WESTERN CONNECTICUT STATE UNIVERSITY

PHOTOGRAPHIC PROCESS WASTE RECOVERY

PROCEDURE E-116

Issued 8/1/02
Revised 5/25/04; 1/29/2020

Please direct any questions or comments about the applicability of this document to David Serino, Director of Environmental Health & Safety

1.0 INTRODUCTION

1.1 PURPOSE

This procedure establishes the process to be undertaken by University personnel in order to manage the waste generated by the photography labs. This procedure has been established to ensure regulatory compliance. Noncompliance with this policy may lead to fines levied by regulatory agencies.

1.2 REFERENCES

40 CFR 122-124
RCSA 22-a

1.3 DEFINITIONS

CFR – Code of Federal Regulations
RCSA – Regulations of Connecticut State Agencies

2.0 SUMMARY OF APPLICATION

2.1 GENERAL

During photographic processing, silver is removed from the film or paper and is carried out in the rinse solution, usually in the form of a silver thiosulfate complex. Silver is to be recovered because its release to the environment is strictly regulated by federal and state agencies.

2.2 AVAILABLE METHODS

There are several methods available for silver recovery. Western Connecticut State University (WCSU) is employing the *Metallic Replacement* method for recovering silver from rinse water solutions.

2.3 METALLIC REPLACEMENT

This technology does not require electricity, but it consists of a cartridge filled with steel wool, with an incoming and an outgoing pipe. Aqueous rinse solutions are placed into a container and gravity fed into a cartridge containing the steel wool. As the silver-bearing solution passes through the container, it comes in contact with the steel wool and reacts with the iron. The iron goes into solution and the silver either precipitates and settles as sludge at the bottom of the cartridge, or is deposited on the steel wool. The effluent is then discharged in the sanitary drain.

2.4 MAINTENANCE

When silver is no longer removed efficiently enough, the sludge and steel wool will be sent for recycling and the container will be filled with new steel wool.

3.0 DISCHARGE REGULATIONS

3.1 LOCATIONS

Silver recovery units are located in the following areas:
Westside Campus
Visual & Performing Arts Center, Room 343

3.2 PERMIT LIMITATIONS

3.2.1 Discharge shall be less than 5000 gallons per day.

3.2.2 Only minor, treated photographic waste shall be discharged to the sanitary sewer.

3.2.3 No chromate or bleach solutions shall be discharged to the sanitary sewer.

3.2.4 The silver concentration of the effluent shall not exceed 5.0 mg/l.

3.2.5 Both feed container and cartridge shall have secondary containment.

3.3 MONITORING

The following parameters will be monitored and recorded on a monthly basis:

3.3.1. Silver concentration of influent.

3.3.2. Silver concentration of effluent.

3.3.3. pH of influent.

3.3.4. pH of effluent.

3.4 TESTING

3.4.1 Silver concentration of influent and effluent solutions shall be performed using the test kit supplied by USI, International, Inc. The test procedure is included with the kit and shall be followed. This is a qualitative test which is based on the color change of a copper strip and the amount of time it was submersed in the solution. The following table illustrates the exposure time during which a noticeable color change of the copper strip took place and the corresponding silver concentration level:

Exposure time (minutes)	Silver Concentration (ppm)
2	50
5	20
10	10
15	7
20	5
60	2

3.4.2 The pH of the solutions shall be measured using the OAKTON portable pH tester. The instrument shall be calibrated (two point calibration is required) before each set of measurements. The two calibration buffers used shall be pH 4.00 and 7.00 and they shall be fresh (not expired).

3.5 MAINTENANCE

Cartridges are scheduled to be changed on a quarterly basis, or as monitoring results indicate. The contracted vendor will replace the spent cartridges with new ones. The same vendor will be in charge of reclaiming the silver from the spent cartridges. Silver containing cartridges are disposed of as: “Silver sludge for recycling”

3.6 RECORDKEEPING

Monthly monitoring records and maintenance records will be kept at each location. Previous years’ records will be kept at the office of Health & Public Safety, and available upon request.

APPENDIX 1

Photographic Process Waste Recovery System
Monthly Monitoring Checklist

Location (Circle one): VPA 343

Date	Influent pH	Effluent pH	Influent [Ag] Min/ppm	Effluent [Ag] Min/ppm	Inspector	Comments

Exposure time (minutes)	Silver Concentration (ppm)
2	50
5	20
10	10
15	7
20	5
60	2

University Certification

Procedure E-116 (Photographic Process Waste Recovery), for the Western Connecticut State University campus located in Danbury, Connecticut, has been reviewed and approved by the appropriate personnel at Western Connecticut State University. The procedures in this plan will be implemented and amended, as necessary, due to expansions, modifications, and improvements at the campus.

Signature:  Date: 4/22/2020

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