**MIT Guidelines for EHS Coordinators and their teams**

**To use for Programs involving Minors**

**That involve Hazardous Materials and Equipment**

**Revision December 2018**

**Precautions that apply to all types of Hazardous Materials and Equipment**

The primary supervisor, EHS Coordinator and Lead Contact will do a risk assessment of the protocol(s) and the lab area to verify that the minor’s safety will be protected. This is also to comply with the intent of the Child Labor laws (federal and Mass.). Include the following precautions unless these are not applicable:

* Confirm that the complexity of the task(s) is consistent with the skill level of the student. Have the student demonstrate what they know how to do. Also ask the direct supervisor if they have the expertise to train, demonstrate, and supervise the minor.
* Determine which hazardous steps of the protocol the minor should observe the supervisor do from a safe distance. In general, the primary supervisor should work with the hazardous materials in large volumes, in high concentrations, and other procedures that involve more risk and require more experience.
* Identify what the student can safely work with if they are trained and closely supervised. In general, this would include hazardous materials in smaller volumes or dilute concentrations, a material bound to a substrate, and procedures that involve less risk of splash, spill, fire, injury or exposure.
* The supervisor should train the student how to safely transport break-resistant containers of liquids, which are minimally hazardous materials. This applies to new bottles, waste containers, and those that are in use. Students can be trained to safely transport bottles and labware that are plastic, metal and plastic-coated glass and small glass bottles/ labware in secondary containers. Due to many accidents, the supervisor should transport large glass containers of liquid hazardous materials.
* All of the precautions should be documented as part of the protocol, reinforced during training and as the experiment progresses.
* It is highly advisable that students first practice transferring hazardous materials using water as a substitute. If the procedure involves pipetting, the student should practice pipetting water until they have demonstrated proficient technique.
* The students should not be allowed to take home (even minimally) hazardous materials or equipment.
* The Chemical Safety Board’s new guidelines for demonstrations in high school labs encourages the student participants to question their teacher if they are concerned that a demonstration, an experiment, etc. is unsafe.

**Hazardous Materials (common types listed first)**

**We could use the** [**ACS recommendations**](http://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/publications/reducing-risks-to-students-and-educators-from-hazardous-chemicals.pdf) **for specific chemicals.**

**Acids and Bases:**

Minors cannot work with hydrofluoric acid (HF), nitric, and other acids or mixtures that are flammable or reactive. It is recommended that the supervisor dilute concentrated acids and bases for the minor’s use. Container size should be limited to less than 100 ml. This is to prevent burns. For work with slightly more concentrated acids and bases the level of PPE should be increased. For example, in lieu of safety glasses, tight fitting goggles should be worn. If there is risk of mixing incompatibles, then the minor should observe the supervisor doing this from a safe distance.

14-15 years old and younger: TBD

**Flammable solvents and open flames:**

16-17 year old Minors may work with flammable solvents under close supervision if the following precautions are taken to minimize the risk of an incident:

* Container size should be limited to 1 liter or smaller.
* The minor must be instructed regarding proper procedures/best practices to minimize the risk of spilling and/or igniting the solvent.
* If the process involves the risk of catching clothing, hair, or anything else on fire, then the supervisor will perform this process while the minor observes from a safe distance.
* If the chemical is toxic (refer to guidance below) and flammable, then the IHP team member will recommend additional precautions. Minors are not allowed to work with solvents that become shock sensitive (peroxides).
* 14-15 year old minors should only handle very small quantities such as a squirt bottle of solvents (minimal hazards) to soak a paper towel or cotton ball in order to clean parts, disinfect items, etc. This age group should not work with solvents that are toxic, carcinogenic, etc. and they should not work with solvents and open flames simultaneously.
* 13 and younger: TBD

**Toxic Chemicals:**

Minors may work with toxic chemicals in a fume hood under close supervision. Minors are not allowed to work with chemicals that are classified as “acutely toxic.”

14-15 years old and younger should not work with toxic chemicals.

**Carcinogenic Substances:**

Minors may work with potentially carcinogenic substances in a fume hood under close supervision. Contact the IHP team member for advice about whether a minor can work with “select” carcinogens and photo resists based on a review of the protocol and specific precautions.

14-15 years old and younger should not work with carcinogenic substances.

**Reproductive Toxins**

Minors are not allowed to work with these toxins.

**Hazardous Waste:**

The student will collect waste chemicals in a small container and the supervisor or the EHS Representative will transfer this to the 4L waste bottle in the appropriate satellite accumulation area, as needed. If the lab documents that there is no risk of mixing incompatibles, then the minor can transfer the waste.

14-15 years old and younger: TBD

**Biological Materials: No one under the age of 16 is allowed to perform work in a biological laboratory.**

The MIT Committee on Assessment of Biohazards Policy #3: **Oversight and Supervision for Undergraduates, High School, and Junior High Students, and Teachers Engaged in Biological Research in MIT Facilities** states

High school and junior high school students may engage in research that has been designated as requiring only BL1 containment and is low risk. This includes research involving murine cell culture. Potential projects that wish to use particular, well-characterized, human cell lines should be discussed with the Biosafety Program before initiation of the project. High school and junior high students cannot work "after hours" and must be carefully supervised at all times in the laboratory.

[Not part of the policy: DNA extraction of fruits and vegetables is acceptable. Minors may not enter BL2+ spaces.]

**Dissection**

Complete the template and follow the process at <https://ehs.mit.edu/site/live-animals-events-safety-plan-template> The Biosafety Associate Director will check with DCM and/or CAC before EHS recommends how to do this safely.

**Phenol:**

16-17 year old Minors may work with small quantities of phenol in a fume hood under close supervision.

Special precautions must be taken when working with phenol, including appropriate PPE and engineering controls. The supervisor will review the appropriate lab-specific SOP\* for phenol use with the minor prior to work with this chemical and will ensure adherence to guidelines are followed whenever there is a risk of phenol exposure.

\*The lab must develop a phenol SOP if one does not already exist. Please contact the EHS Coordinator for assistance.

**Kits used by biological labs:**

These kits contain hazardous materials, such as those listed above, despite the appearance. EHS needs to work with the primary supervisor to determine what steps the minor can safely perform based on the specific kit. This includes whether the minor can safely dispose of the waste.

**Radioactive Materials:**

Minors may work with radioactive materials and/or radiation producing equipment under the following conditions:

1. Minors must be provided “lab specific training” specific to the types of material, equipment and experiments to be performed. A record of the training must be maintained by the lab.
2. Radiation Protection Program (“RPP”) has created a standard letter, the **Dependent Minor Lab Work Acknowledgement Form,** which should be customized to define the general scope of the work and should be signed by the minor’s parents. A copy of the signed letter will kept on file by RPP.
3. Any proposed work by minors with radioactive materials or radiation producing equipment that the DLC does not intend to provide constant supervision must be reviewed by the RPP staff.

**Pyrophoric, Water Reactive, Highly Reactive and Explosive Materials:**

Minors may not work with pyrophoric, water reactive, highly reactive, or explosive materials. Pyrophoric substances are defined as chemicals which may spontaneously ignite on contact with air or moisture. Under controlled circumstances, a 16-17 year old minor may be permitted to observe how these materials are handled by trained and experienced MIT staff and learn the principles. The team Safety Program contact should be consulted.

**Engineered Nanomaterials:**

16-17 year old minors may work with engineered nanomaterials in a fume hood under constant supervision. Engineered nanomaterials may have long-term health effects and may be more toxic than substances with larger particle sizes. Many nanomaterials have not had extensive testing of their toxicity, so the best approach is precautionary. For work with nanomaterials, special precautions should be specified. These specific precautions should be implemented and documented during training. The team IHP contact may be consulted regarding work with engineered nanomaterials.

14-15 years old and younger: TBD

**Other types of hazards**

**Lasers:**

Minors may work with class 3b and class 4 lasers under close supervision. The RPP must be contacted to perform a Lab Hazard Analysis for any work by a minor involving class 3b and 4 lasers. Regular supervision of minors is allowed for class 3r and lower lasers.

1. Minors must be provided lab specific training specific to the lasers system(s) to be used and must acknowledge in writing that they have read the laser safety SOP for the laser(s) to be used. A record of the training and acknowledgement must be maintained by the lab.
2. RPP has created a standard letter, the **Dependent Minor Lab Work Acknowledgement Form**, which should be customized to define the general scope of the work and should be signed by the minor’s parents. A copy of the signed letter will kept on file by RPP.
3. Any proposed work by minors with class 3b and class 4 lasers that the DLC does not intend to provide close supervision must be reviewed/ approved by the RPP.

**Laboratory Animals**

Minors may engage in research requiring BL1 containment, such as work with rodents. This should be discussed with the Biosafety Program (“BSP”) staff and the Committee on Animal Care (CAC) before initiation of the project. Note: The minor’s name must be added to the PI’s CAC protocol. The EHS Office reviews the use of live invertebrates or dissections of invertebrates, so refer to [guidelines](https://ehs.mit.edu/site/live-animals-events-safety-plan-template).

Animal Bite prevention: Minors should observe any protocol that involves the risk of a bite, because most cut resistant gloves don’t provide puncture protection. Note: Minors may not work with non-human primates.

Proposed for 14-15 years old and younger: First observe the supervisors or mentors that handle rodents.

**Access to DCM**

The Division of Comparative Medicine (DCM) has the final decision in granting access to their Department’s animal facilities and this is done on a case by case basis.

**Non-ionizing Radiation: Ultraviolet (UV) light**

Minors may use a UV light imager if it is operated with the door closed so there is no UV exposure to the user. However, the Student shall don a UV-protective face shield over safety glasses, in addition to lab coat and gloves, if there is a need to cut gels using a UV transilluminator or any other potential for UV exposure. If the cutting involves a scalpel, then follow the Sharps guidance below.

**Power tools, Machine shops, Wood-working shops, Dangerous Equipment or Dangerous Activities:**

16-17 year old minors may work with the low power hand and bench tools that are listed in the Shop and Makerspace Safety SOP, Appendix A Tool Classification Guidelines

14-15 years old and younger: TBD

**Sharps**

Minors should not use sharps like needles, utility knives, scalpels, exacto knives, etc. because of the large number of accidents that have occurred at MIT. An exception can be made if engineering controls, safety cutters, and cut resistant gloves are used so the risk of injury is minimal. Refer to the Laboratory Animal section.

**Soldering**

High School students, who are learning about soldering, should be closely supervised to reduce the risk of injury. Follow the [best practices](https://ehs.mit.edu/site/content/soldering-tips-and-best-practices)

14-15 years old and younger: TBD

**Welding**

TBD

**DEA Controlled Substances**

Minors are not allowed to work with Controlled Substances however they are allowed to work in a space where Controlled Substances are securely stored.

For hazards that are not listed above, the appropriate DD and EHSMS team member should review the program’s plan and make a recommendation.