Research Safety Risk Assessment Tool

A risk assessment should identify potential hazards and determine controls that can be implemented to eliminate or reduce any risks to researchers, other 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, develop SOPs as applicable and train impacted individuals to ensure to ensure understanding of the correct steps to take.

There are three general steps to completing a risk assessment. They include
(note: Contact ESH if you need assistance or have questions at any point in the process)

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.

- *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: Hazard Control Plan - implement control measures and create standard operating procedures (SOPs) and training

Once a control measure is identified, the Principal Investigator, research supervisor, or designee, will take steps in implementing the control measure into their process prior to beginning the work. When risk and hazards dictate, SOPs must be developed to ensure safe and consistent work. Ensure researchers receive necessary training to include review of the SOP prior to performing work. Be sure to document all training.

Hierarchy of Controls

The Hierarchy of Controls was developed by NIOSH 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.

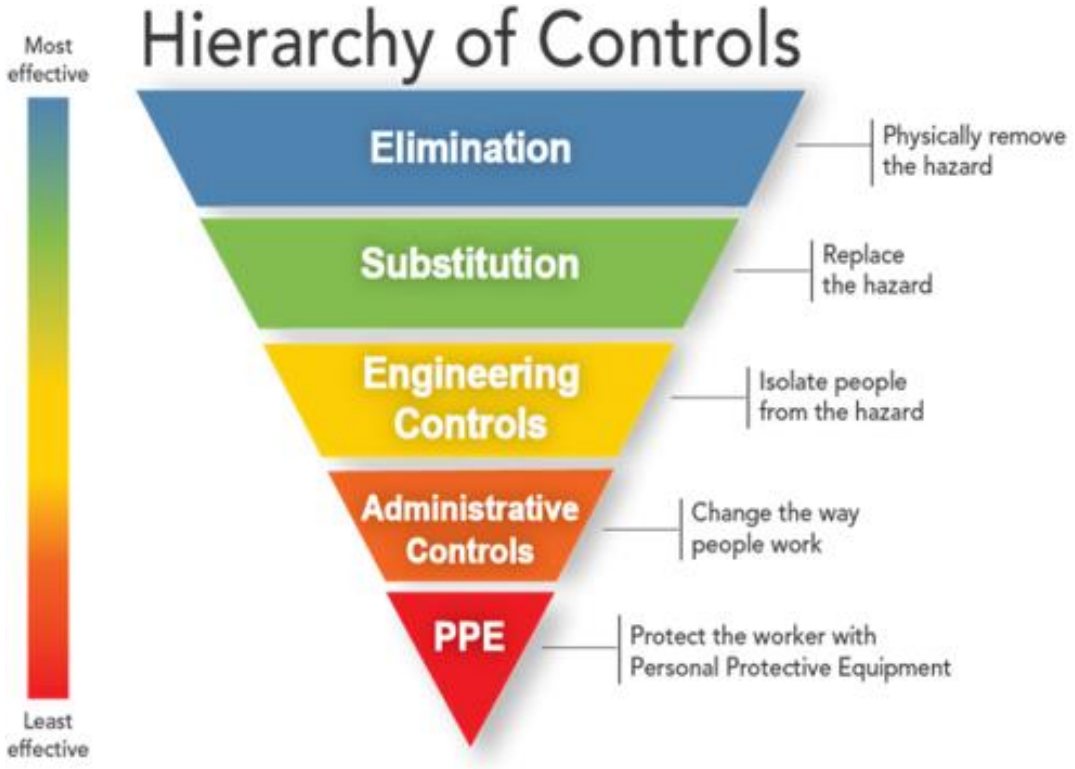

Image courtesy of NIOSH.

Below is a simplified version of a Risk Matrix tool that can be used to score hazards that were identified and grade overall risk.

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, UMBC/ institution, System-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.

Step 1: Identify General Hazards

Hazard Identification Guide

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. state/UMBC 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

Step 2 and 3: Conduct Risk Assessment and Document Hazard Control Plan

Name		Date	
Associated Lab/Room/ Location			
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]

Step 2 and 3, continued

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Step 2 and 3: Conduct Risk Assessment and Document Hazard Control Plan

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