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National High Magnetic Field Laboratory Safety Program

TITLE: Integrated Safety Management Program (ISM)	**SUBJECT:** Integrated Safety Management definition and mechanisms for implementation
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Additional Approval Signatures on Revision and Approval Page	**APPROVAL:** NHMFL Deputy Lab Director DocuSigned by: Eric Palm 074CDA665DEF4E8...

Overall Mission and Overview

The National High Magnetic Field Laboratory (NHMFL) Environmental, Health, and Safety (EHS) Program's mission is to provide support and guidance to all NHMFL departments with the implementation, maintenance, and review of a comprehensive EHS Program. The primary goal of the NHMFL EHS Program is to control, reduce, or eliminate work-related injuries, illnesses, and loss of NHMFL resources.

The NHMFL is charged by the National Science Foundation (NSF) to safely:

- Promote magnet-related research to serve an interdisciplinary scientific user community.
- Provide unique high-magnetic-field facilities through a competitive and transparent proposal review process.
- Advance magnet and magnet-related technology.
- Partner with universities, other national laboratories and industry to enhance national competitiveness in magnet and related technologies.
- Serve the NSF as a prominent example of its successful stewardship of large research facilities.
- Support science and technology education in the United States.
- Increase diversity in the science, technology, engineering, and mathematics workforce.
- Promote collaboration among our three partner institutions: Florida State University (FSU), the University of Florida (UF), and Los Alamos National Laboratory (LANL).

INTEGRATED SAFETY MANAGEMENT (ISM) INDEX

1.0 PURPOSE

The Integrated Safety Management (ISM) Program integrates safety and health requirements and controls into daily work activities in an effort to ensure the protection of the public, worker, and environment. The purpose of this program is to establish policies and procedures to be observed by all lab personnel at the National High Magnetic Field Laboratory (NHMFL).

2.0 SCOPE

The ISM program applies to all NHMFL personnel, visitors, students, users, and contractors.

ISM is the prevailing safety program at the NHMFL, and all other departmental or interdepartmental Safety Programs (SP) will meet the intent of Integrated Safety Management. Safety Programs provide more detailed guidance on how to perform certain activities at the lab safely.

3.0 RESPONSIBILITIES

Management, researchers, students, and workers are directly responsible for the safety of themselves, co-workers, the public, and the environment. There must be clear and unambiguous lines of authority and responsibility to maintain a safe workplace.

3.1 NHMFL MANAGEMENT

Managers must allocate resources to address safety. The protection of workers, the public, and the environment is a priority whenever activities are planned and performed. Managers must understand the experience level of their staff and assign tasks that are commensurate to their abilities.

3.2 NHMFL PERSONNEL

All personnel in the NHMFL are directly accountable to implement the ISM Program. Personnel are required to have the experience, knowledge, skills, and capabilities necessary to perform their responsibilities safely.

3.3 DEPARTMENT OF ENVIRONMENT, HEALTH, AND SAFETY (SAFETY DEPARTMENT)

The Safety Department provides safety policy, enforcement, and independent oversight.

4.0 INTEGRATED SAFETY MANAGEMENT PROGRAM (ISM)

4.1 OBJECTIVES OF INTEGRATED SAFETY MANAGEMENT

It is the aim of ISM to incorporate safety into management and work practices at all

levels. This is accomplished with a strong safety culture and an effective integration of safety management into all facets of work planning and execution.

A strong safety culture is the foundation of a sustainable ISM Program. This foundation must include:

- A commitment to safety at all levels.
- The belief that safety should be treated as an investment, not an expense.
- Safety development through effective training and education.
- A specific process for risk assessment, prevention, and control.
- A review of every safety concern and/or deficiency and their resolution.
- A blame-free work environment.

4.2 GUIDING PRINCIPLES FOR INTEGRATED SAFETY MANAGEMENT

Figure 1 illustrates that these guiding principles remain at the center of ISM's core functions. These principles are the fundamental policies that guide NHMFL actions, from the development of safety directives to the performance of work.

1. *Management Responsibility for Safety*
   Management, working along with the Safety Department, is responsible in the identification of appropriate training requirements for their staff and the assignment of tasks with hazard levels commensurate with an individual's experience level.

2. *Clear Roles and Responsibilities*
   Clear and unambiguous lines of authority and responsibility for ensuring safety shall be established and maintained at all organizational levels within the NHMFL and its contractors.

3. *Competence Proportionate with Responsibilities*
   Personnel shall possess the experience, knowledge, skills, and abilities that are necessary to perform their responsibilities.

4. *Individual Empowerment for Safety*
   Safety shall always be the top priority in any job. From the first day, employees are notified that they have the responsibility and authority to ask the ONE KEY SAFETY QUESTION: "How do I know I will be safe if I perform this work?" All employees also have the ability and responsibility to call for a "STOP WORK" if they notice something that doesn't look safe, even if they are not directly involved in the work being performed. Every employee can submit safety suggestions via the NHMFL's safemag.magnet.fsu.edu website and report more urgent safety concerns via the 855-SAFEMAG cell phone monitored 24/7 by the NHMFL Safety Department.

5. *Identification of Safety Standards and Requirements*
   Existing safety related standards and regulations must be identified and adhered to. These include but are not limited to OSHA, HazMat, EPA, ASME, etc.

6. *Hazard Controls Tailored to Work Being Performed*
   For each specific task that is performed, appropriate engineering and administrative controls need be put into force and safety equipment identified.

7. *Operations Authorization*
   Do not conduct the work until authorized to do so.

4.3 CORE FUNCTIONS FOR INTEGRATED SAFETY MANAGEMENT

ISM is based on five core functions that provide the necessary structure to control safety aspects of any activity. It forms a step-by-step process that helps to identify hazards associated with work details, the potential severity of them, and to properly identify necessary safety controls. This process is depicted in Figure 2 as a continuous cycle where the results of an activity are fed back to improve the safety conditions of following/ongoing tasks.

1. *Define the Scope of Work*
   Missions are translated into work, expectations are set, tasks are identified and prioritized, and resources are allocated.

2. *Analyze the Hazards*
   Hazards associated with the work are identified, analyzed, and categorized.

3. *Develop and Implement Hazard Controls*
   Applicable standards and requirements are identified and agreed-upon, controls to prevent/mitigate hazards are identified, the safety envelope is established, and controls are implemented.

4. *Perform Work within Controls*
   Readiness is confirmed and work is performed safely.

5. *Provide Written Feedback and Continuous Improvement*
   Information on the adequacy of the controls and proper identification of hazards are collected and fed back to management for implementation on follow up activities.

FIGURE 1. THE FIVE CORE FUNCTIONS OF INTEGRATED SAFETY MANAGEMENT

4.4 SAFETY MECHANISMS

Safety Mechanisms define how the core safety management functions are applied. The mechanisms may vary from department to department and from activity to activity based on the hazards and the work being performed and may include:

1. Departmental expectations expressed through directives (policy, rules, orders, notices, standards, and guidance).

2. Program policies, procedures, and documents established to implement safety management and fulfill commitments made to the NHMFL (e.g., Health and Safety Programs, Safety Analysis Reports, Chemical Hygiene Programs, Process Hazard Analyses). A complete list of these documents is available at: https://portal.magnet.fsu.edu/management/safety/default.aspx .

3. ISM Work Control Documents: described in Section 4.5.

4.5 ISM PROGRAM WORK CONTROL DOCUMENTS (WCD)

4.5.1 TASK HAZARD ANALYSIS WORKSHEET

The purpose of the Task Hazard Analysis (THA) is to identify hazards and safety controls associated with a job activity and to assess a residual risk level.

A Task Hazard Analysis (THA) must be performed prior to engaging in any work activity which may have a chance of having a Low-Med residual risk level or greater, as illustrated in appendix A. If there is any doubt as to whether a THA is required for a given task, then best-practice dictates that one be performed. Departments/work groups can customize the form to better suit their needs. Any customized THA must be approved by the Safety Department prior to implementation.

The THA must be reviewed by all Authorized Employees before any work is started. Each Authorized Employee must write their own name on the THA as confirmation that they have discussed the information with the Project Lead. Daily confirmation may be required based on the hazard analysis or at the request of the Safety Department. If the scope or hazards change during the course of work, the THA must be amended or rewritten to include the new information. If a task is done frequently, a Standard Operating Procedure should be considered.

<u>THA Process Steps</u>

The following lists the basic steps needed in any Task Hazard Analysis.

1. List specific tasks associated with the scope of a work activity.
2. Identify the potential hazards for each task.
3. Determine the necessary controls (priority as listed).

    a. Engineering controls
    b. Safe work practices
    c. Administrative controls
    d. Personnel Protective Equipment (PPE)

4. Assess the residual risk level (see Section 4.6).
5. Determine the approval requirements and how the work will proceed.
6. Provide written feedback for continuous improvement.

4.5.2 SAFETY OPERATING PROCEDURE (SOP)

- An SOP is a written set of instructions that document how to safely perform work involving hazardous materials or hazardous operations for a specific scope of work.
- An on-the-job training (OJT) sheet must accompany each SOP or be added as an appendix to record all employees who have been trained.

Once an employee has been trained, the supervisor and employee will sign the OJT sheet confirming the employee is ready to work under the SOP.

- An SOP can be applied for any Residual Risk Category that the task may fall into.
    - The requirements of the residual risk category may be reduced through the use of a Permitted Standard Operating Procedure (See Section 4.5.3)
- An SOP may be required by the Safety Department if sufficient information is not provided in the THA, or the number of steps is too extensive/complex to be contained in a THA.
- If the Residual Risk is a Medium-High, then the SOP must be approved and signed by a member of the Safety Department and the NHMFL Director or his/her designee.
- For the required contents of an SOP see Appendix B.

4.5.3 PERMITTED SAFETY OPERATING PROCEDURE (PSOP)

- A PSOP is a specific type of SOP that has been permitted for an exception to one of the requirements stated in the Residual Risk categories. Safety Department must review each PSOP before it can be put into practice.
    - A PSOP may exempt the requirement of the two-person rule for Low-Med or higher risk categories.
    - A PSOP may exempt the requirement of a repetitive Safety Department approval for Medium or higher risk categories.
- The PSOP must be re-permitting by the Safety Department if there are any changes to the procedure or scope of work.
- In the event of a near miss or incident the PSOP must be reviewed by the supervisor and the Safety Department.
- While working with a PSOP, if there is any deviation from the procedure or change in scope of work, a separate THA must be written to most rapidly proceed with the task in a safe manner (this THA will not be exempt from the Safety Department approval or two-person rule).

4.6 RESIDUAL RISK MATRIX

An example THA worksheet is provided in Appendix A. The THA worksheet may be customized for each department, but the determination of residual risk is standardized.

A Hazard Assessment Matrix and a Residual Risk Assessment Matrix are used to determine the residual risk level of a particular task. The Hazard Assessment Matrix considers the experience level of the workers and the task's complexity. The results of that are folded into the Residual Risk Assessment Matrix along with the potential consequence to determine the overall level of residual risk.

Hazard Assessment Matrix

The Hazard Assessment Matrix is shown in Table 1. The instructions are listed below.

1. Define the worker familiarity level to perform the task.
2. Define the complexity of the task.
3. Find the value associated with familiarity/complexity (1 – 5).
4. Enter value next to: HAZARD on the THA worksheet.

Residual Risk Assessment Matrix

The Residual Risk Assessment Matrix is shown in Table 2. The instructions are listed below.

1. Identify the row associated with the familiarity/complexity value (1 – 5).
2. Identify the consequences.
3. Enter consequences value next to: CONSEQ on the THA worksheet.
4. Find the residual risk value associated with assessed hazard/consequences **Low – Low Med – Medium – Med High – High.**
5. Enter value next to: RESIDUAL on the THA worksheet.

Consequences

Consequences are determined by defining what would happen in a worst case scenario if controls fail.

1. **Negligible**: minor injury resulting in basic first aid treatment that can be provided on site.
2. **Minor**: minor injury resulting in advanced first aid treatment administered by a physician.
3. **Moderate**: injuries that require treatment above first aid but do not require hospitalization.
4. **Significant**: severe injuries requiring hospitalization.
5. **Severe**: death or permanent disability.

TABLE 1. HAZARD ASSESSMENT MATRIX

		Complexity		
		Simple	Moderate	Difficult
Familiarity Level	Very Familiar	1	2	3
	Somewhat Familiar	2	3	4
	Unfamiliar	3	4	5

TABLE 2. RESIDUAL RISK ASSESSMENT MATRIX

Assessed Hazard Level	Consequences				
	Negligible	Minor	Moderate	Significant	Severe
5	Low Med	Medium	Med High	High	High
4	Low	Low Med	Medium	Med High	High
3	Low	Low Med	Medium	Med High	Med High
2	Low	Low Med	Low Med	Medium	Medium
1	Low	Low	Low Med	Low Med	Medium

Rules for determining the Residual Risk Categories

Identify if the proposed activity is covered by an existing Safety Operating Procedure (SOP) or Permitted Safety Operating Procedure (PSOP) and if the worker is qualified to perform the procedure. If not, then perform a Task Hazard Analysis (THA) to determine what the residual risk category is.

Low

- Safety controls can be planned and implemented by the worker.
- Proceed with supervisor authorization.

Low Med

- Safety controls are planned by both the worker and supervisor.
- A second worker knowledgeable of the task and hazards is in the vicinity.
- Proceed with supervisor authorization.

Medium

- Have the Safety Department review and approve the completed THA.
- Additional information on the task process may be required by the Safety Department through the implementation of a Safety Operating Procedure (SOP).
- Two qualified workers must be in place before work can proceed.
- Limit the number of authorized workers in the hazard area.
- Proceed with supervisor authorization.

Med High

- Have the Safety Department review and approve the completed THA.
- A written and approved SOP is required and must be authorized by the Safety Department and the NHMFL Director or his/her designee.

High

- The activity will not be performed.

5.0 INTEGRATED SAFETY MANAGEMENT PROGRAM ASSESSMENT

The NHMFL's ISM Program shall be reviewed by a NHMFL safety subcommittee on a periodic basis. This review can cover any or all of the following components of the ISM program.

- Worker participation.
- Safety concerns, trends, and corrective actions.
- Compliance with required training (Safety Training Database).
- The role of management in conducting THA's and their interaction with workers.
- If hazards have been accurately identified.
- The level of training of personnel in comparison to the tasks they performed.
- The level of resources applied towards safety equipment and controls.
- How feedback and continuous improvement have been implemented.

The committee may choose to utilize the following tools for the assessment.

- NHMFL Safety Survey.
- Audit of Work Control Documents.
- Interviews with management and other personnel.
- Submissions to safemag.magnet.fsu.edu.

The NHMFL's ISM program shall be reviewed by an external safety review committee on a five-year basis.

6.0 APPENDIX A: TASK HAZARD ANALYSIS WORKSHEET EXAMPLE

NATIONAL HIGH MAGNETIC FIELD LABORATORY

Task Hazard Analysis Worksheet

Project:	**Location:**	**Start Date:**	**End Date:**
Project Lead:	**Dept/Lab:**	**Authorized Employees:**	
Notes:			

(1) TASKS	(2) POTENTIAL HAZARDS	(3) CONTROLS	(4) RESIDUAL RISK	Authorizations
			HAZARD CONSEQ RESIDUAL	
			HAZARD CONSEQ RESIDUAL	
			HAZARD CONSEQ RESIDUAL	
			HAZARD CONSEQ RESIDUAL	
			HAZARD CONSEQ RESIDUAL	

		Complexity		
		Simple	Moderate	Difficult
Familiarity Level	Very Familiar	1	2	3
	Somewhat Familiar	2	3	4
	Unfamiliar	3	4	5

Integrated Safety Management Risk Assessment Matrix					
Assessed Hazard	Consequences				
	Negligible	Minor	Moderate	Significant	Severe
5	Low Med	Medium	Med High	High	High
4	Low	Low Med	Medium	Med High	High
3	Low	Low Med	Medium	Med High	Med High
2	Low	Low Med	Low Med	Medium	Medium
1	Low	Low	Low Med	Low Med	Medium

APPENDIX B: SAFETY OPERATING PROCEDURE (SOP) CONTENTS

A safety operating procedure (SOP**)** typically has the following sections followed by a set of step-by-step instructions compiled by any NHMFL employee to help carry out both complex and routine operations. The following outline may be used to create an SOP. A PSOP is an SOP that has been approved by Safety Department for routine operations.

Section 1: Scope and Process

- State the scope of work covered by the SOP.
- Identify the type of process involved.

Section 2: Task Hazard Analysis and Residual Risk

- Include a THA for every task to identify hazards, controls and define the residual risk.

Section 3: Identify Hazards

- Identify the physical hazards that are involved with each task, e.g.,
    - Working at heights
    - Lifting heavy items
    - High voltage
    - Confined spaces
    - Temperature extremes
- Identify the chemical hazards that are involved with each task
    - List the hazardous materials (or hazard class) involved with each task.
    - List hazardous by-products.
    - Define the plan for hazardous waste management.

Section 4: Emergency Response Procedure

- Describe procedures for handling potential emergencies.
- Note the location of emergency equipment such as spill kits, emergency eyewash/showers, pull stations, fire extinguishers, first aid kits, and evacuation routes.

Section 5: Required Approvals

- Identify the required approval as defined by the department and the residual risk.

Section 6: On the Job Training

- Identify the tasks and skills required to use the procedure.
- Identify the Principal Investigator and, if different, the trainer.
- List the minimum duration or number of operations required for training.
- Include a signature sheet for qualified workers.
    - Signature of worker on completion of training.
    - Signature of supervisor (trainer) at completion of worker training.

APPENDIX C: APPROVAL AND REVISIONS

Revisions

Date	Revision #	Section	Description
05/01/2017	001	All	Review for signatures
06/05/2018	002	4.5	Added instruction for THA, SOP, and PSOP
07/17/2024	003	All	Formatting/grammatical changes.

Approvals

Title	Name	Signature
NHMFL Director of Safety	Alfie Brown	DocuSigned by: Alfie Brown 244772F051A0421...