

Materials Science Division Project Safety Review Safety Analysis Form (03/08)

Date of Submission		FWP No.:	
--------------------	--	----------	--

Project Title	
---------------	--

Is this a (check one) new submission renewal supplemental modification

Principal Investigator(s) _____

Other Participants (excluding administrative support personnel) _____

(Attach participant signature sheet)

Project dates:	Start:		End:	
----------------	--------	--	------	--

This form is to be completed for all new investigations or experimental projects that are conducted in MSD laboratories, and for all ongoing such projects that undergo significant change from their original scope of work, or where there has been an addition of a potentially new hazard not covered in the original review. It is not intended to be used for office work, routine maintenance activities, or administrative tasks.

Experimental work may not be performed until the project safety review has been completed, procedures have been approved, and the work has been authorized (ESH Manual 21.2.3).

The completed form and all supporting documentation is to be submitted to the MSD ESH Coordinator by the principal investigator with sufficient advance notice and information to allow a project safety review prior to the beginning of the experiment. The information will be reviewed by the Division Director, members of the MSD safety review team, and by outside experts (if appropriate) for unresolved safety, health, and environmental issues associated with the proposed work. The principal investigator may be asked to resolve outstanding issues through consultations with the safety review team before the work begins. The information submitted will be reviewed by an independent review team, and final approval will be granted by the Division Director.

This form must be accompanied by a participant signature form once work has been authorized.

The principal investigator must be familiar with the responsibilities of a lead experimenter and the general requirements of the experiment safety review in the Argonne ESH Manual, section 21.2.

Useful references:

Argonne ESH Manual: <http://www.aim.anl.gov/manuals/eshman/>

Argonne Waste Handling Procedures Manual: <http://www.aim.anl.gov/manuals/whpm/>

MSD Chemical Hygiene Plan: <http://www.msd.anl.gov/resources/esh/>

Material Safety Data Sheets: <https://webapps.inside.anl.gov/cms/msds/>

Table of Contents¹:

- 1. Scope of Project (ISM Core Function 1) 3
 - 1.1 General Description 3
 - 1.2 Modules of Project 3
 - 1.3 Project Limits 3
- 2. Hazard Analysis (ISM Core Function 2) 4
 - 2.1 Hazard List 4
 - 2.2 Hazard Details 5
 - 2.3 Waste Produced 5
 - 2.4 Effluents and Emissions 5
 - 2.5 Interaction With Other Projects 6
- 3. Hazard Control (ISM Core Function 3) 7
 - 3.1 Design Features and Engineering Controls 7
 - 3.2 Procedural Controls 7
 - 3.3 Personal Protective Equipment 7
 - 3.4 Training 7
 - 3.5 Chemical Storage 7
 - 3.6 Sample Storage and Disposition 8
 - 3.7 Waste Handling 8
 - 3.8 Emergency Management 8
 - 3.9 Additional Hazard Control 8
 - 3.10 Guidance Documents 9
- 4. Working Within Controls (ISM Core Function 4) 10
 - 4.1 List of Work Procedures 10
 - 4.2 Dosimetry 10
 - 4.3 Safety Monitoring Equipment 10
 - 4.4 Industrial Hygiene Monitoring 10
 - 4.5 Medical Surveillance 10
 - 4.6 Working Alone 11
- 5. Feedback (ISM Core Function 5) 12
 - 5.1 Records Kept 12
 - 5.2 Reporting 12
- 6. Radioactive Materials Summary 13
- 7. Certification, Review and Approval 14
 - 7.1 Certification 14
 - 7.2 Reviewers and Review Comments 14
 - 7.3 Environmental Compliance (NEPA) 14
 - 7.4 Approvals and Authorization 14

List of Attachments:

¹ To update table of contents, right/command click inside table; from resulting contextual menu select "Update field", then "Update page numbers only"

1. Scope of Project (ISM Core Function 1)

1.1 General Description

Provide a general overview description of the project. While scientific background is important, concentrate on an operational description that focuses on the experimental work done in the laboratory.

1.2 Modules of Project

Describe the various components that make up this project. Components can be pieces of equipment or specific hazardous or complex tasks within the project that require special training to use or perform safely. Indicate locations, even if the project consists of only one component. Indicate custodians for major equipment. Attach designs, drawings, or other useful descriptive material.

1.3 Project Limits

Define the range of samples, chemicals, physical conditions that you consider covered under this project review. For chemicals and samples include either specific cases that are considered extremely hazardous, e.g. silane, HF, etc., or general classes such as reactive metals, oxidizers, etc. In some cases it may be useful to define the envelope by specifically excluding certain hazard categories.

2. Hazard Analysis (ISM Core Function 2)

2.1 Hazard List

Hazard/Issue	Yes	No	Unknown
Does the proposed work, as you perceive it, intrinsically contain the following safety, health, or environmental issues or concerns?			
<i>Chemical Hazards</i>			
Use of toxic chemicals			
Use of flammable chemicals			
Use of carcinogenic chemicals			
Generation of hazardous or toxic wastes			
Use of explosive or highly reactive chemicals			
Use of strong acids or bases			
Use of carbon monoxide gas			
Use of hydrogen gas (above 4% concentration)			
Use of perchloric acid or perchlorate salts			
Use of hydrofluoric acid			
<i>Nanomaterials</i>			
Nanoparticles dispersible in air			
Nanoparticles dispersible in liquids			
<i>Biological Hazards</i>			
Work with Biosafety Level 2 or above ²			
<i>Radiological Hazards</i>			
Use of radioisotopes (see section 6)			
Exposure to ionizing radiation (excluding radioisotopes)			
Generation of radioactive wastes			
<i>Physical Hazards</i>			
Use of Class III or Class IV lasers			
Use of cryogenic fluids			
Use of high magnetic fields			
Use of high voltage or high amperage equipment			
Electrical work on energized equipment (>50V)			
Operation of equipment at high vacuums			
Operation of equipment at elevated pressures			
Use of compressed gases			
Operation of equipment at high temperatures			
<i>Hazardous Working Environments</i>			
Working in areas with high noise levels			
Potential exposure to climatic extremes			
Working at elevated heights			
Entering confined spaces			
Use of self-contained breathing apparatus or respirators			
Work in areas of mechanical hazards			

² Requires review by Institutional Biosafety Committee

<i>Other (explain)³</i>			

2.2 Hazard Details

For all the hazards checked Yes or Unknown, provide specific details, including locations (unless obvious from 1.3). For highly hazardous or energetic chemicals, indicate specific chemicals, quantities used. For physical hazards, give quantitative details (e.g., voltages for electrical hazards, power and wavelengths of lasers).

Hazard	Detail

2.3 Waste Produced

Describe types and expected quantities of wastes produced by this project (also see 3.6 for the handling of these wastes). Address all applicable major classes (nonhazardous, hazardous/chemical, radioactive, mixed) and the specific types within these classes. Also include wastes that derive from the future decommissioning of equipment (e.g., transformer oils, accumulated debris in reaction chambers) and termination of projects (leftover chemical inventory, samples, materials).

2.4 Effluents and Emissions

Describe types and expected quantities of materials disposed into the water drains (effluent). Include process water if the amount disposed is unusually large (e.g., constantly running water). See ESH Manual 10.4 for rules regarding disposal of chemicals into the waste water stream. Consult with the building manager for stricter rules due to the condition of drain pipes.

Describe types and expected quantities of gases, aerosols, and other volatile materials emitted to the atmosphere through the ventilation system (incl. hoods)

³ See ESH Manual 21.3 Appendix A for a more comprehensive list of potential hazards

Are all components of this project considered "bench scale research" (NEPA)? Yes _____ No _____
[Limited in any single experiment, measurement, or test to 5 gal. or 5 lbs of hazardous material, or 1 lb of extremely hazardous material (40 CFR 355)]

2.5 Interaction With Other Projects

Describe possible interactions with other projects (or separate components within the same project) that are carried out in the same or adjacent spaces. Are there incompatibilities of hazards that need to be mitigated by spatial separation or staggered times of operation (e.g. lasers vs. other work in laser access controlled area). Does this project introduce major hazards into a building that are not covered under the current Building Emergency Plan (Bldg. 223 emergency plan on MSD intranet, <http://www.msd.anl.gov/resources/esh/>, confer with building managers for other buildings)?

3. Hazard Control (ISM Core Function 3)

3.1 Design Features and Engineering Controls

For all hazards present, describe the design features and engineering controls applied to control the hazards. Engineering controls include enclosures and barriers that cannot be removed without the use of tools, interlocks, ventilation, software controls, etc. Engineering controls are possible and should be first line of control for all hazard classes (chemical, physical, electrical, biological, radiological).

3.2 Procedural Controls

For complex hazardous tasks, describe how the hazards are controlled by the work procedure. E.g., specific order of tasks, verification of instrument readings, required use of special tools, and the like.

3.3 Personal Protective Equipment

List personal protective equipment (PPE) to be worn. Be specific to task or situation, unless it applies to all laboratory work in this project. Remember that safety glasses are not sufficient splash protection against certain chemicals. For gloves, be specific as to type appropriate for the task.

Task/Situation	Personal Protective Equipment
All laboratories	Safety glasses (ANSI Z87.1 compliant)

3.4 Training

Indicate the training required for participation in this project. Include Argonne-supplied training (list course numbers and titles), job-specific training (indicate who provides training, how records are kept), and external training (academic requirement, specialized training and/or certification).

3.5 Chemical Storage

Describe the specific locations where chemicals and gases are stored including type of storage (e.g., flammables cabinet) and how hazardous chemicals are labeled. Include precautions taken for the storage of carcinogens. Indicate who is responsible for keeping the Chemical Management System (barcodes) up-to-date. Attach Material Safety Data Sheets (MSDS) for the particularly hazardous chemicals, and describe where all MSDS are available near the location of the project. The PI must ensure that MSDS for all chemicals used in this project are on file in the Chemical Management System (<https://webapps.inside.anl.gov/cms/msds/>) and that all participants have ready access to them.

3.6 Sample Storage and Disposition

Describe how and where samples utilized and produced in this project are stored (and labeled!) while not in active use, how long they will be retained, and how they will be disposed of.

3.7 Waste Handling

For all hazardous, radioactive, and mixed wastes, describe where and how they are accumulated (include satellite waste area number), and who will be responsible for writing up the waste for disposal by Waste Management. Indicate any special circumstances (special containers, venting, etc.) regarding the safe storage of waste. Address the prevention of incompatible waste mixtures. Include plans for dealing with the waste produced by the future decommissioning of equipment and termination of projects.

3.8 Emergency Management

If this project involves chemical hazards, esp. the use of corrosive chemicals, list locations of eyewash stations and safety showers. Indicate who is responsible for checking eyewash stations weekly.

Include emergency procedures in case of accidents, evacuations, or other hazardous situations. Include egress routes into common areas (hallways), safe shutdown procedures, and other pertinent information. Procedures may be attached. Are all hazard categories posted at the laboratory doors?

3.9 Additional Hazard Control

Describe here any measures of hazard controls that are not already documented in the previous sections.

3.10 Guidance Documents

List all documents, publications, and books, that you have consulted in the hazard analysis and control. Include relevant chapters and sections of the ES&H Manual but do not include those chapters that are requirements documents for other documents (e.g., 4.2). The divisional Chemical Hygiene Plan (<http://www.msd.anl.gov/resources/esh/>) is mandatory reading for all participants in projects that contain chemical hazards.

Hazard	Guidance

4. Working Within Controls (ISM Core Function 4)

4.1 List of Work Procedures

List all work procedures relevant to this project

4.2 Dosimetry

List locations where radiation dosimeters must be worn. Indicate if a ring is required in addition to the regular badge, and whether neutron dosimetry (type BGN) or not (type BG) is required. Consult with Health Physics regarding requirements.

Location	Dosimetry Requirement

Identify individuals who will be issued dosimeters.

Name	Ring (Y/N)	Neutrons (Y/N)

4.3 Safety Monitoring Equipment

Describe any equipment that is used to monitor safe working conditions (e.g., oxygen monitors, background radiation alarms). Note that all such equipment must be approved by Industrial Hygiene (or Health Physics for radiological monitoring).

--

4.4 Industrial Hygiene Monitoring

List the periodic Industrial Hygiene sampling that is required based on chemical, biological, or other hazardous materials used in this project.

--

4.5 Medical Surveillance

Identify individuals who will be placed in a medical surveillance program as a result of their participation in this project.

--

4.6 Working Alone

Indicate which tasks of this project are of sufficiently low hazard that they may be carried out by a participant working alone, in particular off-hours. Alternately, it may be more convenient to list the tasks that are prohibited while working alone. Note if different rules apply to specific qualification levels among the participants (e.g., students).

5. Feedback (ISM Core Function 5)

5.1 Records Kept

Identify types of records kept with this project that are useful in recreating and improving on the tasks within this project. In particular, include types of records that can be consulted if a task is unsuccessful or produces an unexpected result (in the scientific or operational sense). This could include lab notebooks, datasheets, computer data, instrument logs, images, etc.

Task/Situation	Record Kept

5.2 Reporting

It is understood that technical results are reported to the outside world in scientific publications, presentations, and technical reports, and to the sponsor in program reviews, contractor meetings, and progress reports. Identify here the channels utilized to report the *operational* experience within the project, division, Argonne, or across the DoE complex. This should include emergency notifications, line management notifications, Lessons Learned (good or bad), group meetings (may serve as pre- or post-job briefings) and other communication channels.

Emergency	Call 911, notify supervisor, building manager, division management, ESH coordinator
Unplanned events or unexpected results that could affect worker safety and health, the environment, the general public, or Argonne's reputation	Stop work if danger is imminent. Immediately notify supervisor

7. Certification, Review and Approval

7.1 Certification

It is my belief that I have identified all the hazards relating to this work, and that by following the procedures outlined above the Materials Science Division and Argonne National Laboratory will be exposed to an acceptable level of risk. I will make this document available to all participants of the project.

Signature, Principal Investigator Date

7.2 Reviewers and Review Comments

List reviewers for this project and indicate (co-)coordinator/chair(s)

Hazard level and review process used: High hazard/complexity _____ Low hazard/complexity _____

Review team comment

7.3 Environmental Compliance (NEPA)

The NEPA review is usually carried out in conjunction with the funding proposal that supports this project, prior to this safety review. Environmental Compliance Representative (ECR) comment:

Urs Geiser

ECR Name Signature Date

7.4 Approvals and Authorization

The review team has reviewed the safety of this project and recommends its approval:

Chair/Co-chair signature Date Co-chair signature Date

Division director check one:

- Approval of this project safety review authorizes this work to begin
- Separate work authorization is required (specify):

I approve this project safety review:

George Crabtree

Division Director Signature Date