



Pollution Prevention Opportunities For Lithographic Printers

I. OVERVIEW

The Federal Pollution Prevention Act (**PPA**) was passed in 1990 to focus national attention on reduction of volume and toxicity of wastes at the source of their generation. Congress declared a national policy to **prevent or reduce pollution at the source whenever feasible**. According to PPA "**source reduction**" means any practice which:

- (i) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and
- (ii) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

The term includes equipment or technological modifications, process or procedural modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

The PPA sets forth a **hierarchy of waste management** options in descending order of preference: **prevention/source reduction, recycling, treatment, and disposal**. Pollution should be prevented or reduced at the source whenever feasible, while pollution that cannot be prevented should be recycled in an environmentally safe manner. In the absence of feasible prevention or recycling opportunities, pollution should be treated. Disposal or other release into the environment should be used as a last resort.

EPA has defined **Pollution Prevention (P2)** as reduction or elimination of waste at the point of generation, as well as protecting natural resources through conservation or increased efficiency in the use of energy, water, or other materials. P2 includes the following activities:

- **source reduction** that results in the reduction of total volume of hazardous and non-hazardous waste and/or reduction of toxicity of hazardous waste,
- **on-site recycling** as part of the technological process, and
- **conservation** of energy, water and other natural resources.

Pollution prevention is not:

- **off-site recycling,**
- **concentration of hazardous components** to reduce volume,
- **diluting hazardous constituents** to reduce toxicity,
- **transferring hazardous components from one environmental medium to another** (e.g., evaporating solvents from contaminated wastewater to the air),
- **waste treatment** (e.g., wastewater pretreatment before disposal to a sewer), and
- **waste disposal.**

Pollution Prevention Opportunities For Lithographic Printers

However, these may be effective waste management or treatment options after pollution prevention is considered.

II. NATION-WIDE NEW PROGRAMS

The U.S. Environmental Protection Agency's (EPA) pollution prevention program began in the late 1980s to advance **prevention** over EPA's traditional pollution **control** and **cleanup** actions and to **incorporate prevention** as the principle of **first choice** into the mainstream work of the Agency. EPA has moved vigorously in recent years to establish programs which move away from the traditional approach of managing waste at the "end of the pipe" to preventing its production at the source. Two of these new programs are accelerating waste reduction in the printing industry:

- **The Common Sense Initiative (CSI)** is a fundamentally different vision of environmental policy. EPA has created new cross-Agency teams to work with industry, states, the environmental community, and others in six pilot sectors (printing, electronics, auto assembly, metal finishing, iron and steel, and petroleum refining) to identify and implement "**cleaner, cheaper, smarter**" preventive environmental management solutions. For the first time, these diverse interests, in the past often playing adversarial roles, are joining together to examine the full range of environmental requirements affecting six industries, with the shared goal of creating environmental protection strategies that are cleaner for the environment and cheaper for industry and taxpayers. The participants are looking for solutions that are: industry specific, focused on industry as a whole rather than one pollutant at a time, based on the concept of pollution prevention rather than End-of-Pipe-Only Controls, consensus-based solutions, and a flexible means of achieving tough environmental standards. For more information on CSI call EPA at 202-260-1023.

- **Design for the Environment (DfE).** Through this program, EPA creates voluntary partnerships with industry, professional organizations, state and local governments, other federal agencies, and the public. Designing for the environment is a strategy for managing the variety of competing demands, such as keeping costs low and quality up, staying competitive in global markets, and meeting consumer preferences for environmentally friendly products. EPA's DfE program helps businesses incorporate environmental considerations into the design and redesign of products, processes, and technical and management systems. How does a business design for the environment?
 - By implementing pollution prevention, energy efficiency, and other resource conservation measures;

Pollution Prevention Opportunities For Lithographic Printers

- By using and producing less toxic and non-toxic materials;
- By making products that can be refurbished, disassembled, and recycled; and
- By keeping careful track of the environmental costs associated with each process.

The DfE Printing Project is a cooperative EPA-industry project aimed at developing pollution prevention information specific to small and medium-sized printers. Project committees are developing cleaner technology substitutes, outreach strategies, and informational products to communicate the results to printers. The committees are also working to identify incentives that will encourage printers to use this information. In lithography, this project is focused on reducing solvent usage from blanket washes. The EPA DfE Printing Project Fact Sheets are included as attachments to this document. For more information on DfE call EPA at 202-260-1023.

EPA's Office of Compliance and Pollution Prevention Policy staff is partnering with industry and environmental experts to develop "**Printers' National Environmental Assistance Center**" (**PNEAC**) which includes compliance assistance and pollution prevention information. A PNEAC fact sheet, partners, program description and contacts are included as an attachment to this document for your information.

In addition, the Council of Great Lakes Governors, working with the Environmental Defense Fund and representatives of the printing industry, has initiated the **Great Printers Project** to prepare a pollution prevention strategy for printers in the Great Lakes region. For more information call Printing Industries of America at 703-519-8114.

On the other hand, printers are facing stiffer environmental regulation by the implementation of the Clean Air Act Amendment, increased hazardous waste disposal costs, and tighter restrictions on allowable discharges from wastewater treatment plants. At the same time, more and more businesses are viewing waste as a reflection of production inefficiency and not as an inevitable part of doing business. All waste represents loss of resources and money. Finally, future waste regulations will likely increase in severity by restrictions associated with waste generation. Businesses are beginning to understand that the best way to avoid these problems is to reduce or eliminate waste generation.

III. WASTE REDUCTION BENEFITS

In general, waste management is becoming increasingly more burdensome in terms of time, resources, and costs. Printers throughout the country have **implemented waste reduction programs** and found that there are many potential **benefits**, such as:

Pollution Prevention Opportunities
For Lithographic Printers

- **Reduced operational costs** through material, energy, and manpower savings typically spent on waste management.
- **Reduced waste transportation and disposal costs** associated with decreased quantities of waste.
- **Reduced long-term liability** for off-site disposal of hazardous wastes associated with improper waste transportation, handling or treatment by disposal facilities.
- **Safer workplace** for employees resulting from reduced exposure to hazardous wastes, which can also reduce the liability of worker health lawsuits and may increase employee loyalty.
- **Improved company public image** by helping sustain environmental quality, which can result in increased sales.

Reduction or elimination of waste generation by lithographic processes can be achieved by implementing pollution prevention techniques. Many pollution prevention practices are low-cost and do not require sophisticated technologies to effectively reduce waste and improve printing efficiency. These simple practices do not involve intensive capital investment and can be implemented relatively easily by small businesses.

IV. POLLUTION PREVENTION PROGRAM

By signing a hazardous waste manifest, the owner/operator of a facility is certifying that they have a hazardous waste minimization program in place. Large Quantity Generators must have a formal written program with documentation. Small Quantity Generators are not required by law to have a formal program, but should be prepared to prove they are performing some type of waste minimization, or have explored alternatives for waste minimization.

BROWARD COUNTY recommends that the owner/operator of each lithographic printing facility develop a **Pollution Prevention (P2) Program**. Development of a P2 Program is advantageous to each facility because it establishes a system that facilitates the objective evaluation of a facility's pollution management capabilities and mechanisms for implementing cost-effective pollution prevention opportunities. Suggestions for developing a comprehensive Pollution Prevention Program follow:

1. Set Overall Pollution Prevention Program Goals.

Identify the goals and objectives of the facility's Pollution Prevention Program. The

Pollution Prevention Opportunities For Lithographic Printers

goals should include minimizing the release of hazardous materials to the environment and the generation of hazardous wastes. The objectives should clearly define what must be done to accomplish these goals.

2. Conduct a Facility Pollution Prevention Assessment.

A facility pollution prevention assessment is a review of current facility operations to identify the sources of waste generation. Once having pinpointed the sources of pollution, the company will identify changes that can save money and reduce pollution risk. The following are a few of the **typical steps** taken when conducting a facility pollution prevention assessment:

- Prepare drawings of the facility layout, including the location of all major equipment and storage areas.
- List all processes that use hazardous materials and their potential for release to the environment.
- List all processes that generate hazardous and non-hazardous wastes.
- Inventory all hazardous substances and the amount handled and used by the facility.
- Inventory all wastes, hazardous and non-hazardous, and the amounts generated.
- Identify major losses by comparing raw materials entering the facility with products and wastes leaving the facility.
- List by priority areas for improvement and waste stream reduction.
- Identify current on-site reuse and/or recycling activities, as well as off site recycling activities. Evaluate their efficiency.
- Determine all costs relating to waste generation, including regulatory compliance and licensing costs, on-site maintenance, transportation and off site disposal costs, long-term liability cost, material loss through evaporation, spills and other releases to the environment.
- Determine all cost savings or profits associated with material reuse or recycling.

Pollution Prevention Opportunities
For Lithographic Printers

3. Prepare a Pollution Prevention Plan (P2 Plan).

A Pollution Prevention Plan is an important element of a Pollution Prevention Program. Based on the facility's current procedures, the P2 Plan identifies improvements, establishes a schedule for implementation of selected improvements, and describes how accomplishments will be tracked and measured. In addition, a written plan becomes an excellent reference guide to ensure the Pollution Prevention Program is being implemented as planned.

The P2 Plan should be developed by the facility with consideration given to the following recommended criteria, as appropriate:

➤ **A written statement of the company's pollution prevention policy, goals and objectives.**

State the company's pollution prevention goals and objectives developed under item 1 above. Include a description of management commitment and involvement in the program. Owners/managers set the tone of a company's activities. Through them employees learn the importance of pollution prevention and waste minimization. Prepare a written statement that expresses management's support for the Pollution Prevention Program and their commitment to implementing planned activities and achieving established goals on schedule.

➤ **Provide a summary of the facility pollution prevention assessment.**

Summarize the findings of the pollution prevention assessment incorporating the elements described above under item 2.

➤ **Identify pollution prevention opportunities for waste reduction, and on-site reuse/recycling. Evaluate each available opportunity and select cost-effective options.**

General and site-specific factors must be considered when evaluating pollution prevention opportunities. Evaluation of waste minimization options should include consideration of the following questions:

- What are the main benefits to be gained by implementing an option?
- How much will it cost to implement the option?
- Is the option economically feasible to implement (what is the net present value, payback period or expected return on investment)?

Pollution Prevention Opportunities
For Lithographic Printers

- Can the option be implemented within a reasonable amount of time?
- Does the option have a good "track record"?
- Will other areas of facility operations be affected?
- Which option will best achieve the facility's waste reduction goals?

➤ **Include a schedule of when selected options will be implemented.**

A schedule helps management to plan for implementing the new pollution prevention and waste minimization procedures and to keep track of progress.

➤ **Describe how progress towards reducing the volume of hazardous wastes disposed will be measured.**

Establish quantitative goals for waste reduction to measure progress. Management can then measure their progress towards meeting established goals. Include a discussion of what data will be collected, how results of the program will be tracked and analyzed, how progress will be measured against goals, and how frequently a Pollution Prevention Program status report will be prepared (quarterly, semiannually or annually).

➤ **Include a description of the employee awareness and training programs that will be implemented to achieve the goals of the facility's Pollution Prevention Program.**

Develop employee awareness and training programs. Provide a description of these programs in the facility's P2 Plan. Create a schedule for implementing these programs and follow the schedule.

4. Involve facility employees in the Pollution Prevention Program.

Although pollution prevention commitments often begin with management, employees are usually the best source for suggesting improvements in the day-to-day operations of the business. Employee incentive programs encourage employees to design and use new pollution prevention ideas. Good suggestions should be put into practice and recognized. One way to reward employee participation in the facility's P2 Program is to establish a monetary reward system. For example, if an employee's suggestion is implemented and results in a cost savings to the facility, the monetary reward to the employee could be set as a percentage of the estimated annual savings to be realized by facility. Rewards for intangible benefits, or suggestions where cost savings cannot be determined should also be granted.

5. An annual review of the Pollution Prevention Program is recommended.

Pollution Prevention is an ongoing effort and facility operations can change.

Pollution Prevention Opportunities **For Lithographic Printers**

Consequently, a facility assessment and a reevaluation of the Pollution Prevention Program, including the P2 Plan, should be repeated at least once a year. Annual review and revision of the P2 Program should be based on the facility assessment. In addition to continually maximizing pollution prevention opportunities, annual review and revision of the program will demonstrate the facility's continued commitment to achieving pollution prevention goals.

The strategies noted above for developing a comprehensive pollution prevention program will be beneficial for the company and the environment. Implementation of pollution prevention procedures can reduce facility operating costs. Such cost savings can quickly compensate for any costs associated with implementing new pollution prevention procedures.

V. SELECTION OF POLLUTION PREVENTION METHODS

Since the most appropriate method of pollution prevention can depend on site-specific considerations, each facility should identify, select and implement the cost-effective options appropriate for the needs and capabilities of each individual facility.

A successful program includes the following **pollution prevention steps**:

- 1.** Commit to pollution prevention. Nothing will happen without your commitment.
- 2.** Identify pollution-related problems you want to address and associated pollution prevention opportunities based on a review of facility activities.
- 3.** Identify, evaluate and select appropriate pollution prevention techniques.
- 4.** Implement the techniques and monitor their effectiveness.

A summary of the **pollution prevention opportunities** follows:

Good Operating Practices

- Segregate wastes to increase recyclability.
- Keep records of inventory. Implement a "first-in, first-out" policy of chemical use. Do not order more than can be used within the shelf life of the product. Labels and expiration dates should be legible.
- Designate one person to manage raw materials for proper inventory control and to

Pollution Prevention Opportunities **For Lithographic Printers**

ensure that hazardous materials are properly contained and labeled and Material Safety Data Sheets (MSDS) are on file.

- Keep lids on bulk solutions to prevent evaporation, oxidation and contamination.
- Minimize spills and use dry methods for cleanup wherever possible. If a spill of a hazardous substance occurs, use a rag or an absorptive material to soak it up and dispose of it in accordance with all local, state, and federal regulations.
- Be innovative in trying new procedures and products, including recycled paper with a high post-consumer content.
- Find ways to reuse paper. Make notepads, poster-paper, or other products from extra paper. Recycle all paper waste.
- Conserve energy by using energy-efficient lights and equipment and turning them off when not in use.
- Conserve water by installing water-saving devices and using only what you need.
- Your local electric utility or water supplier may offer free energy and water conservation audits.

Prepress Operations

- Use computers to set up and edit jobs to produce proofs for client approval. This technique reduces photo processing wastes.
- Adjust chemical replenishment and washwater flow rates on photo processor to optimize bath life and reduce wastewater quantity.
- Reduce unnecessary photographic chemical changeouts by monitoring bath solutions closely.
- Employ photographic intensifiers that don't contain mercury or cyanide salts.
- Use silverless films, such as vesicular, diazo and electrostatic films, that have speeds and resolution comparable to silver films.
- Install an automatic wash bath which saves water and reduces waste by turning on

Pollution Prevention Opportunities For Lithographic Printers

washwater only when film is being processed.

- Use squeegees or rollers between baths to remove residual fluid from the film before it is placed in the next bath. This prevents bath contamination and reduces material use.
- Employ silver recovery units “in-line” to extend the life of the developer and to help meet wastewater discharge limits.
- Contract with a waste hauler to send used film and film scraps offsite for silver recycling.
- Use presensitized plates that only generate small volumes of spent developer (usually nonhazardous) and are reusable.
- Employ aqueous platemaking to reduce or eliminate the use of hazardous developers and fixers. You may be able to discharge wastewater from the aqueous process directly to the sanitary sewer. Check with your wastewater utility.
- Consider new prepress technologies like electronic image processing (e.g., desktop publishing, digital cameras), direct-to-plate, direct-to-press and digital proofing to reduce or eliminate prepress wastes.

Press Operations

- Maximize use of vegetable-based and ultra violet inks that significantly reduce or eliminate volatile organic compound (VOC) emissions. Soy-based inks with 1% VOC content are available. These inks reduce air emissions and improve workplace safety.
- Select inks that minimize the use of metallic pigments.
- Try fountain solutions that don’t contain isopropyl alcohol (IPA) to eliminate or significantly reduce VOC emissions and minimize employee exposure to toxics.
- Use low-VOC and citrus-based solvents that generate less air emissions.
- Buy recycled solvents.
- Install an automatic ink leveler to ensure that ink is evenly distributed.
- Gang print or run similar jobs simultaneously to minimize waste generation between cleanup and starting the next run.
- Look into waterless presses which require no fountain solution or water.

Pollution Prevention Opportunities
For Lithographic Printers

- Refrigerate fountain solution to maintain solution concentration by reducing evaporation. VOC emissions are reduced.
- Use hot parts washers or solvent sinks to clean removable parts. Ask for non-chlorinated solvents if you use sinks.
- Use dirty solvents or lower VOC cleaners for initial wipe down of press equipment, followed by final cleanup using a higher VOC solvent.
- Keep used cleaning rags in closed containers. Cleaning rags contaminated with ink pigments and/or solvents should be laundered off-site by an industrial service or disposed of as hazardous waste. Clean rags can be obtained from the laundry service.
- Use excess ink for future jobs, or mix it together to create a “shop black.”
- Recycle ink. If possible, purchase inks from a distributor who will take back unused inks.
- Recycle press cleanup solvents. If you use large amounts, an onsite recovery unit may be practical.
- Find a recycler for press lubricating oils.

Postpress Operations

- Talk to your vendor and review material safety data sheets to identify lower VOC and less toxic glues that will work for you.
- Collect and segregate all paper trimmings, color and white waste paper, and cardboard for recycling purpose.
- Use water-based adhesives.

Important technical information on waste reduction opportunities and pollution prevention

Pollution Prevention Opportunities
For Lithographic Printers

techniques are provided in this document to assist lithographic printers to choose and implement the most valuable options for their specific operation. The following information are included:

- Excerpt from “**Waste Reduction Manual For Lithographic And Screen Printers**” prepared by the University of Tennessee.
- Excerpt from “**Practical Pollution Prevention Techniques for Lithographic Printers**” prepared for U.S. Environmental Protection Agency Region IX.
- **Fact sheets on pollution prevention opportunities for printers** developed by the EPA-DfE program, the University of Wisconsin, the Minnesota Technical Assistance Program, and the Nevada Small Business Development Center.

A **Pollution Prevention Technique Review Checklist** is provided on the next page. The checklist can help you select the best pollution prevention technique to address the pollution-related problems and opportunities you have identified. It is a tool to help you evaluate pollution prevention techniques by looking at a range of business factors. Check off the factors that are important. The checklist provides an area to write down the problems and opportunities you are addressing. Determine which business factors may apply and make notes as necessary.

POLLUTION PREVENTION TECHNIQUE REVIEW CHECKLIST

POLLUTION RELATED PROBLEMS: _____

POTENTIAL TECHNIQUES: _____

BUSINESS FACTORS TO CONSIDER FOR EACH POTENTIAL TECHNIQUE: _____

- TECHNICAL FEASIBILITY: _____
- EQUIPMENT AND MATERIALS COSTS: _____

Pollution Prevention Opportunities
For Lithographic Printers

- LABOR COSTS: _____
- WASTE MANAGEMENT COSTS: _____
- TRAINING EFFORTS (for new procedures): _____
- PERMIT REQUIREMENTS (new or modified permit): _____
- HEALTH AND SAFETY: _____
- PRODUCT OR SERVICE QUALITY: _____
- ENVIRONMENTAL BENEFITS (reduced raw materials consumption, hazardous and solid waste generation, etc.):

- ANNUAL COST SAVINGS (annual cost of current practice minus annual project costs):

- PAYBACK PERIOD (capital project costs divided by expected annual savings): _____

WHICH TECHNIQUES CAN BE IMPLEMENTED IMMEDIATELY?

WHICH REQUIRE MORE INFORMATION?

WHICH ARE PROBABLY NOT PRACTICAL?

Pollution prevention techniques solve many pollution-related problems associated with waste generation and disposal, discharges and emissions. Pollution prevention is a powerful way to save money and protect the environment by:

- Reducing raw materials use and costs.
- Reducing waste treatment, disposal costs, liability and associated costs.
- Improving operations and efficiency.
- Protecting employee health and safety.

Pollution prevention can also enhance a positive image within your community.

Pollution Prevention Opportunities
For Lithographic Printers

Making changes in your facility requires the understanding and commitment of managers and employees. Therefore, the techniques described above should be implemented with a program to inform, train and involve employees.

Also, tell your customers about the environmentally friendly materials that you have available. For example, inform customers about the availability and quality of soy-based inks and recycled paper. Display examples of finished products made with these materials. Customer interest in these “green products” may surprise you.

Overall, the P2-BMP document is intended to assist lithographic printers in achieving environmental compliance while maintaining a profitable business. This document will be distributed county-wide. The BROWARD COUNTY’s Pollution Prevention Division staff will supplement this document by providing training workshops and technical support to facilities requesting assistance. Confidential, non-regulatory on-site visits will also be made available to assist facilities in developing Pollution Prevention Plans.

For **FURTHER INFORMATION** on this topic, contact:

- Broward County **Pollution Prevention and Remediation Programs Division** at 954-519-1260. World Wide Web: <http://www.broward.org/environment>
- Florida Department of Environmental Protection **Small Business Assistance Program** at 1-800-722-7457.
- U. S. Environmental Protection Agency (**EPA**) at 202-260-1023.