

Environmental  
Management and  
Pollution  
Prevention



A Guide for  
Screen Printers



**ReduceWaste**

*May, 1996*

*Publication 94-137R*

## Department of Ecology Regional Offices

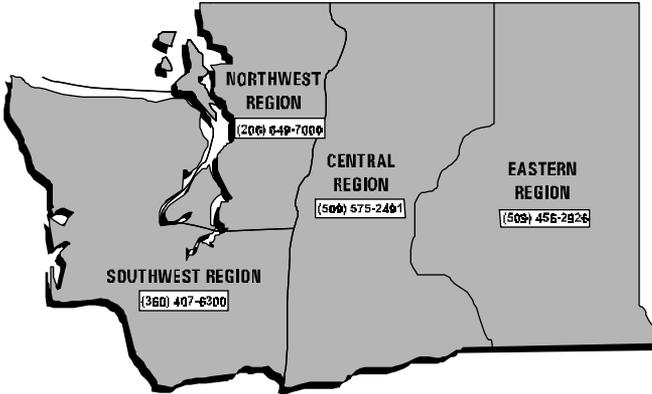


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**F**or questions relating to pollution prevention, you can call 1-800-RECYCLE. General information is available on equipment, service and process changes that can help you reduce and recycle your wastes.

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.

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## Why Should Screen Printers Pay Attention to Their Wastes?



If you're a screen printer looking for practical environmental management and pollution prevention information, this booklet is for you.

Screen printers across the state regularly generate wastes that are of concern to the environment. Film developing, printing 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 ink removers and spot degreasers. 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, 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 screen 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.

# Your Business and Ecology Regulations



**T**he 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 the programs together in a meaningful way. This helps businesses such as screen 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 screen printers.

## **Hazardous Waste and Toxics Reduction**

Screen printers concern Ecology's Hazardous Waste and Toxics Reduction Program mainly because used fixers, and some waste inks, emulsion removers and ink removers 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 (see page 22). 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 waste 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.

## **Water Quality**

Screen 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 is one way to do this.

## **Air Quality**

Screen 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 from neighboring businesses and the public.

## Pollution Prevention: Reduce and Recycle Your Wastes



**E**nvironmental 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 screen 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 and the vendor and services section beginning on page 27.

# Screen Printing Waste Streams of Concern

Waste Stream of Concern	Program of Concern	Environmental Concern
Aerosol Cans	Hazardous Waste Air Quality	“Listed” chemicals (see page 26) High VOCs
Developer	Hazardous Waste Water Quality	Hydroquinone
Fixer	Hazardous Waste Water Quality	High silver
Haze Remover	Hazardous Waste Water Quality	High pH
Ink and Emulsion Remover	Hazardous Waste Air Quality	Heavy metals “Listed” chemicals High VOCs
Parts Washer Solvent	Hazardous Waste	“Listed” chemicals
PMT Activator	Hazardous Waste	Potential silver
Scrap Film	Solid Waste	Recyclable
Screen Degreaser	Hazardous Waste Air Quality	“Listed” chemicals High VOCs
Screen Emulsion	Water Quality	Suspended Solids
Shop Towels	Hazardous Waste Air Quality	Improper disposal of inks and solvents
Waste Ink	Hazardous Waste	Heavy metals “Listed” chemicals
Wash Water	Water Quality	Silver

# Practical Do's and Don'ts



## Practical Do's and Don'ts for Screen Printers

Below are some common wastes generated by screen printers, 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's and don'ts are suggestions that may help save you money and lead toward regulatory compliance, some do's and 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

Screen printers use spray cans for various reasons including film cleaning and garment tacking. 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 26. While an empty can may be put in the garbage, aerosol cans containing "listed" cleaning chemicals are considered a hazardous waste if they are thrown away before they are empty.

#### Do's

- ✓ *Dispose of non-empty cans containing hazardous substances as hazardous wastes.*
- ✓ 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 throw away non-empty cans into the garbage.*
- ✗ Don't buy aerosols containing "listed" compounds. Work with your vendor to find alternatives.

## Developer

Developers change 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 25).
- ✓ 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 fixers when using CRCs (see page 18). Developer can plug CRC's causing a dangerous pressure build up.

## Fixer

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 silver. Because of these high silver levels, used fixer is a hazardous waste.

Screen printers typically generate small volumes of used fixer. See the discussion of on-site versus off-site used fixer management beginning on page 16 and see the vendor and services directory beginning on page 27.

## Fixer (con't)

### Do's

- ✓ Investigate whether on-site recovery or off-site management is the best option for you. (See page 16.)
- ✓ 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 25).
- ✓ 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 22.)*
- ✓ 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.*

## Emulsion and Ink Remover

Many of the ink and emulsion removers used to clean screens before and during screen reclamation contain hazardous chemicals, such as 1,1,1-trichloroethylene and xylene. A list of chemicals that are always hazardous after being used for cleaning can be found on page 26. Any ink or emulsion that a listed ink/emulsion remover comes in contact with will also be a hazardous waste when discarded.

Emulsion and ink removers can also contain volatile organic compounds (VOCs) that evaporate into the air causing potential health and environmental problems including lung irritation and outdoor smog formation.

### Do's

- ✓ Ask your vendor about low VOC ink and emulsion removers. Try to find the lowest VOC products that will work for you.
- ✓ Try to use ink removers and emulsion removers that don't contain listed solvents. This will minimize the chance of generating a hazardous waste.
- ✓ Remove extra ink from screens with a scraper or spatula before using ink remover. Return excess ink to containers.
- ✓ Use a solvent pump can instead of pouring solvent from a jug. This will minimize your use and your exposure.
- ✓ Dry solvent-coated screens before washing them in water.
- ✓ Attach labels to waste solvent containers, identifying them as hazardous waste.

### Don'ts

- ✗ *Don't ever dispose of cleaning solvents to a sanitary sewer, storm drain, septic system, dry well or onto the ground.*
- ✗ Don't clean screens directly over a sink or drain. Instead, use a separate solvent cleaning station. Collect any leftover solvent for reuse, recycling, or disposal.
- ✗ Don't mix solvents. Combining a hazardous waste with a non-hazardous one will make the entire mixture a hazardous waste.
- ✗ Don't store products or wastes together that might react with one another if there is a spill.
- ✗ Don't store solvents near heat sources.
- ✗ Don't give up. Some experimenting may be involved to find the right product or formulation. Spot test products first to see how they work before switching over completely.

## Haze Remover

Haze removers can have a pH high enough to cause them to be a hazardous waste. If the pH of a material is over 12.5 when it is disposed, it is a hazardous waste. Some haze removers can have a pH of around 13.

### Do's

- ✓ Check the material safety data sheet (MSDS) for the pH of your haze remover. Try to find one with a pH under 12.5.

### Don'ts

- ✗ *Don't put haze remover waste in the garbage if the pH is over 12.5.*

## Parts Washer Solvent

Screen printers sometimes 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, and may contain listed wastes. Evaporation of these solvents also creates VOCs.

### Do's

- ✓ Install a filter on your solvent sink to increase the life of the solvent. (Remember to handle 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.
- ✓ Make sure solvent is actually too dirty to use before it is exchanged for new solvent.

### Don'ts

- ✗ *Don't dispose of spent 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.

## **PMT Activator**

Creating a photo mechanical transfer (PMT) requires an activator solution. Used activator may contain up to 20 ppm silver, making it a hazardous waste.

### **Do's**

- ✓ Contact your local sewer authority before discharging activator to the sanitary sewer.
- ✓ Test your used activator through a lab accredited for silver analysis to see if silver levels meet hazardous waste and sewer discharge limits.
- ✓ Use, replenish and change activator solutions according to manufacturer directions to minimize silver content.

### **Don'ts**

- ✗ *Don't put activator into the sanitary sewer unless it meets hazardous wastes and sewer discharge limits.*
- ✗ *Don't ever put activator into a septic system, storm drain, dry well or onto the ground.*
- ✗ Don't add activator to used fixer unless you adjust for the high pH of activator when doing on-site silver recovery.

## **Scrap Film**

Both processed or unprocessed 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 fixer that may make the scrap film hazardous.

### **Do's**

- ✓ Look for a recycling company that will collect your scrap film (See page 28).
- ✓ 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.

## **Screen Emulsion**

Screen emulsion is a cellulose product and is not considered a hazardous waste when disposed. If, however, it comes in contact with a material that is a hazardous waste when disposed, such as hazardous ink and emulsion removers, then the emulsion may become a hazardous waste too. Contact your local sewer utility to see if it has concerns about suspended solids due to screen emulsions. Also, see the section on emulsion removers for more details.

## Screen Degreasers

The degreasers used to clean screens during screen preparation and after screen reclamation have a wide variety of chemical properties. Some degreasers are mild detergent solutions which do not raise any hazardous waste or water quality issues. Other degreasers may contain chemical solvents that would be “listed” hazardous waste when disposed. A listing of these chemicals is located on page 26. Comparing this list with chemicals in your current degreaser will help you determine whether it will be a hazardous waste when disposed.

### Do's

- ✓ Try to find a degreaser that does not contain listed or chlorinated solvents.

### Don'ts

- ✗ *If you are using a degreaser with a listed or chlorinated solvent, don't wash screens over a sink or drain. Collect rinsate and manage as 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 listed chemicals).
- ✓ Check with the local sewer district near the laundry service you use to see if the laundry is meeting local sewer discharge limits.

### Don'ts

- ✗ *Don't dispose of waste solvent or ink 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.

## Shop Towels (con't)

### Do's

- ✓ 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.

## Waste Ink

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 disposed.

Heavy metals such as lead, chromium, silver, cadmium, and barium are used in some ink pigments 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. In general, inks used by textile printers don't contain heavy metals, but the solvent based inks (other than black) used by sign, poster, label and electronic component printers may.

Solvents commonly found in inks, such as ethanol, isopropanol, ethylene glycol, xylene, toluene, cyclohexanone, and petroleum distillates, can also make inks hazardous and contribute to air pollution by emitting volatile organic compounds (VOCs). VOCs are highly evaporative compounds that can cause indoor health problems such as lung irritation and outdoor problems such as smog.

Whether a specific ink is hazardous waste depends on the amount and type of heavy metals, solvents, and other hazardous chemicals it contains.

### Do's

- ✓ Buy only as much ink as needed for the near future.
- ✓ If using colored inks, ask your vendor for inks that contain little or no heavy metals. Ask if your vendor can reblend inks.

### Don'ts

- ✗ *Don't put inks that are hazardous in the garbage. If the ink is hazardous, handle and dispose of it as hazardous waste.*

## Waste Ink (con't)

### Do's

- ✓ *Make sure ink and mixing containers are empty before disposal. Scrape or drain cans until less than one inch covers the bottom, or less than three percent of the volume of the container remains, whichever is least.*
- ✓ Remove ink from stir sticks using a scraper or spatula instead of using solvent and shop towels. Use reusable stainless steel, plastic or wooden stir sticks.
- ✓ Remove as much ink as possible from adhesive tape and screens with a scraper or spatula, returning excess ink to the original or waste container.
- ✓ Check your material safety data sheets (MSDSs) to see if your inks contain ignitable solvents or heavy metals.
- ✓ Non-hazardous inks that have become dried out and solidified can be put into the garbage.

## 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 water 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 ever put ink into a sanitary sewer, storm drain, septic system, dry well or onto the ground.*
- ✗ Don't leave wooden stir sticks sitting in cans of ink. They can absorb additives and solvents and degrade ink quality.
- ✗ Don't throw adhesive tape with excess ink on it into the garbage. Scrape excess ink into ink container before putting tape in the garbage.

### Don'ts

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

## Managing Used Fixer



Screen printers generate used fixer as a normal part of doing business. Used fixer contains up to 4,000 parts per million (ppm) silver. This number greatly exceeds state and federal hazardous waste limits for silver (set at 5 ppm) and various local water quality discharge limits (see page 21). 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 your waste streams, 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 screen 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 the ultimate responsibility for the proper management of your wastes.

## **Waste Management Companies**

Consider using a waste management company to pick up your used fixer (see page 33 for a listing), 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 old fixer.

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 Department of 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**

If you generate less than 220 lbs. of total hazardous waste per month (this is approximately 26 gallons and includes used fixer), you have the option of taking used fixer to another business that is willing and properly set up to do on-site silver recovery. Neither Department of Ecology nor Department of Transportation regulates the transport of such Small Quantity Generator (SQG) volumes of used fixer to another business. This may be an attractive option for businesses with small volumes of used fixer that do not wish to do on-site recovery themselves. Even if your business generates more than 220 pounds per month, you can still utilize the silver recovery services of another business, although you'll need to use a licensed hauler, manifest the waste and get a RCRA ID number (See page 22).

Also check with your 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 22. 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 screen printing shops are electrolytic 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 screen 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 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 21). 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 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 make a business in compliance — each business will need to test 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 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 waste 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 25.

- 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 silver-bearing 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 26) 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 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 a electrolytic unit should have a pH between 7.5 - 8.0. Since the normal pH of silver-bearing solutions ranges from about 5.5 to around 7, pH adjustment is generally necessary. (See pH, page 26.)
- DO NOT put bleach into electrolytic recovery 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	.05	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 local 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 Department of Ecology (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 Screen Printers



## **Step 1** Identify Your Waste and Generator Status

Screen printers generate used fixer which is a hazardous waste, as well as other wastes that may be hazardous, including waste inks and cleanup sludges. 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 waste inks or other hazardous wastes) and you recycle this material, you are a Regulated Generator that n 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 2,220 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 equipments. 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

Screen 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 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 was 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. Makes 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 that are sturdy, leak-proof, properly labeled, and kept closed unless wastes 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.



### 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 while a TCLP (Toxicity Characteristic Leaching Procedure) test is used to determine whether a waste is hazardous. A total metals test checks for total amount of a metal in a waste while TCLP checks for the amount that could leach into the ground in a landfill. 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 waste stream 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. See page 30 for a list of testing services available.

### 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. Screen printers who choose to use electrolytic recovery units to recover silver from silver-bearing 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 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 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  
benzene  
carbon disulphide  
carbon tetrachloride  
chlorinated fluorocarbons  
chlorobenzene  
cyclohexanone  
2-ethoxyethanol  
ethyl ether  
isobutanol  
methanol  
methylene chloride  
methyl ethyl ketone (MEK)  
methyl isobutyl ketone (MIBK)  
ethyl benzene

cresols and cresylic acid  
n-butyl alcohol  
2-nitropropane  
ortho-dichlorobenzene  
pyridine  
tetrachloroethylene  
toluene  
trichloroethylene  
1,1,1-trichloroethane  
1,1,2-trichloroethane  
1,1,2-trichloro-1,2,2-trifluoroethane  
trichlorofluoromethane  
xylene  
ethyl acetate  
nitrobenzene

## Vendors and Services



The following is a list of businesses that can provide a variety of environmental and waste management services. This list does not constitute a recommendation, and the Department of Ecology does not assume any liability for the accuracy or completeness of the information provided in this publication. *Final determinations of the proper handling and disposal of waste are the sole responsibility of the generator.*

Before agreeing to let them handle your waste, it is recommended that you 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.)

**FILM:** Film manufacturers, recoverers,  
film product recycling and film  
collection

**3M Corporation**

3M Center  
Building 235-1C-22  
St. Paul, MN 55144  
(800) 944-664 *Hotline*

**Agfa of Miles Inc.**

100 Challenger Rd  
Ridgefield, NJ 07660  
(201) 440-0111 X4778

**AgCo Metalex**

3701 S. Road  
Mukilteo, WA 98275  
(206) 743-7886

**CMX Corporation**

6601 S. Glacier St.  
Tukwilla, WA 98188-4718  
PO Box 58088 (mail)  
Seattle, WA 98138-1088  
(800) 869-7191

**Fuji Hunt Photographic Chemical**

PO Box 988  
Paramus, NJ 07653-0988  
TECH (800) 526 0851  
SALES (800) 344 1847

**Fuji Photo Film USA, Inc.**

555 Taxter Rd  
Elmsford, NY 10523  
(800) 743 3854 *Hotline*

**Hallmark Refining Corporation**

PO Box 1446  
1743 Cedardale Road  
Mt. Vernon, WA 98273  
(800) 255-1895

**Kodak**

Environmental Services  
1100 Ridgeway Ave  
Rochester, NY 14652-6255  
(716) 477-3194 *Hotline*  
(800) 242-2424 ext.724 *Recycling*

**Konica USA Inc.**

440 Sylvan Ave.  
Englewood Cliffs, NJ 07632  
(800) 285 6422

**LMD Resources Puyallup**

328 5th St. SE  
Puyallup, WA 98372  
(206) 845-5123

**M2 Refining**

PO Box 1049  
Woodinville, WA 98072  
(206) 483-9199

**Pacific X-Ray Corporation**

549 Industry Drive (sales office)  
Seattle, WA 98188  
(206) 575-0202

**Polaroid Corporation**

575-8 Technology Square  
Cambridge, MA 02139  
(617) 386-3548

**Polychrome Corporation**

631 Central Ave  
Carlstadt, NJ 07072  
(201) 531- 0032

**INKS:** Graphic arts manufacturers and suppliers.

**Calcom Inc.**

230 8th Ave. N.  
Seattle, WA 98109  
(800) 562-9401, or  
1822 NE Grand Ave.  
Portland, OR 97212  
(800) 452-7432

**Denco Sales Co.**

668 S. Lane St.  
Seattle, WA 98104  
(800) 625-1138

**EW Dorn Co.**

7831 159th Pl. NE  
Redmond, WA 98052  
(206) 883-2674

**QCM**

930 S. Central Ave.  
Kent, WA 98032  
(800) 321-0170

**Midwest Sign, Screen Printing  
and Supply Co.**

401 Evans Black Drive  
Seattle, WA 98188-2192  
(800) 426-4938

**NW Sign Supply**

5300 4th Ave. S.  
Seattle, WA 98108  
(800) 654-0194

**Seattle Screen Print Supply**

3320 1/2 W. Government Way  
Seattle, WA 98199-1319  
(206) 281-1996

**Sericol Inc.**

6912 S. 220th  
Kent, WA 98032  
(206) 872-4672

**SOLVENTS:** (suppliers, recycling, recycling equipment or treatment and disposal of industrial solvents. Sales and leasing of equipment for removal of grease from tools and machinery)

**Advanced Environmental  
Solutions Inc**

7118 S. 220th  
Kent, WA 98032  
(800) 275-3549

**Bruln Corp**

12506 SE 47th PL  
Bellevue, WA 98006  
(206) 747-1842

**Burlington Environmental**

PO Box 229  
Washougal, WA 98671  
(800) 547-2436

**Chem-Safe Sevices, Inc.**

PO Box 616  
Kittias, WA 98934  
(509) 968-3973

**Chemical Waste Management N.W.**  
1120 Andover Park E  
Tukwilla, WA 98188  
(206) 575 2250

**ChemSearch**  
18000 Pacific HWY S, Suite 1102  
Seattle, WA 98188  
(800) 548-7836

**Envirotech Systems Inc.**  
18820 Aurora Ave. N, Suite 201  
Seattle, Wa 98155  
(800) 922-9395

**Inland Technology Inc.**  
2612 Pacific HWY E #C  
Tacoma, WA 98424  
(800) 552-3100

**Intercontinental Chemical Corp.**  
11038 12th Ave. N.E.  
Seattle, WA 98125  
(206) 364-5310

**Northwest Enviroservice**  
PO Box 24443  
1700 Airport Way S.  
Seattle, WA 98124  
(800) 441-1090

**Northwest ENTEK, Inc.**  
PO Box 6267  
Spokane, WA 99207  
509 489-9176

**Roar Tech, Inc.**  
N. 522 Fiske St., Suite A  
Spokane, WA 99202  
(509) 535-6757

**Safety Kleen Corp**  
3210 C ST NE Unit G  
Auburn, WA 98002  
(206) 939 2022, or  
E. 9516 Montgomery  
Spokane, WA 99206  
(800) 669-5902

**Sol-Pro, Inc.**  
3401 Lincoln Ave.  
Tacoma, WA 98421  
(206) 627-4822

**Van Waters and Rogers Inc.**  
PO Box 34325  
Seattle, WA 98124-1325  
(206) 889-3400, or  
E. 4515 Wisconsin  
Spokane, WA 99220  
(509) 534-0405

**WASTE - Waste Management Technology Inc.**  
PO Box 3164 (*mailing address*)  
Kirkland, WA 98083  
1217 S Angelo St (*location*)  
Seattle, WA  
(206) 763-1879

**Western Pacific Systems, Inc.**  
PO Box 17555  
Seattle, WA 98107  
(206) 784-8691

**LABORATORIES & TESTING SERVICES:** See also "Laboratories-Analytical" and "Laboratories-Testing" in the yellow pages of your phone book.

**Am Test Laboratories**  
14603 NE 87th St  
Redmond, WA 98502  
(800) CHEMLAB

**Analytical & Testing Services**  
*(Division of Weyerhaeuser)*  
32901 Weyerhaeuser Way South  
Federal Way, WA 98003  
(206) 924-6148

**Analytical Resources, Inc.**  
333 Ninth Ave N  
Seattle, WA 98109  
(206) 621-6490

**Analytical Services, Inc.**  
12277 134th Court NE, Suite 200  
Seattle, WA 98134  
(206)820-4551

**Aquatic Research, Inc.**  
3927 Aurora Ave N  
Seattle, WA 98103  
(206) 632-2715

**B & H Consultants, Inc.**  
PO Box 82662  
Kenmore, WA 98028  
(206) 488-9831

**Bioassay Testing Services**  
8455 S 19th  
Tacoma, WA 98465  
(206) 565-5492

**Cascade Analytical, Inc.**  
3019 G.S. Center Road  
Wenatchee, WA 98801  
(509) 662-1888

**Columbia Analytical Services**  
PO Box 479  
Kelso, WA 98626  
(360) 577-7222

**Envirotech Systems Inc.**  
18820 Aurora Ave. N, Suite 201  
Seattle, WA 98155  
(800) 922-9395

**Evergreen Analytical Services, Inc.**  
12831 NE 21st Place  
Bellevue, WA 98005  
(206) 882-2672

**Federal Testing**  
291/2 Dravus St.  
Seattle, WA 98109  
(206) 283-4202

**Friedman & Bruya**  
3008-B 16th Ave West  
Seattle, WA 98119  
(206) 285-8282

**Groundwater Technology, Inc.**  
19033 W. Valley Highway,  
Suite D104  
Kent, WA 98032  
(206) 285-8282

**Hart Crowser, Inc.**  
1910 Fairview Ave E  
Seattle, WA 98102  
(206) 324-9530

**Hazcon, Inc.**  
4643 E Marginal Way S #215  
Seattle, WA 98134  
(206) 763-7364

**La Roche Enterprises**  
15210 13th Ave S  
Spanaway, WA 98387  
(206) 531-7117

**Lauks Testing Laboratories**

940 S Harney  
Seattle, WA 98108  
(206) 767-5060

**Med-Tox NW**

19032 66th Ave S C-105  
Kent, WA 98032  
(206) 656 2920

**North Creek Analytical**

18939 120th Ave. NE, Suite 101  
Bothell, WA 98011  
(206) 481-9200, or  
E. 11115 Montgomery, Suite "B"  
Spokane, WA 99206  
(509) 924-9200

**Northwest Laboratories of  
Seattle, Inc.**

1530 First Ave S  
Seattle, WA 98134  
(206) 622-0680

**Olympic Scientific, Inc.**

975 John Street #100  
Seattle, WA 98109  
(206) 623-5998

**Olympus Environmental, Inc.**

2002 W Valley Highway, Suite 600  
Auburn, WA 98002  
(206) 735-6625

**OMS Laboratories**

911 Western Ave, Suite 421  
Seattle, WA 98104-1031  
(206) 622-8353

**On-Site Environmental, Inc.**

2859 152nd Ave NE  
Redmond, WA 98502  
(206) 883-3881

**Orion Environmental  
Laboratories**

5007 Pacific Highway E, Suite C-6  
Fife, WA 98424  
(206) 922-9008

**Pacific Northwest  
Environmental Lab, Inc.**

6645 185th Ave NE, Suite 100  
Redmond, WA 98502  
(206) 885-0083

**Pacific Testing Laboratories, Inc.**

3257 16th Ave W  
Seattle, WA 98119-1706  
(206) 282-0666

**Prezant Associates, Inc.**

711 6th Ave N, Suite 200  
Seattle, WA 98109  
(206) 281-8858

**Roar Tech, Inc.**

N. 522 Fiske St., Suite A  
Spokane, WA 99202  
(509) 535-6757

**Safety Kleen Corp**

3210 C ST NE Unit G  
Auburn, WA 98002  
(206) 939-2022, or  
E. 9516 Montgomery  
Spokane, WA 99206  
(800) 669-5902

**Sound Analytical Services**

4813 Pacific Highway E  
Tacoma, WA 98424  
(206) 922-2310

**Spectra Laboratories, Inc.**

2221 Ross Way  
Tacoma, WA 98421  
(206) 272-4850

**Treclen Laboratories**

N 1403 Green St, #4  
Spokane, WA 99202

**Silver Recovery:** Waste & Waste  
Water Treatment, Fixer, film and  
silver recovery equipment.

**Advanced Water Systems, Inc.**

14207 NE 193rd Place  
Woodinville, WA 98072  
(206) 485-0670

**AgCo Metalex**

3701 S. Road  
Mukilteo, WA 98275  
(206) 743-7886

**Burlington Environmental**

*(Sales Office)*  
PO Box 229  
Washougal, WA 98671  
(800) 547-2436

**Byers Industries Inc.**

6800 NE 59th Place  
Portland, OR 97218  
(800) 547-9670

**Chemical Waste Management N.W.**

1120 Andover Park E  
Tukwilla, WA 98188  
(206) 575 2250

**CMX Corporation**

6601 S. Glacier St.  
Tukwilla, WA 98188-4718  
(800) 869-7191

**Culligan Soft Water  
Service Comapany**

East 25 Third Avenue  
Spokane, WA 99202  
(509) 455-8050

**South Sound Culligan**

3635 South Lawrence, Suite J  
Tacoma, Wa 98409  
(206) 473-4640

**Drew Products**

1717 4th Street  
Berkeley, CA 94710  
(800) 624-4506

**Enviros**

210 Marina Park Bldg.  
25 Central Way  
Kirkland, WA 98033-6156  
(206) 827-5525

**Envirotech Systems Inc.**

18820 Aurora Ave. N, Suite 201  
Seattle, Wa 98155  
(800) 922-9395

**Hallmark Refining Corporation**

PO Box 1446  
1743 Cedardale Road  
Mt. Vernon, WA 98273  
(800) 255-1895

**Image Control Systems Inc.**

PO Box 9305  
305 9th Ave. N.  
Seattle, WA 98109-0305  
(800) 300-2645

**Litho Development & Research  
(LDR)**  
510 Strander Blvd.  
Seattle, Wa 98188  
(206) 242-9911

**LMD Resources Puyallup**  
328 5th St. SE  
Puyallup, WA 98372  
(206) 845 5123

**M2 Refining**  
PO Box 1049  
Woodinville, WA 98072  
(206) 483-9199

**Momentum Graphics**  
355 Treck Drive  
Seattle, WA 98188  
(206) 575-9494

**Northwest Enviroservice**  
PO Box 24443  
1700 Airport Way S.  
Seattle, WA 98124  
(800) 441-1090

**Pacific X-Ray Corporation**  
549 Industry Drive (*sales office*)  
Seattle, WA 98188  
(206) 575-0202

**Overlake Photo Express**  
1423-130th N.E.  
Bellevue, WA 98005  
(206) 454-5050

**Pacific X-Ray**  
549 Industry Drive  
Seattle, WA 98188  
(206) 575-0202

**Prolab**  
123 N.W. 36th St.  
Seattle, WA 98107  
(206) 547-5447

**Puget Sound Environmental, Inc**  
13823 Sandy Point East  
Gig Harbor, WA 98329  
(206) 549-6305

**Safety Kleen Corp**  
3210 C ST NE Unit G  
Auburn, WA 98002  
(206) 939-2022, or  
E. 9516 Montgomery  
Spokane, WA 99206  
(800) 669-5902

**Seattle Film Works**  
1260 16th Ave W  
Seattle, WA 98119  
(206) 281-1390

**Smith Brothers**  
16077 SE 98th Ave.  
Clackamas, OR 97015  
(503) 655-2065

**.999 Incorp.**  
1901 N 4th  
Pasco, WA 99301  
(206) 547-5711

**Standard Medical Imaging, Inc**  
W. 1915 5th Ave.  
Spokane, WA 99204  
(509) 838-8335

**A**s 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 accomodation needs, please contact the Hazardous Waste and Toxics Reduction Program at (360) 407-6743 (Voice) or (360) 407-6006 (TDD).

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**

**Kodak**

**Lewis County Public Health Department**

**Local Hazardous Waste Management Program in King  
County**

**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**