

## **Nuclear Science Division Integrated Safety Management (ISM) Plan, PY2008**

### **Introduction**

The Nuclear Science Division (NSD) performs basic research in the areas of relativistic heavy-ion physics, nuclear physics, nuclear theory, nuclear astrophysics, nuclear chemistry, nuclear data evaluation and detector development. The Integrated Safety Management (ISM) Plan describes the Division's program and commitment to integrating safety awareness in all levels of its activities. NSD is committed to performing safe work in a manner that ensures adequate protection for employees, guests, the general public, Lab assets, and the environment.

### **ISM Implementation**

The NSD ISM Plan incorporates the seven guiding principles and five core functions of ISM for improving safety in the workplace. (See Appendix A.)

The ISM Plan establishes a management strategy to ensure that all work is carried out in a safe manner consistent with appropriate institutional and divisional EH&S policies and procedures. The plan covers all Nuclear Science Division employees and guests, including students, regardless of work location. Work at the U.C. campus will conform to the LBL-UC Partnership agreement.

The Division plan is reviewed annually at a mandatory All-Hands meeting on EH&S and can be found on the Division Web site. Changes in policy, lessons learned and other information are transmitted by e-mail, at all-staff, building-wide, and project/group meetings, and by members of the EH&S Committees.

### **Responsibility and Accountability**

The Division Director is responsible for assuring that all NSD activities are carried out in a safe manner, in accordance with applicable Laboratory requirements. The EH&S Coordinator oversees the Division EH&S program and is responsible for its effectiveness and audit. Division management will regularly conduct EH&S walkarounds of Division space, verify the safe operation of facilities and Equipment, as well as observe work practices. Division management will meet often (approximately weekly) with the Division Safety Coordinator and Division Liaison to discuss EH&S issues affecting NSD.

Program Heads are responsible for establishing and maintaining appropriate oversight of EH&S procedures and activities.

Group/Project Leaders are responsible for ensuring that work performed by members of the group is conducted in a safe manner, in accordance with appropriate Division and Laboratory procedures and requirements. They also ensure that deficiencies are corrected in a timely fashion. Each individual group member has these same responsibilities.

Shared responsibility exists for employees matrixed from other divisions and may be spelled out in agreements with those divisions. Matrixed employees participate in NSD

activities, such as emergency teams, self-assessment teams and EH&S Committees and are integrated into facility operations.

All Nuclear Science Division staff and guests are responsible for stopping work activities that are considered to be an imminent danger.

### Line Management EH&S Responsibilities

Supervisors and Group leaders are responsible and accountable for implementation of this ISM plan in their labs and workplaces. They are responsible for a range of EH&S functions including:

- Ensuring EH&S requirements are integrated into all work activities and the necessary resources/controls are provided in a timely manner to do the work safely
- Creating and communicating meaningful EH&S standards and holding staff, students and guests accountable for implementing these expectations
- Identifying the EH&S training requirements and medical surveillance requirements for their staff, students, guests and vendors and ensuring that training and medical evaluations are completed in a timely manner
- Conducting periodic safety walkthroughs of labs, offices and other workspaces for which they are responsible to identify problems in the facilities, equipment or work practices
- Working to develop a corrective action for problems identified in the periodic walkthroughs
- Preparing, maintaining and renewing required formal authorization documents
- Managing the accumulation, storage and disposal of hazardous waste
- Ensuring that new or significantly modified projects or facilities are reviewed for hazards in the planning stage
- Conducting periodic safety meetings with supervised staff, students and guests

### Work Leads EH&S Responsibilities

Supervisors or Group Leaders may designate Work Leads for laboratories or workspaces. The work leads are in lead positions in which they may direct, oversee, train and assign tasks to other staff members or guests. In this role they derive authority from their supervisors for the safety of co-workers that goes beyond that expected of all staff members. This category of Work Lead is relied upon by their supervisors to provide assurance that day-to-day work, operations, and activities in their assigned areas are conducted safely and within established work authorizations. A Work Lead's specific functions in completing the safety line management chain are as follows:

- Provide assurance that all EH&S policies are observed in their areas with the aim of providing conditions for conducting work safely in a safe workplace
- Assure that service vendors are aware of hazards and controls in the area where they are scheduled to work. Identify hazards and implement controls related to the contracted service or vendor activities

- Take the initiative to consult with appropriate support organization when safety-related assistance or advice is needed
- Ensure that employees, guests and visitors are properly trained in safety and emergency procedures, and that worker competence and on-the-job training are commensurate with their work assignments
- Notify supervisor of all safety deficiencies and assist, if needed, in entering them into CATS and in developing a corrective action
- Obtain supervisor approval before new or modified work is commenced so that associated hazards are identified and funding is secured to ensure that controls appropriate to the hazards are implemented
- Assure that appropriate authorizations are implemented and current
- Properly respond to reports of incidents or recommendations for EH&S improvements by taking direct mitigating action, if possible, and notifying the supervisor and EH&S

### **EH&S Committees**

In the interest of promoting a safer work environment, NSD has established a Division Safety Committee to review NSD EH&S procedures as concerns and incidents warrant. The NSD Safety Committee consists of a Chair, the Division's EH&S Coordinator, and program representatives or group leaders, including a representative from the 88-Inch Cyclotron Safety Committee. The Committee meets four times per year. The charter of the committee is to:

- Review NSD safety protocols and recommend changes to procedures and, if necessary, organizational changes
- Be involved in investigating incidents and occurrences, look for root causes and trends in incidents, recommending corrective actions to NSD management, and monitoring follow-up
- Disseminate information to NSD staff in a timely manner on the current status of investigations, corrective actions and follow-ups of safety incidents
- Whenever possible, anticipate potential safety issues and recommend changes
- Bring any unaddressed safety concerns to the attention of NSD management
- Review new projects to insure that Lab requirements are met before work begins

The 88-Inch Cyclotron Safety Committee is a subcommittee of the Division Safety Committee. It consists of representatives from Cyclotron operations staff and research groups, the Division's EH&S Coordinator and the Cyclotron's Radiological Technician (see below). The Committee reviews projects and addresses EH&S issues pertinent to the safe operation of the Cyclotron. The 88-Inch Cyclotron Safety Committee meets four times a year.

The Division's EH&S Liaison is invited to the meetings of the NSD Safety Committee and the 88-Inch Cyclotron Safety Committee.

The Committees participate in Self-Assessment activities and can propose corrective actions.

### **Scope of Work**

The principal objective of the Nuclear Science Division is the experimental and theoretical investigation of nuclear physics and chemistry, with a focus on understanding nuclei and nuclear matter under extreme conditions. The Division operates the 88-Inch Cyclotron for basic and applied research. In addition to the basic research program at the 88-Inch Cyclotron, work-for-others is also performed. Members of the Division participate in off-site experiments, e.g., RHIC, CERN, SNO, etc.

### **Work Authorization and controls**

Project/group leaders are responsible for the control of chemical, radiological and bio hazards in their laboratory. They will ensure that appropriate hazard databases and authorizations are updated during laboratory relocations. Line management will ensure that proper knowledge and control of all hazards is transferred in a timely manner during a change in staff or departure of staff.

Line management is responsible for terminating or suspending operations when appropriate approvals are lacking, have expired or training is not current.

Major projects undergo a formal Operational Readiness Review (ORR) or Accelerator Readiness Review (ARR) under DOE direction. Smaller projects undergo internal readiness reviews and work authorization processes performed by program and Division management as described below.

The 88-Inch Cyclotron Facility Safety Assessment Document (SAD) describes an analysis of hazards and the control measures and procedures (engineering and administrative) implemented to ensure safe operation.

Cyclotron experiments are reviewed by the Cyclotron staff. Experiments that require new or modified setups or changes to the facility are referred to the Technical Safety Subcommittee (TSS) of the Cyclotron's EH&S Committee. The TSS reviews the experiments in both the design stage and before implementation. Other changes to the facility, such as the reconfiguration of shielding, are also reviewed by the TSS.

For other projects, the Hazard Management System (HMS) form or the Project Safety Review Questionnaire is prepared for new or modified experiments and reviewed annually. Based on information contained in these forms, the project can be approved or further documentation or authorization required. Authorizations such as Activity Hazard Documents are prepared by the project leader, reviewed by the EH&S Committee and then forwarded to EH&S Division. These authorizations are reviewed annually.

Work requiring a Radiation Work Authorization (RWA), Radiation Work Permit (RWP) or Sealed Source Authorization (SSA) will be performed in accordance with the authorization issued by the EH&S Division. EH&S Division reviews these every 12 to 18 months.

A description of work activities requiring formal authorizations (e.g. AHDs and RWAs, SSAs) is given in Chapter 6 of PUB 3000. Examples of NSD activities requiring formal authorizations are given in Appendix B of this ISM, together with a list of current AHDs and radiological work authorizations.

Oversight and site-specific safety training for off-site experiments is conducted by the host institutions. However, for work at non-DOE sites, an HMS form or Project Safety Review Questionnaire will be completed and reviewed by the EH&S Committee. Large off-site experiments often have significant documentation in EH&S and QA.

### **Qualification and Training**

NSD selects and assigns personnel in accordance with the RPM and HR procedures. Staff and guests are selected based on their knowledge, skills and experience.

Supervisors are responsible for ensuring that assigned employees/guests whose anticipated assignment with NSD exceeds 30 days complete a Job Hazards Analysis (JHA). JHAs are updated when work scope changes and both JHAs and training status are reviewed annually during the PRD (Performance Review and Development) process. Users of the 88" Cyclotron complete a facility-specific Questionnaire.

Supervisors are responsible for reviewing employee and guest training requirements and ensuring all required training is completed in a timely manner (30 days).

### **Performance Metrics**

The effectiveness of the plan will be assessed against a set of performance metrics as part of the annual Self-Assessment (SA) process. The NSD Safety Committee will review data from Division and Laboratory inspections, walkthroughs, reviews, SA, IFA, MESH to track and trend where appropriate and will, where appropriate, identify corrective actions. Some areas to address in detail: accident and injury rates; exposures, environmental releases and all occurrence reports.

### **Resources**

*EH&S costs are integrated into project expenses.*

To facilitate implementation of the ISM Plan, the following Division resources are made available:

- 0.40 FTE Division EH&S Coordinator
- 0.33 FTE Administrative Assistant

The following resources are made available by the EH&S Division for the Cyclotron program:

- 1.00 FTE Radiological Control Technician
- 0.10 FTE Health Physicist and
- 0.20 FTE EH&S Liaison

NSD also receives support from EH&S Division professionals as-needed for specific expertise: hazard evaluation, waste management, industrial hygiene consultation occurrence reporting, environmental issues and, participation in Division and Laboratory self-assessment activities.

**Summary**

The goal of NSD is to perform world class research in a manner that protects the health and safety of our employees and visitors. Although NSD has a good safety record, it is the goal of the Division to continue to improve its safety performance. This ISM Management Plan is an attempt to integrate safety awareness into all levels of the Division's activities. This Plan will be reviewed annually and updated as needed to facilitate compliance with regulatory requirements and to enhance the effectiveness of the Plan.

**Nuclear Science Division Safety Committees  
as of December 17, 2008**

**Division Safety Committee**

Paul Fallon  
Brian Fujikawa, INPA, neutrino program  
Daniela Leitner, Cyclotron Operations  
Larry Phair, Low Energy Program  
Jorgen Randrup, Theory  
Frank Rosado (Secretary)  
Linnea Wahl, EH&S Division Liaison  
Marty White, Division Safety Coordinator (Chair)  
Leo Greiner

**88-Inch Cyclotron Safety Committee**

Jeff Bramble, Radiological Control Technician  
Rod Clark, Nuclear Structure Group  
Ken Gregorich, Heavy Element Group  
Paul Fallon, Deputy Division Director  
Frank Rosado (Secretary)  
Claude Lyneis, Program Head (Chair)  
Jim Morel, Operators' Supervisor  
Larry Phair, Nuclear Reactions Group  
Paul Vetter, Weak Interactions Group  
Marty White, Division Safety Coordinator

## Appendix A

### Seven Guiding EH&S Principles:

- Line management responsibility
- Clear and unambiguous lines of authority are identified and maintained
- Competence commensurate with responsibilities is attained by personnel
- Balanced priorities are used to allot resources for research and safety needs.
- Hazards and standards are identified before any hazardous work is performed.
- Controls (administrative/engineering) are in place to prevent and mitigate hazards.
- Operational authorizations are acquired before hazardous work is begun.

### Five Core EH&S Functions:

- Define and Plan the Work
- Hazard and Risk Analysis environment
- Establishment of Controls
- Work Performance
- Analysis and Feedback

More details can be found by reviewing the Laboratory “Integrated Environment, Health and Safety Management Plan” at <http://www.lbl.gov/ehs/ism/Title.html>

**Appendix B**  
**as of April 7, 2009**

- 1) Examples of NSD activities requiring formal authorizations
- work or storage of sealed/unsealed radioactive materials
  - class 3b or 4 laser operations
  - work with reactive, pyrophoric, or toxic chemicals
  - compressed gas use
  - cryogenic use
  - high pressure or vacuum components

2) Current List of Active Nuclear Science Division Activity Hazard Documents

AHD Number	AHD Name	PI Name
3187	Laser use Bldg 70 Room210	Nitsche, Heino
GS1040	Radioactive Atom Laser Trapping	Vetter, Paul A
2068	LBL VENUS (Versatile Electron Cyclotron Resonance Ion Source for Nuclear Science)	Leitner, Daniela
2096	GRETINA	Lee, I-Yang
3217	ECR & AECR-U Sources	Leitner, Daniela
3419	Gamma-Ray Imaging Laboratory	Vetter, Kai

3) Current List of Nuclear Science Division Radiological Authorizations  
as of April 1, 2009

Authorization #	Class	STATUS	Due Date	PI	TITLE
RWA 1017	II	Renewal	1/2010	Nitsche, Heino	B70 Heavy Element Nuclear and Radiochemistry Group
RWA 1052	II	Renewal	10/1/09	Gregorich, Kenneth E	88-Inch Cyclotron Heavy Element Radiochemistry Group
RWA 1054	II	Amendment	8/1/09	Phair, Larry	Building 88 Waste Characterization
RWA 1079	II	Renewal	7/09	Yuen-dat Chan	LBNL Low Background Counting Facility (LBF)
RWA 1104	III	Renewal	3/12/09	Nitsche, Heino	Radioactive Target Preparation
RWA 1115	III	Renewal	3/3/09	Nitsche, Heino	Investigations of Inorganic and Bacterial Interactions with Actinides
RWA 1161	I	Renewal	12/09	Leitner, Daniela	Production of Uranium rhenium
RWA 1163	II	Renewal	1/10	Phair, Larry W	STARS/LIBERACE Project
RWA 5027	III	Renewal	7/09	Lyneis, Claude M	Cyclotron Proper Vacuum Envelope Maintenance (Deflector, Radio Frequency (RF) tank and Inflector work)
RWA 5083	III	Renewal	7/09	Lyneis, Claude M	88-Inch Cyclotron Operation and Maintenance
RWA 1171	II	New	8/10	Phair, Larry	Storage and Use of Radioactive Materials in Building (B) 088
LAS L024		Amendment	9/09	Johnson, Michael B	88-Inch Cyclotron's Berkeley Accelerator Space Effects (BASE) Facility
SSA 181	I	Renewal	5/14/09	Matis, Howard S	Vertex detector for STAR
SSA 183	II	Amendment	9/1/09	Fallon, Paul	B88 research sealed sources
SSA 215	I	New	07/10	Mihailescu, Lucian	Applied Nuclear Physics Group SSA
SSA 216	II	New	08/10	Johnson, Michael B	Authorized Sources for Detector Calibrations
GLA 428		New	03/10	Johnson, Michael B	Authorized Sources for Detector Calibrations