MICHIGAN GREAT PRINTERS PROJECT

Pollution Prevention Checklist and Strategies

for the Lithographic Printing Industry

The MICHIGAN GREAT PRINTERS PROJECT is based on the simple but powerful idea that it makes far more sense to eliminate the generation of waste than to develop complex and costly treatment and disposal schemes once it has been generated.

What is pollution prevention?

Pollution prevention (P2) is the reduction or elimination of discharges or emissions to the environment. This includes all pollution: hazardous and non-hazardous, regulated and non-regulated, across all media, and from all sources. Pollution prevention can be accomplished by eliminating or reducing the generation of wastes at their source (source reduction) or by using, reusing, or reclaiming wastes once they are generated (environmentally sound recycling).

Why practice pollution prevention?

Pollution prevention is good business. While most pollution control strategies cost money, pollution prevention has saved many firms thousands of dollars in treatment and disposal costs alone.

Many companies have already discovered the tremendous benefits of pollution prevention. McNaughton & Gunn, a Saline, Michigan book printer, instituted a P2 program and reduced the company's solid wastes by half. In 1995, the program generated an income of $280,000 from recycling film plates and paper.

Smaller companies can also benefit. One firm reduced its annual hazardous waste disposal costs by 74 percent and decreased raw material costs by 16 percent.

By eliminating, reducing, or reusing wastes, a firm can:

- Solve the waste disposal problems created by land bans,
- Reduce waste disposal costs,
- Reduce costs for energy, water, and raw materials,
- Reduce operating costs,
- Protect workers, the public, and the environment,
- Reduce risk of spills, accidents, and emergencies,
- Reduce liability and improve its public image, and
- Generate income from wastes that can be sold.

Reduce

Reuse

Recycle

How can you get started?

A systematic approach will produce better results than piecemeal efforts. An essential first step is a comprehensive waste audit. The waste audit should systematically evaluate opportunities for improved operating procedures, process modifications, process redesign, and recycling.

To conduct a waste audit and develop a P2 plan, follow these steps:

- List all generated waste,
- Identify the composition of the waste and the source of each substance,
- Identify options to reduce the generation of these substances in the production or manufacturing process,
- Focus on wastes that are most hazardous and techniques that are most easily implemented,
- Compare the technical and economic feasibility of the options identified, and
- Evaluate the results and schedule periodic reviews of the plan so it can be adapted to reflect changes in regulations, technology, and economic feasibility.

Who is going to do it?

Pollution prevention requires a new attitude about pollution control. Traditional thinking places all the responsibility on a few environmental experts in charge of treatment. The new focus makes pollution prevention everyone's responsibility. Preventing pollution may be a new role for production-oriented managers and workers, but their cooperation is crucial. It will be the workers themselves who must make pollution prevention succeed in the workplace.

Management commitment and employee participation are vital to a successful pollution prevention program. Management can demonstrate its commitment to pollution prevention and encourage employee participation by:

- Training employees in pollution prevention techniques
- Encouraging employee suggestions
- Providing incentives for employee participation
- Creating a P2 team that includes employee representatives
- Providing resources necessary to get the job done

This fact sheet should only be considered as an introduction to pollution prevention. Since new ideas are always being developed, it does not include every existing pollution prevention practice. Mention of a specific practice should not be considered an unqualified endorsement, and not every practice is suitable for every facility.

Additional Information

Publications

- *Guides to Pollution Prevention: The Commercial Printing Industry,* Office of Research and Development, USEPA, Washington, DC 20460, EPA-625/7-90/008, August 1990.
- *Guides to Pollution Prevention: The Photoprocessing Industry,* Office of Research and Development, USEPA, Washington, DC 20460, EPA-625/7-91/012, October 1991.
- *Multimedia Compliance/Pollution Prevention Assessment Guidance for Lithographic Printing Facilities,* Office of Enforcement and Compliance Assurance, 1200 Pennsylvania Avenue, N.W., Washington, DC 20044, DCN: RZ3-SAI-R11012-WA-00393, August 1995.
- *Pollution Prevention Manual for Lithographic Printers,* Iowa Waste Reduction Center, University of Northern Iowa, Cedar Falls, Iowa, (319) 273-2079, 1995.

Websites

- Michigan Great Printers Project
  http://www.deq.state.mi.us/ead/p2sect/greatp-1.html
- Printers' National Environmental Assistance Center
  http://denrl.igis.uiuc.edu/pneac/pneac.html

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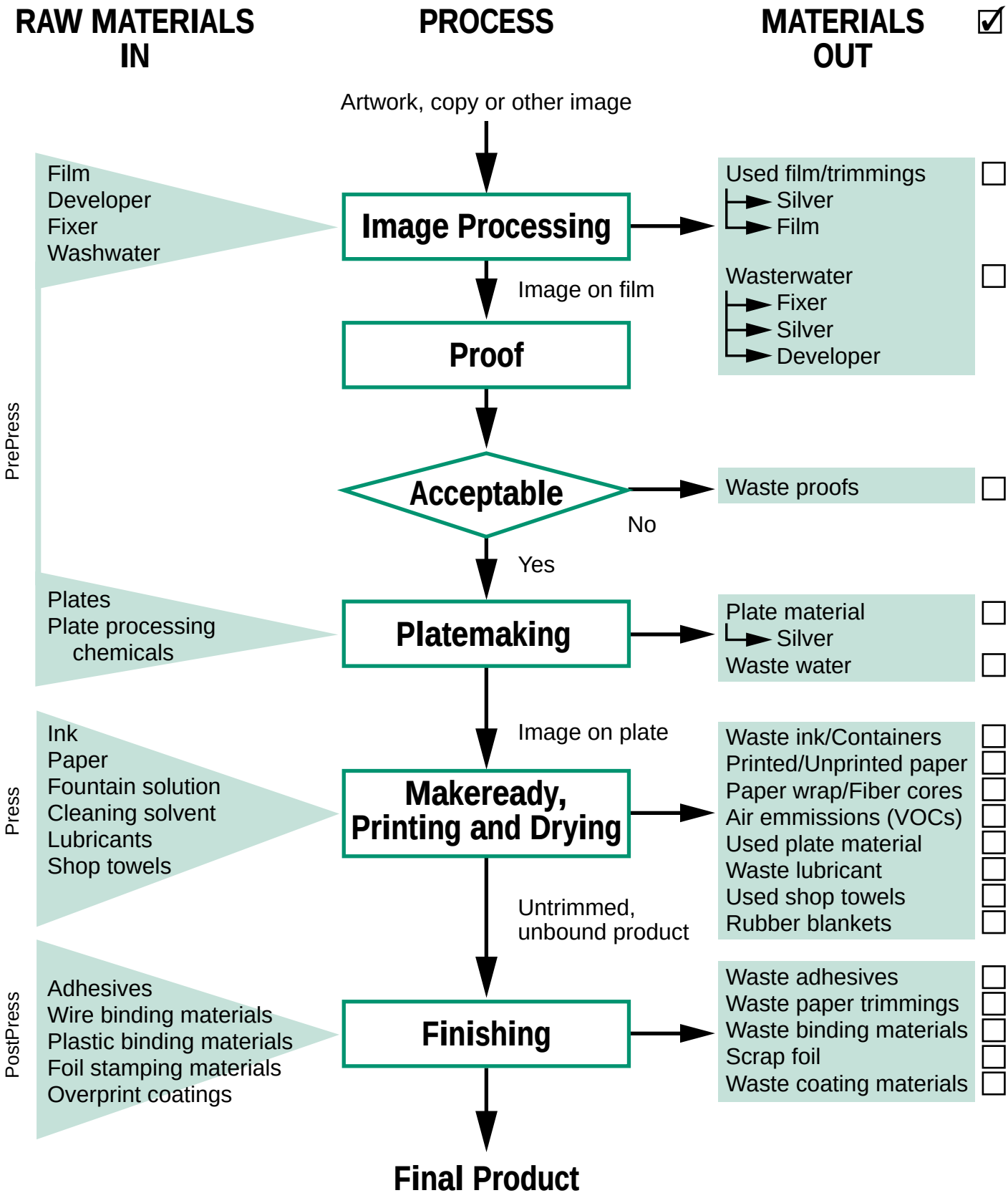
Pollution Prevention Flowchart and Checklist

for the Lithographic Printing Industry



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Pollution Prevention Strategies

for the Lithographic Printing Industry

Process	Potential P2 Areas	P2 Strategies
General Practices	**Aerosol Cans**	• Decide if you actually need these products. If so, limit their use and work with your vendor to find aerosol cans that do not contain hazardous chemicals. • Switch to non-aerosol products as possible, such as manual pump cans or bottles, especially if they can be refilled. • Return defective cans to your supplier.
	Billing	• In larger businesses, bill hazardous waste generating departments for management, compliance, and disposal costs incurred by their hazardous waste and identify the cost premiums as such. Hazardous waste management costs covered under a general expense fund do not give specific departments an incentive to minimize their wastes.
	Containers	• Purchase ink and chemicals in bulk, where possible, using recyclable containers that can be returned to the supplier for refilling.
	Energy Efficiency	• Install fluorescent lighting. • Utilize high-efficiency heaters and coolers. • Add insulation. • Employ motor controllers. • Capture heat from drying ovens (heatset) and use to heat work areas and warehouses. • Reduce the amount of lighting to the amount required for each task. Consider becoming a Green Lights Partner. • Install ceiling fans to bring heat down from high ceilings to work areas. • Use cleanable exhaust filters in place of disposable filters for the exhaust system/stacks, if possible.
	Housekeeping	• Separate waste streams for reuse, recycling, or treatment. Keep non-hazardous materials from becoming contaminated. • Minimize wastes going down the drain from process rinses or rinsing down floor areas. • Keep pallets, empty drums, inks, etc. under protection and away from drains. • Use drip pans under tank inlet hook-ups. • Regularly inspect piping, valves, and couplings for failures or leaks. • Keep fully-stocked spill kits handy. Use dry methods to cleanup whenever possible. • Regularly inspect dumpster/compactor area for spills and staining. • Cover waste disposal area or recycling bins to avoid rainwater infiltration. • Store all drums right-side-up with bungs in place.

Process	Potential P2 Areas	P2 Strategies
General Practices (cont.)	**Inventory Management**	• Practice just-in-time inventory management to reduce waste. • Develop inventory control to prevent excess storage and handling. • If materials have exceeded their shelf life (and the manufacturer will not take them back), check on alternative uses before discarding. Consider contacting nearby theater groups, non-profit groups, or college graphic arts departments to donate expired materials for their programs. • When possible, maintain automated temperature and relative humidity for raw materials, to minimize storage loss.
	Purchasing	• Buy from manufacturers that will accept materials back if shelf life is exceeded. • Be innovative in trying new products that are more environmentally friendly than current products. • Purchase materials in larger quantities to reduce packaging, when possible.
	Shop Towels	• Use cloth towels which can be cleaned and reused, when possible. Find a shop towel laundering/recycling facility and negotiate a contract. • Properly label and store used shop towels, i.e.: keep them in a closed, fireproof container marked “Used Shop Towels Only”. • Separate hazardous and non-hazardous used shop towels, possibly using coloring coding for identification purposes. • Reuse press wipes as long as possible. Use a dirty towel for the first pass and a clean one for the second pass. • Squeeze excess solvent out of used towels. Collect and reuse the liquid for initial cleanup, followed by clean solvent for final cleanup.
	Training	• Train employees on proper filling and transfer techniques for inks and chemicals to minimize drips and spills. • Train employees to empty containers completely prior to disposal. • Train and encourage employees to seek other P2 opportunities.
Pre-Press	**General**	• Utilize aqueous or low-VOC cleaners, developers, fixers, preservers, and proofing methods which minimize use of volatile chemicals. • Utilize solid chemistry, where applicable. It is safer than using liquid concentrates. • Cap chemicals to minimize evaporation. • Use squeegees to wipe excess liquid from film and paper to minimize chemical carryover and process bath contamination. • Use counter-current rinsing to reduce cross-contamination. • Use electronic imaging and/or laser platemaking, if possible. This is a costly alternative, but can significantly reduce the need for photography reshooting. • Use direct-to-plate/direct-to-press technology, when feasible (may use more energy). • Properly dispose of process wastes from fixers, wetting and cleaning agents, intensifiers, reducers, bleaches, light sensitive plate coatings, and scrap film. • Properly dispose of spent plating solutions and cleaning baths. • Install a water meter to measure water used for lawn sprinkling and landscape watering. This will eliminate sewer charges on this water.

Process	Potential P2 Areas	P2 Strategies
Pre-Press (cont.)	**Image Processing**	
	Film/Film Trimmings	• Look for a recycling company that will collect your scrap film. • Consider diazo, photopolymer, vesicular, or electrostatic films to reduce silver use if applicable.
	Fixer/Silver	• Utilize silver recovery. Silver can be recovered from film, fixer, and washwaters. Recovering silver can be profitable because the silver can be sold for as much as 80 percent of its new market value. • Investigate whether on-site silver recovery or off-site management is the best option for you. On-site methods include electrolytic recovery units and chemical recovery cartridges (CRCs) to recover silver from spent fixers and washwaters, and ion-exchange to recover silver from washwaters. • If you are doing on-site silver recovery, properly operate and maintain your equipment. • Work with your vendor to determine methods to extend the life of your fixer bath. • Use an acid stop bath prior to the fixing bath if using tray processing.
	Developer	• Extend photo developer life by monitoring and adjusting process baths. • If possible, purchase developer solutions that contain less than one percent hydroquinone. Check with your supplier or look on your Material Safety Data Sheet (MSDS). • Reduce bath exposure to air.
	Platemaking	
	Plates	• Use two-sided plates. Some aluminum plates can be exposed and developed on both sides, which reduces the number of plates used. • Reclaim metal plates. Recycle paper plates. • Switch to aqueous plates. These plates use aqueous developers that are usually 80 to 90 percent water which makes them less likely to be considered hazardous.
	Wastewater	• Employ counter-current washing instead of parallel rinse systems to reduce process solution contamination and water usage. Reuse rinse water as long as possible. • Eliminate once-through cooling water for equipment and air compressors. • Monitor and accurately add replenisher chemicals to process baths to reduce chemical wastes. • Run similar jobs on the same day, or schedule jobs using light colored ink before darker ones. This may reduce the amount of cleaning required between runs. • Dedicate presses for various ink colors, if feasible. This will result in fewer cleanups. • Dedicate one press for inks containing hazardous pigments or solvents, if possible.
Press	**Makeready**	• Use both sides of your makeready paper to cut the amount used in half. Some printers save even more by using makeready paper after both sides have been printed. A clean sheet of paper is inserted every 10th sheet or so. The clean sheet is used to check print quality while the other sheets serve to keep the press running.

Process	Potential P2 Areas	P2 Strategies
Press (cont.)	**Printing and Drying**	
	Inks	• Use inks that are low in volatiles and hazardous materials (heavy metals). When possible, use inks that are low in volatiles and contain no hazardous materials (heavy metals). • Switch from a petroleum oil-based ink to a vegetable oil-based ink such as soy or linseed oil. • If using colored inks, ask your vendor for inks that contain little or no heavy metals. Ask if your vendor can re-blend waste inks. • Buy only as much ink as needed for the near future. Use older inks first to maintain your inventory. • When storing cans of ink that have been opened, cover the ink surface with waxed paper, lids, or other covers to reduce skinning and to maintain ink quality. • Use anti-skinning products to prevent ink dry-up during shut-downs. • Fill ink fountains with only enough ink for the run or shift and return unemulsified inks to their containers. • Install an ink agitator. • Recycle ink in-house, if possible (add leftover colored inks to black ink). Otherwise, recycle inks off-site, as appropriate. • Properly dispose of waste ink and ink sludges when they cannot be recycled (especially if they contain chromium, lead, barium, or other heavy metals).
	Fountain Solution	• Commit to the significant reduction or phase-out of alcohol in fountain solution. • Look for alcohol substitutes that are not hazardous waste when disposed. Ask your vendor for suggestions. • If you continue to use alcohol in your fountain solution, try to reduce the amount that you use to less than five percent alcohol. • Consider using a recirculating chiller unit that keeps fountain solution clean and reduces evaporation. • Check pH for consistency in each fountain solution bath. Some printers have found a pH of around 4 to 5 to be effective in maintaining print quality. • If you are going to try a low or non-alcohol fountain solution, you may need to experiment to find the right product or formulation. If one does not work, try another one. Keep with it until you find one that satisfies you.
	Paper	• Find ways to use paper in-house. Make note pads, poster paper, or other products from extra paper. • Recycle all paper stock, including office paper. This saves landfill space and money in disposal costs, and may generate income. • Separate printed from unprinted paper. Unprinted paper has a higher recycling value than printed paper. • Donate reusable paper to local organizations (day care, Sunday school, etc.). • Complete the paper recycling loop by purchasing paper with recycled content. Look for the highest pre/post consumer recycled content and the lowest bond weight that your printing requirements and customer stipulations allow. • Encourage customers to avoid bright colored paper when possible, since it is more difficult to recycle and therefore has less recycling value. • Recycle all skid wrappers, rolls, and cardboard.
	Rubber Blankets	• Recycle used rubber blankets.

Process	Potential P2 Areas	P2 Strategies
Press (cont.)	Solvents — cleaning	• Use reduced-VOC wash up cleaners. • Try to find and use the lowest VOC press wash that still works for you. • Work with your vendor to make sure that your press wash does not contain chemicals which are typically hazardous when disposed. • Consider ideas that conserve press wash, such as dedicating a press to just one color on specific days. Since colors are not changed between press runs, the number of press cleanings are reduced. This saves time, press wash, and ink. • Do not saturate shop towels with too much press wash. Use the minimum amount needed to do the job. Excessive use increases the amount of wash that needs to be bought and results in increased air pollution. • Segregate spent solvent according to color and type of ink. Reuse the collected wastes to thin future batches of the same ink. • If possible, use automatic cleaning equipment to promote more efficient use of cleaning solvent. • Properly dispose of spent solvents including blanket washers and other cleanup solvents.
	Waste Lubricants	• Work with your vendor to identify lubricants with the longest life that are as 'environmentally friendly' as possible. • Recycle used oil when possible. Recyclers can either re-refine the oil into new lubricating oil, create fuel grade oil, or use it for blending into asphalt. • Used oils may be contaminated with hazardous materials, such as lead or cadmium. If they can not be recycled, make sure they are disposed of properly. • Segregate the used oil from solvents and other contaminants.
Post-Press	**Finishing**	• Transition to water-based coatings. • Select glues that are low in volatiles. • Properly handle lacquers, lacquer developers, bronzing powder, and certain types of coatings containing copper, zinc, aluminum, and stearic acid. • Reduce or eliminate use of coatings containing copper, zinc, aluminum, and stearic acid. • Recycle waste materials when possible. • Choose finishing materials that can be recycled.
	Shipping	• Ship finished product using returnable/reusable containers and pallets.

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