



## Best Management Practice (BMP) Checklist for X-Ray and Photo Processors

There are four steps required to adopt and follow this program.

- First, the facility must determine its category (small, medium or large).
- Second, the facility must install a silver management technique that meets the recovery efficiency required for the appropriate category.
- Third, proper testing and record keeping must be maintained.
- Fourth, the facility must submit a completed "Letter of Participation" to the City of Tulsa, signed by an authorized facility representative.

**Category Specific Requirements:** (For the purposes of this guide, the only silver-rich solution for x-ray processors is fixer. The only silver-rich solutions for photo processors are fixer, bleach-fixers, and stabilizers.)

**Small Processor** is a business that produces less than two gallons per day of silver-rich waste solutions and no more than 1,000 gallons per day of total process effluent.

- Small processors must recover silver at least 90% efficiency.
- No analytical testing is required for small processors, although field screening (silver-estimating test paper) is required.

The following options are recommended for recovering at least 90% of the silver from silver-rich solutions:

- One or two metallic replacement cartridges (MRCs) with manufacturer specified flow control.
  - Businesses generating less than 0.5 gallons per day of waste silver-rich solutions may use only one MRC.
  - Facilities that generate more than 0.5 gallons per day should use two MRCs.
- Alternative technology providing at least 90% silver recovery e.g. Electrolytic Silver Recovery.

Other silver treatment or pollution prevention options:

- Off-site management
- Digital processing

**Medium Processor** is business that produces no more than 20 gallons per day of silver-rich waste solutions and no more than 10,000 gallons per day of total process effluent.

- Medium processors must recover silver at least 95% efficiency.
- Annual analytical testing performed by a state-certified laboratory is required for medium size processors.
  - The samples should be taken from both the influent and effluent sides of the silver recovery unit to assure that the 95% recovery efficiency is being achieved.
  - The facility shall retain records of sampling results for at least three years.

The following options are recommended for recovering at least 95% of the silver from silver-rich solutions:

- Terminal electrolytic unit followed by a metallic replacement cartridge (MRC) with manufacturer-specified flow control.
- In-line electrolytic unit followed by a metallic replacement cartridge (MRC) with manufacturer specified flow control.
- Two or more MRCs in series with manufacturer-specified flow control.
- Alternative technology providing at least 95% silver recovery.

Other silver treatment or pollution prevention options:

- Off-site management
- Digital processing

**Large Processor** is a business that produces more than 20 gallons per day of silver-rich waste solutions and more than 10,000 gallons per day of total process effluent.

- Large processors should recover silver to at least 99% efficiency.
- Semi-annual analytical testing performed by a state-certified laboratory is required for large size processors.
  - The samples should be taken from both the influent and effluent sides of the silver recovery unit to assure that the 95% recovery efficiency is being achieved.
  - The Facility shall retain records of sampling results for at least three years.

The following options are recommended for recovering at least 99% of the silver from silver-rich solutions:

- Terminal electrolytic unit followed by two metallic replacement cartridges (MRCs) in series with manufacturer-specified flow control.
- In-line electrolytic unit followed by two metallic replacement cartridges (MRCs) in series with manufacturer-specified flow control.
- Alternative technology providing at least 99% silver recovery.

Other silver treatment or pollution prevention options:

- Off-site management
- Digital processing

#### **Screening and Maintenance of Silver Recovery Systems**

- Monthly screening (field testing) of the silver recovery unit from the effluent (unit discharge tube) is required. Silver-estimating test paper is sufficient for this purpose. If the paper shows any color change, the system needs adjustment or replacement.
- The silver recovery unit should be checked daily for leaks or any other signs of malfunctions.
- The unit should be kept away from floor drains or have secondary containment to protect the sanitary sewer from illicit discharges.
- Record all test results and maintenance performed in a Silver Recovery System Log.
- The facility must obtain a silver recovery unit operation and maintenance manual. The manufacturer should have data that demonstrates the recovery efficiency required for the facility's size category.

#### **Metallic Replacement Cartridges**

- As the MRC removes silver from the solution, the iron metal filter becomes depleted and must be replaced. The spent cartridge is then sent to be refined.
- The MRC must be properly sized and installed to handle the processor's flow rate allowing adequate contact time and avoiding channeling (consult with the supplier).

#### **Electrolytic Silver Recovery**

- The electrolytic unit must be sized properly for peak volumes and properly set the amperage for efficient silver recovery.
- Manufacturer and supplier recommendations must be followed for proper installation and maintenance.

#### **Off-Site Management**

- Off-site management means that the silver-rich solution is properly labeled and stored for later pick up and reclamation by an outside contractor.
- Records must be maintained documenting removal & disposal of the silver-rich solution.

