Emergency Eyewash and Shower SOP

1. Purpose / Background
MIT is committed, as per its Environmental, Health and Safety (EHS) Policy, to “excellence in environmental, health and safety stewardship on our campus”… and to minimize “the adverse EHS impacts of our facilities, activities and operations to protect human health…”

Each day about 2,000 U.S. workers have a job-related eye injury that requires medical treatment. (NIOSH, 2006.) In 2002, there were 42,286 occupational injuries or illnesses involving the eye that resulted in days away from work; about 11% were due to chemical burns. (According to Bureau of Labor Statistics, 2002)

Emergency showers and eyewash stations are provided as a first aid treatment to help reduce the effects of an exposure to hazardous material. They provide rapid flushing of the eyes, face and/or body of an individual who has been splashed by a hazardous material.

Eyewashes or emergency showers are not a substitute for prevention and protection but should be used in conjunction with these controls to ensure the safety and health of the M.I.T. community.

There are hundreds of eyewashes and emergency showers on the M.I.T. Campus. This Standard Operating Procedure (S.O.P.) describes when eyewashes and/or emergency showers are needed; how to choose, install and test them; when and how to use them; and who to contact in case of emergency or to obtain additional information.

2. Scope
This document applies to all Departments, Labs, and Centers (DLC’s) at M.I.T. The following types of equipment are covered: emergency showers, hand-held drench hoses, eyewashes, combination shower/eyewash and self-contained eyewashes.

This document summarizes the OSHA and Massachusetts requirements as well as ANSI, NIH and other consensus standards and EHS best practices.

The following sections would be of interest to Project Managers and Repair and Maintenance Supervisors in the Department of Facilities:
4.1 When do we need an eyewash or an emergency shower?
4.2. What are the specifications for equipment/ water/ saline?
4.3.2. The plumber should perform the following tests after installing an eyewash
4.3.3. Inform the Facilities Preventive Maintenance Office about new installations.
4.5. How to test and repair emergency showers and/or eyewashes?
4.6. Access and signage
Note: Appendix A includes the section for the MIT Building Systems Design Handbook.

3. Prerequisites
The supply should be tempered water between 70° F and 90° F and installed in a manner that prevents the stagnation of water in the piping. This is a prerequisite for MIT Department of Facilities (DOF) to obtain a permit from the City of Cambridge Plumbing Inspector.
Engineering controls should be the first level of protection. An additional level of protection to the user is proper primary protective devices. Personal Protective Equipment should be worn as described in the Chemical Hygiene Plan or other SOP of the DLC. Improving procedures to eliminate or minimize hazards may also prevent injuries.

4. Procedures

Summary of this section: Eyewashes and emergency showers should be located in areas where an eye or face hazard exists. This equipment should be readily accessible and the locations clearly marked with signage. Regular testing and inspection (i.e. DLC level 1 and level 2, DOF Preventive Maintenance tests) should be performed to ensure that the equipment will function well in the event of an emergency.

4.1. When do we need an eyewash or an emergency shower?

4.1.1 Legal requirements, consensus standards, and MIT references for eyewashes and emergency showers are as follows:

<table>
<thead>
<tr>
<th>Citation</th>
<th>Legal requirements for Emergency Showers and eyewashes</th>
<th>Factors that MIT considers when applying the criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA 29 CFR 1910.151(c)</td>
<td>“…where the eyes or body of any person may be exposed to injurious corrosive materials”</td>
<td>Quantity, volume, concentration, and manual manipulation of the hazardous material</td>
</tr>
<tr>
<td>OSHA 29 CFR 1910.178</td>
<td>Battery acid is handled and/or wet cell batteries are charged 29 CFR 1910.178(g) requires certain precautions to be taken when charging electric batteries of powered industrial trucks.</td>
<td>Includes uninterrupted power supply battery racks and charging stations for battery operated vehicles.</td>
</tr>
<tr>
<td>OSHA 1910.1048(i 2 &amp; i3)</td>
<td>Formaldehyde If there is any possibility that an employee's eyes/skin may be splashed with solutions containing 0.1 percent or greater formaldehyde, the employer shall provide acceptable eyewash/shower facilities within the immediate work area for emergency use.</td>
<td>Include solutions of formaldehyde and formalin</td>
</tr>
<tr>
<td>Massachusetts Fire Prevention Regulation 527 CMR 10.02 (1)</td>
<td>any room wherein corrosives or flammable liquids are handled or where open flame devices are used</td>
<td>Include chemical stockrooms and Hazardous Waste Storage Areas (less than 90 days)</td>
</tr>
<tr>
<td>Uniform State Plumbing Code 248 CMR 10.13</td>
<td>any room wherein corrosives or flammable liquids are handled, chemicals are stored or used, or where open flame devices are used</td>
<td>Include chemical stockrooms and Hazardous Waste Storage Areas (less than 90 days)</td>
</tr>
<tr>
<td>NRC</td>
<td>Note that there are no requirements for eyewashes or showers when using radioactive materials.</td>
<td>Reactor RPP requires eyewashes</td>
</tr>
</tbody>
</table>

Source

Consensus standards and other recommendations

| Source | | Factors that MIT considers when applying these |
|--------|------------------------------------------------------------------------------------------------------------------|
| CDC/ NIH Biosafety in Microbiological and Biomedical Laboratories, 4th edition | Biosafety level 2 “an eyewash station is readily available” Biosafety level 3 “an eyewash station is readily available inside the laboratory” | BL2 includes BL2+ BL1 labs should be evaluated by the BSP team member to determine if they should have a self-contained eyewash. |
### NIH Policy Manual
Protection of NIH Personnel Who Work with Nonhuman Primates (NHP)

“And for eye, mouth or nose splashes, that flushing of the area with saline solution or at an eye wash station (ocular exposures) should also be initiated within 5 minutes and continue for at least 15 minutes.”

Includes areas where non-human Primates (NHP) are handled. There is a risk of disease transmission if the NHP’s saliva and/ or body fluids come in contact with the person’s eyes, nose, and/ or mouth (any mucous membrane). There is also a risk of disease transmission when people medically treat wounds and clean contaminated instruments, equipment, and containers.

### AAALAC

Similar to NIH guidance above

### NFPA 99 11-6 (Health Care Facilities / Chapter on Laboratories)

where the eyes or body of any person can be exposed to injurious corrosive materials.

### ANSI Z358.1 Emergency Eyewash and Shower Equipment

“Emergency showers shall be in accessible locations that require no more than 10 seconds to reach. The shower shall be located on the same level as the hazard and the path of travel shall be free of obstructions that may inhibit the immediate use of the equipment…. [Eyewashes must be installed according to the same specifications as Emergency Showers.] For a strong acid or strong caustic, the eyewash unit should be immediately adjacent to the hazard.”

### MIT references

- References all of the above.
- Refer to Appendix A for the applicable section of the Design Handbook.

- DCM refers to NIH policy above
  - Wear eye protection and check that an eyewash is nearby when using syringes to inject any type of animal with a hazardous material.
  - Animals other than NHPs are involved in the lab’s research that includes chemicals, biohazards, and/ or radioactive materials.
  - When DCM quarantines the new NHPs, the risk is much higher for the caretakers until the test results are negative.

- Perchloric Acid that is heated in Hoods
- Hydrofluoric Acid is used in any amount in any process.

- Every laboratory where the use of materials that are either corrosive or that otherwise present a significant skin/eye contact or absorption hazard must have access to an unobstructed safety shower and eyewash facility that meets the requirements of OSHA regulations (29 CFR 1910.151(c)).

- Etchers and Spinners that are used in Clean room type labs. Many hazardous chemicals are used with this type of equipment.

#### 4.1.2. Based on an evaluation of the research, operations, and work area, EHS will determine whether emergency showers and/ or eyewashes are needed. EHS will take into account the severity, concentration, and frequency of use of hazardous materials, number of people in area, risk of an accident, and magnitude of splashes or spills that may be encountered. The following criteria can be used to address inspection findings as well as to review plans for new buildings or renovations of existing buildings.

An official hardcopy of this document exists in the EHS Office or on the EHS website.
See Legal Disclaimer at: [http://ehs.mit.edu/site/content/legal-disclaimer](http://ehs.mit.edu/site/content/legal-disclaimer)
1. Concentrated, liquid hazardous materials are frequently handled (i.e. mixed, transferred, sprayed) in a way that could create a splash or spill. The hazardous materials are used in medium to large quantities. Examples include the following: Corrosive chemicals are handled in a manually intensive manner. (This includes certain types of cleaning products that are stored in large drums.) Acid is heated in an open container. Hydrofluoric acid is used in most concentrations. Disinfectants are sprayed frequently on contaminated surfaces (in animal areas, exam rooms, restrooms, etc.) and this can irritate the user’s eyes and skin. Any of these factors would create a higher risk of a serious accident so the need for emergency wash equipment is greater.

2. In contrast, the following factors might lower the risk of an accident. Corrosive and flammable liquids are used in dilute concentrations, small quantities, and/or infrequently. These are not used in ways that create splashes/ spills, such as an automated process when a bottle is connected to a piece of equipment. The physical state of the chemicals does not pose a risk to the eyes.

3. The number of people working with hazardous materials in the area is important to consider because statistically this increases the risk compared to an area where only a few people are working and not very often. A “lab buddy” should be assigned by the supervisor to help them quickly get to a plumbed eyewash.

The EHS Coordinator and lab representative may be involved in this evaluation.

4.1.3 What are the Alternatives to Plumbed Eyewashes that can be used safely?

Bottled eyewash: The typical bottle (8-16 oz) will not provide enough solution to irrigate the eyes for more than a couple of minutes, especially if both eyes and/or face are splashed. Moreover, the victim won’t be able to hold their eyes open to irrigate both eyes simultaneously. If your lab or work area has any of the risk factors described above, the EHS Office does not recommend having a bottled eyewash. If this is the only option, then stock at least two large bottles and plan to have the lab buddy help the injured person.

Self-contained Eyewashes: If the unit meets the ANSI standard for Emergency Eyewash and Shower Equipment and contains supply of sterile wash solution that will flow for 15-minutes, it could be used as an interim solution until a plumbed eyewash is installed
- in areas where water is not available
- in areas where only non-potable or non-tempered, potable water is currently available and a Facilities project has to be funded and scheduled to install the systems needed to supply the required water to the building.
- when small quantities of chemicals are used that have minimal hazards and are not used in ways that create any hazard to the eye.

4.2. What are the specifications for equipment and water / fluid supply?

4.2.1. The specifications include the following:
- Comply with the latest ANSI Z358.1 Standard for Emergency Eyewash and Shower Equipment.
- The lever that you push, pull or squeeze to activate the eyewash/ shower should be designed to remain on without requiring the use of the operator’s hands. It should be easy to operate in an emergency.

An official hardcopy of this document exists in the EHS Office or on the EHS website.
See Legal Disclaimer at: http://ehs.mit.edu/site/content/legal-disclaimer
The water or fluid should flow until intentionally shut off or until the specified amount has been discharged.

**Regarding Eyewash models only:**
- Fluid should be provided to both eyes simultaneously via two nozzles or other means.
- Nozzle protection should automatically come off when the water/ fluid starts to flow.
- In many cases it is preferable to minimize the amount of space that the eyewash unit takes up at the sink.

4.2.2. Refer to the Department of Facilities Building System Design Handbook (section 15, Plumbing – subsection “Emergency Shower and Eyewash Systems”). This is also in Appendix A. The Department of Facilities Repair and Maintenance has specified certain models so that they will be able to obtain parts to repair the Emergency Shower and Eyewash.

4.2.3. **ADA compliance**: Emergency wash equipment that meets the ADA requirements should be installed when new buildings are constructed or when the building is renovated. Designers of new labs should refer to the Massachusetts Access Architectural Board (MAAB) guidelines for approach and reach.

For the existing buildings, ADA compliant models are not required when installing an eyewash in a lab that is not generally accessible to persons with disabilities. However in a given area accessible to disabled students or personnel, accessible and ADA compliant models of eyewashes and emergency showers should be provided.

4.2.4. Some of the specifications for the water or fluid supply are described below. This includes the Uniform State Plumbing Code 248 CMR 10.13 and Fire Prevention Regulation 527 CMR 10.02 requirements for tempered water. These are enforceable.

<table>
<thead>
<tr>
<th>ANSI Z358.1-1998</th>
<th>Eyewash</th>
<th>Emergency Shower</th>
</tr>
</thead>
<tbody>
<tr>
<td>water/ fluid</td>
<td>tepid water (ANSI does not specify temperature range)</td>
<td>Plumbed or self-contained Eyewash: not less than 0.4 gpm for 15 minutes</td>
</tr>
<tr>
<td>temperature</td>
<td>tempered water between 70 and 90 F (527 CMR 10.02, 248 CMR 10.13)</td>
<td>minimum of 20 gpm at a velocity low enough to be non injurious to the user (ANSI)</td>
</tr>
<tr>
<td>water/ fluid</td>
<td>Plumbed or self-contained Eyewash: not less than 0.4 gpm for 15 minutes</td>
<td>30 gallons per minute (527 CMR 10.02, 248 CMR 10.13)</td>
</tr>
<tr>
<td>pressure</td>
<td>Eye / Face wash equipment: not less than 3.0 gpm for 15 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Velocity should be low enough to be non-injurious to the user</td>
<td></td>
</tr>
<tr>
<td>water/ fluid</td>
<td>potable water, preserved water, saline solution or any medically acceptable solution* (ANSI)</td>
<td>potable water (527 CMR 10.02, 248 CMR 10.13)</td>
</tr>
<tr>
<td>quality</td>
<td>Control valve</td>
<td>valve should be the on/off type designed to remain activated until intentionally shut off</td>
</tr>
<tr>
<td></td>
<td>Prevent stagnation</td>
<td>installing equipment in a manner that prevents the stagnation of water in the piping 248 CMR 10 section (l)5</td>
</tr>
</tbody>
</table>

*Note: Sterile Saline is an acceptable alternative to potable water. Preservatives that are added to tap water reservoirs are not an effective long term solution.

It is ultimately the responsibility of the Department of Facilities (DoF) to have the water lines traced and to insure that the emergency equipment is connected to potable water. The DoF shutdown procedure will be followed so the Shutdown Coordinator and DoF Repair and Maintenance (R&M)
Plumbing Supervisor will oversee that the piping is correctly identified and marked. (Note: It would be unlikely that the plumbing inspector would pick up this type of connection given the complexity of the systems.)

The Cambridge Inspectional Services reviewed the requirement that MIT labs flush their eyewashes once a week as part of the Level 1 inspection program. They also reviewed the DOF Preventive Maintenance program to test emergency showers twice a year. They made an agreement with MIT in December 2008 that this is an acceptable alternative to installing equipment in a manner that prevents the stagnation of water in the piping.

4.3  How do we have the equipment installed?

4.3.1. Submit a requisition to the Department of Facilities via SAP for an estimate and/or to schedule the work. If the funding source is different than the lab or department, contact the Repair and Maintenance Support Team. Indicate if the Safety Program has already reviewed this request. If the department is funding this, the Repair and Maintenance Support Team will notify the EHS Office to review the location. The Zone Repair and Maintenance Team will be assigned a work order to install the equipment and the sign that comes with the equipment.

4.3.2. Installation/Testing for Commissioning: The plumber should perform the following tests after installing an eyewash. Hold the eyewash in the position according to the manufacturer’s template during the tests.

- Check if one spray nozzle has more water flowing through it than the other nozzle. If it does, switch the nozzles and test again.
- If the problem persists, the spray nozzle contains an automatic flow control filter that controls the pressure. Unscrew the nozzle and look at the end with the threads. If the filter (black and white or red and white) is missing, ask the supplier to replace the defective unit.
- Check that the eyewash delivers at least 0.4 gpm to meet the ANSI standard. This should be measured with a gauge or by running the water for one minute into a large container (with volume indications).
- Check that the eye/face/bodywash hose delivers at least 3 gpm to meet the ANSI standard. This should be measured with a gauge or by running the water for one minute into a large container (with volume indications). If more than 3 gallons is collected, then the pressure is too high. Ask the supplier to replace the defective unit.
- Verify that the water is potable and tempered. The lines should be flushed adequately during installation so no oil, rust or debris is found by the lab users.

4.3.3. The Department of Facilities Plumbing Supervisor and Construction Coordinators will inform the Facilities Preventive Maintenance Office about new installations. This office will tag a new emergency shower, add it to the database and schedule testing. Refer to the section on testing and maintenance for details. Construction Coordinators will commission emergency showers and eyewashes, which are installed during construction and renovation projects. Repair and Maintenance will do this if the contractor has not.
4.3.4. The EHS Office reviews plans for renovations and new buildings to verify that emergency wash equipment will be installed in rooms that meet the criteria in section titled “When do we need” …

4.4. **How to choose the best location?**

4.4.1. The following summarizes the various requirements criteria to consider when selecting a location for a shower or eyewash. The combined requirements to be within the 10 second travel distance but not greater than 50 feet.

<table>
<thead>
<tr>
<th></th>
<th>Eyewash</th>
<th>Emergency Shower</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA</td>
<td>within the work area for immediate emergency use.</td>
<td></td>
</tr>
<tr>
<td>29CFR 1910.151(c)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANSI</td>
<td>in accessible locations that require no more than 10 seconds to reach (…), on the same level as hazard (i.e. on the same floor). The path of travel (to the safety equipment) should be free of obstructions (i.e. locked doors, boxes, etc.). It is acceptable to go through an unlocked door.</td>
<td>for a strong acid or caustic, (it) should be immediately adjacent to the hazard.</td>
</tr>
<tr>
<td>Z358.1-1998</td>
<td>7.7.4 and 4.6.1</td>
<td></td>
</tr>
<tr>
<td>527 CMR 10.02 (2)</td>
<td></td>
<td>Should not be located greater than 50’ from an experimental area</td>
</tr>
<tr>
<td>248 CMR 10.13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4.2. Chose a location that is adjacent to the hazard but there must be enough room so that the victim and emergency responders will be safe. (For example, installing an eyewash/shower “immediately adjacent” to an exhaust hood is not recommended.) The emergency shower and eyewash unit must be located on the same level of the hazard and the path of travel must be free of obstructions that would inhibit the immediate use of the equipment. For strong acid and strong caustic hazards the eyewash unit should be immediately adjacent to the hazard.

The ANSI standard for Emergency Eyewash and Shower Equipment specifies the distance of the unit from the standing surface and the wall (or the nearest obstruction). This is to ensure that the unit will be reachable by any user and that the user will not be injured.

4.4.3 **Eyewash units must be located within the laboratory and** where possible eyewash units should be installed at sinks for proper draining to allow for required weekly testing of the units. If an eyewash is installed at a lab sink, it should not be located on the counter where the lab ware will often block it (inspection finding). It should spray towards the user so they do not have to twist and bend to flush their eyes. Where eyewashes are not installed at sinks, appropriate provisions must be made in the plumbing design to allow for required testing. In some cases where 2-3 lab rooms are interconnected without intervening doors, an eyewash could be installed in the middle room or the room where the hazard is greatest. This equipment could be shared by the occupants within the 10 second travel distance but not greater than 50 feet.

The water from testing an eyewash or emergency shower can go down the drain per the MWRA regulations. When an eyewash is used after an accident, the quantity of hazardous materials is very small but the EHS Office will determine if we need to notify the MWRA or DEP. The EHS Office will determine how to dispose of the water when a safety shower is used after an accident.
4.4.4. Emergency showers should be located within the laboratory as close to the main door as possible. This minimizes water possibly being sprayed on to electrical equipment that may be in the lab and it is less likely that items will block access to the shower.

If the equipment is installed outside the lab, then the lab door must swing out and the doorway must be recessed so pedestrians will not be hit by the door. Most lab doors swing into the lab to comply with the Building Code.

4.4.5. The EHS Safety Program may be contacted for advice regarding the proposed location of the emergency shower and/or eyewash.

4.4.6 Refer to the SOP on floor drains for guidance.

4.5. How to test, inspect, and repair emergency showers and/or eyewashes?

527 CMR 10.02 (2). Massachusetts Board Fire Prevention Regulations section 10.02 and 248 CMR 10.13 Uniform State Plumbing Code requires testing frequency of twice year and supersedes the ANSI standard, Z358.1, which is not incorporated by reference by Mass. ANSI recommends annual inspection.

4.5.1. Emergency Showers are tested twice a year by Facilities. Please refer to their testing procedure. The Facilities Preventive Maintenance Office will schedule these tests. The test date is recorded on a tag attached to the shower and on the hard copy of the Preventive Maintenance request. The inspection tag should be not be tied to the activation handle. The Facilities Repair and Maintenance Support Office generates work orders if the shower did not operate properly and maintains the testing records in the archive room. Facilities Repair and Maintenance Support Office will notify the EHS Office if a shower is blocked and cannot be tested. The EHS Office DLC team will work with the lab EHS Representative and the EHS Coordinator to resolve the cause of the blocked shower and then notify the Repair and Maintenance Support Office that the test can be rescheduled.

4.5.2. Plumbed Eyewashes: Each EHS laboratory representative is responsible for flushing eyewashes whether sink or wall-mounted. This procedure will flush out any bacteria that might grow in the stagnant water. It will also minimize the residue that will clog up the eyewash. The EHS lab representative should do this as part of the weekly level 1 inspection. The eyewash should be tested in the upright position, which is how it would be used to flush your eyes. Check that the water pressure is high enough so the stream will adequately wash the eyes.

If the eyewash is not next to a sink (wall-mounted eyewashes), then use a large bucket or bin to catch the water so that no one slips. Empty Bio-Sharps containers or large, unused secondary containment (SAA) bins have been used effectively by labs. Consider using a large plastic trash bag (open on both ends) to place around the eyewash spouts and help guide water into the bucket/bin. (For newer models) Test that the water stays on so the person could use both hands to lift eyelids. If the eyewash is not working, the EHS representative or Coordinator will submit a work order by following the instructions in the Repair Requests section below.

The DLC can determine if it is necessary that their Lab representatives use a tag or a list to record when the eyewash is flushed. If you would like to purchase tags, bring a requisition to the E19 Facilities stockroom.
### 4.5.3. Self-contained Eyewashes and wall units

Lab personnel should inspect these on a monthly basis following manufacturer’s instructions and replace the solution before the expiration date. This could be included in the weekly Level I inspection, which includes checking plumbed eyewashes. After any activation, inspect unit and replace the solution. During the inspection if you notice that the seal has been damaged or removed, the solution should be replaced. The lab is responsible for ordering appropriate replacement solutions as soon as possible. The Procurement Partner will arrange to deliver this item within 1-2 days. This is included and tracked in the Level 2 inspections.

### 4.5.4. Repair requests

If the equipment needs to be repaired, the Facilities web page is the preferred method. [https://web.mit.edu/facilities/www/rm/forms/rm-request.shtml](https://web.mit.edu/facilities/www/rm/forms/rm-request.shtml) The number on the blue preventive maintenance tag (for showers only) and the location (building-room number) should be included. Eyewashes will not have a blue number tag so the building-room number and the brand/model should be included instead. The Zone representative will explain the repair procedure. Note that if the lab installed the equipment, Facilities may not have the parts to repair it. Alternatively, the Coordinator can create an inspection finding, which generates the same type of work order.

### 4.6. Access and signage

4.6.1. Each emergency shower or Eyewash location “should be identified with a highly visible sign and the area around the equipment should be well lighted”. (according to ANSI Z358.1-1998). The signs must have contrasting color of green and white and be at least 70 square inches in area (527 CMR 10.02 (2)). Refer to Appendix C. For existing equipment, the EHS representative is responsible for obtaining a sticker/sign from EHS and installing it. For new installations, the Department of Facilities will install the sign that the manufacturer provides, which meets the standard.

4.6.2. If at anytime lab personnel observe that a safety shower or eyewash is blocked, they should take action to correct the situation. A lab representative should also be checking this during the weekly Level I inspection checklist of the lab.

4.6.3. If the safety equipment is consistently blocked, DLCs should include this in the inspection findings that are sent to the PI. The DLC should consider installing a distinctive color or pattern on the floor to denote the area should be kept clear.

### 4.7. When do we or do we not use an eyewash?

4.7.1. High-speed foreign objects (metal, glass, wood or plastic chips/fragments/particles) have the potential for penetrating the protective coats of the eye and enter the inner cavities of the eye. Serious damage often results regardless of the nature of the foreign object. The patient should not use an eyewash. Their co-workers should call 100 so the patient can be immediately taken to the Mass Eye and Ear Institute for treatment by eye professionals. No attempt should be made by an untrained person to remove foreign objects from the eyes because more serious injury can result from the attempted removal of the foreign object. Exception: If the patient’s eye/face is also contaminated with a hazardous material, then decontaminate first with an eyewash to prevent chemical burns and secondary contamination of the emergency responders.

4.7.2. If small wood dust particles (not metal or plastic chips as described above) are irritating the eyes or a hazardous liquid is splashed in someone’s eye(s), then immediate and copious irrigation of the eyes is critical. This should be done initially on site using eyewashes. (Refer to next section.) The patient should be taken to the MIT Medical Dept Urgent Care.
4.7.3 The MIT Medical Department advised the EHS Office not to install eyewashes in Machine shops and wood-working shops, which often have metal, wood or plastic chips/fragments/particles. These shops may have both of the hazard types as well as liquid cleaning solvents, corrosive metal-etching solutions, and oils. The supervisor is responsible for educating shop users, for making an informed decision about first aid, and for informing emergency responders.

4.7.4 Sodium, Phosphorus and other water-reactive materials may produce heat or a more toxic chemical when rinsing with an eyewash or shower. Develop an SOP and review it with the MIT Medical Department, Emergency responders and Hospitals. The following is from the MSDS—A Practical Guide for First Aid, CCOHS 2005. Remove contaminated clothing, shoes, etc. Quickly and gently blot or brush away excess chemical. Immediately flush with lukewarm, gently flowing water for at least 30-60 minutes [depends on whether the material is a strong alkali]. Do not interrupt flushing. If necessary and if it can be done safely, continue flushing during transport to the emergency care facility. (Ask if towel soaked with mineral oil instead of water should be used to blot or brush away material.) A second person should collect whatever material is removed by the responder and dispose of it in mineral oil.

4.8. **How do we use an eyewash or emergency shower?**

4.8.1. Prior to an incident, each EHS lab representative should train their lab personnel on how to use their own emergency wash equipment because the procedure varies depending on the model. Emergency showers will continue to flow until purposeful steps are taken to stop the flow. Learn how to shut off the shower in your lab since there are various models with different shut off mechanisms. Prior to an incident, review the first aid requirements as described by MSDS.

4.8.2 Colleagues should immediately help the victim to get to the safety equipment so the victim can flush the affected areas with water or saline. Colleagues should put on appropriate personal protective equipment to avoid becoming a second victim. If the victim’s clothes are contaminated, help the victim to remove clothing. If both the eyes and the body are contaminated, it is best to use the nearest eyewash/shower combination unit and use both at once. Alternatively, the victim could first rinse off the area that has the most amount of contamination in the shower and then rinse their eyes. Then they can get under the shower again.

4.8.3. If a hazardous liquid is splashed in the eye, the victim should lift their eyelids and roll eyeballs around to ensure effective rinsing of the eyes. Remove contaminated gloves and rinse off your hands before touching your eyes.

If the victim wears contact lens, begin eye irrigation immediately and remove contact lenses as soon as practical (when hands are decontaminated). Lenses may fall out on their own during irrigation. For more information, refer to the NIOSH guidelines about Contact lenses [http://www.cdc.gov/niosh/docs/2005-139/pdfs/2005-139.pdf](http://www.cdc.gov/niosh/docs/2005-139/pdfs/2005-139.pdf).

4.8.4. Flood contaminated body part(s) with large amounts of running water for at least 15 minutes. Someone should keep track of the time and encourage the victim to continue for 15-20 minutes.

Water does not neutralize contaminants: it only dilutes and washes them away. This is why large amounts of water are needed.
4.8.5. Call 100 to report what happened and what is being done to decontaminate the victim. Specify whether the victim was exposed to small amount of a hazardous material on a small area of the body or contaminated with a large amount over a large area of the body. (This is also in the definition section) Alert Safety responders in the DLC and the supervisor or principal investigator of your lab.

4.8.6. The City of Cambridge emergency responders and the Boston area hospital emergency departments may require a complete decontamination of the victim before transporting them to the MIT Medical Dept or any of the Boston area hospitals. A victim will be required to remove contaminated clothing/ shoes and use an emergency shower and/ or eyewash. The goal is to prevent secondary contamination of the emergency responders, their equipment, the ambulance, and hospital emergency staff and the emergency department. Contamination could shut down an entire hospital and take an ambulance out of service. The Cambridge Fire Department Chief at the scene will decide how much decontamination is sufficient.

4.8.7. The City of Cambridge emergency responders and hospital emergency departments require that the lab provide a copy of the MSDS to the emergency responders when they take the victim to the MIT Medical Dept or to a hospital. Also provide any other relevant information about the hazards and whether exposure to the patient could result in secondary contamination or infection. Describe what has been done to decontaminate the victim and ask the emergency responders if they require additional decontamination. The guideline is in appendix B.

4.8.8. The victim may not be able to convey this information or obtain a copy of the MSDS. The other people, who were working in the area at the time, will have to play this essential role. This is why it is important not to work alone.

4.8.9. The emergency responders will determine where the patient will be taken for examination, additional irrigation, and treatment by eye professionals. MIT Medical has urgent care services available 24/7 and the eye clinic is open during regular business hours. Mass Eye and Ear Institute is used for further evaluation if needed.

4.9. Following up after an incident

4.9.1. The wastewater may contain hazardous materials that should not be introduced into a sanitary or storm drain. The Operations Center will contact Custodial Services to collect the water with wet vacuums. EHS Environmental Management Program will determine if the wastewater could be disposed of via the sanitary sewer or as hazardous waste.

4.9.2. OSHA requires supervisors to submit a Supervisor’s Report of Occupational Injuries, within 24 hours to the EHS Office. For a link to the Supervisors’ Report, go to http://mit.edu/sapweb/PS1/ehs_home.shtml and click on Supervisor’s Injury Report.

4.9.3. Lab personnel should immediately reorder the saline solution when the self-contained eyewash has been used.

5. Roles & Responsibilities
5.1. **PI / EHS representative**

Although the PI is responsible for the lab, s/he could designate the EHS representative or any other person within the DLC (i.e. the EHS Coordinator or Administrative Officer) to complete the following responsibilities:

5.1.1. Install eyewashes or emergency showers depending on the hazards of the lab’s activities. The factors s/he needs to consider are detailed in 4.1. “when do we need eyewashes or emergency showers”.

5.1.2. Confer with the EHS Safety Program to choose the models and their best location.

5.1.3. Test the eyewashes weekly as part of the Level 1 inspection program and request repairs if necessary.

5.1.4. Order appropriate replacement solutions for self contained eyewashes when needed.

5.1.5. Ensure that Lab personnel have been trained to locate and use the eyewashes and emergency showers. This can be done as part of the lab specific chemical hygiene training.

5.1.6. Prevent the obstruction of Emergency Wash equipment.

5.1.7. The lab’s supervisor, PI or their designee has to report any injury to EHS Office within 24 hours (Refer to 4.9.4).

5.1.8. Update Lab’s Emergency Response Guides and the SAPweb EHS PI Space Registration database when a new emergency shower and/or eyewash is installed or other changes are made.

5.1.9. EHS representative is responsible for obtaining a sticker/ sign from EHS and installing it, when existing equipment doesn’t have signage.

5.2. **EHS Office / Safety Program**

The Safety Program will complete the following responsibilities:

5.2.1. Assist the DLC’s to evaluate their need for Emergency showers and Eyewashes. Justify the need for that equipment to obtain funding to install it.

5.2.2. Advise the DLC’s on the suitable equipment depending on their specific situation.

5.2.3. Advise the EHS representative on the location of the equipment within the lab/ shop.

5.2.4. Ensure that the testing and maintenance program is effective and will help to resolve issues with damaged or malfunctioning equipment.

5.2.5. If signage was not posted when the equipment was installed, the EHS Office will provide a sticker to identify the Emergency Wash Equipment.

5.2.6. Offer training related to General Chemical Hygiene and Biosafety that includes the use of Emergency Wash Equipment.

5.2.7. Investigate any incident involving the use of Emergency Wash Equipment.
5.2.8. Evaluate the general effectiveness of this SOP on a periodic basis.

5.2.9 The EHS primary responder, EMP and/or the safety responders will determine if it is safe for the custodians to wet vac the rinsate and will determine if the rinsate needs to be disposed of as hazardous waste.

5.3. **Department of Facilities**

5.3.1. Install Emergency Wash equipment and perform required testing.

5.3.2. Post signage provided by the manufacturer when installing new equipment.

5.3.3. Plumbing supervisor and Project Managers will inform the Preventive Maintenance Office about new installations.

5.3.4. Preventive Maintenance Office will schedule periodic testing and the Repair and Maintenance Support Team will process work orders for maintenance if necessary. (*section 4.5.*)

5.3.5. Custodial Services will contact the EHS Office before they clean areas after emergency wash equipment is used. The EHS primary responder, EMP and/or the safety responders will determine if it is safe for the custodians to use wet vacuums to pick up the rinsate and will determine if the rinsate needs to be disposed of as hazardous waste.

6. **Training**

6.1. Lab personnel working with chemicals should attend the General Chemical Hygiene (*course ref: EHS0100c-A*) and/or the General Biosafety (*course ref: EHS0260c-A*) trainings offered by EHS Office.

6.2. Each EHS lab representative should train their lab personnel on the location and how to use their own equipment because the procedure varies depending on the model. Lab personnel should also be trained on the way to test and stop emergency wash equipment. This is part of lab specific Chemical Hygiene training.

7. **Monitoring Requirements**

7.1. Pressure, temperature and quality of the water supply for emergency wash equipment as well as the condition of the equipment are monitored as described in *section 4.5.* The MIT Central Utility Plant (CUP) tests water quality in the buildings but this does not meet these requirements.

7.2. Access to emergency wash equipment should be continuously monitored within the lab.

8. **Record Management**

8.1. The Department of Facilities Plumbing Supervisor and Project Managers will inform the Preventive Maintenance Office about new installations. This office will maintain the testing records.

8.2. The Lab Emergency Response Guide should be updated by the EHS rep when new equipment is installed or moved. (*Emergency Equipment Location section.*)
8.3. Department of Facilities will record bi-annual Emergency Showers testing on the tag attached to them.

8.4. The SAPweb EHS PI Space Registration database will be updated when a new emergency shower and/or eyewash is installed or other changes are made. This will keep this information accurate. The EHS representative or the Coordinator will update this information.

8.5. MIT EHS Safety Program will maintain injury records as required by OSHA.

8.6 The EHS and Facilities databases will be compared periodically to correct discrepancies and ensure that all of the active equipment is tested. The SOP owner will request that IST generate this report.

9. References

For more information, refer to the following documents.

9.1. Standards and regulations

- **ANSI Z358.1 standard for Emergency Eyewash and Shower Equipment**: (2009 edition or most recent)
  This standard applies to the design, location, testing, performance and maintenance of eyewash and emergency showers. The latest edition of ANSI standard Z358.1 is available from the Barker Engineering Library or EHS Office.

- **OSHA 29 CFR 1910.151** describes the OSHA requirements for emergency eyewashes and showers.

- **527 CMR Massachusetts Board of Fire Prevention**, section 10.02, is also available through the EHS Office, and contains additional requirements for emergency showers and eyewashes.

- **248 CMR Uniform State Plumbing Code section 10.13** Note: This includes the same requirements as 527 CMR 10.02

Best practices


The following is an excerpt from the section titled Wound Care. The management staff for each NHP facility is responsible for maintaining an adequately stocked bite/scratch/splash kit. The bite/scratch/splash kit must be located in an easily accessible area, and instructions for first aid (to include use of eyewash stations, if saline is not provided) and reporting to OMS (or designated hospital) must be prominently displayed. The first aid instructions for bite/scratch or lacerations should discuss initiation of wound scrubbing within 5 minutes of the incident, with an antibacterial soap, and that scrubbing should continue for at least 15 minutes. And for eye, mouth or nose splashes, that flushing of the area with saline solution or at an eye wash station (ocular exposures) should also be initiated within 5 minutes and continue for at least 15 minutes. The facility NHP Course Trainers are responsible for showing all research and animal care staff the location of the bite/scratch/splash kits and eyewash stations as part of the second component of the “Working Safely with NHPs” training.

- **AAALAC International publishes "Recommendations for Prevention of and Therapy for Exposure to B Virus (Cercopithecine Herpesvirus 1)"**
Eyes or mucous membranes potentially exposed to B virus should be irrigated immediately with sterile saline solution or water for 15 min. If reaching the nearest eye-washing station requires a delay of more than a few minutes, then a kit that contains a 1-L bag of sterile saline should be available at the work site. If the worker is based at a remote location, he or she should transport a 1-L bag of saline to that site, so there will not be a delay in cleansing the wound or mucosa.

- CDC and NIOSH also recommend immediate flushing but do not state that an eyewash should be installed.

- NFPA 99 11-6 (Health Care Facilities / Chapter on Laboratories) includes recommendations about Emergency Wash Equipment.


### 9.2. Other SOP/ SOGs
- Personal Protective Equipment
- Laboratory Start-Up
- Reporting Work-related Injuries and Illness of OSHA-covered Personnel

### 9.3. Supplementary Documents
- Chemical Hygiene Plan of the Lab
- Building Systems Design Handbook
- MIT Emergency Response Guide in the Lab
- Level I inspection check list

### 10. Definitions and Abbreviations

A.N.S.I: American National Standards Institute

**BL 1/2/3:** Biosafety Level 1/2/3 Laboratory is the level of physical containment necessary to protect personnel and the environment for standard laboratory experiments. A Biosafety Level 1 (BL-1) is the least restrictive, while Biosafety Level 3 (BL-3) is applicable for work with indigenous or exotic agents that may cause serious or potentially lethal disease.

C.M.R.: Code of Massachusetts Regulations

**Contaminated Victim:** when there is a large amount of hazardous material on a large area of the victim’s body.

**Corrosive Chemical:** A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. *(OSHA definition of corrosive in 29 CFR 1910.1200 App. A)*

**Emergency Shower:** An assembly consisting of a showerhead controlled by a stay open valve and operated by an approved control valve actuator. *(ANSI definition) This is also known as a safety shower.*

**Exposed Victim:** when there is only a small amount of hazardous material on a small area of the victim’s body.
Eyewash: A device used to irrigate and flush the eyes.

Flushing Fluid: Potable (suitable for drinking) water, preserved water or buffered saline solution, or other medically acceptable solution manufactured and labeled in accordance with applicable government regulations. (ANSI definition) It should be clear and visibly free from foreign particles. For eyewashes, it should ideally have a pH close to 7.4 as well as a saline content similar to the fluid in the eye.

g.p.m.: gallon(s) per minute. A measure of flushing fluid flow.

Hand-held drench hose: A single-headed emergency-washing device connected to flexible hoses and used to irrigate and flush the face or other parts of the body.


N.F.P.A: National Fire Protection Association

O.S.H.A.: Occupational Safety and Health Administration

Plumbed Eyewash: An eyewash unit permanently connected to a source of potable water.

Primary Protective Devices: Any protection device designed to prevent splashing of chemicals to the face or eye (such as spectacles, shields, screens...). They must be used in conjunction with eye glasses or goggles.

Self-Contained Eyewash: An eyewash device that contains its own flushing fluid that must be refilled or replaced after each use. Some, mounted on walls are also called Wall Units. Portable ones are commonly called Bottled Eyewashes.
Appendix A

The following section is from the MIT Building Systems Design Handbook, EHS Guidelines for Building Design.

2.1.6 Emergency Eyewashes and Showers

Emergency eyewashes and showers are to be installed in all laboratories, where materials, that are either corrosive or that otherwise present a significant skin / eye contact or absorption hazard, are used. This would include laboratories with fume hoods / biosafety cabinets that have chemical use; chemical use areas (wet labs, chemicals stored or used, corrosive or flammable liquids, particulates, open flame devices used); corrosive cleaning areas; non human primate testing and test preparation areas, and other non lab facilities with these types of exposures. Based on a survey of the area, EHS determines the significance of hazard and whether to use emergency eyewashes or showers or both taking into account the severity, concentration, and frequency of use of hazardous materials, number of people in area, risk of an accident, and magnitude of splashes or spills that may be encountered.

The eyewash and shower must be within 10 second travel distance but no greater than 50 feet from any experimental area in the laboratory. Where a highly corrosive chemical is used, an eyewash station may be required immediately adjacent to the hazard. Showers should be located within the laboratory as close to the main door as possible. If the shower can not be located in the laboratory, then the shower can be in hall outside of the laboratory so long as the door to the laboratory swings in the same direction of travel to reach the shower. Eyewash units must be dual nozzle with remain open valve and must be located within the laboratory and where possible eyewash units should be installed at sinks for proper draining to allow for required weekly testing of the units. Where eyewash units are not installed at sinks, appropriate provisions must be made in the plumbing design to allow for required testing. The supply should be tempered, potable water between 70° F and 90° F and installed and tested in a manner that prevents the stagnation of water in the piping (i.e., weekly flushing for eyewashes and twice a year flushing for showers). These units should be installed in such a way that they do not become contaminated from corrosive chemicals used nearby. In certain cases, self-contained eyewash units may be installed until permanent, plumbed eyewashes can be installed.

Non lab work areas and operations that may require these devices include: pH neutralization system locations, battery charging areas, spraying operations, high dust areas, printing areas, shops, hazardous waste main accumulation areas, etc.

All emergency eyewashes and showers shall comply with and be installed in accordance to The American National Standards Institute (ANSI), Z358.1 and the Plumbing Code, 248 CMF 10.00. Emergency eyewashes and showers are required by a combination of the Massachusetts Building Code, 780 CMR, Fire Prevention Regulations, 527 CMR 10 and Plumbing Code, 248 CMR 10.00; OSHA; NIH and AAALAC guidelines and ANSI Z358.1, Emergency Eyewash and Safety Shower Equipment.

Refer to MIT Emergency Eyewash and Showers SOP and Floor Drains SOP.
Appendix B -- CAMBRIDGE LEPC’s Biotech Subcommittee

Guidelines for Pre-ER Decontamination after Laboratory Exposures

**Intent:** This guide has been developed to help clarify the type and extent of decontamination that a patient(s) should receive following an accidental laboratory exposure. The primary objective of this effort is to assure timely treatment of the exposed patient, protection of first responders and emergency medical personnel, and prevention of contamination of facilities and equipment. It outlines specific information that must be provided by representatives of the facility or the patient to the first-responders and emergency-medical-personnel to help evaluate the situation and determine the extent of personnel-decontamination appropriate for the exposure incident.

**Guideline for Laboratory Facility:**
In the event of personnel exposure to laboratory chemicals or other hazardous materials, the following information shall be provided to First-Responders, and transported along with patient to Emergency-Medical-Facility.

**PROVIDE:**
1. Name of hazardous material(s) involved in writing.
2. A copy of MSDS for the hazardous material(s).
3. Description of signs and symptoms the patient is experiencing from exposure.
4. Detailed description of the extent of exposure/contamination (parts of body, amount of material, etc.) of the patient.
5. Detailed description of what has been done in-house to decontaminate the patient (specifics on type and extent of decontamination).
6. Information in writing on any “special concerns” regarding this exposure. Explain whether exposure to the patient could result in secondary contamination or infection.
7. The name & phone number in writing of a knowledgeable-person who can be contacted for further information/clarification (This may be the lab manager and/or a representative from the EHS Office.).
8. Any other relevant information.

**Guideline for Emergency Personnel:**
When faced with a potential chemical or other hazardous material exposure in a laboratory the following steps shall be used as guidance in determining if full body decontamination is needed prior to transporting a patient to a medical facility.

**Request information:**
1. Is product known? If so, what is it?
2. Is there a copy of the MSDS available for the hazardous material(s)?
3. What signs and symptoms is the patient displaying?
4. What is the extent of exposure/contamination (parts of body, amount of material, etc.)
5. What has been done regarding the exposure (specifics on type and extent of decontamination)?
6. What is the secondary contamination potential?

Using this information, first responders can determine how extensive the decontamination of the patient must be in order to protect themselves, their equipment, and hospital personnel from secondary contamination or exposure. If unable to get answers for these questions or if conditions dictate, full body decontamination may be undertaken.

**NOTE:** As always, it is the prerogative of the first-responders and/or emergency-medical-personnel to require additional precautionary measures and/or decontamination beyond what this guideline would recommend. This guide is not intended to supersede the judgment and expertise of emergency responders, merely to support them in making informed decisions on the extent of personnel-decontamination suited to the situation.
Appendix C--NEW EMERGENCY SHOWER CONSTRUCTION POLICY

Please follow this policy regarding new installations of Emergency Safety Showers or combination Emergency Safety Shower and Eyewash Units:

It is the requirement of all MIT Project Managers to inform the Planning and Scheduling Group, within Repair & Maintenance, of any new installation of Emergency Safety Showers. This notification can be conveyed via electronic email to: rm-planning@mit.edu The email must contain the following information:

- Building Number / Name
- Room number
- Quantity of Showers
- Manufacturer Name and Model
- Approximate Date of installation

The Plumbing Contractor (EXTERNAL or INTERNAL) is required to flush the piping until the water is clear and make sure the shower and eyewash unit operates with a uniform water flow. The Plumbing Contractor will then notify the Project Manager that the shower is ready for further testing in accordance to MIT’s Emergency Safety Shower PM Task List (See Addendum 1) The Plumbing Contractor will perform prescribed test and affix a signed inspection card to the shower handle. The Task list will be signed by the Contractor and given to the project Manager. The Project Manager will send a copy of the signed task list to the Planning Scheduling Office. Upon receipt of said document; the Planning and Scheduling Group will go to the location and apply a yellow plastic identification tag. The Planning Scheduling Group will document the device in its database (SAP) and schedule biannual testing thereafter.

ADDENDUM 1***NOTIFY OPERATIONS PRIOR TO STARTING WORK TO VERIFY THAT THE SAFETY SHOWER IS NOT ALARMED***

Check each step as completed. For steps that do not apply mark as "NA.

_____10 USE LOTO AS REQUIRED.
_____20 CHECK LOCATION OF EMERGENCY SHOWER TO VERIFY THAT IT IS IN AN ACCESSIBLE AREA WHERE THE PATH OF TRAVEL FROM THE HAZARD IS FREE OF OBSTRUCTIONS THAT MAY INHIBIT THE IMMEDIATE USE OF THE EQUIPMENT. NOTE ON PM WORK ANY OBSTRUCTIONS.
_____30 VISUALLY CHECK THE PIPING CONNECTIONS FOR LEAKS.
_____40 LOCATE ISOLATION VALVE FOR ONE OR MORE DEVICES.
_____50 OPEN THE OPERATING VALVE AT THE DEVICE TO THE FULL OPEN POSITION. THE VALVE SHALL REMAIN OPEN WITHOUT REQUIRING FURTHER USE OF THE OPERATOR'S HANDS. THE VALVE SHALL BE DESIGNED TO REMAIN ACTIVATED UNTIL INTENTIONALLY SHUT OFF.
_____60 FOR SAFETY SHOWERS: USE THE CANVAS FUNNEL BAG AND THE 55 GALLON DRUM PROVIDED. RUN THE WATER FOR APPROXIMATELY 20 SECONDS. THE SHOWER HEAD SHOULD PROVIDE A UNIFORM SPRAY PATTERN.
_____70 FOR PLumbed EYE WASHES: RUN THE WATER FOR APPROXIMATELY 20 SECONDS. IF EYEWASH IS NOT PIPED TO DRAIN USE A 5 GALLON PAILS OR SIMILAR CONTAINER TO COLLECT WATER RUN-OFF. EYE WASH NOZZLES SHOULD PROVIDE A CONTROLLED UNIFORM FLOW OF FLUSHING WATER.
_____80 FOR TEMPERED WATER SYSTEMS; CHECK TEMPERATURE OF WATER UPON ACTIVATING THE SHOWER. WATER TEMPERATURE MUST BE BETWEEN 70 AND 90 DEGREES FAHRENHEIT. IF WATER EXCEEDS 90 DEGREE MARK THEN REPORT IT IMMEDIATELY TO ZONE SUPERVISOR.
_____90 NOTE ON WORK ORDER ANY DEFICIENCIES TO R & M SUPPORT IN ORDER TO CREATE A FOLLOW UP WORK ORDER FOR THE NECESSARY REPAIRS.
_____100 SIGN AND DATE INSPECTION TAG; IF INSPECTION TAG IS FULL, REMOVE AND REPLACE WITH NEW TAG. RETURN FULL TAG TO PLANNING SCHEDULING OFFICE FOR REVIEW.

Contact the Planning and Scheduling Group for the current version.