

**Level II – Guidance Documentation**  
(Revised March, 2006)

## **Postings**

**PT-01 Are current emergency telephone numbers and flip chart posted in a conspicuous location?**

**PT-02 Are all evacuation routes from each room to the exit stairway clear and accessible?**

Guidance: The path to take to get to an exit should be obvious to building occupants; if not, exit signs w/directional indicators should be installed. Corridors should not be used for storage and must be kept clear of excess furniture or other materials. Exit doors should be clearly marked with an EXIT sign that is visible from all directions.

For specific areas where allowed as a variance by the building inspector, noncombustible/materials may be stored in the corridor if these materials are located on only one side of the corridor to allow for uniform access and a minimum of 44 inch clearance is maintained at all times.

The State of Massachusetts Building Code and the NFPA Life Safety Code requires that exits doors and exit paths be clearly marked.

Reference: Massachusetts Building Code; NFPA Life Safety Code 101

**PT-03 Are rooms properly posted with the appropriate warnings for the hazards identified on the space registration or otherwise present in the room?**

Guidance: Is the lab posted with a ‘Green Card’? The purpose is twofold: (1) to be able to contact lab members 24 hours a day if an emergency occurs inside the lab and (2) an emergency outside the lab impacts lab equipment (e.g. water leak that may damage equipment). Knowledgeable lab members could provide valuable information about the current hazards to the MIT Emergency Response Team and the Fire Dept.

If the lab uses particularly hazardous chemicals, it must be posted with the yellow sign designating the area for use with particularly hazardous substances. Particularly hazardous substances include chemicals that are select carcinogens (those strongly implicated as a potential cause of cancer in humans), reproductive toxins, and compounds with a high degree of acute toxicity.

The Institute Committee on Safety requires that Emergency Notification Signs (green signs), which indicate occupants and emergency contact phone numbers, are posted on or near all laboratory and shop entrances. The OSHA Lab Standard

29CFR1910.1450 and most MIT Chemical Hygiene Plans require areas (when necessary) to be designated as using particularly hazardous substances.

Coordinators should check with their Lead Contact to determine other required postings, such as radioactive material, BL, laser, magnetic field, etc., as determined by the space registration.

Reference: OSHA Lab Standard 29CFR1910.1450 and NFPA 45

**PT-04 Is the space registration accurate? (For EHS Coordinators Only)**

**PT-05 Are all lab equipment and waste containers which could potentially contain a biohazardous agent marked with a universal biohazard symbol?**

Guidance: Lab equipment that contains or potentially may be contaminated with live bacteria, yeast, human or animal tissues, cell lines and other biohazardous agents, must be labeled with the universal biohazard symbol. Biohazard stickers can be obtained through the Biosafety Program. Such equipment includes but is not limited to the following: refrigerators, freezers, incubators, shakers, sonicators, centrifuges, water baths, fume hoods, waste containers, etc.

The OSHA bloodborne pathogen standard requires these markings for equipment that may be contaminated or contain human blood, body fluids, or cell lines. In addition, such warning stickers segregate areas and equipment and warn personnel such as custodians and maintenance staff, who may be unfamiliar with the lab and the agents used in the lab.

Reference: OSHA 29CFR1910.1030

## **Documentation/Training**

**DT-01 Is the EHS-MS training current for all personnel assigned to PI/lab? (Inspectors should spot check training status with people encountered in lab)**

**DT-02 Are emergency action plan and evacuation maps developed/posted?**

Guidance: A written Emergency Action Plan (EAP) should be developed at the DLC level. The plan identifies all of the potential emergency scenarios (fire, spill etc.) which could be anticipated in the DLC, including location specific response actions. Evacuation route maps consist of floor plans that illustrate the paths to exits.

Emergency Action Plans are required by OSHA 29CFR1910.38. This requires that an EAP be developed and communicated to employees. It also requires that

evacuation route maps be developed and posted for employee use in the event of an emergency.

Evacuation maps should be placed: next to doors leading to fire rated egress stairwells, next to elevators, and at mid-hallway exit sign locations.

Contact Bethany Silva in facilities at [bsilva@plant.mit.edu](mailto:bsilva@plant.mit.edu) for information regarding installation of evaluation maps.

Reference: OSHA 29CFR1910.38

**DT-03 Are radioisotope inventory and use logs current and up-to-date?**

Guidance: All sources of radioactive materials are inventoried when delivered to the laboratory. The inventory and use records track the receipt, use and user of the material. Maintenance of these records is a requirement of the authorization that permits the use of these radioactive materials.

The State of Massachusetts Radiation Control Program requires that all sources of radiation are controlled and accounted for.

Reference: Massachusetts Department of Public Health 105CMR120

**DT-04 Have significant ergonomic or musculoskeletal disorder (MSD) hazards been identified?**

Guidance: This question provides examples of some common examples that indicate a potential for an ergonomic problem. EHS has established a program for assessing ergonomic hazards. When potential problems are found, EHS should be contacted for an assessment of the specific job or task.

Some examples where MSD hazards may exist include heavy, awkward, lifting postures, repetitive motions (pipetting).

OSHA general duty clause that requires employers to provide safe and healthful working conditions for employees. The largest number of workplace injuries that occur each year are due to ergonomic hazards including manual materials handling, repetitive motion, and overexertion. Many of these injuries are quite serious and result in loss of time from the job. Reducing these hazards will reduce the potential at MIT for employee injury and lost time. It is important to assess the physical work performed by an employee to evaluate the potential for ergonomic problems.

## **Safety Equipment**

**SE-01 Is the area equipped with portable fire extinguishers?**

Guidance: Portable fire extinguisher should be readily available in the workplace for use by trained emergency response personnel only. The rating on the extinguisher should match the hazard found in the work area; although at MIT, multi-rated (ABC type) fire extinguishers are acceptable for most occupancies. Portable fire extinguishers need to be readily accessible to emergency personnel in the event of a fire and should be located along normal paths of travel, including at exits. A monthly quick check should be performed which confirms that the unit is available and in operable condition. An annual inspection is required by an outside, certified vendor.

Access to portable fire extinguishers should be readily available and not blocked by equipment or other obstructions.

The requirement to have portable fire extinguishers in the workplace falls under the jurisdiction of the local authorities (Cambridge Fire Department) as portable fire extinguishers are intended to provide a first defense for fire fighters when responding to fires. NFPA 10 and 29CFR1910.157 outlines the installation, inspection, maintenance and testing requirements for portable fire extinguishers.

Reference: NFPA 10 and OSHA 29CFR1910.157

**SE-02 Are the fire extinguishers unobstructed?**

**SE-03 Are available emergency eye wash stations/drench showers unobstructed?**

Guidance: Emergency eye wash stations and showers provide rapid flushing or drenching of the eyes face and/or body of an individual who has been splashed by a harmful chemical or particulate. Eye wash and safety showers are located in areas where an eye or face hazard exists. They should be readily accessible and the locations clearly marked with signage. Regular testing and inspection (preventative maintenance) should be performed to ensure equipment readiness in the event of an emergency. Plumbed equipment should be run weekly.

**Safety Showers** – run/tested twice yearly (Department of Facilities)

**Plumbed eye-wash stations** – run/cleaned on a weekly basis (DLC)

**Portable eye-wash units** – inspected monthly to ensure that bottles are full and that expiration date is current (DLC)

Eye wash and drench showers are required by OSHA 29 CFR 1910.151 where injurious corrosive materials are present. Inspection and maintenance is outlined by ANSI Z358.1. This standard applies to the design, location, testing, performance and maintenance of eyewash and safety showers.

Reference: OSHA 29CFR1910.151; ANSI Z358.1; and NFPA

**SE-04 Are all emergency eye wash stations/drench showers appropriately tested/inspected/tagged?**

**SE-05 Is the area equipped with sufficient drench showers and eye wash stations?**

**SE-06 Are survey meters within calibration date (yellow sticker)?**

Guidance: The yellow sticker indicates the calibration date and due date for the next calibration. The MIT RPP calibrates the meter twice a year. Meters with low voltage batteries may under respond or even not respond to radiation.

The State of Massachusetts Radiation Control Program requires that the survey meter must be working and calibrated annually.

Reference: Massachusetts Department of Public Health 105CMR120

**SE-07 Is soap available at hand washing sinks?**

Guidance: Standard laboratory practices outlined in the NIH/CDC BMBL require persons to wash their hands after they handle viable materials, after removing gloves, and before leaving the lab. Although it is not a requirement for soap to be available at the sink, soap near the sink is an indication that handwashing is practiced in the lab. If no soap is available, lab personnel should be reminded of the importance of handwashing to reduce spread of contamination.

Having soap in the lab is not a requirement but handwashing after working with viable materials and prior to leaving the lab is a good practice. If soap is unavailable, researchers should be reminded of the importance of handwashing.

**SE-08 Are disinfectants (such as bleach, wescodyne, Lysol, etc.) available?**

Guidance: Not all disinfectants are effective against all microorganisms. It is not only important that disinfectants are available but that disinfectants are mixed/diluted properly and are approved (or effective) against the agents used in the lab. For example, alcohol is not approved for use with spore forming bacteria. Also, bleach, once diluted can have a short shelf life and fresh solutions should be mixed frequently in order to achieve maximum potency. Lab personnel are required to clean up any spills using an approved disinfectant and should be trained in how to do this properly. If any questions arise about effectiveness of a particular disinfectant, one may consult the BSP. The BSP maintains information on a variety of antimicrobial agents.

Standard lab practices require the prompt clean up of any biohazardous spills using an approved disinfectant. In addition, researchers should also regularly clean and disinfect their work areas (such as bench tops where agents are handled).

**SE-09 Are bench tops being decontaminated with appropriate cleaner or disinfectants following work involving microbial agents?**

## **Laboratory/Shop Protocol**

**LS-01 Are chemical containers labeled with the identity of the material?**

Guidance: With few exceptions, all chemical containers at MIT must be labeled with chemical name<sup>1</sup>. Labeling is important for safe management of chemicals, preventing accidental misuse, inadvertent mixing of incompatible chemicals, and facilitating proper chemical storage. Proper labeling helps assure quick response in the event of an accident, such as a chemical spill or chemical exposure incident. Finally, proper labeling prevents the high costs associated with disposal of “unknown” chemicals.

### **Labeling Requirements by type of container.**

- **Original containers, as received from the manufacturer.** Chemicals received from outside vendors or from stockrooms of laboratory supply rooms will have labels indicating the chemical name<sup>1</sup>, manufacturer name and address, physical hazard<sup>2</sup>, health hazard<sup>3</sup>, and target organ. Upon receipt of a chemical, the containers should be checked to assure labels are not removed or defaced, and a date of receipt should be put on the label. If incoming containers are not properly labeled, the chemical supplier should be contacted immediately to correct the problem.
- **Durable containers** means those containers that are not provided by the manufacturer, but that hold chemicals decanted from a larger container that will be used only in one work area usually for longer than a day. All durable containers of chemicals that have been decanted from a large quantity container must be labeled with the chemical name<sup>1</sup>, concentration, person responsible, and date. For non-laboratory areas, the label must contain physical hazard and health hazard information. For laboratory areas, it is suggested the label contain physical and health hazard information, when feasible, since this information will be needed if the material becomes excess or waste and this information can assist in determining proper storage for the material. Labels for this purpose are available at Lab Supply stockroom.
- **Containers of chemicals prepared in the laboratory** means those containers used by researchers to contain materials synthesized or otherwise generated in the laboratory that will be maintained for longer than one day. All containers of chemicals prepared in the laboratory must be marked with the chemical name<sup>1</sup>, person responsible, and date. It is suggested that the label contain physical hazard and health hazard information. Options for labeling small containers are provided under “special circumstances” below. **Note:** If the container is transferred or shipped to a user outside the immediate work area<sup>4</sup>,

a complete label is required, to include the chemical contents, the physical and health hazard information, target organ information, and the name and address of the generator. Contact EHS for assistance with labeling and shipping.

- **Transient containers** means those containers that will be used to hold chemicals for less than one work day and that will be under the control of the person filling the container. No labeling is required of these containers unless they are not emptied by the end of the work day or unless they are no longer under the control of the person who prepared the material. Examples include solutions that will be used immediately in an experiment or cleaning solutions that will be used by the end of a work day. It should be noted that transient containers can be inadvertently left unlabeled at the end of the day, so consideration should be given to labeling them in accordance with the requirements for durable containers whenever possible.
- **Hazardous waste collection containers** means those containers used to collect used or excess chemicals for pickup by EHS. These types of containers are subject to hazardous waste regulations. The following information should be provided on these containers: the full chemical name and the percent composition of the chemical for mixtures. Chemical hazard information should also be provided. For details, contact EHS. Red tags are available from EHS for labeling these containers. Contact EHS at 2-3477, or visit the EHS website to order red tags.

**Special Circumstances.** Small containers, such as vials and test tubes, can be labeled as a group by labeling the outer container (i.e., rack or box). Alternatively, a placard can be used to label the storage location for small containers (i.e., shelf, refrigerator, etc.) An additional option for labeling small containers is to label them with a code number or name, and have that code listed in a readily available log book or sheet with information on the chemical name, date generated, and person responsible. The log book or sheet should be available in the area where the chemical is used and stored, and should be retained in the area as long as the chemical is present. All personnel working in the area should be familiar with the location of such log books and sheets and should know how to determine the contents of materials labeled using a code.

**Exceptions.** All containers must be labeled as to chemical name<sup>1</sup> unless it is a transient container, as noted above. However, additional labeling requirements do not apply to the following items: consumer products, food and food products labeled in accordance with the Food, Drug, and Cosmetic Act; samples and specimens received in a lab for testing when the exact composition is not known; and pesticides labeled in accordance with the Federal Insecticide, Fungicide, and Rodenticide Act.

Containers of practically non-toxic and relatively harmless chemicals are also exempt from other labeling requirements so long as they are labeled with the chemical name<sup>1</sup>.

<sup>1</sup>Chemical name can mean an acronym or shorthand abbreviation if a cross-reference between the fully written chemical name and its associated short-hand name is posted in the work area. However, shorthand or abbreviated chemical names are never allowed on hazardous waste collection containers.

<sup>2</sup>Physical hazards can be described by one or more of the following words, or their associated symbols: flammable, combustible liquid, organic peroxide, pyrophoric, oxidizer, explosive, unstable (reactive) and water reactive.

<sup>3</sup>Health hazards can be described by one or more of the following words, or their associated symbols: carcinogen, toxic, highly toxic, reproductive toxin, irritant, corrosive, sensitizer, hepatotoxin, nephrotoxin, neurotoxin. In addition, materials that contain hazardous biological agents may be labeled as biohazardous or infectious, and solutions that are radioactive may be labeled radioactive. Terms may also be used to describe agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes, e.g. skin and eye irritant.

<sup>4</sup>Immediate work area does not necessarily mean a single room. A single work area can consist of multiple rooms that are used for similar processes (e.g. suite of labs under the control of a single Principal Investigator). Distinct processes, staff, and persons responsible for the area generally define different work areas.

Reference: OSHA 29CFR1910.1200 and 1910.1450; NFPA

**LS-02 Are chemicals stored appropriately when not in use?**

**LS-03 If chemicals are stored on the floor, are they within approved secondary containers for lab storage?**

**LS-04 Are all personnel in the lab/shop area observing the required protocol of not eating and/or drinking in the area?**

Guidance: No eating, drinking, or application of cosmetics is allowed.

The State of Massachusetts Radiation Control Program does not allow eating, drinking, or cosmetic application in the vicinity of radioactive materials.

Reference: Massachusetts Department of Public Health 105CMR120

**LS-10 Is personal protective equipment (PPE) available in the workplace suitable for the hazards?**

Guidance: PPE only offers effective protection when chosen, worn, and maintained properly. It should be apparent that some thought was given when the worker chose or was assigned to wear PPE. Disposable gloves should not be saved, but disposed of. Respirators should be stored in a bag out of direct sunlight and out of the hazard area so as to not become saturated: i.e. a painter should not store the respirator adjacent to where paint is mixed. Respirators, cryo

gloves, eyewear, lab coats, and other PPE should be kept clean and in good working condition. Workers should be aware of how to obtain new and/or replacement PPE. Respirator supplies should be obtained through the Industrial Hygiene Program and gloves, glasses.... generally through the VWR stockroom.

**Eye Protection:** MIT policy requires wearing eye protection in all labs and shops when and where potential eye hazards exist whether you are working, or visiting and observing. Many DLCs require eye protection at all times and post eye protection required signs on the doors/ in the hazardous areas. OSHA requires employers to provide employees with the appropriate eye protection (PPE standard 1910.133 Eye and Face Protection).

**Lab Coats:** Lab coats are required by MIT's Radioactive Materials License while an employee is working with unsealed radioactive materials. For work with biological materials, lab coats are required for Biosafety Level 2 (BL2) laboratories and highly recommended for Biosafety Level 1 (BL1) laboratories. They are highly recommended for work with most chemicals. It may also be necessary to wear chemically resistant aprons with sleeves for work with certain types of acids.

**Gloves:** Gloves are required for all work with unsealed radioactive materials and biological work. Gloves are also recommended for work with most chemicals but the glove must be chosen for good resistance to the chemicals being used. Latex and vinyl gloves have only splash resistance to many lab chemicals and other types might be a better choice. They should not be used for most chemical work. Disposable nitrile gloves have good resistance to a variety of chemicals.

MIT policy requires that PPE be used and maintained as directed by the manufacturer. MIT's Radioactive Materials license requires that certain PPE be worn. The OSHA lab standard as well as PPE standards require PPE be worn in certain situations as well as maintained and stored properly. MIT policy requires use of splash resistance eye protection when working with chemicals that can be splashed in the eye.

Reference: OSHA 29CFR1910.133 and OSHA Lab Standard 1910

- LS-11 Are laboratory/shop personnel wearing eye protection, gloves, and other appropriate personal protective equipment (PPE)?**
- LS-12 Is PPE (personal protective equipment) stored and maintained in generally good condition and readily available?**
- LS-13 Is there a mechanism for personnel to re-supply or request supplemental PPE (personal protective equipment) for additional hazards?**
- LS-14 Is respiratory protection stored and maintained in good condition (NIOSH**

certified)?

**LS-15 Are compressed gas cylinders properly secured and labeled?**

Guidance: Compressed gas cylinders need to be secured from accidental tipping as the cylinder valves can strike nearby objects and be sheared off, causing the cylinder to become a projectile. Caps should be in place at all times when cylinders are in storage.

All compressed gas cylinder need to be clearly labeled as to there contents for obvious operational and emergency response purposes.

OSHA 29 CFR 1910.101 references the Compressed Gas Association. The GCA outlines the required in-plant handling and storage practices for compressed gas cylinders.

Reference: OSHA 29CFR1910.101

**LS-16 Is access to visible electrical panels unobstructed?**

Guidance: Access to electrical panels needs to be unobstructed to allow for quick access in the event of an emergency if power needs to be de-energized.

For the purpose of this inspection, visible panels are those which are observable without requiring the movement of equipment.

OSHA 29 CFR 1910.303 requires at minimum of 30 inch working clearance all around electrical panels.

Reference: OSHA 29CFR1910.303

**LS-18 Are doors to and from laboratories/shops kept closed when required?**

Guidance: Hazardous laboratory operations need to be segregated from exit corridors. Spills or other releases of hazardous materials or biological agents have the potential to contaminate corridors and /or people using them. Also, the integrity/fire rating of exit corridors needs to be maintained to provide protection during a fire. An unprotected opening (i.e. an open door) in a 2 hour rated corridor wall reduces the rating, thus limiting the protection that the corridor affords to occupants while exiting during a fire.

The Massachusetts Building Code and NFPA Life Safety Code 101 detail the requirements for the fire ratings of corridors and door assemblies. There is no code which indicates that all laboratory doors need to be closed constantly, however, it should be viewed as a good management practice, provided it does

not create additional hazards. Each situation needs to be evaluated on a case by case basis.

Reference: EHS SOP on Closing of Laboratory Doors; Massachusetts Building Code; and NFPA Life Safety Code 101

**LS-19 Is guarding installed on equipment/machinery at all points of operation (pinch, cutting, or crushing)?**

Guidance: Machines/equipment that require guarding that are commonly found in work areas, shops and laboratories at MIT include but are not limited to saws, fans, abrasive grinding wheels, presses, belt, chain, pulley and gear assemblies, fume hoods and laser equipment. The major categories of guards include fixed, interlocking, adjustable and self-adjusting.

Moving machine parts have the potential for causing severe injuries, such as crushing fingers or hands, amputations, burns, blindness, etc. Safeguards are essential for protecting workers. Any machine part, function, or process which may cause injury must be safeguarded. When the operation of a machine or accidental contact with it can injure the operator or others in the vicinity, the hazards must be either eliminated or controlled.

Guards are intended to protect workers from exposure to hazards. Equipment should not be operated with guards removed or altered. Equipment that is found with guards adjusted wrong, loose, or missing should be more closely evaluated, once taken out of service.

Machines designed for a fixed location include drill presses, lathes, milling equipment, etc. Machines capable of unintended movement should be bolted to walls or floors to prevent them from creeping during operation. Drill presses (and other upright standing equipment) shall be secured to the floor to prevent tipping.

**LS-20 Are all electrical conductors on equipment or service enclosed?**

**LS-22 Are extension cords only being used on a temporary basis?**

Guidance: Per OSHA 29 CFR 1910.305, extension cords (including power strips) are not to be used as a substitute for the fixed wiring of a structure. Extension cords are prohibited for equipment in continuous service, with the exception of computers. Computer peripherals are not exempt. Refer to *Guideline for Inspecting Extension Cords*.

Cords and cord use applications should be evaluated based on the following criteria:

- Grade and condition of the cord: It should be of commercial grade and in sound, non-compromised condition. Shop made cords or any non UL or ANSI cords should not be used. Commercial grade cordsets will have an outer cover enclosing the inner conductors (which themselves are insulated). Narrow gauge home use types are not acceptable in most applications. Actual reading of the classification of the cord is not necessary, but it should be evident that the cord is of reasonable quality and durability. The cord and plug should be in good condition, free of splits, cracks, or derangement. Repairs to cords are generally not acceptable unless it returns the cord to its original level of continuity; this requires some judgment. Generally, flimsy repairs or many repairs (to the same cordset) are not acceptable.
- Placement of the cord: The cord should not be draped over, on or under objects which crimp, crush, or cut the cord or conductors within. The cord should not cause a trip hazard.
- Cords should not be used in series.
- Devices served by the cord: Use of high demand devices (which draw high current/amperage) for long periods such as resistance heaters, broilers, large motors, air conditioners, compressors, etc., should be more closely evaluated as to whether they exceed the rated capacity of the cord. These devices generally have specific restrictions on length and gauge of cord required if an extension cord is used. Manufacturers of certain high demand devices prohibit the use of extension cords. Generally, shorter and heavier cords or no extension cord at all is what you are looking for.
- Simpler devices such as computers, monitors, simple light fixtures, radios, small electronics, etc., are less likely to draw current that will exceed commercial extension cords. The distinction regarding these devices requires that knowledge and judgment be used in the assessment process.
- Cube taps (outlet multipliers) should not be used. Strip outlets with overload protection may be used, but only with low amperage devices, and within the capacity of the strip.
- Grounding plug adapters should not be used. Nearly all electrical outlets are three-prong type therefore this will unlikely be seen at MIT.

If an application is encountered that is clearly questionable, but is not readily or confidently answered, it should be flagged and a note made that it should be further evaluated. For example, if a large refrigerator is temporarily being run from heavy gauge but relatively long extension cord you will not be able to determine if the length for the gauge is adequate. This should be noted as an item for further investigation but not a finding.

Reference: OSHA 29 CFR 1910.305 and EHS SOP Guidelines for Inspecting Extension Cords

**LS-23 Are portable electric tools and equipment grounded/double insulated?**

Guidance:

- All small, portable electrical devices should either have a three pronged cord, or be of “double insulated” design. Generally this means that the housing and parts that the user touches are non-conductive (e.g. plastic) or that the internal conductors cannot contact the housing (shielded). The designation of “double insulated” is usually on the device. Nearly all UL approved devices are double insulated or have three-pronged plugs. Older, non-standard devices would be most suspect to have neither of these.

You can generally see that a plug is three-pronged by the shape of it, without unplugging the device. Generally you should not unplug devices to determine this.

- For construction activities or in wet areas, all portable and temporary electrical devices are required to be used with a GFCI. These are present either as an adapter with or as part of the extension cord, or the circuit itself is protected. In latter case, it is either on the outlet itself or at the breaker panel. It is harder to verify the breaker panel as being GFCI protected as you usually have to look at the breaker itself. Sometimes outlets that are protected at the breaker are so indicated as GFCI protected.

Any workplace or work classification that comprises non-fixed, non-standard activities should be considered as a construction activity. Any area where wet conditions are expected or anticipated nearby requires GFCI; this would include bathrooms, janitors closets, outlets near sinks or wet processes.

GFCIs work with two or three prong plugs.

**LS-24 Are portable electric tools and equipment, if used in construction-related activity or wet-use area, used on GFCI circuit?**

**LS-25 Is the bottom slot of the chemical fume hood at least 70 percent unobstructed?**

Guidance: There are 2 or 3 slots in the back of the fume hood (usually at bottom/middle/top of the back wall) which create airflow, drawing air from the front toward the back of the hood. If the bottom slot of the fume hood is blocked more than about 30% (by bottles or equipment) within 6 inches of the back bottom slot, there will not be good airflow and it is should be considered obstructed. Turbulence, which leads to poor containment of contaminants can be avoided by minimizing larger obstructions in the air pathway. Containment of chemicals at the front of the hood or along the hood surface where the chemical work is usually performed will be compromised by turbulent flow. Obstructing equipment can be mounted on small blocks or equipment grids, which will allow the air to flow under it. Also, all work with chemicals should be conducted 6 inches back from the front of the fume hood and nothing should protrude through the sash opening that would obstruct or disrupt airflow. The MIT IHP sticker

should be on the side of the hood where the sash slides and should indicate air flow, hood or room, and date.

In laboratories, “fume hoods” are a critical engineering control that keeps contaminants from entering the laboratory. They are often the difference in preventing potential significant exposures to lab workers and other building occupants and subject to various influences in the building and maintenance issues. IHP “certifies” each hood once per year, to indicate that it is working to performance specifications. However, that certification is based on the hood being used in accordance with good practices and if slots are obstructed, the hood may not be controlling contaminants, even though it has a current certification sticker. ANSI/AIHA Z9.5-2003 recommends that chemical fume hoods be inspected annually.

Please ask occupants to remove materials that are blocking slots (or put up on noncombustible blocks). If out of date, you should notify the lab occupants and IHP. You may also refer them to IHP if they have further questions.

Reference: ANSI/AIHA Z9.5-2003

**LS-26 Is the fume hood free of large equipment?**

**LS-27 Has the fume hood been inspected and tagged by IHP within the last year?**

**LS-28 Is stock radioactive material secure?**

Guidance: All stock radioactive materials must be secured from unauthorized removal or access.

The State of Massachusetts Radiation Control Program states that the licensee shall maintain constant surveillance and use devices or administrative procedures to prevent unauthorized use of licensed radioactive material that is in an unrestricted area and that is not in storage.

Reference: Massachusetts Department of Public Health 105CMR120

**LS-29 Is the appearance of the laboratory/shop neat, orderly, and clean?**

Strategies for good housekeeping

Good housekeeping should be maintained in all work areas. This often involves careful use of limited space by planning ahead for delivery and storage of materials, as well as disposition of unwanted/discarded equipment. Quantities of equipment, supplies and other materials should be ordered in moderation. Upon receipt, material and supplies should be unpacked and put into storage.

General Safety

Poor housekeeping can lead to trip/fall hazards, as well as life/fire safety code violations. Examples of poor housekeeping include storage of materials in aisle ways between laboratory benches, restricted or block exits, cluttered work surfaces, desks and bench tops, as well as blocked emergency equipment. Waste containers of all types should be emptied on a regular basis.

#### Walking and working surfaces

Personnel working in laboratory, shop and office areas should clean up spills on floors and benches as soon as they occur but only if it is a minor spill that remains confined to the location. All other spills should be reported to the MIT emergency number x-100 from a campus telephone or the MIT Operations Center 3-1500 or if the spill occurs during regular business hours to the EHS Office 2-3477. In all cases of spills, nearby personnel should be asked to immediately vacate the area of the spill. A minor spill is a spill of a known material that presents no immediate, significant threat to personnel; the spill is not in a public area, has no potential for release to the environment and can be cleaned up by pre-trained personnel using appropriate PPE. Lab benches should be free of chemical residues, razor blades and other sharps.

Leaks from pipes, ceiling or other facility related equipment should be reported to the local facilities zone office, immediately. Caution tape, barriers or warning signs should be erected to warn others who may enter the area until such time as the leak has been repaired and the area cleaned.

#### Storage

Overloading wall shelving should be avoided. Heavier items should be stored on the lowest shelves. Avoid storing power supplies, monitors and CPU's on standard wall shelving that is intended for book storage. Heavy items should be reserved for free-standing storage shelving that has been designed for that purpose. Storage should be kept a minimum of 18 inches from ceiling or wall mounted sprinkler heads. Liquid chemicals should be safely stored in appropriate cabinets as opposed to open wall/bench top shelving. This helps to avoid the risk of a falling bottle and subsequent spill.

### **LS-30 If HF is present, are the workers trained for using HF? (Inspectors should spot check training status with people encountered in lab)**

Guidance: If you ascertain that hydrofluoric acid is in use or if a bottle of HF is visible, please inquire whether they have the calcium gluconate "antidote" gel and what the expiration date is. The date is printed on the salve tube/ box. If it is expired, please have them call IHP to pick up a new tube.

HF is an especially dangerous acid because its effects are delayed. The dilute solutions that are most frequently in use in the lab do not produce an immediate

sensation of burning. Instead, HF penetrates the skin and produces a deep, very painful (and often disfiguring) burn hours after the initial skin contact. All users of HF at MIT must be trained in its use and have calcium gluconate gel in their lab. If any exposure is suspected, the user should wash with water for 10 minutes, apply the calcium gluconate gel (the calcium binds with the fluorine to prevent penetration), and then go the Medical Department for follow-up treatment.

MIT's Industrial Hygiene Program created a policy for those who work with Hydrofluoric Acid.

**LS-31 If HF is present, is calcium gluconate present and within the expiration date?**

## **Waste**

**WA-01 Are radioactive waste inventory cards (solid/liquid container, sink) properly filled out?**

Guidance: All radioactive waste disposal must be recorded.

The State of Massachusetts Radiation Control Program requires tracking of the receipt, use and disposition of all sources of radiation. Appendix 3 of the MIT Required Procedures for Radiation Protection Manual.

Reference: Massachusetts Department of Public Health 105CMR120

**WA-02 Is biohazardous waste and non-biohazardous sharps being disposed of according to MIT policy?**

Guidance: MIT segregates biological waste into solids, liquids, and sharps. In the event that waste must be stored then the following steps must be taken:

- The container is clearly marked as a "Biohazard", typically with the universal biohazard symbol.
- "If it can't go down the drain or in the trash (due to chemical or radiological contamination), it can't be disposed of as biohazardous" (into BioSystems or other biohazardous waste stream.)
- Containers for storage must be unbreakable under normal conditions of use.
- All contaminated non-sharps containers are placed into a clear autoclave bag and autoclaved prior to disposal.
- All sharps are placed in either gray or beige leak-proof, puncture-proof containers and removed weekly by BioSystems (except chemical and radiological sharps and empty, intact new chemical containers).
- Liquids can be decontaminated by autoclaving or by addition of a disinfectant such as bleach or Wescodyne and poured down the drain after 20 minutes.

The MA State Sanitary Code requires that wastes from biomedical and biotechnology (rDNA) labs be properly disposed of. Sharps must be rendered nonphysically sharp prior to disposal in a landfill. The labeling and segregation of sharps meets the regulation and provides protection to the MIT janitorial staff.

Reference: Massachusetts State Sanitary Code. Please have employees consult the Biosafety Manual or the EHS website at [http://web.mit.edu/environmental/ehs\\_services/ehs\\_areas/biosafety/procedures/biomed\\_waste.html](http://web.mit.edu/environmental/ehs_services/ehs_areas/biosafety/procedures/biomed_waste.html). They may also consult BSP at 2-3477.

**WA-03 Is all biohazardous waste tagged and autoclaved?**

Guidance: Solid waste that is biologically contaminated, such as gloves, Petri dishes, paper plates, must be placed in an autoclave bag, the autoclave tag must be attached to the bag, and the bag should be autoclaved open. When cool, the bag should be closed (with the autoclave tag attached to the outside) and disposed of in regular trash. This type of waste cannot be disposed of without being decontaminated.

According to the State Sanitary Code, after biological waste has been autoclaved and rendered non-infectious, it can be disposed of as regular trash.

Reference: Massachusetts State Sanitary Code. Please refer them to the Biosafety Manual, the EHS website at [http://web.mit.edu/environmental/ehs\\_services/ehs\\_areas/biosafety/procedures/biomed\\_waste.html](http://web.mit.edu/environmental/ehs_services/ehs_areas/biosafety/procedures/biomed_waste.html), or BSP at 2-3477.

**WA-04 Is autoclave logbook up to date and all treatment of waste is properly recorded (including tag numbers)?**

**Satellite Accumulation Area (SAA)**

**SA-01 Is the hazardous waste satellite accumulation area (SAA) clearly labeled?**

Guidance: MIT requires that the pale green sticker be used at each SAA. It is approximately 4" by 6" and should be applied to the secondary containment(s) or in the immediate area where they are kept. Others signs are not acceptable. EPA requires that areas be posted to designate the area, but does not specify the exact signage. MIT has chosen to standardize the signs wherever possible by use of the green sticker. (Green and white barber pole tape is used for Main Accumulation or <90-day areas only.)

Reference: 40 CFR 260

**SA-02 Is the SAA located at or near the point of hazardous waste generation and under the control of a responsible person (generators, PI, EHS coordinator, EHS representative)?**

Guidance: Satellite accumulation areas must be located near the point of waste generation and under control of the person generating the waste. If you have to go through a hallway or other public access area to get to the hazardous waste accumulation area it cannot be considered a satellite accumulation area.

Reference: 310 CMR 30.340

**SA-03 Are all hazardous waste containers provided with secondary containment and is the containment intact (containment may be shared for compatible wastes)?**

Guidance: EMP provides secondary containment for all hazardous waste storage areas. Incompatible wastes should be stored in different secondary containers. Containers should be free of cracks or other damage.

Reference: 40 CFR 264.175

**SA-04 Are incompatible hazardous wastes separated and kept in different secondary containers?**

Guidance: Hazardous waste regulations permit only one container of hazardous waste per waste stream be stored at Satellite Accumulation Area (SAA). A maximum of 55 gallons of hazardous waste or 1 qt of acutely hazardous waste is permitted to be stored under these regulations.

Reference: 40 CFR 262.34

**SA-05 Is there only one hazardous waste container per waste stream in each SAA?**

**SA-06 Are the hazardous waste containers in the SAA in good condition?**

Guidance: Waste containers should be of seamless construction and not cracked or damaged. Incompatible wastes cannot be stored in the same secondary containment so that in the event of commingling (from breakage or other localized spill or release) there will be no reactivity issue. Typically, glass or plastic bottles of various sizes are used, with original labels fully obscured of their labeling and wording.

Containers must be compatible with hazardous waste stored in them, e.g. Hydrofluoric acid not stored in glass container, corrosives not in metal containers. Container materials must be compatible with the hazardous waste stored so as to avoid reactions.

Reference: 310 CMR 30.340 and 30.253

**SA-07 Is the hazardous waste compatible with the containers?**

Guidance: Containers must be compatible with hazardous waste stored in them, e.g. Hydrofluoric acid not stored in glass container, corrosives not in metal containers. Container materials must be compatible with the hazardous waste stored so as to avoid reactions. Also, an overall objective is to ensure that obviously inappropriate containers are not being used (household, makeshift, food containers, etc.). (Chemical compatibility tables and charts are available for basic and common questions where chemicals are stored)

**SA-08 Are labels for hazardous waste containers marked with: Hazardous Waste or Waste Oil, the type of waste, the type of hazard, properly dated (if appropriate) and all old labels defaced or removed?**

Guidance: Containers used for hazardous waste must be properly and clearly labeled. Labels must include: (1) the words “Hazardous Waste”, (2) the container’s contents written out (e.g. “WASTE OIL, no formulas, no abbreviations”); (3) the hazard classification associated with the waste (e.g. “TOXIC”). EMP provides red HW tags, however, other labels must be used as well if OK’s by EMP. Original container labels must be defaced and obscured or removed.

Once a container in a SAA is or nearly full, the date must be written on the label and the 3-day period begins for movement to a main/<90 day area.

DEP/EPA regulations on SAA and Main (90 day areas) are explicit in their requirements and MIT has been the focus of inspection of these areas in the past. SAAs tend to become poorly managed in some locations and must not become randomly created without recognition of the regulatory risks and associated inspections and fines. In addition, releases or reactions can cause harm to the environment, public and personnel.

Reference: 40CFR262.34

**SA-09 Are hazardous waste containers firmly CLOSED except when waste is being added?**

Guidance: Satellite Accumulation containers must be firmly closed except when waste is being added to the container.

Reference: 40 CFR 265.173

**SA-10 Are the dates of containers ready for collection less than 4 days?**

Guidance: Full containers of hazardous waste can be stored at the satellite accumulation area for a maximum of 3 days, then must be transferred to a main storage area.

Reference: 310 CMR 30.340

**SA-11 Have all SAAs been inspected at least weekly?**

Guidance: Ensure that conditions observed indicate that SAAs are in overall good condition and in accordance with the other criteria found in this section. If the inspections are being done by users, these things should be in order. You should simply ask the user(s) if these inspections are occurring and check their response against conditions you observe (for consistency).

DEP/EPA requires that SAAs be inspected weekly, though documentation of the inspection is not required.

**SA-12 Is all hazardous waste stored within a properly marked SAA?**

Guidance: Hazardous waste regulations establish a two-tiered waste accumulation and storage system: satellite accumulation and main accumulation/storage. “Accumulation” which is storage of smaller quantities at the point of generation and under the control of the person generating the waste, is called satellite accumulation. If you have to go through a door to get to the hazardous waste accumulation area, it cannot be considered a satellite accumulation area.

No log or registration of the locations of SAAs is required, though designating signage and labeling is required (see below).

SAAs should not be near drains, sinks, or at locations where an accidental release could create a “release to the environment” such as near a sump pump or an unpaved or non-impervious areas (e.g., broken concrete floor).

Regulations allow:

- A maximum of 55 gallons of hazardous waste (or 1 quart of acutely hazardous waste) at each satellite accumulation area;
- Only one container per waste stream;
- Satellite accumulation containers must be firmly closed except when waste is being added to the container;
- Full containers of hazardous waste can be stored at the satellite accumulation areas for a maximum of 3 days, then must be transferred to a main storage area.

MIT requires that the pale green sticker be used at each SAA. It is approximately 4” by 6” and should be applied to the secondary containment(s) or in the immediate area where they are kept. Others signs are not acceptable. EPA requires that areas be posted to designate the area, but does not specify the exact signage. MIT has chosen to standardize the signs wherever possible by use of the green sticker. (Green and white barber pole tape is used for Main Accumulation or <90-day areas only.)

Reference: 40CFR260 and 310CMR30.340

**SA-13 Are spill kits available?**

Guidance: Spill response materials or kits and other emergency response supplies should be generally accessible for use without undue effort; line of sight is a good indication generally.

Spill response materials shall be present to minimize exposure and transport in the event of a spill, as part of OSHA requirements for response. Users must be aware of these materials’ location, based on the training they have received, as required under RCRA.

**SA-14 Are storage containers provided for silver reclamation?**

Guidance: Storage containers should be compatible with the fixer inside. Plastic containers are used. The EMP provides containers for fixer collection – either 5, 16, 30, or 55 gallon drums. If other containers are requested, these are the responsibility of the DLC. The containers are closed except for small openings in the top to allow for draining of the fixer into the drum. The containers should be kept in secondary containment (either a catch pan or a spill pallet) and labeled as “Fixer for Recycling”.

**SA-15 Are storage containers for silver reclamation stored separately from the SAA?**

**SA-16 Are all hazardous waste and waste oil containers stored such that a leak will not result in material entering a drain, a waterway, or the ground?**

Guidance: Hazardous waste storage areas should not be near drains, sinks, or at locations where an accidental spill/release could create a “release to the environment” such as near a sump pump or an unpaved or non-impervious areas (e.g., broken concrete floor).

## **Biosafety**

**EB-01 Have Biological Safety Cabinets (BSCs or biosafety cabinets) been tested and certified within the past year?**

**EB-02 Are the front and back grates of the biosafety cabinet unobstructed?**

Guidance: The biosafety cabinet operates with an internal blower that draws room air through the front grill at the opening of the cabinet. Depending upon the cabinet type, 30 to 100% of the cabinet air is exhausted through a HEPA filter. This air is either ducted to the outside (preferred) or recirculated into the lab. The room air that enters the front grill is also HEPA filtered and this provides particulate free air to the work surface. If the grills in the front and back are blocked or the HEPA filter begins to fail, then there will not be good airflow and this could potentially contaminate work in the cabinet and compromise the protection of the researcher and/or the environment.

A vendor sticker (usually “B&V Testing”) should be on the front of the biosafety cabinet and should indicate when it was certified and when the expiration date is.

Reference: In laboratories, the biosafety cabinet is a critical engineering control to protect the worker, product, and environment from exposure to microbiological agents. The MIT Committee on the Assessment of Biohazards (CAB) requires Principal Investigators to have them certified annually.

**EB-03 Does the lab have a current *Biosafety Manual* and *Exposure Control Plan* (if applicable)?**

Guidance: Any BL1, BL2 or other lab working with biological agents must have a *Biosafety Manual* available for use by lab personnel. This *Manual* is produced and periodically updated by the EHS Office Biosafety Program. A copy can be obtained by contacting the EHS Office.

The *Exposure Control Plan* (ECP) outlines lab-specific policies and procedures for working safely with potentially infectious materials in the lab. An *ECP* is required in laboratories that work with human blood, body fluids and/or human cell lines or other human-derived research materials. A generic template version of the plan is available from the EHS Office with a few sections left blank for PIs to customize the plan to their lab.

Each PI is responsible to write a lab-specific Exposure Control Plan. *ECPs* are submitted to, and reviewed by, the EHS Office Biosafety Program annually. The *ECP* and *Biosafety Manual* should be kept in a location that is available and known to all lab personnel.

Reference: The OSHA Bloodborne Pathogen Standard (BBP) requires employers to write an *Exposure Control Plan* and update it on a regular basis.

## Lasers

- EL-01 Are all doors to rooms, where Class 3b or 4 lasers are used, posted with a DANGER signal word sign?**

Guidance: Requirements for posting rooms where Class 3b or 4 lasers are used are described in the MIT Laser Safety Program manual. The manual is available on the EHS web site. Signs are available from the Radiation Protection Program office.

- EL-02 Is there a lighted warning sign outside the room to indicate when open beam Class 3b or 4 lasers are in use?**

Guidance: An open beam laser system means that the beam is free in air and accessible to persons in the room. Lighted warning signs are available from the Radiation Protection office.

- EL-03 Have Class 3b and 4 Lasers in use been registered with RPP?**

Guidance: Requirements for the registration of Class 3b and 4 Lasers are described in the MIT Laser Safety Program manual.

- EL-04 Is protective eyewear available for areas where Class 3b and 4 Lasers are used?**

Guidance: There should be appropriate laser eyewear in sufficient quantities for all persons in the areas where Class 3b or 4 lasers are in use. The Radiation Protection Program office can provide guidance on the specific eye protection requirements for the laser system being used.

Reference: Massachusetts Department of Public Health **105 CMR 121 Regulations for the Control of Lasers** regulates the use of the laser systems, devices or equipment to control the hazards of laser rays or beams. The MIT Laser Safety Program and the MDPH regulations are based on the requirements set forth in the most recently published version of the ANSI Z136.1 standard.

## Cryogenics

- EC-01 Have areas with oxygen detectors and alarms been tested to be sure detectors and alarms are in working order?**

Guidance: Detection and alarm systems can provide a false sense of security if they do not function properly. A regular schedule should exist for calibrating detectors and testing these systems; any malfunctions or deficiencies should be addressed immediately.

**EC-02 Do piping, valves, hoses, tanks, etc. that handle cryogenic liquids have pressure relief valves?**

Guidance: Cryogenic liquids shall be used and stored only in containers and systems designed for these materials. Due to the hazards of pressure buildup due to off-gassing vapors, cryogenic liquids shall never be contained in a closed system; appropriate accommodations shall be designed into any system that contains cryogenic liquids in order to allow relief of pressure buildup during the most adverse conditions. Pressure relief may be provided by spring-loaded relief devices or by an open passage to the atmosphere. Frangible disks are recommended as additional relief devices when the capacity of the operational relief device is not adequate to take care of unusual or accidental conditions. This is especially true when insulation of the system is dependent upon maintaining a vacuum in any part of the system, including permanently sealed dewars. Users shall not tamper with pressure relief devices.

Reference: NFPA 45, Fire Protection for Laboratories using Chemicals

**AF-01 If necessary, please note any findings or corrected findings not directly related to a question in this inspection.**