Best management practices to reduce prepress wastes

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Prepress processes generate several waste streams that can be reduced or managed differently to reduce operating costs. Primary components of the prepress waste stream are used photographic film, waste photochemical baths, rinse waters and coatings, and plate developers and waste plates.

The best pollution prevention (P2) opportunity, of course, is a complete switch to electronic prepress operations. However, the cost of going totally digital is significant and many shops still rely on photographic processes or automatic film and plate developers to create their finished copy, proofs, and image transfer plates.

Process Description

Imaging

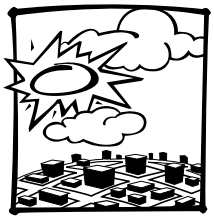
Traditional photographic developing uses a light-sensitive emulsion composed of silver-halide salts in a gelatin base on paper, plastic, or metal. The first image is reproduced for proofing the copy, and then the image is converted to an intermediate image carrier—the plate—that accepts ink from a roller and transfers it to a rubber blanket, which then transfers the image to the final printed material.

Developing process

Photographic images are used for getting the art and copy into a photographic negative or positive that is used for proofing and to make the printing plate. The desired image is developed by first immersing the film into a developing chemical. The most common developing agents may contain benzene derivatives such as hydroquinone and metol. These solutions are alkaline in nature and also contain accelerators and preservatives to enhance developing speed and prolong bath life. Waste developer generally has an alkaline pH of less than 12.5 and is not usually considered a hazardous waste unless mixed with another hazardous waste such as the silver-rich waste fixer. However, it is the responsibility of the business to determine if its wastes are hazardous and to provide documentation to support the waste's classification. Developer may contain chemicals with high demands for oxygen in the degradation process, which will interfere with publicly owned treatment works (POTW) wastewater operations. Process liquids should not be sent to an on-site septic system for disposal, and permission should be obtained from the local POTW before discharging any liquid waste or process rinse water to the city sewer.

Fixing the image

The image is stabilized following the developing bath by an acidic fixer bath of sodium thiosulfate, ammonium thiosulfate, or sodium hyposulfite. These chemicals stop the developing action and fix the image to the film or plate and are replenished continuously to maintain solution strength. As a result of this process, silver is leached or eroded from the negative and concentrates in the fixer bath. Waste fixers typically contain 2000–4000 parts per million silver and are regulated as a toxic metal under hazardous waste regulations. However, the rinse bath after the fixer should be tested to determine levels of silver. Rinse waters contaminated with silver may also be considered a hazardous waste if silver content is 5 mg/l or higher, or may require permitting as a waste-



water discharge by the local POTW.

If reducers or intensifiers containing mercury or cyanide compounds are used to enhance film images, testing may also be needed to determine if they, too, are present in regulated levels. For more information on testing requirement and metals testing see the fact sheet: *Regulated Metals: The Rule of 20*.

Print shops can eliminate, or at least greatly reduce, their compliance requirements for their waste fixer and silver-rich rinse water by recovering silver from both of these waste streams. Recovering silver on site is easy, cost-effective, and usually generates a positive cash flow. But more importantly, it can reduce hazardous waste generation and long-term liabilities associated with hazardous waste disposal.

Prepress waste reduction

To reduce prepress wastes consider the following:

- Work with your chemical vendor for training to establish proper testing and maintenance practices to extend bath life.
- Practice sound material handling and inventory control practices (see the fact sheet, *Is Your Inventory Out of Control?*). Store UV light and temperature sensitive chemicals properly.
- Add acetic acid to fixer bath to control pH and extend bath life. Fresh fixer baths are around pH 4.1, but become more basic with carryover from the developer. Proper pH must be maintained to control fogging. Consult your chemical vendor for guidance on pH control for your fixer bath.
- Use bath extenders when possible to extend bath life and reduce material use.
- Use an acid stop bath prior to fixer to stop the action of the developer and reduce developer carry over to the fixer bath.
- If manually developing film, keep containers covered or install floating lids to reduce oxidation of developing chemicals.
- If using automatic developers and platemakers, turn off wash-water flow when film is not being processed or install a standby wash device to automatically shut off water.
- Use squeegees in automatic processors to reduce chemical losses.
- Large printers may benefit from bulk purchases in reusable containers.
- Use silverless film such as diazo or vesicular. These films do not produce silver-laden hazardous waste, but may have different performance characteristics than silver films.
- Work with vendors to purchase non-hazardous reducers, intensifiers, developers, and finishers whenever possible.
- Recycle waste fixer and silver-laden rinse waters to recapture silver. The photographic industry is the largest user of silver, with printers generating over 30 million gallons of waste fixer each year—representing a tremendous opportunity for P2 and cost savings through silver recovery. For more information on the benefits of silver recovery, see the fact sheet: *The Silver Fix: How Much Is Your Waste Worth?*
- Use an in-line silver recovery unit on the fixer bath to continuously de-silver the fixer. This arrangement will also lower the silver concentration in the following rinse (because the silver in the fixer bath carryover will always be low) and will prolong fixer life, saving chemical use.
- Use pre-sensitized lithographic plates; discontinue etch plate use.
- Use water-developed plates.
- Recycle used film and plates. Keep film segregated by high image/low image content—film with less image area contains more silver and may be worth more to the recycler.

Web resources

www.pneac.org/ (Printer's National Environmental Assistance Center (PNEAC) offers case studies, fact sheets, and maintains a listserve for printers' technical and regulatory questions)

http://nuclear.hazard.uiuc.edu/packets/printing/p2pract.htm (contains a comprehensive overview of the domestic printing industry, P2 for all print sectors, and emerging technologies)

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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.