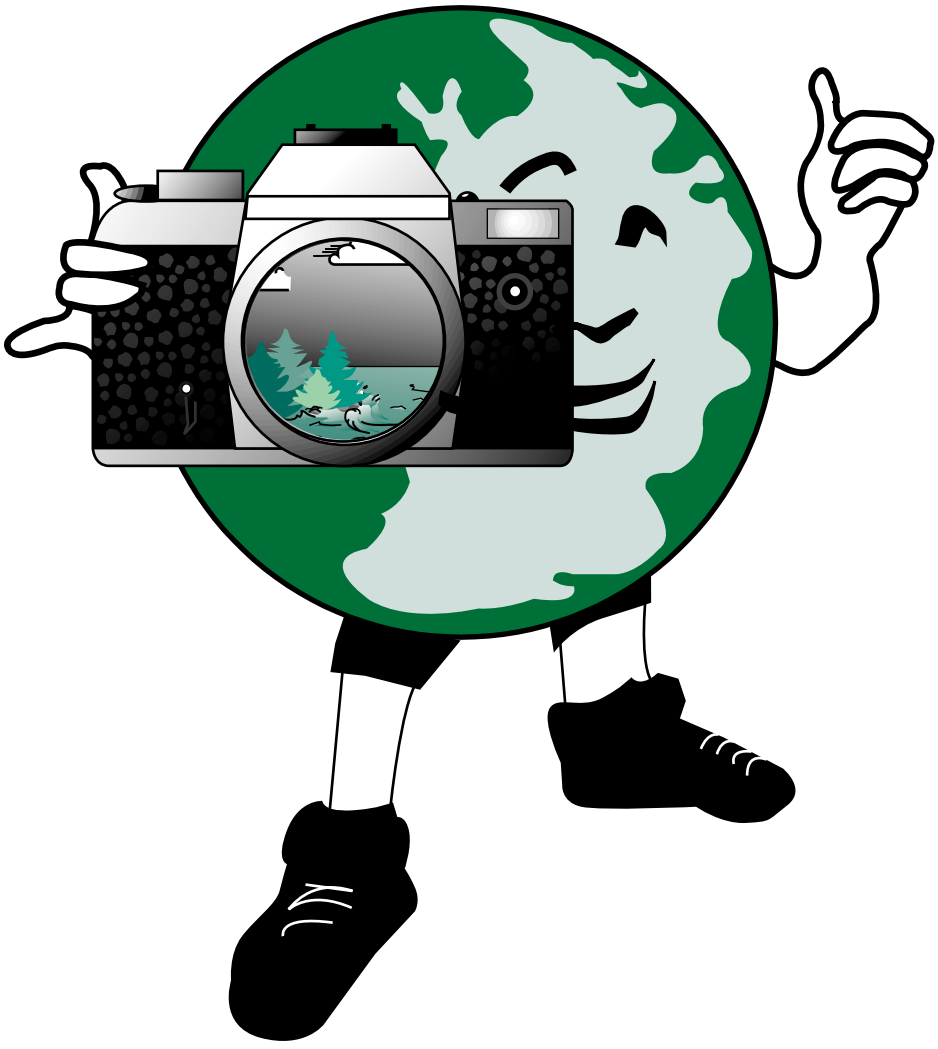
Photo Processor Environmental Certification Workbook



For use with DEP's Environmental Results Program

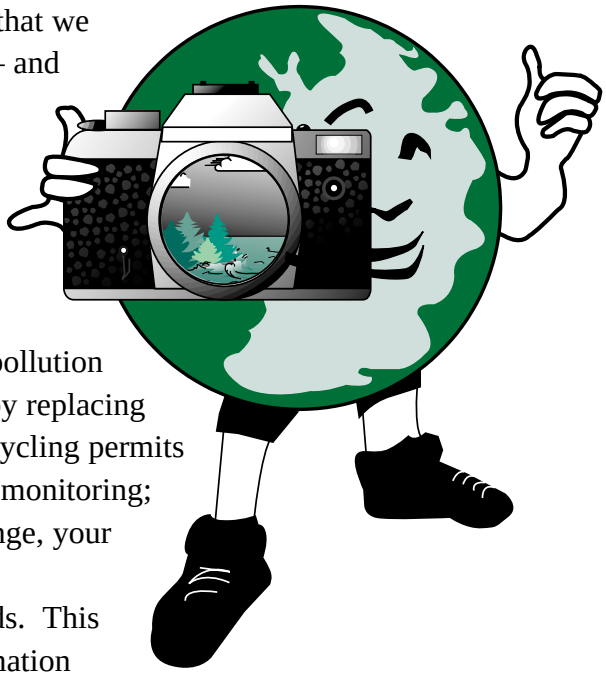
Massachusetts Department of Environmental Protection

Environmental Results Program

The Environmental Results Program

We at the Massachusetts Department of Environmental Protection have fundamentally redesigned environmental regulation to be less costly and more effective. We have replaced the 25 year-old system of prescriptive case-by-case permits with annual comprehensive compliance certifications, industry wide performance standards and streamlined regulation.

This new, common sense approach to regulation is the Massachusetts Environmental Results Program, a new regulatory system that we believe holds great promise for making it easier to meet — and exceed — Massachusetts' environmental standards. This new approach gives your business the flexibility and information you need to do the job, while improving accountability to the public for environmental performance.



The Environmental Results Program streamlines existing pollution control requirements for your photo processing company by replacing individual water pollution control and hazardous waste recycling permits with a minimum statewide silver discharge limit of 2ppm; monitoring; and simplified operating and maintenance rules. In exchange, your photo processing company will have to submit an annual certification of its compliance with environmental standards. This workbook provides you and your company with the information you need to understand and meet your environmental obligations.

Promise of ERP Performance

Photo processors are part of the Massachusetts Department of Environmental Protection's (DEP) Environmental Results Program (ERP) designed to improve environmental protection at less cost to both government and business. ERP eliminates the sewer discharge permit and the Class A hazardous waste recycling permit for the approximately 500 Massachusetts photo processors by replacing them with a performance-based compliance certification. The certification is an annual requirement as explained in this workbook. (If you have questions contact the DEP Infoline 338-2255, or outside 617 area code: 1-800-462-0444).

Table of Contents

Note: Citation referenced in parenthesis indicates the compliance certification form question covered by the section.

Legend of Icons

The icons below are designed to introduce specific types of information as defined next to each icon.

 = Rule or Regulation required for compliance certification.

P^2 = Pollution Prevention.

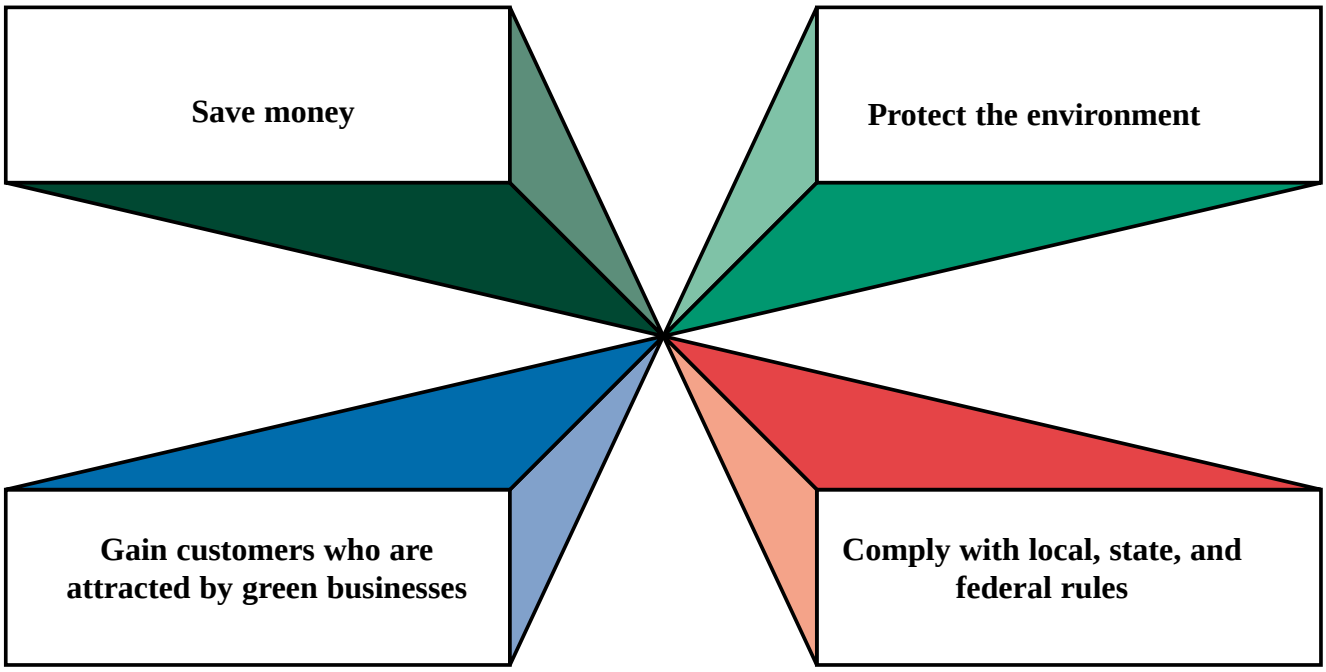
May be part of a rule or regulation, helps prevent pollution and makes good business sense.

 = Recycling tip

Photo Processors

1.0 GETTING STARTED

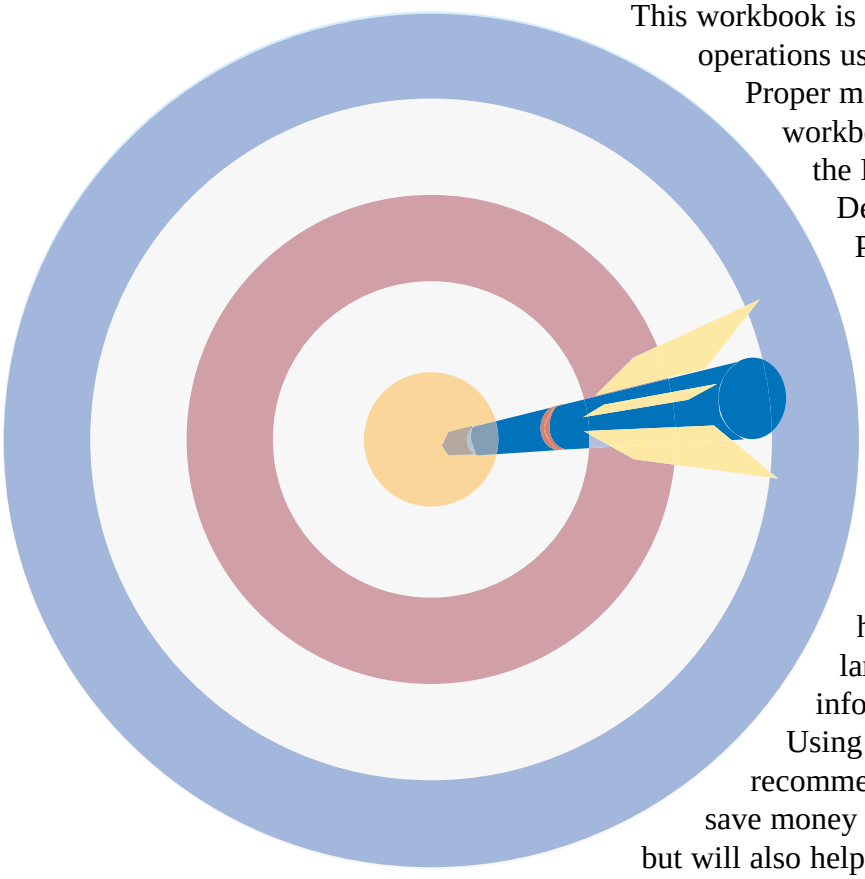
Photo processing produces pollutants which impair water quality. Specifically, silver, which is the primary pollutant of concern, is toxic to aquatic organisms. Proper management of your photo processing wastes, especially silver waste will ensure that you:



This workbook will help you fill out your annual compliance certification form. The certification form must be completed and submitted to the MADEP annually with the appropriate fee. If you do not have a certification form, call the MADEP to get one (338-2255 or outside 617 area code: 1-800-462-0444) You can also find out how to obtain a copy of the regulations referred to in the workbook at the same telephone number.

If you need more information than provided in this workbook, see contacts in Appendix I.

Getting Started

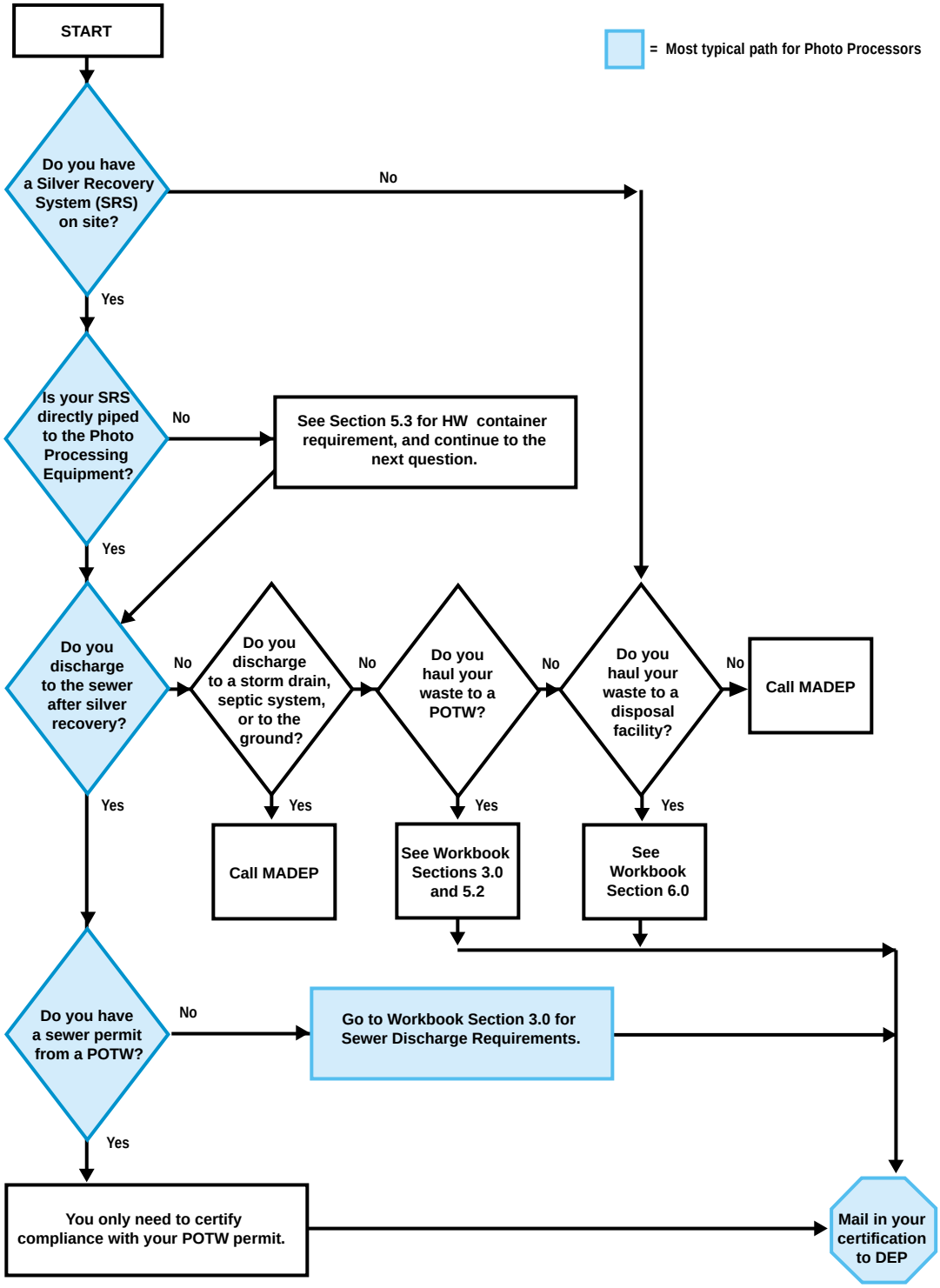


This workbook is targeted to small photo processing operations using automated processing equipment. Proper management, as described in this workbook, are either rules enforceable by the Massachusetts Department of Environmental Protection or are suggestions to lower your operating costs, including potential liabilities, by improved management and waste reduction techniques.

It is your photo lab. Success in preventing pollution and reducing wastes will depend on your commitment towards making them happen. Whether your laboratory is large or small, everyone must be informed on what they can/must do. Using pollution prevention techniques recommended in this workbook will not only save money and help you remain in compliance, but will also help the environment.

The following flow diagrams will serve as your road map to finding the information and requirements applicable to your facility. As user friendly as we have attempted to make it, there may be times when you may have questions and need guidance. Please call the appropriate regional DEP office for assistance (contact the DEP Infoline 338-2255 or outside 617 area code: 1-800-462-0444) for more information.

Road Map to Certification Compliance*



** Assuming that you do not discharge industrial wastewater to a septic system*

2.0 WASTES OF CONCERN

This section reviews the nature of photo processor wastes and provides some tips on preventing waste before it is created.

2.1 Waste Generation Factors

The amount of silver-bearing wastewater you produce will largely depend on the following factors:

- Number of film rolls developed and printed
- Type of film processing used

2.2 Waste Types

Most automated photo processing equipment produce silver-bearing wastes. Newer automated photo processing machines may have very efficient systems which conserve water and produce a fraction of the wastewater volumes produced by photo processing machines typically in use. While the wastewater volumes from these newer systems may be very small, they may contain higher concentrations of significant pollutants. See Appendix E for some helpful hints.

Table 3.1: Identify Wastes of Concern

Waste Stream	Concern	Suggested Solution
Developer	Improper Disposal	Recycle If Possible
C-41 Bleach	Silver Content	Recycle
Fixer, Bleach Fixer	Silver Content	Recycle
Washless Stabilizer	Silver Content	Recycle
Waste Water	Silver Content	Recycle
Paper Cores	Solid Waste	Recycle
Plastic Film Containers	Solid Waste	Recycle
Scrap Film and Paper	Solid Waste	Recycle
Single Use Cameras	Solid Waste	Recycle
Steel Film Magazines	Solid Waste	Recycle
Photographic Solution Filters	Solid Waste	Rinse Before Disposal

2.3 Inventory Control

P^2

Managing the chemical inventory so that the oldest stock is used first will reduce the chance of shelf life expiration and reduce waste. Accurate inventories are necessary to allow improving your purchasing practices so you buy only the amount you need. In addition, monitoring replenishment rates, processing temperature, and chemical mix procedures can result in significant savings in materials. Inventory control is only one way to prevent pollution. The office of Technical Assistance can give your facility - specific advice on other ways to save money and protect the environment. (See Appendix I for the telephone number)

Wastes of Concern (cont'd)

Requirements/Rules or Regulations

- Never pour processing chemical wastes or silver bearing wastes down the drain if you are using a septic system. [2.3a][1]
- Never pour processing chemicals or untreated silver bearing wastes down the sewer. [2.3b]

Pollution Prevention and Recycling

- Post signs near all sinks and drains in the work area indicating that pouring untreated silver bearing wastes or cleaners to the sewers is prohibited.
- Spill control is an easily overlooked way to prevent pollution. Always have someone on site with spill control training. A spill control plan helps minimize losses from spills (see Appendix K for spill reporting guidance).
- Consider using low replenishment photo processing chemicals for both film and paper. This can materially reduce your chemical use.
- Never pour developer into a cartridge silver recovery system.
- Include washless stabilizer in your silver recovery management plan.
- Consider whether on-site or off-site silver recovery is to your advantage.

- Waste definitions and some more helpful hints are listed in Appendix E.
- Recycle your solid wastes. Use available vendor recycling programs to reduce your waste volume. If you use a vendor without a recycling program, encourage them to develop one or switch to another vendor with a recycling program.
- For a more comprehensive list of pollution prevention measures, see workbook Section 7.0.
- Contact the Massachusetts Office of Technical Assistance for facility - specific advice (617-727-3260).

1 The numbers in the square brackets are requirement reference numbers for use in Return to Compliance Forms.

3.0 PHOTO PROCESSING WASTEWATER SEWER DISCHARGE REQUIREMENTS

(This section contains guidance for questions 9 and 10 on the compliance certification form.)

This section describes discharge; sampling; operation and maintenance; and reporting and record keeping requirements for photo processors using sewers, and shipping to treatment plants (POTWs).

You cannot discharge photo processing wastewater to a sewer or haul it to a POTW without treating the wastewater to recover the silver. The following section describes the wastewater management requirements to consistently achieve the two (2) parts per million (ppm) silver limit.

The State has a limit of 2 ppm. If the local POTW requires photo processors to have an individual permit with a discharge limit less than 2 ppm for silver, then photo processors must comply with the more stringent limit. If the local POTW has silver discharge limits of higher than 2 ppm, then photo processors must comply with the more stringent State 2 ppm limit. Photo processors with existing State - issued industrial wastewater permits need **not** certify until that permit has expired.

In addition to wastewater requirements, there are hazardous waste management requirements for some photo processors (refer to sections 5.0 and 6.0). If you have spills to the environment you must report them. See Appendix K for guidance.

Photo processors must also comply with any other requirements imposed by their local POTW.

3.1 Compliance with Locally-Issued Discharge Permits

(This section contains guidance for question 4 on the compliance certification form.)

Photo processors with locally-issued sewer discharge permits with discharge limits no greater than two (2) parts per million (ppm) need only certify compliance with their local permit conditions.

Photo processors with locally issued sewer discharge permits higher than 2 ppm, must comply with requirements contained in sections 3.2 through 3.6. [3.1a]

Photo processors discharging photoprocessing waste into the Massachusetts Water Resource Authority (MWRA) sewer service area don't have to submit an ERP Compliance Certification Form to DEP. However; they must obtain an MWRA group permit (G1 permit). Photo processors located in the MWRA which haul or ship photoprocessing waste (not including silver solution in the cartridge system or column from the small scale precipitation system) to a Treatment, Storage, Disposal Facility (TSDF) must continue to certify to DEP. [3.1b]

While photo processors with non-MWRA permits must comply with monitoring conditions in their permits, they must submit discharge monitoring information requested in the MADEP Certification Form as well. See Appendix J for list of MWRA Communities.

3.2 Prohibition on any silver discharge greater than two parts per million

This simple provision requires any photo processor discharging to a sewer or hauling to a POTW to reduce the silver content of their photographic wastewater to two (2) parts per million or less.

Common silver recovery systems include: two cartridges in series, electrolytic followed by one or two cartridges, and small scale precipitation.

3.3 General and Specific Prohibitions

All photo processors discharging to sewers must comply with general and specific prohibitions.

General Prohibitions [3.3a][1]:

Do not introduce pollutants into the sewer that will cause problems to treatment works operations, sludge disposal, or to the health and safety of treatment plant workers.

Specific Prohibitions [3.3b]:

Do not discharge pollutants into the sewer that can cause:
- Fire or explosion hazard
- Corrosive structural damage (no pH less than 5.0 standard units)
- Obstruction of flow in the sewer system such as solids or viscous pollutants,
- Inhibition of biological activity such as heated waste exceeding 40ºC (104ºF)

3.4 Operation and Maintenance of Silver Recovery Systems

(This section contains guidance for question 5, 11, 12, and 15 on the compliance certification form.)

Operation and Maintenance Requirements [3.4a]:

If you operate any silver recovery unit or system (i.e., cartridge, electrolytic, or small scale precipitation) on your premises, you are required to maintain the unit in accordance with the manufacturer's or vendor's instructions to meet the two (2) parts per million silver limit. [3.4a]

Training staff is critical to successfully operating and maintaining silver recovery system. Appendix A contains a suggested training log to ensure your staff stay current. [3.4b]

1 *The numbers in the square brackets are requirement reference numbers for use in Return to Compliance Forms.*

3.4 Operation and Maintenance of Silver Recovery Systems (cont'd)

Certified Operator Requirements [3.4b][1]

Most photo processors do **not** need certified operators for their silver recovery systems, including cartridge-based and small scale precipitation systems. All others call the Board of Certification of Wastewater Treatment Facilities (telephone number is in Appendix I).

3.5 Sampling and Analysis

(This section contains guidance for question 15 on the compliance certification form.)

Sampling is required to show compliance with the 2 ppm standard. Sampling frequency depends on the type of silver recovery system you use in your facility. DEP is aware of, and has established sampling requirements for two recovery systems that are now in use. These two systems and the sampling required for each is specified below. While DEP has established more stringent requirements for any other silver recovery system that may be in use or developed for future use, DEP does not wish to discourage the development and use of innovative technologies that can provide facility operators with increased reliability, decreased maintenance needs, or lower costs and simultaneously protect or improve the environment. For this reason, DEP seeks information on all new technologies under development or in commercial use. DEP will review information received as soon as practicable and will update sampling requirements as necessary to define sampling requirements that are appropriate for all commercially viable technologies.

- One annual sample is required if you are using a cartridge system, in series or combined with an electrolytic silver recovery system or a small-scale precipitation system. Samples must be taken within one month before the cartridge is replaced. [3.5a]
- Using any other silver recovery system requires <u>monthly</u> sampling and analysis. [3.5a]

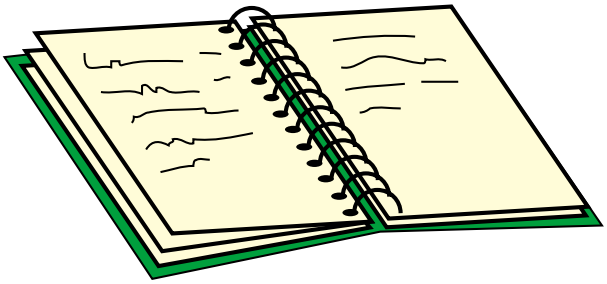
*If you find the results of your analysis out of compliance (that is, over the two (2) parts per million limit), then you must provide the DEP with information on the corrective action taken and take another sample to verify compliance. If you are **out** of compliance with the 2ppm discharge limit at the time you certify, you must provide the DEP with information on the corrective action taken and on a Return to Compliance Form submitted with your annual compliance certification. For basic sampling procedures, see Appendix D. [3.5b].*

1 The numbers in the square brackets are requirement reference numbers for use in Return to Compliance Forms.

3.6 Reporting and Record Keeping

(This section contains guidance for question 15 on the compliance certification form.)

- All non-MWRA photo processors must submit their annual certification of compliance to the DEP annually. [3.6a][1]
- All photo processors discharging to sewers must report accidental discharges to the local sewage treatment authority by telephone immediately. [3.6b]
- All non-MWRA photo processors must retain records, such as monitoring log and certification, for a minimum of three years. [3.6c]
- Photo processors with locally - issued permits (Non-MWRA) can substitute sampling data gathered for their local permit to satisfy their certification requirements, as long as the requirements are interchangeable. You must annually file a compliance certification with the DEP. [3.6d]



- One element in the certification asks for the amount of silver-bearing waste processed through your silver recovery system. Appendix L contains a worksheet to help you identify all silver-bearing wastes and calculate your annual volume by adding monthly totals. [3.6e]
- All photo processors who ship hazardous waste must maintain records sufficient to demonstrate that all hazardous waste is shipped off-site, including, but not limited to, your manifests, receipts, copies of notification reports, transporter name and address, dates of shipment, amount shipped. These records must be kept on-site for at least three (3) years. [3.6f]

1 The numbers in the square brackets are requirement reference numbers for use in Return to Compliance Forms.

Surface Water and Groundwater Discharge Requirements

4.0 SURFACE WATER AND GROUNDWATER DISCHARGE REQUIREMENTS

(This section contains guidance for questions 1 & 2 on the compliance certification form.)

How do I know where my wastewater goes? The easiest way to find out whether you are sewered is to check with your department of public works or local board of health. If you are renting your space, check with the landlord. If you are not in a sewered area, then you are discharging to either a septic tank, cesspool, or leachfield.

In addition to checking these sources, you should visually trace your drain pipe to see if it empties into a street drain. That street drain probably leads to a stream, river, pond, or lake. If your drain pipe merely leads outside your building, then your wastewater is likely to be simply going into the ground.

Generally, wastewater from a photo processing facility is discharged to Publicly Owned Treatment Works (POTWs). Any photo processing facility that discharges directly into surface waters (e.g., pond, stream, or storm drains) must obtain a National Pollutant Discharge Elimation System (NPDES) Permit from EPA and DEP. [4.0a] [1]

Discharge of any silver bearing waste to a septic system is **prohibited** because of the high potential for contaminating a drinking water aquifer. If you discharge your industrial wastewater directly to the ground, you **must** obtain a groundwater permit from the DEP. [4.0b]

YOU MUST CALL THE DEP AND EPA IF YOU DISCHARGE TO EITHER SURFACE WATER OR GROUNDWATER

Obtaining an NPDES or groundwater discharge permit is usually beyond most photo processor's financial means. Two other options available to you are 1) recover silver, store, and ship to a POTW (see section 3.0 and 5.0 for requirement); or 2) store and ship the wastewater as hazardous waste (see section 6.0).

1 The numbers in the square brackets are requirement reference numbers for use in Return to Compliance Forms.

5.0 CONTAINER MANAGEMENT FOR PHOTO PROCESSORS

Container requirements for photo processors depend on whether your silver recovery is directly piped to your photo processing equipment. Directly piped simply means that there is a pipe carrying waste from the photo processing to the silver recovery system.

If your system is directly piped, and you store wastewater in a container, then adhere to the requirements in section 5.2. If you store wastewater form a directly piped silver recovery system, in a tank, see section 5.4. If your system is not directly piped or you do not have silver recovery, then your wastewater is considered hazardous waste and section 5.3 applies. Also, if your system is not directly piped, then you must place your silver-bearing wasted immediately into your silver recovery system to avoid being subject to hazardous waste generator requirements.

Container Management (cont'd)

5.1 Identifying Your Hazardous Waste

Hazardous waste identification is usually perceived as difficult to explain because of all the different rules. Determinations for photo processor wastes, however, are relatively simple for **most** operations. The primary waste of concern is silver. (You may have other wastes which are classified as hazardous, such as contaminated, off-specification, or out-of-date photographic chemicals. Material Safety Data Sheets, required for all chemicals used in photo processing, are great sources of hazard information. If you are unclear about such wastes, call the MADEP at 1-800-462-0444 for the answers.)

In general, whether your silver wastes are hazardous or not depends on if you recover silver and where you dispose of your wastewater outflow. You are responsible for determining whether your waste is hazardous or not . The table below presents the different possibilities and will help you determine whether you generate hazardous waste. Most photo processors have silver recovery and discharge to a sewer and consequently do not generate hazardous waste.

<table>
<tr><th>Do you have silver recovery on-site?</th><th>Where do you dispose of the wastewater outflow from your silver recovery system?</th><th>Is the resultant waste hazardous?</th></tr>
<tr><td rowspan="7">Yes</td><td>To a sewer</td><td>No
(Remember, you have to comply with the 2 ppm silver limit.)</td></tr>
<tr><td>To a septic system, which is illegal</td><td rowspan="6">Maybe: If less than 5 parts per million of silver, then non-hazardous; if 5 parts per million or more, it is hazardous. It is your responsibility to know whether your wastewater is hazardous or not. If it is, then you must comply with applicable requirements found in 310 CMR 30.00.

Common silver recovery systems which regularly remove silver to less than 5 parts per million include:
• 2 Cartridges in series,
• Electrolytic coupled with a cartridge, and
• Small scale precipitation

Other silver recovery systems are capable of reliably removing silver to less than 5 parts per million but are not as well known.</td></tr>
<tr><td>To the groundwater, which is legal only with a permit</td></tr>
<tr><td>To surface water via storm drain, which is legal only with a permit</td></tr>
<tr><td>Hauled off-site to a publicly owned treatment works (POTWs)</td></tr>
<tr><td>Hauled off-site to a silver recovery facility</td></tr>
<tr><td>Hauled off-site for disposal</td></tr>
<tr><td>No</td><td>Not Applicable (Without silver recovery on-site, the waste must be hauled to a silver recovery or disposal facility)</td><td>Yes</td></tr>
</table>

5.2 Non-hazardous Industrial Wastewater Containers

(This section contains guidance for question 14 on the compliance certification form.)

Silver-bearing wastes that have been treated through a well maintained silver recovery system to less than 5 ppm of silver are classified as non-hazardous industrial wastewater. If you haul this waste to a sewage treatment plant, you must comply with the requirements in section 3.0 of this workbook, in addition to those listed below.

The following requirements apply to you if you choose to accumulate this waste and haul off-site for disposal:

- Use containers that are in good condition; [5.2a][1]
- Make sure containers are placed on a surface that does not have any cracks;[5.2b]
- Provide a spill containment system if containers are stored outside the building; (see Appendix H) [5.2c]
- Label containers with the words “Non-Hazardous Waste”; [5.2d]
- Use containers which comply with Department of Transportation (DOT) standards (call D.O.T.: 1-617-494-2770). [5.2e]

5.3 Hazardous Industrial Wastewater Containers

(This section contains guidance for questions 6 and 16 on the compliance certification form.)

Silver-bearing solutions placed in containers for transfer into the silver recovery unit are considered hazardous and must be managed appropriately to avoid creating spill liabilities. This occurs when your silver recovery system is not directly piped to your photo processing operation. In such situations, you must have containers which comply with the following basic requirements:

- Follow all of the above non-hazardous industrial wastewater requirements, except labeling requirements; [5.3a]
- Keep containers closed except when adding wastes; [5.3b]
- Segregate hazardous and non-hazardous wastes into separate containers; [5.3c]
- Post sign with the words “HAZARDOUS WASTE” in the storage areas; [5.3d]
- Mark your storage areas by a visible line or tape or by fence and separate your wastes; [5.3e]
- Restrict general public access into storage area with, for example, a fence; and [5.3f]
- Label containers with the words “HAZARDOUS WASTE”. [5.3g]

1 The numbers in the square brackets are requirement reference numbers for use in Return to Compliance Forms.

5.4 In-ground and Above-ground Tanks Requirements

(This section contains guidance for question 16 on the compliance certification form.)

Tanks, as opposed to containers, have their own set of requirements. Tanks for photo processor wastewater must have:

- Containment structure with 110% capacity of the total volume if they are above-ground; [5.4h]
- Bell and light alarm in a conspicuous location for remotely/automatically filled tanks. The alarm must activate when the level of wastewater reaches seventy-five (75) percent capacity of the tank and the alarm signal must be transmitted to a staffed location [5.4a][1];
- Visual or sight glass type of level measurement for manually filled tanks [5.4b];
- Year round access for pumping out [5.4c];
- Odor control must be provided as necessary [5.4d].

Additional requirements for **in-ground** tanks:

- All in-ground tanks must have an at least twenty-four-(24)-inch-in-diameter cast iron frame and cover at finished grade and constructed so as to eliminate entrance of surface waters. Permanent suction piping must also be provided [5.4e].
- All in-ground tanks must be waterproof and watertight, should not be located below the water table without an integrity assessment certified by a Massachusetts registered professional engineer that addresses leaks, cracks, corrosion and erosion. Where the tank system is placed within ten feet of a saturated zone, the tank must be anchored to prevent flotation and dislodgement [5.4f].
- The construction and installation of all tanks subject to vehicular loading must be designed to withstand H-20 loading and ensure that the tank foundations will maintain the load of a full tank. [5.4g].

1 The numbers in the square brackets are requirement reference numbers for use in Return to Compliance Forms.

6.0 OFF-SITE WASTE MANAGEMENT

(This section contains guidance for questions 14 and 16 on the compliance certification form.)

Off-site waste management is usually selected to avoid capital, operational, and maintenance costs associated with equipment, including analytical monitoring. It is also an attractive alternative for photo processors without sufficient space to accommodate silver recovery. The disadvantages of off-site silver recovery, however, include trusting your hazardous waste to a third party. The generator is responsible for the waste from "cradle to grave."

If you do select off-site silver recovery, carefully select a waste management company or contact your photographic supplier for possible leads.

The following describes hazardous waste requirements for off-site waste management.

6.1 Waste Generator Status:

Recording the amount of waste silver rich solution (solution containing > 5ppm of silver) that was generated every month, allows you to identify your waste and generator status including the time and volume limits which apply to you. Most smaller photo processors will be classified as very small quantity generators (VSQG), unless they do not have silver recovery systems. All photo processors with directly piped silver recovery are classified as VSQG. **See Appendix F for guidance**. [6.1a]

6.2 Generator Identification Number:

(This section contains guidance for question 18 on the compliance certification form.)

All photo processors shipping hazardous waste must use a generator identification number. If you are a small or large quantity generator (see Appendix F) then obtain an EPA identification number or a state notification number by calling DEP at 617/338-2255 or 1-800-462-0444. If you are a very small quantity generator, then use your telephone number, as of September 1, 1997, with an "MV" in front as your identification number as follows: [6.2a]
MV _ _ _ -_ _ _-_ _ _ _.

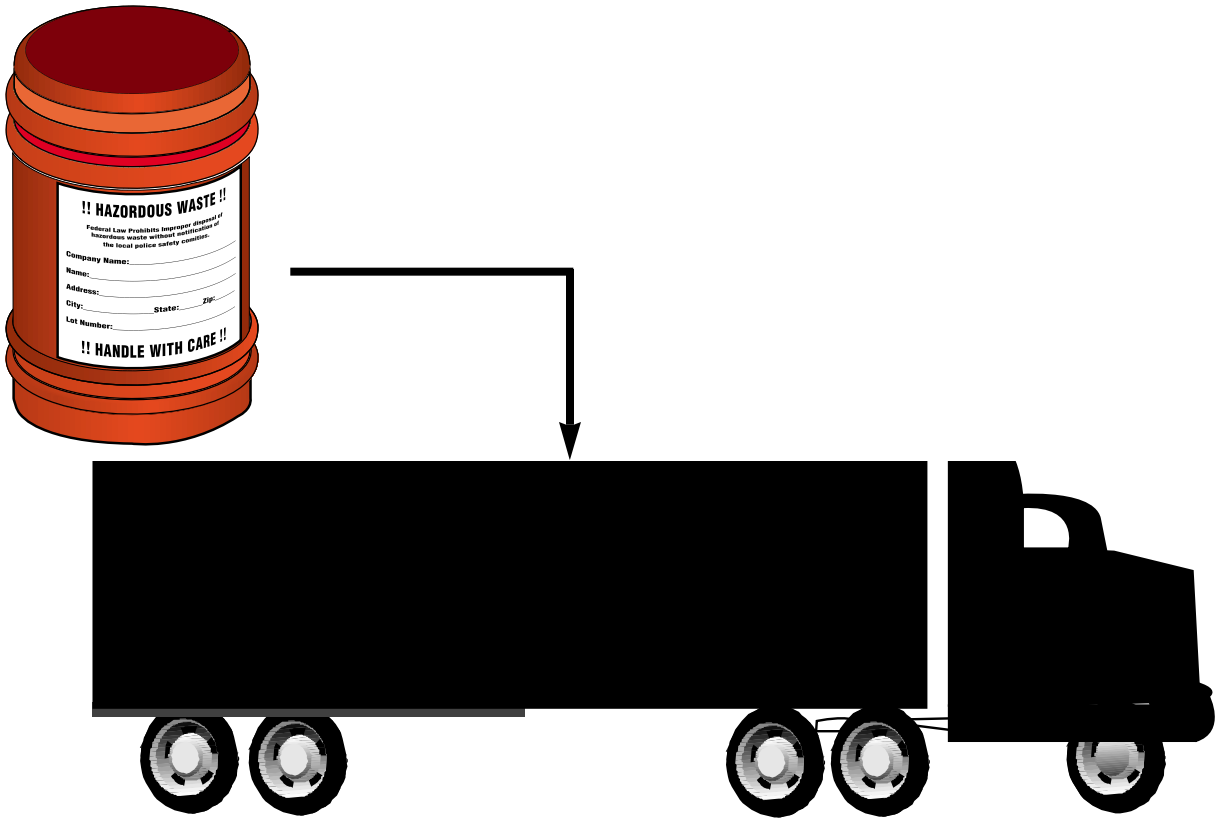
6.3 Accumulating Hazardous Waste:

Follow all of the hazardous waste container requirements in section 5.3. See sample of a hazardous waste label in Appendix G.

6.4 Shipping Hazardous Waste:

Use a licensed hazardous waste or precious metal transporter for shipping hazardous waste (i.e. most likely silver solutions) [6.4a] except if you are a very small quantity generator (VSQG) and self-transport to another generator [6.4b]. For example, if you have more than one shop, you may choose to consolidate waste generated at all shops into one shipment. For a list of transporters, call MADEP (617) 292-5898. For reporting and record keeping refer to section 3.6.

In a chemical spill or chemical leak emergency, you must contain the spill to the extent possible and as soon as practical, clean up the spill materials and contaminated materials (including contaminated soils). [6.4c]



Off-Site for Silver Recovery

1 The numbers in the square brackets are requirement reference numbers for use in Return to Compliance Forms.

7.0 Pollution Prevention

This section is a brief guide to pollution prevention measures which will increase your efficiency, save money, and improve your environmental performance. These measures range from very practical steps that are easy to implement immediatedly to innovations which may transform the industry and its environmental impact in the future. If you would like more information about and/or assistance incorporating pollution prevention into your operation, call the Massachusetts Office of Technical Assistance (a non-regulatory agency) charged with assisting firms with pollution prevention (617-727-3260).

Storage [7.0a]

- Avoid material exceeding shelf-life.
- Use a first in/first out policy (make the oldest materials the most accessible).
- Use a computerized inventory tracking system which ensures use before expiration.
- Train employees on handling and storage.
  - — Instill respect for chemicals.
- Do not allow eating, drinking, or smoking in workrooms where chemicals are used.
- Store in closed containers to:
  - — Minimize exposure to air (protects supplies from oxidation).
  - — Protect from degradation by light.
- Add glass marbles to bring liquid level to the brim to reduce exposure to air.
- Store paper in refrigerator or freezer for longer storage periods.
- Control heat and humidity.
- Return damaged containers to supplier and investigate supplier take-back of recyclable containers.
- Rinse containers with water and use the water in the process if possible.
  - — Do not use containers that might be mistaken for drinking vessels.
  - — Slit or cut containers after use so cannot be misused.
- Assess indoor air quality.
- Check regularly for leaks and spills.
  - — Store so that leak or spill won't go down a floor drain. Have spill plan and spill response equipment.
  - — Have spill plan to cover tank and rack cleaning areas, chemical storage areas, areas where chemicals are handled — hoses, bottles, tanks.

7.0 Pollution Prevention (cont'd)

Process [7.0b]

- Regular preventive maintenance schedules and records prevents inefficiencies and targets problems.
- Observe recommended parameters for operating conditions, especially temperature, heat, light, and humidity.
- Utilize proper pouring and mixing procedures — not just for safety, but to avoid overmixing. Make up solutions only in quantities needed and establish protocols.
- Use test strips to determine when chemical solutions should be discarded and when replenishment is necessary, do not rely on scheduled replacements, and check manufacturer's operating instructions.
  — Test strips can also determine optimal flow rates on continuous processors.
- Use squeegees, which can reduce chemical carry over by 75 percent. Types include: squeeze roller (two soft rollers like a clothes wringer), blades, air squeegees, and vacuum squeegees. *Caution: some types may damage film if not hardened. Some processing equipment can't be retrofitted for this.*
- Shut off rinse water except when film is moving through the processor. Install automatic controls if possible
- Determine and write down optimal flow rates and train employees.

Recycling [7.0c]

If your process allows: recirculate developer, recirculate fixer, or extend stabilizer with amendments. *Note: While there are many products which are recyclable, many manufacturers recommend caution due to potential incompatibility among different components.*

Silver Recovery [7.0d]

- Do not over replenish fixer.
- Keeping pH of fixer between 5 and 5.5 metallic replacement is usually recommended.
- Observe manufacturer recommended flow rates. Have holding tank, restricting orifice, or other method for control.
- Use two metallic replacement units in tandem. When silver is detected in the first, replace the second, use fresh canister in place of second.
- Use electrolytic if iron discharges are a concern. In addition, electrolytic silver recovery allows fixer reuse.
- Use silver test paper, analytical test kit, or lab analysis to maintain your silver recovery system. Record results.
- Distillation, enclosed evaporation, and precipitation are considered feasible for small operations.
- Digital phot processing and image capture is developing. In the future it will also create opportunities to drastically reduce your waste streams.

Appendix A

Silver Recovery Unit Staff Training Log

SILVER RECOVERY SYSTEM
EMPLOYEE OPERATION AND MAINTENANCE
TRAINING RECORDS FOR

_____
(Name of Business)

_____
(Address of Business)

_____
(for year)

EMPLOYEE NAME:	DATE OF TRAINING:	COMMENTS:

Appendix B

Glossary

MSDS: Material safety data sheets (MSDSs) are fact sheets about chemicals providing at a minimum 1) physical and chemical properties of the hazardous substances contained in the product, 2) spill clean-up instructions, 3) health hazards and appropriate first aid, 4) fire and explosion hazards, and 5) proper management and disposal practices. The MSDSs must be supplied by the chemical manufacturer or supplier and are designed to inform the chemical users about workplace and environmental hazards. MSDSs are required to be available to all user of the product.

Parts Per Million (PPM): The measure parts per million (ppm) is equal to milligrams per liter (mg/1).

pH: pH is a measure of how acidic or alkaline a solution is, with neutral solutions rating a 7, acidic solutions less than 7, and alkaline solution greater than 7. The optimal pH for electrolytic silver recovery units ranges between 7.5 and 8.0. For cartridges after electrolytic, pH should be reduced back down to 5.5. Sodium hydroxide is commonly used to adjust pH upward. Glacial acetic acid is commonly used to adjust pH downward. Both sodium hydroxide and glacial acetic acid are hazardous and require special management.

DEP: Massachusetts Department of Environmental Protection

Tanks: A stationary device used to store or contain an accumulation of industrial wastewater and which is constructed of non-earthen materials (e.g., concrete, steel or plastic) which provide structural support.

Containers: Any portable device in which an industrial wastewater is stored, transported, treated, disposed of, or otherwise handled.

Cartridge Silver Recovery: Cartridges are hollow canisters that contain steel wool or fiberglass fibers impregnated with iron filling. Fixer, bleach fixer, and washless stabilizer are metered through the cartridge. When the iron contacts the silver in solution, the silver comes out of solution. Using two cartridges in series, in conjunction with other recommended practices, can achieve compliance. This, however, takes time and effort and may be achievable only under ideal circumstances.

Electrolytic Silver Recovery: Electrolytic recovery systems work by attracting positively charged silver ions to a negatively charged cathode with is immersed in silver bearing waste. These systems remove most of the easily recoverable silver in a nearly pure metallic state. Purity translates into lower transportation, shipping, and refining costs than cartridge units.

Industrial Wastewater: Wastewater resulting from any process of industry, trade or business, regardless of volume or pollutant content. Wastewater which contains only sewage, non-contact cooling water, compressor or air conditioner condensate, including wastewaters from restaurants and school/industry cafeterias is **not** considered industrial wastewater.

Appendix B (cont'd)

Glossary (cont'd)

Precious Metal Recycler: Companies which are permitted by DEP to recover silver from silver bearing waste streams.

Sanitary Wastewater or Sewage: The water-carried human or animal wastes from residences, buildings, industrial establishments or other places, together with such ground water infiltration and surface water as may be present.

Septic Tank: A watertight receptacle to receive sewage from a building sewer which is designed and constructed to permit sufficient retention of wastewater to allow for the separation of scum and sludge and the partial digestion of organic matter before discharge of the liquid portion to a soil absorption system (i.e., leaching field).

Sewer System: Pipelines or conduits, force mains, and all other structures used for collecting and conveying wastes to the site for treatment or disposal (POTW).

Small Scale Precipitation: Small-scale precipitation silver recovery units add reagents to the silver-bearing solutions causing the silver to clump and form larger particles which are easily caught on a filter. The reagents must be added at precise rates to achieve the two parts per million silver discharge limit. Small scale precipitation units have reservoirs of each reagent which are automatically pumped and mixed with the silver bearing wastes. The silver laden clumps are then caught on a filter before discharge. Once calibrated correctly these units can be reliable and effective.

Steel Film Magazines: Steel film magazines include the magazine, spool, felt tip, and end caps.

Storm Drain: Any discernible, confined, and discrete conveyance, including but not limited to any pipe, conduit, ditch, channel, and tunnel used for collecting and conveying storm water run-off directly to the waters of the Commonwealth such as rivers, streams, lakes, or ponds.

Storm Water Run-Off: Rainfall that is not absorbed by the ground and collected by a storm drain.

Waste Disposal Facilities: Include centralized operations which are licensed to treat, store, or dispose certain types of waste (e.g., hazardous).

Appendix C

References

Alaska Health Project, Waste Reduction Assistance Program **April 1991** Waste Reduction Guide: Photo Finishing Business.

Alaska Health Project, Waste Reduction Assistance Program **Undated** Waste Reduction Fact Sheet Photo Finishing.

City of Santa Monica, Department of General Services **Undated** Hazardous Waste Reduction Facts: Photographic Processors; (231) 458-8228.

County Sanitation Districts of Los Angeles County **Undated** Photo processing: Pollution Prevention Opportunities Checklist (213) 699-7411 or 685-5217.

Kodak Environmental Services, Eastman Kodak Company **June 1995** MWRA Group Permit Requirements for Photo Processing and Printing Operations.

Massachusetts Executive Office of Environmental Affairs, Department of Environmental Protection, and The Office of Technical Assistance **Winter 1996** Massachusetts Printers Partnership Workbook: A Self-Certification Guide for Commercial Printers.

National Association of Photographic Manufacturers, et al **November 1995** New York Best Management Practices Workbook.

The Silver Council **October 1996** Applied Silver Management: A Practical Guide for Controlling Photographic Silver in the Environment.

The Silver Council/Association of Metropolitan Sewerage Agencies **November 1996** Code of Management Practice for Silver Dischargers.

US Department of the Interior, Office of Environmental Affairs **1990** Pollution Prevention Handbook: Photo processing and Blueprint Operations, two in a series of fact sheets.

USEPA, Office of Research and Development **October 1991** The Photo processing Industry: Guides to Pollution Prevention EPA/625/7-91/012.

The Virginia Department of Waste Management, The Virginia Waste Minimization Program Waste Reduction Fact Sheet: Waste Minimization in Photographic Processing: Vol 1, Issue 5; (804) 371-8716.

Washington State, Department of Ecology **May 1996** A Guide for Photo Processors: Environmental Management and Pollution Prevention.

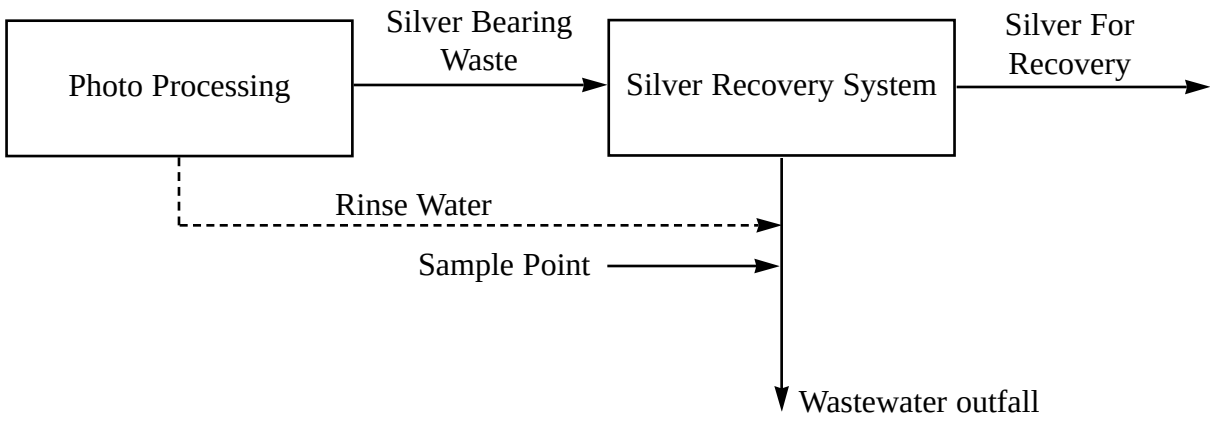
Washington State, Department of Ecology, Office of Waste Reduction **November 1988** Fact Sheet: Photo Processors.

Appendix D

Basic Sampling Procedures

- Obtain clean bottle (plastic or glass) acidified with nitric acid to a pH below 2.0 from your analytical laboratory. This is to minimize precipitation and adsorption on the container walls.
- If the bottle is **not** acidified with nitric acid, rinse sample bottle two or three times with the water to be sampled before filling.
- Fill the container with sample leaving an air space of about 1% of the container capacity.
- Label or attach an inscribed tag to the container for identification.
- Record information to provide sample identification, type of sample, the name of the sample collector, the date, hour, and the exact location of the sampling point.
- Return the sample to the laboratory as soon as possible (ideally, within 24-hour period) to prevent sample deterioration.
- Ask your laboratory for a copy of the completed chain of custody form.

Conceptual Diagram to Locate Sample Point



Appendix E

Helpful Hints-Wastes of Concern

Developer: Developers change the silver halide into metallic silver. Developers do not contain silver and can present significant operational problems for silver recovery systems if mismanaged (e.g., placing it in the silver recovery system.) In addition, most black and white developers contain small proportions of hydroquinone, which presents health issues in its unused state. During the black and white development process, however, the hydroquinone is usually consumed and does not present a problem.

C-41 Bleach: This bleach comes in a regenerative and non-regenerative form.

> **Non-regenerative Bleach**: converts silver metal back to silver halide so that it can be removed in the fixer. Effluent from non-regenerated C41 RA Bleach will contain a small amount of silver which can become soluble in solution during this process. As a result the effluent should be treated in the silvery recovery unit.
>
> **Regenerative C-41 Bleach:** can be captured, regenerated and reused. The only portion which is discharged as effluent is that which carries over to either the wash tank or the fixer tank, depending on the type of machine you have.

Fixer, Bleach Fixer: Fixer sets the image areas and removes light sensitive silver halide that could cause the photo image to darken with time. Fixer allows silver to dissolve out of the film and paper and into solution. As a result, used fixer and bleach fixer contain high concentrations of silver, ranging from 2,000 to 8,000 parts per million (which is equivalent to milligrams per liter). These high levels of silver make silver recovery necessary and economically feasible.

Washless Stabilizer: Washless stabilizer solutions are used in the last step of most one-hour photo processing. These stabilizers enhance image stability and stop the reaction started by the developing solution. Washless stabilizers typically contain 100 to 300 parts per million of silver (For comparison, hazardous waste contains over five parts per million).

Paper Cores: Several photographic manufacturers will take their brand of cores from photographic paper and color paper plastic core plugs for recycling.

Photographic Solution Filters: Film and paper developing machines use filters which remove particulates from processing solutions. These filters are made of spun cotton similar to cotton swabs. Fixer and washless stabilizer probably leach enough silver into the filters to require them to be managed as hazardous waste.

Appendix E (cont'd)

Helpful Hints - Wastes of Concern (cont'd)

Plastic Film Containers: Most plastic film containers are made of two different types of plastic, both of which are recyclable. Several photographic manufacturers will take these containers to recycle them.

Scrap Film and Paper: Color film processing removes all silver from the film and paper and therefore it can be treated as solid waste. Silver on unprocessed film and paper has not leached from landfills to date. Silver on unprocessed film with fixer will present a problem. Do not coat your unprocessed film to remove the silver because it transforms the unprocessed film into hazardous waste.

Single Use Cameras: Most single use cameras can be returned to the manufacturer for recycling or reuse. Do not throw out your single use cameras after extracting the film for developing.

Steel Film Magazines: Steel film magazines include the magazine, spool, felt tip, and end caps. Many photographic manufacturers recycle the steel film magazines.

Wash Water Wash water is used to remove residual chemistry from films, slides, etc., after processing and prior to drying. Rates will vary with process and may exceed 5 gallons per minute.

Helpful Hints - Conversion Table

Measurement

Non-metric Unit	Metric Equivalent
one fluid gallon (U.S.)	3.785 liters (l)
one fluid quart	0.946 liters (l)
one fluid pint	0.473 liters (l)
one fluid ounce	29.57 milliliters (ml)

Conversion Factors

Unit	Multiply by	To Obtain Equivalent
gallons	3.785	liters (l)
liters	0.264	gallons (gal)
grams	0.0321	troy ounces (troy oz)
grams/liter	1000	milligrams/liter (mg/l)
grams/liter	0.122	troy ounces/gallon
troy ounces	31.1035	grams (gm)
troy ounces/gallon	8.2	grams/liters (gm/l)
milliliters (ml)	0.001	liters (l)
1ppm	=	1 mg/l
liters	1000	milliliters (ml)

Appendix F

What is Your Hazardous Waste Generator Status?

Step 1 Using your Hazardous Waste manifest copies, fill in the "My Actual" column of the following chart then compare with the example column:

My Actual Shipments			Example		
Month		**Pounds**	**Month**		**Pounds**
January	_____	Pounds	January	0	Pounds
February	_____	Pounds	February	300	Pounds
March	_____	Pounds	March	0	Pounds
April	_____	Pounds	April	0	Pounds
May	_____	Pounds	May	200	Pounds
June	_____	Pounds	June	0	Pounds
July	_____	Pounds	July	200	Pounds
August	_____	Pounds	August	0	Pounds
September	_____	Pounds	September	0	Pounds
October	_____	Pounds	October	150	Pounds
November	_____	Pounds	November	0	Pounds
December	_____	Pounds	December	150	Pounds

In the above example, there are 5 shipments, the largest shipment is 300 lbs, generated over a period of 2 months, so the average generation rate may be considered 150 lbs per month of hazardous waste.

Step 2 Compare your result from step 1 to the chart below in order to determine your hazardous waste generator status. In this example, you are considered as a very small quantity generator (VSQG). *Note, silver bearing waste processed through a silver recovery system (as prescribed in this workbook) does not count as hazardous wastes.*

Definitions of Hazardous Waste Status:

Generator Status	Monthly Generation Threshold	Time Limits for Accumulation
Very Small Quantity Generators (VSQGs)	< 220 lbs/month (< 27 gal/month)	unlimited time, and must ship when they accumulate ≥ 1,320 lbs (165 gal)
Small Quantity Generators (SQGs)	≥ 220 lbs/month but ≤ 2200 lbs/month (≥ 27 gal/mth but ≤ 270 gal/month)	Must ship every 180 days or less
Large Quantity Generators (LQGs)	≥ 2,200 lbs/month (≥270 gal/mth)	Must ship every 90 days or less

Appendix G

Examples of Hazardous Waste Labels

HAZARDOUS WASTE

NAME OF WASTE _____

_____

HAZARD(S) _____

_____

DATE OF ACCUMULATION BEGAN ___/___/20___

HANDLE WITH CARE

HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
IF FOUND, CONTACT THE NEAREST POLICE,
OR PUBLIC SAFETY AUTHORITY, OR THE
U.S. ENVIRONMENTAL PROTECTION AGENCY.

MANIFEST # _____

D.O.T. SHIPPING NAME _____

UN OR NA # _____

EPA NAME _____

EPA # _____

GENERATOR INFORMATION:

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

DATE OF
GENERATION/ACCUMULATION _____

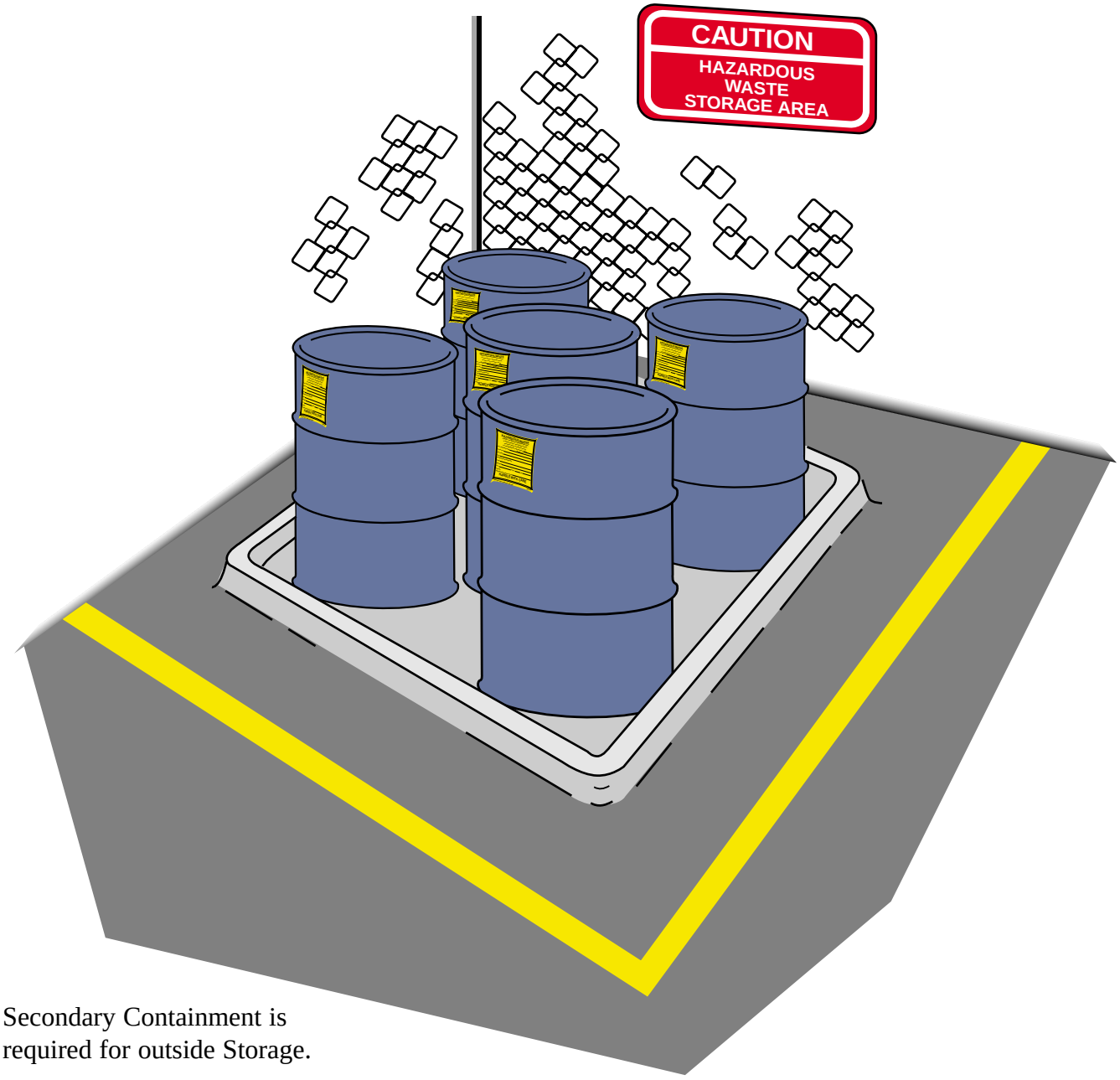
HANDLE WITH CARE

CONTAINS HAZARDOUS OR TOXIC SUBSTANCE

BOSTON TAG & LABEL 617-783-2760 5200 HW

Appendix H

Example of Spill Containment System



Secondary Containment is required for outside Storage.

Storage areas shall be clearly marked (e.g., by a clearly visible line or piece of tape on the floor, or by gate or fence, with lettering at least 1-inch high or by a sign at the boundary of a clearly distinguishable area).

Appendix I

More Information

(This section contains guidance for questions 5, 12, and 17 on the compliance certification form.)

State Agencies

Department of Environmental Protection

- Main Office
  1 Winter St,
  Boston, MA 02108
  (617) 292-5500

- Certification of Operators of Wastewater Treatment Facilities
  1 Winter St., 8th Fl.
  Boston, MA 02108
  617-292-5650

Office of Technical Assistance for Toxics Use Reduction
100 Cambridge Street
Boston, MA 02202
617-727-3260

Massachusetts Office of Business Development
1 Ashburton Place Rm. 2101
Boston, MA 02108
(617) 72-3206

Industry Associations

Photo Marketing Association International
3000 Picture Pl.
Jackson, Michigan 49201
(517) 788-8100
(517) 788-8371 Fax
www.pmai.org E-mail

Federal Agencies

U.S. Environmental Protection Agency
Pollution Prevention and Technical Assistance
JFK Federal Building (WGP)
Boston, MA 02203
(617)565-3600

Other Organizations

Massachusetts Manufacturing Partnership
Corporation for Business, Work and Learning
101 Summer St.
Boston, MA 02110
1-800-667-6347

Northeast Waste Management Officials' Association
129 Portland Street, Suite 601
Boston, MA 02114-2041

Appendix J

Communities with MWRA Sewer Service

MWRA telephone no. 617-241-2333

Arlington
Ashland
Bedford
Belmont
Boston
Braintree
Brookline
Burlington
Cambridge
Canton
Chelsea
Dedham
Everett
Framingham
Hingham
(Northern Hingham District only)
Holbrook
Lexington
Malden
Medford
Melrose
Milton
Natick
Needham
Newton
Norwood
Quincy
Randolph
Reading
Revere
Somerville
Stoneham
Stoughton
Wakefield
Walpole
Waltham
Watertown
Wellesley
Westwood
Weymouth
Wilmington
Winchester
Winthrop
Woburn

Appendix K

Releases or Spills Requiring Notification for Photo Processors

(This section contains guidance for question 3 on the compliance certification form.)

Silver is the most likely pollutant chemical in photo processing, which is subject to spill or release or release notificaton requirements.

If you spilled or release silver solution with concentration of equal or greater than 5 parts per million to the environment AND it is more than 50 pounds by weight or 6 gallons of silver solution , then you must :

- Notify to the Department as soon as possible but not more than “two hours” after sudden, continuous, or intermittent release, [8.1] **and**

- Obtain a Release Notification Form (BWSE-103) from the DEP, and submit to DEP within 60 days following the date of original notification. [8.2]

- Releases to the environment include releases to:
  — Outside the building
  — The ground
  — A storm drain
  — Unlined trenches or sumps

For a complete list of all chemicals subject to spill or release notification see 310 CMR 40.1600. [8.3]

If you have questions, please contact (617) 556-1133 or 1-888-304-1133.

Appendix L

Silver Bearing Waste Volume Calculation Worksheet

(This section contains guidance for questions 6a, 8, and 13a on the compliance certification form.)

Chemistry	Average Monthly Volumes (in gallons) Month _____	Check Here If Annual Sample Included This Solution
Fixer		
Bleach-Fix		
Stabilizer (washless systems)		
Other		
TOTAL		

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