

## Risk Assessment Instructions

This document provides guidance on completing the laboratory task based risk assessment. It includes the process for identifying hazards for the task and the controls to reduce the risk. Specifically the risk assessment tool:

- Identifies the hazards of the task
- Assesses the risk of exposure to the hazard
- Identifies controls for the hazards and approval steps

It is recommended that the risk assessment be completed for laboratory processes where:

- Extremely hazardous materials or operations are used or desired to be used or
- There is a significant change to an experimental process that is using extremely hazardous materials or
- Use of hazardous gases (flammable, oxidizers, toxics) or
- The experimental process contains unique hazards such as pressurized vessels, exposed live electrical conductors greater than 50 volts, extreme temperatures (localized or environmental), etc.

An extremely hazardous material is any material that:

- Is acutely hazardous such as strong acids/basis, cryogenics, or toxic materials (HF, cyanides, sulfides, etc.);
- Has chronic health hazards (carcinogenic effects or reproductive hazards);
- Is identified as a Class I flammable;
- Is a pyrophoric, water reactive, explosive or is sensitive to localized thermal or mechanical shock at normal temperatures and pressure;
- Is time sensitive such as a peroxide former

### General Guidelines

There are two pages to the University of Notre Dame's Laboratory Risk Assessment tool. This tool is available on the RMS web site at this [link](#). The first page (Figure 1) documents the hazards and controls and provides a risk priority number that categorizes the hazard as low, medium, or high. The second page (Figure 2) provides the definitions of the hazard severities and examples of the controls that can be used for hazard mitigation.

If necessary contact Risk Management and Safety when completing the assessment (RMS) at 631-5037 if there are any questions regarding the process, identifying hazards or the controls. It is recommended that the completed assessments be made accessible to employees working on the task that was evaluated.

The risk assessment should be conducted for a specific task. The assessment should be updated when changes occur to the task that may affect results of the assessment and the associated controls.

**Figure 1**  
**Risk Assessment Tool**  
(Page 1 Partial View)

Laboratory Experiment Risk Ranking									
Hazards			Controls						Risk Priority Number (RPN)
Laboratory Hazards	Severity of Hazard	Specify Hazard	Engineering Controls (-1.5)	Specify Engineering Controls	Administrative Controls (-1)	Specify Administrative Controls	PPE (-0.5)	Specify PPE Controls	
Flammability	N/A		N/A		N/A		N/A		N/A
Toxicity	N/A		N/A		N/A		N/A		N/A
Corrosivity	N/A		N/A		N/A		N/A		N/A

**Figure 2**  
**Risk Assessment Tool Definitions**  
(Page 2 Partial View)

Laboratory Risk Assessment Tool				
LABORATORY PROCESS RISK CRITERIA		CONTROLS DEFINED		
Hazard	Severity of Hazard	Engineering Controls (-1.5)	Administrative controls (-1.0)	PPE (-0.5)
Flammability	3 - <0 .5L (Class II/III) <b>FP &gt;73F and BP &gt;100F</b> 5 - 0.5L - 1 L Class I B <b>FP &lt; 73 and BP &gt;100F</b> 5 - 0.5L - 1 L Class I C <b>FP &gt;73 and BP &lt;100F</b> 7 - <500 ml Class I A, <b>FP &lt; 73F and BP &lt;100F</b> 7 - Class III if heated over FP 9 - >500ml Class I A <b>FP &lt; 73F and BP &lt;100F</b> 9 - Class I, II if heated over FP	Hood, Glove Box, Blast Shield, Biosafety Cabinet, etc.	Written SOPs Training	Eye Protection (Specify type) Gloves (Specify type) Lab Coat (Flame Retardant or standard) Other (Apron, Respirator, etc.)
Toxicity	3 - Irritant 5 - Carcinogen/Sensitizers 7 - Reproductive Hazards 7 -Poison Inhalation Hazard (pesticides, chlorine gas, CO, CO2, etc.) 9 - Acute toxics LD <50mg/kg or LC50 in air of 200 parts per million by volume (refer to SDS for Exposure limits)	Hood, Glove Box, Blast Shield, biosafety cabinet, other	Written SOPs Training	Eye Protection (Specify type) Gloves (Specify type) Lab Coat (Flame Retardant or standard) Other (Apron, Respirator, etc.)

When reviewing the remainder of these instructions, you will note red numbers e.g., **1**. These will be used as reference guides in this document and are not on the working form.

## RISK ASSESSMENT INSTRUCTIONS

### STEP 1: Identify the Task or Experiment Requiring a Risk Assessment

At the top of the first page of the risk assessment, basic information is required. This includes:

- Date – this is the date the assessment was conducted
- Task description – this is a brief explanation of the task or experiment being evaluated (e.g. Quenching Calcium Hydride with Ethanol)
- Location – this is the lab number and if needed a brief description of where in the lab the experiment is being conducted
- PI Name
- Person completing the risk assessment

### Step 2: Review the Task to the Hazards Listed in the First Column (Figure 3, #1) Determine if the Hazard is Applicable to the Task

Tasks may have more than one hazard associated with it. Identify each hazard for the task.

**Figure 3**  
**Risk Assessment Tool**  
(Partial View)

Laboratory Experiment Risk Ranking										
Hazards			Controls					Risk Priority Number (RPN)		
Laboratory Hazards	Severity of Hazard	Specify Hazard	Engineering Controls (+.5)	Specify Engineering Controls	Administrative Controls (-1)	Specify Administrative Controls	PPE (-0.5)		Specify PPE Controls	
Flammability	N/A	3 - <0.5L (Class III/III) FP >73F and BP>100F 5 - 0.5L - 1 L Class I B FP< 73 and BP >100F 5 - 0.5L - 1 L Class I C >73 FP <100F 7 - <500 ml Class I A, FP< 73F and BP <100F 7 - Class III if heated over FP 9 - >500ml Class I A FP< 73F and BP <100F 9 - Class I, II if heated over FP 9 - >1L Class I B FP< 73 and BP >100F 9 - > 2L Class I C >73 FP <100F			N/A		N/A		N/A	
Toxicity	N/A					N/A		N/A		N/A
Corrosivity	N/A					N/A		N/A		N/A

### Step 3: Determine the Severity of the Applicable Hazards

Determine the severity by reviewing the “Severity of Hazard”. This can be viewed by placing the mouse pointer over the cell (Figure 3, #2). The definitions will be displayed (Figure 3, #3) or you can review the second page (Figure 2) for the same information.

After determining the severity, click on the “Severity of Hazard” cell. A drop down list will appear, click the appropriate number representing the severity.

Example: Using Figure 3, the Severity of Hazard for Flammability is highlighted showing the list options for this hazard. If an experiment is using a Class III material above its Flash Point (FP), then “7” would be selected.

FYI – For a list of common chemicals and their flammability classification review the “Flammable and Combustible Liquids Organized by Class” document on the RMS web site at this [link](#).

#### Step 4: Provide Brief Explanation of the Hazard

Write a brief explanation of the hazard(s) in the cell to the right of the “Severity of Hazard” cell.

Example: Using the Flammability example from Step 3, the following is an acceptable explanation statement:

Cyclohexanol (Class III material) is being heated to 200 F, this is above its flash point

#### Step 5: Identify the Controls

The hazard controls are listed from left to right in the light green section of the table and are listed from the most desirable control (engineering) to least desirable (PPE). The list includes: engineering, administrative, PPE (Figure 4). For more information on the hierarchy of controls review the information on the RMS web site at this [link](#).

When controls are identified and implemented, the risk of an incident is reduced. It is important to identify each control being used that mitigates the risk of the hazard. To do this select “Yes” in one or all of the control (engineering, administrative, PPE) drop down lists.

A hazard control can be used for any number of hazards identified. Control definitions can be viewed by placing the mouse pointer over the hazard control box. This will display a listing of control examples (Figure 4, #'s **2**, **3**, and **4**). These can also be viewed on the definition page (Figure 2). If an experiment is being conducted in a hood that has a flammability hazard and a toxicity hazard, engineering controls can be credited for both hazards.

Each control selected as “Yes” reduces the overall risk priority number or RPN for that hazard (Figure 4, #**1**). Note that multiple controls of the same type e.g., engineering are only counted once.

**Figure 4**  
**Risk Assessment Tool**  
(Partial View)

Laboratory Experiment Risk Ranking									
Hazards			Controls					Risk Priori Numb (RPN)	
Laboratory Hazards	Severity of Hazard	Specify Hazard	Engineering Controls (-1.5)	Specify Engineering Controls	Administrative Controls (-1)	Specify Administrative Controls	PPE (-0.5)		Specify PPE Controls
Flammability	N/A		N/A		N/A		N/A		1
Toxicity	N/A		Hood, Glove Box, Blast Shield, Biosafety Cabinet, etc.		N/A	Written SOPS Training		Eye Protection (Specify type) Gloves (Specify type) Lab Coat (Flame Retardant or standard) Other (Apron, Respirator, etc.)	
Corrosivity	N/A		N/A		N/A				

**Step 6: Provide Brief Explanation of the Control**

If “Yes” is selected indicating that a control is present, write a brief explanation of all the control types in use.

Example: Using the Flammability example from Step 3, the following is acceptable for Cyclohexanol (Class III material) being heated to 200 F. The experiment is being done in a lab hood. Check “Yes” for engineering controls. An acceptable statement is:  
“Lab hood being used”

**Step 7: Compare the Risk Priority Numbers (RPN)**

Determine the risk priority number (Figure 5, number 1). RPN’s can range from 0 to 9 with 9 being “High” risk. If there are multiple hazards with the same RPN just identify the highest RPN.

Once the highest RPN has been identified compare it to the “Controls Matrix”. The “Controls Matrix” (Figure 6) is located on page 1 and 2 of the Risk Assessment. This Matrix provides guidance on the risk acceptability and whether additional actions or controls are recommended.

**Step 8: Implement the Controls and/or Actions**

Implement the controls as indicated in the Risk Assessment Tool or take additional action as described in the Controls Matrix.

**Step 9: Begin the Task / Experiment**

**Figure 5**  
**Risk Assessment Tool**  
(Partial View)

Laboratory Experiment Risk Ranking									
Hazards			Controls						Risk Priority Number (RPN)
Laboratory Hazards	Severity of Hazard	Specify Hazard	Engineering Controls (-1.5)	Specify Engineering Controls	Administrative Controls (-1)	Specify Administrative Controls	PPE (-0.5)	Specify PPE Controls	
Flammability	5	Ethanol 200 ml	Yes	Lab Hood	Yes	Written SOP and trained on it	Yes	Lab Coat, safety glasses, nitrile gloves	2.0
Toxicity	3	Ethanol 200 ml	Yes	Lab Hood	Yes	Written SOP and trained on it	Yes	Lab Coat, safety glasses, nitrile gloves	0.0
Corrosivity	N/A		N/A		N/A		N/A		N/A
Reactivity	9	110 mg Calcium Hydride	Yes	Lab Hood	Yes	Written SOP and trained on it	Yes	FR Lab Coat, safety glasses, nitrile gloves	6.0

**Figure 6**  
**Risk Assessment Controls Matrix**

Controls Matrix		
Ranking	RPN	Controls
Low	<4	No Additional Controls Required
Medium	4 - 5.5	PI Approval; PPE Assessment; Standard Operating Procedure (SOP); Training
High	>5.5	All of Controls Listed for Medium Ranking; Job Safety Analysis; Safety Coordinator or Oversight Committee Approval NDFD review for flammable gas use in closed systems