



Guidance Document for Silver Waste from Photo Processors

If you use fixer or similar solutions in a photographic image processing unit in a darkroom as part of your duties at UC Denver, then you are discharging silver that must be recovered before it reaches the environment. This document discusses why the requirement exists and takes you through the steps of setting up and maintaining a silver recovery system. For questions, please contact [Environmental Health & Safety](#) at (303) 724-0345.

1. Silver in the Environment

Silver attaches readily to surfaces and is toxic to aquatic wildlife. Water or fish contaminated with silver in high enough concentrations can present a health hazard to humans. This has driven regulations which limit the concentration of silver that can be discharged into the environment. Silver is also a valuable element that can be re-used. This has created an interest in industry for the development of collection and recycling technology.

Silver bearing wastes found in fixer, bleach-fix, stabilizers and similar solutions are discharged after the developing process. Due to the silver content in fixer, these wastes typically exceed Denver Metro Wastewater's limits for the discharge of silver. A pre-treatment system (silver recovery unit) can treat this wastewater so that silver levels are below prohibited limits.

2. Silver Recovery Systems

Many of UC Denver's silver recovery systems use metallic replacement secondary terminal units. Metallic replacement occurs when a metal, commonly iron, contacts a solution containing dissolved ions of a less active metal, such as silver. The iron goes into solution as an ion, and the silver is now a solid metal. As the cartridge nears depletion the silver concentration in the exiting fixer rises rapidly—creating the need for replacement of the cartridge over time.

3. How to set up a Silver Recovery System

Those in charge of photo-processing systems or darkrooms at UC Denver should refer to the manufacturer's specifications for its silver recovery equipment along with the darkroom equipment. In addition, it is recommended that the facility maintain a log with dates of change-out of silver recovery cartridge by the vendor. In addition, the outside of the recovery unit should be labeled with the last date of change-out of the recovery cartridge.

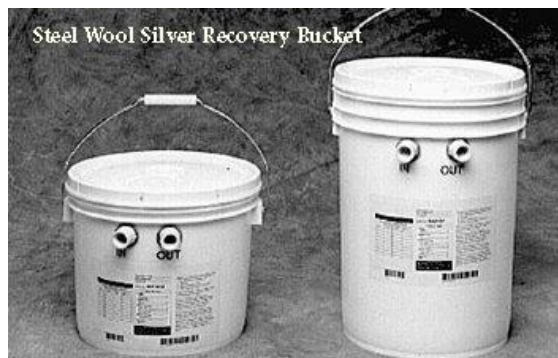
Additional Requirements

- Register your photo-processing system with EHS
- Ensure that a silver recovery system is installed
- System specifications will be entered in an inventory system—EHS Assistant



4. Maintenance of Silver Recovery Systems

The vendor who services your photographic processing unit will also install silver recovery cartridges. These vendors clean critical components of the photo processor, change out silver recovery cartridges, check machine functionality and refill chemicals used in the photo developing processor. Too frequent service increases maintenance costs without improving performance, while too infrequent service will allow silver to penetrate through the cartridges resulting in silver discharge and the potential for a violation. Most service providers recommend scheduling maintenance for the unit once a month. If you have any problems with the unit, call your service provider and schedule a time for them to come out.



The vendors should check the silver filtration equipment and should change the filter cartridges when necessary. This may involve testing the discharge from the filters. Most service providers recommend changing the silver recovery filter cartridges once per year. If you are generating a high volume of images, talk to your service provider when they are performing maintenance on the unit and ask that they check the silver recovery unit performance. They can then tell you the recommended date of when the silver filter cartridge needs to be

changed next – often based on your reported usage/volume. The cost of periodic maintenance will be the responsibility of the Department or Principal Investigator that is responsible for the dark room.

5. Hazardous Waste Disposal of Silver

If you do not have a silver recovery system installed, the spent photo chemicals that contain silver must be picked up and managed as hazardous waste. The silver bearing waste must be collected in containers and placed in established Satellite Accumulation Areas for removal by the University EHS department.

6. How to decommission a darkroom or a photo processor

EHS and your Silver Recovery vendor should be notified when decommissioning or moving a photo process from a UC Denver Building. Facility Managers should report all new or relocated darkrooms and photo-processors to EHS at (303) 724-0345.