

**FACT SHEET: HAZARD ASSESSMENT TABLE**

*This hazard assessment reference is provided to help identify the different types of hazards that may occur within a lab, and to provide guidance in the appropriate precautions for any given lab activity. It is prudent to always ensure that the PPE and work practices are suitable to the work being done, as every lab is different and one size does not fit all. If you have any questions or need assistance, please contact EH&S.*

**CHEMICAL HAZARDS**

| Activity  | Potential Hazard  | Appropriate Precautions   |
|---|---|---|
| Working with small volumes (<4 liters) of corrosive liquids, or corrosive solids.   | Skin or eye damage.   | Safety glasses or goggles. Chemical-resistant gloves. Lab coat.   |
| Working with corrosive liquids or other materials which create a splash hazard.   | Poisoning, increased potential for eye and skin damage.   | Safety goggles. Chemical-resistant gloves. Lab coat.  |
| Working with small volumes (<4 liters) of organic solvents or flammable organic compounds.  | Skin or eye damage, potential poisoning through skin contact. Fire.   | Safety glasses or goggles. Chemical-resistant gloves. Lab coat. Fume Hood. Keep heat/flames away.   |
| Working with large volumes of organic solvents, small to large volumes of very dangerous solvents, or work which creates a splash hazard. | Major skin or eye damage, potential for poisoning through skin contact. Fire.   | Safety goggles. Chemical-resistant gloves. Flame-resistant lab coat (e.g. Nomex). Fume hood. Keep heat/flames away.   |
| Working with toxic or hazardous chemicals (solid, liquid, or gas).  | Skin or eye damage, potential poisoning through skin contact.   | Safety glasses (goggles for large quantities). Chemical-resistant gloves. Lab coat.   |
| Working with acutely toxic chemicals.   | Spills, splashes, ingestion, inhalation, absorption. Chemicals pose a high level of immediate health risk.  | Safety glasses or goggles. Chemical-resistant gloves. Lab coat. Fume hood.  |
| Working with air or reactive chemicals.   | Severe skin and eye damage. Fire.   | Work in inert atmosphere when possible. Safety glasses or goggles. Chemical-resistant gloves. Flame-resistant lab coat for high risk activities (e.g. Nomex). |
| Working with potentially explosive chemicals (e.g. Nitrates, Perchlorates, Azides, Nitrites, etc.).                                       | Splash, detonation, flying debris, skin and eye damage. Fire.   | Safety glasses or goggles, face shield and/or blast shield. Chemical-resistant gloves. Flame-resistant lab coat (e.g. Nomex).                                 |
| Working with low and high temperatures.   | Burns, splashes. Fire.  | Safety glasses. Lab coat. Thermal insulated gloves, when needed.  |
| Minor chemical spill cleanup.   | Skin or eye damage, respiratory damage.   | Safety goggles. Chemical-resistant gloves. Lab coat. If respirator is needed, treat as major spill.   |
| Working with regulated carcinogens.   | Spills, splashes, ingestion, inhalation, absorption. High hazard cancer-causing agents.   | Safety glasses or goggles. Chemical-resistant gloves. Lab coat. Fume hood.  |
| Working with select carcinogens.  | Spills, splashes, ingestion, inhalation, absorption. Potential cancer-causing agents.   | Safety glasses or goggles. Chemical-resistant gloves. Lab coat. Fume hood.  |
| Working with listed carcinogens.  | Spills, splashes, ingestion, inhalation, absorption. High hazard cancer-causing agents.   | Safety glasses or goggles. Chemical-resistant gloves. Lab coat. Fume hood.  |
| Working with reproductive toxins.   | Spills, splashes, ingestion, inhalation, absorption. Agents that affect reproductive capability, cause mutation and adversely affect fetal development. | Safety glasses or goggles. Chemical-resistant gloves. Lab coat. Fume hood.  |

## BIOLOGICAL HAZARDS

| Activity  | Potential Hazard  | Appropriate Precautions  |
|---|---|--|
| Working with human or non-human primate blood, body fluids, tissues, cells, or other potentially infectious material which may contain bloodborne pathogens.  | Exposure to infectious material, sharps injuries.   | Eye and mucous membrane protection (as appropriate for operations), latex or nitrile gloves, lab coat or gown. Other engineering or administrative controls may be required, based on risk assessment by the IBC.  |
| Working with microbial agents (bacteria, virus, parasites, yeast, fungi, prions), recombinant DNA, and/or biological materials (cell, tissues, fluids) exposed to or likely to contain Risk Group 1 microbial agents or recombinant DNA.        | Eye irritation, sharps injuries. Exposure to infectious material for those who may have personal health issues which make them more susceptible to infection. Cross-contamination.                          | Safety glasses or goggles for protection from splashes and other eye hazards. Latex or nitrile gloves for broken or irritated skin. Lab coat or gown. Other engineering or administrative controls may be required, based on risk assessment by the IBC.   |
| Working with microbial agents, recombinant DNA and/or biological materials (cells, tissues, fluids) exposed to or likely to contain Risk Group 2 microbial agents or recombinant DNA.   | Exposure to infectious material, particularly through broken skin or mucous membranes. Sharps injuries.   | Safety glasses or goggles for protection from splashes and other eye hazards. Latex or nitrile gloves. Lab coat or gown. Additional engineering or administrative controls may be required, based on risk assessment by the IBC.   |
| Working with microbial agents, recombinant DNA and/or biological materials (cells, tissues, fluids) exposed to or likely to contain Risk Group 2 microbial agents or recombinant DNA for which Biosafety Level 3 practices are required.        | Exposure to infectious materials through broken skin, mucous membranes, and/or potential or unknown routes of entry and/or increased consequences of exposure. Sharps injuries.                             | Safety glasses or goggles for protection from splashes and other eye hazards. Double layer of latex or nitrile gloves. Disposable gown or lab coat. Surgical mask. Additional engineering or administrative controls, or additional PPE (e.g. N-95 respirators) may be required, based on risk assessment by the IBC.  |
| Working with microbial agents, recombinant DNA and/or biological materials (cells, tissues, fluids) exposed to or likely to contain Risk Group 3 microbial agents or recombinant DNA.   | Exposure to infectious materials with high risk of exposure, particularly through the inhalation route.   | Safety glasses or goggles for protection from splashes and other eye hazards. Double layer of latex or nitrile gloves. Full back-closing disposable gown or Tyvek suit, respirator, shoe cover or dedicated shoe. Additional engineering or administrative controls may be required, based on risk assessment by the IBC and the BSL-3 facility operations manual. |
| Working with live animals—alone, or in conjunction with Risk Group 1 microbial agents or recombinant DNA (i.e., experiments requiring Animal Biosafety Level 1, ABSL-1)   | Animal bites, allergies, eye irritation, sharps injuries. Exposure to infectious material for those who may have personal health issues which make them more susceptible to infection. Cross-contamination. | Safety glasses or goggles for protection from splashes and other eye hazards. Latex or nitrile gloves. Lab coat or gown. Additional PPE, engineering or administrative controls may be required, based on risk assessment by the IBC and IACUC.  |
| Working with infected or potentially infectious live animals—alone, or in conjunction with Risk Group 2 microbial agents or recombinant DNA, or materials exposed to RG-2 agents (i.e., experiments requiring Animal Biosafety Level 2, ABSL-2) | Animal bites, exposure to infectious material, allergies, sharps injuries.  | Safety glasses or goggles for protection from splashes and other eye hazards. Latex or nitrile gloves. Lab gown, hair cover, shoe covers, surgical mask. Additional PPE, engineering or administrative controls may be required, based on risk assessment by the IBC and IACUC.  |
| Working with biological toxins or materials exposed to biological toxins or toxic/venomous plants, animals, or insects.   | Exposure to toxins or venoms. Sharps injuries.  | Safety glasses or goggles for protection from splashes and other eye hazards. Latex or nitrile gloves. Lab coat or gown. Additional PPE, engineering or administrative controls may be required, based on risk assessment by the IBC and IACUC.  |

## PHYSICAL HAZARDS

| Activity   | Potential Hazard   | Appropriate Precautions  |
|--|--|--|
| Working with an apparatus with contents under pressure or vacuum.                                  | Eye or Skin damage   | Safety glasses or goggles. Face shield for high risk activities. Chemical-resistant gloves. Lab coat.      |
| Working with cryogenic liquids.  | Major skin, tissue, or eye damage. Asphyxiation hazard.                      | Safety glasses or goggles for large volumes, impermeable insulated gloves, lab coat. Adequate ventilation. |
| Removing freezer vials from liquid nitrogen  | Vials may explode upon rapid warming. Cuts to face/neck. Frostbite to hands. | Face shield, impermeable insulated gloves, lab coat.   |
| Working with very cold equipment or dry ice.   | Frostbite, hypothermia.  | Safety glasses, insulated gloves. Possibly warm clothing (for example, if working in cold room). Lab coat. |
| Working with hot liquids, equipment, open flames (autoclave, Bunsen burner, water bath, oil bath). | Burns resulting in skin or eye damage.                                       | Safety glasses or goggles for large volumes, insulated gloves, lab coat.                                   |
| Glassware washing.   | Lacerations.   | Heavy rubber gloves. Lab coat.   |
| Working with loud equipment, noises, sounds, alarms, etc.  | Potential ear damage and hearing loss.                                       | Earplugs or ear muffs as necessary.  |
| Working with a centrifuge.   | Imbalanced rotor can lead to broken vials, cuts, chemical exposure.          | Safety glasses or goggles. Lab coat. Latex or nitrile gloves.  |
| Working with a sonicator.  | Ear damage. Chemical exposure.   | Safety glasses or goggles. Lab coat. Latex or nitrile gloves. Ear plugs as necessary.                      |
| Working with sharps.   | Cuts. Chemical exposure.   | Safety glasses or goggles. Lab coat. Latex or nitrile gloves.  |

## RADIOLOGICAL HAZARDS

| Activity   | Potential Hazard   | Appropriate Precautions  |
|--|--|--|
| Working with solid radioactive materials or waste.   | Cell damage, potential spread of radioactive materials.  | Safety glasses. Impermeable gloves. Lab coat.  |
| Working with radioactive materials in hazardous chemicals (corrosives, flammables, liquids, powders, etc.) | Cell damage or spread of contamination, plus hazards for the specific chemical.  | Safety glasses (or goggles for splash hazard), chemical-resistant gloves. Lab coat.  |
| Working with sealed, General License radioactive material or devices.                                      | If sealed source is compromised due to removal from equipment or physical abuse: cell damage, potential spread of radioactive materials. | PPE not necessary under normal operation instructions. Source may not be removed from device except by manufacturer.       |
| Working with unsealed, exempt quantity radioactive material or devices.                                    | Respiratory irritant. Chronic exposure may lead to kidney, liver, and cell damage. Potential spread of radioactive materials.            | Safety glasses (or goggles for splash hazard), chemical-resistant gloves. Lab coat. Fume Hood, if material may volatilize. |

## LASER HAZARDS

| Activity   | Potential Hazard                              | Appropriate Precautions  |
|--|---|--|
| Working with infrared emitting equipment.  | Cataracts, burns to cornea.                   | Appropriate shaded goggles. Lab coat.  |
| Working with ultraviolet radiation.  | Conjunctivitis, corneal damage, skin redness. | UV face shield and goggles. Lab coat.  |
| Open Beam—Performing alignment, troubleshooting or maintenance that requires working with an open beam and/or defeating the interlocks on any Class 3 or Class 4 laser system. | Eye damage, skin damage.                      | Appropriate protective eyewear, wavelength and optical density based on individual beam parameters. Appropriate skin protection. |
| Open Beam—Viewing a Class 3R laser beam with magnifying optics.  | Eye damage.                                   | Appropriate protective eyewear, wavelength and optical density based on individual beam parameters.                              |
| Open Beam—Working with a Class 3B laser open beam system with the potential for producing direct or specular reflections.  | Eye damage, skin damage.                      | Appropriate protective eyewear, wavelength and optical density based on individual beam parameters. Appropriate skin protection. |
| Open Beam—Working with a Class 4 laser open system with the potential for producing direct, specular, or diffuse reflections.  | Eye damage, skin damage.                      | Appropriate protective eyewear, wavelength and optical density based on individual beam parameters. Appropriate skin protection. |
| Non-Beam—Handling dye laser materials, such as powdered dyes, chemicals, and solvents.   | Cancer, explosion, fire.                      | Gloves, safety glasses, flame-resistant lab coat or coveralls.   |
| Non-Beam—Maintaining and repairing power sources for large Class 3B and Class 4 laser systems.   | Electrocution, explosion, fire.               | Electrical isolation mat, flame-resistant lab coat or coveralls. Follow proper lockout/tagout procedures.                        |
| Enclosed Beam—Using a Class 1 device housing a Class 3B or Class 4 enclosed or embedded laser with the potential for beam exposure during a Service Event.                     | Eye damage, skin damage.                      | Appropriate protective eyewear, wavelength and optical density based on individual beam parameters. Appropriate skin protection. |

## NANOMATERIAL HAZARD

| Activity                               | Potential Hazard                      | Appropriate Precautions   |
|--|---------------------------------------|---|
| Working with engineered nanomaterials. | Inhalation exposure, dermal exposure. | Safety goggles. Chemical-resistant gloves. Lab coat. Fume Hood. |