Laboratory Risk Assessment

Laboratory Safety

A risk assessment should identify potential hazards and determine controls that can be implemented to eliminate or reduce any risks to employees, operations, and/or property. A new risk assessment should be completed and documented each time a new potentially hazardous experiment is carried out. After control measures are implemented, standard operating procedures and training should follow to ensure employees are aware of the correct steps to take and can reference such material as needed.

There are three main steps to complete this include:

Step 1: Identify General Hazards

Mark off known risks of the hazardous agents, processes and equipment. Use this list as a tool to help complete the risk assessment in step 2.

Step 2: Perform Risk Assessment

Fill out the risk assessment form. Please note, EH&S can assist in filling out parts of the risk assessment if the information is not known.

- *For box 1, "Task/Activity/Chemical," input the hazardous process, chemical/substance or hazardous equipment that will be or is being used for your research. You can use the "Identify General Hazards" information (Step 1) to help fill out this box.*
- *For box 2, "Significant Hazard," input the hazard that relates to the hazardous process, chemical/substance, or equipment. A safety data sheet (SDS) is a useful piece of information for this section if your process includes a hazardous material (e.g. chemical or substance). For example, if you work with hydrofluoric acid (HF), the significant hazard is that HF differs from other acids because the fluoride ion readily penetrates the skin, causing destruction of deep tissue layers, including bone.*
- *For box 3, "Potential Consequence of Hazard," note the potential consequence of the hazard such as loss of research, property, injury, or death. A SDS may also be useful here.*
- *For box 4, "Initial Risk Level," use the risk matrix tool in Table 1 to determine if the risk is low, medium or high. Table 2 and 3 are also available for reference in helping you work through the Risk Matrix.*
- *For box 5, "Control Measures," input what control measures are in place or need to be in place in order to reduce the risk. If you are unsure of control measures for your task, please consult with EH&S. Exhibit 1 is included to assist with figuring out what type control measures are most effective to implement. An example of a control measure is utilizing a fume hood when working with chemicals, substituting a hazardous chemical with a less hazardous chemical.*
- *For box 6, "Final Risk Level," should indicate the final risk level, after control measures are in place. Use the Risk Matrix tool. The final risk level should be less than the initial risk level.*

Step 3: Action Plan - implement control measures and create standard operating procedures (SOPs) and training

Once a control measure is identified, the researcher should take steps in implementing the control measure into their process prior to beginning the work. A brief standard operating procedure (SOP) should be completed to document what the correct procedures are for the process, equipment or substance at hand. Employees should be able to readily review the SOP. Employees should also be trained, with training documented, on the correct procedures.

Exhibit 1:

NIOSH has developed a hierarchy of controls as a means of determining how to implement feasible and effective control solutions to exposures and hazards. Control methods at the top are potentially more effective and protective than those at the bottom. Following this hierarchy normally leads to the implementation of inherently safer systems, where the risk of illness or injury has been substantially reduced.

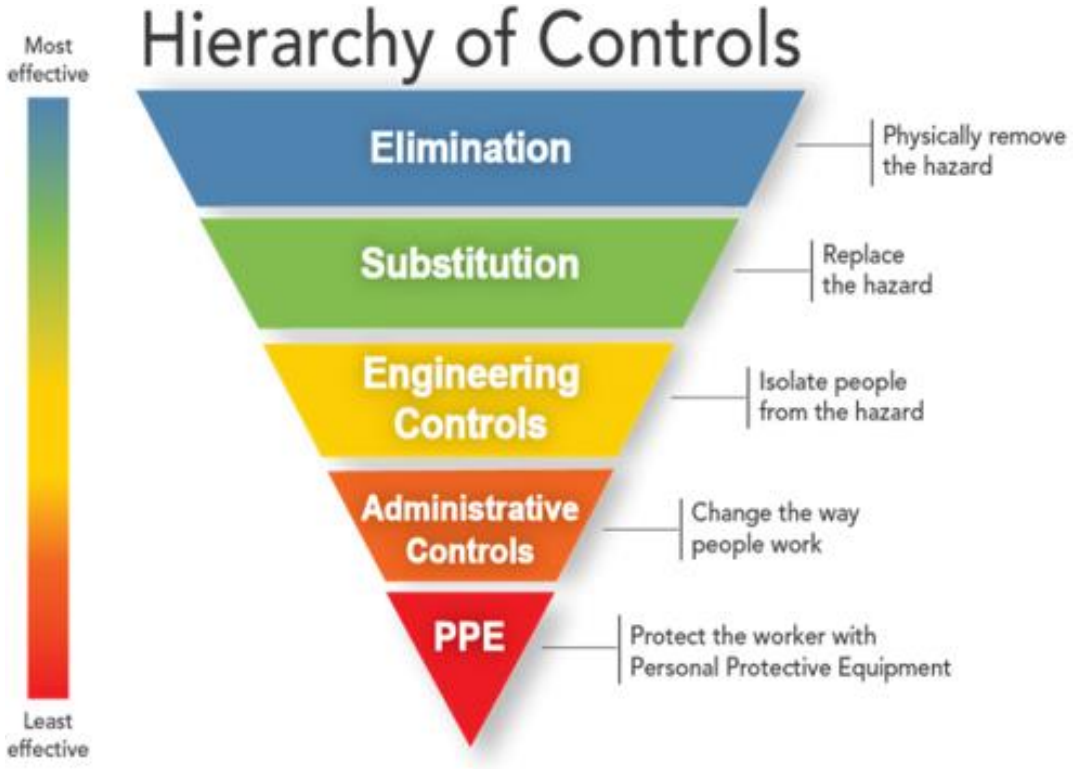

Image courtesy of NIOSH.

Table 1:

Use this table to score your hazard or activity's risk while performing a risk assessment. Use 'L' for low, 'M' for medium, 'H' for high when describing your risk in your Risk Assessment Tool.

		Risk Matrix		
		Low	**Medium**	**High**
Likelihood/ Probability	**High**	***Medium***	***High***	***High***
	Med	***Low/Medium***	***Medium***	***High***
	Low	***Low***	***Low***	***Medium***
		Consequence/Severity		

Table 2:

This table defines what a low, medium and high severity risk is based on risk to people, environment, operations, and reputation. Use this table to assist with the Risk Matrix (Table 1).

Consequence/ Impact					
		People	**Environment**	**Operations**	**Reputation**
Severity	Low	No safety or health hazards present, first aid injury, short-term exposure to mild health effect.	Minor spill or emission / Slight effect.	Insignificant or minimal impact on operations.	Department / College level attention.
	Medium	Medical treatment injury, chronic health effects, time-loss <7 days, moderate health effect.	Controlled environmental release, minor and/or localized effects.	Could delay operations due to minor property damage.	Local area attention, OSU school level attention.
	High	Severe health effect, time-loss > 7 days, permanent incapacitation or disability of fatality.	Some permanent ecological damage, major effect, widespread ecological damage.	Significant or long-term effects on the ability to continue operations, results in significant property damage and financial loss.	State, National and International attention.

Table 3:

This table defines what a low, medium and high likelihood/probability is for the Risk Matrix tool (Table 1).

Likelihood / Probability	Explanation
Low	Nearly unlikely to happen in the near future and no immediate action is needed.
Medium	Moderately unlikely or likely to occur and actions should be taken to reduce or control the risk.
High	More than likely to occur or high probability the risk will occur; immediate action plans required.

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Step 1: Identify General Hazards

Hazardous Chemicals, Substances, Biohazards

Chemicals/Substances

- ☐ Compressed Gases - Flammable
- ☐ Compressed Gases - Oxidizing
- ☐ Compressed Gases - Toxic
- ☐ Compressed Gases - Inert
- ☐ Cryogenic materials
- ☐ Organic peroxides
- ☐ Peroxide Formers
- ☐ Self-reactive substances
- ☐ Water-reactive substances
- ☐ Pyrophorics
- ☐ Acutely toxic chemicals
- ☐ Carcinogens
- ☐ Nanomaterials
- ☐ Reproductive Toxins
- ☐ Simple Asphyxiant
- ☐ Corrosive Liquid
- ☐ DEA/Controlled Substances
- ☐ Specific Organ Toxicity
- ☐ Explosives
- ☐ Flammable Liquids
- ☐ Oxidizers/reducing agents

Biohazards

- ☐ Animal Infection Studies
- ☐ Large Scale Culture
- ☐ Risk Group – 2 Pathogens
- ☐ Risk Group – 3 Pathogens
- ☐ Plant Pathogens
- ☐ Biological Toxins
- ☐ Human, Blood, Body Fluids
- ☐ Cell Culture
- ☐ Viruses/Recombinant Viral Vector
- ☐ Transgenic Plants or Animals

Hazardous Processes or Equipment

- ☐ Explosion hazard
- ☐ Exothermic, with potential for fire or excessive heat
- ☐ Acid Baths
- ☐ Hazardous reaction or products
- ☐ Generation of air contaminants (e.g. gases, aerosols, particulates)
- ☐ Heating chemicals
- ☐ Large volumes
- ☐ Chemical transferring
- ☐ Hand/power tools
- ☐ Moving Equipment or parts
- ☐ Electrical hazards
- ☐ Noise > 85 dBa
- ☐ Hot surfaces
- ☐ Ergonomic Hazard
- ☐ Needles/Sharps
- ☐ Drying Oven/Furnace
- ☐ Centrifuge
- ☐ Working alone/ Afterhours
- ☐ Unattended Reactions
- ☐ Respiratory Hazard
- ☐ Vacuum/Pressure Systems
- ☐ Refrigerators and Freezers
- ☐ Stirring and Mixing devices
- ☐ Laboratory Microwave ovens
- ☐ Slip, trip, falls
- ☐ Repetitive Motion

Field Hazards

- ☐ Foul Weather
- ☐ Temperature Extremes
- ☐ Darkness/low light
- ☐ Altitude
- ☐ Smoke/dust
- ☐ Wild Animals/insects
- ☐ Plants/Allergens
- ☐ Vector-borne or other endemic disease
- ☐ Hygiene/water or food-borne illness
- ☐ Falling objects
- ☐ Boating/swimming/water hazards
- ☐ Limited Communication
- ☐ Remote area/limited medical services
- ☐ Lifting/carrying
- ☐ Strenuous physical activity (e.g long days, high stress, etc.)
- ☐ Driving/Operating a Vehicle (e.g. Tractor, OSU or personal)
- ☐ Uneven Surfaces
- ☐ Heights

Shop/Laser/Radiation

Shop

- ☐ Aerial Lift
- ☐ Air Compressor
- ☐ Crane
- ☐ Forklift
- ☐ Hot Work
- ☐ Used/New Oil

Laser

- ☐ Class IIIb Laser
- ☐ Class IV Laser

Radiation

- ☐ X-ray Machine
- ☐ Magnetic Field (e.g. NMR, MRI)
- ☐ Radioactive Materials
- ☐ Unsealed Source Radionuclides
- ☐ Sealed Source Radionuclides
- ☐ Ultraviolet Light/Infa-red Light

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Steps 2: Perform Risk Assessment

Name		Date	
Rooms Associated			
Persons at Risk: ☐ Employees ☐ Students ☐ Public ☐ Visitors ☐ Other			

Task/Activity/Chemical[1]	Significant Hazard[2]	Potential consequence of Hazard[3]	Initial Risk Level[4]	Control Measures[5]	Final Risk Level[6]
EXAMPLE: Using Hydrofluoric Acid	Causes severe burns with delayed tissue destruction. Rapidly absorbed through the skin. Causes tissue necrosis and bone destruction. Exposure may not be immediately visible or painful.	Long-term scarring, hospital stay, could be fatal.	H	If a substitute is available, this would be the first potential control measure. If not, other measures such as using HF in a fume hood only, proper PPE (double gloves, chemical resistant lab coat, closed toed shoes, long pants, face shield), proper signage, proper training, do not work alone or after hours and an exposure kit with tums and calcium gluconate.	M

