

Print More, Waste Less— Reduce Your Ink Waste

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Color changes, press cleaning, and poor ink management practices generate waste ink. Careful attention to good operating practices and work flow scheduling, as well as ink reblending or recycling can decrease income losses associated with ink waste. This fact sheet presents an overview of the environmental concerns of ink waste and pollution prevention (P2) opportunities shops can use to reduce the amount and cost of waste ink coming from their processes.

Environmental concerns over waste ink center around heavy metals, solvents, and toxicity. If an ink contains color pigments with toxic heavy metals such as barium, cadmium, chromium, or lead (see the fact sheet *Regulated Metals: the Rule of 20*), or if the ink is mixed with solvents classified as hazardous wastes, it must be disposed of as a hazardous waste. Some solvents in inks are toxic and/or flammable, and almost all are classified as volatile organic compounds (VOCs), which are regulated under the Clean Air Act Amendments of 1990. VOCs readily evaporate, and once in the atmosphere may be hazardous to your employees' health and can combine with other pollutants to form smog. Another concern is that spent inks have the potential to cause serious water pollution to drinking water supplies if illegally disposed in a septic system, or can, if discharged directly or indirectly to surface waters, deplete the water of its oxygen supply killing fish and other aquatic life.

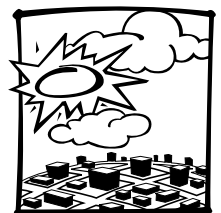
Proper disposal of ink wastes can be expensive but is necessary to meet regulatory compliance requirements, and at least as importantly, to minimize long-term liabilities associated with hazardous waste disposal.

In order to be landfilled, non-hazardous waste ink must be in a non-liquid state or otherwise stabilized. Many printers dispose of their inks by sending them to a fuel-blending service, which then combines and forwards these and other wastes for disposal by burning them at industrial boilers or kilns. Burning the ink reduces the potential exposure to litigation and cleanup costs to which a printer could be exposed if the inks are landfilled, and the landfill used experiences groundwater contamination problems. Whether waste inks are burned or landfilled, costs can be reduced by minimizing the generation of ink wastes and re-using inks internally whenever possible. Remember, if it has a viable use, it's still a product, not a waste.

P2 to reduce ink waste

Although ink recycling is an option to reduce disposal costs and related liabilities, the most effective way to save costs is to reduce the amount of ink waste coming from the processes. The following P2 practices are used to reduce ink waste, saving raw materials and waste costs:

Optimize press scheduling to minimize color changes. Efficient scheduling can greatly reduce press downtime and labor associated with press cleaning, which increases solvent use, ink losses, and shop towel use. Use a standard ink sequence—from light to dark to minimize degree of cleaning needed between ink changes. Group print jobs and



production runs according to the colors needed. Consider the ink lay-down sequence on multi-color presses.

Minimize additions to ink fountains. If ink is added by hand, train press operators to add only as much ink as needed to complete the job and/or production run. If ink is added automatically, advise operators of the press schedule so they can anticipate down-time and adjust ink additions accordingly.

Practice proper ink handling methods. Encourage operators to keep ink containers closed unless adding or removing ink from the can. Prior to closing the can, coat the lip of the can with petroleum jelly or a similar ink-compatible product to form an air-tight seal on the can. This will prevent oxidation and drying, and make the lid easy to remove.

Track ink usage. Keep accurate records of the quantity of ink used for specific jobs, particularly repeat jobs. Train press operators in ink-estimating techniques to help them accurately estimate the amount needed for each job.

Establish ink inventory controls. Monitor ink inventory and use existing stock according to the "first-in/first-out" strategy. Test any out-of-date ink for usability before considering it a waste ink. Carefully label, log, and store special order colors for future use rather than dumping them into waste ink drums.

Maximize ink reuse and recycling opportunities.

- Do not mix small quantities of leftover or obsolete inks with different colors of ink.
- Keep different types of ink separate.
- Store excess ink in properly sealed and labeled containers. Place plastic or waxed paper on top of sheet-fed ink and/or spray the ink with an anti-skinning agent, or cover the ink with an ink-compatible oil to prevent skinning and oxidation.
- Do not dip knives deeply into sheet-fed inks. Removing the ink evenly from the top surface of

the ink can reduce the surface area of the ink exposed to oxidation.

- Transfer used ink back to the original empty container, and prevent drying by keeping ink containers sealed.

Use vegetable oil-based inks. Soy oils do have a lower VOC content than petroleum oils. The real advantage of soy inks comes from increased ink mileage. In a comparison test, soy ink required 17% less material than traditional ink for comparable print jobs.

Eliminate inks with regulated metal-based pigments. Metals such as lead, mercury, cadmium, and hexavalent chromium have been used for coloring pigments, which make the waste hazardous and increase disposal costs. Ask suppliers to identify those inks with regulated metal and ask them for inks with less toxic alternative pigments with acceptable color matches.

Use anti-skin agents. Anti-skinning products, put directly onto the ink while it remains in the ink fountain, will allow the press to be shut down without removing ink from the fountains, reducing ink waste, labor, solvent, and rag usage.

Dedicate presses. Dedicate presses for specific ink colors if feasible, and dedicate one press for inks with hazardous pigments or solvents.

Use automatic ink levelers and hard-pipe ink delivery. Large printers especially may benefit from automated process ink additions with dedicated ink-pumping equipment. Rather than purchasing ink in kits or other small containers, printers may purchase ink (high-volume process colors) in 55 gallon drums or 250 gallon totes. This will lower the unit cost paid, and reduce container waste and materials associated with ink transfer.

Switch to UV or EB inks. Ultraviolet (UV) and electron beam (EB) inks eliminate the use of VOCs. These inks dry by a curing process initiated by ultraviolet light or electron beams. Since the ink

will not dry unless exposed to the UV or EB light source, generation of waste ink is reduced because the presses are cleaned less often. Although these ink systems involve costly technology changes, they do allow for very high-speed, high-quality printing.

If ink dryers are added to your inks, consider buying the ink, without dryers, adding the dryers as needed to help control skinning and related ink waste.

Recycle Ink Waste

Recycling services can be used to reclaim waste inks although these services are more practical for web press operations, especially those with larger amounts of waste inks. Whether ink can be reused or recycled is dependent upon the quality of the ink waste generated. Waste ink can typically be classified in two categories:

- Uncontaminated, excess ink—ink not used in the press fountain. Although it can be recycled, reuse of this ink is usually a more cost-effective means of managing it.
- Contaminated, combined ink—has been used in the press fountain and is contaminated with paper fibers, solvents, or other colors of ink. For these inks to be recycled, they typically must be filtered, reconditioned, and reblended. This category will contain waste ink, solvent, and water.

Commercial ink recyclers take waste inks and reprocess them, along with necessary additives, to make recycled ink. Opportunities for recycling web off-set inks are growing, but are currently very limited for sheet-fed inks. Consider the following advantages to recycling waste ink:

- The cost of fuel-blending or landfilling the ink can be avoided. The avoided cost typically results in a savings of \$100 to \$200 per 55-gallon drum.
- Liability associated with ink disposal is minimized.

- The recycled ink meets new ink specifications and is available to you at a savings compared to new ink prices.
- Businesses with environmentally sensitive customers may increase, if they are aware that you recycle.

Typically, ink recycling service providers filter the ink to remove impurities, mix the ink with oil, or otherwise adjust its physical characteristics. Some blend the recycled ink with new ink to ensure that product specifications are being satisfied. Some ink recyclers will mix colored inks to produce black inks. Others have the capability of recycling color for color, if large volumes of colored ink are generated. Most ink recyclers will return your recycled ink to you, but some service providers will accept ink for recycling, which is not returned but sold to other printers.

Some companies may choose to re-blend inks in house. Ink waste from off-spec product, ink with expired shelf life, surplus quantities of a particular color, and waste generated from cleaning ink fountains during job changes or press cleaning can all be re-blended on site.

The simplest re-blending involves mixing variously colored inks together to make black. This re-blended ink may need to be doctored to modify the “tack” or drying rate, or the ink may be acceptable “as is” for a lower quality job. Printers may also blend inks on site into particular color formulations; however, this involves more sophistication and expense than in-house blending a black ink.

Many printers are successfully reusing and recycling ink as a cost effective alternative to disposal. These companies are saving money, improving shop productivity, and reducing environmental liability by recycling their waste ink. For help with reducing the amount of ink your company uses, call the Pollution Prevention Institute at 800-578-8898.

Ink Recycling Service Providers

The following ink recyclers serve printers located throughout the United States and Canada. Most of these companies offer recycling services for both heat-set and non-heatset inks from web presses. Economies of scale associated with ink volumes affect the feasibility of recycling. Therefore, accumulating a large quantity of waste ink reduces the cost of recycling the ink on a per pound or per drum basis. However, as demand increases, and the technology for processing sheetfed ink improves, it is likely that the availability and affordability of sheetfed ink recycling will increase.

Envirecycle Ink Recovery
610 Kasota Ave
Minneapolis, MN 55416
612-379-7500
Sheetfed recycled into sheetfed ink.

Lithographic Ink Reformulating Technology, Inc.
3021 Old Maryville Pike
Knoxville, TN 37920
520-577-7966
Sheetfed recycled into sheetfed ink.

3R Corporation
800 Vinial St.
Pittsburgh, PA 15212
412-323-1733
Sheetfed recycled into heatset web ink.

Pro Active Recycling
908 Niagra Falls Blvd
N. Tonawanda, NY 14120-2060
519-371-6511
Web heatset and non-heatset.

Worldwide Environmental Systems (WECORP)
112 Bedford Rd. Suite 116
Bedford, TX 76022
817-590-2936 Toll free 888-588-7828
Heatset and non-heatset litho.

Ink Reclamation Systems

Semler Industries, Inc.
3800 N. Carnation
Franklin Park, IL 60131
708-671-5650
Lithographic and flexographic Filtration equipment.

Separation Technologies, Inc.
740-H S Van Buren St.
Placentia, CA 92670
714-632-1306
Lithographic Equipment for on-site recycling.

Ink Reblending

Mixmasters, Inc.
11 Colmer Road
Lynn, MA 01904
800-332-9321
Software to guide reblending.

Case study

Cost savings are realized from reducing the amount of ink disposed of or recycled off site. These savings may be offset by personnel costs associated with reblending and color matching, as well as capital equipment purchases. According to a Design for the Environment case study, however, one printer (with 30 employees and \$4 million in annual sales) realized \$8,000 per year in savings by initiating a color-matching and re-blending program for its waste inks, not to mention, reducing its potential liabilities under RCRA.

Resources

<http://www.pneac.org/sheets/litho/litho.html> (PNEAC fact sheets for ink waste)



The Small Business Environmental Assistance Program's (SBEAP) mission is to help Kansas small businesses comply with environmental regulations and identify pollution prevention opportunities. SBEAP is funded through a contract with the Kansas Department of Health and Environment. SBEAP services are free and confidential. For more information, call 800/578-8898, send an e-mail to SBEAP@ksu.edu, or visit our web site at <http://www.sbeap.org>. Kansas State University is an EEO/AA provider.