Illinois Environmental Protection Agency
Office of Pollution Prevention
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Pollution Prevention Checklist

Improving the Environment and Your Bottom Line

Looking for ways to save money, increase efficiency, reduce regulatory costs and improve the environment all at the same time? Adopting a pollution prevention program may be just the answer for you.

Many Illinois companies are realizing that reducing waste and pollution at the point of generation- before it goes into the dumpster, down the sewer, out the stack, or away with the hauler – make a lot more sense than trying to treat or clean it up after the fact. In other words, if you don't generate waste or pollution, you don't half to track it, permit it, pay for costly treatment or disposal, or insure against the risks that might be associated with it.

Whether your company has five employees or two hundred, generating less waste and pollution is good business. Many firms have saved thousands of dollars by employing relatively simply pollution prevention measures like installing splash guards and drain boards on tanks and faucets, training employees in work practices that minimize paint overspray, keeping lids on containers and tanks when not in use, or purchasing raw materials in reusable containers. Others have taken more ambitious steps like switching to aqueous cleaners, using counter-current rinsing methods or installing more efficient coating systems.

Looking at things in a new light

Setting up a pollution prevention program does not require exotic or costly technologies. Some of the most effective methods are simple modifications in work practices and equipment. Others require more detailed engineering or design changes, but experience has proven that pollution prevention usually pays for itself within a short time through savings in raw material purchases and waste disposal costs.

You can find pollution prevention opportunities all around your facility if you look at things in a new light. This may require a shift in thinking, from "How do I get rid of it" to "How do I prevent it." As you walk through your shop, ask yourself if you can change a process in some way so that it doesn't produce a waste or if you can lower the toxicity of the raw materials you use. You should also encourage your employees to think "pollution prevention." Better yet, involve them in design or operating changes that would reduce waste generation --- they will have good ideas and will help make the program succeed.

Getting Started

Attached is a checklist of common pollution prevention methods. Choose the categories in this checklist that are most applicable to your facility and don't feel as if you have to everything at once. Start with a few waste streams or processes and select pollution prevention projects with short payback periods first. The options you choose will depend on technical considerations, costs and environmental priorities.

This checklist is not intended to be a comprehensive list of all techniques that could be used to reduce waste and pollution as a business. Each facility is unique, with its own challenges and opportunities to minimize waste and pollution; therefore, each pollution prevention program will be unique.

As long as wastes and emissions are being produced, there is the potential for pollution prevention. Less polluting materials, equipment and procedures are constantly being developed so the wastes and emissions that are difficult or costly to control today may be easily eliminated tomorrow. Stay alert for new developments and reassess your operations periodically to avoid slipping back into the old, wasteful ways of doing things.

To wrap up, make pollution prevention just as important to your company as worker safety, customer satisfaction, and product quality. The money saved in reducing your waste treatment and disposal costs can be directed to other pressing areas, giving you a competitive advantage over businesses saddled with high environmental costs. There are several state agencies that have years of experience with the technical and organizational aspects of pollution prevention. For more information about how pollution prevention can improve your bottom line and other resources that can help you develop and implement a program, contact:

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Illinois EPA's Office of Pollution Prevention (OPP) can provide companies with technical assistance and serve as a conduit for finding the latest information on pollution prevention strategies and methods. OPP also places graduate students in engineering and other technical fields with companies to work on pollution prevention projects during the summer months. Each year, it sponsors statewide workshops that bring together government, industry, and environmental professionals to share pollution prevention successes and ideas. Contact us to be added to our P2 mailing list.

IL Waste Management and Research Center
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The Waste Management and Research Center is a non-regulatory environmental agency that can help companies identify pollution prevention opportunities through confidential on-site assessments, feasibility studies, research support, vendor information and training activities. The Center also maintains an information clearinghouse and operates a laboratory for testing cleaner production technologies and material substitutes. Each year it recognizes and issues awards on behalf of the Governor's Office to business and other organizations that implement innovative pollution prevention projects.

Each set of questions begins with the phrase,

"Have you considered…"

Planning and Assessment

	Adopting a corporate policy that makes pollution prevention a priority in everyday business activities?
	Creating a pollution prevention committee, headed by an enthusiastic advocate?
	Developing pollution prevention goals with measurable objectives?
	Identifying the types and amounts of pollutants generated, the processes that create them and where they go?
	Examining the full costs of waste treatment and disposal, including the need for permits, monitoring and reporting requirements, raw material losses and reduced production potential?
	Conducting regular internal assessments to identify pollution prevention opportunities and to select projects for implementation?
	Training employees in pollution prevention practices and rewarding them for their efforts and suggestions?
	Discussing your pollution prevention priorities with suppliers and end-users?
	Monitoring the progress of your pollution prevention program to publicize achievements, gain feedback and identify areas for improvement?

Inventory Control

	Inspecting deliveries immediately and returning unacceptable materials to suppliers?
	Employing a “first in, first out” policy for raw materials to keep them from becoming too old to use?
	Practicing “just-in-time” inventory control, which moves raw materials directly from the receiving dock to the manufacturing area for immediate use?
	Checking that all containers have legible labels?
	Storing materials in locations that will preserve their shelf life?
	Purchasing raw materials in reusable containers, tote bins or bulk shipments, but avoiding the purchase of too much of a product that might spoil?
	Reducing unnecessary use of hazardous materials by centralizing and limiting access to them?
	Ordering smaller containers of infrequently used materials to avoid disposing of large quantities of unused obsolete materials?
	Tracking quantities of raw materials used and waste produced by individual process lines or operations?
	Substituting non-hazardous materials where possible?

Facility Housekeeping

	Keeping storage and work areas clean and well organized?
	Keeping non-hazardous materials from being contaminated?
	Restricting traffic through storage areas to reduce likelihood of contamination or spillage of stored material?
	Storing containers to allow for visual inspection of corrosion and leaks?
	Stacking containers in a way to minimize the chance for tipping, puncturing, or breaking?
	Raising drums off the floor to prevent corrosion from leaks or sweating concrete?
	Dispensing and transferring materials using pumps or gravity fed spigots and funnels?
	Using floating lids on liquid storage containers to prevent loss of materials through evaporation or contamination?
	Converts to reusable shipping pallets?
	Designing responsibility for process fluid recycling, maintenance and replacement?

Spills and Leak Control

	Installing splash guards and drip boards on tanks and faucets?
	Routinely inspecting and maintaining valves, pipe joints, pumps, tanks, etc?
	Using all welded piping construction, double seals and bellows-sealed valves?
	Using seal-less pumps?
	Keeping tanks and containers covered to prevent spills, evaporation. And contamination?
	Covering waste disposal areas and recycling bins to avoid rainwater infiltration?
	Using drip pans under vehicles?
	Using overflow control devices on process vessels and storage tanks?
	Installing spill basins and dikes in storage areas?
	Sweeping or vacuuming floors before washing to keep soils out of drains?
	Using pans, trays or wringable pads for capturing and retrieving spilled liquids instead of granular absorbent?
	Regularly inspecting dumpsters and compactors for spills and stains?

	Keeping track of where spills occur so that you can take precautionary measures in the future?
	Training employees to respond to equipment malfunctions?

An office furniture manufacturer in Chicago, The Marvel Group, reduced paint usage by almost three-quarters and cut waste disposal costs by about 60% by switching to powder-based coatings.

Production Line

	Keeping procedures for using equipment written in simple form and posted for quick reference?
	Segregating wastes by type to enhance their potential for reuse?
	Organizing the flow of the production line to minimize handling of materials?
	Regularly calibrating and adjusting all automatic process control devices to increase productivity and prevent loss?
	Scheduling regular cleaning and maintenance to prevent leaks, avoid product contamination, remove deposits and maintain process efficiency?
	Evaluating process performance to help determine efficiency; adjusting as necessary to reduce waste and off-specification products?
	Where feasible, dedicating process equipment to a single product to reduce number of clean-ups?
	Installing closed-loop recycling systems?
	Installing quality monitoring systems to reduce waste and production line rejects?
	When buying new equipment, looking for equipment that will minimize both the amount of hazardous materials used and the amount of waste produced?
	Redesigning or reformulating end-products to be less hazardous?

Cleaning and Degreasing

	Investigating ways to reduce contamination of parts prior to cleaning?
	Training employees to use only small amounts of solvent to clean equipment?
	Scheduling jobs in batches to reduce the need for frequent cleanings?
	Using counter-current cleaning methods where possible (i.e., using dirty solvent for initial and clean solvent for final cleaning)?
	Pre-cleaning parts by wiping, scraping, using air blowers, or pre-dipping in cold mineral spirits?

	Using dry and non-solvent cleaning procedures when feasible, such as air blast systems, dry stripping or blasting media?
	Installing high pressure spray nozzles for tank rinsing?
	Using poly-pigs or other cleaning devices rather than solvents to clean transfer lines?
	Using parts-holding fixtures that promote better drainage?
	Installing lids or silhouettes on tanks?
	Increasing freeboard space on tanks?
	Avoiding drafts over the degreaser?
	Adjusting cooling for proper vapor zone?
	Installing freeboard chillers in addition to cooling jackets?
	Avoiding spraying parts above the vapor zone or cooling jacket?
	Moving work more slowly?
	Bringing parts up to temperature before removal?
	Locating cold cleaning tanks away from heat sources?
	Consolidating cold cleaning operations into a centralized vapor degreasing operation?
	Replacing solvent-based cleaners with aqueous cleaning solutions or less toxic solvents (e.g., terpenes, citric acid-based cleaners)?
	Reclaiming dirty water-based cleaners through ultrafiltration and dirty solvents through distillation?

R.B. White, a sheet metal fabricator in Bloomington, installed an ultrafiltration system to remove contaminants from its cleaning solution. This reduced both dump frequency and allowed for the reuse of water and chemicals. The company reduced hazardous waste generation by over 99% and saved 30,000 in disposal costs.

Metal Finishing and Electroplating

	Optimizing drainage time and parts withdrawal rate to reduce drag-out?
	Racking parts in a way to minimize drag-out?
	Installing drain boards or drip trays?

	Using air knives or fog rinse systems over process tanks?
	Maximizing bath operating temperatures to lower solution viscosity and surface tension?
	Using low concentration plating solutions rather than mid-point concentrations?
	Adding non-ionic wetting agents to reduce solution surface tension?
	Using countercurrent rinsing?
	Agitating rinsing baths either mechanically or with air?
	Using de-ionized water instead of tap water for rinsing operations and process baths to reduce sludge generated?
	Performing more frequent chemical analysis to determine need for bath replenishment?
	Using conductivity controllers on plating rinse tanks to control water use?
	Reducing bath dumps by using filtration to remove suspended solids contamination?
	Replacing cyanide and barium salt baths in metals heat treating processes with alternative treatment methods, including the use of sulfate or chloride baths?
	Using less toxic plating solutions (e.g. zinc instead of cadmium, trivalent chromium instead of hexavalent chromium)?
	Segregating plating waste streams to allow metal recovery and reduce treatment costs?
	Using metal recovery techniques (e.g., ion exchange, reverse osmosis, electrolysis) or evaporators to reuse rinse water?

Eaton Corporation reduced VOC emissions by 87% and saved $39,000 per year at its Rochelle plant by replacing organic solvents with mineral spirits and converting to an aqueous wash system for parts cleaning.

Coating and Painting Operations

	Training paint operators to minimize unacceptable quality and paint waste?
	When different colors will be applied on the same day, scheduling the lightest colors first and moving progressively to the darkest colors?
	Finding safer substitutes for conventional solvent-based systems, such as high-solids coating formulations, water-based coatings, radiation-curable (UV or IR) coating formulations or low-VOC powder coatings?
	Avoiding overspray by holding the gun level, setting controls appropriately and maintaining proper gun distance and speed?
	Replacing high air pressure guns with low pressure guns or an electrostatic spray system?
	Using a smaller than standard (one quart) size paint cup on spray guns for small touch up jobs?

	Isolating spray booths for solvent-based paints from those for water-based paints to prevent mixing?
	Scheduling batches of similar coated objects to be done on the same day or during the same part of the day?
	Using paint heaters instead of solvent thinners to reduce coating viscosity?
	Purchasing a gun washer for cleaning spray guns and reusing paint thinner?
	Using spray-booth coatings, water curtains and reusable filters?
	Inspecting production equipment, such as racks, for cleanliness on a regular basis?
	Installing on-site paint mixers to control material use?
	Routinely cleaning hooks to prevent paint buildup?

A manufacturer of radios and televisions transmitters, Harris Corporation, used material substitution to reduce the amount of toxic wastes generated. Methyl ethyl ketone (MEK) was used as a paint reducer and cleaning solvent. Methyl chloroform (TCA) was used as a cleaning solvent for hand-soldering printed circuit boards. By developing a less toxic paint reducer and switching to a water-clean solder, Harris Corporation saves approximately $17,000 per year. In addition, the new paint reducer improved the finish quality of paint.

Printing and Silk Screening

	Using water-based inks, soybean oil inks, UV-curable inks or electron beam drying inks in preference to solvent-based inks?
	Reusing press wipes by using a dirty towel for the first pass and a clean one for the second?
	Applying solvent directly to roller blanket with a squeeze bottle?
	Squeezing excess solvent out of used towels and reusing the liquid for initial cleanup, followed by clean solvent for final cleanup?
	Utilizing aqueous or low VOC cleaners, developers, fixers, preservers and proofing methods?
	Using squeegees to wipe excess chemicals from film and paper to minimize carryover and process bath contamination?
	Utilizing silver recovery, such as electrolytic recovery units and chemical recovery cartridges?
	Scheduling runs to reduce color changeover?
	Dedicating presses for various ink colors, if feasible?
	Filling ink fountains with only enough ink for he run or shift and returning unemulsified links to their containers?

	Cleaning ink fountains only if different color is used or if ink might dry out between runs?
	Adding leftover colored inks to black ink?
	Reformulating the composition of the fountain or the solution used to eliminate isopropyl alcohol?
	Using non-toxic inks, free of heavy metals (lead, barium, cadmium and chromium)?

Highland Supply, a manufacturer of decorative packaging for the floral industry, switched to a water-based ink system and eliminated the use of solvents for cleaning presses and printing rolls at its facility in Highland, Illinois. Hazardous Waste disposal costs were reduced by approximately $90,000 per year.

Chemical Blending and Mixing

	Mixing similar batches in succession to avoid stringent cleaning of mixing equipment between batches?
	When volume requirements permit, dedicating mixing equipment to specific compositions?
	Scheduling batch processes to make a full year's run at one time?
	Converting from batch to continuous process?
	Checking mechanical agitators to ensure that proper operation and mixing occur?
	Installing mechanical wall-wipers to reduce quantity of material remaining on mix-tanks after a batch has been emptied?
	Improving physical mixing in reactor vessels (e.g., baffles, multiple impellers, pump recirculation, in-line static mixer)?
	Switching from a stirred-tank mix reactor to a plug flow reactor?

Laboratory Operations

	Shifting to microscale chemistry (i.e. scaling dale experiments and use of chemicals)?
	Linking purchasing requests into an inventory system so that excess chemicals in stock can be used before buying more?
	Periodically inspecting stored chemicals for signs of leakage, poor storage practices, and other problems?
	Using spent/recovered solvents for an initial rinse and fresh solvents for a final rinse?
	Using specialty detergents (e.g., potassium hydroxide or sonic baths instead of chromic acid solutions) to clean glassware?

	Substituting less toxic chemicals (e.g., sodium hypochlorite for sodium dichromate, alcohols instead of benzene, cyclohexane for carbon tetrachloride, stearic acid for acetamide)?
	Increasing use of instrumental analysis over wet chemistry (e.g., chromatography, spectropho-tometry, atomic absorption, X-ray diffraction)?

North American Lighting manufactures exterior automobile lighting devices. Freon 113 was used in their sonic cleaning process. Due to increasing restrictions on the use of chlorofluorocarbons, North American Lighting began looking for alternative cleaning options. It was determined that a high pressure air system could be designed and implemented that would result in an annual savings of $200,000 in solvent purchases as well as reducing waste disposal costs and long-term liability associated with solvent usage.

Water Use and Conservation

	Encouraging employees to shut off hoses and sinks when not in use?
	Implementing an inspection and repair program for water lines?
	Installing flow control valves, flow meters and shut-off nozzles?
	Measuring water inflow and outflow for each process unit to optimize water use?
	Installing water-efficient shower heads?
	Cleaning equipment by first sweeping and shoveling?
	When washing, using high pressure, low volume cleaning washing equipment?
	Reusing or recycling water whenever possible?

Energy Efficiency

	Having an energy audit at your facility?
	Implementing an inspection and repair program for compressed air lines?
	Using condensers or regenerative heat exchanges to recapture heat?
	Using co-generation of electricity and steam?
	Placing cool air intakes and air conditioning units in cool, shaded locations?
	Using energy efficient lighting?
	Installing motion-sensitive lights in rooms or storage areas that are infrequently used?

	Insulating hot water holding tanks and hot and cold water pipes?
	Improving lubrication practices for motor driven equipment?
	Weatherstripping around loose-fitting windows and doors?
	Turning off computers, printers and copiers at night?
	Using energy efficient motors, compressors, and pumps?
	Purchasing equipment with an energy-saving mode?
	Installing programmable thermostats?
	Allowing natural light into work areas?
	Installing fans to bring heat down from high ceilings to work areas?
	Creating incentives for employees to use public transportation, car pool, walk. Or ride bicycles to work?
	Planting windbreaks and shade trees around your facility?

Twinplex Manufacturing, a precision metal stamping company, reduced the amount of waste generated from its transfer presses by installing a portable ultrafiltration unit. This unit allows for oil/water separation and wastewater concentration. The facility saves approximately $14,000 annually by using this system.

Solid Waste Prevention

	Asking vendors to minimize unnecessary packaging or consider reusable packaging?
	Saving and reusing boxes for shipping?
	Using bulk dispensing systems?
	Using cloth towels which can be laundered for reuse?
	Purchasing reusable mugs for employees?
	Promoting practices that reduce wastepaper, such as two sided copying, using e-mail, posting information an announcement boards, sharing and circulating documents, storing files on computer disks, and reusing scrap paper for notes and message pads?
	Purchasing products made with recycled material, such as printing and writing paper, shipping containers, outdoor benches and tables, carpeting, notebooks, parking stops, fences, sign posts, antifreeze, wall panels, road building materials, retread tores, garbage bags, and speed bumps?

	Purchasing a plain paper fax machine so faxes are recyclable?
	Using rebuilt or recharged toner cartridges for copiers and laser printers?
	Using rechargeable batteries for beepers and other electronic devices?
	Reusing scrap material from your processes within your own company?
	Donating office equipment, supplies or goods that have become obsolete to non-profit organizations?
	Recycling scrap metals. Fluorescent lamps, used oil, and lead-acid batteries?
	Hiring caterers who use recyclable kitchenware?
	Selecting non-toxic products that don't require special handling, ventilation, or have warning labels?

Pest Control and Groundskeeping

	Using a mulching lawn mower or retrofitting your mower to leave grass clippings on the lawn?
	Xeriscaping or landscaping with slow growing, drought tolerant native plants that require less fertilizer and pest control measures?
	Keeping work areas clear of food wastes to avoid attracting pests?
	Investigating non-toxic pest control methods such as live trapping and destruction of pest breeding refuge areas?
	Monitoring for early signs of pest problems?
	Practicing spot application where a problem exists instead of spraying over an entire area?
	Applying pesticides efficiently and at a time when wind drift and runoff losses are unlikely?
	Selecting the most species-specific, least broadly damaging treatment?
	Leaving unsprayed buffer zones to protect sensitive areas or wildlife habitats?
	Watering during cooler parts of the day (before 10 a.m. and after 5 p.m.) to minimize evaporation?