency
2200 Churchill Road
P.O. Box 19276
Springfield, IL 62794-9276
217-782-8700

Illinois Hazardous Waste Research and Information Center
One East Hazelwood Drive
Champaign, IL 61820
217-333-8940

Indiana

Office of Pollution Prevention and Technical Assistance
Indiana Department of Environmental Management
105 South Meridian Street
P.O. Box 6015
Indianapolis, IN 46206-6015
317-232-8172

Iowa

Iowa Waste Reduction Center
University of Northern Iowa
Cedar Falls, IA 50614-0185
319-273-2079

Kansas

Bureau of Waste Management
Kansas Department of Health and Environment
Forbes Field, Building 740
Topeka, KS 66620-0001
913-296-1603

Hazardous Waste Engineering Extension Program
Ward Hall
Manhattan, KS 66506-2508
913-532-6026

Center for Environmental Education and Training
Kansas University
P.O. Box 25936
Overland Park, KS 66225-5936
913-864-3284

Kentucky

KY PARTNERS—State Waste Reduction Center
Ernst Hail, Room 312
University of Louisville
Louisville, KY 40292
502-588-7260
(Inside KY 1-800-334-8635 x7260)