



Rutgers Environmental Health and Safety (REHS)

Program Name:	Darkroom Chemical Waste Management Program		
Responsible Executive:	Executive Director of REHS		
Adopted:	September 29, 2005	Reviewed/Revised:	November 24, 2020

1. Program Statement

The photographic developing process involves many types of chemicals that can ultimately end up as a waste product. Stop bath chemicals are acidic and spent fixer solution contains silver, which is regulated by federal and state environmental agencies.

2. Reason for Program

This program describes the procedures for managing waste chemicals produced from the photographic developing process at Rutgers in order to protect the faculty, staff and students from chemical hazards and environmental liability. It is also designed to ensure compliance with the following regulatory standard:

- *Resource Conservation and Recovery Act (RCRA) – 40 CFR Parts 260-273 (EPA)*

3. Who Should Read this Program

This program applies to all Rutgers faculty, students and staff who work with photographic developing processes and chemicals.

4. The Program

I. Roles and Responsibilities

A. Faculty, Students & Staff Who Work With Photographic Development

- 1) Minimize the generation of hazardous and non-hazardous waste streams whenever possible.
- 2) Substitute less hazardous alternative products or chemicals whenever possible.
- 3) Manage chemical wastes in a safe and environmentally responsible manner in accordance with the procedures in the program.
- 4) Properly maintain and keep documentation regarding maintenance of silver recovery systems.

- 5) Contact REHS at 848-445-2550 or hazwaste@rutgers.edu if you have any questions regarding the proper management of chemical wastes generated from photographic development.

B. Rutgers Environmental Health and Safety

- 1) Provide technical assistance and advice to personnel who work with photographic chemicals.
- 2) Conduct periodic audits of silver recovery units to ensure proper operation, management and documentation.
- 3) Pick up and properly dispose of waste chemicals upon request and within required time limits.

II. Definitions

Acutely Hazardous Waste (P-Listed Waste)

Wastes that have the potential to cause death, disabling personal injury or serious illness. EPA designates them as "P-Listed" which refers to listed unused (not spent) commercial chemicals in either pure form or as the sole active ingredient in a mixture, or spill cleanup contaminated with said chemicals.

Hazardous Waste

A waste with certain characteristics that make it dangerous or capable of having a harmful effect on human health or the environment. EPA defines a hazardous waste as one that either a) exhibits the characteristics of ignitibility, corrosivity, reactivity and/or toxicity, or b) is a "listed" waste from common manufacturing and industrial processes, specific industries or discarded commercial products. Listed wastes can be found in the EPA RCRA regulations.

Spent Developer

A chemical used in photographic development that may contain hydroquinone and sodium sulfite.

Spent Fixer

A chemical used in photographic development that contains silver as a by-product from the film or paper.

Spent Stop Bath

A chemical used in photographic development commonly consisting of 2% acetic acid or 2.5% potassium or sodium metabisulfite.

III. Procedures

A. Waste Minimization

- 1) Make every attempt to minimize the generation of hazardous waste by using these guiding principles:
 - Only purchase the amount of materials needed to complete a project. Disposal of excess materials often costs more than the original purchase price.

- Purchase non-toxic, non-hazardous alternative products whenever possible
- Use a silver recovery system
- Consult the Rutgers Chemicals for Reuse Program at <https://ipo.rutgers.edu/rehs/labenv-chemical> for donating chemicals for reuse or obtaining them free of charge

B. Drain Disposal

In general, drain disposal of chemicals is prohibited. However, certain buffers, salts, non-hazardous chemicals and dilute aqueous solutions can be safely drain disposed if the building is connected to a public sanitary sewer system. If however, the building is connected to a septic system (e.g. farms, marine research centers, remote off-campus locations), drain disposal is prohibited.

In addition, aqueous solutions must be within the range of 6-9 pH to be drain disposed. Refer to the Rutgers Hazardous Waste Disposal Program at the following link for further information on drain disposal:

https://ipo.rutgers.edu/sites/default/files/hazwaste_disposal%20%281%29.pdf

Table 1 provides a summary of drain disposal options for common photographic chemicals.

Table 1

Waste Type	Darkroom in Building Connected to Sanitary Sewer System	Darkroom in Building Connected to Septic System
Unused photographic chemicals	No Drain Disposal Dispose Through REHS	No Drain Disposal Dispose Through REHS
Spent developer	If non-hazardous, drain dispose (contact REHS first)	No Drain Disposal Dispose Through REHS
Spent fixer <i>without</i> a silver recovery system	No Drain Disposal Dispose Through REHS	No Drain Disposal Dispose Through REHS
Spent fixer <i>with</i> a silver recovery system	Drain dispose. Ensure system is properly maintained and working.	No Drain Disposal Dispose Through REHS

C. Types of Waste and Disposal

1) Hazardous Waste

The following are considered hazardous waste:

- Spent fixer without a silver recovery system

- Intensifiers, reducers and toners that contain toxic compounds such as mercuric iodide, potassium cyanide, cyanide salts, carbon tetrachloride or heavy metals such as selenium, gold or lead

Procedures for Managing Hazardous Waste

- Collect hazardous wastes in satellite accumulation areas (SAAs) specifically designated for the temporary storage of hazardous waste.
- Store liquid wastes in secondary containment unless they are in the 5-gallon carboys provided by REHS.
- Segregate wastes by chemical compatibility (e.g. do not store acids and flammable liquids in the same secondary container). Make sure the container holding the waste is chemically compatible with the waste (e.g. store corrosive chemicals in plastic containers). See example in Figure 1.
- Label waste containers with the Rutgers Hazardous Waste Label shown in Figure 2. Make sure the label is completely filled out including checking off one or more pictograms on the bottom of the label to further identify the waste characteristics. Use chemical names (not formulas or acronyms) to identify the constituents.
- Keep lids securely closed on all hazardous waste containers in storage.
- Submit an online Request for Hazardous Waste Disposal at the following link to alert REHS to pick up the waste. Request additional replacement waste containers at the online link.
<https://half-life.rutgers.edu/forms/hazwaste.php>
- Contact REHS at hazwaste@rutgers.edu or 848-445-2550 if you have any questions regarding the collection, storage and disposal of hazardous waste.

2) Non-Regulated Waste

The following are considered non-regulated wastes:

- Spent developer that is collected due to the prohibition of drain disposal because a septic system is present
- Any other chemical intended for disposal where the constituents do not meet the definition of Hazardous Waste (check with REHS if you are unsure).

Procedures for Managing Non-Regulated Waste

- Collect the waste in appropriately sized and chemically compatible containers.
- Label the container with the Non-Regulated Waste label shown in Figure 3. Mark the contents as “100% Spent Developer” or other appropriate general description.
- Submit a Request for Hazardous Waste Disposal at the online link below to notify REHS to pick up the waste:
<https://half-life.rutgers.edu/forms/hazwaste.php>

3) Unused, Expired or Excess Chemicals

- a. Unused, expired or excess chemicals should first be considered as a possible donation to the Rutgers Chemicals for Reuse Program. Contact REHS at (848) 445-2550 or hazwaste@rutgers.edu for advice.
- b. All other unused chemicals must be disposed of through REHS by submitting an online Request for Hazardous Waste Disposal form at: <https://half-life.rutgers.edu/forms/hazwaste.php>

D. Silver Recovery

- 1) Silver recovery units must be properly maintained at a frequency that ensures acceptable capture of silver (i.e. quarterly). The frequency will depend on how often the equipment is used.
- 2) Vendors who service silver recovery units are required to fill out the Silver Recovery Maintenance Log in Attachment #1.
- 3) Maintenance logs and any other documentation pertaining to the servicing of silver recovery systems must be maintained for 3 years by the Rutgers department responsible for operating the equipment. These records must be made available upon request during inspections by REHS and/or regulatory agencies.
- 4) The silver recovered from the unit must be transported by the vendor on a Bill of Lading or other shipping papers (**not** a Hazardous Waste Manifest). Shipping papers must also be kept for 3 years and made readily available to REHS and/or regulatory agencies upon request.

E. Waste Containers

- 1) REHS can provide the following containers for collecting and storing wastes:

Liquid Wastes

- 5-gallon plastic carboys
- 30-gallon plastic drums
- 55-gallon plastic or metal drums

Solid Wastes

- 1-gallon plastic screw top jars
- 5-gallon plastic screw top pails
- 55-gallon metal open top drums

REHS will also provide plastic liners for pails and drums used for solid wastes.

- 2) Do not use your own drums or pails unless approved by REHS. They may not meet US Department of Transportation (DOT) requirements or may have residual material left behind from former uses.
- 3) Select the smallest container size available that will properly hold the anticipated quantity of waste and still allow sufficient headspace above the liquid for expansion under different storage temperatures.
- 4) Containers must be leak-proof and sealed with lids secured while in storage.

F. Labeling

Hazardous Waste labels must be applied to all waste containers described in this program (under Section C. 1) as soon as the first amount of liquid or solid waste is added to the container. or unused or expired chemicals, labels must be applied as soon as the determination is made to dispose of the chemicals.

See Figure 2 for an example of a Hazardous Waste Label.

- 1) Make sure the label is completely filled out including checking off one or more pictograms on the bottom of the label to further identify the waste characteristics.
- 2) Use chemical names (not formulas or acronyms) to identify the constituents.

G. Satellite Accumulation Areas (SAAs)

- 1) Hazardous waste must be stored in the darkroom Satellite Accumulation Area (SAA) that is a designated area at or near the point of generation and under the control of the operator generating the waste. Typically there is a SAA in each room where such wastes are generated. REHS can assist in determining appropriate locations for SAAs.
- 2) Chemical wastes in SAAs must be segregated by waste type and arranged so that incompatible wastes cannot mix.
- 3) Hazardous wastes must be stored in secondary containment bins in SAAs.
- 4) Containers in SAAs must be arranged so that the labels are easily visible during inspection.
- 5) Follow the basic guidelines below for safely storing hazardous wastes:
 - a. Store like materials in the same secondary containment bin (e.g. store flammables in one bin, acids in another, toxics in another – See Figure 1)
 - b. Separate acids and bases
 - c. Keep acids separate from oils, flammables, cyanides and sulfides
 - d. Store corrosive chemicals in plastic containers
 - e. Keep water-reactive chemicals away from water sources or aqueous solutions
 - f. Immediately clean up spilled materials in secondary containment bins
 - g. Consult REHS if you encounter shock-sensitive, explosive or air-reactive chemicals
- 6) No more than 55 gallons of hazardous waste or 1 quart of acutely hazardous waste are allowed to be stored in a SAA.

H. Request for Waste Removal

- 1) Submit an online Request for Hazardous Waste Disposal whenever hazardous waste containers are full. The link for the online request can be found at: <https://half-life.rutgers.edu/forms/hazwaste.php>
- 2) REHS will pick up the waste within 5-10 working days at the New Brunswick/Piscataway campuses and every 30-60 days at the Newark and Camden campuses. Remote farm research centers and other off-campus locations are generally scheduled within one month of receipt of the online form.

Figure 1. Example of Properly Stored Hazardous Waste in SAA



Figure 2. Rutgers Hazardous Waste Label

HAZARDOUS WASTE
(For Satellite Accumulation Areas)
Rutgers, The State University of New Jersey

Chemical Contents: (% vol. or % weight) circle one

_____ % _____ %
_____ % _____ %
_____ % _____ %
_____ % _____ %

Are heavy metals present? Yes No (If yes, add to chemical contents section)

SAA Manager: _____ Telephone: _____

Campus: _____ Bldg.: _____ Rm#: _____

Have Accumulation Limits Been Exceeded: YES NO (Circle One)

(55-gallons Hazardous Waste and/or 1-Qt Acutely Hazardous Waste)

If yes, please indicate date excess accumulation began: ____/____/____

IN CASE OF EXCESS ACCUMULATION, CONTACT REHS IMMEDIATELY: 848/445-2550






Ignitable  Toxic  Corrosive  Compressed Gas  Reactive 

Figure 3. Non-Regulated Waste



Attachment #1

Silver Recovery Maintenance Log

Date/Time of Service	Name of Service Company	Name of Service Technician	Type of Service Performed	Quantity of Silver Bearing Material Removed for Reclamation	Signature of Service Technician

*This log must be kept on file for three years from the last date of service listed.