

## Chapter 18 – Emergency Eyewash & Shower Equipment (REDACTED)

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### 18.1 Purpose

The purpose of this chapter is to provide guidance on the use, maintenance, selection, and installation of emergency eyewash and shower equipment to prevent injurious hazardous materials from damaging the eyes and skin of employees at Ames Research Center (ARC).

### 18.2 Policy

The policy of ARC is to provide a safe working environment for employees and safety-related equipment that is in compliance with American National Standards Institute (ANSI) standards and Occupational Safety and Health Administration (OSHA) requirements. Accomplishing this goal requires proper facility design, effective process layout, appropriate supervision, employee training, availability of appropriate personal protective equipment (PPE) and an employee commitment to ensuring their own safety. Emergency eyewash and shower equipment is the last line of defense for preventing prolonged employee exposure to injurious hazardous materials. This emergency equipment is no substitute for PPE, including protective eyewear and face shields. The purpose of PPE is to prevent the injury, whereas the eyewash and shower equipment is intended to minimize the injury, should the first line of defense fail.

### 18.3 Applicability

This manual is applicable to: (1) all Ames Employees; and (2) all persons and entities who agree in writing to comply with this manual.

### 18.4 References

1. 29 CFR 1910.151, Medical Services and First Aid
2. CCR Title 8, Article 109, Section 5162, Emergency Eyewash and Shower Equipment
3. CCR Title 8, Article 10, Section 5185, Changing and Charging of Storage Batteries
4. ANSI Z358.1-1998, American National Standard for Emergency Eyewash and Shower Equipment

### 18.5 Definitions

1. **Combination Unit:** A unit that combines a shower with an eyewash or eye/face wash, or with a drench hose, or with both, into one common assembly.
2. **Emergency Shower:** A unit that enables a user to have water cascading over the entire body.
3. **Eye/Face Wash:** A device used to irrigate and flush both the face and the eyes.
4. **Eyewash:** A device used to irrigate and flush the eyes.
5. **Faucet-Mounted Eyewash System:** A device that is connected to a faucet and used to irrigate and flush the eyes.
6. **Hand-Held Drench Hose:** A flexible hose connected to a water supply and used to irrigate and flush eyes, face, and body area.

7. **Injurious Hazardous Materials:** Hazardous Material is defined in the California Health and Safety Code as, "Any material that because of its quantity, concentration or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety...." These materials include those that are corrosive, severely irritating, can cause permanent tissue damage, or are toxic by absorption. Some examples of injurious hazardous materials used at Ames include sulfuric acid, phosphoric acid, nitric acid, hydrofluoric acid, sodium hydroxide, potassium hydroxide, and ammonia, as well as paints, glues, adhesives, sealants, fuels, and other chemical mixtures or substances.
8. **Personal Eyewash:** A supplementary eyewash that supports plumbed units, self contained units, or both, by delivering immediate flushing fluid.
9. **Plumbed Eyewash:** An eyewash unit permanently connected to a source of potable water.
10. **Potable Water:** Water that is suitable for drinking.
11. **Routinely Handled (as in, Significant Amounts of Injurious Hazardous Materials Routinely Handled):** As general guidance, the daily use of a mixture or substance constitutes routine handling. This is not defined in any of the regulatory or consensus standards because of the diversity of circumstances from workplace to workplace.
12. **Self-Closing Valve:** A valve that closes automatically when released.
13. **Self-Contained Eyewash:** An eyewash device that contains its own flushing fluid and must be refilled or replaced after use.
14. **Self-Contained Shower:** A shower that contains its own flushing fluid and must be refilled or replaced after use.
15. **Significant Amounts (as in, Significant Amounts of Injurious Hazardous Materials):** This is not defined in any of the regulatory or consensus standards because of the diversity of circumstances from workplace to workplace. General guidance is areas where breakable containers (one liter or more) are handled outside of their original shipping cartons; e.g., glass bottles of substance that are corrosive, severely irritating, can cause permanent tissue damage, or are toxic by absorption.

## 18.6 Responsibilities

### 18.6.1 Line Management

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### 18.6.2 Employees

Employees are responsible for performing tasks and operations in a manner that minimizes risk to self and others, and in compliance with the guidelines specified in this chapter. Employees shall:

1. Attend training as directed.
2. Obtain and use appropriate PPE.
3. Practice good housekeeping in the work area and maintain an unobstructed path to the emergency eyewash and shower equipment.
4. Use emergency eyewash and shower equipment when necessary.

### 18.6.3 Safety, Health, and Medical Services Division

1. Review this chapter annually and update as needed when new or modified applicable regulations become effective.
2. Provide assistance to management and employees when requested.

## 18.7 General Requirements

Emergency eyewash and shower equipment is required during routine operations or foreseeable emergencies where an employee may come in contact with a substance that is corrosive, severely irritating, may cause permanent tissue damage, or is toxic by absorption.

### 18.7.1 Equipment Selection

#### 1. General

- All new emergency eyewash and shower equipment must meet the requirements of ANSI Z358.1-1998.
- Other devices such as drench hoses or personal eyewash units that meet the requirements of sections 6 or 8 of ANSI Z358.1-1998 may support emergency eyewashes or showers, but shall not be used in lieu of them.
- Code QH will amend Chapter 18 to ensure that newly installed emergency eye washes and showers are referred to Code JFP for regular maintenance and that the equipped that is located in restricted areas have the owner/operator implement and record the inspections.

#### 2. Plumbing Units

- Because many foreseeable emergencies would require one to flush the eyes and body immediately, plumbed combination eyewash and shower units are recommended in areas where large amounts of injurious hazardous materials are used. The preferred equipment is a combination deluge shower and foot-operated eyewash fountain that fully drenches a contaminated person, and also allows free use of hands to assist opening the eyes while washing them. A model equivalent to or better than the Haws 8300 is recommended.
- Faucet-mounted eyewash units can be a cost-effective solution for operations that require only an eyewash. A model equivalent to or better than the OPTI-KLENS eyewash fountain is recommended.
- All plumbed units must be connected to a potable water supply.

#### 3. Self-Contained Units

- In areas where plumbing is not feasible or portable water is not available, self-contained eyewash or shower equipment is acceptable.
- Self-contained eyewashes shall be capable of delivering to the eyes not less than 1.5 liters per minute for 15 minutes. A model equivalent to or better than the Haws 7602 is recommended.

### 18.7.2 Equipment Use

1. Emergency eyewashes are for flushing an employee's eyes only.
2. Eye/Face wash equipment is available for the eyes and surrounding facial tissue.
3. Emergency showers and hand-held drench hoses are used for washing all other parts of the body.
4. Activation and use of emergency eyewash and shower equipment are dependent upon the equipment type and design. Manufacturer's literature should be consulted to determine proper equipment use.

### 18.7.3 Emergency Eyewash and Shower Location

1. Emergency eyewash and shower equipment shall be installed within the work area in laboratories, chemical dispensing areas, shops, flammable liquid handling areas, battery

charging rooms, photographic labs, and all other indoor and outdoor areas where significant amounts of injurious hazardous materials are routinely handled.

2. Areas or rooms where breakable containers (one liter or more) are handled outside of their original shipping cartons (e.g., glass bottles of corrosive chemicals removed from their original cardboard boxes) shall have emergency showers and eyewash stations.
3. The location of this emergency equipment shall be as close to the hazard as possible, in accessible areas requiring no more than 10 seconds to reach, within a travel distance no greater than 100 feet from the hazard, and no travel through doors or use of stairs. Site or operation-specific circumstances may require closer installation (e.g., large amounts of corrosives in open containers).
4. The potential effect of the chemical(s) being used should be considered when assessing the maximum time required to reach the emergency eyewash and/or shower station. The quick removal of the contaminant from the exposed person is of primary importance and the potential spread of contamination is a secondary consideration in such circumstances.
5. The location shall not become hazardous when the eyewash or shower is used (e.g., near open electrical contacts).
6. Before an eyewash and/or shower is installed, the path to the unit must be considered with respect to exposure to other hazards (e.g., stairs, protruding fittings, hot surfaces, closed doors with latches, etc.). The contaminated person may have to feel his/her way to the eyewash and shower equipment if an eye exposure is involved. An additional consideration when locating a unit is, in the case of a major hazardous material release, the contaminated person may need to leave the immediate danger area to use the equipment safely.

#### **18.7.4 Equipment Installation**

1. Plumbed of eyewash and shower equipment shall be connected to potable water systems.
2. Equipment installation criteria including minimum pressure requirements, pipe size, unit height, etc., shall be per manufacturers' specifications and as specified in ANSI Z358.1-1998.
3. Floor drains should be installed near the shower if flooding will create a serious hazard.
4. All eyewash and shower equipment shall be installed in well-lighted areas and their location shall be easily identified by signage and/or appropriate markings.
5. Contact the Safety, Health, and Medical Services Division with questions that pertain to equipment installation and signage.

#### **18.7.5 Equipment Performance and Maintenance**

1. Eyewash and shower equipment shall meet or exceed the performance requirements as specified in ANSI Z358.1-1998.
2. All eyewash and shower equipment shall be inspected and tested ANNUALLY to assure their performance complies with ANSI Z358.1998.
3. Eyewash nozzles shall be protected from airborne contaminants and their removal shall not require a separate motion by the operator when activating the unit.
4. Plumbed eyewash and shower equipment shall be inspected and activated at least monthly to flush the line and verify proper operation. Plant Engineering Branch provides testing and maintenance of emergency eyewash and shower units on a charge-back basis. To initiate this service, forward a Service Request with Job Order number to Plant Engineering Branch.

5. Self-contained equipment (eyewash, shower or combination) and personal eyewashes shall be inspected and maintained in accordance with the manufacturer's instructions.

## 18.8 Review and Update

This chapter will be updated when new or modified applicable regulations become effective.

## 18.9 Appendix

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### 18.9.1 Appendix A: NASA Risk Assessment Code

The Risk Assessment Code (RAC) is described in NPG 8715.3.

The RAC is a numerical expression of risk determined by an evaluation of both the potential severity of a condition and the probability of its occurrence as follows:

1. Severity classification will be identified as follows:
  - Class I Catastrophic - Marginal (may cause death or permanently disabling injury)
  - Class II - Critical (may cause severe injury or severe occupational illness)
  - Class III - Marginal (may cause minor occupational injury or illness)
  - Class IV - Negligible (probably would not affect personnel safety or health)
2. Probability is estimated as follows:
  - Estimate A - Likely to occur immediately.
  - Estimate B - Probably will occur in time.
  - Estimate C - May occur in time.
  - Estimate D - Unlikely to occur.

		Probability Estimate			
		A	B	C	D
Severity Class	I	1	1	2	3
	II	1	2	3	4
	III	2	3	4	5
	IV	3	4	5	6

To determine if an emergency eyewash or shower is required, supervisory personnel shall verify that a thorough review is performed of operations where injurious hazardous materials are routinely handled.

If the results of the evaluation determine that the RAC is 1 or 2, an eyewash or shower is **required**. If the results of the evaluation determine that the RAC is 4, 5, or 6, an eyewash or shower is **not required**. A RAC of 3 indicates that the eyewash or shower is optional.

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