

# General Employee Training Study Guide

Oak Ridge National Laboratory  
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## ABBREVIATIONS AND ACRONYMS

AHA	activity hazard analysis
ALARA	as low as reasonably achievable
AVID	Accelerated Vendor Inventory Delivery
CBD	chronic beryllium disease
CBDPP	Chronic Beryllium Disease Prevention Program
DCSO	Division Computer Security Officer
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DRCO	Division Radiological Control Officer
DTO	Division Training Officer
EAP	Employee Assistance Program
ECR	Environmental Compliance Representative
EPO	Environmental Protection Officer
EPWS	Environmental Protection and Waste Services Division
ES&H	environment, safety, and health
ETTP	East Tennessee Technology Park
GET	General Employee Training
GI	Generator Interface
ISM	Integrated Safety Management
ISSM	Integrated Safeguards and Security Management
HazCom	Hazardous Communication
HFIR	High Flux Isotope Reactor
LLC	Limited Liability Corporation
LSA	Limited Security Areas
LSS	Laboratory Shift Superintendent
LSS/PSS	Laboratory Shift Superintendent/Plant Shift Superintendent
MSDS	Material Safety Data Sheets
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
OSSD	Operational Safety Services Division
P-AAA	Price-Anderson Amendments Act
PCBs	polychlorinated biphenyls
PPA	Property Protection Areas
PPE	personal protective equipment
PRISM	Property Information System
PSS	Plant Shift Superintendent
RCT	Radiological Control Technician
SBMS	Standards-Based Management System
SRT	Special Response Team
SWP3	Storm Water Pollution Prevention Program
TLD	thermoluminescent dosimeters

## WHERE TO REPORT

### Emergencies 911

Laboratory Shift Superintendent (574-6606 on cell phones, Station 10 on two-way radios)  
Reporting activities that are unsafe to site operations, the environment, the general public, and matters and concerns that affect you personally. **Your first avenue of reporting concerns is through your supervisor.**

Type of Situation	Report To
Asbestos material—damage or debris associated with labeled	Your Supervisor, the Building Manager, Operational Safety Services Division, ORNL Asbestos Manager
Badge—lost, stolen	ORNL Badge Office (574-7205)
Beryllium Disease Prevention	<a href="http://hss.ossd.ornl.gov/beryllium.htm">http://hss.ossd.ornl.gov/beryllium.htm</a>
Bomb Threats 911, Your Supervisor, Laboratory Shift Superintendent	(574-6606)
Cyber Security Your Division Computer Security Officer Discrimination Your Supervisor, the Workforce Diversity Office	(576-2432), Helplines list on page 11 of this Study Guide
Division Computer Security Officer	<a href="http://internal-security.ornl.gov/dcsoorg.shtml">http://internal-security.ornl.gov/dcsoorg.shtml</a>
Drug Control Program Your Supervisor	<a href="http://sbms.ornl.gov/sbms/sbmsearch/subjarea/subabuse/sa.cfm">http://sbms.ornl.gov/sbms/sbmsearch/subjarea/subabuse/sa.cfm</a>
Environment concerns Your Supervisor, ORNL ES&H staff, Helplines list on page 11 of this Study Guide Environmental Compliance Representative (ECR)	<a href="http://eshtraining.ornl.gov/sbms/SBMSearch/SubjArea/ecr.html">http://eshtraining.ornl.gov/sbms/SBMSearch/SubjArea/ecr.html</a>
Environmental Protection Officers (EPO)	<a href="http://www-ep.ornl.gov/admn/epo/list/epo.cfm">http://www-ep.ornl.gov/admn/epo/list/epo.cfm</a>
Export Control	<a href="http://home.ornl.gov/divisions/contracts/contresp09a.html">http://home.ornl.gov/divisions/contracts/contresp09a.html</a>
Fire Extinguisher Use Fire Department	(574-5678)
General Employee Training Records, Training and SBMS Services Division	(576-1460)

Type of Situation	Report To
Generator Interface (GI)/Generator Equivalent (GIE)	<a href="http://ntser3.cad.ornl.gov/lws/Documents/juneGIE.PDF">http://ntser3.cad.ornl.gov/lws/Documents/juneGIE.PDF</a>
Health concerns Your Supervisor, Health Services	(574-7431)
ORNL Environment, Safety and Health staff, Atomic Trades and Labor Council Health and Safety Representatives	Helplines list on page 11 of this Study Guide
Illness or Injury	Your Supervisor
ISSM	<a href="http://home.ornl.gov/general/issm/issm_functions.pdf">http://home.ornl.gov/general/issm/issm_functions.pdf</a>
ISSM Working Group	<a href="http://home.ornl.gov/general/issm/helpdesk.shtm">http://home.ornl.gov/general/issm/helpdesk.shtm</a>
Jogging, bicycling, walking routes	<a href="http://home.ornl.gov/general/ORNL_Today/todayfiles/jogprint.pdf">http://home.ornl.gov/general/ORNL_Today/todayfiles/jogprint.pdf</a>
Maintenance/Operations and Research and Development Work Control Processes	<a href="http://home.ornl.gov/general/issm/issm_wep.shtm">http://home.ornl.gov/general/issm/issm_wep.shtm</a>
Mismanagement—violation of laws or regulations	Your Supervisor, Helplines list on page 11 of Study Guide
Occupational Dose	<a href="http://www.ossd.ornl.gov/ds/tld/">http://www.ossd.ornl.gov/ds/tld/</a>
ORNL Policy on Personal Use of Unclassified ORNL Resources	<a href="http://eshtraining.ornl.gov/sbms/SMBSearch/ORNLPO033.htm">http://eshtraining.ornl.gov/sbms/SMBSearch/ORNLPO033.htm</a>
P-AAA	<a href="http://nfs.ossd.ornl.gov/p-aaa/">http://nfs.ossd.ornl.gov/p-aaa/</a>
Pollution Prevention Home Page	<a href="http://www.ornl.gov/ornlp2/p2main.htm">http://www.ornl.gov/ornlp2/p2main.htm</a>
Protected Information Your Supervisor, Security Organization, Laboratory Shift Superintendent	(574-6606)
Proximity Card—lost, stolen, temporary	ORNL Visitor Services (574-7199)
Public Address System/Emergency Notification System	Laboratory Shift Superintendent (574-6606)
Quality	Your Supervisor, Helplines list on page 11 of this Study Guide
Radiological material—unattended or an unusual radiological situation	Radiological Support Services or the Laboratory Shift Superintendent (574-6606)/PSS (574-7172)
Radioactive sources—bringing radioactive sources into ORNL	Radiological Support Services

<b>Type of Situation</b>	<b>Report To</b>
Radionuclides medical treatment	Dosimeter Distribution Center (574-6668)
Reproductive health concerns Health Services	(574-7431)
Safety—non-imminent dangers	Your Supervisor, Safety Officers, Atomic Trades and Labor Council Health and Safety Representatives
Service Subcontractors	<a href="http://sbms.ornl.gov/sbms/SBMSearch/SubjArea/Procurement/procuresa.cfm">http://sbms.ornl.gov/sbms/SBMSearch/SubjArea/Procurement/procuresa.cfm</a>
Storm Water Pollution Prevention Programs (SWP3)	<a href="http://oecdwsrv.oecd.ornl.gov/water/swp3/swp3docurwp3toc.htm">http://oecdwsrv.oecd.ornl.gov/water/swp3/swp3docurwp3toc.htm</a>
TLD—lost or forgotten	Your Supervisor, a Radiological Control Technician, y Division Radiological Control Officer
Unsafe operation— activities that may affect the safe operation of the installation	Your Supervisor, Security Organization, Laboratory Shift Superintendent (574-6606), Helpline on page 10 of this Study Guide
Vehicles accidents	Your Supervisor
Vehicles deficiencies— that did not pass the operator inspection	Your Supervisor
Waste Disposal	Your Environmental Protection Officer, Generator Inte staff
Working Alone Working Alone After Normal Working Hours	Laboratory Shift Superintendent (574-6606)

# GENERAL EMPLOYEE TRAINING

## INTRODUCTION

Welcome to the Oak Ridge National Laboratory (ORNL) General Employee Training (GET). The purpose of this training is to assist you in learning about ORNL, its policies, and its operations. It is a general guide to standards of ethics and conduct all employees are expected to observe.

This training we will cover the following major topics:

- Integrated Safety Management (ISM) Program describes a program to improve safety, increase efficiency, and minimize costs.
- Standards of Conduct address the rules that govern work- related responsibilities.
- Laboratory Security identifies requirements for protecting information, personnel, and property.
- Emergency Preparedness and Response covers requirements for responding to emergency signals and reporting emergency events.
- Environment, Safety, and Health (ES&H) includes responsibilities and methods for protecting the environment and the safety and health of personnel working or visiting at ORNL.
- Nuclear Safety explains the fissile control areas and other Nuclear Criticality Safetyrelated topics.

Successful completion of this training allows unescorted access to the Controlled Areas at ORNL, BWXT Y-12 (outside the protected areas), and at East Tennessee Technology Park (ETTP). The training is effective for two years, and then must be renewed via classroom training, web-based training, or test-out.

Many employees will receive additional training based upon their specific job assignments (e.g., radiological areas, etc.). If you are required to take this additional training, it is very important that you keep your training current.

If you have any questions about the ORNL GET course, please contact the Records, Training and SBMS Services Division at 576-1460.

# INTEGRATED SAFETY MANAGEMENT (ISM) PROGRAM

## OBJECTIVE

*Identify concepts that make up Integrated Safety Management (ISM) to include the core safety management functions, roles and responsibilities, mandates and drivers, and implementation.*

*Safety [environment, safety, and health (ES&H)] is a core value and fundamental to all work activities. ISM is a formal process “to do work safely” for improving safety, increasing work efficiency, and minimizing costs.*

## CORE SAFETY MANAGEMENT FUNCTIONS

The framework for ISM is established through a five-step process that consists of the following core safety functions:

### **1. Define the Work and Its Hazards**

- Translate ORNL mission objectives into work
- Identify expectations for the performance of that work
- Prioritize tasks

### **2. Analyze Hazards**

- Identify and analyze hazards
- Categorize hazards

### **3. Develop and Implement Hazard Controls**

- Identify applicable standards and requirements
- Establish safety controls to prevent and mitigate hazards
- Implement controls
- Allocate resources to ensure work is performed safely

### **4. Perform Work Within the Controls**

- Confirm readiness
- Perform work safely
- Operations
- Maintenance
- Research and Development activities

### **5. Provide Feedback and Continuous Improvement**

- Assess work performance and adequacy of controls
- Collect feedback information
- Identify improvement opportunities

## GUIDING PRINCIPLES

ISM's eight guiding principles, when combined with the five core functions, are fundamental elements to performing work safely.

### 1. Line management responsibility for safety.

Line management is directly responsible for the protection of the public, the workers, and the environment.

### 2. Clear roles and responsibilities.

Clear lines of authority and responsibility for ensuring safety are established and maintained at all organizational levels.

### 3. Competence commensurate with responsibilities.

Personnel possess the experience, knowledge, skills, and abilities that are necessary to do their jobs.

### 4. Balanced priorities.

Resources are effectively allocated to address safety, programmatic, and operational considerations.

### 5. Identification of safety standards and requirements.

Before the work is done, the identified hazards are evaluated and an agreed-upon set of standards and requirements are established.

### 6. Hazard controls tailored to work.

Administrative and engineering controls to prevent or minimize hazards are tailored to the work and the hazards.

### 7. Operations authorization.

The conditions and requirements to be met are clearly established and agreed upon before operations are initiated.



## **8. Employee Involvement.**

**ALL** ORNL employees should have a working knowledge of their division's ISM plan and understand how they should implement it in their daily work activities (including an understanding of how they can contribute to the process).

## **ROLES AND RESPONSIBILITIES**

We each play a role in the ISM process by utilizing an integrated "team" approach to ensure everyone's safety. Everyone is responsible for safety:

- senior managers,
- organization managers,
- general supervisors or unit managers,
- first- line managers,
- workers, and
- subcontractors.

## **MANDATES AND DRIVERS**

The mandates and drivers behind ISM include:

- Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 95- 2, "Integrated Safety Management";
- Department of Energy (DOE) Policy 450.4, "Safety Management Systems Policy"; and
- ISM description prepared by each contractor.

## **IMPLEMENTATION**

ISM description reflects our approach for integrating safety into all aspects of work planning and execution. "Safety" includes ES&H programs and practices to ensure safety and health of the worker and protection of the environment. Worker involvement at all levels is important to successful implementation and safe performance of work activities.

Work Control is the process used for managing and controlling work at ORNL. Work is evaluated through the appropriate ISM procedure in the Work Control subject area prior to the initiation of work activities. Hazards for research and development activities are identified and controlled through the use of the "Research Hazard Analysis and Control System" tool. Hazards for operations, maintenance, and services activities are identified and controlled through a pre-approved work package/plan or the step-by-step development of a work plan specific to the job. The "Work Plan System" tool is available to use for the development of an operations, maintenance, or services work plan.

# STANDARDS OF CONDUCT

## OBJECTIVE

*Identify the standards of conduct, rules, and regulations that govern the work-related responsibilities and obligations of a DOE contractor, subcontractor, or visitor to ORNL. Standards of conduct, rules, and regulations help you understand your responsibilities and obligations as an employee, subcontractor, or visitor.*

## RESPONSIBILITIES

### FREE FROM THE INFLUENCE

Having a drug-free workplace protects our health and safety. Drugs keep you from doing your best on the job, and the effects can be dangerous to others as well. Employees who are free of alcohol and other drugs have fewer accidents, make fewer mistakes, and are more productive.



### Impact of Substance Abuse

Abusing drugs and/or alcohol impacts an employee's health, productivity, safety, decision making, morale and security. Abuse of drugs and alcohol affects an employee emotionally (i.e., aggression, burnout, anxiety, depression), behaviorally (i.e., slow reaction time, impaired coordination, irritability, lack of energy), and physically (i.e., weight loss, sweating, chills).

People who abuse drugs and/or alcohol have a higher use of health benefits, increased use of sick time and higher absenteeism and tardiness. The employee can be physically and mentally impaired while on the job which interferes with job satisfaction, reduces output, increases errors, lowers work quality and reduces customer satisfaction.

Abuse of drugs and alcohol often leads to employees' making poor decisions, reduces innovation and reduces creativity. Common effects of substance abuse include impaired vision, hearing and muscle coordination and lower attention span, alertness and mental sharpness. This can lead to increase workplace accidents which can affect other employees.

<b>Specific Drug Abuse</b>	<b>Signs and Symptoms of Abuse</b>	<b>Health Effects</b>
Alcohol	Dulled mental processes; lack of coordination; slowed reaction time; poor judgment; reduced inhibitions	Liver disease; increased cancers of the mouth, tongue, pharynx, esophagus, rectum, breast and skin; kidney disease; ulcers; spontaneous abortion; birth defects
Marijuana	Physical: Substantial increase in heart rate; bloodshot eyes; dry mouth and throat; increased appetite; chronic sore throat Mental: Impaired or reduced short-term memory and comprehension; altered sense of time; changed sensory perception (sight, smell, hearing, touch); reduced ability to perform tasks requiring concentration and coordination	Emphysema-like symptoms; respiratory track and sinus infections; lowered immune system response
Cocaine	Dilated pupils; increased pulse rate; elevated blood pressure; insomnia; loss of appetite; tactile hallucinations; paranoia; seizures; anxiety, agitation; periods of increased activity followed by fatigue and depression; wide mood swings; difficulty in concentration	Stimulates central nervous system; immediate effects include dilated pupils and elevated blood pressure, heart rate, respiratory rate and body temperature
Narcotics	Drowsiness; nausea and vomiting; constricted pupils; watery eyes and itching; low and shallow breathing; clammy skin; impaired respiration; convulsions; coma; possible death	Tolerance to narcotics develops rapidly and addiction is likely; use of contaminated syringes may result in diseases such as HIV/AIDS, endocarditis and hepatitis; can lead to premature, stillborn or addicted infants

### **Employee Responsibilities**

ORNL employees and subcontractors who use, possess, sell, distribute, traffic in, or manufacture illegal drugs on or off the job or on company premises subject themselves to disciplinary action up to and including termination, even for a first offense.

An employee will not be retained on the payroll following a second offense.

All employees must abide by the terms of the Substance Abuse subject area (<http://sbms.ornl.gov/sbms/sbmsearch/subjarea/subabuse/sa.cfm>) as a condition of employment.

### **Testing Designated Position**

Some positions at ORNL are designated as Testing Designated Positions. All persons assigned to Testing Designated Positions are subject to random drug testing on an on-going basis. You will be told by your supervisor if you are in a Testing Designated Position. Those positions include:

1. positions covered by the Personnel Security Assurance Program (PSAP);
2. positions that require an employee to perform work with high explosive or nuclear material that could detonate;
3. positions where failure could significantly harm the environment, public health or safety, or national security;
4. other positions determined by DOE to have the potential to significantly affect the environment, public health or safety, or national security; or
5. any individual who is allowed unescorted access to the control areas of the High Flux Isotope Reactor (HFIR).

Where there is reasonable suspicion to believe that an employee may have used an illegal drug, the Company may require the employee to submit to a drug test.

### **Employee Assistance Program**

We care about your health and well-being. Assistance is available to every UT-Battelle employee through the [Health Division](#) or through the Employee Assistance Program (EAP) provider, [Magellan Behavioral Health](#). Either of these assistance programs provides help. If an employee chooses to seek help for a drug problem from the Health Division or from a program such as the EAP, this act by itself will not be used against him or her by the company as the basis for a disciplinary action. However, if ORNL learns about an employee's drug involvement from another independent source, the fact that the employee sought assistance will not lessen any appropriate disciplinary action, including termination.

ORNL has no obligation to pay the costs of any individual's counseling, treatment, or rehabilitation beyond those services provided by the Health Division or the EAP, except as provided for under ORNL benefit programs.

## Smoke-Free Environment

ORNL is a smoke free working environment. Smoking is permitted outdoors unless otherwise indicated. to employees with problems that affect their work – from a family crisis to an alcohol or other drug abuse problem. An employee who has a drug problem may voluntarily seek help from the Health Division or from the EAP.

## MISCONDUCT

You are expected to conduct yourself in a way that helps your area run efficiently and safeguards the workplace for all personnel. You are also expected to follow legal instructions from a supervisor that falls within company policy. This topic explains types of misconduct (inappropriate behavior and property abuse) that are prohibited and that are grounds for disciplinary action, including termination.

### Inappropriate Behavior

The following inappropriate behaviors are prohibited and are grounds for disciplinary action, including termination or removal from the site:



- taking or offering a bribe in exchange for a job, a contract, or any other company action;
- willfully signing or recording the time of another individual for the purpose of creating a false record;
- sleeping during work hours (even during the unpaid break);
- refusing to carry out job responsibilities or obey legal instructions;
- willfully neglecting job duties;
- inflicting indecent conduct, remarks, or improper proposals on another site worker, either at work or after business hours (e.g., phoning a person who has made it clear the contact is unwanted); or
- intentional, willful, or grossly negligent conduct in violation of ES&H standards.

### Property Abuse

The United States Government owns and entrusts the property, materials, and equipment at DOE installations to our use. Any of the following acts, including misuse, or destruction of government property may result in immediate termination and prosecution:

- stealing or dishonesty, including aiding or abetting in the unauthorized removal of government property from installations;
- theft of property from a fellow employee;
- use of government vehicles for personal use; or
- accidents or breakage resulting from horseplay.

## REPORTING

DOE considers the health, safety, and concerns of individuals to be of paramount importance. Reporting activities that are unsafe to site operations, the environment, and the general public are important. In most cases, you are required to report certain activities. You are also responsible for reporting some matters and concerns that affect you personally. This topic explains your personal and plant reporting responsibilities, including the avenues for reporting.

### Illness and Injury

If you should become ill during the course of the workday, contact your supervisor.

If you are injured on the job, no matter how slight the injury, you must report it to your supervision. Reporting injuries is for the protection of the employee. A minor injury may be more serious than first thought. If you need emergency medical treatment, it can be obtained at site Health Services. If required, Health Services may transport you to an area medical treatment facility.



### Working Alone After Normal Working Hours

Although ORNL prefers that people not work by themselves performing possible hazardous duties during non-business hours, it is realized that this may be necessary on some occasions. When this occurs and the working time is not incidental (i.e., more than one hour), employees at the Laboratory should notify the Laboratory Shift Superintendent (LSS) 574-6606, or submit the online Notification of Work After Hours form and notify the LSS that the entry has been made in the system ([http://home.ornl.gov/divisions/laboratory\\_protection/lss/working\\_late.shtm](http://home.ornl.gov/divisions/laboratory_protection/lss/working_late.shtm)). The LSS organizations will arrange for periodic checks (about every 2 hours) to ensure your well being.

Laboratory employees or guest assignee at BWXT Y-12 should notify the Plant Shift Superintendent (PSS), 574-7172 or the ETPP Park Shift Superintendent (574-3282).

### Vehicle Accident

Government vehicles are provided only for employees conducting official business. As a user of DOE property, you have a responsibility to immediately report to your supervision any accident involving a DOE vehicle on or off a DOE installation.



## Discrimination

If you experience or witness discrimination, harassment or coercion, report the incident to your immediate supervisor or the Workforce Diversity Office. Every effort is made to keep your reporting as confidential as practical. DOE does not tolerate reprisals against employees who raise concerns.

## Unsafe Operation

Every employee is responsible for reporting activities that may affect the safe operation of the installation. Such activities include:

- any theft or crime witnessed on or involving government property;
- incidents that result in damage to government property, serious injury of personnel, or endangerment of the public (e.g., accidental release of a hazardous substance);
- security violations; or
- waste, fraud, and abuse.

If you observe an unsafe operation, **notify your supervisor first**. If your supervisor is not immediately available, notify one of the following:

- your security organization;
- Laboratory Shift Superintendent, 574- 6606/Plant Shift Superintendent, 574- 7172 (LSS/PSS);
- Bechtel Jacobs Company, LLC, Ethics Helpline, 241- 1153;
- General Accounting Office Hot Line, 800/424- 5454; or
- DOE Inspector General, 800 /541- 1625.

Unless there is reason to fear reprisal, you should use the internal notification channels prior to using the helplines.

## Helplines

DOE encourages employees to voice concerns and to raise issues with their immediate supervisor regarding the following:

- quality, safety, health, the environment;
- waste, fraud, abuse;
- mismanagement, violation of laws or regulations; and
- discrimination, or any other matter involving operations at their installation.

**The first avenue for reporting concerns is your supervisor.** If you do not receive adequate resolution, discuss your concern with the supervisor at the next highest management level. If you still do not receive adequate resolution regarding your concern, or if you wish to report a concern anonymously, the following “helplines” are available to you:

Helplines		
Organization	Telephone	Report
ORNL Employee Concerns	865/576-2432	Concerns about environment, safety, and health; ethics; equal employee opportunity/affirmative action; sexual harassment; and other issues.
ORNL Ethics Hotline	865/241-5676	Ethics concerns.
ORNL Office of Audit and Management Advisory Services	865/241-7614	Fraud, waste, abuse, and ethics concerns.
ORNL Ombudsman Office	865/576-7802	Ethics concerns.
ORNL Safety Concerns Hotline	865/241-5500	Concerns about safety issues ORNL.
Bechtel Jacobs Company LLC Ethics Office	865/241-1153	Ethics, fraud, waste, and abuse concerns.
Bechtel Jacobs Company LLC Safety, Health, and Environment	865/241-1303	Safety, health, or environment concerns.
Bechtel Jacobs Company LLC Quality	865/241-1168	Quality concerns.
DOE Inspector General and Environmental	800/541-1625	Concerns directly to DOE.

## STOP-WORK AUTHORITY

If you see an unsafe act, activity, or condition that creates an **imminent danger**, take action to stop it. This requirement should not be influenced in any way by personal or organizational relationships. Employees must exercise this authority responsibly.

Imminent dangers are any conditions or practices, which, could reasonably be expected to cause an accident that will result in death or serious physical harm, significant property damage, or environmental impairment.

Use a Stop-Work Order **only** for imminent dangers. For hazards of lesser magnitude, or for imminent danger situations that can be corrected immediately, use normal supervisory procedures and the services of division compliance staff, such as Safety Officers, by filing a Safety Suggestion form, by contacting the appropriate ORNL ES&H staff, or by contacting one of the Atomic Trades and Labor Council Health and Safety Representatives.

## **EMPLOYMENT AT WILL**

Employment at ORNL is on an “at-will” basis, consistent with Tennessee law. This means simply that the employee or the employer can terminate the employment relationship at any time for any reason that is not prohibited by law. Supervisors and other agents of UT-Battelle, LLC, do not have authority to enter into employment contracts with employees. Any statements implying or providing that employment is, or will be, on a basis other than “at will” are invalid and should not be relied upon.

Employees and job applicants who have questions about these matters should contact the ORNL Human Resources and Diversity Programs Directorate.

## **FUNDS CONTROL**

UT-Battelle employs a funds control system to preclude violations of the Anti-Deficiency Act. This statute provides that no officer or employee of the government may:

- Incur expenditures during a fiscal year over the amount appropriated by Congress, apportioned by the Office of Management and Budget (OMB), or permitted by agency regulations;
- Enter into contracts for the future payment of money (commitments such as purchase orders, lease agreements, etc.) in excess of appropriations or agency regulations;
- Incur expenditures or future commitments in advance of appropriations.

### **Crucial points to remember:**

- Work authorization or program guidance and funding must be in place before work can begin.  
Specifically,
  - DOE work requires a work authorization and funding in the ORNL financial plan before starting work.
  - Work for Others (WFO) funding requires DOE approval and authorization from the ORNL WFO office before work starts.
- Financial commitments should not be entered into that would cause total project costs to exceed authorized funds.
  - o Funds are expended solely for the purposes authorized and within the dollar amount authorized.
  - o Funds to cover commitments must be available before acquiring goods and services.
  - o Commitments for procurements, subcontracts, etc., plus actual costs cannot exceed the funding available.
  - o Cost in excess of project funding creates overruns that cannot be charged to the sponsor.

- o If an overrun occurs and additional funding is not received, the overrun must be written off to UT-Battelle as unallowable costs.
- Sponsors must be properly charged for products and services:
  - o All staff are responsible for recording time accurately.
  - o The total time charged to any account must not exceed the hours actually worked on that account.
  - o Mischarging is a violation of law, regulation, and UT-Battelle policy.

## **EXPORT CONTROLS ON U.S. TECHNOLOGIES AND COMMODITIES**

The research and development activities of the United States cover a very broad range, and some activities are considered to be so vital to our national interests that foreign persons are denied access to them. "Export Control" is the name given to this process, and several U.S. statutes mandate export control. The primary government agencies having export jurisdiction are the Department of Commerce, Department of State, Nuclear Regulatory Commission, Department of Energy and Department of Agriculture.

An export can occur by shipping, mailing, drop-shipping, communicating (e-mailing, faxing, telephoning, etc.) to a foreign country/person **outside** the United States (includes foreign travel). A deemed export can occur by communicating with a foreign national **within** the United States (foreign visits and assignments). A re-export can occur by exporting to one country and subsequently sending that export to a second country (foreign travel). All three types of exports are subject to export control. The most commonly seen type of export at ORNL is the deemed export, which occurs when dealing with foreign nationals on our site.

Items or technologies that are export controlled can be shared with other countries and/or their citizens, but a license must first be obtained by ORNL from the agency that has jurisdiction over the item or technology (e.g. military items are normally under the Department of State). Obtaining a license is a complicated matter (for example, a license may or may not be required, depending on which country is involved); for that reason, ORNL has an Export Control Department (<http://home.ornl.gov/divisions/contracts/contresp09a.html>) to assist with determining the need for a license and obtaining it from the proper agency. Failure to obtain a required license can lead to fines and/or imprisonment for both ORNL and the individual employee.

Research areas typically requiring export control are high-tech equipment and materials (computers, processing equipment, etc.), nuclear reactor and fuel technology, missile technology, and chemical and biological weapons technology. The list of controlled items and technology is substantial (thousands of pages) and indexes are available at

<http://home.ornl.gov/divisions/contracts/contresp09a.html>, as are the names of contacts and phone numbers to get assistance. Procedures covering many of these topics are located in SBMS at <http://sbms.ornl.gov/sbms/sbmsearch/subjarea/export/sa.cfm>.

Restrictions are also placed on certain countries and activities. DOE prohibits any support to terrorist-supporting countries (currently Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria). U.S. citizens are also prevented from supporting nuclear proliferation, chemical and biological weapons, high-level encryption technology and missile technology.

Examples of areas reviewed by the Export Control Department include Cooperative Research and Development Agreements (CRADAs), Work for Others Agreements, patents, procurements, non-disclosure agreements, property sales, mailings and shipments, and programs directly associated with foreign entities.

While ORNL has an Export Control Department to help, export control responsibility begins with the individual employee. If you are faced with a potential export, deemed export, and/or re-export and are not sure of the requirements, you should consult with the ORNL Export Control Department for guidance

# LABORATORY SECURITY

## OBJECTIVE

*Identify the security requirements that apply to protecting information, personnel, and property.*

## INTEGRATED SAFEGUARDS AND SECURITY MANAGEMENT (ISSM)



Integrated Safeguards and Security Management (ISSM) is a DOE-complex wide initiative designed to ensure that in addition to considering safety in everything that we do, that we also consider security in planning for and executing our work. Policy guidance provided within DOE Policy 470.1, *Integrated Safeguards and Security Management (ISSM) Policy*, is the principal driver for the ORNL's ISSM program.

The overall ISSM objective is to systematically integrate safeguards and security into management and work practices at all levels so that missions are accomplished securely.

ORNL's ISSM initiative occurs for the following reasons:

- to improve overall security at the laboratory by building upon and enhancing our existing safeguards and security program;
- to assure that safeguards and security requirements are clearly articulated, appropriately defined, and easily understood by the laboratory staff;
- to improve employee awareness and individual acceptance of responsibility for performing "work securely" through the visibility of the ISSM initiative;
- to cultivate real "ownership" of security by line and project managers who will apply the ISSM Guiding Principles and Core Functions ([http://home.ornl.gov/general/issm/issm\\_functions.pdf](http://home.ornl.gov/general/issm/issm_functions.pdf)) in work activities; and
- to ensure that developed safeguards and security controls are appropriately tailored to the "science" work environment and that these work controls are applied prior to the commencement of any actual work at the laboratory.

ORNL ISSM responsibilities are detailed in contracts, regulations, and contractor-specific procedures [e.g., the ORNL Standards Based Management System (SBMS) R2A2s, and measures of performance as part of the overall ORNL Performance Assessment Program]. The framework for ISSM is established through the guiding principles and core functions ([http://home.ornl.gov/general/issm/issm\\_functions.pdf](http://home.ornl.gov/general/issm/issm_functions.pdf)). ORNL ISSM implementation involves integrating specific instances of defining and planning work, formally identifying and analyzing risk, developing and implementing measures and controls, performing work, and monitoring and assessing performance for feedback and continuous improvement.

These are the two key messages communicated by the ORNL ISSM initiative:

1. **YOU are the Key to Ensuring Effective Security and**
2. **ORNL's mission success depends on quality work done securely.**

Posing the right security questions during the Operations and Maintenance and Research and Development Work Planning and Work Control Processes is the best means of ensuring that "quality work" is actually "done securely. "

To incorporate security into work activities in a cost-effective and practicable manner, staff members should review the function for Maintenance/Operations and Research and Development Work Control Processes ([http://home.ornl.gov/general/issm/issm\\_wcp.shtm](http://home.ornl.gov/general/issm/issm_wcp.shtm)).

To ensure the success of ORNL ISSM implementation, the laboratory has appointed an ISSM Initiative Coordinator/Steward and has formed a multi-discipline ISSM Working Group (<http://home.ornl.gov/general/issm/helpdesk.shtm>).

## PROTECTING INFORMATION



Although most information generated at ORNL is or can be made publicly available, certain types of information require protection by either statute, DOE Order, or good business practice. Such protected information is normally marked, and the markings range from "Internal Use Only" to actual classified information.

Details about the various categories and rules for handling them can be found in the consolidated "Sensitive Information Guide" ([http://home.ornl.gov/techinfo/Sensitive\\_Guide.shtml](http://home.ornl.gov/techinfo/Sensitive_Guide.shtml)). However, the following general practice is the responsibility of **ALL** employees, subcontractors, and visitors.

When you encounter protected information that is so labeled and you do not meet the criteria defined on the label of the information [e.g., you find a document labeled "Protected Cooperative Research and Development Agreement (CRADA) Information" and you are not working on that project], you should:

- not read the information;
- protect the information; and
- report the matter to your supervisor, the LSS/PSS, or the site security organization.

Failure to protect several types of information at ORNL carry serious consequences like fines and jail time for the employee in addition to problems for the company. For this reason, you should familiarize yourself with the Sensitive Information Guide.

## Cyber Security

As custodians of DOE information, employees are responsible for knowing information protection requirements and for carrying out this responsibility. This responsibility includes information on ORNL cyber resources. As a computer user, you are responsible for protecting information on ORNL cyber resources to which you have access.

Cyber security policies, guidelines, and training requirements have been developed and implemented at ORNL to assist users in the protection of information on computers (<http://eshtraining.ornl.gov/SBMS/SBMSearch/ORNLProc/io005.htm>). These requirements are a result of applicable DOE Orders and company policies; some are just good business practices.

Individual users must be aware of the policies and guidelines that apply to their work and the information they process on ORNL cyber resources. Some of the policies and guidelines that apply to all users of ORNL cyber resources are:

- Users are expected to refrain from using ORNL resources for activities that are inappropriate (see the “Computer Software and Property Management subject areas” at <http://sbms.ornl.gov/sbms/sbmsearch/subjarea/CompSoftware/sa.cfm> and <http://sbms.ornl.gov/sbms/sbmsearch/subjarea/propmgt/sa.cfm>).
- Never share your computer password with anyone.
  - o All passwords must conform to the ORNL password policy.
- All systems must have a DOE login banner.
  - o Any system may be monitored, audited, and/or inspected, and the information disclosed to the authorized site, DOE, and law enforcement personnel, as well as authorized officials of other appropriate agencies.

The primary point of contact for a user for computer security requirements and issues is their division computer security officer (DCSO). They are listed at <http://internalsecurity.ornl.gov/dcsorg.shtml>.

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While ORNL has an Export Control Office to help, export-control responsibility begins with the individual employee. If you are faced with the potential export, deemed export, and/or re-export and are not sure of the requirements, you should consult with the ORNL Export Control Office for guidance.

## **PROTECTING PERSONNEL**

### **Badges**

When on-site, **ALL** personnel are required to wear a security identification badge. The badges denote security clearance level. Badges in use include:

- prime contractor to DOE,
- subcontractor,
- foreign national,
- visitor, and
- temporary.

## Standard Badge Features

### Standard Badge Features



Badge Serial Number

Operations Office Prefix

Operations Office Name

Clearance Level

Blue - Q-cleared (highest)

Yellow - L-cleared

Gray - Uncleared (no clearance)

Red - Foreign Nationals

(Badges also have a Q or L in a box to denote clearance held)

Contractors (Contractors have "C" Federal Badges do not)

Employee Badge Number

Smart Card Reserved Area

## Badge Wearing



Security badges identify personnel as having access to a particular area and must be worn:

- at all times while on-site or while on-duty at an off-site leased installation operated by DOE,
- between the shoulder and the waist on the front of the body, and
- on the outer layer of clothing where your picture can be seen at all times.

If you should see an individual without a badge displayed, question him or her about his or her badge. If he or she cannot produce a security badge, stay with the individual and contact your security organization.

## Proximity Card System


The proximity card is actually a "key card" that functions as a key to a lock. It does not replace the DOE standard badge, which still will be required for all ORNL employees. The front of the card has ORNL and UT-Battelle logo, and the back of card has a hot stamp (serial) number along with instructions as to where the card should be returned if lost.



Proximity cards should be worn behind your standard badge. It must be placed within two inches of the proximity reader to activate the door or gate.

With the proximity card system, employees and visitors can gain access to individual ORNL buildings by placing the proximity card near the proximity card reader. The proximity card system is ORNL site-specific and not all buildings at ORNL are controlled by proximity readers. However, the majority of on-site buildings will be equipped with proximity card readers. Proximity cards are for access to ORNL facilities **only**, and the system can identify who has entered a building and at what time.

Proximity card readers can be activated around-the-clock. The reader will have one of three lights displayed:

<b>red</b>	indicates “no entry,”	
<b>green</b>	indicates “access granted,”	
<b>yellow</b>	indicates “power failure,” <b>Note:</b> The new system is operated by AC power and has battery backup. It will allow people to exit any facility, even if all power has failed.	
<b>red/green flashing light</b>	indicates “secure mode.”	

### Lost/Forgotten Badge or Proximity Card

Control of your security badge and proximity card is essential to prevent unauthorized personnel from gaining access to the installations. You are responsible for the safekeeping of your badge and proximity card both on and off site. If you should lose your badge, report the loss immediately to the Badge Office:

- ORNL: 574- 7205,
- BWXT Y- 12: 574- 3285, or
- ETPP: 574- 9804.

If you should lose your proximity card, report the loss immediately to the ORNL Visitors' Center, 574-7199.

If you forget your badge at home, the Badge Office at each installation can issue a temporary badge. A temporary proximity card can be obtained from ORNL's Visitor Services.

## Badge/Proximity Card Do's and Don'ts

Do	Don't
<ul style="list-style-type: none"> <li>- Protect your badge/proximity card as government property.</li> <li>- Report lost or stolen badge/proximity card (574-7199).</li> <li>- Display badge to security officers, as required.</li> <li>- Request a new badge if your appearance changes significantly.</li> <li>- Return all temporary badge/proximity cards at the end of a shift.</li> <li>- Return all visitor badge/proximity cards at the end of a visit.</li> </ul>	<ul style="list-style-type: none"> <li>- Allow unauthorized access.</li> <li>- Lend badge/proximity card to anyone.</li> <li>- Be careless with badge/proximity card control.</li> <li>- Misplace badge/proximity card.</li> <li>- Wear badge/proximity card in public.</li> <li>- Leave badge/proximity card in your vehicle.</li> <li>- Use badges for unofficial personal identification.</li> <li>- Abuse badge/proximity card.</li> </ul>

## Escorts

Once you receive a security clearance, you may be called upon to escort visitors or other uncleared personnel. When required to be an escort, you must:

- have the proper security clearance,
- be trained for areas to be visited,
- notify supervisors prior to visits, and
- be able to see your visitor at all times.

## ORNL Building Access

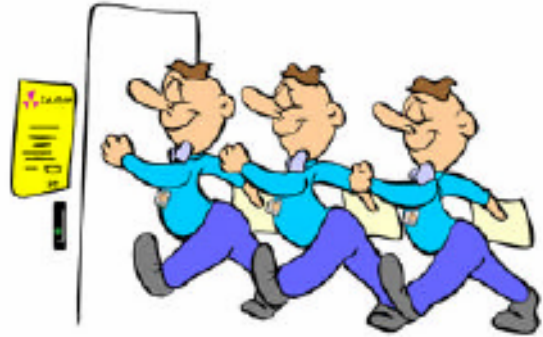
It is the shared responsibility of facility managers and individual employees to ensure that all entries into the building are proper. At buildings equipped with proximity card readers, only doors so equipped will be used to enter buildings. Other locked doors will be used for exit only.

Individuals must have the appropriate access authorization/security clearance before their access to the facility will be granted. Generally, U.S. citizen UT-Battelle employees will have access to most buildings at the Laboratory. However, access to limited security areas and facilities that require special training, may be further controlled. Entry into these buildings or areas may require advance notice to facility managers and completion of required training.

## ***Piggyback or Vouching***

Piggybacking, or vouching, is accessing an area through the use of an access permit held by another person. This type of access is permitted at ORNL up to and including limited security areas if the person doing the vouching verifies that personnel being vouched for

- possess the appropriate access authorization/security clearance level, and
- is entitled to access a specific area or building.



If the piggybacking/vouching is to a Limited Area and classified access is involved, the voucher must verify that personnel vouched for have the appropriate “need to know” prior to classified access.

In the case of foreign national assignees (red badges) or visitors who may have access to specific buildings only, escorts or other employees should ask them to activate the reader with their cards. If it beeps, they have access to the building. If it doesn't, they don't. They should either be accompanied by an escort or should report to the Visitor Center.

## **Compliance with Security Instructions**

Security personnel patrol ORNL in both defensive and offensive postures. Some sites contain a Special Response Team (SRT) to respond to specific threats. SRT members typically wear camouflage uniforms and may be armed with automatic weapons.

Should **ANY** security personnel give you written and/or verbal instructions follow the directions quickly and precisely. Your safety and the protection of the installation depend on your compliance.

## **Reporting**

As part of maintaining your security clearance, the security organization must be kept informed of certain activities in your life. If you are a DOE employee, DOE contractor, or a subcontractor on a DOE contract with an L or Q clearance, you are responsible for reporting to DOE or

ORNL Security any of the following, should they occur:

- marriage, or divorce, or any legal action resulting in a name change;
- an arrest, detention, or charges brought against you, even if the charges are dismissed;
- traffic violations with fines greater than \$250.00;
- hospitalization/treatment for drug, alcohol, mental, or emotional problems;
- any planned foreign travel; or
- bankruptcy.

## PROTECTING PROPERTY

### Prohibited Articles

Under DOE Order 5632.1C, any dangerous weapon, explosive, or other dangerous instrument or material likely to produce substantial injury or damage to persons or property are prohibited from Security Areas unless approved by the cognizant local authority for safeguards and securities. All employees are subject to search at all times while on DOE property, including parking lots.



### ***Property Protection Areas (PPA)***

Property Protection Areas (PPA) are security areas established for the protection of unclassified DOE property against damage, destruction, or theft. PPAs have boundaries identified with physical barriers, and access controls for the protection of DOE property. Uncleared persons may enter these areas unescorted if they are properly badged.

You cannot bring the following items inside the PPA without prior approval:

- firearms or other dangerous or deadly weapons,
- incendiary or explosive devices,
- other dangerous instruments or materials likely to produce substantial injury or damage to persons or property.

### ***Limited Security Areas (LSA)***

Security areas that are protected by security officers or other internal controls that prevent unauthorized persons from accessing classified matter or Special Nuclear Material. Unescorted access requires an "L" or "Q" clearance.

Items that are prohibited inside a LSA and above without prior approval include:

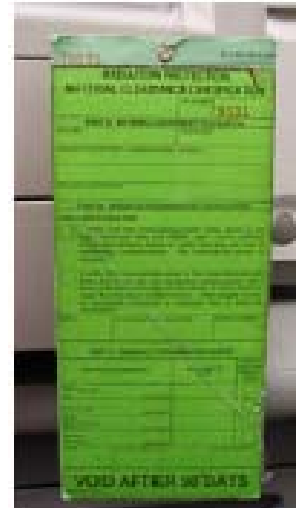
- firearms, other dangerous or deadly weapons, explosives, incendiary, and explosive devices;
- privately owned recording equipment (audio, video, optical, or data) such as tape recorders and cameras;
- privately owned electronic equipment with a data exchange port capable of being connected to automated information system equipment (such as personal data assistants like Palm Pilots);
- privately owned cellular telephones;
- privately owned radio frequency transmitting equipment (such as two - way radios);
- privately owned computers and associated media;

- controlled substances including illegal drugs and associated paraphernalia (less prescription medicine); and
- other items prohibited by law.

***Personal cell phones may be brought into most ORNL areas; however, personal cell phones may not be brought into more secure areas of ORNL (i.e., Limited Security Areas and above).***

### **Property Removal**

You can obtain a Property Removal Pass via Property Information System (PRISM) ([home.ornl.gov/auth-cgi-bin/cgiwrap?user=xvp&script=prism/prismMenu.cgi](http://home.ornl.gov/auth-cgi-bin/cgiwrap?user=xvp&script=prism/prismMenu.cgi)) to bring in and take out certain property items from the site. The pass includes specific item identification data (e.g., serial numbers, etc.) to allow for easy identification by Security Officers at ORNL portals.



When removing government property from any government site, remember that:

- removal of items from the installation may require a radiological survey and a “green tag,” and
- removal of classified material requires additional permission and controls.

Random searches are conducted at the portals. If you are caught removing government property without obtaining a property removal pass, this could result in disciplinary action up to and including termination, fines, and/or imprisonment. Property Removal Passes have a one- year time limit.

### ***Items Requiring a Pass***

You are required to obtain a property removal pass to remove items such as:

- anything with a bar code property number whether issued to you or not; and
- personally owned or company- owned laptop computers or other equipment needed in the performance of official duties at ORNL.



***Items Not Requiring a Pass***

- Small personal- type items the company issues to you, such as planners and pens that are taken to and from home or the other installations.
- Government - owned motor vehicles.
- Craft tools associated with a craft crew and carried between sites and off- site facilities to perform official work.
  - Property associated with an emergency vehicle or emergency crew.

***When in doubt, get a Property Removal Pass.***

# EMERGENCY PREPAREDNESS AND RESPONSE

## OBJECTIVE

*Identify requirements for responding to emergency signals (Radiation Emergency Alarm and the Standard Alerting Tone) and reporting emergency events as they apply to DOE contractors, subcontractors, and visitors.*

*At ORNL, radiological and non-radiological hazardous material is used, stored, and transported.*

*Because of this, we are committed to having emergency management programs that plan for, prepare for, and respond to emergencies. Therefore, you must know how to prepare for and respond to emergencies while on site.*

## REPORTING

Emergencies are broken down into two broad categories: radiological and non-radiological emergencies. Radiological emergencies involve radioactive material. Non-radiological emergencies may involve other hazardous material.

Each DOE installation has personnel trained to respond to both categories of emergencies that are likely to occur at that installation. The first step in putting emergency response personnel into action is the prompt reporting of an emergency.

### What to Report

When on-site, all personnel are required to report the following emergencies:

- injuries or illness,
- fires,
- bomb threats,
- explosions,
- spills of any hazardous substance,
- chemical/radiological releases,
- security violations, or
- natural disasters.

## **Bomb Threats**

Anyone who answers a telephone has the potential to receive a bomb-threat call. The ORNL Bomb Threat Checklist (<http://home.ornl.gov/general/forms/pdf/ORNL-419.pdf>) provides valuable information for responding to such calls.

- **Remember to be calm**, to be courteous, to listen, and do not interrupt the caller.
- **Make notes** on the ORNL Bomb Threat Checklist (at web address given above) or any notepaper.

- o Note the exact time.
- o Note background noise.

- Ask for location of bomb by saying, "Did you say the bomb is in the basement, etc.?"
- Ask for time of possible detonation.

- o If caller specifies a time, ask him/her to repeat the exact time.

- Inform caller that building has personnel and a bomb could result in death or injury of innocent people.

- As soon as the caller hangs up, **immediately report the call to your supervisor or to the LSS/PSS by calling 911.**

## **HOW TO REPORT AN EMERGENCY**

You should report emergencies to:

- LSS/PSS, your supervisor, or
- installation or building manager.

**For major emergencies, the LSS/PSS should be contacted directly.** There are four main methods you can use to report an emergency.

### **Telephone**

Use the telephone to call for emergency help. Be sure to stay on the telephone, if it is safe to do so, until released by the LSS/PSS.

- ORNL LSS 911 or 574- 6606
- BWXT Y- 12 PSS 911 or 574- 7172
- ETPP PSS 911 or 574- 3282

**Note:** If you are using a cell telephone, to get emergency support dial **574-6606** not 911. If you call 911 using a cellular telephone, you might get a nearby municipal or county agency (e.g., Oak Ridge or Roane County). This will result in a delay of emergency responders.



## Fire Alarm Box



Use the fire alarm box to summon help for any emergency. Fire alarm box may not always provide local, visible, or audible indications.

Emergency response personnel will respond to the location of the fire alarm box. If it does not jeopardize your safety:

- stand by the fire alarm box you have activated, and
- provide information to emergency personnel when they arrive.

Do not leave the fire alarm box unattended unless you are at risk or to render aid to other personnel.

If it is unsafe to stay at the fire alarm box location, move away a safe distance and provide information to emergency personnel as they arrive.

## Two-Way Radio

An additional way to call for emergency help and a safety work practice to use when working in a remote or infrequently visited area is to carry a two-way radio and always check its operation before entering the area. Employees with access to two-way radios can contact the LSS/PSS at:

- ORNL Station 10,
- BWXT Y- 12 Station 4, or
- ETTP Station 9.

Other two-way radio users should suspend communication when radios are in use during emergencies.

## Messenger

The messenger method must be used if you:

- cannot make the emergency report because of tending to injured personnel or attempting to minimize the extent of the emergency; or
- are in a remote location and do not have access to a telephone, functional radio, or alarm pull box.

If no one else is available to act as a messenger, you must leave the scene to make the report.

## WARNING SIGNALS

The Oak Ridge Reservation has two reservation-wide emergency alarm signals: the Radiation Emergency Alarm (a clarion horn sound) and the Standard Alerting Tone (a high/low sound). You must become familiar with these two alarms and know how to respond to their signals.

**Call 574-4462 (ORNL) or 576-3587 (ETTP and BWXT Y-12) to hear the alarms.**

## Radiation Emergency Alarm



The radiation emergency alarm signals a criticality accident that produces potentially lethal amounts of radiation. The alarm is installed only in buildings where a nontrivial risk of a nuclear criticality accident exists, and where the facility construction does not protect (shield) personnel from the radiation.

The alarm is a continuous sound from a clarion horn. In most high- noise areas, rotating colored signals are provided. At ORNL, rotating magenta or red beacons are used; at BWXT Y-12, rotating magenta/blue lights are used; and at ETPP, rotating red beacons are used.

### ***Operable Radiation Emergency Alarm***



If the Radiation Emergency Alarm sounds, time is of the essence. You must follow these steps:

- **Evacuate immediately.**

o If security actions such as “scram” or shutdown procedures are required, proceed with those actions **ONLY** if you are certain that safety will not be compromised.

In all cases, safety comes first.

- **Proceed to the nearest Assembly Station/Point .**

o Remain away from the building and **DO NOT** enter the predetermined evacuation zone (normally within 200 feet of the building) unless directed by the Facility Operation Manager, LSS/PSS, or personnel assigned to contain the area.

- **Follow all postings in the area and the instructions of personnel assigned to contain the area.**

- **Wait until an announcement is made on the Public Address System or Emergency Notification System before returning to your work area.**

If you are authorized to return to the building or your work area during the emergency, you must wear a personal monitoring device that will warn you if the radiation is high in the area. Such authorization should be concurred with by the Facility Operation Manager or personnel assigned to contain the area. You must be instructed on how to use the personal monitoring device.

## ***Inoperable Alarm System***

Regular surveillance is conducted on the Radiation Emergency Alarm to verify operability. If the Facility Operation Manager or LSS/PSS discovers that the Radiation Emergency Alarm is inoperable, an announcement to evacuate the building will be made on the Public Address System or Emergency Notification System. You must follow the steps above.

## **Entering a Radiation Emergency Alarm Location**

If you need to enter a building that has a Radiation Emergency Alarm in place and are not a resident of the building, you must:

- sign in on the accountability log when entering the building,
- receive approval from the Shift Manager before performing tasks in area, and
- sign out on the accountability log when exiting the building.

These measures are vital to ensure that the Shift Manager can account for all personnel in the facility in the event of an evacuation.

## **Standard Alerting Tone**

The Standard Alerting Tone is an emergency alarm signal with an alternating high/low tone. It indicates that an important announcement concerning emergency response or actions is about to be made over the Public Address System or Emergency Notification System.

If the Standard Alerting Tone sounds, you must:

1. **Stop working.**
2. **Listen carefully.**
3. **Follow instructions given** over the Public Address System.
4. **Perform shutdown procedures ONLY** when certain that safety will not be compromised.

**In all cases, safety comes first!**

The Public Address System and the Emergency Notification System are used to convey important information to the Laboratory population. Modifications or adjustments to these systems, speakers, or components are not allowed. Direct questions concerning the Public Address System or the Emergency Notification System to the LSS/PSS.

You may hear one of three messages associated with the Standard Alerting Tone:

1. Take Cover message,
2. Evacuate message, or
3. Shelter in Place message.

### ***Take Cover Message***

Follow these instructions if the Standard Alerting Tone gives a verbal message to “Take Cover.”

- If you are indoors, go to a strong, sheltered part of the building.
  - o A basement provides excellent protection.
- If you are in a motor vehicle or temporary structure (e.g., a trailer or shed), go to a strong, sheltered part of the nearest permanent building.
- Do not evacuate a permanent building and do not return to offices for nonessential items (e.g., purses, planners) unless instructed to do so by the LSS/PSS.
- Secure classified documents or take them with you.
- Perform shutdown procedures **ONLY** when certain that safety will not be compromised.

### ***Evacuate Message***

If the Standard Alerting Tone gives a verbal message to “Evacuate,” follow these instructions:

- **immediately evacuate** through the nearest exit (even if it has security alarm) unless otherwise directed by an Emergency Response Team member,
  - o Perform shutdown procedures **ONLY** when certain that safety will not be compromised.
  - o Take personal items such as briefcases, purses, coats, and keys.
    - **walk (do not run) to your assigned Assembly Station/Point, and - follow the instructions provided at the Assembly Station/Point.**

### ***Shelter In Place Message***

In the event that the Standard Alerting Tone gives verbal instructions to “Shelter in Place,”

- **immediately isolate yourself** from the toxic environment, and
  - o This isolation can be accomplished within a room by shutting down air systems and closing and sealing doors and windows.
- **follow instructions given by the building manager and/or member of the Emergency Response Team during this emergency.**

### **Other Alarm Signals**

The site and some facilities may have local alarms that will sound, warning you that there is an emergency. Some of these are activated automatically while others are activated manually.

The Facility Emergency Procedures will describe these alarms where they exist.

- ORNL and ETPP have a Fire Alarm, which is a recognizable electronic buzz.
- BWXT Y- 12 uses the Standard Alerting Tone to evacuate the building/area during a fire.

There have been several fire alarm system upgrades and new fire alarms installed in buildings across the ORNL site. These systems have an evacuation signal that is not the same as what is heard in older buildings. Buildings where the new fire alarm system is located include: Building 1005, 3047, 3500, 4500S, 4501, 4505, 4508, 5500, 5600, 5700, 5800, 7900, 7920, and 7930. As new buildings come on line they will also have a similar system installed.

In addition to the sound, strobes with the text “**FIRE**” will flash in common areas, assembly areas, and restrooms.

# ENVIRONMENT, SAFETY, AND HEALTH

## OBJECTIVE

Identify UT-Battelle, LLC's responsibilities and methods for protecting the environment and the safety and health of all personnel working on or visiting any of its installations including:

- environmental protection,
- waste handling and disposal,
- industrial safety programs,
- individual responsibilities,
- industrial hygiene programs,
- radiation protection program, and
- reporting requirements for safety and health issues.

UT-Battelle, LLC and DOE are committed to protecting the environment and the safety and health of all personnel working on or visiting any of its installations. Carrying out this commitment requires the rigorous observation of environmental requirements, safety and health practices, and the belief in the benefits of those requirements/practices by all personnel. In this section, you will learn about environmental protection, waste handling and disposal, industrial safety, industrial hygiene, radiation, reporting requirements, and your responsibilities in these areas. Failure to comply with applicable standards may result in disciplinary action, up to and including termination.

## ENVIRONMENTAL PROTECTION

UT-Battelle, LLC's policy is to integrate environmental management into all facets of ORNL's missions. UT-Battelle's [Environmental Management System](#), which is modeled after ISO 14001, is designed to assess and control the environmental impacts of research and support activities. We manage our programs in a manner that protects human health and the environment. ORNL is committed to adhering to applicable federal, state, and local environmental laws, regulations, and requirements. UT-Battelle, LLC integrates pollution prevention/waste minimization, resource conservation, and compliance into all planning and decision-making. It is important that all UT-Battelle staff understand the potential environmental impacts associated with their work.

The Environmental Protection and Waste Services Division (EPWS) helps divisions, staff, subcontractors, visitors, and guests understand the applicable regulatory requirements at ORNL. EPWS staff identify, incorporate, and communicate environmental protection and waste management requirements into ORNL level subject areas and program descriptions. Failure to follow these procedures can result in negative environmental impacts and regulatory fines and penalties. EPWS staff provide specialized technical assistance on implementing environmental protection and waste manage requirements to the line organizations and also prepare required

(site-wide or reservation-wide) environmental protection and waste management documents. EP interfaces with the appropriate regulatory agencies and DOE on environmental protection/regulatory compliance issues.

Each division has an Environmental Protection Officer (EPO) [refer to EPO list at <http://www.ep.ornl.gov/admn/epo/list/epo.cfm>], Generator Interface (GI) [refer to the Generator Interface/Generator Equivalent list at <http://ntser3.cad.ornl.gov/lws/Documents/juneGIE.PDF>] or Environmental Compliance Representative (ECR) [refer to the ECR list at <http://eshtraining.ornl.gov/sbms/SBMSearch/SubjArea/ecr.html>] staff member who is here to help you evaluate and address environmental requirements including the disposition of materials/wastes.

## **WASTE HANDLING AND DISPOSAL**

ORNL is not like home; different rules apply to industrial and research facilities. Things that you put in the garbage at home (e.g., batteries, fluorescent light bulbs, aerosol cans) have to be handled differently—not in the routine garbage. You have to pay attention to the disposal of all wastes and need to recycle where possible. ORNL is committed to the proper management of wastes. Consequences of mistaken waste handling can be severe.

Waste falls into three major types:

- recyclable (including paper, cardboard, scrap metal, toner cartridges, oil);
- liquid (wastewater including storm water);
  - o ORNL wastewater treatment facilities have waste acceptance criteria, thus only certain liquid wastes can go down a drain.
  - o ORNL has different treatment systems for different types of wastewater. It is important to make sure the waste you are disposing of goes to the correct system.
  - o Sanitary system.
  - o Storm water system (no oil, liquids).
- solid (sanitary, hazardous and/or radioactive).
  - o Sanitary/industrial [landfill's permits define what is acceptable (e.g., office trash)].
  - o Hazardous (hazardous to human health or the environment).
  - o Polychlorinated biphenyls (PCBs).
  - o Mixed (contains both hazardous and radioactive wastes).
  - o Radioactive.

More detailed information on how to handle wastes is available through your EPO, GI, ECR, or further training [consult your Division Training Officer (DTO) ([http://eshtraining.ornl.gov/wmrad/new\\_page/dtolisting.pdf](http://eshtraining.ornl.gov/wmrad/new_page/dtolisting.pdf))].

What you need to remember is:

- Recycle aluminum cans, paper, toner cartridges, cardboard, scrap metal, and used oil where possible.
- Don't put chemical wastes, including aerosol cans or solvent-contaminated rags, in the sanitary dumpsters or wastebaskets.
- Consequences of mistaken waste handling can be severe.
- If you have questions, ask your supervisor, EPO, GI, or ECR for assistance.

Reducing your waste generation and participating in the recycling programs helps hold down operating costs for ORNL. For information on recycling options, see the Pollution Prevention Home Page (<http://www.ornl.gov/ornlp2/p2main.htm>).

Construction activities have tremendous potential to impact storm water quality. Protection measures are required for all ORNL work. Protection measure include:

- good housekeeping,
  - o Have a spill kit, maintain a 25-foot minimum buffer zone from the back of streams, respect existing vegetation, be aware of storm drain inlets, cover or contain debris, and inspect equipment for leaks and containment of materials.
- efficient fueling stations,
  - o Prevent spills, avoid topping off, and provide spill kit, back pump fuel left in hose to a supply tank.
- minimize equipment maintenance outdoors,
  - o Prevent spills to the ground, use drip pans, and do not discharge wastes into any ORNL systems without approval.
- minimize sedimentation,
  - o Minimize rinsing/demudding of equipment and rinse in grassy areas away from storm drains/waterways.
- maintain product/material/waste storage areas,
  - o Store indoors or provide cover if outdoors, keep containers closed and labeled, and provide secondary containment.
- minimize erosion
  - o Stabilize disturbed areas quickly, prevent or minimize runoff, use straw bales or silt fencing, protect storm drains, and revegetate.
- minimize discharges from painting operations.
  - o Use tarps/vacuums/enclosures to contain wastes, collect and properly manage paint wastes (including empty paint cans), and minimize overspray.

More information is provided on the SWP3 web site at

<http://oecdwsrv.oecd.ornl.gov/water/swp3/swp3document/swp3toc.htm>.

## Storm Water Pollution Programs SWP3

### INDUSTRIAL SAFETY PROGRAMS

Industrial Safety programs provide systems and programs to control physical hazards in the workplace. All employees must be aware of the safety guidelines that are part of the Lockout/Tagout program and the Fire Prevention and Protection Program.

#### Lockout/Tagout Program

The lockout/tagout program exists to prevent injuries to employees during servicing and/or maintenance tasks. Specifically, the program is designed to protect against injuries from the unexpected energizing or startup of machines or equipment, or release of stored energy. The program applies to any source of energy: electrical, pneumatic, hydraulic, chemical, thermal, or other form of energy.

Before service or maintenance is performed on machines or equipment:

1. the machines or equipment must be turned off,
2. all sources of energy must be isolated, and
3. the isolation points must be locked with a red lock and/or tagged with a "Danger - Do Not Operate" tag per the lockout/tagout procedure.

**No** employee shall attempt to change the status of equipment or a system that has a red lock and/or a "Danger - Do Not Operate" tag affixed to it unless authorized to do so under the lockout/tagout procedure.

#### Electrical Safety

Be aware of electrical hazards in both the industrial and office environments. Report all damaged electrical equipment to your supervisor. **Only qualified and authorized individuals are permitted to perform electrical work.** A qualified person is one who has the required skills, knowledge, and training to perform electrical work safely. Such individuals must be aware of the hazards associated with electrical work and the methods for reducing the risk of electrical accidents that can result from unsafe equipment, adverse environmental conditions, and unsafe acts.

#### Fire Prevention and Protection

The Fire Prevention and Protection Program is an integral part of emergency preparedness. We must be very careful that our activities **DO NOT**:

- create conditions which may lead to a fire,
- aid the spread of a fire,
- impair emergency response to a fire, or
- impair evacuation in the event of a fire.

## ***Housekeeping***

Good housekeeping can prevent fires from starting and spreading. Therefore, follow these housekeeping practices at all installations:

- store flammable materials in approved storage cabinets,
- take the minimum amount of flammable material required for the job to the work site,
- use only approved containers for flammable materials,
- keep work locations orderly and free of trash,
- store materials at least 36 inches from electrical panels, and
- keep designated fire doors closed, as required.

## ***Extinguishing a Fire***

After reporting a fire and if you are trained to operate a fire extinguisher, you may choose to fight a small fire with the appropriate extinguisher.

**No one is required to fight a fire!**

## ***Heat-Generating Activities***

If you must perform a heat-generating activity, be sure to follow all safety-related guidelines. Completed work permits are required before heat-generating activities such as welding and burning can begin.

In the event that you discover a fire **BEFORE** the automatic fire protection system sounds the evacuation alarm, you must know what action to take and act quickly.

### **1. Summon help and activate the local evacuation alarm.**

Your first response to a fire should be to summon help and activate a local evacuation alarm, if one is installed.

### **2. Attempt to extinguish the fire.**

Portable fire extinguishers are located throughout the installations. If you believe you can safely extinguish or contain the fire, you may attempt to do so only after summoning help.

### **3. Evacuate to the Assembly Point/Station and assist personnel**

All personnel not involved in extinguishing a fire should evacuate and report to the nearest assembly station. It is your responsibility to learn the location of your assembly station. When evacuating, check for personnel who may need assistance.

### **4. Stand by to direct responders.**

When emergency response personnel arrive, one person should brief the responders on the location and status of the fire and on any injured and missing personnel. He or she should also provide any other information that might be useful.

## **Fire Protection Systems**

Installations at Oak Ridge are equipped with automatic fire protection systems. Some use an inert gas to displace oxygen and extinguish the fire. Signs are posted in locations equipped with oxygen-displacing fire protection systems. In the event of a fire, an evacuation alarm sounds before the extinguishing agent discharges. If the evacuation alarm sounds,

**EVACUATE IMMEDIATELY!**

## **INDIVIDUAL RESPONSIBILITIES**

### **Inspections and Testing**

Perform safety-related equipment inspections and testing within the specified time frame.

### **Construction Sites**

Always wear a hard hat and safety glasses on construction sites. All work and personnel at construction sites must be in compliance with Occupational Safety and Health Administration (OSHA) standards and other construction-related safety standards. Do not enter a construction site without authorization.

The Project Specific Activity Hazard Analysis (AHA) shall be available at the work site. Each worker shall be briefed on the work site hazards before signing the AHA. Anyone visiting the site shall be required to review and sign the AHA prior to entering the work area.

### **Tags and Signs**

Every employee must follow directions on all tags and signs, including requirements for:

- personal protective equipment (PPE),
- speed limits,
- parking, and
- work practices.

Obey signs and instructions for entry into an area. Posted signs and instructions inform you about necessary protective equipment, pre-entry evaluation (atmospheric testing, etc.), and training. Always follow directions on signs related to equipment and work practices. Obeying these signs may save someone from injury or death.

There are many signs, tags, and markings you may encounter in general areas on a DOE site. They indicate a hazard you should know about. As in driving, it is important to recognize and take appropriate actions when encountering these signs, tags, or markings. The following are some signs, tags, and markings you may see at ORNL:

- Danger – High Voltage
- Danger – Confined Space – Permit Required for Entry - Authorized Personnel Only
- No Smoking
- Caution – Hard Hat Area
- Caution – Do Not Operate this Machine
- Caution – Contains Asbestos Fibers – Avoid Creating Dust - Cancer and Lung Disease Hazard

## **ORGANIZATIONAL RESPONSIBILITIES**

The Operational Safety Services Division (OSSD) works with line organizations at ORNL to implement programs and policies that help to protect the safety and health of employees and visitors to ORNL.

### **Some of the programs for which the OSSD is responsible are**

- Accident Investigation
- Asbestos
- Bloodborne Pathogen Protection
- Carcinogen Protection
- Compliance with OSHA and other directives
- Confined Space Entry
- Dosimetry Services
- Electrical Safety
- Embryo/Fetus Protection
- Hazard Communication
- Hearing Conservation
- Lockout/Tagout Program
- Motor Vehicle Safety
- Physical Stresses Protection
- Radiological Support Services
- Respiratory Protection
- Service Subcontract Safety and Health

### **Service Subcontractor Safety and Health**

The requirements for controlling safety and health risks from on-site activities performed by ORNL service subcontractors are outlined in the [Purchasing Supplies and Services](#) subject area.

ORNL Service Subcontract ES&H Management is based on interaction among the requester, Procurement, and OSSD. Unless the service requestor determines that the service subcontract meets the exemption criteria outlined in the procedure, they are required to obtain input and assistance from OSSD in identifying the potential hazards associated with the

subcontracted activity and the specific safety and health requirements to be included in the procurement contract to control those hazards to both the subcontractor and ORNL employees who may be exposed to the potential hazard.

Anyone who initiates a service subcontract should review and follow the requirements of for including safety and health requirements in the contract and oversight of the activity to assure that the activity is performed in a safe manner.

## **MOTOR VEHICLE SAFETY**

All employees must comply with motor vehicle safety rules at all Oak Ridge installations.

### ***Speed Limits***

Never exceed posted speed limits. The maximum speed limit within fenced areas at ORNL and BWXT Y-12 is 25 mph. The maximum speed limit at ETTP is 20 mph. Lower limits apply in some areas.

### ***Seat Belts***

Always fasten seat belts when they are provided. When available, seat belt use is mandatory in all vehicles including buses, personal and government-owned vehicles, work vehicles, and Cushman-type vehicles. Operators of government-owned vehicles are responsible for making sure all occupants of the vehicle wear seat belts.

### ***Right-of-Way***

Always allow pedestrians the right-of-way. Pedestrians should use designated crosswalks. Never block sidewalks, driveways, loading zones, or driving lanes.

If you're a hiker, jogger or cyclist, take a moment to familiarize yourself with those routes ([http://home.ornl.gov/general/ORNL\\_Today/todayfiles/jogprint.pdf](http://home.ornl.gov/general/ORNL_Today/todayfiles/jogprint.pdf) ) that are currently approved and accessible for all forms of pedestrian activity in and around ORNL.

### ***Inspect Vehicles***

Inspect vehicles prior to operation. Report deficiencies to your immediate supervisor. subject area and understand their responsibility [Purchasing Supplies and Services](#) the

## **INDUSTRIAL HYGIENE PROGRAMS**

### **Asbestos**

Asbestos can be a hazardous substance. It is a naturally occurring material that, in the past,

was used in hundreds of commercial and industrial products. Common sources of asbestos in the DOE installations include:

- pipe and duct insulation,
- floor and ceiling tile, and
- cement - like corrugated siding on some of the older buildings.

**Intact and undisturbed asbestos does not pose a health risk.** However, if it is worn away, eroded, or crushed, it releases microscopic fibers that can become airborne and inhaled. Inhalation of high concentrations of asbestos fibers over an extended period of time may cause lung diseases such as asbestosis (a respiratory disease due to asbestos fibers) and cancer. Therefore, to avoid health risks, do not damage or disturb asbestos-containing materials! A special Asbestos Management Program has been established to control conditions that might lead to employee exposure.

Most asbestos-containing materials have been identified and labeled; however, do not assume that unlabeled insulation material is asbestos-free. If you see damage or debris associated with labeled asbestos materials, you should notify:

- your supervisor,
- the building manager,
- the OSSD, or
- ORNL Asbestos Manager.

Only qualified individuals can remove asbestos.

## **ORNL Chronic Beryllium Disease Prevention**

### ***Beryllium***

Beryllium is a hard grayish metal that is a chemical component of certain kinds of rocks, coal and oil, soil, and volcanic dust. The mineral rocks bertrandite and beryl are mined commercially for the recovery of beryllium. Beryllium has many useful applications due to its characteristics. DOE has used beryllium metal and ceramics in weapons, reactor moderators and reflectors, and as fuel element cladding. ORNL personnel occasionally work with beryllium and have used beryllium in the past.

### ***Health Effects***

Beryllium is a hazardous material that impacts the respiratory system. Medical testing procedures indicate that certain individuals may become sensitized to beryllium and have an allergic reaction when exposed to beryllium. Airborne exposures to beryllium may lead to

beryllium sensitization or the development of chronic beryllium disease (CBD). Sensitization is a condition whereby the individual has no symptoms of disease but their immune system reacts to beryllium. CBD is an allergic condition where the lungs become inflamed and non-cancerous growths develop which interfere with lung function.

Although it was thought for many years that CBD had been eliminated, recent studies have identified workers with CBD suggesting that current legal standards may not be protective enough to prevent disease.

### ***Exposure Reduction and Minimization***

Exposures to beryllium are controlled by means of:

- reducing airborne levels of beryllium,
- minimizing the number of workers potentially exposed and the number of opportunities for potential exposure, and
  - setting risk-based exposure reduction and minimization goals.

### ***Chronic Beryllium Disease Prevention Program (CBDPP)***

In order to help protect current workers, DOE has issued 10 CFR Part 850, ***Chronic Beryllium Disease Prevention Program (CBDPP)***. The program is designed to:

- reduce the number of workers exposed to beryllium,
- minimize the levels of beryllium exposure and the potential for exposure,
- establish medical surveillance protocols to ensure early detection of CBD, and
- establish continual monitoring of the effectiveness of the program in preventing CBD.

ORNL has established ORNL-SH-P010, *ORNL Chronic Beryllium Disease Prevention Program (CBDPP)* in order to help meet the above goals. Additionally, an ORNL Beryllium Disease Prevention web page has been developed and may be accessed at <http://hss.ornl.gov/beryllium.htm>.

### ***Beryllium Regulated Areas***

A posted Beryllium Regulated Area is established whenever airborne beryllium reaches a specified level. **Access to Beryllium Regulated Areas is limited to authorized personnel who have a job to perform in the area.**

### **Hazard Communication Standard**

The OSHA Hazard Communication (HazCom) standard requires that potentially hazardous chemicals in the workplace be evaluated, and the results of the evaluations communicated to employers and employees. The five elements of the HazCom Program are:

1. Chemical Lists Inventory lists of all chemicals in the workplace.
2. Material Safety Data Sheets (MSDS) Technical information, prepared by the manufacturer, for each chemical.
3. Labeling Labels on all hazardous substances.
4. Written HazCom Programs - The OSHA HazCom standard requires a written HazCom Program describing how OSHA requirements for safeguarding employees will be met.
  - The OSHA HazCom applies to facilities in General Industry and Construction. It applies to some areas of ORNL and most of BWXT Y-12 and ETPP.
  - The Chemical Hygiene Plan applies to laboratories. It describes how procedures, equipment, and work practices will protect workers from hazardous chemicals.
5. Training Information for workers on hazardous chemicals is required for the initial assignment and every time a new hazard is introduced.

### ***Material Safety Data Sheets (MSDS)***

A MSDS is a technical bulletin containing information about a hazardous chemical. The chemical manufacturer prepares it. OSHA requires that each MSDS contain the following information:

- chemical information;
- hazardous ingredients;
- physical and chemical characteristics;
- fire, explosion, and reactivity hazard data;
- health hazard data;
- spill or leak procedures; and
- special protection information and precautions.

MSDSs must be readily accessible through supervisors during each work shift to employees when they are in their work area. MSDSs may be made available through hard copy notebooks or through computer access on the Web.

### ***Labels***

Warning labels are a type of administrative control that helps “communicate the hazard” to the worker. OSHA requires labels on all substances identified by the manufacturer as hazardous. The label must include:

- material name/content identification,
- appropriate hazard warning symbols or written precautionary information, and
- manufacturer name and address.

When hazardous material is transferred from its original container to another container at DOE site area installations, the second container must be labeled with:

- information identifying the contained hazard, and
- appropriate health and physical hazard warnings.

Currently labels require the identification of the hazardous substance and hazardous information be included on the label in text format.

### ***OSHA Training***

OSHA training is another administrative control by which DOE manages safety and health issues in the workplace. OSHA requires employers to provide employees with information and training on hazardous chemicals in their workplace at the time of their initial assignment and whenever a new hazard is introduced. If your job requires the use of hazardous chemicals, or you work in a “designated” lab or production installation, you will be required to complete additional hazard communication training.

### ***Hazardous Chemicals***

The responsibility for chemical hazard evaluations belongs to the manufacturer of the chemical and experts from Safety and Health, Health Services, and Engineering. When a substance is evaluated as “hazardous,” we usually search for a substitute. All employees are encouraged to suggest alternatives to hazardous substances in use.

If your job requires you to use hazardous chemicals, or you work in a “designated” lab or production installation, you must complete additional hazard communication training beyond GET.

### ***Physical and Health Hazards***

Hazardous chemicals are any chemicals that can cause a physical or health hazard. We must take care to avoid the physical and health hazards that hazardous chemicals can present. Some hazardous chemicals are both physical and health hazards (e.g., gasoline).

Physical hazards can cause possible personnel or property damage. Examples of physical hazards are:

- compressed gases,
- explosives,
- flammable and combustible liquids, and
- water- reactive chemicals.

Health hazards can cause possible acute or chronic adverse health effects. Examples of health hazards are:

- irritants,

- corrosives,
- toxins,
- sensitizers, and
- carcinogens.

Hazardous substances can enter the body in four ways:

1. **Inhalation**—breathing chemicals into the nose or mouth, down the windpipe, and into the lungs. Some chemicals become trapped in the lungs. Others exit the body when you exhale. But many chemicals can pass from the lungs into the bloodstream.

2. **Ingestion**—taking materials into the body when you swallow them. If you swallow a hazardous chemical, it goes down your esophagus and into the stomach. From your stomach, chemicals may enter the intestines, where they can be absorbed into the bloodstream and spread throughout your body.

3. **Absorption**—chemicals contact the skin or the mucous membranes of the eye. When they're absorbed, they enter the bloodstream and can cause health problems throughout the body.

4. **Injection**—chemicals enter the body through a cut, wound, or puncture in the skin. Injected chemicals enter the bloodstream where they're carried to all parts of the body.

### ***Controlling Hazardous Substances***

Besides the human senses, there are three primary methods to control hazardous substances. They are engineering, administrative, and PPE controls (or a combination of the three).

**Engineering Controls** are mechanisms designed to safeguard personnel and the work environment. Engineering controls include systems, equipment, instruments, and other such manufactured devices. Engineering controls are the preferred method for control of hazardous substances/conditions. Examples of engineering controls are:

- air and ventilation systems,
- automatic detection systems that detect changes in temperature, pressure, or atmospheric conditions,
- barriers erected to prevent entry to certain areas,
- direct reading instruments such as indicator tubes that can instantly read results,
- emergency systems such as sprinklers,
- exhaust systems, and
- machine (fume) hoods.

**Administrative Controls** are methods of managing and monitoring work practices, equipment, and personnel for safety and health purposes. Examples include DOE orders and procedures.

**Personal Protective Equipment (PPE)** is gear worn by personnel for safety and health reasons. PPE is the last route of defense and should be used when engineering and administrative controls are not feasible or sufficient to fully protect against hazards. Examples of PPE are:

- face shields,
- protective clothing (e.g., gloves, shoes, aprons),
- respirators, and
- safety glasses.

## **RADIATION PROTECTION PROGRAM**

**ALL** employees must play active roles in keeping exposure to radiation and radioactive materials as low as reasonably achievable (ALARA). We must have a healthy respect for, not fear of, the radiological hazards at ORNL.

This section will help you understand the benefits and risks of radiation and the importance of keeping exposure ALARA. Specifically, it will cover ALARA, radiation, radiation exposure, radioactive contaminants, risks in perspective, and nuclear criticality.

### **ALARA**

DOE and ORNL are firmly committed to maintaining a radiological control program of the highest quality. This means keeping exposure to radiation and radioactive material ALARA. An occupational radiation exposure is an exposure to radiation on the job that is not related to natural (e.g., sun) or medical exposure.

Maintaining exposure to radiation and radioactive material ALARA is a goal in all ORNL activities. Consistently achieving that goal requires:

- awareness of the radiological hazards at the workplace,
- knowledge of methods used to minimize exposures,
- positive attitudes about radiological safety, and
- the cooperation of all employees, both radiological and non-radiological.

Three basic practices used to maintain exposures ALARA are:

1. **Reduce time** spent near a radiation source.
2. **Increase distance** between you and the radiation source (as much as possible).
3. **Install shielding** between you and the radiation source.

Employees can apply the ALARA concept and minimize their radiation exposure if they adhere to the following:

- obey all signs and postings,
- comply with all radiological and safety rules, and
- **NEVER** enter radiological areas unless you are escorted or properly trained. Only qualified radiological workers are allowed into radiological areas without escorts.

## **Radiation Defined**

Released energy that travels through space and matter is known as radiation.

## **Types of Radiation**

Radiation is typically divided into two categories: ionizing radiation and non-ionizing radiation. Ionizing radiation is radiation that is energetic enough to remove an electron from an atom, creating an ion. Non-ionizing radiation is not capable of producing ions and, as such, is not as great a radiological concern.

### ***Ionizing Radiation***

This is the type of radiation that we most often think of when the term radiation is used. The radiological protection program at ORNL is concerned with controlling exposures to ionizing radiation.

#### ***Types of Ionizing Radiation***

- alpha particles,
- beta particles,
- gamma rays /X- rays, or
- neutrons.

### ***Natural Background Sources of Ionizing Radiation***

- cosmic (e.g., sun, stars),
- the earth's crust (e.g., rocks and soil),
- radon (e.g., radioactive gas from the earth's crust), or
- materials present in our body (e.g., radioactive potassium).

### ***Man-Made Sources of Ionizing Radiation***

- medical X- rays and nuclear medicine,
- consumer products such as smoke detectors and tobacco products, or
- fallout from nuclear weapons testing.

### ***Non-Ionizing Radiation***

Non-ionizing radiation can cause biological damage, but it is not a major radiological concern. Sources of non- ionizing radiation are

- microwaves,
- radio waves,
- light (infrared and visible),
- heat, or
- lasers.

## **Radiation Exposure**

### ***Measuring Radiation Exposure***

Thermoluminescent dosimeters (TLDs) detect and measure doses of ionizing radiation to personnel. Because they are issued on the basis of work assignments and other considerations, some employees do not receive TLDs. TLDs are not required for visitors or short-term employees who are not likely to receive 50 mrem or more in a year. ORNL employees can access their individual occupational dose from external radiation exposures from the OSSD web site at <http://www.ossd.ornl.gov/ds/tld/>.

### **Wearing and Caring for Your TLD**

#### **Do's and Don'ts**

- If you are issued a TLD, you must wear it facing out on the front of your upper body between your waist and shoulders and at all times while on site.
- If you lose, damage, forget, etc. your TLD, report it to your supervisor, a Radiological Control Technician (RCT) or your Division Radiological Control Officer (DRCO).
- Report planned receipt of medical radionuclides to the Dosimeter Distribution Center ( 574-6668) prior to treatment or tests, if possible, or as soon as possible thereafter.
- Disassemble or use for any purpose other than monitoring radiation.
- Leave on the television, microwave oven, computer monitor, or near sources of high heat.
- Drop into water or laundry.
- Expose to medical or dental X-rays.

### ***Engineering Controls***

Because our senses do not warn us of radiation or radioactive material, ORNL provides administrative and engineering controls in radiological areas to support the ALARA concept by minimizing radiation levels and controlling radioactive material. Ventilation and lead shielding are common engineering controls.

### ***Administrative Controls***

**ALL** personnel must understand the administrative controls established for their protection. Some of those controls are:

- signs with the standard radiation symbol (trefoil) colored magenta or black on a yellow background,
- a label or yellow plastic wrap indicating radioactive material,
- signs indicating areas that store radioactive material, or
- tags and labels with a yellow background and either a magenta or black radiation symbol displaying:

“Caution – Radioactive Material.” The purposes of postings are to:

- alert personnel to potential or known radiological conditions,
- aid in minimizing exposures,
- prevent the spread of contamination, and
- let you know if you are allowed in certain areas.

Items bearing yellow tags must be stored within radiological areas. If you discover a yellow tagged item that appears to be unattended (e.g., in a trash receptacle, outside, or in a corridor), **DO NOT** touch or handle the material. Instead, take these steps.

1. Warn people not to approach the area.
2. Guard the area and ask someone to immediately notify the Radiological Support Services, or the LSS/PSS.
3. Await Radiological Support Services personnel.

Items bearing green tags meet acceptable radiological release limits for unrestricted use and may be taken out of radiological areas.

Brown-tagged items (i.e., pipes) have potential or actual internal contamination and may not be removed from the ORNL site.

## **Radiological and Non-Radiological Workers**

**At DOE facilities, employees are classified as radiological and non-radiological workers. After successfully completing GET, non-radiological workers may enter Controlled Areas unescorted.**

A Controlled Area is an area to which access is controlled to help protect individuals from exposure to radiation and radioactive contamination.

It is important to remember that **ONLY** specially trained and qualified workers, called Radiological Workers are allowed to:

- enter a radiation buffer area without an escort,
  - o A radiological buffer area is an area established within a Controlled Area to minimize exposure by providing a secondary boundary.
  - o A controlled area is an area to which access is controlled to help protect individuals from exposure to radiation and radioactive contamination.

- touch and handle radioactive material, and
- perform hands- on work in radiological areas.

If you have questions on which training is required for specific areas or facilities, contact the appropriate Facility Manager, Safety Officer, or your supervisor.

### **What is the Difference between Radiation and Contamination?**

A common misconception is that things that are exposed to radiation become contaminated. This is **NOT** true. Contamination is radioactive material in a place where it is not wanted.

Contamination of a person results from direct contact with removable radioactive material and consequent transferal of some of the radioactive material to the person.

### **Chronic Radiation Dose**

A chronic radiation dose refers to small amounts of ionizing radiation received over a long period of time. Sources of chronic radiation dose include:

- natural background (cosmic rays , the earth's crust, etc.),
- medical X rays,
- injections of radioisotopes for medical purposes, and
- occupational radiation.

The primary biological effect of chronic doses of radiation is a slight risk that cancer may occur in the exposed individual or in future children of the exposed individual. This risk is small at occupational dose levels.

### **Reproductive Health**

To minimize risk to the reproductive health of men and women, exposure to radiation and other hazardous substances is kept below federal guidelines and ALARA. Employees with concerns about the safety of their reproductive health should bring their concerns to Health Services or to the Radiological Support Services. The greatest risk to reproductive health is to the unborn child of a pregnant worker. A developing embryo/fetus is especially sensitive to ionizing radiation and other hazardous substances.

Significant radiation dose to the embryo/fetus may increase the likelihood of effects such as:

- slow physical growth,
- mental retardation, or
- childhood cancer.

These effects have only been observed at high radiation exposures, such as those received by pregnant women when the atomic bombs were dropped on Japan. Because the effects have

been observed at very high radiation exposures, we conservatively assume that any exposure may increase the likelihood of these effects. Remember, these effects can also be caused by many other hazards in our environment.

DOE policy is basically the same on prenatal exposure to ionizing radiation and other hazardous substances. All risks are minimized by having special protective measures for the embryo/fetus and by keeping all exposures ALARA.

The responsibility for declaring a pregnancy resides with the worker. This responsibility is considered voluntary in the same sense that a pregnant person can be encouraged, but not forced, to limit other activities that may be detrimental to the child during gestation. However, a female worker is encouraged to voluntarily notify her employer, in writing, when she becomes pregnant.

A pregnancy may be declared by written notification to Health Services. An ORNL woman can declare her pregnancy by going to Health Services and signing a declaration form. She may also write out a declaration by hand or typewriter or print the form out from the Web. She or her supervisor then may mail or fax the form to Health Services. Once the pregnancy is declared, workplaces will be evaluated by Radiological Support Services personnel for potential exposure to radiation and by Industrial Hygiene personnel for potential exposure to other hazardous substances.

If a work area presents the potential for exposure to radiation or other hazardous substances, the declared pregnant worker may be asked to relocate to another work area or work assignment for the protection of the unborn child.

In the event of re-assignment, the employer provides a mutually agreed upon assignment of work tasks, without loss of pay or promotional opportunity. The reassignment makes further occupational exposure to radiation and other hazards unlikely. Reassignment of a declared pregnant worker is a voluntary act and does not create a basis for discrimination. A worker has the option of withdrawing a declaration at any time.

### **Risks in Perspective**

Although it is true that radiation can cause biological damage, it is important to keep the risks in perspective. The annual limit for visitors is 100 mrem. This maximum annual dose allowed is only about one-third of the annual radiation dose that we all receive as a result of cosmic radiation from outer space and the natural radioactive materials in the earth's crust. Together, these natural sources contribute about 300 mrem per year of dose to the average person. Manmade sources of radiation (such as medical X rays) account for another 60 mrem per year, so the average person receives a total radiation dose of about 360 mrem per year. Some groups may get higher doses due to their occupation, lifestyle, or location. Examples of increases in average exposures:

## **Group Average Annual Dose (mrem)**

cigarette smokers 1300  
airline flight crew 1000  
nuclear power plant worker 560  
living in Colorado 100  
medical personnel 70

Workers at DOE facilities are protected against receiving radiation doses at levels that might result in any significant increase in the risk of cancer or other ill effects. The vast majority of visitors and employees at DOE sites receive no measurable dose as a result of their time spent at ORNL.

## **REPORTING**

Be sure to report any of the following types of situations to the appropriate personnel.

### **Type of Situation Report To**

Damage or debris associated with labeled asbestos material Your supervisor, Building manager, OSSD, ORNL Asbestos Manager  
Deficient vehicles (that did not pass the operator inspection) Your immediate supervisor  
Reproductive health concerns Health Services  
Unattended radiological material or an unusual radiological situation Radiological Support Services or the LSS/PSS  
Lost or forgotten TLD Your supervisor, a RCT or your DRCO  
Bringing radioactive sources into ORNL Radiological Support Services

# NUCLEAR SAFETY

## OBJECTIVE

Identify Nuclear Safety responsibilities to include:

- Fissile Control Area requirements,
- fission chain reaction definition,
- explanation of subcritical, critical, and supercritical conditions,
- effects of a nuclear criticality accident,
- nuclear criticality accident definition, and
- basic concepts and terms of ORNL's P- AAA program.

## FISSILE CONTROL AREA

Fissile Control Areas are areas used to store and process materials that have a potential for a nuclear criticality accident. You may encounter a sign marking the boundary of a Fissile Control Area. Generally, you are not permitted to enter Fissile Control Areas without a qualified escort. To enter most Fissile Control Areas or Radiation Buffer Areas, a person must receive special radiological training.

This GET course is **NOT** sufficient to allow unescorted entry into most Radiation Buffer Areas or Fissile Control Areas.

If you have questions on which training is required for specific areas or facilities, contact the appropriate Facility Manager, Safety Officer, or your Supervisor.

## FISSION CHAIN REACTION

Fission is the splitting of the nucleus of an atom, usually caused by a neutron striking the nucleus. The fission produces two smaller atoms, heat, radiation, and more neutrons. In a neutron fission chain reaction, a fissionable nucleus absorbs a neutron and fissions occur, releasing additional neutrons, which cause more fission in a continuous, self-sustaining chain.

### Subcritical, Critical, and Supercritical

**Subcritical Condition** means that a self-sustaining fission chain reaction cannot be maintained. Normal, safe plant operations are examples of subcritical conditions.

**Critical Condition** means that a self-sustained fission chain reaction is maintained at a constant level, as in a normal reactor.

**Supercritical Condition** means that the fission rate rises rapidly, as in the case of a criticality accident

## **NUCLEAR CRITICALITY ACCIDENT**

A nuclear criticality accident is an uncontrolled, unintentional, self-sustaining neutron fission chain reaction. A nuclear criticality accident is hazardous because large amounts of energy in the form of heat and radiation are released. An unpredictable and uncontrollable radiation source is produced which is harmful to people near the accident site. Other possible consequences of a nuclear criticality accident include:

- fire,
- equipment damage,
- steam explosion, and
- the permanent shutdown of the facility involved.

## **PRICE-ANDERSON AMENDMENTS ACT (P-AAA)**

### **Overview**

On August 20, 1988, Congress enacted the Price-Anderson Amendments Act (P-AAA), which made coverage for DOE contractors mandatory for the first time. It provides indemnification (insurance) to DOE contractors and establishes an enforcement system for DOE indemnified contractors, subcontractors, and suppliers. In essence, the Government acts as an insurer for these contractors against any findings of liability arising from the nuclear activities of the contractor. Congress mandated that the DOE develop and enforce nuclear/radiological safety requirements to minimize the risk of injury to workers and the public.

### **Purpose**

The cornerstone of the DOE enforcement policy is the contractor's effort to implement effective programs to implement nuclear/radiological safety requirements, critically self-assess activities, and promptly identify, report, and correct noncompliance conditions. The DOE P-AAA Program promotes nuclear/radiological safety and protects the environment, health, and safety of the public and workers by requiring contractor compliance with PAAA nuclear/radiological safety rules.

### **Applicability**

P-AAA applies to the work of the DOE personnel, contractor and subcontractor employees, and other persons (including visitors) conducting activities that affect or may affect the safety of DOE nuclear and radiological facilities or activities. It also addresses work **in support of** those facilities and activities that can cause or contribute to nuclear or radiological incidents. These support activities can include design, design review, operational support, procurement, receipt inspection, dedication of components, and other types of activities even where the activities are conducted outside the facility or activity. ORNL P-AAA program is accomplished through ORNL implementing procedures.

## Drivers

P-AAA requirements are law and are established through nuclear safety requirements, regulations and procedures known as the DOE Nuclear Safety Rules. DOE requires compliance with those Rules and holds nuclear/radiological safety to be a contractor responsibility.

Contractors who do not conduct their work and operations in compliance with the Rule requirements are subject to fines and penalties. DOE enforcement discretion is based on the contractor's **timely** self-identification of nuclear/radiological safety deficiencies, **prompt** reporting of those deficiencies, and **prompt and corrective actions**. It behooves the contractor to effect safe work practices, which produce a quality product satisfying the customer needs. Simply put, implementation of a sound Price-Anderson program is just good business.

## Additional Information

Information on the structure, elements, procedures, and contacts for the ORNL P-AAA Program can be found at <http://nfs.ossd.ornl.gov/p-aaa/>.