



**Risk Management and Safety  
Audit Processes  
Buildings, Laboratories, Machine Shops and Departments**

1. Purpose and Scope.
  - 1.1. This document establishes the environmental, safety and health audit processes for Risk Management and Safety (RMS).
  - 1.2. The purpose of this document is to establish a consistent approach to conducting, documenting, and communicating safety and health assessments in the University of Notre Dame's buildings, laboratories, machine shops and departments.
  
2. Definitions
  - 2.1. Building – A roofed structure for permanent or temporary shelter of persons, animals, plants, materials, or equipment.
  - 2.2. Building Assessment – Process by which a representative from Campus Safety (NDSP, NDFD or a combination of these organizations) conducts an assessment of a building.
  - 2.3. Building Integrated Safety Plan (BISP) – The term used for auditing purposes when identifying a building assessment.
  - 2.4. Laboratory - Any site where research or teaching involving risk to personnel is conducted. Included are sites where bench research is conducted, field sites, and any other research or teaching activity which involves potential exposure to hazardous materials, equipment, or other risks to safety. This definition also includes any such research conducted either at sites owned or leased by the University and at sites not owned or leased by the University (although only laboratories and sites which are owned or leased by the University must undergo validation). Not included in this definition is research conducted entirely via computer simulation; and that which is comprised entirely of data/information analysis.
  - 2.5. Laboratory Joint Assessment – Process by which a representative from RMS and the Principal Investigator, or designee, conduct an assessment of the laboratory.
  - 2.6. Laboratory Integrated Safety Plan (LISP) – A structure for managing safety and health in laboratories at a local level. This provides a means to coordinate and promote practices that mitigate risk associated with hazards present in laboratory environments.
  - 2.7. Machine Shop – A work area with fixed or portable machinery where the primary function is to fabricate or machine materials. This includes shops for the purpose of teaching and research as well as operational functions.
  - 2.8. Machine Shop Assessment – Process by which a representative from RMS and the Shop Manager, or designee, conduct an assessment of the machine shop.
  - 2.9. Risk Assessment - Process by which representatives from RMS, NDSP, NDFD and

departmental personnel conduct an assessment of the risks present in work areas under the purview of the department. This includes quantifying applicable hazards with use of a Risk Priority Number (RPN).

- 2.10. Safety Assessment – Process by which representatives from RMS, NDSP, NDFD and departmental personnel conduct an onsite assessment of the work areas under the purview of the department.
- 2.11. [Unannounced Laboratory Walk Throughs](#) – Non-scheduled laboratory inspections conducted to evaluate the sustainability and effectiveness of hazard controls.
- 2.12. Validation – The process where correction of deficiencies identified during an assessment are verified as being adequately remediated. Only after all deficiencies have been verified as adequately being addressed shall a laboratory, machine shop, building or department be validated. The validation process includes two members from RMS and any applicable laboratory, machine shop, building or departmental personnel.

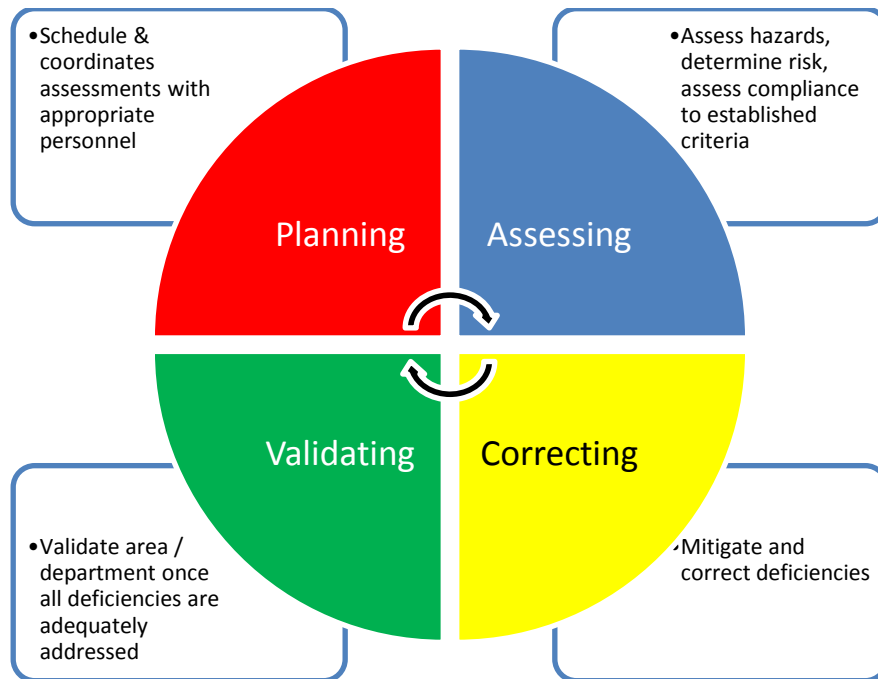
### 3. General Information

- 3.1. Building assessments are an activity that is conducted by Campus Safety personnel and may include participation from the individual identified as the facility manager.
- 3.2. Laboratory and machine shop assessments are a joint activity between RMS staff and associated laboratory or shop personnel.
- 3.3. Safety assessments are a joint activity between Campus Safety staff and associated departmental personnel. These assessments are led by RMS.
- 3.4. Every building, laboratory and machine shop requires a safety assessment. Those departments that conduct high hazard activities by nature of their operations require a safety assessment. This includes select departments within the following divisions:
  - 3.4.1. Auxiliary Operations
  - 3.4.2. Campus Safety
  - 3.4.3. Campus Services
  - 3.4.4. Facilities, Design and Operations (FDO)
  - 3.4.5. Student Activities / Student Affairs
  - 3.4.6. Athletics
- 3.5. Assessments shall be coordinated in conjunction with the appropriate contacts, such as the Department Safety Coordinator (labs), shop manager, building manager and departmental personnel.

### 4. Overall Philosophy

- 4.1. Figure 1 depicts the philosophy of the assessment processes, which includes four key components (Planning, Assessing, Correcting and Validating).

**Figure 1**



## 5. Scheduling

5.1. The schedules for building, laboratory, machine shop and safety assessments are based on the fiscal year and shall be considered flexible.

5.2. All schedules shall be developed and maintained by RMS.

### 5.3. Building Schedules

5.3.1. Each University building shall be inspected annually by the Campus Safety division (NDSP, NDFD or a combination of these organizations). Provincial buildings are excluded from this program as well as entire buildings that fall within the purview of departments included in safety assessments.

5.3.2. Building managers are encouraged to accompany inspectors but are not required to do so.

5.3.3. Buildings shall be assigned to Campus Safety departments to aid in scheduling.

5.3.4. Assessments shall be assigned a target inspection month.

5.3.5. The assigned inspecting department for buildings shall contact the building manager/point of contact to schedule the inspection. A list of building contacts shall be maintained by RMS.

### 5.4. Laboratory Schedules

5.4.1. Each laboratory shall be jointly inspected by RMS and lab personnel.

5.4.2. Laboratory assessments shall be assigned a target inspection date by

department. This shall be created in conjunction with the Department Safety Coordinator.

5.4.3. The Departmental Safety Coordinator shall assist RMS staff in the identification of the lab contact. RMS shall contact the lab contact to schedule the joint assessment for that lab(s). RMS shall refer lab personnel to the RMS web site or the [joint assessment](#) and [pre-assessment checklist](#) to prepare for the audit.

5.4.4. The laboratory's assessment frequency is determined by its risk tier rating (see Appendix A). The schedule frequency is:

- Risk Tier 1 = Once every three years
- Risk Tier 2 = Once every two years
- Risk Tier 3 = Annually

5.4.5. The joint assessment frequency shall be annual regardless of the laboratory's risk tier when:

- It is a teaching laboratory.
- A laboratory has not been validated.
- A new principal investigator assumes responsibility for the laboratory.
- The laboratory is new or has been significantly redesigned due to construction activity.
- A significant safety hazard has been identified which demonstrates a systemic failure in the laboratory's safety processes and the Departmental Safety Coordinator and RMS recommend increasing the joint assessment frequency.

#### 5.5. Machine Shop Schedules

5.5.1. Each machine shop shall be jointly inspected by RMS and shop personnel.

5.5.2. Machine shop assessments shall be assigned a target inspection. This shall be created in conjunction with the Shop Coordinator.

5.5.3. RMS shall contact the shop contact to schedule the joint assessment for that shop. RMS shall refer shop personnel to the RMS web site or the [shop assessment checklist](#) to prepare for the audit.

#### 5.6. Safety Assessment Schedules

5.6.1. Each department shall be joint inspected by Campus Safety (RMS, NDFD and NDSP) and departmental representatives.

5.6.2. Safety assessments shall be assigned a target inspection date by department.

5.6.3. The Director of the Department or designee shall assist RMS staff in the identification of the appropriate department representatives. RMS shall contact the Director of the Department or designee to schedule the safety assessment for that department(s). RMS shall refer department personnel to the RMS web site or the [risk assessment](#), [safety assessment](#) and [pre-assessment checklist](#) to prepare for the audit.

5.6.4. The departments shall be assessed biennially.

## 6. Assessment Tools

### 6.1. Building, Laboratories, and Machine Shops

6.1.1. The assessment tools for [buildings](#), [laboratories](#) and [machine shops](#) are divided into hazard sections, each addressing a unique hazard that may be present within the space.

### 6.2. Safety Assessments

6.2.1. The assessment tools for departments shall consist of two independent tools. This includes the [risk assessment](#) (refer to Section 5.3) and [safety assessment](#).

6.2.2. The [risk assessment tool](#) is divided into individual potential hazards assessing for what hazards are or are not applicable to the department.

6.2.3. The [safety assessment tool](#) is divided into hazard sections, each addressing a unique hazard that may be present within the department.

6.3. All sections in the assessment tools shall be completed.

6.4. Inspectors shall document each assessment using either the appropriate paper form or mobile device.

6.5. For assessment tools other than the risk assessment:

6.5.1. Each question shall be marked as meeting requirements (Yes), not meeting requirements (No), or not applicable (N/A).

6.5.2. Each question marked as not meeting requirements shall be compared to the previous assessment for the lab or area to determine if the finding is repeated. If it is a repeat finding, this shall be identified.

6.5.3. Each question marked as not meeting requirements shall be evaluated for its severity. The finding resulting in the question not meeting the requirement is rated for its severity. The severity definitions are as follows:

- **Minor** – The deficiency poses a risk of injury (minor first aid) or there is a documentation gap.
- **Intermediate** - The deficiency poses a risk of:
  - an injury requiring medical treatment beyond first aid
  - a violation of regulation or University policy (not documentation related) and/or
  - minor property damage involving equipment or intellectual property where the loss is limited to the area being inspected and there is no long term impact.
- **Severe** - The deficiency poses:
  - an immediate risk to life
  - a risk of an environmental release that could result in a Notice of Violation (NOV)
  - a risk of a significant property damage involving equipment or intellectual property where the loss could affect other areas and the impact is long term.

6.6. In addition to sections 4.1-4.5, the laboratory, machine shop and safety

assessment tools shall also include the following:

- 6.6.1. Each question is prepopulated with a weight (1, 2, or 3) depending on its risk to personnel safety, with 3 being highest risk.
  - 6.6.2. Each hazard section is provided a percent compliance score based on the applicable questions.
  - 6.6.3. A score is calculated for the entire assessment. For laboratories, this score is used in conjunction with the risk level score to determine the lab's risk tier level.
- 6.7. The most current assessment tools are located on the RMS Web Site.

## 7. Risk Assessment

### 7.1. Building Risk Levels

- 7.1.1. Each building shall be characterized as either high or low risk.
- 7.1.2. High-risk buildings are defined as:
  - Residential halls/buildings
  - Daycare centers
  - Mission-essential infrastructure (needed to keep University open)
  - Symbolic landmarks uniquely identifiable to the University
- 7.1.3. All other buildings are considered low-risk.
- 7.1.4. A complete list of buildings and associated risk levels are maintained by RMS.

### 7.2. [Laboratory](#) and [Machine Shop](#) Risk Assessments (Leveling)

- 7.2.1. Each laboratory's and machine shop's hazards shall be assessed for risk during the assessment process. The laboratory and machine shop risk assessment is referred to as risk leveling.
- 7.2.2. Each hazard is assessed independently of other hazards.
- 7.2.3. Each hazard shall be assessed by its severity, frequency of personnel exposure to the hazard, regulatory requirements, and maximum probable loss (MPL). A scale of 3-9 (low to high) shall be used for each criterion (see Appendices B, C & D). A risk priority number (RPN) shall be calculated for each hazard by taking the average of each criterion.
- 7.2.4. The lab or shop's overall risk score shall be the hazard with the highest RPN.

### 7.3. Safety Risk Assessments

- 7.3.1. Each department shall be assessed for risk during the risk assessment process.
- 7.3.2. Each hazard is assessed independently of other hazards and documentation shall include rationale as to how the hazard is or is not applicable and identify the appropriate exposure groups.
- 7.3.3. Each hazard shall be assessed by its frequency of personnel exposure, number of people exposed to the hazard, the current controls that are in place, and severity of the hazard. The appropriate scales shall be used for each criterion. A risk priority number (RPN) shall be calculated for each hazard by summing the totals for frequency, number of people and controls and then multiplying



by the total for severity squared (see Appendices E & F).

7.3.4. The department's overall risk score shall be the hazard with the highest RPN.

## 8. Conducting Assessments

### 8.1. Buildings

8.1.1. The following building areas shall be included in the scope of the assessment:

- Common areas such as hallways, general corridors, etc.
- All spaces in undergraduate residential halls

8.1.2. Those building areas not included as part of an assessment include private offices and all other private residences.

8.1.3. During the audit, inspecting staff shall wear the necessary PPE required based on the tasks and activities taking place at the time of the inspection.

### 8.2. Laboratories and Machine Shops

8.2.1. Inspectors shall examine all physical spaces within a lab or shop and all documentation.

8.2.2. During the audit, RMS staff shall wear the PPE required by the Chemical Hygiene Plan or if more restrictive, by the lab or department. For shops, RMS staff shall wear the PPE required by the PPE Hazard Assessment.

8.2.3. RMS staff shall conduct an opening conference with the lab or shop contact(s) to explain the assessment process.

8.2.4. Once the assessment is complete, RMS staff shall have a closing conference with the lab or shop and review the findings from the assessment.

### 8.3. Safety Assessments

8.3.1. Risk assessments shall be conducted in a desktop meeting format and does not require a physical examination of work areas, unless deemed necessary.

8.3.2. For safety assessments, inspectors shall examine physical spaces within the facilities identified under the purview of the department and all documentation.

8.3.3. For department's that operate and or have ownership of spaces in numerous locations on campus, the inspectors shall examine approximately one-third of all spaces during the physical tours so as to examine 100% of spaces over the course of three assessment cycles, or six years in total.

8.3.4. During the audit, RMS staff shall wear the necessary PPE required based on the tasks and activities taking place at time of inspection or as required by the department.

8.3.5. RMS staff shall conduct an opening conference with the departmental contact(s) to explain the assessment process.

8.3.6. Once the assessment is complete, RMS staff shall have a closing conference with the departmental contact(s) and review the findings from the assessment.

## 9. Findings and Documentation

- 9.1. All assessments shall be documented.
- 9.2. All deficiencies (findings) noted during an assessment shall be documented in sufficient detail. This may include specific details of documents reviewed, photographs, or other observations.
- 9.3. All deficiencies shall be noted as an issue and assigned to an issue owner for resolution. Issue owners are the person responsible for coordinating actions to resolve an issue (e.g. building/lab manager, PI, department contact, etc.).
- 9.4. Actions to address the non-compliance findings and target dates shall be established by personnel for each action finding.
- 9.5. If life threatening or severe findings that may result in an injury are discovered during the audit, the hazard shall be removed, fixed, or mitigated prior to the RMS staff leaving. If for some reason the item cannot be made safe and the RMS staff must leave to seek assistance for correcting the hazard, the area shall be barricaded or someone shall be assigned to be physically present to warn others of the hazard. The RMS staff is required to return and verify the hazard has been corrected or mitigated.
- 9.6. For building inspections, inspectors shall provide all inspection documentation to their Inspection Administrator, when applicable. Inspection Administrator's shall complete/approve inspections and assign outstanding items as issues.
- 9.7. For laboratory, machine shop and safety assessments, inspectors shall complete and approve inspections and assign outstanding items as issues.
- 9.8. Once the assessment is complete, the inspector shall communicate the inspection results via email to the appropriate personnel (e.g. lab, building, or departmental manager).
- 9.9. Once issues are assigned, issue owners shall complete items assigned to them. Closure of the item shall include appropriate supporting documentation. This may include physical training sign-in sheets, records of procedures, photographs, etc.

## 10. Validations

- 10.1. Once Campus Safety is notified that a building, laboratory, machine shop or department has addressed all findings, the appropriate staff shall validate the closure of all issues by performing a validation walkthrough.
- 10.2. The validation walkthrough shall include a review of documentation gaps and inspection for physical findings.
- 10.3. A RMS staff member who did not conduct the laboratory, machine shop or safety assessment shall perform the validation walkthrough with the RMS staff member who did conduct the assessment.
- 10.4. Once all items have been closed and verified, the space/department is validated.
- 10.5. A validation certificate shall be sent by RMS to the primary contact for the





space/department. The certificate shall indicate the date that the validation expires.

## 11. Recordkeeping

11.1. Assessment data shall be maintained per the University of Notre Dame record retention requirements.

## Appendix A Laboratory Risk Tier Matrix



Risk Level	Score Range
Low	<5
Moderate	>5 - <7
High	>7

JA	Score Range
High	>85%
Moderate	>70% - <85%
Low	<70%

Risk Tier	Audit Frequency
1	3 Years
2	2 years
3	1 Year

**Appendix B**  
**Laboratory Risk Ranking Criteria**

Laboratory Risk Ranking Criteria					
Hazard	Description	Severity of Hazard	Frequency of Exposure	Regulatory Requirements	MPL
Biological Hazards & BBP	Evaluate for exposure to blood or bloodborne pathogens, other pathogenic material, select agents, vectors or animals.	3 - BSL 1 7 - BSL 2 7 - BSL 3 9 - BSL 3 w/ Animals	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	3 - BSL 1 7 - BSL 2 9 - BSL 3	3 - BSL 1 7 - BSL 2 9 - BSL 3

Laboratory Risk Ranking Criteria					
Hazard	Description	Severity of Hazard	Frequency of Exposure	Regulatory Requirements	MPL
Chemical	Includes all liquid, dry and gaseous chemicals.	<p><b>3</b> - Using weak acids/basis; Using/storing flammables &amp; combustibles up to .5 gal for 100 ft<sup>2</sup> (.005 gal/ft<sup>2</sup>) of lab area; Areas that are just for storage, e.g., walk-in coolers.</p> <p><b>5</b> - Using mildly strong acids/basis; Using/storing Class I flammables in quantities &gt;0.5 - 1 gal for 100 ft<sup>2</sup> (&gt;0.005 - 0.01 gal/ft. 2) of lab area or flammables &amp; combustibles &gt;0.5 - 2 gal for 100 ft<sup>2</sup> (&gt;0.005 - 0.02 gal/ft. 2) of lab area; Gas cylinders such as N<sub>2</sub> or air or not identified by hazard type.</p> <p><b>7</b> - Using acutely hazardous materials such as strong acids/basis &amp; cryogenics; using chemicals with chronic health hazards (carcinogenic effects or reproductive hazards); Using/storing Class I flammables in quantities &gt;1 - 2.5 gal for 100 ft<sup>2</sup> (&gt;0.01 - 0.025 gal/ft<sup>2</sup>) of lab area or flammables &amp; combustibles 2 - 5 gal for 100 ft<sup>2</sup> (0.02 - 0.05 gal/ft<sup>2</sup>) of lab area.</p> <p><b>9</b> - Using highly toxic materials (HF, cyanides, sulfides, etc.).            - Using/storing Class I flammables in quantities &gt; 2.5 gal for 100 ft<sup>2</sup> (&gt;0.025 gal/ft<sup>2</sup>) of lab area or flammables &amp; combustibles &gt; 5 gal for 100 ft<sup>2</sup> (&gt;0.05 gal/ft<sup>2</sup>) of lab area.            - Any amount of explosive materials (materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressure) and time sensitive chemicals such as peroxide formers in containers &gt;100 grams or &gt;100 mL.            - Pressurized reactions (see definitions).</p>	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	Gas cylinders such as N <sub>2</sub> or air select 5; other chemical gases select 7.  If chemicals present select 7.	See Table

Laboratory Risk Ranking Criteria					
Hazard	Description	Severity of Hazard	Frequency of Exposure	Regulatory Requirements	MPL
Non-Ionizing Radiation  Laser UV Microwave energy	Includes non-ionizing radiation such as laser activities, UV and microwave energy	3 - Laser intensity of 3A or less 3 - Laser 3B or 4 that are completely shielded with interlock that shuts down laser 5 - Ultraviolet light 5 - Microwave energy 7 - Laser intensity of 3B 9 - Laser intensity of 4	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	Select 3 for laser 3A or less Select 3 for UV & microwave Select 5 for lasers (3b or 4)	See Table
Ionizing Radiation	Includes radiation sources (Materials and Machine producing).	<u>Non-Sealed Sources:</u> 5 - NRC 4 - Least health hazard, ex. - Hydrogen 3 (H3), Thorium (Th 232), Tritium (H3), Uranium (U 238) 7 - NRC 2 and 3 - Moderate health hazard, ex. - Carbon 14 (C 14), Cesium 127 (CS 127), Iodine, Phosphorous 32 (P32), Sodium 22 (Na 22) 9 - NRC 1 - Extreme health hazard, ex. Americium, Curium, Neptunium (237), Plutonium, Radium 236 (Ra 236), Thorium 228 (Th 228) <u>Sealed Sources:</u> 5 - Sources not requiring leak test (<10 micro curries alpha, <100 micro curries beta or gamma) 7 - Sources requiring leak test 9 - Neutrons (NSH and Jordan) <u>Machines:</u> 3 - X-Ray Defractometer 7 - X-Ray and CT 7 - Accelerators	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	7	See Table
<b>Physical Safety and Environmental</b>					

Confined Space	Applicable if confined spaces are entered.	9 - Confined spaces are entered	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	7	See Table
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Laboratory Risk Ranking Criteria					
Hazard	Description	Severity of Hazard	Frequency of Exposure	Regulatory Requirements	MPL
Working from Heights (Fall Hazards)	Applicable if personnel work from heights, ladder use, platforms present, or lifting devices (scissor lifts) are used.	5 - Personnel work from ladders >4' 7 - Personnel work >4' requiring the use of fall protection or scissor lift.	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	7	9
Machine Shop Tools	Applicable if machine shop tools, e.g., drill press, lathe, etc., are present.	3 - Bench Grinders 3 - Drill presses & Microtomes 3 - Band Saws 5 - Lathes 7 - Power Presses (press brakes) - ex., metal forming, punch press	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	5	See Table
Unexpected Hazardous energy (LOTO)	Applicable if personnel engage in repair and maintenance of machines or equipment requiring LOTO.	9 - Lockout required if personnel conduct maintenance & repair of machinery	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	7	See Table
Welding, Cutting and Brazing	Use of electric or gas welding and cutting equipment.	5 - Brazing activities 7 - Welding & cutting activities	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	3 - Brazing 5 - Welding and cutting	See Table

Laboratory Risk Ranking Criteria					
Hazard	Description	Severity of Hazard	Frequency of Exposure	Regulatory Requirements	MPL
Live Electrical	Evaluate if exposure to live electrical conductors is present >50 Volts.	9 - Live electrical work >50 volts	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	7	9
Other Safety	Evaluate if exposure to noise, magnetic fields, and lifting devices.	5 - High Noise 5 - Hoists, cranes, or fork truck use 7 - Magnetic Fields	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	5 - High Noise (>85 dBA) 5 - Magnetic Fields 5 - Hoist, crane, fork truck	See Table
Environmental	Evaluate if environmental regulations apply.	3 - Universal Waste or non-hazardous waste 5 - Hazardous Waste	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	5 - Universal Waste or non-hazardous waste 7 - Hazardous Waste	See Table



**Appendix C**  
**Maximum Probable Loss Table for**  
**Laboratories & Machine Shops**

		Consequences by Area				
Category	Rating	Personnel (Students, Faculty, Staff, Visitors)	Regulatory / Environmental	Business Continuity	Physical Assets	Reputational Risk
Catastrophic	9	<p>Fatality.</p> <p>Serious injury or illness resulting in extensive lost work time.</p> <p>Permanent or partial disability.</p>	<p>Extensive reportable environmental release affecting site and off-site locations.</p> <p>Major regulatory action effecting the University, criminal prosecution and/or significant fine in &gt;\$25,000.</p> <p>Disruption of waste water treatment facility.</p> <p>Release resulting in wildlife fatalities.</p> <p>Material release associated with adverse employee or community health.</p> <p>Environmental damage requiring extensive clean-up.</p>	<p>Loss or damage suspends (&gt;1 day) routine operations throughout University.</p> <p>Major physical or intellectual property loss.</p> <p>Loss of grant(s).</p>	<p>Catastrophic loss or damage extending beyond University property.</p> <p>Suspends operations at University &gt;2 days.</p> <p>Event resulting in &gt;\$50K</p>	<p>Significant adverse national or global media exposure.</p>

<p><b>Severe</b></p>	<p><b>7</b></p>	<p>Major injuries / illness requiring emergency transport to medical facility.</p> <p>Limited hospitalizations.</p> <p>Limited Loss of work.</p> <p>Risk of chronic illness.</p>	<p>Major reportable environmental release confined to the ND property.</p> <p>Significant enforcement action affecting operations including fines.</p> <p>Incident initiates regulatory inspection.</p> <p>Material release requiring regulatory notification (phone, written follow-up).</p>	<p>Loss or damage that suspends routine operations throughout University (1 day or less)</p>	<p>Significant loss or damages but confined to the University.</p> <p>Event resulting in \$10K to \$50K loss and/or 1 to 2 days loss of operations</p>	<p>Significant adverse local and regional media exposure.</p>
<p><b>Moderate</b></p>	<p><b>5</b></p>	<p>Moderate employee injury.</p> <p>OSHA recordable injury without lost work time</p>	<p>Environmental release requiring minor clean-up action.</p> <p>Regulatory implications with limited or no enforcement actions.</p>	<p>Loss or damage that temporarily suspends routine operations but is limited to area of incident.</p>	<p>Moderate loss or damage affecting an isolated area of the University.</p> <p>Minimal effect to operations.</p> <p>Event resulting in less than \$10K loss.</p>	<p>Adverse local public media exposure.</p>

<p><b>Minor</b></p>	<p><b>3</b></p>	<p>Minor injury or non-recordable employee injury.</p>	<p>No regulatory notification and no enforcement action.</p>	<p>Loss or damage limited to area of incident but does not affect routine operations.</p>	<p>Minor isolated property loss or damage.  Event resulting in isolated equipment/building damage, readily repairable.  Event requiring University emergency response, issue quickly resolved at negligible expense</p>	<p>Minimal impact.</p>
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## Appendix D

### Machine Shop Risk Ranking Criteria

Shop Risk Ranking Criteria					
Hazard	Description	Severity of Hazard	Frequency of Exposure	Regulatory Requirements	MPL
Chemical	Includes all liquid, dry and gaseous chemicals.	<p>3 - Using weak acids/basis; Using/storing flammables &amp; combustibles up to .5 gal for 100 ft<sup>2</sup> (.005 gal/ft<sup>2</sup>) of shop area; Areas that are just for storage.</p> <p>5 - Using mildly strong acids/basis; Using/storing Class I flammables in quantities &gt;0.5 - 1 gal for 100 ft<sup>2</sup> (&gt;0.005 - 0.01 gal/ft. 2) of shop area or flammables &amp; combustibles &gt;0.5 - 2 gal for 100 ft<sup>2</sup> (&gt;0.005 - 0.02 gal/ft. 2) of shop area; Gas cylinders such as N2 or air or not identified by hazard type.</p> <p>7 - Using acutely hazardous materials such as strong acids/basis &amp; cryogenics; using chemicals with chronic health hazards (carcinogenic effects or reproductive hazards); Using/storing Class I flammables in quantities &gt;1 - 2.5 gal for 100 ft<sup>2</sup> (&gt;0.01 - 0.025 gal/ft<sup>2</sup>) of shop area or flammables &amp; combustibles 2 - 5 gal for 100 ft<sup>2</sup> (0.02 - 0.05 gal/ft<sup>2</sup>) of shop area.</p> <p>9 - Using highly toxic materials (HF, cyanides, sulfides, etc.).                      - Using/storing Class I flammables in quantities &gt; 2.5 gal for 100 ft<sup>2</sup> (&gt;0.025 gal/ft<sup>2</sup>) of shop area or flammables &amp; combustibles &gt; 5 gal for 100 ft<sup>2</sup> (&gt;0.05 gal/ft<sup>2</sup>) of shop area.                      - Any amount of explosive materials (materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressure) and time sensitive chemicals such as peroxide formers in containers &gt;100 grams or &gt;100 mL.</p>	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	Gas cylinders such as N2 or air select 5; other chemical gases select 7.  If chemicals present select 7.	See Table
Non-Ionizing Radiation  Laser	Includes non-ionizing radiation such as laser activities	<p>3 - Laser intensity of 3A or less                      3 - Laser 3B or 4 that are completely shielded with interlock that shuts down laser</p> <p>7 - Laser intensity of 3B                      9 - Laser intensity of 4</p>	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	Select 3 for laser 3A or less Select 5 for lasers (3b or 4)	See Table

**Shop Risk Ranking Criteria**

Hazard	Description	Severity of Hazard	Frequency of Exposure	Regulatory Requirements	MPL
Physical Safety and Environmental					
Machine Shop Tools	Applicable if machine shop tools, e.g., drill press, lathe, milling machines, etc., are present.	3 - Circular Saw    3 - Chop/Miter Saw    3 – Microtomes 3 - Laser Cutting Device 3 - Angle Grinder 3 - Reciprocating Saw  5 - Small/Benchtop Drill Press 5 - Small/Benchtop Milling Machine 5 - Small/Benchtop Lathe 5 - Small/Benchtop Band Saw 5 - Bench Grinder  7 - Full Sized Metal Lathes / CNC Lathes 7 - Full Sized Milling Machines 7 - Surface Grinders 7 - Large Drill Press 7 - Full Sized Band Saws 7 - Radial Arm Saw, Table Saw  9 - Metal Forming Machines - ex., mechanical power press, hydraulic press, shear, punch press, press brake, forging machine	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	5	See Table
Confined Space	Applicable if confined spaces are entered.	9 - Confined spaces are entered	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	7	See Table
Working from Heights (Fall Hazards)	Applicable if personnel work from heights, ladder use, platforms present, or lifting devices (scissor lifts) are used.	5 - Personnel work from ladders >4' 7 - Personnel work >4' requiring the use of fall protection or scissor lift.	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	7	9

**Shop Risk Ranking Criteria**

<b>Hazard</b>	<b>Description</b>	<b>Severity of Hazard</b>	<b>Frequency of Exposure</b>	<b>Regulatory Requirements</b>	<b>MPL</b>
Unexpected Hazardous energy (LOTO)	Applicable if personnel engage in repair and maintenance of machines or equipment requiring LOTO.	9 - Lockout required if personnel conduct maintenance & repair of machinery	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	7	See Table
Welding, Cutting and Brazing	Use of electric or gas welding and cutting equipment.	5 - Brazing activities 7 - Welding & cutting activities	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	3 - Brazing 5 - Welding and cutting	See Table
Live Electrical	Evaluate if exposure to live electrical conductors is present >50 Volts.	9 - Live electrical work >50 volts	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	7	9
Other Safety	Evaluate if exposure to noise and lifting devices.	5 - High Noise 5 - Hoists, cranes, or fork truck use	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	5 - High Noise (>85 dBA) 5 - Hoist, crane, fork truck	See Table

**Shop Risk Ranking Criteria**

Hazard	Description	Severity of Hazard	Frequency of Exposure	Regulatory Requirements	MPL
Environmental	Evaluate if environmental regulations apply.	3 - Universal Waste or non-hazardous waste 5 - Hazardous Waste	Exposure frequency: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	5 - Universal Waste or non-hazardous waste  7 - Hazardous Waste	See Table

**Appendix E**  
**Risk Assessment Probability Definitions**

<b>Risk Assessment Probability Definitions</b>		
<b>Frequency of Exposure</b>	<b>Number of People</b>	<b>Controls</b>
Frequency of Exposure: 3 - > Monthly 5 - Monthly (<2x/wk.) 7 - Weekly (>3x/wk.) 9 - Daily	Number of People Exposed to Hazard: 3 - < 5 persons 5 - 6 to 14 persons 7 - > 14 persons	Present Controls in Place (Hierarchy of Controls): 1 - Engineering Controls 5 - Administrative Controls 7 - Personal Protective Equipment (PPE) 9 - No Controls



**Appendix F**  
**Severity Table - Safety Assessments**

		Consequences by Area		
Category	#	Personnel (Students, Faculty, Staff, Visitors)	Regulatory / Environmental	Physical Assets

<p><b>Catastrophic</b></p>	<p><b>9</b></p>	<p>Fatality.</p> <p>Serious injury or illness resulting in extensive lost work time.</p> <p>Permanent or partial disability (not noise induced).</p>	<p>Extensive reportable environmental release affecting site and off-site locations.</p> <p>Major regulatory action effecting the University, criminal prosecution and/or significant fine in &gt;\$25,000.</p> <p>Disruption of waste water treatment facility.</p> <p>Release resulting in wildlife fatalities.</p> <p>Material release associated with adverse employee or community health.</p> <p>Environmental damage requiring extensive clean-up.</p>	<p>Catastrophic loss or damage extending beyond University property.</p> <p>Suspends operations at University &gt;2 days.</p> <p>Event resulting in &gt;\$50K</p>
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<p style="text-align: center;"><b>Severe</b></p>	<p style="text-align: center;"><b>7</b></p>	<p>Major injuries / illness requiring emergency transport to medical facility.</p> <p>Limited hospitalizations.</p> <p>Limited Loss of work.</p> <p>Risk of chronic illness.</p>	<p>Major reportable environmental release confined to the ND property.</p> <p>Significant enforcement action affecting operations including fines.</p> <p>Incident initiates regulatory inspection.</p> <p>Material release requiring regulatory notification (phone, written follow-up).</p>	<p>Significant loss or damages but confined to the University.</p> <p>Event resulting in \$10K to \$50K loss and/or 1 to 2 days loss of operations</p>
<p style="text-align: center;"><b>Moderate</b></p>	<p style="text-align: center;"><b>5</b></p>	<p>Moderate employee injury.</p> <p>OSHA recordable injury without lost work time</p>	<p>Environmental release requiring minor clean-up action.</p> <p>Regulatory implications with limited or no enforcement actions.</p>	<p>Moderate loss or damage affecting an isolated area of the University.</p> <p>Minimal effect to operations.</p> <p>Event resulting in less than \$10K loss.</p>

<p style="text-align: center;"><b>Minor</b></p>	<p style="text-align: center;"><b>3</b></p>	<p>Minor injury or non-recordable employee injury.</p>	<p>No regulatory notification and no enforcement action.</p>	<p>Minor isolated property loss or damage.</p> <p>Event resulting in isolated equipment/building damage, readily repairable.</p> <p>Event requiring University emergency response, issue quickly resolved at negligible expense</p>
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### Revision History

History	Effective Date
Creation of procedure.	March 2015
Several revisions made to incorporate Building and Safety Assessments.	March 2016
Revisions made throughout document to incorporate Machine Shop inspections as well as recently revamped Safety Assessments (Risk & Safety Assessments).	March 2018