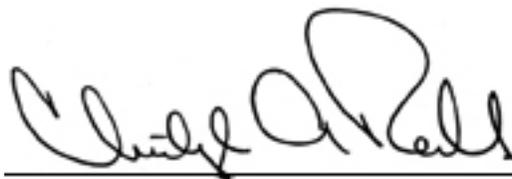

Safety, Health, and Environmental Protection Policy and Procedures Manual

**Environmental Research Division
Argonne National Laboratory**

February 2003

Approved by

A handwritten signature in black ink, appearing to read "Chris A. Reilly", is written over a horizontal line.

**CHRISTOPHER A. REILLY
Division Director**

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ACRONYMS

ALARA	As Low As Reasonably Achievable (radiation exposure goal)
ANL	Argonne National Laboratory
ANSI	American National Standards Institute
CFR	<i>Code of Federal Regulations</i>
CGA	Compressed Gas Association
CW	continuous wave (laser)
DOE	Department of Energy (U.S.)
DOT	Department of Transportation (U.S.)
EEST	Energy and Environmental Science and Technology
EQO	Office of ESH and QA Oversight (ANL)
ER	Environmental Research Division (ANL)
ESH	Environment, Safety, and Health (refers to the ER Division ESH Coordinator, to the <i>ANL ESH Manual</i> , and to environment, safety, and health concerns in general)
GFCI	ground fault circuit interrupter
IH	Industrial Hygiene (ANL)
ISM	Integrated Safety Management
LSO	laser safety officer
MSDS	Material Safety Data Sheet
NEPA	National Environmental Policy Act
OCF	Office of the Chief Financial Officer (ANL)
ORPS	Occurrence Reporting and Processing System (DOE)
OSHA	Occupational Safety and Health Administration (U.S.)
OSS	Office of Safeguards and Security (ANL)
OTD	Office of the Director (ANL)
PAAA	Price-Anderson Amendments Act
PFS	Plant Facilities and Services Division (ANL)
PSA	Project Safety Analysis
QA	quality assurance
RCRA	Resource Conservation and Recovery Act
SAF	Safety Analysis Form (ER)
SARS	Safety Analysis and Review System
SHE	Safety, Health, and Environment (Committee; ER)
STA	special-term appointee
WMO	Waste Management Operations (ANL)

1 ABOUT THIS MANUAL

1.1 Introduction

The policy of Argonne National Laboratory (ANL) and of the Environmental Research Division (ER) is that all activities will be conducted in a safe and reasonable manner. Incorporation of Integrated Safety Management (ISM) principles and core functions into all activities forms the basis of a sound system for protecting the environment from adverse impacts and protecting the health and safety of all employees and of the general public. Such protections will take precedence over the operation of ER facilities and the conduct of any research activity. It is the policy of ER to comply with all applicable health, nuclear safety, radiological safety, environmental protection, and fire protection regulations and policies promulgated by ANL, as contained or referenced in the *Argonne National Laboratory Policy Manual* (an ANL Tier 1 manual) and the *Environment, Safety, and Health Manual — ANL-East (ANL ESH Manual)*; an ANL Tier 2 manual). These manuals are available online.

1.2 Scope

This document, a Tier 3 ANL manual specific to ER, provides basic information on established ANL and ER policies and procedures designed to provide a safe working environment and to ensure continued compliance with applicable safety and environmental protection regulations and requirements. This ER manual does not seek to replace other relevant ANL policy and procedure documents, but instead to provide ER staff with a basic understanding of how ER policies and procedures coincide with ANL and Department of Energy (DOE) directives in the areas of safety, health, and environmental protection. In some instances, critical information contained in other relevant documents has been distilled and included in this ER manual for the reader's convenience. However, the reader must consult other documents for more detailed information.

It is the continuing responsibility of all ER employees to become familiar with and maintain compliance with the policies, procedures, and directives contained or referenced in this ER manual.

Formal updates to this document will occur biennially or more often, as needed. Changes or additions necessitated by changes to the basic ANL or DOE policies on which this ER manual are based may occur more immediately via written addenda. Necessary changes or additions to this document identified by ER staff should be brought to the attention of a current member of the ER Safety, Health, and Environment (SHE) Committee or to the Division Director, via written memoranda. Until such changes or additions are formally incorporated (either by written addenda or formal revisions), the directives contained in this ER manual will prevail. Likewise, requests for exceptions or variances to the requirements contained herein should be directed in writing to the ER Director. When granting such variances or exceptions is beyond the Division Director's authority, the ER Director will consult with the appropriate ANL health, safety, or environmental protection authorities.

1.3 Applicability

Compliance with these policies and procedures will extend not only to all ER facilities and areas at ANL-East that are assigned to or occupied by ER personnel, but to (1) all off-site locations where ER employees or ER contract employees may be working and to (2) all personnel, whether ER employees or not, working in ER facilities on the ANL-East site. When off-site activities occur at other DOE or non-DOE installations, ER employees will comply with these policies and procedures, as well as with the analogous policies and procedures of that installation.

When ER staff are working temporarily at ANL facilities under the control of other ANL divisions, those employees will be responsible for compliance with all applicable safety, health, and environmental protection policies and procedures established by the host division.

These requirements extend to all ER staff, including postdoctoral appointees, temporary employees, students, visitors, and contractors working for ER.

1.4 Distribution

This ER manual is available to all ER employees online. Any employee who prefers a hard-copy version of this ER manual should contact the ER ESH Coordinator at 2-3924. It is the continuing responsibility of all ER employees to keep individual hard copies of the manual updated.

2 ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH CHARTER

2.1 Environment, Safety, and Health Policy

In keeping with the policy set by DOE, the University of Chicago, and ANL, the policy of the ER is that environmental protection, safety, and health are to be given the highest priority in the conduct of ANL activities. Thus, all activities for which ER has primary responsibility will be conducted in such a way that all reasonable precautions are taken to protect the environment and the health and safety of employees and the general public. Likewise, the facilities for which ER has primary responsibility will be operated and maintained in a safe condition at all times. Protection of the environment and the health and safety of ER employees, ER contract employees, and the general public will take precedence over the operation of ER facilities and the conduct of ER research. Further, all reasonable steps will be taken to minimize dangers from all hazards to life, property, and the environment. ER will comply fully with all health, nuclear safety, radiological safety, industrial safety, fire protection, and environmental protection rules and policies of ANL and DOE, including the policies and procedures outlined in the *ANL ESH Manual*. The intent of ER management and staff is to follow the seven guiding principles and five core functions of the ISM system in all work activities. A description of these principles and core functions is found in the *ANL ESH Manual*, Chapter 1.1.

2.2 Roles and Responsibilities

Environmental protection, safety, and health protection are line responsibilities within ER, extending from the Director to section heads, group leaders, project managers, principal investigators, and all ER employees. These responsibilities are automatically delegated, coincident with authorization to proceed, when responsibility for performance of an operation is delegated. A detailed description of the responsibilities for health and safety assigned to Laboratory employees is in the *ANL ESH Manual*, Chapter 1.1. A description of the responsibilities for environmental protection assigned to Laboratory employees is in the *ANL ESH Manual*, Chapter 10.1.

2.2.1 Division Director

The Division Director has overall responsibility for the safety of ER operations and facilities and for taking necessary measures to ensure that ER facilities and activities comply with established environmental protection, safety, and health requirements. The Director must verify compliance with all relevant components of the ANL environmental protection, safety, and health program. In addition, the Director must ensure that safety analyses are conducted for all new or significantly modified experimental activities within ER. The Director must approve such safety analyses before facilities are occupied or operations begin. The Director may also seek approval of safety analyses from appropriate cognizant individuals within the ANL Office of ESH and QA Oversight (EQO). The ER Director will appoint individuals from within ER to serve as the ER ESH Coordinator, Field Safety Coordinator, Environmental Compliance

Representative, and Chemical Hygiene Officer. The responsibilities of individuals appointed to these positions are outlined in Sections 2.2.6-2.2.9, respectively.

2.2.2 Supervisors

Supervisors, section heads, group leaders, project managers, principal investigators, and others functioning in a supervisory capacity are responsible for being knowledgeable about applicable safety policies and directives, for implementing these policies and directives, and for taking other actions as necessary to provide for the safety of the personnel and operations they supervise. This responsibility includes taking positive actions to determine and reduce, as necessary, the hazards associated with operations under their purview; instructing employees in safe work methods and associated safety requirements; and ensuring that employees perform their work in a safe manner. Supervisors are responsible for knowing about and implementing applicable environmental policies and directives. Supervisors are also responsible for identifying, in advance, operations that have the potential for adverse environmental impacts or noncompliance with environmental regulations and for mitigating the risks due to such operations.

2.2.3 Principal Investigators

Principal investigators are responsible for ensuring that all operations are performed safely. As one element in meeting this responsibility, principal investigators must complete the Safety Analysis and Review System (SARS) Applicability Assessment Form (see Forms section) for each proposal for new funding and for each proposal for continuing funding in which program content is altered sufficiently to cause a significant change in the safety aspect. Principal investigators are also responsible for submitting a Safety Analysis Form (SAF; see the Forms section of this ER manual) to the ER ESH Coordinator for review by the ER SHE Committee before new or significantly modified experimental activities begin.

2.2.4 Individual Investigators

The primary responsibility for the safety of each experiment or investigation rests with the individual investigator, his or her immediate supervisor, and the section head or group leader. At a minimum, this responsibility extends to ensuring the following:

- The experiment or investigation proceeds safely at all times.
- All personnel associated with the experiment or investigation are aware of and continuously follow applicable safety requirements.
- Exposures to hazards associated with the experiment or investigation are minimized for all persons who might suffer such exposures.

- Every reasonable effort is made to prevent adverse environmental impacts associated with the experiment or investigation.

2.2.5 All Employees

All ER employees (including special-term appointees [STAs], visitors, and students) are responsible for (1) performing their work in a way that will not endanger themselves or their coworkers and (2) complying with established environmental protection, safety, and health rules and requirements. Employees are encouraged to contribute to the Division's environmental protection, safety, and health program and have the responsibility to correct or bring to the attention of their supervisor or a member of the ER SHE Committee any condition that they believe is unsafe or might adversely affect the environment. In conditions of imminent danger, every individual has STOP WORK authority. (See also Section 2.4 of this ER manual.)

2.2.6 ESH Coordinator

The ER ESH Coordinator is appointed by the Division Director and has the following responsibilities:

- Review, interpret, and coordinate the implementation of applicable environmental protection, safety, and health regulations, policies and procedures, as they apply to activities within the Division. Develop and maintain appropriate documentation demonstrating conformance to applicable requirements. Provide recommendations to the Division Director.
- Serve also as the Division's Environmental Compliance Representative, Chemical Hygiene Officer, Sealed-Source Custodian, and Occurrence Report Coordinator for the DOE Occurrence Reporting and Processing System (ORPS).
- Coordinate and participate in audits and safety reviews of divisional facilities, apparatus, and experiments. Maintain a database of corrective actions and track progress.
- Act as co-chair of the ER SHE Committee.
- Conduct and coordinate training of Division personnel in the areas of environmental protection, health, and chemical hygiene.

A comprehensive list of the ESH Coordinator's responsibilities is in the appendix to Chapter 1.1 of the *ANL ESH Manual*.

2.2.7 Field Safety Coordinator

The ER Field Safety Coordinator is appointed by the Division Director and has the following responsibilities:

- Review, interpret, and coordinate the implementation of applicable safety regulations, policies, and procedures as they apply to activities within the Division. Develop and maintain appropriate documentation demonstrating conformance with applicable requirements. Provide recommendations to the Division Director.
- Participate in field projects and develop specialized safety procedures. Oversee safety at off-site research and construction sites.
- Coordinate and participate in audits, inspections, and safety reviews of divisional facilities, apparatus, and experiments. Maintain audit and inspection records. Maintain a database of corrective actions and track progress.
- Act as the Division's representative to ANL safety committees. Interact with outside contractors and other entities outside the Division with regard to safety.
- Act as co-chair of ER SHE Committee.

2.2.8 Environmental Compliance Representative

The ER Environmental Compliance Representative is responsible for informing ER staff about applicable environmental protection requirements and procedures and assisting the Director in developing implementation strategies for those requirements. This individual represents the Division Director in matters relating to environmental impacts and compliance with applicable regulations and directives. The Environmental Compliance Representative attends training sessions arranged by the ANL environmental protection staff and maintains a working knowledge of applicable regulations and directives in the area of environmental protection.

2.2.9 Chemical Hygiene Officer

The ER Chemical Hygiene Officer is a technically qualified individual designated by Laboratory management and appointed by the Division Director to have the responsibilities outlined below. The role of the ER Chemical Hygiene Officer is to provide technical guidance in developing and implementing the provisions of the ER *Chemical Hygiene Plan*. The ER Chemical Hygiene Officer is assigned the following tasks:

- Maintain the chemical inventory and *Chemical Hygiene Plan* for the Division.
- Provide specific training for ER staff on the requirements of the Division's *Chemical Hygiene Plan*.

- Communicate to affected employees the results of workplace monitoring.

2.2.10 Safety, Health, and Environment Committee

The ER SHE Committee is a standing committee established by the Director to serve in an advisory capacity on matters relating to safety, health, and environmental protection. The SHE Committee is responsible for reviewing project safety analyses and related documentation and for advising the Division Director on project acceptability. The makeup and function of the SHE Committee are discussed further in Section 9 of this ER manual.

2.3 Training (See *ANL ESH Manual*, Chapter 1.5.)

The ANL environmental protection, safety, and health training program provides the necessary information and establishes in workers the required skills to conduct ANL-East activities in a way that gives the highest priority to worker, public, and environmental safety. The ANL program also documents training, including both general and site- or facility-specific training. The training is designed to achieve and maintain compliance with applicable environmental, health, and safety laws, regulations, and orders.

Each supervisor must complete an ANL Job Hazard Questionnaire for every employee. Joint completion of the Job Hazard Questionnaire by the supervisor and the employee helps ensure that both recognize, identify, discuss, and concur on hazards. The supervisor must maintain frequent contact with and close observation of personnel to remain aware of work habits and to determine the need for retraining as indicated by on-the-job performance. The supervisor must ensure that employees receive on-the-job training with appropriate emphasis on the environmental, safety, and health aspects of each task. The Job Hazard Questionnaire is online.

Contact the ER Training Management Coordinator (2-9553) to enroll in a class or cancel a registration.

2.4 Stop Work Authority (See *ANL ESH Manual*, Chapter 1.1.)

It is an inviolate principle that ANL-East employees, visitors, facility users, and contractors must not be exposed to unsafe conditions or conduct activities that adversely affect the environment. All employees who find themselves engaged in an unsafe activity or observe unsafe working conditions are empowered and obligated to stop the activity that they believe has placed themselves or others in immediate danger. Furthermore, anyone stopping work is obligated to bring the hazardous conditions immediately to the attention of the line management of the relevant organization.

Work must not be restarted until the activity is deemed safe (e.g., appropriate hazard control measures are in place). The line organization has responsibility to document the original condition and the corrective action in a format and at a level of rigor commensurate with the seriousness of the situation. Supervisors are expected to participate in continuous safety

improvement by communicating lessons learned through existing communications channels. Supervisors are expected to communicate this policy to subordinates.

2.5 Working Alone

Working alone is defined in the *ANL ESH Manual*, Chapter 1.6, as the performance of any work by an individual who is out of auditory or visual range of another person for more than a few minutes at a time. Argonne policy is that employees working alone on the ANL-East site should not be subjected to increased risk as a consequence of working alone. The ER policy on working alone is spelled out in Section 10.2.22 of this ER manual. Supervisors are responsible for personnel, including students and visitors, working in laboratories and other locations. Supervisors must determine that all qualifications, training requirements, etc. have been met before personnel are considered capable of working alone. Supervisors must acknowledge responsibility for individuals working alone and determine conditions in which working alone will be authorized.

In areas without special hazards, such as offices, working alone presents little additional risk, because 911 assistance is readily available at all times. However, that is not the case in laboratories and other areas where hazardous materials are present. Potential hazards in working alone must be anticipated, and proper precautions must be taken to prevent or reasonably reduce risks. The principal investigator is responsible for evaluating the hazards of working alone and for taking proper measures to avoid or reduce these risks. The employee must be sensitive to the dangers of working alone in certain situations and must seek advice and authorization from his/her supervisor prior to working alone.

The *ANL ESH Manual*, Chapter 1.6, outlines telephone safety checks and other contact systems that can be used by personnel whose supervisors have authorized them to work alone.

3 LOCAL AREA EMERGENCY PLANS AND FLOOR PLANS

All ER employees must review emergency plans for the facilities in which they conduct activities and be familiar with the information and directives contained therein. The Local Area Emergency Plans for Building 203 and Building 202 have been developed as fundamental elements of the overall ANL emergency preparedness plan. The local plans provide important information and directions for actions during anticipated emergencies. Activities conducted in Building 484 do not require a local plan; however, specific instructions for responding to weather emergencies are posted, and users of this facility should be familiar with those instructions. Users of the Advanced Photon Source facilities should become familiar with the emergency plan associated with the specific facility in which they work.

This ER manual is not intended to contradict in any way or otherwise be incompatible with the directives in the Local Area Emergency Plans for Building 203 and Building 202. Any inconsistencies between those documents and directives contained in this ER manual should be brought immediately to the attention of the ER Director for resolution.

The Local Area Emergency Plan for Building 203 is available online through the Physics Division. The Local Area Emergency Plan for Building 202 is available through the Biosciences Division (D. LeBuis, 2-3944). Floor plans are included in the Local Area Emergency Plans.

A safety briefing for non-ANL workers in Building 203 is in Appendix A.

4 IMPORTANT CONTACTS

Important contact points related to safety, health, and environmental protection are in Table 1.

TABLE 1 Important Contacts

Title/Office/Division ^{a,b}	Individual	Room (Bldg.)	Phone	Pager
Fire Department (all emergencies) From cellular phones			911 252-1911	
ANL Emergency Operations Center From cellular phones			911 252-1911	
Fire Department Services (non-emergency)			2-6136	
Area Emergency Supervisor, Building 203	T. Mullen	R210 (203)	2-2879	4-1317
Alternate Area Emergency Supervisor, Building 203	L. Brandner	J014 (203)	2-2885	888-912-3471 ^c
Area Emergency Supervisor, Building 202	D. LeBuis	A105 (202)	2-3944	4-1208
Alternate Area Emergency Supervisor, Building 202	H. Gaines	B403 (202)	2-3163	4-1285
ER Division Director	C. Reilly	J101 (203)	2-3879	
ER Associate Division Director	B. Lesht	J108 (203)	2-4208	
ER Key Access	K. Ley	J107 (203)	2-3137	
ER ESH Coordinator	D. Peterson	H102 (203)	2-3924	314-4045 ^d
ER Field Safety Coordinator	L. Brandner	J014 (203)	2-2885	888-912-3471 ^c
ER Environmental Compliance Representative	D. Peterson	H102 (203)	2-3924	314-4045 ^d
ER Chemical Hygiene Officer	D. Peterson	H102 (203)	2-3924	314-4045 ^d
ER Training Management System Representative	D. Peterson	H102 (203)	2-3924	314-4045 ^d
ER Health Physics Personnel, Building 203		R110 (203)	2-4138 2-6062	4-1943 4-6062
ER Health Physics Personnel, Building 202		E175 (202)	2-3953	
ER Safety, Health, and Environment Committee	V. Allison L. Brandner P. Doskey K. Kemner D. Peterson C. Rose D. Susterson	E133 (203) J014 (203) J183 (203) E109 (203) H102 (203) B137 (203) J002 (203)	2-3766 2-2885 2-7662 2-1163 2-3924 2-3499 2-5836	888-912-3471 ^c 314-4045 ^d

TABLE 1 Important Contacts (Cont.)

Title/Office/Division^{a,b}	Individual	Room (Bldg.)	Phone	Pager
EEST Occurrence Reporting				
Facility Manager	D. Haugen	LA113 (202)	2-3916	722-6824 ^d
Facility Manager Designee	D. Peterson	H102 (203)	2-3924	314-4045 ^d
EEST Health Physicist	G. Mosho	L121 (200)	2-6172	4-6172
ANL Construction Safety	T. Tess	2H16 (201)	2-6183	4-1958
ANL Emergency Management	G. Winner	227A (201)	2-5991	218-3310 ^d
ANL Environmental Compliance	G. Pierce	C120 (331)	2-2940	888-534-9262 ^c
ANL Training	E. Langenberg	E135 (202)	2-4903	314-5849 ^d
ANL Industrial Hygiene				
Respirator Services		C134 (200)	2-4149	
Other Services		L167 (200)	2-3310	
ANL Laser Safety	B. Murdoch	L158 (200)	2-4905	722-3583 ^d
ANL Medical Department		110 (201)	2-2800	
ANL Radiation ALARA	S. Baker	2J16 (201)	2-4392	314-8147 ^d
ANL Safety Engineering	J. Woodring	L172 (200)	2-5641	612-0473 ^d
ANL Security	D. Metta	238 (302)	2-5738	417-5522 ^e
ANL Transportation/Shipping	J. McGhee	A152A (214)	2-5712	218-3190 ^d
ANL Waste Management	C. Rock	L131 (306)	2-5606	722-5049 ^d

^a Detailed information on the services and functions of these individuals and offices and the occasions on which they should be contacted is found in other sections of this ER manual.

^b Abbreviations: ALARA, As Low As Reasonably Achievable
EEST, Energy and Environmental Science and Technology
ESH, Environment, Safety, and Health

^c Dial 7 plus 1 plus pager number. At the tone, enter the number to be called; then enter # and hang up.

^d Dial 7 plus pager number. At the tone, enter the number to be called; then enter # and hang up.

^e This number is for a cell phone.

5 INCIDENT REPORTING

5.1 Emergencies

To report any emergency from an ANL phone, move to a safe location and DIAL 911; from a cellular phone, DIAL 252-1911.

During normal working hours, a 911 call is routed to a number of ANL-East emergency response groups. A group alerting system (teleconferencing network) is in place to connect the following ANL groups to the 911 caller:

- Communications Center
- Fire Department
- Plant Facilities and Services
- Security
- Industrial Hygiene
- Emergency Management Officer
- Medical Department

After you make a 911 call, be prepared to identify yourself and your location and to describe the emergency as fully as possible.

Stay on the line and be prepared to answer additional, more specific questions about the emergency from the various emergency response groups and departments that participate through the teleconferencing network.

Stay in the general area of the emergency but at a safe distance. Keep others from entering the area of immediate danger, and be prepared to direct responding emergency personnel to the scene of the emergency.

Make the 911 call even if you believe that you personally can deal successfully with the emergency.

Emergency incidents might require additional written reports to be submitted. Among these reports are ANL Incident Investigation Reports, DOE Occurrence Reporting and Processing System (ORPS) reports, and reports to various state or federal regulatory officials (if the emergency results in off-site environmental impacts). See Sections 5.3 and 5.4 for guidance on written reports that might be required. Only the ANL Environmental Compliance Officer is authorized to make contact on behalf of the Laboratory with state or federal environmental agencies.

5.2 Chemical Spills

Report chemical spills as you would any other emergency by making a 911 call. In addition to the normal emergency information (see Section 5.1), be prepared to identify the chemicals involved in the spill or release.

Do not attempt to deal with the spill or accidental release until you have made the 911 call.

Consider all spills of flammable, toxic, radioactive, or reactive chemicals as having the potential to result in a life-threatening situation.

Attempt to contain the spill or eliminate the release only if you can do so safely. If not, keep others from entering the immediate danger zone, and direct properly equipped emergency response personnel to the emergency when they arrive.

5.3 Incident Reporting and Analysis

Supervisors with direct responsibility for the people, equipment, or facility involved in an incident involving personal injury are responsible for completing a written Incident Description form (ANL-239) and an Incident Analysis Report (ANL-240) for submittal to EQO. These forms are in the Forms section of this ER manual.

Contact the ER ESH Coordinator at the earliest possible time for assistance in the completion of the reporting requirements. In the event of a near-miss or other significant incident, a graded-approach investigation will be conducted.

All ER staff involved in or having knowledge of injury-producing accidents are expected to cooperate in the development of the required incident description.

All incident description forms are to be reviewed and signed by both the injured employee and his or her immediate supervisor.

A detailed description of the ANL incident reporting and analysis requirements is in the *ANL ESH Manual*, Chapter 1.7.

In addition to providing factual information about the accident, the Incident Analysis Report is intended to identify the root cause of and factors contributing to the accident. The ER staff involved in or witnessing the accident are to provide support to the supervisor and the ER ESH Coordinator in determining root causes of each reportable incident.

5.4 Occurrence Reporting

The DOE ORPS is an interactive computer system designed to support DOE-owned or DOE-operated facilities in the reporting and processing of information concerning occurrences related to facility operation. Occurrence reporting for ER is in accordance with the *ANL ESH Manual*, Chapter 1.8, which establishes responsibilities and requirements for identifying, assessing, and reporting occurrences.

An occurrence report is a documented evaluation of an event or condition that is prepared in sufficient detail to enable the reader to (1) assess the event's significance, consequences, or implications and (2) evaluate the actions being proposed or employed to correct the condition or to avoid recurrence. Written occurrence reports must be prepared according to the instructions in DOE M 232.1-1A and the *ANL ESH Manual*, Chapter 1.8.

DOE Order 232.1A describes the requirements for the reporting of occurrences related to the operation of facilities and the processing of occurrence reports related to safety, health, security, property, operations, or the environment, up to and including emergencies. The requirement for filing an ORPS report will be determined by the Energy and Environmental Science and Technology (EEST) Facility Manager and the ER ESH Coordinator, in concert with the ER employee reporting the incident.

The ER personnel involved in or familiar with the incident or condition identified in the occurrence report are responsible for assisting the EEST Facility Manager or Facility Manager Designee (see Section 4 of this ER manual) with the investigation of facts surrounding the occurrence.

6 EXPERIMENT SAFETY REVIEW (PROJECT SAFETY ANALYSIS)

The ER Division complies with experiment safety review requirements set forth in the *ANL ESH Manual*, Chapter 21.2. The policies of DOE and ANL require that all new or modified facilities, operations, or experiments undergo safety analyses when the hazards they present are not routinely encountered at ANL. Accordingly, ER uses a graded approach to implementing this process.

No new research may begin and no significant alterations to existing research or facilities may occur until a safety analysis has been completed and authorization to begin is obtained from the Division Director. The potential hazard level for each project is determined at the proposal stage by completion of a SARS Applicability Assessment Form (distributed with proposal approval forms and in the Forms section of this ER manual). The hazard classes identified on the form are defined as follows:

- *Other (O)* — Covered by other DOE order requirements (e.g., field work).
- *Covered (C)* — Involve a facility or apparatus covered by a safety analysis report.
- *Everyday routine (1)* — The potential hazards are routinely encountered and accepted in the course of everyday living by the vast majority of the general public.
- *Routine laboratory (2)* — The potential hazards are considered routine and of minimal risk by the scientific community.
- *Nonroutine laboratory (3)* — Potential hazards involve specialized materials, energy sources, or equipment that might present limited and local on-site impacts and negligible off-site impacts to people or the environment.
- *Low (4)* — The potential hazards might present minor on-site and negligible off-site impacts to people or the environment.
- *Moderate (5)* — The potential hazards might present considerable on-site impacts to people or the environment, but off-site impacts are minor at most.
- *High (6)* — The hazards have the potential for on-site or off-site impacts to large numbers of persons or for major impacts to the environment.

Operations conducted in ER normally fall into the classes of nonroutine laboratory, routine laboratory, and everyday routine hazards. Analysis of everyday routine hazards can be informal, with little documentation. The safety analysis process for routine and nonroutine laboratory hazard classes is documented by completion of an ER Project Safety Analysis (PSA), the primary hazard analysis tool. Activities associated with the higher hazard levels (4-6) require a more formal safety analysis that will include subject matter experts from outside the Division.

The ER policy is that the principal investigator of all newly funded projects with routine and nonroutine hazards is to complete a Safety Analysis Form (SAF) that identifies the hazards involved with the activity. The SAF is in the Forms section of this ER manual, and an electronic

file can be obtained from the ER ESH Coordinator. The requirement for completing an SAF is determined by the ER ESH Coordinator or Field Safety Coordinator in concert with the principal investigator.

The completed SAF is returned to the ER ESH Coordinator for distribution to and review by the ER SHE Committee. After the review, recommendations from the committee are communicated to the Division Director via memorandum. The Division Director considers the recommendations of the SHE Committee and either approves the SAF or requests modifications to it. Once the Division Director gives his/her approval, the Division Director and SHE Committee co-chairs sign the Record of Environment, Safety, and Health Review of Projects to document the formal review process. This process must be completed before any new experiment or project begins. Minor revisions to a PSA may be approved by the ESH Coordinator or the Field Safety Coordinator without review of the SHE Committee and without approval by the Division Director.

Resources used to complete the SAF include ANL Tier 2 documents (principally the *ANL ESH Manual* and the *ANL Waste Handling and Procedures Manual*), as well as ER Tier 3 documents (this ER manual, the *ER Chemical Hygiene Plan*, and the *ER Quality Assurance Plan and Implementation Guide*). These documents, which address line management roles and responsibilities, are important during the analysis of hazards and the development and implementation of hazard controls.

Additional actions needed to mitigate the hazards identified in the SAF might include development of standard operating procedures, the identification of waste minimization/pollution prevention opportunities, additional training, and, in the case of chemical hazards, locating and reviewing Material Safety Data Sheets (MSDSs). The principal investigator must consult with the ER ESH Coordinator or Field Safety Coordinator to determine whether planned modifications to ongoing work require a new safety analysis. Any variance or exemption from this requirement must be obtained formally from the Division Director.

The objective of the PSA is to assure that reasonable efforts have been made to identify and minimize hazards associated with new or modified activities. Submitting the SAF does not relieve the principal investigator of responsibility for providing a safe work environment for participants in his/her project.

The SAFs may be reviewed periodically by the ER SHE Committee. Any principal investigator requesting an expedited review should provide notice and a rationale to the SHE Committee co-chairs. PSAs are reviewed during the annual self-assessment. At that time, principal investigators evaluate the adequacy of the PSA and determine whether any changes are needed.

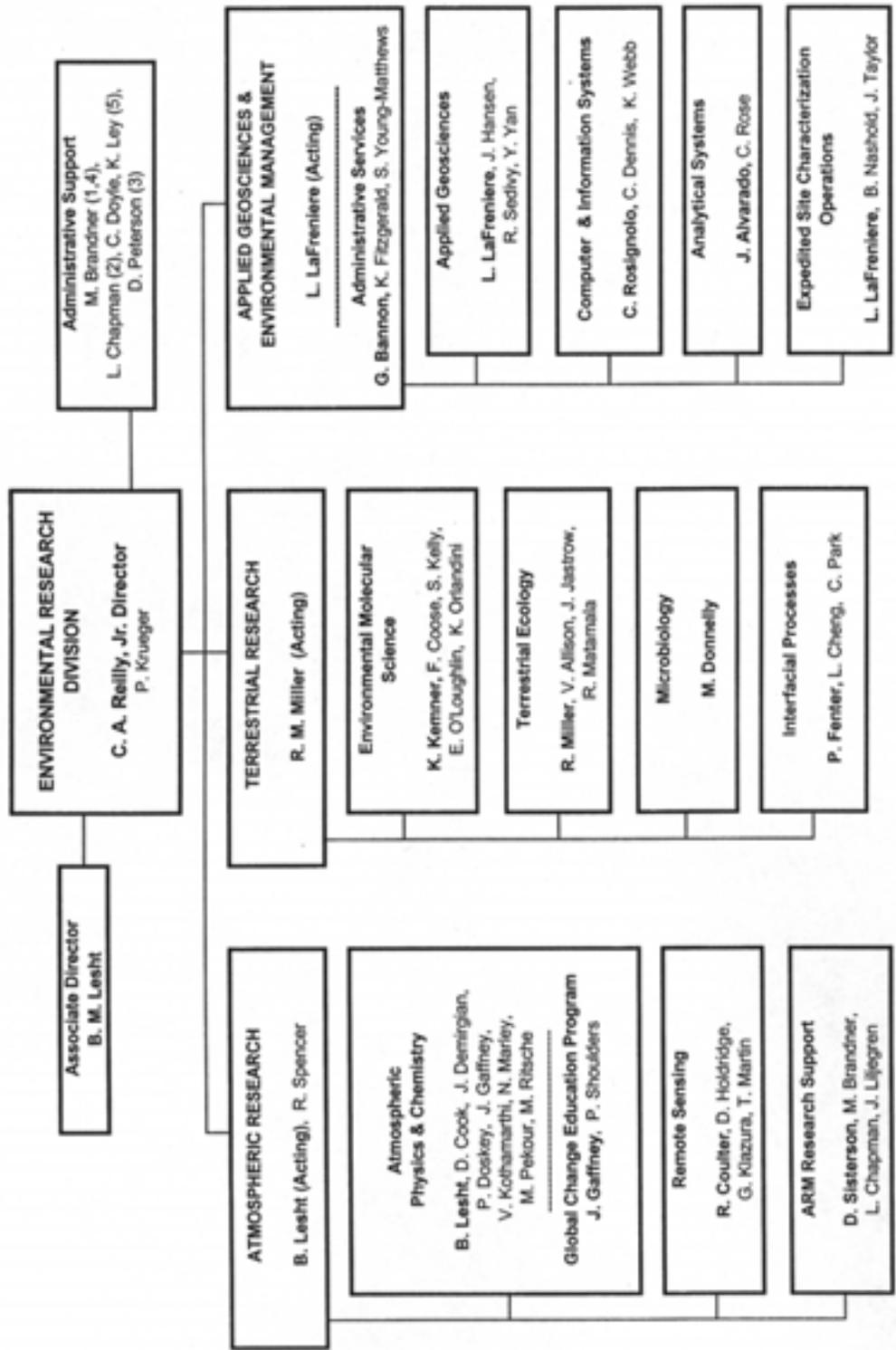
Documentation of compliance with the National Environmental Policy Act (NEPA) occurs at the proposal stage of a project. The EEST Approval for Environmental Evaluation form (see Forms section of this ER manual) and associated checklist are submitted to the EEST NEPA Owner for approval of a categorical exclusion for bench-scale research and development. For projects that might involve impact to the environment or are expected to involve field work, an ANL Environmental Review Form must be completed and forwarded by the ER Environmental

Compliance Representative to the EEST NEPA Owner, in compliance with NEPA requirements. The levels of review and authorization are commensurate with the severity of the hazards. The ANL Environmental Review Form can be obtained from the ER Environmental Compliance Representative or online.

When more than one ANL division is involved in a project, the lead division will be responsible for the safety analysis and environmental review and will coordinate with the other involved divisions/departments to arrange for an experiment safety review.

7 ENVIRONMENTAL RESEARCH DIVISION ORGANIZATION

The current ER organization chart appears on the following page. This chart identifies the supervisory chain of command for experiments and activities within the Division.



- Safety, Health & Environment**
- (1) Alternate Area Emergency Supervisor (203)
 - (2) Quality Assurance Representative
 - (3) Environment, Health and Safety Coordinator
 - (4) Field Safety Coordinator
 - (5) ER ESH Training Coordinator

C. A. Reilly
C. A. Reilly
February 15, 2003

8 SUPPORTING AND RELATED DOCUMENTS

This ER manual is not intended to stand alone. In many instances, ER safety policies and procedures are direct interpretations or extensions of ANL-wide policies and directives. Although the essence of those ANL policies and directives is discussed in this ER manual, the individual ER employee may need to consult other relevant documents for more extensive discussion. The major ANL documents to which this ER manual relates are listed in Table 2. In addition, ER files regarding safety, health, and environmental protection listed in Table 2 might be needed to resolve specific issues. Some of the listed documents are in the reading area of the ER ESH Coordinator's office (Room H102, Building 203). Others are in the Division office (Room J107, Building 203). Many are available online.

TABLE 2 Supporting and Related Documents

Document Title	ANL Level	Issuing Office^a	Location^{b,c}
<i>ANL Policy Manual</i>	Tier 1	OTD	Online
<i>ANL ESH Manual</i> (hard copy version)	Tier 2	EQO	H102
<i>ANL ESH Manual</i> (electronic version)	Tier 2	EQO	Online
<i>Nuclear Safety Procedures Manual</i> (electronic)	Tier 2	EQO	Online
<i>Quality Assurance Program Plan</i> (electronic)	Tier 2	EQO	Online
<i>Spill Prevention, Control, and Countermeasures Plan</i> (electronic)	Tier 2	EQO	Online
<i>Hoisting and Rigging Manual</i> (electronic)	Tier 2	PFS	H102
<i>Hazardous Materials Transportation Safety Manual</i> (electronic)	Tier 2	PFS	Online
<i>Comprehensive Emergency Management Plan</i> (electronic)	Tier 2	EQO	Online
<i>Procurement Operations Manual</i> (electronic)	Tier 2	OCF	Online
<i>Special Materials User's Guide</i> (electronic)	Tier 2	OSS	Online
<i>Waste Handling Procedures Manual</i> (hard copy version)	Tier 2	PFS-WMO	H102
<i>Waste Handling Procedures Manual</i> (electronic version)	Tier 2	PFS-WMO	Online
<i>Chemical Hygiene Plan</i> (2003) (hard copy version)	Tier 3	ER	H102
<i>Chemical Hygiene Plan</i> (2003) (electronic version)	Tier 3	ER	Online
<i>Environmental Research Division Quality Assurance Plan and Implementation Guide</i> (hard copy version)	Tier 3	ER	J013, other locations upon request
<i>Environmental Research Division Quality Assurance Plan and Implementation Guide</i> (electronic version)	Tier 3	ER	Online

TABLE 2 Supporting and Related Documents (Cont.)

Document Title	ANL Level	Issuing Office^a	Location^{b,c}
<i>Protective Glove Selection Guide</i>	Other	IH	H102
<i>American National Standard for Safe Use of Lasers (ANSI Z136.1-2000)</i>	Other	ANSI	Bldg. 200, L101 (library)
ER SHE Committee Meeting Minutes	Other	ER	H102
Material Safety Data Sheets (electronic)	Other	EQO	Online
<i>Electrical Safety Guidelines (DOE/ID-10600, September 1993)</i>	Other	DOE	H102
<i>Asbestos and Fiber Content of Selected Building Materials at ANL-East (October 1993)</i>	Other	IH	H102

^a Abbreviations: ANSI, American National Standards Institute
 DOE, Department of Energy (U.S.)
 EQO, Office of ESH and QA Oversight (ANL)
 ER, Environmental Research Division (ANL)
 IH, Industrial Hygiene (ANL)
 OCF, Office of the Chief Financial Officer (ANL)
 OSS, Office of Safeguards and Security (ANL)
 OTD, Office of the Director (ANL)
 PFS, Plant Facilities and Services Division (ANL)
 WMO, Waste Management Operations (ANL)

^b All locations are in Building 203 unless otherwise indicated.

9 ER SAFETY, HEALTH, AND ENVIRONMENT COMMITTEE

9.1 Responsibilities

The ER SHE Committee was established by the Division Director to serve in an advisory capacity to the Director on matters relating to safety, health, and environmental protection. The responsibilities of the SHE Committee include the following:

- Maintain a working knowledge of applicable ANL and DOE policies and directives regarding safety, health, and environmental protection.
- Provide the Division Director with interpretations of those ANL policies and directives as they apply to ER facilities and activities and with recommendations on implementation of those policies and directives.
- Identify shortcomings in the ER implementation of ANL and DOE policies and directives in matters of safety, health, and environmental protection; provide the Division Director with options for elimination of those shortcomings.
- Review safety analyses prepared for new or significantly altered facilities or projects and provide assistance to the principal investigators in identifying and resolving safety, health, or environmental concerns associated with those facilities or activities.
- Maintain written documentation of ER efforts toward compliance with applicable policies and directives regarding safety, health, and environmental protection by keeping minutes of regularly or specially scheduled meetings and writing memoranda to the record.

9.2 Composition

The composition of the ER SHE Committee will be as follows:

- The Committee will consist of a minimum of five members of the ER technical staff, recommended by the Division ESH Coordinator and Field Safety Coordinator and appointed by the Division Director.
- Collectively, the membership will represent, to the extent possible, all major aspects of the Division's current experimental and investigative activities.
- The Division ESH Coordinator and Field Safety Coordinator will serve as the SHE Committee co-chairs. Their duties will include scheduling monthly meetings of the committee; preparing the agenda for those meetings; scheduling special-interest meetings as necessary to deal with specific or new safety issues or requirements; initiating the involvement of subject matter experts where needed; and assigning other

members of the SHE Committee tasks relating to safety, health, or environmental protection as necessary. The co-chairs will represent the Division at all ANL safety meetings. In the absence of the co-chairs, the secretary will assume these responsibilities.

- A SHE Committee secretary will be appointed by the SHE Committee co-chairs. The secretary will maintain written records of ER SHE Committee activities in the areas of safety, health, and environmental protection and will distribute the records appropriately.
- Members of the SHE Committee will serve for a designated period. Appointments will be arranged so that the institutional knowledge and experience of the SHE Committee are preserved.
- *Ad hoc* appointments to the SHE Committee may be made by the Division Director or the SHE Committee co-chairs at any time to ensure that specific and appropriate knowledge exists within the SHE Committee to deal effectively with special safety, health, or environmental protection issues under consideration. All project reviews with risks higher than the nonroutine laboratory level require *ad hoc* expansion of the committee to include relevant subject matter experts.

The membership of the ER SHE Committee (as of February 2003) is as indicated in Table 3.

TABLE 3 Current Members of ER SHE Committee

Individual	Office	Phone
Victoria Allison	E133 (203)	2-3766
LaMonte Brandner ^a	J014 (203)	2-2885
Paul Doskey	J183 (203)	2-7662
Kenneth Kemner	E109 (203)	2-1163
David Peterson ^a	H102 (203)	2-3924
Candace Rose	B137 (203)	2-3499
Douglas Sisterson ^b	J002 (203)	2-5836

^a Committee co-chair.

^b Committee secretary.

10 SAFETY RULES AND PROCEDURES

10.1 General Prohibitions

- Eating and drinking are strictly prohibited in all laboratories and chemical storage areas.
- No food or drink may be stored in laboratory refrigerators. Refrigerators in which foodstuffs are stored may not be used to store chemicals. Refrigerators must be appropriately labeled as to their use restrictions.
- No smoking is permitted within any space occupied by ER.
- The consumption of any alcoholic beverage within the Division's facilities is prohibited.
- Sandals and open-toed shoes may not be worn in laboratories.
- Chemicals may be discarded only in accordance with appropriate policies and procedures established by Waste Management Operations. Hazardous chemical wastes or radioactive wastes may not be discarded in laboratory sinks, in restroom facilities, in water fountain basins, in eyewash basins, or by evaporation in fume hoods. The ER ESH Coordinator will provide consultation and technical support on proper waste management and disposal.
- Pipetting of any chemical by mouth is strictly prohibited.
- Water from drinking fountains and washroom faucets is considered potable. Water from laboratory sinks, eyewash stations, and safety showers is not considered potable and may not be used for drinking, cooking, making coffee, or washing eating utensils.
- Fume hoods may not be used for long-term storage of chemicals.
- Fire extinguishers, electrical service panels, eyewashes, safety showers, and all building hallways and routes of access/egress must be unobstructed.
- No chemical or laboratory material or equipment (including material designated for disposal or excess) may be removed from a controlled area of the building until it has been surveyed by health physics personnel for possible radioactive contamination. The two controlled areas in the Division are laboratories E154 and R002. Contact health physics personnel in Building 203 at 2-4138 (Room R110), or in Building 202 at 2-3953 (Room E175), to arrange for such surveys. See *ANL ESH Manual*, Chapter 5.17, for specifics.

10.2 Specific Considerations (listed in alphabetical order)

10.2.1 Chemical Storage

Acids, bases, and organic solvents may not be stored above the height of a standard laboratory bench, except in approved storage cabinets. Chemicals that are not compatible (acids versus bases, oxidizing agents versus organic materials, etc.) must be stored separately, in containers, cabinets, or both designed specifically for such storage.

Only flammable or combustible liquids, including aerosol cans of flammable/combustible liquids, may be stored in a flammable liquid storage cabinet. Thus, storage in a flammable liquids cabinet is prohibited for water-based materials, reactive materials, flammable solids, corrosives, nonflammable carcinogens, liquefied petroleum gas cylinders, or compressed gas cylinders. Storage cabinets are to be approved metal cabinets with a spill reservoir built into the bottom. New cabinets are to be equipped with self-closing doors. Each cabinet must be labeled to indicate flammable/combustible liquid storage. Storage cabinets must be located away from sources of heat or ignition. Cabinets are not permitted in corridors or stairwells or within 5 ft on either side of a doorway or an exit.

The *ANL ESH Manual* (Chapter 11.3.10) recommends that flammable liquid storage cabinets be grounded to reduce the possibility of static electricity buildup. Grounding can be accomplished by providing a direct connection between the cabinet and an electrical conduit, if the conduit contains a separate ground wire. Static grounds may not be made to gas, steam, or air lines; sprinkler systems; or air terminals of lightning protection systems.

Flammable liquids containers are to be kept closed when not in use (i.e., except during transferring or dispensing procedures). Flammable liquids storage cabinets are to be kept closed except when users are gaining access to containers. Flammable liquids storage cabinets may not be vented for fire protection purposes. (However, some toxic chemicals might require venting for other purposes, such as inhalation hazard.) Unvented cabinets are to have the vent covers (bung caps) retained in place. A comprehensive description of the requirements for flammable and combustible liquid storage is in the *ANL ESH Manual*, Chapter 11.3.

Chemical containers must be properly labeled and must clearly indicate both the chemical identity of the contents and the potential hazards (toxic, radioactive, carcinogenic, flammable; see *ANL ESH Manual*, Chapters 4.3 and 4.5).

Observe the following specific rules:

- Store chemicals according to their compatibility, not necessarily in alphabetical order.
 - DO NOT store acids and cyanides together.
 - DO NOT store alkali metals and aqueous liquids together.

- Store perchloric acid and other strong oxidizers in separate areas, away from all oxidizable chemicals.
- Designated areas such as carcinogen hoods, storage cabinets, glove boxes, laboratory rooms, and restricted entry areas are to be posted appropriately.
- Glass containers holding amounts of acids and toxic chemicals greater than 4 kg must be stored inside cabinets and as close to floor level as possible. Smaller quantities should be stored inside cabinets or on covered shelves.
- Use an appropriate secondary container to transport chemicals within a building, preferably a container with handles for ease of carrying.
- Store laboratory coats in laboratories, not in offices.

10.2.2 Chemical Storage — Ethers and Other Peroxide-Forming Compounds

(See also *ANL ESH Manual*, Chapter 4.3.)

Some chemicals present special hazards because they form explosive peroxide compounds during storage. Certain ethers are also subject to oxidation (peroxide formation) during distillation and other concentration procedures.

Note that peroxide formation is variable. Factors influencing peroxide formation include the type of chemical and container, the water content, the presence of inhibitors and light, the temperature, and the number of times the container is opened. If in doubt, test the chemical for peroxides. Use fresh supplies of peroxide-forming chemicals to minimize accumulation of potentially explosive peroxides.

Label peroxide-forming chemicals to indicate the date of container opening and the storage expiration date. If they are not provided by the manufacturer, obtain suitable labels from Industrial Hygiene (2-3310).

Test opened, dated containers for peroxides according to the schedule presented in Appendix A of Chapter 4.3, *ANL ESH Manual*. Commercially available test strips will identify peroxides in certain chemicals, although they are not suitable for all peroxide formers.

Before storage, close ether containers tightly. Store the containers away from heat and ignition sources, protected from light (preferably in small metal cans), and in plain view. Storage in an approved explosion-proof refrigerator will reduce peroxide formation, as will the addition of water. Use only original containers for storage.

Use ethers only with good exhaust ventilation (preferably in a hood) and away from ignition sources. Exposure to high vapor concentrations can cause dizziness or loss of consciousness.

Do not distill or evaporate ethers until they have been tested and found to be free of peroxide contamination. Distillation and evaporation tend to concentrate the less volatile

peroxides. Do not allow distillation to proceed to dryness. Do not use air leaks to prevent bumping during distillation.

Dispose of outdated ethers or other peroxide-forming chemicals by calling Waste Management Operations, extension 2-5865. Do not pour ethers into laboratory sinks, and do not unscrew the cap of or puncture outdated containers.

10.2.3 Compressed Gas Cylinders (See *ANL ESH Manual*, Chapter 13.2.)

General Handling Requirements

All personnel authorized to use compressed gases must have received appropriate training.

Oxygen cylinder regulators, fittings, piping, and connections must be kept free of oil, grease, and dirt.

All compressed gas cylinders must be appropriately labeled. Use cylinders only in conjunction with appropriate pressure regulators. Never change CGA (Compressed Gas Association) fittings on a regulator.

Use care when attaching and detaching regulators. Do not overtighten brass fittings. Take regulators with damaged threads out of service. Inspect cylinders routinely for signs of deterioration. Take severely corroded cylinders out of service and arrange for their return to the vendor.

With appropriate hardware, secure all compressed gas cylinders used in laboratories (regardless of the size of the cylinder) upright, and at least across the upper half, to the laboratory bench or to a building wall or other structural element. If it is used away from a bench or wall, support the cylinder in a cylinder stand or cart. Cylinders may be inclined to an angle not exceeding 45 degrees if they are to be used in that orientation and are properly secured.

While they are in service, cylinders of flammable gases or mixtures must be equipped with a flashback arrester (installed downstream of the second-stage regulator).

In storage, separate cylinders of oxygen and other strong oxidizers (e.g., chlorine, fluorine, and nitrous oxide) from gases that can support combustion by (1) a minimum distance of 20 ft or (2) a firewall at least 5 ft high with a fire rating of at least 0.5 hr.

Handling Prohibitions

The following prohibitions apply to the handling of compressed gas cylinders:

- Never substitute oxygen in applications that call for compressed air.

- Never allow compressed gas cylinders to be in contact with direct flame or heat.
- Do not expose compressed gas cylinders to temperature extremes.
- Do not allow compressed gas cylinders to come in contact with an electrically energized system or to be used as an electrical ground.
- Never strike compressed gas cylinders forcefully with tools or allow them to strike other cylinders.
- Do not subject containers to artificially created low temperatures unless the containers were designed by their manufacturer to withstand such conditions.
- Transport cylinders within a building only by using a cylinder cart with four or more wheels.
- Never drop, drag, or roll cylinders.
- Never lift compressed gas cylinders by their safety caps or by using magnets.
- Lift compressed gas cylinders not equipped with lugs only when they are held securely in suitable cradles or platforms.

Emergency Conditions

Do not attempt to fight fire emergencies involving compressed gas cylinders. Evacuate the area immediately, call 911 from the nearest safe location, and prevent others from entering the affected area until emergency response personnel arrive.

Storage Requirements

Keep storage areas for compressed gas cylinders well ventilated and posted with “No Smoking” and “No Open Flame” signs, in addition to signs that indicate the principal hazards of the gases being stored.

Store cylinders for long periods in the outdoor storeroom on the Building 203 dock (northwest section of service floor), rather than in a laboratory or in an outdoor location where the cylinders will be exposed to weather or direct sunlight. Place cylinders on sturdy surfaces in well-ventilated areas designed so that precipitation will readily drain away, preventing accelerated corrosion of cylinder bottoms.

Never store cylinders in confined spaces, under stairwells, or in other areas where leaking gases can accumulate or where the cylinders can sustain damage when they are moved into or out of the area.

Do not store corrosive gases longer than the manufacturer’s recommended storage period.

Do not store flammable, combustible, or corrosive materials with compressed gas cylinders.

Disposal

Deliver damaged, unused, corroded, and empty gas cylinders, as well as those whose contents are not clearly labeled, to the loading dock (northwest section of service floor), and place the cylinders in the appropriate storage room for radiation survey, pickup, and return. Do not empty cylinders to the air (whether inside or outside a building) or into a hood to prepare them for return to the vendor.

10.2.4 Cryogenic Materials (See also *ANL ESH Manual*, Chapter 4.10.)

Definitions

For the purpose of this ER manual, cryogenic materials are defined as liquefied gases and the containers or equipment in which such gases are contained. These materials are maintained at temperatures substantially below ambient temperature. Therefore, they present certain hazards, such as severe burns, frostbite, and increased potential for implosions, explosions, and asphyxiation.

Requirements

Staff preparing to use cryogenic equipment or containers should routinely inspect such equipment to ensure that it is in good working order before the cryogenic material is introduced. Of particular importance is the careful inspection of thermal protective gloves for deterioration.

Employees must wear protective equipment when they transfer or otherwise handle cryogenic materials. At a minimum, this equipment includes a face shield, safety glasses under the face shield, a long-sleeved laboratory coat (or a long-sleeved shirt buttoned at the wrists and worn outside the pants), no cuffs on trousers, loose-fitting thermal protective gloves, and shoes. Shoes should have uppers made of nonabsorbent material (e.g., leather).

The following general rules apply to activities involving cryogenic fluids:

- Use cryogenic materials only in well-vented areas to prevent the displacement of ambient air and the consequent risk of asphyxiation.
- If a spill of a significant volume (greater than one liter) of cryogenic material occurs, evacuate the laboratory and contact your supervisor for direction.
- Introduce cryogenic fluids only into dry vessels.

- Cover containers filled with cryogenic fluids with loose-fitting covers to prevent condensation of atmospheric moisture and the potential plugging of pressure safety vents. Remove any condensate blockages as soon as possible to prevent pressure buildup within the container.
- Introduce cryogenic materials only into equipment designed specifically for that purpose.
- Tape or otherwise sheath glass Dewar flasks to keep glass from flying in the event of implosion or explosion.
- If frostbite occurs, immediately immerse the affected area in tepid to warm water. Do not rub the frostbitten area. Dial 911 for additional assistance.
- Throughout the course of an experiment involving cryogenic fluids, verify that no unusual or unmanageable pressures are building up within the experimental equipment.

10.2.5 Electrical Equipment (See also *ANL ESH Manual*, Chapters 7.10, 9.1.)

Extension Cords

Extension cords must not be:

- Used as a substitute for fixed wiring of a structure;
- Attached to building surfaces;
- Run through walls, ceilings, doorways, or windows;
- Spliced or taped;
- Concealed behind building walls, ceilings, or floors;
- Wired so that an exposed male plug is energized; or
- Laid across aisles or passageways without protective cover.

Temporary wiring associated with experimental equipment is permitted for a period not to exceed 90 days. Temporary wiring must be installed in a way that does not create hazards; run it overhead whenever possible.

Power Tools

Plug a portable electric hand-held motorized tool only into a circuit protected with a ground fault circuit interrupter (GFCI). Do not use portable electrical equipment in conductive, wet, or damp areas.

Do not use defective electrical equipment. Disable such equipment to prevent its use (e.g., by cutting off a deteriorated cord after making sure that it is disconnect from the power supply) until it is repaired or discarded.

Use ungrounded equipment only when the equipment has been manufactured and sold commercially in that manner, is underwritten by accredited testing laboratories, and is used in its intended manner. Defeating ground plugs is prohibited.

10.2.6 Electrical Work (See also *ANL ESH Manual*, Chapter 9.1.)

All employees are required to become acquainted with all potential electric hazards in their work areas. The *ANL ESH Manual* provides guidance and lists requirements for employees working around electrical hazards. Technical staff are not normally qualified or certified to work with high voltages (greater than 600 V).

A Hot Work Permit (ANL-211) must be completed and approved whenever work or circuit testing must be performed on or close to energized circuits above 50 V.

10.2.7 Emergency Equipment

Emergency exits, safety showers, eyewash stations, and fire extinguishers are strategically located throughout Building 202 and Building 203.

Employees are responsible for knowing the locations of the emergency exits and the proper use of emergency equipment in their areas.

Eyewash stations are to be tested weekly by laboratory supervisors or their designees.

Employees should immediately report any missing or defective emergency safety equipment to the ER ESH Coordinator.

10.2.8 Ergonomics (See *ANL ESH Manual*, Chapter 7.5.)

Line managers must be aware of risks associated with repetitive motion. Good ergonomics can be accomplished by (1) addressing ergonomic factors when structuring a job, designing a work area, and selecting the materials, furniture, tools, and other equipment to be used in the work area; (2) controlling the work environment; and (3) training employees in good ergonomic practices and instructing them in the proper use of equipment.

Employees are responsible for attending training and for participating in ergonomics evaluations, assessments, and design as needed. Employees should report concerns about the ergonomics of their work environments to their supervisors and the ER ESH Coordinator.

10.2.9 Eye Protection (See also *ANL ESH Manual*, Chapters 4.3, 6.2, 12.1.)

All persons working in or entering areas where a potential eye hazard exists must wear appropriate eye protection (goggles, safety glasses, or face shield) at all times. All ER laboratories are assumed to present some nominal eye hazards, even laboratories where no chemicals are used or stored. Thus, safety glasses are required in all ER laboratories unless specific instructions are posted to the contrary.

Contact lenses DO NOT provide adequate eye protection and may not be worn in eye hazard areas without additional appropriate eye protection.

Where chemical splash hazards exist, safety glasses with side shields or full-covering goggles are minimally required.

Additional specific eye protection might be necessary in areas where lasers are in use. For additional laser-specific guidance, consult Section 13 of this ER manual and the *ANL ESH Manual*, Chapter 6.2.

Face shields must be worn when cryogenic fluids are being poured and when flying materials (solids or liquids) could be present. Safety goggles or safety glasses must be worn under the face shields.

Principal investigators may petition the ER SHE Committee in writing for exemptions from the requirement for safety glasses in laboratories in which the investigators believe that no eye hazards exist. The SHE Committee will then make recommendations to the Division Director for final approval.

Prescription safety glasses can be obtained through ANL. Requests for prescription safety glasses should be made to the ER Division office. The procedure for obtaining prescription safety glasses is outlined in Chapter 12.1 of the *ANL ESH Manual*.

Eyewash stations and safety showers are provided in strategic locations throughout Building 202 and Building 203 for emergency flushing of the eyes and body.

10.2.10 Fire and Flammable Materials (See also *ANL ESH Manual*, Chapter 11.2.)

Fire emergencies can be reported to the ANL Fire Department by dialing 911 or by activating the manual pull stations located near all building exits. The pull stations enable personnel to simultaneously initiate evacuation and notify the Fire Department of a fire emergency. Manual pull stations operate with a simple pulling action and are easily identified by their bright red coloration with white lettering.

Fire Doors

Fire doors (doors in corridors separating wings or entrances to stairwells) must remain shut. Never block fire doors open.

In the event of an emergency, glass panels in office and laboratory doors (aside from those with laser interlocks) enable safety personnel to assess the safety of the occupant. The condition of the glass panel should facilitate this action and permit emergency response personnel to view the entire room. Under no circumstances can the viewable area be less than 20 square inches.

Fire Extinguishers

Do not attempt to fight a fire with a fire extinguisher unless you have received formal fire extinguisher training from the ANL Fire Department within the previous 12 months.

The ANL Fire Department offers the following training courses on proper fire extinguisher use:

- A general one-hour information course, given in various locations listed in the online *ANL-East Training Schedule*. ER staff are encouraged to attend as their schedules permit (with their supervisor's approval).
- A more extensive hands-on training course, scheduled by contacting the Fire Department administrative office (2-6136). ER staff wishing to take this course must receive approval from their supervisors. Coordinate registrations for this course with the ER Training Management System Representative (2-3137).

After completing training on the use of fire extinguishers, employees should familiarize themselves with the locations of the closest extinguishers.

Notify the Fire Department immediately (2-6131 or 2-6136) after an extinguisher has been used or is accidentally damaged, when an extinguisher is discovered to be missing from its usual location, or if an extinguisher has been discharged.

Keep areas around extinguishers clear of materials and equipment to permit unrestricted access.

Flammable Materials

Keep quantities of flammable materials (solid, liquid, or gaseous) in active use to a minimum. To do this, transfer a suitable portion of the material to a smaller container, if possible and practical. Label all chemical containers as to their contents and the flammable hazards of the contents.

During active use, limited amounts of flammable liquids may be kept in fume hoods. When flammable materials in a hood are not in immediate use, keep the hood's door closed or at the recommended operating height, and keep the fan operating at all times.

Store flammable materials only in an approved, properly ventilated flammable materials cabinet.

Label refrigerators used for the storage of flammable materials as such. Only appliances listed by Underwriters Laboratories, Inc., or approved by an ANL fire inspector for flammables storage may be used for this purpose (*ANL ESH Manual*, Chapter 11.3.10).

Rooms in which flammables are stored or used must have at least two clear exits.

Isolate combustibles from accidental ignition sources such as hot plates, soldering irons, and portable heaters and flame-producing devices.

Open-flame, arc, or spark-generating operations require an open-flame operating permit, to be issued by an ANL fire inspector or the ANL Fire Department before any open-flame operation begins. (See *ANL ESH Manual*, Chapter 11.4.) Example operations include welding, soldering pipe with a propane torch, grinding, and melting of materials. Considerations include proper ventilation in the area of the operation, use of appropriate protective equipment, and notification of the ANL Fire Department before work begins.

Flammable Liquids (See also *ANL ESH Manual*, Chapter 11.3.)

A flammable liquid has a flash point below 37.8°C. (The flash point is the lowest temperature at which the vapors in air above a volatile combustible substance ignite when the vapors are exposed to a flame.)

Flammable liquids that are spilled or released from their containers can form vapors that can cause flash fires and explosions.

Store flammable liquids in appropriately designed flammable materials cabinets or refrigerators. Keep the cabinets closed except when opening the door is required to introduce or remove material.

Do not store flammable liquids adjacent to, above, or below corrosives, oxidizers, chemicals capable of spontaneous heating, explosives, or materials that react with air or moisture to liberate heat.

Store 1- to 5-gallon quantities of flammable liquids in safety cans or in original containers approved by Underwriters Laboratories, Inc., or the Factory Mutual Engineering Corp.

10.2.11 Food and Drink (See also *ANL ESH Manual*, Chapter 4.3.)

Do not prepare, consume, or store food and drink in areas where carcinogenic, toxic, or radioactive materials are handled, stored, or used. Storage of food and drink is prohibited in a laboratory; a storage area; or a refrigerator or freezer containing chemicals, organic solvents, field samples, or other potentially toxic nonfood items. Food and drink may not be contained in or consumed from laboratory glassware, containers, or other devices that are used or intended for other purposes.

10.2.12 Hand Tools (See also *ANL ESH Manual*, Chapters 7.12, 7.15.)

General rules for hand tool safety are the following:

- Select the right tool for the job.
- Keep tools in good working condition, with guards and handles firmly intact. Repair or replace worn or defective tools.
- Use tools as they were intended to be used. Use screwdrivers as screwdrivers, not as chisels, punches, or pry bars.
- Keep and store tools in safe places. Do not place them where they may cut, fall on, or trip someone.
- Strike objects only with the head of a hammer, never its side.
- Use only sharp chisels. Chisels with mushroomed heads are hazardous.
- Wear eye protection whenever you use hand tools.
- Use only files that have wooden or plastic handles.
- Do not use wrench extenders (cheaters) to increase leverage.
- Use properly sized wrenches rather than pliers to tighten nuts and bolts.

10.2.13 Laboratory Hoods (See also *ANL ESH Manual*, Chapters 4.3, 4.5, and 7.11.)

For most ordinary circumstances, a properly designed, properly operated hood in a well-ventilated room can provide adequate protection against hazardous exposures. Conduct laboratory operations that could result in the release of undesirable or hazardous gases, vapors, mists, airborne particles, odor, or heat only in an approved laboratory hood or with other approved local exhaust.

Certain work practices and procedures are required if a hood is to perform adequately. The following practices are generally required. More rigorous controls might be necessary for particular situations.

- Keep all apparatus at least 6 inches back from the face of the hood.
- DO NOT put your head inside the hood when airborne contaminants are being generated.
- DO NOT use the hood as a waste disposal mechanism (i.e., for purposeful evaporation of volatile waste materials). However, legitimate experimental procedures involving the evaporation of volatile chemicals are permitted.
- DO NOT store chemicals or apparatus in the hood. Limited quantities of chemicals may be kept in a hood while an experiment is in progress.
- Keep the slots in the hood baffle free of obstruction by apparatus or containers.
- Minimize foot traffic past the face of the hood. (The effectiveness of a hood is strongly dependent on the room air currents.)
- Keep the doors closed in laboratories in which hoods are operational.
- DO NOT remove hood sashes or panels except when necessary for apparatus setup; replace sashes or panels before you begin an experiment. (All sashes and panels must be in place for the hood to function properly and to prevent excessive turbulence inside the hood.)
- DO NOT place electrical receptacles or other spark sources inside the hood when flammable materials are present.
- DO NOT use a hood that is out of compliance relative to inspection, or one that you feel is operating improperly. Routine inspections of all hoods are conducted annually by Plant Facilities and Services Division (PFS) personnel. Contact the building maintenance foreman to schedule additional hood inspections and flow calibrations if programmatic needs change, if you suspect that the hood is not functioning properly, or if 12 months or more have elapsed since the last inspection.
- DO NOT use a hood for work with radioactive materials that require containment unless the hood has been equipped with HEPA filters that are designed to trap airborne radioactive contaminants. Consult the ER ESH Coordinator for additional guidance and assistance in determining when containment is required. (See *ANL ESH Manual*, Chapter 5.18.)
- DO NOT use a hood for work involving perchloric acid unless the hood has been specifically designed for such use.

In the event of hood ventilation failure, close cylinders of toxic or flammable gases, shut down operations, and seal off associated systems insofar as doing so is possible and safe.

10.2.14 Noise Control and Hearing Conservation

(See also *ANL ESH Manual*, Chapter 7.6.)

Report areas of potentially high noise levels to your supervisor. Industrial Hygiene (2-3310) will monitor or survey sound levels, upon request, to determine hearing loss risk factors; their findings and recommendations will be reported to you, your supervisor, and the Division Director. Areas having noise levels above 85 dBA will be posted as such for the protection of employees who might be subject to the noise hazard. Use noise suppression devices (ear protection) whenever noise exposure limits might be exceeded.

Personnel subject to noise exposures exceeding the criteria in the *ANL ESH Manual*, Chapter 7.6, will be placed in a hearing conservation program and will use approved hearing protection devices or equipment to bring noise levels below those outlined in the criteria. Industrial Hygiene (2-3310) will recommend and must approve hearing protection devices (*ANL ESH Manual*, Chapter 12.1).

Equipment or facilities requiring noise abatement may be modified with the approval or assistance of PFS-Facilities Planning and Engineering.

10.2.15 Packaging and Transportation

Section 20.1 of the *ANL ESH Manual* describes the requirements for packaging and transportation of hazardous materials. The originator is responsible for identifying the material and its hazards, and a support organization is responsible for assisting in packaging the material and for moving it. All packaging, shipments, transfers, and movements of hazardous materials at ANL-East must comply with DOE Orders 460.1A and 460.2, regulations of the U.S. Department of Transportation (DOT), and other applicable regulations. All movements of hazardous materials, both on and off the site, must be carried out in accordance with the requirements of the ANL-East *Hazardous Materials Transportation Safety Manual*. This manual is available online.

Lessons learned from past shipping mistakes indicate the importance of validating shipping order information before it is submitted to the shipping department. Verbal instructions can be misunderstood. A request for preparation of a shipping order for hazardous material should include written instructions (normally a photocopy of the front page of the shipping order, completed in writing by the originator) to the person entering the transfer order. After the shipping order is complete, the originator should review the form for accuracy and completeness. Individuals requesting the shipment of hazardous materials must understand the regulatory responsibility they have when they describe the contents of a package by signing or initialing the shipping order.

Packaging and transportation of hazardous materials to or from field locations can be difficult. Only individuals with the proper DOT training are authorized to ship hazardous materials. If possible, have gas cylinders bought locally and delivered to field site location by a local vendor. Vendors have trained individuals who can transport materials to the field site and pick them up when they are empty. Discuss packaging and transportation requirements with the ANL Traffic Manager (2-5712) as far as possible in advance of actual needs, to prevent delays.

10.2.16 Personal Protective Equipment (See also *ANL ESH Manual*, Chapter 12.1.)

Eye protection and noise protection are described in detail in Sections 10.2.9 and 10.2.14, respectively, of this ER manual. Consult your supervisor or the ER ESH Coordinator for advice on the type of personal protective equipment required for an operation, experiment, or procedure.

Wear foot protection whenever you handle heavy materials or are in danger of making contact with sharp or rolling objects. Argonne supplies safety shoes that may be requested through the ER Division office.

Use gloves in the laboratory where hand injury or exposure to hazardous chemicals (e.g., carcinogens, cryogenics, corrosives) is possible. A summary of recommendations for protection from many common chemicals (*Protective Glove Selection Guide*) is available from Industrial Hygiene (2-3310) or the ER ESH Coordinator. When you handle rough, splintered, or sharp materials, wear work gloves rather than laboratory gloves. Do not use gloves around moving machine parts.

Use safety helmets in areas where head injury could result from impact, falling, or flying objects; around high-voltage equipment; and in all areas posted as requiring safety helmets.

Work garments must be snug, with no loose flaps or strings and no cuffs. Long, loose, torn, or ragged clothing; neckties; and jewelry, including finger rings, may not be worn around moving machine parts. Constrain long hair to keep it from becoming entangled in moving machine parts.

Eyewash stations and safety showers are provided in strategic locations for emergency flushing of the eyes and body.

Fall protection equipment (belts, harnesses, tower safety systems) must be used for work 6 ft or more above the ground or floor level. Training in the use of fall protection equipment is required.

When engineering controls are not feasible, use respirators to control exposure to harmful dust, acid vapors, and corrosive or noxious fumes, as well as in oxygen-deficient areas. Respirator use requires approval of the ANL Medical Department (2-2800). Respirators are issued by Industrial Hygiene (2-4149) after completion of required training and a quantitative fit test. See the ER ESH Coordinator for guidance.

10.2.17 Radiological Operations (Ionizing Radiation)

(See also *ANL ESH Manual*, Chapter 5, and Section 11 of this ER manual.)

Radiological operations are covered by the *ANL ESH Manual*, Chapter 5. All radiological operations must be planned and executed with concurrence from cognizant health physics personnel.

Line supervisors must identify to health physics personnel the individuals who require personal monitoring for external radiation exposure. In addition, line supervisors must do the following:

1. Ensure that all individuals who require personal monitoring for external radiation exposure provide a record of previous occupational radiation exposures.
2. Ensure that all individuals under their supervision are aware of personal monitoring requirements; this includes employees, visitors, and subcontractors.
3. Control and appropriately post all areas in which radioactive materials are stored or used. Contact the ER ESH Coordinator for assistance.

The storage or use of radioactive materials in uncontrolled areas is prohibited.

10.2.18 Smoking

Policies of both ANL and the ER Division forbid smoking in any laboratory or area where chemicals, carcinogens, or radioactive materials are used or stored. Further, no smoking is permitted within any space occupied by the ER Division. All ER staff are expected to comply with postings elsewhere in Building 203 and Building 202 with respect to smoking restrictions.

10.2.19 Spills (See also Section 5.2 of this ER manual.)

DIAL 911 for help with any hazardous material spill that cannot be contained safely.

Attempt to contain the spill or eliminate the release only if you can do so safely. In attempting to contain a spill, make a particular effort to prevent the spilled material from entering floor drains. Remember that asphyxiation, burns, poisoning, fire, radiation exposure, explosion, and chemical reactions are all hazards that might be encountered in a poorly or hastily performed cleanup. After dialing 911, keep others from entering the immediate danger zone. Direct properly equipped emergency response personnel to the emergency when they arrive. Consider all spills of flammable, toxic, radioactive, or reactive chemicals as having the potential to result in a life-threatening situation.

10.2.20 Stop Work Authority

If you are directed to perform operations that you feel will jeopardize your safety, or if you have doubts about the safety of a planned or ongoing operation, immediately STOP WORK and notify your supervisor or the ER Director. All activities must be conducted with all reasonable measures in place to protect the health and safety of employees and of the public. See also *ANL ESH Manual*, Chapter 1.1, and Section 2.4 of this ER manual.

10.2.21 Waste Disposal (See *ANL ESH Manual* [Chapter 10.6] and *Waste Handling Procedures Manual*.)

The *Waste Handling Procedures Manual* (available online and as hard copy in Room H-102, Building 203) describes in detail the appropriate disposal methods for each type of hazardous waste, including packaging and labeling requirements, documentation, inspection, and proper storage techniques. The *Waste Handling Procedures Manual* also describes the policy on reuse of product containers and drums. That manual should be consulted for information on the disposal of all hazardous wastes.

Activities involving materials that contain RCRA (Resource Conservation and Recovery Act) hazardous wastes are regulated by the Illinois Environmental Protection Agency. The *Waste Handling Procedures Manual* should be consulted for the requirements for such activities and a description of the regulatory process.

Satellite accumulation areas have been set up in a number of ER laboratories for the management of waste materials. Contact the ER Division Environmental Compliance Representative for information on the locations of these areas, the responsible laboratory custodian, proper accumulation procedures, and other information about waste disposal.

Oily rags and other materials contaminated with oils represent a spontaneous combustion hazard. Collect these waste materials in a metal drum labeled "OILY SOLIDS ONLY." Disposal of this type of waste is accomplished through PFS-Waste Management Operations (2-5865).

Do not pour waste organic solvents and other hazardous chemicals down the drain, dump them onto the ground, or evaporate them as a means of disposal. Do not wash bottles containing hazardous chemicals in laboratory sinks.

The Laboratory has developed a Mixed Office Paper Recycling Program to segregate and collect recyclable paper from the ANL-East general refuse waste stream. Every occupant of an ANL-East building or complex is responsible for placing the recyclable paper he or she generates in a designated container provided by the program. Nonrecyclable and nonreusable materials cannot be accepted and become waste. Table 4 summarizes the types of paper that are acceptable and not acceptable for the recycling program.

Place only nonrecyclable paper and other lightweight items (no glass, metal, or liquids) in wastebaskets. Place large quantities of nonrecyclable paper printouts, magazines, or books; metals; and uncontaminated glass on the floor next to a wastebasket, and label the material

“DISCARD.” Place broken uncontaminated glass in a container such as a cardboard box for disposal.

10.2.22 Working Alone (See *ANL ESH Manual*, Chapter 1.6.)

Working alone is defined as the performance of any work by an individual who is out of audio or visual range of another person for more than a few minutes at a time. Guidance on working alone is in the *ANL ESH Manual*, Chapter 1.6.

Potential hazards in working alone must be anticipated, and proper precautions must be taken to prevent or reasonably reduce risks (*ANL ESH Manual*, Chapter 1.6). The principal investigator is responsible for evaluating the hazards of working alone and for taking proper measures to avoid or reduce these risks. The employee must be sensitive to the dangers of working alone and must seek advice and authorization from his or her supervisor on proper procedures to follow in conducting the work.

TABLE 4 Types of Paper That Are Acceptable and Not Acceptable for the Mixed Office Paper Recycling Program

Acceptable	Not Acceptable
White or colored paper	Paper towels, tissues, and napkins
Letterhead	Food-contaminated paper
Computer paper	Food wrappers
Stationery or tablet sheets	Disposable plates and cups
File folders	Plastic
Envelopes (white or colored or with windows)	Carbon paper
Newspapers (including inserts)	Hanging file folders with metal
Fax paper	Plastic overhead projection material
Phone books	Photographs
Paper ream wrappers	
Paperboard (tablet backs)	
Books	
NCR forms	
Data tab cards	
Blueprint paper	
Corrugated cardboard	
Brown paper	

11 RESEARCH INVOLVING RADIOACTIVE MATERIALS OR RADIATION-PRODUCING EQUIPMENT (EXCLUDING LASERS)

11.1 Radiological Control Policy

The ER Division is firmly committed to having a radiological control program of the highest quality. This commitment applies to the management of radiation and radioactive materials and to all activities that might result in radiation exposure to workers, the public, and the environment. Each person involved in radiological work is expected to demonstrate responsibility and accountability through an informed, disciplined, cautious attitude toward radiation and radioactivity.

All radiological activities in the Division are to be consistent with the requirements of the Occupational Radiological Protection Rule, Title 10 *Code of Federal Regulations* Part 835 (10 CFR 835). The Division is not currently required to set ALARA goals because of the limited potential for radiation exposures. Nevertheless, ER has adopted a policy of maintaining personal radiation exposures as low as reasonably achievable (ALARA). (See *ANL ESH Manual*, Chapter 5.1.)

11.2 General Considerations in Radiological Control

As with all experimental work, radiological work must be performed under an approved PSA (see Section 6 of this ER manual). The principal investigator is directed to review relevant sections of Chapter 5 of the *ANL ESH Manual*. All radiological work must be performed in a radiological controlled area.

The amount of radioactivity and the nature of the work may require health physics personnel (Table 1) to provide standby coverage. If health physics personnel cannot provide coverage, the work must be suspended until the necessary coverage is available. Make requests for after-hours coverage as far in advance of the required time as possible.

Store only limited amounts of radioactive materials (e.g., an amount necessary for immediate use) in the laboratory, within a properly labeled laboratory hood, cabinet, or refrigerator. Store radioactive materials for longer periods only in approved, labeled, and locked storage cage areas rather than in an occupied laboratory.

Do not store or use radioactive materials in offices, lunchrooms, or uncontrolled areas.

Dispose of radioactive materials that are no longer needed as soon as possible with the assistance of building health physics personnel.

Do not remove materials from radiological controlled areas until radiation surveys have been performed and the removal is approved by building health physics personnel.

Have materials and equipment used in the manipulation of radioactive material surveyed before they are relocated.

The transfer of radioactive material between buildings must be approved by health physics personnel and processed through the ER ESH Coordinator.

Health physics personnel will provide personal radiation monitoring upon your request. If your work involves radioactive materials or occurs in an area where radiation exposures are possible, contact the ER Division office through your immediate supervisor or your principal investigator to acquire the appropriate personal radiation monitors from health physics personnel.

If you suspect radiation contamination, notify health physics personnel in Building 203 (2-4138) or Building 202 (2-3953) immediately. If you suspect that your clothing is contaminated, you must have it surveyed before you remove it from the area.

Each employee and his/her supervisor are responsible to develop, request assistance with, and implement proper handling techniques for work involving radioactive materials and other hazardous materials.

Warning signs must be posted to identify controlled areas involving the use of radiation or radioactive materials. Health physics staff will assist in posting an area with appropriate warning labels and signs. Detailed information on posting requirements is in the *ANL ESH Manual*, Chapter 5.25.

Submit an ANL Radiological Work Permit (ANL-206, available online) to your supervisor and cognizant health physics personnel (*ANL ESH Manual*, Chapter 5.24) to request assessment of radiological hazards before construction or maintenance work begins in a "Radiation Area," a "High Radiation Area," or an area where radioactive material is or has been used or stored. If you request construction or maintenance work in such areas, you must also arrange for the appropriate radiation surveys.

Areas marked with hazard tags, yellow-and-magenta braided rope, or 3-in. yellow ribbons with the message "Keep Out!" printed in magenta have known or suspected high radiation hazards. Only trained personnel with appropriate monitoring devices may enter such areas.

Additional inventory and safeguarding procedures are mandatory for special nuclear materials. The following nuclear materials require special accountability: deuterium; tritium; all isotopes of thorium, uranium, and plutonium; lithium-6; americium-241; americium-243; berkelium; californium; curium; and neptunium-237. Further information on this subject can be found in the *Special Materials User's Guide*, current version. Contact building health physics personnel for additional information about meeting accountability requirements for these materials.

11.3 Enforcement

Violation of the Atomic Energy Act of 1954 or a DOE Nuclear Safety Requirement like those in 10 CFR 835 is a basis for the assessment of civil and criminal penalties under the Price-Anderson Amendments Act (PAAA) of 1988, Public Law 100-408, August 20, 1988. Parties subject to enforcement under PAAA include organizations or individuals (or their subcontractors or suppliers) under contract to DOE, with the responsibility to perform activities or to supply services or products that are subject to DOE Nuclear Safety Requirements [10 CFR 820.2]. The University of Chicago is exempt from the assessment of civil penalties under 10 CFR 820, Subpart B, with respect to activities associated with ANL [10 CFR 820.20(c)(1)].

If a party subject to the Atomic Energy Act or DOE Nuclear Safety Requirements has, by act or omission, knowingly and willfully violated, caused to be violated, attempted to violate, or conspired to violate any section of the Act or any applicable DOE Nuclear Safety Requirement, that party is subject to criminal sanctions under the Act [10 CFR 820.71].

Deficiencies in a radiation protection program, noncompliance with 10 CFR 835 requirements, failure to follow requirements of a site-specific radiation protection program or implementing procedures, and radiological incidents might require reporting under PAAA as nuclear safety noncompliances. Noncompliances and potential noncompliances are to be brought to the attention of the PAAA Coordinator in the ANL Office of ESH/QA Oversight. Guidance on this subject is in the ANL *Quality Assurance Program Plan*; the ANL *ESH Manual* (Chapter 1.2); and the DOE handbook *Guidance for Identifying, Reporting, and Tracking Nuclear Safety Noncompliances* (DOE-HDBK-1089-95).

12 RESEARCH INVOLVING CARCINOGENIC SUBSTANCES

Chapter 4.5 of the *ANL ESH Manual* establishes the requirements for laboratory and nonlaboratory handling and use of substances designated as carcinogens. Potential users of carcinogens must review the contents of that chapter and comply with all of its requirements before any work with carcinogens begins. The ER policy is to keep employee exposures to these substances as low as reasonably achievable (ALARA).

12.1 General Considerations

Argonne defines two classes of carcinogens.

Class 1 carcinogens (ANL-East classification, *ANL ESH Manual*, Chapter 4.5, Appendix A) are regulated as carcinogens by the Occupational Safety and Health Administration (OSHA) through substance-specific performance standards or are classified by the American Conference of Governmental Industrial Hygienists in group A1 (confirmed human carcinogens) or A2 (suspected human carcinogens). The ANL-East class 1 list includes certain additional chemicals for which published data and physical properties indicate a significant carcinogenic potential.

Class 2 carcinogens (ANL-East) are other “select carcinogens” (as defined by OSHA in 29 CFR 1910.1450, “Occupational Exposures to Chemical Hazards in the Laboratory”) that do not meet the class 1 criteria described above.

The risk of exposure of personnel to chemical carcinogens or other potentially hazardous materials used in the laboratory is related to the quantity and physical properties of the material used, the carcinogenic or mutagenic potency of the material, and the type of experimental procedures required. The *ANL ESH Manual* (Chapter 4.5) defines standard operating procedures and practices designed to minimize the risk of personnel exposure during the use of these materials. The principal investigator has primary responsibility for assuring the safe conduct of experiments by applying these guidelines to specific laboratory activities. Responsibilities are defined further below.

For operations with carcinogens in which the risk of exposure has been minimized by engineering (i.e., operations conducted in a vapor hood), the *ER Chemical Hygiene Plan* will serve as the standard operating procedure. Other operations with carcinogens, which entail a significant risk of exposure at levels above established guidelines (threshold limit values and permissible exposure limits), must have a specific written standard operating procedure, as indicated in Chapter 4.5 of the *ANL ESH Manual*.

Use small, working-level quantities of carcinogens (e.g., benzene, chloroform, and carbon tetrachloride) only in designated carcinogen-approved work areas, clearly marked as such and identified in the *ER Chemical Hygiene Plan*. These approved work areas must be capable of maintaining levels of carcinogens in air at or below the occupational exposure levels defined in the *ANL ESH Manual* (Chapter 4.5). Label containers for working-level quantities clearly with the chemical name (not symbols), and indicate that the contents are carcinogenic by using the labels specified in the *ANL ESH Manual*, Chapter 4.5.7.

12.2 Responsibilities

Supervisors are responsible for the following:

- Recognizing carcinogen hazards and understanding the control methods necessary to minimize exposures of employees and the public, consistent with the ALARA concept.
- Ensuring that employees receive appropriate information, including MSDSs and training, for working safely with carcinogens.
- Incorporating safe carcinogen handling practices into standard operating procedures for the project.
- Providing for ER Division and Industrial Hygiene (2-3310) review of carcinogen use, as specified by the *ANL ESH Manual*, Chapter 4.5.
- Reporting occupational exposure incidents involving carcinogens to the Medical Department (2-2800).
- Ensuring that carcinogens are disposed of properly in accordance with ANL-East procedures.

Employees engaged in research involving carcinogens are typically responsible for the following:

- Knowing and applying the safe work practices established by ER and the *ANL ESH Manual*.
- Complying with the oral and written safety policies and procedures established by ER, their supervisor, or both.
- Reporting all accidents resulting in possible exposure to carcinogens to their immediate supervisor.
- Reporting unsafe conditions to the principal investigator, the supervisor, or the ER ESH Coordinator.

12.3 Safety Training for Use of Carcinogenic Materials

All employees must have appropriate training in the standard operating procedures and emergency procedures to be used in the performance of assigned tasks before they are authorized to work with carcinogenic materials.

12.4 Work Practices

To achieve ALARA levels, adhere to the following safe work practices:

- Perform common procedures that can generate air contaminants (pouring, weighing powders, dropping liquids onto surfaces, etc.) in a laboratory hood. Use a glove box for operations that intentionally create significant aerosols of a carcinogen.
- Transport carcinogenic materials outside storage areas, laboratory hoods, or glove boxes in closed, unbreakable containers, using a secondary container.
- Do not mouth-pipette, eat, drink, smoke, chew gum, apply makeup, or place anything in your mouth or eyes when you are handling carcinogens or working in designated carcinogen areas.
- Eliminate the use of sharp objects (e.g., hypodermic needles, syringes, scalpels) whenever possible. Do not recap needles by hand.
- Wear a buttoned laboratory coat while you working with carcinogens. Do not wear such coats outside the laboratory area into offices, rest rooms, etc. When a laboratory coat is known to be contaminated, dispose of it as contaminated waste.
- When respirator use might be necessary, contact the ER ESH Coordinator or Industrial Hygiene (2-3310). Respiratory protection is selected according to the chemical, its physical form, and the nature of the task. See *ANL ESH Manual*, Chapter 12.2.
- Wear protective gloves to prevent hand contact with carcinogens. Industrial Hygiene personnel will help you select the best type of glove material on the basis of the chemical properties of the carcinogen and the nature of the task. Rubber and plastic gloves are permeable to certain chemicals. When disposable gloves can be used, discard them as carcinogen waste after each use or immediately after overt contamination. Check reusable gloves before each use for cracks, tears, or other signs of deterioration requiring disposal. Store reusable gloves worn for carcinogen work in a labeled container, separately from those used for noncarcinogen work, and use each type only for its designated purpose.

13 RESEARCH INVOLVING LASERS

Most lasers can cause eye injury to anyone who looks directly into the beam or specular reflections. Even diffuse reflections of a high-power laser beam can produce permanent eye damage. High-power laser beams can burn exposed skin, ignite flammable materials, and vaporize materials, possibly releasing hazardous fumes, vapors, or gases. The equipment and optical apparatus required to produce the lasing action and to control and direct the laser beam might introduce additional hazards, including high voltage, high pressure, cryogenics, noise, radiation, and toxic fluids.

Chapter 6.2 of the *ANL ESH Manual* establishes policy and procedures for the safe operation of lasers. All lasers used at ANL-East or at any field location, whether purchased, borrowed, fabricated, or brought in for use by others, are governed by the provisions of that chapter.

The classification of lasers is as follows:

- *Class 1 laser* — A laser that, because of its low emission or its installation, cannot produce accessible laser radiation levels in excess of the Class 1 Accessible Emission Limit for the maximum possible exposure duration listed in ANSI (American National Standards Institute) Z136.1.
- *Class 2 laser* — (Per ANSI Z136.1.) A continuous wave (CW) or continuously pulsed visible-light laser that could cause injury to the retina of the eye from the direct beam or certain specular reflections, from other than very brief exposures. Class 2 laser output cannot exceed 1×10^{-3} W (1 mW) total power.
- *Class 3 laser* — (Per ANSI Z136.1.) A pulsed or CW, visible- or invisible-beam laser that produces sufficient power or energy to cause retinal or other injury to the eye from the direct beam or specular reflections, from even momentary exposures. Diffuse reflections of Class 3 laser beams are not hazardous unless the beam is focused. Class 3 laser output cannot exceed 0.5 W for periods >0.25 sec or 0.125 J for periods <0.25 sec. A Class 3a laser produces accessible radiation that is between 1 and 5 times the Class 1 emission limit for invisible beams, or between 1 and 5 times the Class 2 emission limit for visible beams. All other Class 3 lasers are in Class 3b.
- *Class 4 laser* — (Per ANSI Z136.1.) A pulsed or CW, visible- or invisible-beam laser that produces sufficient power or energy to cause retinal or other injury to the eye from the briefest of exposures to the direct or specularly reflected beam, and diffuse reflections of which can be hazardous. Class 4 lasers are skin burn hazards and fire hazards. Class 4 laser output exceeds 0.5 W for periods >0.25 sec and 0.125 J for periods <0.25 sec.

Safety requirements for installations with exposed laser beams are summarized in Table 5. Chapter 6.2 of the *ANL ESH Manual* contains a complete description of the administrative, safety, and procedural requirements for laser use. Outdoor use of lasers should conform with ANSI Z136.6, *Safe Use of Lasers Outdoors*.

TABLE 5 Safety Requirements for Installations with Exposed Laser Beams^a

Requirement	Class 2	Class 3a	Class 3b	Class 4
No intentional staring into beam or specular reflections	LSO ^b or deputy evaluate and advise	x	x	x
No unshielded eye-level or vertical beams		LSO or deputy evaluate and advise	x	x
Area posted	LSO or deputy may advise	x	x	x
Indicator of invisible beam "ON"		x	x	x
Laser safety training	LSO or deputy may advise	x	x	x
Eye protection	Only for direct beam viewing	LSO or deputy evaluate and advise	x	x
Careful control of spectators		x	x	x
Laser controlled area		Recommended	x	x
Interlocked laser controlled area entry			If operated unattended	x
Documented standard operating procedures			x	x
Eye examination			x	x
Shielding for diffuse reflections				x
Written approval of ER Director		x	x	x
Laser safety audit by LSO		x	x	x

^a "x" indicates a requirement.

^b LSO, laser safety officer, a person qualified to recognize and evaluate laser hazards, appointed by the director of EQO to review and approve laser installations at ANL-East and to carry out related duties.

14 BIOSAFETY AND INFECTION CONTROL

Environmental materials can be biosafety hazards if microorganisms that can cause infection and disease in humans are present. Such microorganisms include, but are not limited to, certain bacteria, viruses, and fungi. These microorganisms vary widely in their ability to cause disease. A determination of the need for biological control should be made before work begins with materials that could contain biological agents.

Hazardous biological agents can be handled safely with the proper precautions. The *ANL ESH Manual*, Chapter 4.9, contains general biosafety principles and infection control practices required to ensure the health and safety of ANL employees. These principles and practices are based on applicable current guidelines issued by the National Institutes of Health and other organizations. More specific procedures and more stringent requirements might be required by the individual division or for special projects.

15 WORK NOT COVERED BY OTHER ARGONNE OR DIVISIONAL POLICY

15.1 General Considerations

As indicated in Section 1, the policies and procedures in this ER manual apply to all areas where ER personnel perform their work, including off-site locations and all areas at ANL-East outside Building 203. This section summarizes guidelines designed to minimize potential risk for off-site work.

15.2 Responsibilities

The principal investigator is responsible for the following:

- Receiving approval from the Division Director to begin any new activities. This process includes completing an SAF and submitting it to the ER SHE Committee.
- Implementing applicable safety policies and directives and taking other actions as required to provide for the safety of the operations he or she supervises.
- Inspecting the outside workplace for potential safety hazards and correcting or minimizing these hazards, as they apply to the type of work being performed (see Section 15.8 of this ER manual).
- Evaluating hazards for staff working alone; advising and directing the activities of personnel working alone outside.

The employee is responsible for the following:

- Following safe work practices in the outside workplace, particularly with regard to the supervisor's instructions to that effect.
- Not working alone without the supervisor's approval and guidance.

15.3 Environmental Hazards

Many natural hazards occur in the environment. Principal investigators must identify potential environmental hazards where they or their employees might work. First aid treatment and sources of emergency medical treatment must be identified before the hazards are encountered. Hazards that might be present during outdoor activities include the following:

- *Uneven terrain* — Uneven ground surfaces, protruding rocks, tree branches, and other vegetation might make walking difficult.

- *Poisonous snakes, insects, and plants* — Vipers (such as rattlesnakes, copperheads, water moccasins), spiders (such as the brown recluse or black widow), scorpions, and poison ivy or poison oak are common in many locations in the United States.
- *Disease-carrying insects and animals* — Infected mosquitoes (encephalitis), ticks (Lyme disease, Rocky Mountain spotted fever, Colorado tick fever), and mammals (rabies virus, hanta virus) are present in various regions of North America.
- *Hornets, wasps, bees* — Stinging insects found throughout the United States can pose severe hazards.

15.4 Accidents and Incidents

Procedures for accident/incident handling, reporting, and investigation in outdoor workplaces are similar to procedures for on-site situations. An exception is that an injured person might not be able to visit the ANL Medical Department for evaluation of injuries. In that case, the injured person is to visit a local doctor, clinic, or emergency room and immediately afterward report the incident to his/her supervisor. Section 5.3 in this ER manual describes ER reporting requirements. Employees who are away from ANL must report all accidents or injuries to their supervisors and ER management as soon as possible after an occurrence (certainly within one working day).

15.5 Project Safety Analysis

As with laboratory work in Building 203, new or substantially changed work outside requires completion of a PSA. This process is described fully in Section 6 of this ER manual.

15.6 Safe Work Permit

A safe work permit must be completed by the principal investigator for operations having unusual risks and hazards. With the aid (if needed) of the ER ESH Coordinator, the ER Field Safety Coordinator, or both, the principal investigator will plan operations requiring safe work permits. Examples of operations requiring a safe work permit are in the *ANL ESH Manual*, Chapter 7.4. Every effort must be made to avoid injury, and extraordinary safety precautions, justification, and documentation must be employed to compensate for the risks involved.

15.7 Working Alone

Working alone outdoors may present additional risks because of the unavailability of emergency care or the distance emergency response professionals might have to travel to provide assistance. Potential hazards in working alone outside must be anticipated, and proper precautions must be taken to prevent or reasonably reduce risks (*ANL ESH Manual*, Chapter 1.6). The principal investigator is responsible for evaluating the hazards of working

alone outside and for taking proper measures to avoid or reduce these risks. The employee must be sensitive to the dangers of working alone outside and in certain situations must seek advice and authorization from his/her supervisor on proper procedures to follow in conducting the work.

15.8 Premobilization Considerations

The principal investigator is responsible for the following actions before workers mobilize to an off-site work area:

- Designating persons for the following tasks:
 - Coordinate experiments and take overall responsibility
 - Communicate site/area hazards
- Ensuring the availability of and appropriate locations for these site resources:
 - Potable water
 - Wash-up facilities (pesticides, if applied during experiment)
 - Eating/drinking/smoking/chewing area (pesticides)
 - Telephones and other communication methods
 - First aid training and first aid kit
 - Fire extinguishers
 - Trash removal
 - Toxic/hazardous substances list
 - MSDSs for all substances
 - Lights for after-dark work
 - Storage area for flammable or toxic substances/gases
- Posting emergency contact information for the following:
 - Police protection
 - Fire protection
 - Ambulance service
 - Poison control center

- Location of and directions to the nearest hospital
- Establishing procedures for the following:
 - Evacuation in the event of fire, explosion, severe weather (including designation of a maximum wind speed before evacuation is required)
 - Moving to a tornado shelter or the nearest depression in the event of a tornado
 - Alarms or method to communicate emergency to all workers
 - Field check in/out (including designating an accountable individual)
 - Handling, disposal, and cleanup of toxic/hazardous chemicals/waste
 - Shipping and transportation of materials (gases, chemicals, etc.)
 - Scaffold erection and inspection
 - Provision and use of personal protective equipment (glasses, hard hats, body harnesses, etc.)
 - Security and equipment protection
 - Ladder use (e.g., set on plywood instead of soft ground)
 - Electrical safety (use of heavy-duty extension cords, GFCIs, proper voltage)
- Locating utilities before digging

16 ACTIVITIES AT HAZARDOUS WASTE SITES

16.1 General Considerations

For the purposes of this ER manual, hazardous waste sites are defined as locations where hazardous wastes are generated, stored, treated, discarded, or otherwise managed. Hazardous waste sites also include locations where hazardous wastes are known or suspected to have been previously discarded or abandoned. One important factor is the uncontrolled condition of the site. Uncontrolled conditions might pose an immediate danger to life or health, might not be immediately obvious or identifiable, might vary according to the location on the site and the task being performed, and might change as site activities progress.

All activities conducted at hazardous waste sites will be in compliance with applicable health and safety regulations promulgated by OSHA in 29 CFR 1910.120.

16.2 Training Requirements

All ER employees whose duties require them to be at hazardous waste sites are required to undergo a minimum of 40 hours of training, as specified under OSHA regulations [29 CFR 1910.120 (e)]. Workers who are unlikely to be exposed to permissible and published exposure limits, or who work in areas that have been monitored and fully characterized with no indications of health hazards, must have at least 24 hours of training. An annual 8-hour refresher course is required for each worker.

All ER employees whose responsibilities include directing or supervising individuals (including subcontractors) working at hazardous waste sites will undergo an additional minimum of 8 hours of training for supervisors as specified under OSHA regulations [29 CFR 1910.120 (e)].

All required training received from an outside vendor must be approved by the Training Section of EQO to obtain credit in the ANL Training Management System.

When the required training extends to the use of respirators, the respirator training will be administered through Industrial Hygiene (2-4149).

16.3 Medical Surveillance Requirements

All ER employees whose duties require them to be at hazardous waste sites for a total of 30 calendar days or more per year will undergo a medical supervision program coordinated by the ANL Medical Department. At a minimum, the surveillance program will satisfy the applicable OSHA regulatory requirements [29 CFR 1910.120 (f)], including termination evaluations.

Supervisors of employees required to undergo medical surveillance will be responsible for conveying relevant information regarding anticipated or potential hazardous chemical exposures

to the ANL Medical Department (2-2800), so that an appropriate medical surveillance program can be established for each individual subject to that requirement.

16.4 Health and Safety Plans

For all activities involving sampling and analysis at known or suspected hazardous waste sites, the principal investigator will develop formal health and safety plans. These plans will be reviewed by the ER SHE Committee and approved by the ER Director as part of the PSA process (Section 6 of this ER manual). The principal investigator will be responsible for implementation. Copies of all health and safety plans will be kept by the principal investigator, the field team leader, and the ER ESH Coordinator.

Health and safety plans will, at a minimum, meet the requirements of such plans specified in applicable U.S. Environmental Protection Agency, OSHA, and DOE regulations or orders. In addition, health and safety plans will satisfy any requirements for such plans established by state or local environmental regulatory agencies.

Consult with the ER ESH Coordinator for guidance on developing health and safety plans.

**Appendix A:
Building 203 Briefing**

ARGONNE
NATIONAL
LABORATORYINTRA-LABORATORY MEMO

To: All Non-ANL Workers

From: David P. Peterson

ESH Coordinator/ER

Subject: Building 203 Briefing

- **POLICY** - All work is to be planned and performed safely. No task is so important that it will be started without the right tools and the proper personal protective equipment required to perform the job.
- **WORKPLACE HAZARDS** -
 - Office hazards are no different than you would encounter anywhere else you perform work.
 - Laboratory hazards are more varied in nature and you must be briefed on the specific hazards before you enter the laboratories. The person responsible is listed on the white emergency notification card outside the laboratory. That person or his/her alternate must inform you of the specific hazards and the requirements that you must follow to safely perform work therein.
- **REPORTING EMERGENCIES** - To contact emergency response from any laboratory phone, dial 911. If you are calling from a cellular phone, you must dial 252-1911. State the emergency; give your exact location to the emergency dispatcher. Information identifying your location can be found on the 911 sticker attached to the phone in your location or on the white emergency notification card posted outside of all laboratories.
- **EMERGENCIES/EVACUATIONS** - You must participate.
 - In the event of a fire you may hear steady bells in the area where you are working and/or a steady tone over the Public Address System followed by an announcement. If told to evacuate the building or the wing where you are working, you must exit the area immediately via the nearest exit and wait for further instructions.
 - In the event of a severe weather warning, such as a tornado warning, proceed to the nearest tornado shelter. The tornado warning will be preceded by a steady tone over the Public Address System followed by an announcement telling you to proceed to a designated shelter. All tornado shelters in Building 203 are located on the service floor (basement). Yellow and black arrows are on all doors leading to the service floor. If you are outside the building during a tornado warning, civil defense sirens will sound. Again, seek shelter immediately in the nearest tornado shelter.
- **ALL ACCIDENTS, INCIDENTS, NEAR MISSES AND/OR SAFETY CONCERNS** - These should be reported to the person who authorized your presence in Building 203. If you are unable to find that person, you should notify:
 - ER ESH Coordinator -Room H-102, Ext. 2-3924 (can be called from on-site phones) or his alternate - Room J001, extension 2-2885.
 - In the event there is no one at said locations, proceed to Room J-107, the ER Division Office, where someone will always be available during normal working hours.
- **SAFETY** - It is expected that you will not perform work at any time in an unsafe manner or when unsafe conditions exist. Failure to comply with safety requirements such as the use of safety glasses, hearing protection, or safe work practices, will not be tolerated. Violators will be asked to leave the laboratory and will not be allowed to return to the ER Division.

Forms

The use of the forms in this section is discussed in the *ER Division Safety, Health, and Environmental Protection Policy and Procedures Manual*. All of these forms are available electronically. The following forms are included in this section:

- ER Safety Analysis Form
- SARS Applicability Assessment Form
- EEST Approval for Environmental Evaluation
- Accident Investigation Forms (ANL-239, ANL-240)

SAFETY ANALYSIS FORM Environmental Research Division

Note: This form is to be completed for all new investigations or activities and for all ongoing activities that undergo significant change from their original scope of work. The completed form will be submitted to the ER Division Office by the principal investigator. The information will be reviewed by the Division Director and by each member of the ER Division SHE Committee for unresolved safety, health, or environmental protection issues associated with the proposed work. The principal investigator may be asked to resolve outstanding issues through consultations with the SHE Committee before the work begins.

Section 1. Project Description

Date of Submission _____

Proposal No. TTP No. FWP No.

Project Title _____

Project Sponsor _____

Principal Investigator(s) _____

Other Participants (excluding administrative support personnel) _____

The project will begin on _____ (date).

The duration of the project will be _____ days/weeks/months/years.

In the space below (and on additional sheets if necessary) give a general description of the project, its objectives, and deliverables.

Section 2. Safety and Health Issues

Place an "x" in the appropriate column for each item in the table below to indicate the safety and health issues anticipated for this project.

JHQ No. ^a	Impact	Yes	No
RADIOLOGICAL HAZARDS^b			
R1	Anticipate receiving annual occupational radiation dose of 100 millirem or more from internal and external sources (or supervise those who do).		
R2	Work with radioactive material in quantities greater than 2% of the annual limit of intake.		
R3.1	Need to enter posted radiation areas without a trained escort.		
R3.2	Need to enter posted radioactive materials areas without a trained escort.		
R5	Operate, use, maintain, or inspect radiation-generating devices (or supervise those who do), specifically		
R5.1.1	Electron microscope,		
R5.1.2	Radiography device,		
R5.1.3	Analytical X-ray generator, or		
R5.1.4	Portable X-ray fluorescence device.		
R6	Need to have unescorted access to radiologically controlled areas at an accelerator facility.		
PHYSICAL HAZARDS			
P1	Work with or have significant potential for exposure to ultraviolet radiation (other than sunlight).		
P2	Work with devices that generate or emit microwave or radio frequency radiation (or supervise those who do).		
P3	Work with or have significant potential for exposure to magnetic fields greater than 60 millitesla.		
P4	Receive noise exposure greater than 85 dBA as an 8-hour time-weighted average at least once a year.		
P5	Work with lasers (or supervise those who do), specifically		
P5.1	As the supervisor of a laser controlled area,		
P5.2	With Class 2 lasers (including laser pointers),		
P5.3	With Class 3a lasers (including surveying devices), or		
P5.4	With Class 3b or Class 4 lasers.		
P6	Have responsibilities that may lead to electrical exposure, specifically		
P6.1	Work with electrical equipment or		
P6.2	Work on energized circuits or serve as a safety watch. [If "yes" to question JHQ P6.1 or P6.2, complete Section 3a ("Electrical Hazards") of this form.]		
P7	Have lockout/tagout responsibilities.		
P8	Enter confined spaces (or supervise those who do).		

JHQ No. ^a	Impact	Yes	No
PHYSICAL HAZARDS (Cont.)			
P9	Use pressure systems (or supervise those who do), specifically		
P9.1	Compressed gases, [If "yes," complete Section 3b ("Compressed Gases") of this form.]		
P9.2	Cryogenic fluids, or		
P9.3	Vacuum systems.		
P10	Use scaffolds or platforms.		
P11	Experience potential fall hazards.		
P12	Need to work in the following environments:		
P12.1	Outdoors (including all weather extremes)		
P12.4	Uncharacterized or hazardous waste sites		
P13	Need personal protective clothing and equipment, specifically		
P13.3	OSHA Level A, B, C, D protective equipment;		
P13.6	Self-contained breathing apparatus (SCBA);		
P13.7	Air-purifying respirator;		
P13.8	Supplied-air respirator; or		
P13.9	Powered air-purifying respirator.		
–	Experience exposure to potentially hazardous equipment or physical hazards/conditions. [If "yes," complete Sections 3c and 3d ("Potentially Hazardous Equipment" and "Physical Hazards/Conditions") of this form.]		
–	Experience exposure to nearby or co-located hazards/activities that might affect safety.		
–	Need to perform field work and/or work at remote locations.		
CHEMICAL AND BIOLOGICAL HAZARDS			
C1	Handle or have potential for exposure to human blood or body fluids (or supervise those who do).		
C2	Work with biohazards (or supervise those who do).		
C2.1	Handle or have potential for exposure to bacteria or bacterial toxins, viruses, or other microorganisms, regardless of biohazard level (or supervise those who do).		
–	Work with recombinant DNA.		
C3.1	Routinely use hazardous chemicals (or supervise those who do). [If "yes," complete Section 3e ("Hazardous Liquids and Solids") of this form.]		
C4	Work with explosives or highly reactive chemicals.		
C5	Work with inorganic or organic lead under conditions where exposure is likely, specifically with		
C5.1	Low to moderate potential for exposure or		
C5.2	High potential for exposure (> 30 µg/m ³).		
C6	Work with toxic chemicals, specifically		
C6.1	Carcinogens (see list of carcinogens at the back of ER Chemical Hygiene Plan);		
C6.2	Other acutely toxic or toxic chemicals (listed in question C6 on the Argonne Job Hazard Questionnaire).		
C7	Work with or handle asbestos.		

JHQ No. ^a	Impact	Yes	No
ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT HAZARDS			
E1	Have responsibility for waste, specifically		
E1.1	Hazardous,		
E1.2	Radioactive,		
E1.3	Biohazardous,		
E1.4	Mixed,		
C7	PCB or asbestos, or		
–	Oil and oil-like fluids (e.g., in vacuum pumps, in dielectric fluids, or in vacuum, lubrication, cooling, or hydraulic systems).		
E2	Have responsibility for completing or signing a waste disposal requisition form, specifically		
E2.1	A chemical waste disposal requisition form or		
E2.2	A radioactive or mixed waste disposal requisition form.		
–	Have evaluated and implemented waste minimization and/or pollution prevention strategies.		
MACHINE AND EQUIPMENT HAZARDS			
M1	Use or operate portable or hand-held power tools.		
M3	Operate hoisting and rigging equipment.		
M4	Perform open-flame or spark-producing operations.		
M5	Operate industrial trucks such as forklifts and motorized or manual pallet movers.		
–	Work in areas of high mechanical hazards, such as equipment shops, near drilling rigs, in hazardous waste site operations, etc.		
–	Generate oil or oil-like liquids or waste.		
–	Have designated personnel to use specific hazardous equipment and/or materials.		
–	Need to use equipment that is custom designed, fabricated, or assembled.		
NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)			
D4.9	Activity subject to authority of National Environmental Policy Act. ^c		
–	Have completed environmental evaluation for activity.		
GENERAL			
G3	Use fixed or portable ladders for nonconstruction work (including incidental use).		
–	Have JHQs and training profiles covering current activities for all personnel.		
–	Use written procedures/instructions/checklists as necessary to assure quality, continuity, and safety.		

^a Related question number on the Argonne Job Hazard Questionnaire.

^b If this work involves potential exposures to radioactive materials, complete the Safety Evaluation for Experiments Involving Radioactive Materials Conducted by ER Employees (Section 5 of this form).

^c If NEPA applies (or if it may apply), you are also required to complete the Environmental Evaluation Notification Form (DOE-CH-560).

Section 3. Experiment Safety Questionnaire

Name/description of R&D organization or area _____

Responsible person(s) _____ Date _____

3a. Electrical Hazards (Place an "x" in the appropriate column to indicate yes/no.)

Type	Yes	No
High-voltage equipment (≥ 600 V)		
Storage batteries, capacitors		
Arc/spark generation		
Need for working "hot"		
Insulation subject to radiation damage		
Normal operations requiring lockout		
Design of electrical systems (including interlocks) by division personnel		
Custom-designed control/operating systems		
Electrical work by division personnel for specific purposes:		
Operation		
Installation		
Modification		
Maintenance		

3b. Compressed Gases (Place an "x" in the appropriate column to indicate yes/no.)

Type	Yes	No	Type	Yes	No
Inert (e.g., nitrogen, argon, helium)			Compressed air cylinders		
Flammable (e.g., methane, acetylene)			Oxidizer (other than O ₂ or compressed air)		
Toxic (e.g., H ₂ S, CO, NO _x , NH ₃ , Cl ₂)			Corrosive		
Pyrophoric			Reactive		
Hydrogen ($\geq 4\%$)			Other (explain)		
Oxygen ($> 25\%$)					

3c. Potentially Hazardous Equipment (Place an "x" in the appropriate column to indicate yes/no.)

Type	Yes	No
Furnace		
Pressure systems (≥ 10 psi gauge)		
Complex liquid/gas distribution system (valves, pumps, flow controllers, tanks)		
Stationary power tools		
Portable power tools		
Materials-processing machinery (e.g., size-reducing, screening, mixing)		
Use of equipment for lifting/handling:		
Crane		
Hoist, fixed or portable		
Lift table		
Pallet mover		
Other (explain)		
R&D devices/machines with other notable electrical or mechanical hazards (e.g., rotating shafts, gears, belts, pinch points)		

3d. Physical Hazards/Conditions (Place an "x" in the appropriate column to indicate yes/no.)

Type	Yes	No
Hot (thermal surfaces/items)		
Cold surfaces/items		
Pressurized steam		
Use of needles or cutting blades		
Shrapnel/fragmentation potential		
Ergonomic (vibration, repetitive motion)		
Entry of confined space or equivalent		
Airborne dusts or aerosols		
Welding, brazing, or soldering		
Stored energy not otherwise indicated		

3e. Hazardous Liquids and Solids (including test materials/samples)

(Place an "x" in the appropriate column to indicate yes/no.)

Type	Yes	No	Type	Yes	No
Strong acids or bases			Carcinogens, mutagens, or teratogens		
Hydrofluoric acid			Irritants, allergens, sensitizers		
Etching reagents			Toxic heavy-metal compounds		
Perchloric acid, perchlorates			Alkali metals		
Strong oxidizers (e.g., nitrates)			Water-reactive chemicals		
Flammable liquids (fl. pt. < 38°C)			Air-reactive chemicals		
Combustible liquids (fl. pt. 38-93°C)			Pyrophoric materials		
Halogenated organic liquids/cleaners			Petroleum liquid fuels, including LP		
Halogenated refrigerants			Finely divided metals		
Cryogenic liquid			Explosives		
Dyes/stains			Asbestos (other than fixed, protected)		
Peroxide formers (e.g., ethers)					
Use/storage of ≥ 20 gallons of hazardous liquid					
Activities that create aerosols or particulate suspensions in air					
Other notably toxic/hazardous materials (explain)					

Identify additional training to be given to project participants to meet minimum training requirements.

Identify individuals who will wear radiation dosimetry monitors.

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

Identify any other outstanding safety, health, or environmental protection issues associated with this project that have not been addressed above.

Section 5. Statement of Prior Related Work

Is this work related to an earlier project that has undergone a Safety Analysis Review?

Yes	No

If yes, please complete this page. If no, go on to Section 6.

Provide name and date of the earlier project.

Identify any new health and safety issues that were not associated with the earlier work and state how these issues will be addressed in the present work.

Section 6. Safety Evaluation for Experiments Involving Radioactive Materials Conducted by ER Employees (Complete this section for projects that involve potential exposures to radioactive materials.)

What isotopes and amounts will be involved?

Isotope	Physical Form ^a	Total Quantity Involved ^b	Quantity Typically Used in a Single Experiment ^b

^a Physical form could be salt, powder, liquid, gas, etc.

^b Specify units (dis/min, Ci, etc.).

The experiment will begin on _____ (date).

The duration of the experiment will be _____ days/weeks/months/years.

Provide a schedule for the necessary radiation monitoring.

Where will the experiment be performed? (Identify all laboratories to be used, as well as hoods and/or glove boxes.)

What special provisions will be made for waste disposal?

Are additional or modified emergency plans required? Yes No

If so, identify appropriate changes and additions.

Will the experiment involve special nuclear materials? Yes No

Has the appropriate signage for experimental areas been discussed with Health Physics? Yes No

Have radiation monitors been ordered for all researchers? Yes No

Estimate the total external radiation dose equivalents from this work (in person-rems): _____

I certify that the above information was compiled by me or under my direction and that it is complete and correct to the best of my knowledge. I further certify that all participants in this project will be fully informed of safety, health, and environmental impacts associated with the proposed work.

Signature, Principal Investigator Date

SARS Applicability Assessment Form Direct-Funded Programmatic Activities

Instructions: Fill out this form for each new funding proposal or for each proposal for continuing funding in which program content is altered sufficiently to significantly change the safety impact. A “significant change” would increase the hazard class of the work or of the facility or apparatus used for the work. When an individual proposal is part of a larger group of proposed activities or represents a change in a larger ongoing activity, the form may be prepared either for the individual proposal or for the larger group. If a group assessment is used, the individual proposals included must be clearly identified. Proposals submitted by users through their own institutions for work at ANL-E user facilities should not be addressed. This form should be completed by the technical personnel most knowledgeable about the hazards of the work and their accident implications (e.g., the principal investigator and the senior staff associated with the proposal). Upon completion, provide an independent review and approval of the form by the Division Director or his designee. File the completed form with the safety documentation for the proposal or with other safety documentation for the division.

A. Type of assessment (check the one that applies in each column):

_____ Individual proposal	_____ New proposal
_____ Group of proposals	_____ Significant change

B. Proposal/group identification (for a group assessment, provide the following information, as an attachment, for each proposal in the group):

Title _____

 B&R code or other proposal number _____
 Principal investigator(s) _____

 Proposal date _____

C. Building(s) or facilities where conducted. If out of doors, indicate where, including off-site locations:

D. Determination of hazard class:

A preliminary hazard class of O is assigned if one or more of the following applies (check if appropriate):

_____ Involves the handling of nuclear weapons.
 _____ Consists solely of construction-related activity.
 _____ Work conducted primarily out of doors, e.g., observational environmental research, environmental characterization, environmental remediation. Exclusion assumes that NEPA documentation adequately addresses hazards.

A preliminary hazard class of C applies if the work is conducted in a facility or with apparatus covered by a safety analysis report. If applicable, indicate the name of the facility or apparatus:

If a preliminary hazard class of 4 (low), 5 (moderate), or 6 (high) has already been assigned to this work but a safety analysis report has not been completed, indicate the reference (e.g., internal memo, letter to DOE) in which the hazard class is documented or attach the documentation.

Preliminary hazard class (check one):

- O Other – covered by other DOE Order requirements, as determined above.
- C Covered – involves a facility or apparatus covered by a safety analysis report.
- 1 Everyday routine – the potential hazards are routinely encountered and accepted in the course of everyday living by the vast majority of the general public.
- 2 Routine laboratory – the potential hazards found in the Laboratory R&D environment are considered routine and of minimal risk by the scientific community.
- 3 Nonroutine laboratory – potential hazards found in the Laboratory R&D environment involve specialized materials, energy sources, or equipment that might present limited and local on-site impact and negligible off-site impacts to people or the environment.
- 4 Low – the potential hazards might present minor on-site and negligible off-site impacts to people or the environment.
- 5 Moderate – the potential hazards might present considerable on-site impacts to people or the environment, but off-site impacts are minor at most.
- 6 High – the hazards have the potential for on-site or off-site impacts to large numbers of persons or for major impacts to the environment.

E. Supporting Information:

Provide any information about the nature of the proposal and its hazards, plausible accidents, or accident consequences that will help justify or clarify the hazard class. (Continue on additional pages if necessary.)

F. Depth and Detail of Safety Documentation:

Proposals falling into classes 4-6 require a safety analysis report. Proposals falling into class C are covered by an existing safety analysis report but may require supplemental safety documentation. Proposals falling into classes O or 1-3 require simpler safety documentation for the identification, characterization, and control of hazards and the reduction of accident risk.

G. Certification:

Prepared by: _____ Date: _____

Approved by: _____ Date: _____

Division Director or Designee

EEST APPROVAL FOR ENVIRONMENTAL EVALUATION

Release of Funds Is Contingent on Approval

A. DESCRIPTION (For consolidated approvals, attach continuation page.)

Name of project or activity _____

Division _____ Principal Investigator/Project Manager _____
(name)

Identifying number (enter all that apply):

_____ WFO proposal number	_____ Work for Other DOE contractor
_____ CRADA proposal number	_____ LDRD number
_____ FWP number	_____ B&R Code
_____ Other (explain) _____	

CONTINUE.

B. APPROVAL FOR OFFICE ACTIVITIES (If not applicable, GO TO Section C.)

The activity(s) described above will be wholly confined to conducting "office work" (e.g., program planning, management, and administration; information gathering; information/data analysis; preparation and dissemination of reports; modeling; conceptual design; software development).

For any off-site or on-site activities ANL personnel will not be responsible for directing or conducting: laboratory work, field sampling, geophysical or geological characterization, installation of field instruments, drilling or digging, or any other activities with potential for disturbing the existing ecological/environmental conditions.

Principal Investigator/Proj. Mgr. _____
(name)
(signature)
(date)

Environ. Compl. Rep. _____
(name)
(signature)
(date)

STOP if Section B is applicable.

C. APPROVAL FOR OTHER ACTIVITIES (Complete either item 1 or item 2.)

1. _____ As documented by completion of checklist EST-EE-02, the activities will fully conform with the criteria for a categorical exclusion for bench-scale research and development as described in EST-EE-03.

The EST checklist (EST-EE-02) was completed on _____
(date)

2. _____ Other NEPA documentation has been approved by (check all that apply):

_____ EST NEPA Owner _____ ANL NEPA Reviewer _____ DOE-ARG

Most recent approval _____
(date)
(description)

EST NEPA Owner _____
(name)
(signature)
(date)

EEST CHECKLIST: CONFORMANCE WITH CATEGORICAL EXCLUSION FOR BENCH-SCALE R&D

For each line in sections 1, 2, and 3 enter either Y (yes), N (no), or NA (not applicable) with either (a) consultation of or (b) knowledge of the indicated sections of EEST-EE-03, "Categorical Exclusion for Bench-Scale R&D: EST Criteria."

1. "YES" is required for a categorical exclusion.

_____ All work will be conducted at ANL-E. (1)

2. "NO" is required for a categorical exclusion.

- _____ 2.1 Construction or major renovation is required. (1)
- _____ 2.2 A Safety Analysis Report is required. (2.1)
- _____ 2.3 A new or modified RCRA or NPDES permit is required. (4.1)
- _____ 2.4 A new or modified Federal/State permit is required. (4.5)
- _____ 2.5 Asbestos removal is required as part of the R&D activity. (2.4)

3. "YES" or "NA" is required for a categorical exclusion.

- _____ 3.1 Radioactive materials and sources of radiation will be used with appropriate control. (3.1)
- _____ 3.2 Limited amounts of chemicals will be used appropriately. (2.2)
- _____ 3.3 Limited amounts of PCBs will be used appropriately. (2.3)
- _____ 3.4 Preparatory asbestos removal has been evaluated by PFS. (2.4)
- _____ 3.5 Hazardous waste will be appropriately accumulated and disposed. (2.5)
- _____ 3.6 Radioactive waste will be appropriately accumulated and disposed. (2.6)
- _____ 3.7 Mixed waste will be appropriately accumulated and disposed. (2.7)
- _____ 3.8 Studies of hazardous waste treatment will be preceded by notification of Illinois EPA. (4.5)
- _____ 3.9 Noise protection will be provided. (3.2)
- _____ 3.10 Emission of volatile chemicals will conform with existing permits. (4.2)
- _____ 3.11 Emission of hazardous/toxic/criteria pollutants will conform with existing permits. (4.3)
- _____ 3.12 Floor drains will be protected from hazardous/radioactive material. (4.4)

4. Description and Certification (Add continuation page for consolidated evaluations.)

Division _____ Name of project or activity _____

Identifying number (enter all that apply):

- | | |
|-----------------------------|-------------------------------------|
| _____ WFO proposal number | _____ Work for Other DOE contractor |
| _____ CRADA proposal number | _____ LDRD number |
| _____ FWP number | _____ B&R Code |
| _____ Other (explain) _____ | |

The responses in sections 1, 2, and 3 accurately represent the project or activity described in section 4. The project or activity will fully conform with the conditions in EEST-EE-03.

Principal Investigator/Proj. Mgr. _____
(name) (signature) (date)

Environ. Compl. Rep. _____
(name) (signature) (date)

**Argonne National Laboratory
INCIDENT ANALYSIS REPORT**

Person Involved			
1. Name of person, home address	2. Badge no.	3. Division & department	4. Date of hire (service date)
5. Job classification/ occupation	6. Years of experience on this job	7. Date of incident	8. Time of incident
9. Time workday began		10. Supervisor's name	
11. Location of incident: Building/room Area/address		12. How was the incident reported?	
Injury/Illness Only			
13. Name and address of treating physician			
14. Date reported to Medical Department _____ Time _____			
15. Date reported to Supervisor _____ Time _____			
16. Hospitalized? <input type="checkbox"/> No <input type="checkbox"/> Yes			
If yes, name of hospital and address _____			

17. Property damage (vehicle/equipment/structure)		18. Other Incidents	
A. Vehicle or Equipment Number:		A. Nature of Incident	
B. Nature of damage <input type="checkbox"/> Fire <input type="checkbox"/> Explosion <input type="checkbox"/> Collision <input type="checkbox"/> Other: _____		<input type="checkbox"/> Personal radiation exposure <input type="checkbox"/> Personal contamination <input type="checkbox"/> Chemical release <input type="checkbox"/> Personal chemical exposure <input type="checkbox"/> Radiological release <input type="checkbox"/> Near miss <input type="checkbox"/> Other: _____	
C. Cost of repair & cleanup _____ <input type="checkbox"/> Estimated <input type="checkbox"/> Actual (check one)		B. Cost, if applicable	
D. Object/equipment/substance inflicting damage		C. Person(s) reporting incident	
E. Operator of equipment		D. Object/equipment/substance related	
F. Was vehicle equipped with seatbelts? <input type="checkbox"/> No <input type="checkbox"/> Yes If yes, was seat belt in use?			

Incident (use additional sheets if needed)

19. Describe the incident and how it occurred:

20. Witnesses to incident:

21. Describe the specific factors that caused or contributed to this event.

22. What were the contributing causes that, if corrected, could prevent recurrence?

Action Plan (use additional sheets if needed)

23. What immediate remedial actions were taken?

24. What corrective actions will be taken to address contributing causes?

25. Incident Analysis Report prepared by:

Print name: _____ Signature: _____ Date: _____

I have reviewed and approve of this incident analysis report:

26. Employee's supervisor's signature: _____ Date: _____

27. Division director's signature: _____ Date: _____

Instructions

1. Record name of the person involved, e.g., person injured, person operating motor vehicle at time of incident, or person observing property damage.
2. Record ANL-E badge number of person involved. For persons without an ANL-E badge number, enter "None."
3. Record division and department of the person involved. For non-ANL-E personnel, enter division and department responsible for their access to ANL-E.
4. Record the involved person's most recent date of hire at ANL. For non-ANL-E personnel, enter "Not an employee."
5. Record job classification or occupation.
6. Record the length of time in years that the employee has worked at his/her present job classification or occupation.
7. Record the date of the incident.
8. Record the time of the incident.
9. Record the time the workday began for the person involved.
10. Record the name of the supervisor of the person involved. For non-ANL-E personnel, enter the name of the person responsible for their access to ANL-E.
11. Record the location of the incident. Provide the ANL-E building and room number, area, or address.
12. Record how the incident was reported (e.g., employee informed supervisor; 911 call [name of person who placed call]; employee reported to Medical Dept.; employee was driven to Medical Dept., etc.).
13. If treatment was provided by the ANL-E Medical Department, enter "ANL Medical Department." For injuries/illnesses treated by a non-ANL-E medical care provider, provide the name and address of the treating physician.
14. Record the date and time employee reported injury/illness to the ANL-E Medical Department.
15. Record the date and time employee reported injury/illness to first line supervisor.
16. Identify whether injury/illness required in-patient hospitalization. If hospitalized, provide the name and address of the hospital.
17. If damage to a vehicle, equipment, or structure occurred, provide information on (A) the vehicle or equipment number; (B) nature of damage; (C) cost to repair/replace and clean up damage (include programmatic time spent); (D) what caused the damage; (E) name of person operating the equipment that caused the damage or was damaged; and (F) if a vehicle was involved, was it equipped with seatbelts and, if yes, was the seat belt in use.
18. For an incident other than occupational injury/illness or property damage, indicate (A) the nature of the incident; (B) cost including cleanup and disposal and/or cost to control the hazard; (C) name of person(s) reporting the event; and (D) name of the object, equipment, and/or substance related to or involved in the incident.

19. Describe the incident in detail and how it occurred. Items to include are the specific activity the employee was engaged in at the time of the accident/incident, a chronological description of all facts relating to the incident, and any action that removed or by-passed safety requirements or features. Attach additional sheets if necessary.
20. Identify any witnesses to the incident. Statements of persons involved, witnesses, and supervisor must be attached to this Incident Analysis Report. Use Incident Description form, ANL-239.
21. Describe the specific factors that caused or contributed to this event. Identify any contributing personnel actions, hazardous physical conditions, job factors, and environmental and equipment conditions that may have had any impact on the incident. Attach additional sheets if necessary.
22. Describe the contributing causes that need to be corrected to prevent recurrence. Attach additional sheets if necessary.
23. Describe the immediate actions that were taken to remove the hazard or to avoid a repeat of the incident. Attach additional sheets if necessary.
24. Describe the corrective actions that will be taken to address the contributing causes. Include assignment of responsibility and anticipated completion dates. Attach additional sheets if necessary.
25. Provide the name of the person preparing the Incident Analysis Report, as well as their signature and date signed.
26. The Incident Analysis Report must be reviewed and approved by the employee's immediate supervisor. Document the review and approval by providing the signature of the employee's immediate supervisor and date signed.
27. The Incident Analysis Report must be reviewed and approved by the employee's division director. Document the review and approval by providing the signature of the employee's division director and date signed.