

A Guide for Lithographic Printers



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The Department of Ecology thanks the Snap Shots printers and photo processors workgroup participants shown below, for their commitment of time, energy and expertise to this campaign.

Byer Industries, Inc.

Franklin County Public Works Department

Inland Technology, Inc.

Hallmark Refining Corporation

Island County Solid Waste Department

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**Local Hazardous Waste Management Program in King
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Pacific Northwest Screen Printing Association

Pacific Printing and Imaging Association

Photo Marketing Association International

Photo Establishment

Print NW - Six Sigma

Qualex

Sun Sportswear

Thurston County Environmental Health Department

WHY SHOULD LITHOGRAPHIC PRINTERS PAY ATTENTION TO THEIR WASTE

If you're a lithographic printer looking for practical environmental management and pollution prevention information, this booklet is for you. Lithographic printers across the state regularly generate wastes that are of concern to the environment. Film developing, press runs and cleanup operations in your shop generate wastes such as used fixer, waste ink, ink cleanup sludges and shop towels, not to mention a steady stream of air emissions from press washes and fountain solutions. These wastes may pose solid waste, hazardous waste, water quality or air quality concerns.

Silver has a very high aquatic toxicity and accumulates in the tissue of aquatic organisms. Because of concerns with silver, used fixer is a state and federal hazardous waste. Many local sewer authorities have strict silver discharge limits. With thousands of businesses in Washington State generating used fixer, it's important that each one do their part to manage these wastes correctly and keep them out of the soils and waters of the state.

So you play an important role. Used fixer and other hazardous wastes don't belong on the ground, untreated down the drain, or in the dumpster. Good waste management practices are important for the following reasons:

- You'll ensure that you're in compliance with federal, state and local waste management regulations and avoid costly penalties.
- You'll provide a safer, healthier workplace for your employees.
- You'll be joining other lithographic printers in Washington State who are taking pride in maintaining a clean and healthy environment.
- You'll gain customers who know they have made a wise choice in selecting a business that helps protect the environment.

The Department of Ecology (Ecology) is divided into various programs, each with a different environmental emphasis. Ecology is trying to do a better job of linking the requirements of all these programs together in a meaningful way. This helps businesses such as lithographic printers understand their overall responsibility in meeting Ecology's requirements, rather than learning about them one program at a time. This is commonly called a "multi-media" approach.

Below is a brief description of how key Ecology programs affect lithographic printers.

HAZARDOUS WASTE AND TOXICS REDUCTION

Lithographic printers concern Ecology's Hazardous Waste and Toxics Reduction Program mainly because used fixer and some waste inks, ink cleanup sludges and fountain solutions sludges are hazardous wastes. Some developers, if they contain more than one percent hydroquinone as an ingredient and are discarded before used, may also be a hazardous waste. Businesses that generate more than 220 lbs. of such hazardous wastes per month (or ever accumulate more than 2,200 lbs. on site) are Regulated Generators and need to get a RCRA ID number from the state (see page 28). Shops that generate less than 220 lbs. are Small Quantity Generators and fall under the jurisdiction of local government (city or county) moderate risk programs (see local government insert).

SOLID WASTE AND FINANCIAL ASSISTANCE

Ecology's Solid Waste and Financial Assistance Program provides statewide guidance and technical assistance to local governments developing and implementing moderate risk management programs for Small Quantity Generators. Solid Waste also provides assistance to businesses concerned with pollution prevention of non-hazardous solid wastes, such as scrap film and paper

WATER QUALITY

Lithographic printers are a concern for Ecology's Water Quality Program because improper disposal of solvents, inks and film developing chemicals can have adverse impacts on the state's groundwater, surface waters and sediments. Such chemicals can affect the proper operation of municipal sewage treatment plants. Water Quality hopes that through education about proper waste management, businesses will minimize the amount of wastes sent to the sanitary sewer and discharge those wastes necessary in accordance with local sewer limits. More centralized treatment and recovery of used fixer waste is one way to do this.

AIR QUALITY

Lithographic printers affect air quality in Washington State mainly because volatile organic compounds (VOCs) evaporate into the air. VOCs come from clean up solvents, fountain solutions, aerosol cans and inks. Inhaling VOCs introduces toxic chemicals into the body. VOCs are one of the ingredients that form smog.

Some VOCs are listed as hazardous air pollutants (HAPs). Sources of HAPs are now beginning to be identified, registered, and in some cases issued permits. When building or expanding, any business that emits pollutants to the air is required to check with their area's Local Air Authority to determine if a "New Source Review" permit applies to them.

Businesses that choose to minimize the use of traditional "hot" solvents and change to products that contain less volatiles and HAPs are moving in the same direction as federal, state, and local air authority regulations. They also are "good neighbors", with fewer odor complaint problems with neighboring businesses and the public.

POLLUTION PREVENTION: REDUCE & RECYCLE YOUR WASTE



Environmental management is a growing concern for businesses. Whether it's a concern about disposal costs, filling our landfills, resource depletion, air pollution, or even your business image, environmental management issues are receiving more and more attention. That's where pollution prevention fits in.

In the world of waste, the greatest economic and environmental benefits usually come from avoiding the generation of waste in the first place. This is known as **waste reduction** and it's the number one waste management priority in Washington State. Some examples of simple waste reduction techniques include writing on both sides of a piece of paper, using a durable rather than a disposable product, or just not purchasing a product at all if you really don't need it.

It may not be as hard as you think. A good place to start is to walk through your shop and review all the processes which use chemicals or generate solid, liquid or air wastes.

When you begin to look at the wastes generated by your business, you may feel overwhelmed by how much there is to do. To reduce frustration, make incremental changes. Begin in areas where waste reduction and recycling are easiest, then build up to the more complicated items. Even small changes can make a large difference. As you consider each process, ask yourself if you can change the process in some way so that it doesn't produce a waste or if you can lower the toxicity of the products you use.

Identifying materials that your business can recycle is another great way to reduce the amount of waste your business disposes of. **Recycling** is the state's second waste management priority. Recycling is good because it takes materials that might have once been thrown away and makes them available to be

used again. Although recycling is much better than disposing of materials, it is less beneficial than waste reduction because it requires a lot of energy to collect and remanufacture the materials into new products. In addition, for recycling to be successful, products made with recycled materials must be purchased by consumers.

The chart that follows includes most of the wastes you may generate in your lithographic printing business. To find out more specific information about regulatory compliance, recycling options and alternative chemical products, see the do's and don'ts section beginning on page 7.

LITHOGRAPHIC PRINTING WASTE STREAMS OF CONCERN

Waste Stream of Concern	Program of Concern	Environmental Concern
Aerosol Cans	Hazardous Waste Air Quality	"Listed" chemicals (see page 28) High VOCs
Developer	Hazardous Waste Water Quality	Hydroquinone
Fixer	Hazardous Waste Water Quality	High silver
Fountain Solution	Hazardous Waste Air Quality	Ethylene glycol High VOCs
Ink Cleanup Sludges	Hazardous Waste	Heavy metals "Listed" chemicals
Ink/Ink Skins	Hazardous Waste	Heavy metals
Paper Waste	Solid Waste	Recyclable
Parts Washer Solvent	Hazardous Waste	"Listed" chemicals
Plates	Solid Waste	Recyclable
Plate Developing and	Water Quality	Cyanide
Activators	Hazardous Waste	Silver
Press Washes	Air Quality	High VOCs
Scrap Film	Solid Waste	Recyclable
Shop Towels	Hazardous Waste Air Quality	Improper disposal of inks and solvents
Wash Water	Water Quality	Silver

PRACTICAL DO'S & DON'TS

Below are some common wastes generated by lithographers, along with do's and don'ts for implementing better pollution prevention and staying in compliance with Ecology regulations. To find out more about how and why Ecology regulates businesses in the areas of hazardous waste, solid waste, water quality and air quality, see the discussion on page 3.

While many of the do' do's and don' s don'ts are suggestions that may help save you money and lead toward regulatory compliance, some do' do's and don' s don'ts are federal or state regulatory requirements. These will be highlighted in italics to distinguish them. Businesses should always check with their local (city or county) government agencies to see if they have additional or more stringent regulatory requirements (see government contacts insert).

AEROSOL CANS

Printers use spray cans for various reasons including film cleaning and ink anti-skinning. Many of these spray cans may contain hazardous chemicals, such as 1-1-1-trichloroethylene or toluene. A list of chemicals that are always hazardous after being used for cleaning can be found on page 34. While an empty can may be put in the garbage, aerosol cans containing "listed" chemicals are considered a hazardous waste if they are thrown away before they are empty.

DO'S

- ✓ Switch to non-aerosol products if possible, such as manual pump cans or bottles especially if they can be refilled.
- ✓ Decide if you actually need these products. If so, limit their use and look for aerosol cans that do not contain listed chemicals.
- ✓ Return defective cans to your supplier.

DON'TS

- ✗ Don't buy aerosols containing "listed" compounds. Work with your vendor to find alternatives.
- ✗ *Don't throw non-empty cans hazardous waste aerosol cans into the garbage.*

DEVELOPER

Developers change the silver halide into metallic silver. Most developers for black and white film contain a small percentage of hydroquinone. These developers, if disposed as an unused product, will be hazardous due to hydroquinone levels. However, hydroquinone is consumed during use and does not show up in used developer in concentrations that would be considered hazardous waste.

DO'S

- ✓ If possible, purchase developer solutions that contain less than one percent hydroquinone — check with your supplier or look on your Material Safety Data Sheet (see page 33).
- ✓ Check with your local sewer utility to make sure it will accept used developer in the sanitary sewer.
- ✓ Make sure your employees know that unused developer may be a hazardous waste.

DON'TS

- ✗ *Don't ever put developer into a septic system, storm drain or dry well or onto the ground.*
- ✗ *Don't dispose of unused or past shelf life developer to the sanitary sewer unless you have permission from your local sewer utility.*
- ✗ Don't put developer into used fixer when using CRCs (see page 23.) Developer can plug CRCs, causing a dangerous pressure build up.

FIXER AND BLEACH-FIXER SOLUTION

Fixing sets the image areas and removes the light sensitive silver halides that could cause the photo image to darken with time. Fixer allows silver to dissolve out of the film and paper into the solution. As a result, used fixer, contains up to 4,000 parts per million of silver. Because of these high silver levels, used fixer is a hazardous waste.

Lithographic printers typically generate small volumes of used fixer. See the discussion of on-site versus off-site management beginning on page 20.

FIXER (CON'T)

DO'S

- ✓ Investigate whether on-site recovery or off-site management is the best option for you (see page 18).
- ✓ If you're doing on-site silver recovery, assure compliance with hazardous waste and sewer discharge limits by routinely testing your effluent through a lab accredited for silver analysis (see Testing, page 33).
- ✓ If you're doing on-site silver recovery, get approval from your local sewer authority to discharge the remaining effluent.
- ✓ If you're doing on-site silver recovery, properly operate and maintain your equipment.
- ✓ Make sure your employees know that used fixer is a hazardous waste.
- ✓ Count the amount of used fixer generated during the month toward your hazardous waste total (see page 28).
- ✓ Attach labels to your used fixer containers, identifying them as hazardous waste.

DON'TS

- ✗ *Don't put used fixer into the sanitary sewer unless it meets hazardous waste and sewer discharge limits.*
- ✗ *Don't ever put used fixer into a septic system, storm drain, the ground, surface water or any other drain not connected to a sanitary sewer.*

FOUNTAIN SOLUTIONS

Although fountain solution is composed mainly of water, some chemicals that are added to increase wetting ability can create health and environmental problems. The most common additive, isopropyl alcohol, is a volatile organic compound (VOC). VOCs are highly evaporative compounds that can cause health problems such as lung irritation. Some fountain solutions contain alternatives to alcohol that are lower in VOC's. Certain alternatives to alcohol, such as ethylene glycol at greater than 10 percent concentration, could make fountain solution a hazardous waste if used or dirty solution needs to be disposed. Drain disposal of chemicals **may** be allowed if they do not designate as hazardous waste.

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| <p>DO'S</p> <ul style="list-style-type: none">✓ Consider changing to an alcohol free fountain solution. Look for alcohol substitutes that are not hazardous waste when disposed. Ask your vendors or printing association for suggestions.✓ If you continue to use alcohol in your fountain solution, try to reduce the amount that you use. The Federal government may recommend five percent alcohol as a maximum amount.✓ Consider using a recirculating chiller unit that keeps fountain solution clean and reduces evaporation.✓ Check pH for consistency in each fountain solution batch — some printers have found a pH of around 4 to 5 to be effective in maintaining print quality. | <p>DON'TS</p> <ul style="list-style-type: none">✗ <i>Don't dispose of waste fountain solution that contains hazardous chemicals (such as ethylene glycol) at hazardous levels down the drain. Manage it as a hazardous waste.</i>✗ <i>Don't ever put fountain solution into a septic system, storm drain, dry well or onto the ground.</i>✗ Don't give up. 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 doesn't work, try another one. Keep with it until you find one that satisfies you. |
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INK AND INK SKINS

Lithographic inks have three primary components: pigments which give color, solids which give body, and solvents which are the liquid portion of the ink. Two of these components, pigments and solvents, may make an ink a hazardous waste when it's disposed. Inks, other than black, may use heavy metals such as lead, chromium, silver, cadmium, and barium to achieve their color. These metals can be harmful to the environment. Because of this, waste inks that contain heavy metals could be hazardous wastes.

Solvents commonly found in inks, such as petroleum distillates, can also make inks hazardous and contribute to air pollution by emitting volatile organic compounds (VOCs). The solvent portion of the ink is not hazardous when vegetable oils, such as soy, linseed or canola oil are used. Vegetable based inks also send little or no VOCs into the air, and, unlike petroleum oils, are renewable resources.

Whether a specific ink is hazardous waste depends on the amount and type of heavy metals, solvents and other hazardous chemicals it contains. Check your Material Safety Data Sheet (MSDS) to help make a determination — see page 33 for more information on MSDSs.

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| <p>DO'S</p> <ul style="list-style-type: none">✓ Consider switching 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. | <p>DON'TS</p> <ul style="list-style-type: none">✗ <i>Don't put inks that are hazardous in the garbage. If the ink is hazardous, handle and dispose of it as hazardous waste.</i>✗ <i>Don't put excess ink onto shop towels or into the shop towel container as a convenient method of ink disposal.</i> |
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INK AND INK SKINS (CON'T)

- ✓ 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.
- ✓ Non-hazardous inks that have become dried out and solidified can be put into the garbage, with permission from your local landfill.

INK CLEANUP SLUDGES

Ink cleanup sludges come from press cleaning operations. Even if the ink itself is not hazardous, if it comes in contact with a press wash that is, then the whole waste mixture could be a hazardous waste.

DO'S

- ✓ Try to find and use press washes without hazardous "listed" solvents. Look on page 28 for "listed" chemicals that could make a press wash a hazardous waste.

DON'TS

- ✗ *Don't dispose of ink cleanup sludges in the garbage or down the drain. These sludges may be a hazardous waste.*
- ✗ *Don't set your ink cleanup trays out to evaporate. This pollutes the air. Put ink cleanup sludges into a container with a lid on it. Keep the container covered when not in use.*

PAPER WASTE

Paper waste is often the largest volume of waste generated by a printer. Paper waste from "makeready" and from cutting and trimming operations can be a significant portion of the total waste stream. Steps can be taken to reuse, reduce and recycle the waste paper that is generated. Scrap paper is recyclable in many areas of Washington State. The recyclability of paper is based on many factors, such as the paper value or grade, the volume that is generated by individual shops and geographic regions.

DO'S

- ✓ 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.
- ✓ Recycle your waste paper. This saves landfill space and may save you money in disposal costs. Call 1-800-RECYCLE.
- ✓ 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 allow.
- ✓ Encourage customers to avoid bright colored paper, which is more difficult to recycle and therefore has less value.

DON'TS

- ✗ Don't put waste paper in the garbage if you can find a recycling program that will accept it.

PARTS WASHER SOLVENT

Some printers use part washer solvent tanks for cleaning parts and tools. Solvents used include mineral spirits, Stoddard solvent, petroleum naphtha, and xylene, and they typically become hazardous wastes when they can no longer be used. These used solvents are hazardous because they are ignitable and/or toxic. Evaporation of these solvents also creates VOCs.

DO'S

- ✓ Install a filter on your solvent sink to greatly increase the life of the solvent. (Remember to dispose of the used filter as a hazardous waste.)
- ✓ Use less hazardous solvents in your parts washer.
- ✓ Consider purchasing your own solvent still and recycling your solvent on-site. (The sludges, filters, and still bottoms generated from on-site solvent recycling are typically hazardous and will still need to be managed as a hazardous waste when they're disposed).
- ✓ Make sure solvent is actually too dirty to use before it is exchanged for new solvent.

DON'TS

- ✗ *Don't dispose of spent hazardous solvents to drains, the air, or the ground.*
- ✗ *Don't evaporate solvents as a means of disposal.*
- ✗ Don't mix solvents with any other waste and keep different types of solvents in separate, labeled, closed containers.

PLATES

Many types of lithographic plates can be recycled. Aluminum, polyester, and paper plates are all potentially recyclable. Reclaim the metal in aluminum plates by returning them to the manufacturer or arranging for plate pick-up with a local salvage company. Polyester plates used in the "silver master" process contain small amounts of silver on them and can be recycled for their silver value. Electrostatic paper plates can be recycled with paper waste.

DO'S

- ✓ Use two-sided plates—some aluminum plates can be exposed and developed on both sides, which reduces the number of plates used.
- ✓ Recycle plates.

DON'TS

- ✗ Don't throw away plates that can be recycled.

PLATE DEVELOPING SOLUTIONS

In the past, plate developers were solvent based and potentially hazardous. Some also had a high enough pH to make them a hazardous waste. Today, water-based or aqueous plate developing solutions contain little or no solvent. These developers are plate specific, so changing developers also means changing to aqueous plates, but the change can yield many advantages including increased quality and durability, shorter exposure times, and decreased fogging. Aqueous plates also cost about the same as solvent-based plates, require no procedural changes and since less chemicals are used in the developer, the developers are generally less expensive. Activator solutions for "silver master" plates will contain some silver, but not enough to be a hazardous waste. During development, electrostatic plates are often treated with a cyanide solution. This solution is considered hazardous.

DO'S

- ✓ *Manage cyanide developing solutions from electrostatic plates as a hazardous waste.*

DON'TS

- ✗ *Don't dump cyanide developing solutions from electrostatic plates down the drain. Manage it as a hazardous waste.*

PLATE DEVELOPING SOLUTIONS (CON'T)

- ✓ If you haven't done so already, 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.
- ✗ Don't put activator solutions from "silver master" or paper plates into CRCs. The solutions will stop the cartridges from working properly.

PRESS WASHES

Volatile organic compounds (VOCs) are highly evaporative compounds that can cause health problems such as lung and nervous system irritation, and contribute to the formation of smog. Press washes have a very high VOC content, typically ranging from 80 to 100 percent VOC. Vapor pressure determines how much of the VOCs evaporate into the air. The lower the vapor pressure, the less evaporation. In one study, almost half of the blanket wash purchased by a company was wasted since it evaporated before it made it from the shop towel to the press! Lower VOC products may actually save money since not as much is lost through evaporation. Several states and local governments have begun to set vapor pressure limits for press washes. Press washes may also contain chemicals that could cause them to be a hazardous waste when disposed. A list of chemicals that may make press washes hazardous when disposed can be found on page 34.

DO'S

- ✓ Work with your vendor to find the lowest VOC press wash that still works for you.
- ✓ Consider using press washes that don't contain chemicals which are typically hazardous waste when disposed.

DON'TS

- ✗ Don't 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.

PRESS WASHES (CON'T)

- ✓ 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, the amount of press wash used, and ink.
- ✗ Don't give up. If you're going to try a low VOC press wash, some experimenting may be involved to find the right one. If one doesn't work, try another. Keep with it until you find one that works for you.

SCRAP FILM

Processed or unprocessed black and white film will have some silver on it, but data indicate that the silver will not leach out of a landfill over time. However, soaking scrap film in fixer to remove silver will leave a coating of leachable silver that may make the film scraps hazardous.

DO'S

- ✓ Look for a recycling company that will collect your scrap film.
- ✓ If you do on-site silver recovery, ask your silver recovery equipment supplier if they will take your scrap film.

DON'TS

- ✗ Don't soak scrap film in used fixer to remove silver. This will leave a coating of leachable fixer that may make the scrap film a hazardous waste.

SHOP TOWELS

Some solvents and inks are hazardous waste when thrown away. Because of this, shop towels are often hazardous waste when they are contaminated with these solvents and inks. If your towels are handled according to the do's and don'ts below, you do not have to determine if the towels are hazardous and they do not need to be counted as a hazardous waste.

DO'S

- ✓ *Keep waste shop towels in a closed, fireproof container marked "CONTAMINATED SHOP TOWELS ONLY".*
- ✓ Use cloth towels which can be cleaned and reused.
- ✓ When possible, use less hazardous cleaning solvents (ones without chlorinated compounds).
- ✓ Check with the local sewer district near the laundry service you use to see if the laundry is meeting local sewer discharge limits.
- ✓ Squeeze excess solvent out of used towels. Collect and reuse the liquid for initial cleanup, followed by clean solvent for final cleanup.
- ✓ If you use disposable towels with hazardous solvents, dispose of them as hazardous waste.

DON'TS

- ✗ *Don't dispose of waste solvents, ink or fountain solutions by pouring or placing them into containers of used shop towels or individual shop towels.*
- ✗ Don't throw dirty towels into your dumpster.
- ✗ Don't saturate towels with solvent.
- ✗ Don't saturate towels with ink.
- ✗ Try not to use disposable paper towels or rags.

WASH WATERS

Wash waters used in the film developing process may contain small amounts of film developing chemicals, including used fixer. Typically, these chemicals are found in very small amounts so that wash waters isn't a hazardous waste. However, in areas with very low sewer discharge limits for silver, even wash waters can present a concern.

DO'S

- ✓ Routinely test the silver levels in your wash water to ensure compliance with silver discharge limits.

DON'TS

- ✗ Don't dispose of wash water to the sanitary sewer until find out what your local silver discharge limit is.

MANAGING USED FIXER

Lithographic printers generate used fixer as a normal part of doing business. Used fixer from film developing contains up to 4,000 parts per million (ppm) silver. This number greatly exceeds state and federal hazardous waste limits for silver (set at five ppm) and various local water quality discharge limits (see page 26). Used fixer should never be discharged to the sanitary sewer without proper silver recovery, either at your place of business or through off-site management. And it should never be put into storm drains, septic systems or dry wells.

ON-SITE OR OFF-SITE?

Managing used fixer is unique because silver has value. Whether you choose on-site treatment, off-site treatment or a combination of both for this waste stream, the choice is yours — and it's an important one. While a business generating large volumes of used fixer (such as photo processors) may recover the costs of their on-site recovery system in a matter of months, smaller volume producers like printers will take longer to see a similar payoff. It is important to remember that whichever strategy you choose, your business must meet hazardous waste and local sewer discharge limits for used fixer. Some lithographic printers are already trying to reclaim their used fixer using on-site technologies. These businesses should consider this option carefully. Historically, on-site silver recovery has focused on economics rather than meeting hazardous waste and sewer discharge limits. On-site silver recovery designed to meet such limits is not as simple as plugging in a machine and walking away — it takes a lot of time, effort and trial and error to do it right, and even then may not meet some of the stricter local sewer discharge limits. This booklet contains guidance to help you do a better job if you choose to do on-site recovery.

OFF-SITE MANAGEMENT OPTIONS

Off-site management of used fixer has certain advantages over on-site recovery. Capital, operation and maintenance costs for equipment are non-existent. Administrative costs, such as analytical monitoring, are not incurred. If a business has space limitations, the off-site option may help ease crowding. Most importantly, having your used fixer managed off-site will ensure that hazardous waste and local silver discharge limits for silver will not be violated

at your facility.

The downside to off-site management may be in putting your hazardous waste into the hands of a third party. In addition, off-site hauling may create more air pollution due to increased trucking and transport of wastes. If you choose an off-site option, carefully choose the company — you still have ultimate responsibility for the proper management of your wastes.

WASTE MANAGEMENT COMPANIES

Consider using a waste management company to pick up your used fixer, or ask your chemical supplier if they have a program (or will start a program) that will supply you with new chemicals as they pick up and reclaim your used fixer solutions.

The pick up fees charged by many silver recovery and waste management facilities range from \$50-\$100 per service visit. While some will only pick up used fixer others will manage other waste streams as well, so shop around. Many facilities will allow spent used fixer to be dropped off free of charge but prior arrangements should be made. Other facilities will accept shipments of used fixer through common carriers, such as UPS. (Do not send fixer through the U.S. mail.) Shipping small amounts of used fixer is allowed under Ecology and Department of Transportation rules. The cost of shipping a five gallon carboy from Seattle to Spokane ranges from \$12-\$63. These prices include pickup at your business. The common carriers should be contacted directly for the most accurate pricing information.

RECLAMATION AT ANOTHER BUSINESS

In many communities, photo shops with proper on-site silver recovery systems will accept reasonable amounts of used fixer from other small businesses at no charge. This may be the easiest, most economical option for the management of smaller amounts of used fixer. This option is available for businesses that generate a total of less than 220 lbs of hazardous waste per month, including used fixer (220 lbs is approximately 26 gallons). Neither Ecology nor the Department of Transportation have regulatory requirements for the transport of such Small Quantity Generator (SQG) volumes of used fixer to other busi-

nesses. Also check with your local government moderate risk waste program for similar reclamation services they might provide (see government contacts insert).

Businesses using this option should request a receipt for wastes accepted. Businesses receiving used fixer from Small Quantity Generators need to ensure that these wastes are legitimately recycled and that hazardous waste and local sewer discharge limits are being met. Those businesses receiving used fixer from Regulated Generators must follow the hazardous waste requirements outlined on page 28. Businesses receiving used fixer from other businesses do not need to count these wastes toward their own monthly hazardous waste total.

ON-SITE RECOVERY OPTIONS

There are several different types of equipment that fall under the broad heading of silver recovery units. The most common units found in lithographic printing shops are electrolytic recovery units and metallic replacement or chemical recovery cartridges. While other technologies exist (such as chemical precipitation and ionic exchange) these technologies are complicated or expensive given the small volumes of fixer generated by most printers.

METALLIC REPLACEMENT OR CHEMICAL RECOVERY CARTRIDGES (CRCs)

CRCs are hollow canisters that contain steel fibers or fiberglass impregnated with iron filings. Used fixer is run through the cartridge. When the iron contacts a solution containing dissolved silver, the iron is dissolved and the silver comes out of the solution. CRCs can be used by themselves or after an electrolytic recovery unit.

Using two CRCs in series, in conjunction with other recommended management practices, can reduce silver concentrations to about one ppm — but this takes time and effort and may be achievable only under ideal circumstances. Even with proper care, two CRCs may not be able to meet the sewer discharge limits adopted by many municipalities (see page 26). Costs for printers setting up two CRCs in series range from \$200 to \$1,700. Operating, changeover and silver testing costs on a three to six month changeover schedule range from

\$150 to \$300 annually.

If you are currently using CRCs or a combination of electrolytic recovery and CRCs for on-site reclamation, the following management practices will help bring you closer toward meeting hazardous waste and sewer discharge limits. These recommendations are not guaranteed to automatically bring a business in compliance — each business will need to monitor its progress to see if hazardous waste and sewer discharge limits are being met.

MAINTAINING AND OPERATING CRCs

- At a minimum, businesses choosing to use CRCs for on-site recovery need to use two in series unless they can document through routine testing that they consistently meet hazardous waste and local water quality discharge limits using just one. One canister, even of high quality, will show diminishing returns after being used a few times and will eventually stop working. An electrolytic recovery unit by itself will not meet hazardous waste or sewer discharge limits. If you are using an electrolytic recovery unit, you should also use two CRCs.
- Have a sample valve installed between canisters. Use this valve to take samples of the effluent from the first canister. Using silver test papers, check the sample to see when the first canister is spent. Silver test paper can detect silver at levels between 200 and 500 parts per million (ppm). When your first canister reaches this level, it is time to rotate it out, putting your second canister first in line and adding a new, second canister. In addition, if your tubing between canisters is clear plastic, you can visually inspect the solution flowing through — if it is brown or has debris in it, this is a good sign that the working ability of the first canister is spent.
- Monitor the flow of used solutions into the canisters. If the flow is too fast, the proper reaction won't happen inside the canister and you won't meet silver discharge limits. If it is too slow, it may deteriorate the canister too soon. Use a metered pump system or a restricted gravity feed system and keep flow rates at manufacturers' recommendations, usually between one and three gallons per hour.

- Test your outflow. If you are doing on-site silver recovery, take periodic samples of recovered used fixer over the life span of a canister and have the wastes analyzed for silver to see if it meets hazardous waste and sewer discharge limits. Keep a file with all test data in it — you'll have a starting point from which to make refinements to your on-site process. See the Testing section on page 32.
- Keep a maintenance/changeover log. Perform regular maintenance as recommended in the manufacturer's instruction manual. Work closely with your supplier for help in developing a changeover schedule based on your volumes of used fixer solutions. Ask your supplier if they provide a full service waste management arrangement.
- If you're using electrolytic recovery before CRCs, monitor/adjust the pH (see page 33) of the used fixer before it enters the CRCs. Using simple pH testing papers as an indicator, keep the pH of used fixer entering CRCs between 5.5 and 6.5, which is the optimum range for pulling out the most silver and lengthening the life of the canisters. Look for units that have a sample valve in the tubing entering the canisters where a small sample can be periodically taken. Record pH monitoring levels and occurrences in your maintenance/changeover log
- Fill CRCs with water before initially putting them into service. This will extend the life of canisters by preventing the steel wool from dissolving as they fill with fixer.

ELECTROLYTIC RECOVERY UNITS

An electrolytic recovery unit works by attracting positively charged silver ions to a negatively charged cathode that is immersed in used fixer. Electrolytic recovery units remove the majority of easily recoverable silver in a nearly pure metallic state. This purity translates into lower refining and shipping costs than other silver recovery methods. An advantage of a properly functioning electrolytic recovery unit is that the solutions processed can be reused, given proper attention to pH levels. A disadvantage is that it can only reduce silver concentrations down to a range of 100 to 300 ppm. Without further reclamation, your effluent will not meet hazardous waste or sewer discharge limits. An average unit costs around \$2500.

SOME MANAGEMENT PRACTICES FOR ELECTROLYTIC RECOVERY UNITS

- For printers generating less than 25 gallons of fixer per month, the costs outweigh the benefits of using electrolytic recovery. Such printers choosing to do on-site recovery will find using just 2 CRCs in series meets their needs.
- For optimum silver recovery efficiency, solutions entering an electrolytic recovery unit should have a pH between 7.5 - 8.0. Since the normal pH of used fixer solutions ranges from about 5.5 to around 7, pH adjustment is generally necessary. (See pH, page 33.)
- Do not put bleach into electrolytic units.

WATER QUALITY REQUIREMENTS

STRICT LOCAL SEWER DISCHARGE LIMITS

As the chart below shows, some sewer districts in the state have set their own local silver discharge limits for businesses in order to help the sewage treatment plant meet its own discharge levels for silver. In many locations, sewer discharge levels are so low that businesses using on-site silver recovery technologies such as electrolytic recovery and CRCs will have difficulty meeting these levels. Similar low limits are continuing to be developed in other areas of the state. Businesses located in areas with strict current or future local sewer limits may have no choice but to explore off-site options.

Municipality	Silver Limit (ppm)	Delegated?
Aberdeen	0.2	No
Chehalis	0.2	No
Clark County	0.1	No
Everett	0.69	Yes
Federal Way	0.5	No
Kalama	0.1	No
Lynnwood	0.5	Yes
Olympia (LOTT)	0.2	Yes
Pierce County	0.2	Yes
Richland	0.2	Yes
King County (Metro)	3.0	Yes
Spokane	0.43	Yes
Tacoma	0.2	Yes
Vancouver	0.1	Yes

All businesses conducting on-site silver reclamation should contact their local sewer utility for more information about local limits. See the Water Quality contacts in the government contacts insert.

DELEGATED AND NON-DELEGATED SEWER UTILITIES

Some sewer utilities, such as those noted above, are known as “delegated” pretreatment programs. This means that the Ecology has granted regulatory authority to these local entities to pass local ordinances, issue their own discharge permits and run their own programs. Non-delegated sewer utilities are still under the management authority of Ecology’s Water Quality program, and sewer discharge permits for businesses are issued by the appropriate Ecology regional office.

HAZARDOUS WASTE REQUIREMENTS FOR LITHOGRAPHIC PRINTERS

STEP 1 IDENTIFY YOUR WASTE AND GENERATOR STATUS

Lithographic printers generate hazardous used fixer which is hazardous waste, as well as other wastes that may be hazardous, including waste inks, ink cleanup sludges, film developer solutions and fountain solution wastes. Businesses need to “count” these wastes toward a monthly hazardous waste total. If your total monthly amount of hazardous waste totals over 220 pounds (about 26 gallons) and this count includes more than just used fixer, you are a Regulated Generator required to meet compliance Steps 2-11 below. If you are over 220 lbs. but only generate used fixer (i.e. no ink cleanup sludges or other hazardous wastes) and you recycle the fixer, you are a Regulated Generator that needs to comply with Steps 2, 3, 8, 9 and 10 below. You are a Small Quantity Generator if you always generate less than 220 pounds of hazardous waste per month or batch and always dispose of the waste before you accumulate more than 2,200 pounds. Small Quantity Generators are required to comply only with Steps 1, 8 (and 3 if you already have an active RCRA ID number).

STEP 2 OBTAIN A GENERATOR ID NUMBER

If you are a regulated generator, you are required to notify Ecology of your hazardous waste activities and obtain a site-specific RCRA ID number using Ecology’s Form 2. Call (360) 407-6737 or your nearest Ecology regional office.

STEP 3 REPORT ANNUALLY

If you have an active RCRA ID number, you must submit an annual report (Ecology’s Annual Report Form) by March 1 of each year, even if you have not generated waste in that year. Record your hazardous waste activities for the previous calendar year on this report, including how much waste you’ve generated or accumulated on-site and waste you’ve sent off-site. Ecology conducts annual workshops for businesses seeking assistance in completing their annual reports. Call (360) 407-6170 to request an annual report form.

STEP 4 PERFORM PREVENTIVE MAINTENANCE

Hazardous wastes must be handled in a manner that prevents leaks, spills, fires and explosions. Develop and follow a written inspection schedule for all hazardous waste storage areas, containers and tanks and include all emergency, safety and monitoring equipment on site. Keep the necessary emergency equipment (such as fire extinguishers and telephones) on hand and accessible to employees. You must regularly test and maintain all your emergency equipment. Notify police, fire departments and local hospital of the characteristics of hazardous wastes generated at your site, as well as the facility layout and access routes.

STEP 5 PROPERLY ACCUMULATE HAZARDOUS WASTE

Lithographic printers typically generate less than 2,200 lbs. per month. If so, they can accumulate their hazardous waste on site for up to 180 days from the date it is first generated before they must manage it on-site or send it to an appropriate facility. If you generate more than 2,200 lbs per month, you can only accumulate the waste for up to 90 days.

While accumulating wastes, you must follow certain requirements:

- Establish and clearly mark an accumulation area. If constructed after September 30, 1986, it must have a containment system able to hold spills and leaks.
- Place the waste in an appropriate container and mark it with the words “Hazardous Waste”, the waste’s major risk (such as “Ignitable”), and the date you first put waste in the container.

STEP 6 PLAN FOR EMERGENCIES

There must be an emergency coordinator on the premises or on call at all times who is familiar with the operations and activities at the site and has the authority to commit the resources necessary to deal with a hazardous waste emergency. In a small shop, this will probably be the owner or manager. Make sure you train your employees to know how to react to different types of emergencies in your shop.

STEP 7 USE PROPER CONTAINERS

Many hazardous waste incidents and work related injuries are linked to improper or unsafe container management. To avoid such accidents:

- Accumulate your wastes in containers which are sturdy, leak-proof, properly labeled, and kept closed unless waste is being added or removed. Use your empty product containers as convenient waste accumulation containers.
- Don't accumulate incompatible wastes in the same containers or areas.
- Store reactive and ignitable wastes according to the uniform fire code.
- Maintain a minimum aisle space of 30 inches between container rows.
- Inspect containers at least once a week, keeping a log of inspections.

STEP 8 ENSURE PROPER TRANSPORTATION AND DISPOSAL

Regulated Generators must hire a transporter that has a RCRA ID number and ensure that wastes are handled at a permitted hazardous waste facility or a facility that legitimately recycles and reclaims hazardous waste. Small Quantity Generators can transport their own wastes or make sure they are sent to a permitted facility, a legitimate recycler, or the sanitary sewer (with written authorization only).

STEP 9 MANIFEST SHIPMENTS OF HAZARDOUS WASTE

To ship hazardous wastes off site, Regulated Generators must prepare a Uniform Hazardous Waste Manifest Form which identifies the contents of the shipment, the transport company used and the facility receiving the wastes. This form accompanies the waste from the site where it is generated to its ultimate resting place and then back to you for your records. If you are a Regulated Generator, your waste hauler needs to use a manifest and not just issue a bill of lading or receipt.

STEP 10 DON'T SPECULATIVELY ACCUMULATE

If you are a Regulated Generator and you accumulate used fixer for more than 180 days, you need to document that you are not speculatively accumulating this material. Speculative accumulation means collecting something without value with the hope that it may one day have value. You would need to keep records showing the volume of these materials stored at the beginning of the year, the amount of these materials generated or received during the calendar year, the amount of materials remaining at the end of the calendar year, and be able to show that you recycled, or transported elsewhere for recycling, 75 percent of that year's used fixer.

STEP 11 KEEP RECORDS

There are a number of records that Regulated Generators must prepare and keep on the premises for at least five years, including annual reports and manifest forms. Keep copies of notification reports (Form 2), inspection records, results from waste analyses or tests, and on-site recycling records for as long as you are in business. Small Quantity Generators should also keep records of their hazardous waste management activities.

IMPORTANT TOPICS

TESTING

Businesses discharging reclaimed used fixer are responsible for knowing if they meet hazardous waste and sewer discharge limits. Sending a sample of a waste to a laboratory for analysis is the most accurate way to determine if the waste is hazardous or meets sewer discharge limits — and it's relatively inexpensive.

For analyzing concentrations of metals, a total metals test is used to determine compliance with local sewer discharge limits. This test checks for total amount of a metal in a waste. For used fixer, a total metals test can be used for determining sewer discharge and hazardous waste levels. Other wastes, such as waste inks and cleanup sludges, may need different tests (such as ignitability). Talk to testing labs about which tests are best for your wastes. If you're using CRCs, regular testing over the life span of a canister may indicate if your maintenance schedule may be extended, saving you the cost of an additional unit. Once you have established a track record of consistent compliance, you can use those test results and changeover schedules as an indicator of future compliance with regulatory levels. For example, if you test your used fixer over time and find that it meets hazardous waste and sewer discharge limits, you may use this information for future disposal of reclaimed used fixer.

MATERIAL DATA SAFETY SHEETS (MSDSs)

A material safety data sheet (MSDS) should come with each of the chemical products you purchase from a manufacturer or vendor. As a business, you are required to keep MSDSs for all products available to employees. This is a WISHA requirement. MSDSs have a reputation for being long, too technical and difficult to read. Although this may be true, the ability to scan through an MSDS and pick out the following information is important. MSDSs are valuable because they describe:

- physical and chemical properties of the hazardous substances contained in the product,
- spill cleanup instructions,
- health hazards and appropriate first aid,
- fire and explosion hazards, and
- proper management and disposal practices.

Not all MSDSs are formatted the same, but they are all required to contain certain information. If you want additional information about a chemical product, contact the manufacturer using the phone number provided on the MSDS.

pH

pH is the measure of how acidic or alkaline a solution is, with neutral solutions rating a 7, acidic solutions less than 7, and alkaline solutions greater than 7. Lithographic printers who choose to use electrolytic recovery units to recover silver from used fixer solutions may wish to adjust the pH of these solutions to between 7.5 and 8.0 before use in electrolytic recovery units. If CRCs are used following an electrolytic recovery unit, pH can be adjusted back down to 5.5. Sodium hydroxide is commonly used to adjust solutions upward, while glacial acetic acid is used to adjust solutions downward. Both of these chemicals are hazardous themselves, so employers should carefully weigh the risks to the responsibilities of employees handling such chemicals with the benefits derived from pH adjustment. Check with your service company, vendor, product manufacturer or analytical lab for help in making pH adjustments.

“F-LISTED” CHEMICALS

If your cleaning solvents contain, before use, 10% or more of any one or combination of the chemicals shown below, they are hazardous when disposed. These F-listed wastes are hazardous because of their high flammability, persistence or toxicity. (The “F” comes from the federal waste code that describes such wastes.) Look at your MSDSs to find these chemicals and work with your vendors to find safer alternatives.

acetone	cresols and cresylic acid
benzene	n-butyl alcohol
carbon tetrachloride	2-nitropropane
carbon disulphide	ortho-dichlorobenzene
chlorinated fluorocarbons	pyridine
chlorobenzene	etrochloroethylene
cyclohexanone	toluene
2-ethoxyethanol	trichloroethylene
ethyl ether	1,1,1-trichloroethane
isobutanol	1,1,2-trichloroethane
methanol	1,1,2-trichloro-1,2,2-trifluoroethane
methylene chloride	trichlorofluoromethane
methyl ethyl ketone (MEK)	xylene
methyl isobutyl ketone (MIBK)	ethyl acetate
ethyl benzene	nitrobenzene

FOR MORE INFORMATION

ARE YOU CONNECTED TO THE INTERNET ?

You can find information about businesses that can help you properly manage your wastes on the Internet at <http://www.ecy.wa.gov/apps/hwtr/hwsd/default.htm>, the Hazardous Waste Services Directory.

The first screen lists the services available to hazardous waste generators. Select which type of waste management service is needed, then click on the “Search” button. This generates a listing of all the companies that offer this service. Select a firm, then click on “Details” to get more information.

Although the directory is updated routinely to keep the information current and useful, these listings do not constitute a recommendation, and the Department of Ecology does not assume any liability for the accuracy or completeness of the information in the directory.

DO YOU PREFER PAPER COPIES OF THIS INFORMATION?

If so, or if you have any questions or comments about the on-line Hazardous Waste Services Directory, e-mail Dave Zink at dzin461@ecy.wa.gov or call (360) 407-6752.

PLAY IT SAFE!

Before you agree to let a company handle your waste, ask for, and check, the company’s references. The following questions might be useful in assessing the management practices of a business you are considering:

- ✓ How do you manage the waste you collect or analyze?
- ✓ Do you reduce or recycle waste before disposal? Do you contract out for such services, and if so, to whom?
- ✓ How do you train your employees? Do they have a basic understanding of regulations/liabilities pertaining to my waste stream?
- ✓ Are you insured? In some cases it may be appropriate to ask for an RCRA identification number?
- ✓ Do you or your affiliate companies have any current, recent (3-5 years) or pending enforcement actions or fines with state, federal or local authorities? (Call your nearest Ecology regional office to verify.)

As part of the Department of Ecology's "Snap Shots" campaign, environmental education efforts are being geared toward photo processors, screen printers, lithographic printers and the medical/dental community.

The immediate goals of this effort are 1) to encourage pollution prevention as the first step toward better environmental management on the shop level and 2) to educate the printing and film developing industry on applicable federal, state and local government environmental requirements and options available to meet those requirements.

Long term goals include evaluating our success at improving overall environmental compliance and pollution prevention habits of the industry.

If overall regulatory compliance is not improved significantly during this educational phase, Ecology may take additional actions to encourage compliance, including developing a general state sewer discharge permit for the film developing industry.

While this booklet summarizes some of Ecology's hazardous waste, solid waste, water quality and air quality requirements, it does not replace the regulations themselves. Always refer directly to the regulations for more detail or ask to speak to a hazardous waste, solid waste, water quality or air quality specialist at your nearest Ecology regional office.

Ecology is an Equal Opportunity and Affirmative Action Employer. If you have special accommodation needs, please contact the Hazardous Waste and Toxics Reduction Program at (360) 407-6743 (Voice) or (360) 407-6006 (TDD).

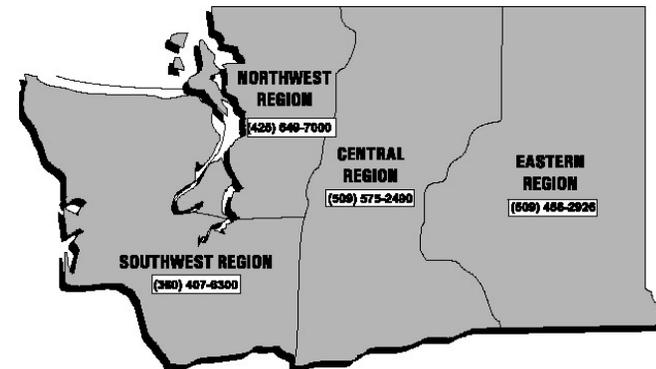
Department of Ecology Regional Offices

● ● ● ● ● ●
Eastern Regional Office
North 4601 Monroe, Suite 202
Spokane, WA 99205-1295

Central Regional Office
106 South Sixth Avenue
Yakima, WA 98902-3387

Southwest Regional Office
5751 Sixth Avenue SE
Post Office Box 47775
Olympia, WA 98504-4775

Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008



For questions relating to pollution prevention, you can call 1-800-RECYCLE. General information is available on equipment, service and process changes that can help you reduce and recycle your wastes.

You can also get help for specific pollution prevention problems in your facility by calling your nearest Ecology regional office and asking for a toxics reduction specialist.

For additional information and assistance on regulatory concerns from hazardous wastes, solid waste, water quality or air quality, contact the nearest Ecology regional office and ask for the appropriate program specialist.

The first printing of this booklet was printed on 100% post-consumer recycled paper, on a waterless and alcohol free press, using 100% vegetable-based inks. The booklet size is most efficient for minimizing paper waste during cutting.

Subsequent reproductions of this booklet have been photocopied on recycled paper, using electronic originals for continued conservation of natural resources.