

BROOKHAVEN NATIONAL LABORATORY Safety & Health Services Division INDUSTRIAL HYGIENE GROUP Standard Operating Procedure	NUMBER IH75137
	REVISION Final Rev 1
SUBJECT: POLICY AND FIELD PROCEDURE: Chemical Eyewash & Safety Shower Activation & Testing	DATE 02/21/08
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1.0 Purpose/Scope This procedure documents recommendations by the SHSD Industrial Hygiene Group for [frequency of routine activation and testing of eyewash stations, safety showers, and other similar health and safety protective devices.](#) It documents the decision logic of the recommendations. It is available for use by any BNL organization needing recommendations on the frequency of activation of eyewashes/showers in their areas. The procedure to conduct *testing* is outside the scope of this procedure.

2.0 Responsibilities This procedure of establishing an “activation and testing frequency” [can be implemented through the IH Group.](#) Organizations [that own and/or service eyewash stations, safety showers, and other similar health and safety protective devices can also refer to this method.](#) The SHSD Personal Protective Equipment Subject Matter Expert and the Chemical Hygiene Officer hold the responsibility to review the regulatory drivers on which this procedure is based and revise the procedure as necessary.

3.0 Definitions

Activation: The act of briefly starting flow through an eyewash or shower for the purposes of verifying that water flows from the unit (i.e. it is functional). A secondary benefit of this process is to replace stagnant water with fresh water which allows disinfectant chemicals in the water to be renewed and to flush out settled particulates in the stagnant water.

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Inspection Testing: The act of starting and sustaining flow through an eyewash or shower for the purposes of measuring the performance of the unit versus regulatory, consensus or manufacturer's recommendations or standards of performance. The procedure to conduct *inspection testing* is outside the scope of this procedure.

4.0 Prerequisites

- 4.1 Hazard/Risk Assessment of area: None to implement this procedure.
- 4.2 Personal Protective Equipment: None to implement this procedure.
- 4.3 Environmental Impact and Waste Disposal: None to implement this procedure.

5.0 Precautions None to implement this procedure.

6.0 Procedure

- 6.1 The BNL "activation and testing frequency" is set at a frequency established by the Personal Protective Equipment [PPE] Subject Matter Expert and the Chemical Hygiene Officer [CHO] based on a review the regulatory drivers (see Attachment 9.1 *Eyewash & Safety Shower Regulatory Drivers*.)
- 6.2 The PPE SME prepares Attachment 9.2 *BNL Eyewash & Safety Shower Activation and Inspection Testing Frequency*. The task of activating and testing Eyewash stations, safety showers, and other similar health and safety protective should be based on:
 - The degree of significant employee health risks from working with hazardous substances.
 - Regulatory requirements.
 - Best management practices in lieu of regulatory drivers.
 - Avoidance of undue research program interruption and creation of area hazards. (There is risk of ergonomic injury from lifting water filled catch basins and moving testing equipment from location to location. Areas where *activation and inspection testing* is done can become temporarily hazardous from *drained*

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or spilled water. *Activation* and *Inspection Testing* should be at a frequency necessary to ensure proper functioning in times of emergency while not placing the work areas at undue risk from un-necessarily frequency of *activation & testing*.)

- 6.3 The PPE SME revises the Attachment 9.2 *BNL Eyewash & Safety Shower Activation and Inspection Testing Frequency*, as necessary for compliance with regulatory drivers.
- 6.4 Line organizations *activate* their showers/eyewash stations by briefly initiating water flow via the emergency valve, handle, pedal, etc. Typical flow times would be one to five seconds for the purpose to visually see that water flows from the unit in an acceptable manner. Provisions to catch water from units that are not drained must be taken to prevent a slipping hazard from water on floors.
- 6.5 *Activation* does not include running the water for the period of time necessary for *Inspection Testing* flow rate or delivery temperature. *Inspection Testing* for proper functioning of units (measurement of performance to specifications) is reserved for specifically trained personnel in the plant Engineering Division.

7.0 Implementation and Training

7.1 Personnel Qualification:

- 7.1.1 Only persons who thoroughly understand the related regulatory standards, including Hazard Communication or Laboratory Standard, should set the *BNL Eyewash & Safety Shower Activation and Inspection Testing Frequency* recommendations.
- 7.1.2 Workers in an area with an eyewash or shower are allowed to *activate* the equipment without formal training. Workers are to follow pictograms on units, labeling on the unit, signage, or common knowledge of plumbing implements (i.e. spigot knobs, levers, handles) as their means of instruction.

8.0 References

- 8.1 ANSI Z358.1
- 8.2 OSHA 29CFR1910.1450 and other OSHA standards listed in Attachment 9.1.

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9.0 Attachments

9.1 *Eyewash & Safety Shower Regulatory Drivers.*

9.2 *BNL Eyewash & Safety Shower Activation and Inspection Testing Frequency.*

10.0 Documentation

Document Development and Revision Control Tracking		
PREPARED BY: <i>(Signature and date on file)</i> R. Selvey Certified Industrial Hygienist Date 01/05/05	REVIEWED BY: <i>(Signature and date on file)</i> P. Williams SHSD Manager Date 01/06/05	APPROVED BY: <i>(Signature and date on file)</i> R. Selvey SHSD IH Group Leader Date 01/06/05
ESH Coordinator/ Date: <i>none</i>	Work Coordinator/ Date: <i>none</i>	SHSD Manager / Date <i>none</i>
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ISM Review - Hazard Categorization <input type="checkbox"/> High <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Low/Skill of the craft	Validation: <input type="checkbox"/> Formal Walkthrough <input type="checkbox"/> Desk Top Review <input type="checkbox"/> SME Review Name / Date:	Implementation: Training Completed: n/a Procedure posted on Web: 02/21/08 Hard Copy files updated: 02/21/08 Document Control on forms: n/a

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Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input checked="" type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change: Minor text changes marked in the document. Added definitions. Added 6.5. and 6.6. Added references in Section 8. Corrected the error in Attachment 9.1 Title.		
02/21/08 R. Selvey (signature on file) SME Reviewer/Date:	Reviewer/Date:	Reviewer/Date:
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change:		
(signature on file) SME Reviewer/Date:	SME Reviewer/Date:	SME Reviewer/Date:

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Attachment 9.1

Eyewash & Safety Shower Regulatory Drivers

Revision 0: Date: 01/04/2005

1.	ANSI Z358.1- 2004	4.6 Maintenance and Training 4.6.2 Plumbed shower equipment shall be activated weekly for a period long enough to verify operation and ensure that flushing fluid is available. 4.6.5 All shower units shall be inspected annually to assure conformance with ANSI Z358.1 Section 4 requirements. 5.5.2 Plumbed eyewash equipment shall be activated weekly for a period long enough to verify operation and ensure that flushing fluid is available. 5.5.5 All eyewash units shall be inspected annually to assure conformance with ANSI Z358.1 Section 5 requirements.
2.	29CFR1910.1450 <i>Occupational exposure to hazardous chemicals in laboratories.</i>	(a) Scope and application. (2) (ii) Prohibition of eye and skin contact where specified by any OSHA health standard shall be observed. (e) Chemical hygiene plan--General. (3) The Chemical Hygiene Plan shall include each of the following elements and shall indicate specific measures that the employer will take to ensure laboratory employee protection: (iii) A requirement that fume hoods and other protective equipment are functioning properly and specific measures that shall be taken to ensure proper and adequate performance of such equipment; Appendix A to Sec. 1910.1450--National Research Council Recommendations Concerning Chemical Hygiene in Laboratories (Non-Mandatory) C. The Laboratory Facility 1. Design. The laboratory facility should have: d) Other safety equipment including eyewash fountains and drench showers; D. Components of the Chemical Hygiene Plan; 4. Housekeeping, Maintenance, and Inspections (c) Maintenance. Eyewash fountains should be inspected at intervals of not less than 3 months. Respirators for routine use should be inspected periodically by the laboratory supervisor. Safety showers should be tested routinely. Other safety equipment should be inspected regularly. (e.g., every 3-6 months). Procedures to prevent restarting of out-of-service equipment should be established (25). 6. Protective Apparel and Equipment These should include for each laboratory: b) An easily accessible drench-type safety shower; c) An eyewash fountain; [55 FR 3327, Jan. 31, 1990; 55 FR 7967, Mar. 6, 1990; 55 FR 12111, Mar. 30, 1990; 57 FR 29204, July 1, 1992; 61 FR 5508, Feb. 13, 1996]
3.	29CFR1910.151 <i>Medical services and first aid.</i>	(c) Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. [39 FR 23502, June 27, 1974, as amended at 63 FR 33466, June 18, 1998]
4.	29CFR1910.1030 <i>Bloodborne pathogens.</i>	d) Methods of compliance-- (3) HIV and HBV research laboratories shall meet the following criteria: (i) Each laboratory shall contain a facility for hand washing and an Eyewash facility which is readily available within the work area. (4) HIV and HBV production facilities shall meet the following criteria: (iii) Each work area shall contain a sink for washing hands and a readily available Eyewash facility. The sink shall be foot, elbow, or automatically operated and shall be located near the exit door of the work area.
5.	29CFR1910.1048-- <i>Formaldehyde.</i>	(i) Hygiene protection. (1) The employer shall provide change rooms, as described in 29 CFR 1910.141 for employees who are required to change from work clothing into protective clothing to prevent skin contact with formaldehyde. (2) If employees' skin may become splashed with solutions containing 1 percent or greater

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		<p>formaldehyde, for example, because of equipment failure or improper work practices, the employer shall provide conveniently located quick drench showers and assure that affected employees use these facilities immediately.</p> <p>(3) If there is any possibility that an employee's eyes may be splashed with solutions containing 0.1 percent or greater formaldehyde, the employer shall provide acceptable eyewash facilities within the immediate work area for emergency use.</p> <p>Appendix A to Sec. 1910.1048--Substance Technical Guidelines for Formalin</p> <p>Eye Contact: Wash the eyes immediately with large amounts of water occasionally lifting lower and upper lids, until no evidence of chemical remains (at least 15 to 20 minutes). In case of burns, apply sterile bandages loosely without medication. Get medical attention immediately. If you have experienced appreciable eye irritation from a splash or excessive exposure, you should be referred promptly to an ophthalmologist for evaluation.</p> <p>Eye Protection: If you might be splashed in the eyes with formalin, it is essential that you wear goggles or some other type of complete protection for the eye. You may also need a face shield if your face is likely to be splashed with formalin, but you must not substitute face shields for eye protection. (This section pertains to formaldehyde solutions of 1% or more.) If you are splashed with formaldehyde, use the emergency showers and eyewash fountains provided by your employer immediately to prevent serious injury. Report the incident to your supervisor and obtain necessary medical support.</p>
6.	<p>OSHA Instruction CPL 2-2.52 Office of Health Compliance Assistance <i>Subject: Enforcement</i> <i>Procedures for Occupational Exposure to Formaldehyde 11/20/1990</i></p>	<p>Paragraph (i), Hygiene Protection. a. Emergency Showers. Because of the severe dermal effects that can occur when employees have skin contact with concentrated solutions of formaldehyde and because of the relative irreversibility of dermal sensitization to formaldehyde, the employer is required to provide conveniently located quick drench showers for employees who become splashed with solutions of 1 percent or greater formaldehyde as the result of equipment failure, improper work practices, or other emergencies. Whether or not the employee is wearing protective clothing does not affect the need for quick drench showers since the employee must be able to remove PPE splashed with formaldehyde in a safe manner. The availability of emergency showers should also help to lower any potentially serious inhalation hazard when an employee has been splashed with a formaldehyde solution.</p> <p>b. Eyewash Facilities. Liquid formaldehyde can also cause severe damage to the eyes. Thus, the standard requires employers to provide appropriate Eyewash facilities within the immediate work area for emergency use by any employee whose eyes are splashed with solutions containing 0.1 percent or more of formaldehyde. c. The degree of sophistication of the emergency shower and/or eyewash station varies with the size of the potential splash. The use of portable units or hand-held fixtures should be carefully evaluated. Such use should be limited to small spills (generally less than 8 oz.), provided that all possible affected body parts can be flushed continuously for 15 minutes. (For this reason, bottle-type eyewashes are not acceptable.) Appendix C of this instruction contains specific (nonmandatory) evaluation criteria for emergency showers and eyewashes.</p>
7.	<p>OSHA Instruction CPL 2-2.52 for 1910.1048 Appendix C Nonmandatory Evaluation Criteria for Emergency Showers and Eyewashes (FORMALDEHDE)</p>	<p>The criteria for acceptable eyewashes and quick drench showers should be taken from ANSI Z358.1-1981, which will be revised in the near future. [BNL PPE SME Note: This standard has been revised in 1990, 1998 and 2004. ANSI Z358.1-2004 is used].</p> <p>The National Safety Council Data Sheet 1-686-Rev. 86 contains comparable criteria, but not identical specifications. Generally, the main criteria for judging acceptability are:</p> <p>(1) Initiation: one hand, one action. Once initiated, flow continues, leaving both hands free. (2) Location: 15 seconds, 25 feet travel, maximum (for highly concentrated solutions, 10 seconds, 10 feet maximum). Eyewashes positioned 34"-39" high, shower approximately 82" high, with 67" high activation (maximum), positioned 23" (maximum) off center from shower head. Location must be clearly marked, well lighted, and easily accessible; i.e., no obstacles, doorways, or turns. (3) Water quality: potable, temperature (60-100 degrees F, ideally 90-95 degrees F), pressure (eyewash 30 psi at supply line, shower 30 psi), amount (eyewash 3 gallons/minute for 15 minutes minimum, showers 30 gallons/minute for 15 minutes minimum), maintenance (float-away covers or means to prevent contamination; flush units weekly for a minimum of 3 minutes; bump test eyewashes daily, showers weekly; full flow testing monthly). (4) Training: Routine drills advisable. As a minimum, employees must know the location and proper use of eyewashes and showers</p>

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		(i.e., initiate, remove contaminated clothing, flush full 15 minutes, etc.).
8.	29CFR1910.1052-- Methylene Chloride.	<p>(h) Protective Work Clothing and Equipment. (1) Where needed to prevent MC-induced skin or eye irritation, the employer shall provide clean protective clothing and equipment which is resistant to MC, at no cost to the employee, and shall ensure that each affected employee uses it. Eye and face protection shall meet the requirements of 29 CFR 1910.133 or 29 CFR 1915.153, as applicable.</p> <p>(i) Hygiene facilities. (1) If it is reasonably foreseeable that employees' skin may contact solutions containing 0.1 percent or greater MC (for example, through splashes, spills or improper work practices), the employer shall provide conveniently located washing facilities capable of removing the MC, and shall ensure that affected employees use these facilities as needed.</p> <p>(2) If it is reasonably foreseeable that an employee's eyes may contact solutions containing 0.1 percent or greater MC (for example through splashes, spills or improper work practices), the employer shall provide appropriate eyewash facilities within the immediate work area for emergency use, and shall ensure that affected employees use those facilities when necessary.</p> <p>Appendix A to Section 1910.1052--Substance Safety Data Sheet and Technical Guidelines for Methylene Chloride III. Emergency First Aid Procedures In the event of emergency, institute first aid procedures and send for first aid or medical assistance. A. Eye and Skin Exposures: If there is a potential for liquid MC to come in contact with eye or skin, face shields and skin protective equipment must be provided and used. If liquid MC comes in contact with the eye, get medical attention. IV. Respirators, Protective Clothing, and Eye Protection C. Eye Protection: Employees should be provided with and required to use splash-proof safety goggles where liquid MC may contact the eyes.</p> <p>[62 FR 1601, Jan. 10, 1997, as amended at 62 FR 42667, Aug. 8, 1997; 62 FR 54383, Oct. 20, 1997; 62 FR 66277, Dec. 18, 1997; 63 FR 1295, Jan. 8, 1998; 63 FR 20099, Apr. 23, 1998; 63 FR 50729, Sept. 22, 1998.</p>
9.	29CFR1910.1045-- Acrylonitrile.	<p>(2) Dermal and eye exposure. The employer shall assure that no employee is exposed to skin contact or eye contact with liquid AN.</p> <p>(m) Hygiene facilities and practices. (1) Where employees are exposed to airborne concentrations of AN above the permissible exposure limits, or where employees are required to wear protective clothing or equipment pursuant to paragraph (j) of this section, the facilities required by 29 CFR 1910.141, including clean change rooms and shower facilities, shall be provided by the employer for the use of those employees, and the employer shall assure that the employees use the facilities provided.</p> <p>(2) The employer shall assure that employees wearing protective clothing or equipment for protection from skin contact with liquid AN shall shower at the end of the work shift.</p> <p>(3) The employer shall assure that, in the event of skin or eye exposure to liquid AN, the affected employee shall shower immediately to minimize the danger of skin absorption.</p> <p>(4) The employer shall assure that employees working in the regulated area wash their hands and faces prior to eating.</p> <p>Appendix A to Sec. 1910.1045--Substance Safety Data Sheet for Acrylonitrile iii. Emergency First Aid Procedures A. Eye exposure: If acrylonitrile gets into your eyes, wash your eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. iv. Respirators and Protective Clothing D. Eye protection: You must wear splashproof safety goggles in areas where liquid acrylonitrile may contact your eyes. In addition, contact lenses should not be worn in areas where eye contact with acrylonitrile can occur. [43 FR 45809, Oct. 3, 1978, as amended at 45 FR 35283, May 23, 1980; 54 FR 24334, June 7, 1989; 58 FR 35310, June 30, 1993; 61 FR 5508, Feb. 13, 1996; 63 FR 1291, Jan. 8, 1998; 63 FR 20099,</p>

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10.	29CFR1910.1018-- Inorganic arsenic.	<p>(m) Hygiene facilities and practices--(1) Change rooms. The employer shall provide for employees working in regulated areas or subject to the possibility of skin or eye irritation from inorganic arsenic, clean change rooms equipped with storage facilities for street clothes and separate storage facilities for protective clothing and equipment in accordance with 29 CFR 1910.141(e). (2) Showers. (i) The employer shall assure that employees working in regulated areas or subject to the possibility of skin or eye irritation from inorganic arsenic shower at the end of the work shift. (ii) The employer shall provide shower facilities in accordance with Sec. 1910.141(d)(3). (6) Avoidance of skin irritation. The employer shall assure that no employee is exposed to skin or eye contact with arsenic trichloride, or to skin or eye contact with liquid or particulate inorganic arsenic which is likely to cause skin or eye irritation.</p> <p>Appendix A to Sec. 1910.1018--Inorganic Arsenic Substance Information Sheet B. Protective clothing. If you work in a regulated area, your employer is required to provide at no cost to you, and you must wear, appropriate, clean, protective clothing and equipment. The purpose of this equipment is to prevent you from bringing to your home arsenic-contaminated dust and to protect your body from repeated skin contact with inorganic arsenic likely to cause skin irritation. This clothing should include such items as coveralls or similar full-body clothing, gloves, shoes or coverlets, and aprons. Protective equipment should include face shields or vented goggles, where eye irritation may occur.</p> <p>[39 FR 23502, June 27, 1974, as amended at 43 FR 19624, May 5, 1978; 43 FR 28472, June 30, 1978; 45 FR 35282, May 23, 1980; 54 FR 24334, June 7, 1989; 58 FR 35310, June 30, 1993; 61 FR 5508, Feb. 13, 1996; 61 FR 9245, Mar. 7, 1996; 63 FR 1286, Jan. 8, 1998; 63 FR 33468, June 18, 1998]</p>
11.	29CFR1910.1044-- 1,2-dibromo-3-chloropropane.	<p>(j) Protective clothing and equipments-- (ii) The employer shall assure that employees whose skin becomes contaminated with DBCP-containing liquids or solids immediately wash or shower to remove any DBCP from the skin.</p> <p>Appendix A to Sec. 1910.1044--Substance Safety Data Sheet For DBCP i. Substance Identification 2. Dermal. Eye contact and skin contact with DBCP are prohibited. iii. Emergency First Aid Procedures A. Eye exposure. If DBCP liquid or dust containing DBCP gets into your eyes, wash your eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention immediately. Contact lenses should not be worn when working with DBCP.</p> <p>[43 FR 11527, Mar. 17, 1978, as amended at 45 FR 35283, May 23, 1980; 49 FR 18295, Apr. 30, 1984; 54 FR 24334, June 7, 1989; 58 FR 35310, June 30, 1993; 61 FR 5508, Feb. 13, 1996; 63 FR 1291, Jan. 8, 1998]</p>
12.	29CFR1910.133-- Eye and face protection. FOR GENERAL INDUSTRY	<p>(a) General requirements. (1) The employer shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.</p>
13.	29CFR1926.102-- Eye and face protection. FOR CONSTRUCTION	<p>(a) General. (1) Employees shall be provided with eye and face protection equipment when machines or operations present potential eye or face injury from physical, chemical, or radiation agents. (2) Eye and face protection equipment required by this Part shall meet the requirements specified in American National Standards Institute, Z87.1-1968, Practice for Occupational and Educational Eye and Face Protection. [44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, as amended at 58 FR 35160, June 30, 1993]</p>

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Attachment 9.2

BNL Eyewash & Safety Shower Activation and Testing Frequency

Work Area/ Operation Classification	Hazard	Frequency of Activation		Frequency of ANSI Z358.1 Compliance Testing	
		Eyewash	Shower	Eyewash	Shower
HazCom	Only Chemicals that are <u>not</u> corrosive to eye or skin	Annual	Annual	Annual	Annual
HazCom	Chemicals that are <u>corrosive</u> to eye or skin	Weekly	Weekly	Annual	Annual
HazCom	Formaldehyde (>1% solution)	Weekly	Weekly	Annual	Annual
Laboratory Standard	Only Chemicals that are <u>not</u> corrosive to eye or skin	Quarterly	Annual	Annual	Annual
Laboratory Standard	Chemicals that are <u>corrosive</u> to eye or skin	Quarterly	Quarterly	Annual	Annual
Laboratory Standard	Formaldehyde (>1% solution)	Weekly	Weekly	Annual	Annual