ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.1 Interim
TITLE: Structure of Handbook of Environmental Health and Safety	**DATE:** 1/2001

Requirements for environmental health and safety (EHS)—including various aspects of occupational safety and occupational health—and environmental protection related to research, teaching, and industrial activities, are increasing rapidly not only in numbers, but also in complexity. The time necessary to understand and comply with these requirements is considerable. It is, therefore, both logical and economical to provide information in a brief and understandable language to those involved with handling chemical, radiological, biological, and physical agents. The ICESH/EHS Handbook is designed to meet this need.

Consistent with numerous legal mandates, the ICESH/EHS Handbook makes a distinction among various categories of information as follows:

1. **Policies** - are binding requirements that are either based entirely on legal requirements, or are highly desirable.

2. **Procedures** - contain a detailed, and often step-by-step description of how a policy is implemented in a specific setting. By their very nature, procedures are specific to an operation and are often voluminous.

3. **Guides** - perform an important function by providing the necessary technical information to assist those who must comply with policies and/or must follow procedures.

4. **Regulations** - are often voluminous and are used by the ICESH staff to develop policies. In certain cases their texts are not readily available and thus are included in the ICESH/EHS Handbook. In other cases a hyperlink to appropriate data base provides the text to the users of ICESH/EHS Handbook.

5. **EHS Personnel** - consists of one or more individuals responsible for identification of applicable requirements and their enforcement.

The ICESH/EHS Handbook is intended as a living document. Its modular form permits easy revisions of relevant segments. The needed revisions may be based on new regulations; revision of existing regulations; or experience from the large number of organizations associated with ICESH.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.2 Interim
TITLE: Requirements for Environmental Heath and Safety Programs	**DATE:** 1/2001

All buildings and facilities where the public can access or individuals are employed should and often must have an EHS program. Experience has shown that regardless of legal requirements, essentially every organization benefits from an EHS program—provided its extent is commensurate with its need and meets the legal requirements.

As a general rule, an acceptable EHS program must have the following elements:

EHS Personnel

An individual with appropriate knowledge and training must be authorized by the top management to direct EHS activities. Depending upon the size and complexity of the organization, an individual who has other duties may be appointed as EHS director. A full-time director may be required, or the director may need a group of individuals to perform this duty.

Generic EHS Information

Each organization must have or must have access to generic information applicable to the needs of that organization. The ICESH/EHS Handbook is intended to provide this information.

Site-Specific EHS Information

In most cases, each organization is unique by virtue of its operation; location; the education and training of its employees; and many other parameters. Therefore, a site-specific safety program is required. The ICESH/EHS Handbook can be supplemented by information meeting site-specific EHS needs.

Legally Mandated Information

Certain materials are legally mandated to be readily accessible. These include: Material Safety Data Sheets (MSDSs) for those organizations that use chemical agents; text of certain regulations; and others. These materials are accessible via ICESH.

Legally Mandated Training

Organizations that handle chemical, radiological, microbiological, or physical agents as well as certain professions are required to receive training. These are identified in relevant segments of the ICESH/EHS Handbook.

Periodic Inspection

An acceptable environmental health and safety program requires periodic inspection. In certain cases, such as radiation safety, periodic inspection is legally mandated. However, at a minimum, an annual inspection is highly desirable.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.3 Interim
TITLE: Environmental Health and Safety Committee	DATE: 1/2001

The operation of an organization involved in research, patient care, or activities that involve multiple chemical, radiological, or microbiological agents must be conducted safely and in compliance with applicable federal, state, and local regulations. Furthermore, in such an organization, the consensus process is the most appropriate approach for the development and implementation of policies. Experience has shown that the EHS Committee provides the vehicle for such an approach.

The responsibilities of the EHS Committee include the following:

1. The oversight of EHS-related activities to ensure that they are: consistent with protection of human health and the environment; and in compliance with applicable federal, state, and local regulations.

2. Development of relevant policies.

3. Review and approval of policies, procedures, and guides developed by others.

4. A forum for resolution of EHS-related disputes between those responsible for enforcement of EHS policies, and those who have to abide by them.

5. Coordination of activities of various EHS-related committees.

6. Oversight of risk management, including; accident investigation; accident prevention; and reduction of accident-related costs.

7. Authorization of an individual such as the Chair of the EHS Committee to act on its behalf on day-to-day activities of the EHS managers.

The EHS Committee is chaired by a senior administrative official, preferably one who is not subject to EHS compliance. Members of the EHS Committee include the following:

1. Chair or a representative of the Radiation Safety Committee—if such a committee exists.

2. Chair or a representative of the Chemical Hygiene Committee—if such a committee exists.

3. Chair or a representative of the Biosafety Committee—if such a committee exists.

4. Chair or a representative of Committees with oversight of fire protection; emergency management; and the many other occupational safety and environmental issues—if any of these committees exist.

5. Representatives of administration, particularly those responsible for allocation of funds.

The EHS Committee normally meets quarterly, or upon the request of its chair or at least three members.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.4 Interim
TITLE: Organization of Environmental Health and Safety	DATE: 1/2001

One of the key ingredients of an acceptable operation of an organization involved in research, patient care, or activities that involve multiple chemical, radiological, or microbiological agents, is the availability of EHS personnel. The needed EHS personnel may range from a part-time individual, or a department with a number of sections. As a general rule, the EHS may include the following functions:

Safety Officer

An individual with the responsibility to oversee the entire EHS operation is the organizations' Safety Officer. This individual should have the appropriate education, training, and experience to perform this important duty. Depending upon the size and complexity of an organization, this individual performs some or all of the activities described below.

Radiation Safety Officer

Universities, research organizations, health care facilities, and certain other organizations use radioactive materials for a variety of purposes. The application of radionuclides requires a license from the U.S. Nuclear Regulatory Commission or the state. A prerequisite for licensing is the existence of a radiation safety program headed by a Radiations Safety Officer.

Chemical Hygiene Officer

All facilities that use industrial chemicals need someone who oversees the safety of chemical operations. This function is performed by the Chemical Hygiene Officer.

Biosafety Officer

Health care facilities and organizations engaged in biomedical research need someone who oversees the safety of various aspects of biosafety. Again here, on occasion, the Industrial Hygiene Officer or the Safety Officer performs the tasks of Biosafety Officer.

Industrial Hygiene Officer

Essentially every organization involved in activities that have the potential for occupational accidents needs an Industrial Hygiene Officer. In some organizations, this individual is referred to as the Safety Officer or the Industrial Hygienist.

Fire Safety Officer

Fire prevention, fire investigation, and enforcement of fire rules are the responsibility of the Fire Safety Officer. On occasion, this individual is referred to as the Fire Marshall.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.5 Interim
TITLE: Safety Custodians	DATE: 1/2001

An organization may comprise a broad and diverse spectrum of working spaces, laboratories, storage areas, and multi-use facilities. Each facility has its own purpose, and consequently, its own unique requirements for safety practices and procedures. The foundation of a properly-designed safety policy is an unambiguous individual responsibility in implementing its program. Every space—including storage areas, laboratories, workshops, and machinery spaces—must have a designated Safety Custodian. These custodians are responsible for communicating and implementing the policies and requirements of the EHS. Administrative managers are appropriately designated as Safety Custodians. They may delegate this responsibility to Principal Investigators, supervisors, or other persons with authority to act on behalf of the Safety Officer. However, if for any reason Safety Custodians become unavailable or unresponsive to safety requirements, the custodianship reverts back to administrative managers.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.6 Interim
TITLE: Vacating a Space Containing Hazardous Material	**DATE:** 1/2001

Many spaces that were used for operations using chemical, radiological, or biological agents, or those that may pose safety hazards, are occasionally vacated for renovation, reconstruction, or permanent move of the occupant. These facilities must be decontaminated and cleaned. The Safety Custodian must certify that all known hazardous materials have been removed; other safety issues have been satisfactory resolved; and that outside personnel may safely enter the area.

Accordingly, the vacated area must be left free of debris as well as all biological, chemical, and radiological hazards. The safety custodian must provide the Safety Officer with a completed "Certificate of Vacancy" form ICESH 1.6F-001 before outside personnel can enter the laboratory.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY

CERTIFICATION OF VACANCY

Building and Room number: _____

The following hazardous materials have been used in this laboratory:

G Pathogenic (biohazardous) organisms: _____
_____

G Radioactive materials (specify radionuclides): _____
_____

G Toxic chemicals (specify the most significant ones): _____
_____
_____
_____

G Other hazards (specify the most significant ones): _____
_____
_____
_____

I hereby certify that all known biological, chemical, and/or radiological hazards have been removed from the laboratory areas listed on this form. I further certify that all listed work areas have been properly decontaminated and cleaned, and are ready for the entry of construction workers.

_____ _____
Name of Safety Custodian* Signature of Safety Custodian

_____ _____
Telephone No. of custodian Date

For further information, call the Safety Officer.

*Person assigned by the administrative unit to be responsible for the facility.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.7 Interim
TITLE: Assurance on Hazardous Procedures	**DATE:** 1/2001

An important element of a well-functioning safety program is appropriate planning for various services. A major ingredient of the planning process is the availability of information on the nature and quantity of hazardous materials that are expected to be used by various investigators. Form ICESH 1.7F-001, "Assurance on Hazardous Procedures," is designed to accommodate this requirement. Every investigator is required to complete this form whenever a new project is being planned, or a significant redirection of an existing project is being contemplated. ICESH 1.7F-001 should be filled out and provided to the Safety Officer for review and approval.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY

ASSURANCE ON HAZARDOUS PROCEDURES

1. Principal Investigator: _____

2. Project Title: _____

_____

_____

3. Identification of Hazard (check as many as applicable):

Radioactive Materials_____ Ionizing Radiation Mechanics_____ Non-Ionizing Radiation_____ Biologicals_____ Recombinant DNA/RNA_____

Controlled Substances_____ Laboratory Chemicals_____ Dioxin or Polychlorinated Phenyls_____ Others_____

(If no item is checked, skip 4 and 5 and fill out the rest of the form)

4. Safety precautions and training of PI:

Please attach a page containing a description of how hazardous agents are used in the study, particularly procedures that are followed to protect the personnel. Furthermore, describe specific training and experience of the PI in the use of hazardous agents utilized in this research.

5. Expected average quantity of waste generated (in kg per month):

Radioactive_____ Chemical_____ Biomedical_____

6. The PI agrees to provide the Safety Officer with appropriate information related to the study. Furthermore, the PI agrees to comply with all applicable regulations of the U.S. and state agencies as well as policies established by the Safety Officer. In particular, the PI agrees to the participation of all personnel involved in the study in safety-related training.

7. Signature of PI: _____ Date: _____

Department: _____

Department Chairperson: _____ Date: _____

To be filled out by the EHS

_____ The EHS has no objection to this research.

_____ The EHS has identified issues that must be addressed before this project can be pursued (see attached memo).

_____ _____

Date Signature

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.8 Interim
TITLE: Prohibition of Certain Activities Related to Hazardous Materials	**DATE:** 1/2001

Recognizing that inhalation is not necessarily the only route of exposure to hazardous materials, federal and state agencies have promulgated regulations which prohibit activities that may lead to exposure to hazardous materials through the GI tract. For the purpose of this policy, certain activities are prohibited in laboratories or similar facilities. A laboratory or similar facility is an area where one or more of the following materials are stored or used:

1. radionuclides
2. chemicals
3. biologic materials
4. cleaning agents, paints, solvents, and similar chemicals
5. materials that to the judgement of the EHS Committee would pose an unreasonable health risk

The following activities are prohibited in laboratories or in similar facilities:

1. smoking
2. eating
3. drinking
4. application of cosmetics
5. manipulation of contact lenses
6. storage of foods and drinks

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.9 Interim
TITLE: Respiratory Protection	**DATE:** 1/2001

The Safety Officer oversees respiratory protection, which requires that the control of airborne contaminants must occur by accepted engineering control measures. These engineering controls should alleviate the necessity for application of respirators. However, if for whatever reason effective controls are not feasible—or while they are being instituted—appropriate respirators must be used. A respirator is defined as a device used to protect the wearer from inhalation of harmful contaminants. As a general rule, respirators approved jointly by the National Institute for Occupational Safety and Health (NIOSH), and the Mine Safety and Health Administration (MSHA) are considered to be acceptable. The EHS provides fit testing and training for those who are covered by the respiratory protection program.

Administrative Directors, Safety Custodians, and their equivalents are responsible for identifying all personnel under their supervision who require respiratory protection. Furthermore, these supervisors must identify potential work areas where potential respiratory protection is required. The EHS provides assistance in specifying the type of respiratory protection based on the nature and concentration of hazardous material; condition of use; and environmental factors. In addition, the EHS identifies activities such as welding, painting, or embalming, which may require respiratory protection.

No occupational health and safety program is effective unless the affected employees are aware of it, and are willing to implement it when and where required. Employees are required to wear the appropriate respiratory equipment according to relevant instructions, and to maintain the equipment in a clean and operable condition.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.10 Interim
TITLE: Medical Assessment and Treatment	**DATE:** 1/2001

Risk management must be based on prevention of accidents and accidental exposure to chemical, biological, or radiological agents. However, despite the best preventive measures, provisions must be made to manage accidents including the treatment of those who have been overexposed to these agents. Therefore, medical support must be provided for potential exposure to chemical, biological, or radiological agents. Depending upon the size and complexity of an organization, the medical service may range from an in-house medical service to access to a physician. For the purpose of this policy, the organization responsible for the medical support of an organization is defined as the Medical Support Service.

Employees likely to be exposed to hazardous chemicals during the course of their work (Policy No. 5.1) are provided the opportunity to receive medical attention. This includes medical consultation and follow-up—if warranted.

Employees likely to be exposed to bloodborne pathogens (Policy No. 6.5) are required to receive a Hepatitis B vaccine (Policy No. 6.7). Furthermore, all exposure incidents involving bloodborne pathogens are evaluated and followed-up with medical attention as necessary.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.11 Interim
TITLE: Risk-Based Safety Management	**DATE:** 1/2001

The policy on corrective actions must rely upon a number of parameters, including the probability of an adverse effect and regulatory requirements as well as common sense. There is an increasing recognition that risk-based decisions are more cost-effective and lead to safer conditions than the previously-held notion that a condition or an action is either safe or unsafe. Accordingly, this policy relies upon—and is based on—a grading system for corrective actions. The extent of corrective action depends on the severity level of the safety infraction. There are five Action Classes (AC) as follows:

Action Class I: The highest and most severe safety problem—AC I—requires an immediate corrective action. A condition or activity which is likely to lead to injury or property damage is classified as AC I. This likelihood may be expressed as a high probability.

Action Class II: Activities or conditions that are unambiguously in violation of existing laws, regulations, or policies, or have the potential for a certain level of harm are classified as AC II. Corrective actions are required for AC II safety problems, however, the time provided for corrective actions depends upon the potential impact of the violation, and may range from a few hours to longer times.

Action Class III: Violations of certain regulations, or disregard for specific recommendations and guides of appropriate federal agencies, scholarly organizations, or recognized professional groups are placed at AC III. The prerequisite for placing a safety problem at AC III—and not AC II—is its potential impact. The likelihood of an adverse effect should be small. Corrective actions are required for AC III safety problems with the stipulation that the cost and potential alternatives would be considered.

Action Classes IV and V: Activities that could improve safety are placed in these categories. The prerequisite for AC IV or AC V is the existence of a reasonably safe condition. The objective of placing a potential safety problem at these levels is to bring to the attention of investigators options that would improve their operations. Often, corrective actions are associated with small costs and result in significant improvements in operational safety. The difference between Action Classes IV and V is their potential impact. Remediation of AC IV is expected to be more cost-effective than that of AC V.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 1.12 Interim
TITLE: EHS Inspection Program	**DATE:** 1/2001

There is an increasing recognition that periodic inspection by the EHS staff is necessary to ensure that the operation of a research, health care, or production facility is safe and complies with appropriate requirements. Safety inspections do not need to be threatening or ominous. Instead, if properly performed, they will be considered as helpful by those who must comply with numerous federal, state, local, and institutional requirements.

Each institution has its own unique operation and requires a suitably-designed inspection system. There are however, common features to all operations as described in this policy. As a general rule, there are three major classes of inspections as follows:

Self Inspection

Every investigator, health care professional, or production manager should be encouraged to perform self inspection. In order for the self inspection to be practical, it must meet the following requirements:

1. Relevant forms must be provided to those who perform self inspection.
2. The labor involved in self inspection must be commensurate with potential hazards of an operation, and may not impose undue burden on those who perform self inspection.
3. The information resulting from self inspection should be used to learn lessons for related or future activities.

Inspection by the EHS

A properly managed EHS program relies upon periodic inspection of all facilities and activities in an institution. Experience shows that pre-announced EHS inspections are as useful or more valuable than unannounced inspections. The primary objective of the EHS inspections is to assist various individuals and groups in operating safely, and in compliance with legal requirements.

Inspections by Regulatory Agencies

Regulatory agencies perform pre-announced and unannounced inspections. Violations identified by regulatory agencies during their inspection have unpleasant and often monetary consequences.

Frequency of Inspections

The frequency of inspections is based on the legal requirements and the potential hazards associated with each specific operation. The frequency of inspections is provided for each class of hazardous materials as described in policy No.'s 4.8 and 6.2. However, at a minimum, every area including offices, workshops, and those where hazardous materials are present should be inspected annually.

Corrective Actions

The ultimate objective of the EHS program is not only to ensure that an operation complies with legal requirements, but also to improve its safety. Policy No. 1.11 describes responses to potential safety infractions.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 2.1 Interim
TITLE: Classification of Wastes	**DATE:** 1/2001

Wastes generated at most organizations must be collected; stored; transported; disposed of safely and economically; and in compliance with relevant federal and state regulations. A logical classification of waste generated in most facilities is as follows:

Radioactive Waste

Waste containing radioactive materials generated at most facilities is regulated as class A low-level radioactive waste. This waste includes: source materials; special nuclear materials; and by-product materials as defined by the Atomic Energy Act. Furthermore, in many states naturally-occurring and accelerator-produced radioactive materials (NARM) are regulated in the same manner as other classes of radioactive materials. Classes B, C, and above are not currently included in the ICESH/EHS handbook.

Chemical Waste

For the purpose of this policy, chemical waste is defined as a waste resulting from chemicals that are used in production, research, and health care. These can be generally categorized into two categories:

Hazardous Waste: This class is regulated by the U.S. Environmental Protection Agency (EPA) and all authorized states. This hazardous waste includes: F list (from unspecific sources); K list (from specific sources); U list (residues from production of chemicals); and P list (acute hazardous). In addition, the law provides for generic tests to decide whether certain wastes are hazardous on the basis of four characteristics: flammability; corrosivity; reactivity; or toxicity characteristics (TC) based on the toxicity characteristic leachability procedure (TCLP).

Other Chemical Waste: There are a large number of waste chemicals that are not covered by hazardous waste regulations, but still need to be controlled. This chemical waste must be collected and disposed of in a safe manner, regardless of its legal status.

Mixed Waste

Regulations for hazardous and radioactive wastes are based on different criteria and are often administered by different agencies. Prevention of mixed waste generation is particularly important, as its treatment and disposal pose specific problems.

Biomedical Waste

This waste is regulated mostly at the state level. Its classification, management, treatment, and disposal deviates somewhat from state to state. This waste can logically be divided up into three groups.

Infectious Waste: This class of waste consists of: anatomical material; blood; blood-soiled articles; and sharps defined by the a variety of regulations as Infectious Waste. In certain states—notably in Pennsylvania—this waste must be placed in red bags, hence the term Red Bag Waste. Once sterilized or decontaminated, this waste is called Black Bag Waste.

Chemo-Biological Waste: This class of waste consists of: anatomical material; blood; blood-soiled articles; fluids; and sharps resulting from chemotherapy and related treatments. In certain states—notably in Pennsylvania—this waste must be placed in yellow bags, hence the term Yellow Bag Waste.

Sterile Biomedical Waste: This waste consists of sterilized or disinfected laboratory waste such as petri dishes as well as uncontaminated laboratory waste.

Waste Water

Waste water is normally managed and treated by the municipality. There are, however, limitations on releases of regulated and controlled wastes into the sanitary sewer. These limitations are specific to the waste streams and are covered in the respective policies.

Municipal Waste

The municipal or household waste is managed by a special group, and is often disposed of in sanitary landfills. The only major requirement for this class of waste is that it cannot be mixed with regulated or controlled waste.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 2.2 Interim
TITLE: Generic Waste Policy	DATE: 1/2001

The responsibility for the proper management of waste is jointly held by the Waste Generator and the Safety Officer. The Waste Generators must correctly identify; treat; package; and handle wastes generated within their facilities. The Safety Officer is responsible for the disposal of waste materials subsequent to collection by personnel.

Definition of Waste Generator

Waste Generators are those who have the authority to obtain and use chemicals; radioactive materials; biohazardous agents; and material which may become municipal waste. Unless the Safety Officer is advised otherwise in writing, the Safety Custodian is considered to be the Waste Generator for a particular facility such as a laboratory.

Responsibilities of the Waste Generator

The Waste Generator is responsible for the initial classification; treatment; packaging; and handling of waste materials. Appropriate documentation must accompany waste for EHS pick-up. The Waste Generator is responsible for the safe storage of waste until it is in the custody of the EHS. Waste Generators are responsible for compliance with regulations when using the sanitary sewer for disposal, or when opting for disposal of materials such as municipal wastes.

Responsibilities of the EHS

The EHS provides policies and guides for definition; classification; treatment; storage; and disposal of various wastes. Other responsibilities of the EHS are:

1. To assist and advise Waste Generators in the selection of procedures and methodologies to be employed when treating, segregating, and handling waste materials for disposal.

2. To provide Waste Generators with forms and certain packaging materials.

3. To dispose of waste materials in its custody, or arrange for the disposal of waste in accordance with appropriate regulations or accepted prudent practices.

4. To collect the waste within three days of notification. The arrangement for pick-up is made upon mutual agreement.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 2.3 Interim
TITLE: Hazardous/Chemical Waste Removal	**DATE:** 1/2001

Hazardous chemicals and potentially hazardous wastes must be handled and disposed of according to legally-mandated methods and accepted prudent practices. The definitions of hazardous waste and chemical waste, and the release limits for each waste in the sanitary sewer, are covered under specific policies. This policy contains procedures for removal of hazardous/chemical waste.

The generators of waste must fill out form ICESH 2.3F-001 "Hazardous/Chemical Waste Removal Form." Instructions for filling out the form are given on the back of the form. The waste container must be properly sealed and labeled with the name of the chemical.

The EHS staff will remove and transfer waste to an appropriate staging area. Consistent with legal requirements, chemical waste will be picked up by a contractor every three months—four times per year. Waste Generators are required to provide the EHS with the completed form 2.3F-001 at least two weeks prior to the pick-up date. The temporary storage of waste should occur at the site of generation. Departments wishing to make other arrangements are required to seek EHS approval.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY

HAZARDOUS/CHEMICAL WASTE REMOVAL REQUEST FORM

P.I.: _____ Contact Person: _____ Phone: _____ Date: _____

Dept./School: _____ Location: _____ Signature: _____

CHEMICAL NAME	QTY.	CONTAINER		EHS USE ONLY EPA NO.
		SIZE	TYPE	

COMMENTS: _____

_____

_____

_____

DATE RECEIVED: _____ DATE PICKED UP: _____ BY: _____

See back side for instructions

INSTRUCTIONS

Use this form to request the removal of identified waste chemicals. Do not include radioactive, infectious, or other medical wastes on this form. Please follow these instructions in filling out the form.

Chemical Name

Please spell out the name of the chemical. The chemical name—as given to the EHS—is repeated in the Manifest used by the vendor for transportation and disposal. Therefore, the name must be the proper chemical name. Please do not use abbreviations, chemical formulae, or trade names. For solutions, include the percent (e.g. nitric acid 40%). For mixtures, use one line for each constituent and its percentage; use brackets to combine lines for each mixture.

Quantity

Give the quantity of the waste chemical in mL, L, g, or kg. Fractions of a gram should be rounded up to the nearest g or mL.

Container

Write B for bottle, C for can, and O for other containers.

Top of the Form

The name of the Laboratory Custodian should be given since he/she is considered to be the waste generator. The contact person is usually under the supervision of the PI or Laboratory Custodian. Please sign the form indicating that the information given to the EHS is the best information available to the Safety Custodian or the contact person.

Comments

Include any other relevant information, such as exact location of chemicals; type of container if "other" is checked; and alternate contact person.

EXAMPLE

CHEMICAL NAME	QTY.	CONTAINER		ICESH USE ONLY EPA NO.
		SIZE	TYPE	
Phenol	500 mL	500 g	B	
Methylene Chloride	4 L	4 L	B	
Ether	3.5 L	4 L	C	
Nitric Acid, 40%	1.5 L	4 L	B	
Chloroform, 30%	2 L	4 L	B	
Methanol, 70%				

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 2.4 Interim
TITLE:t	

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 2.5 Interim
TITLE: Management of Biomedical Chemo-Biological Waste	**DATE:** 1/2001

This class of Biomedical Waste consists of waste resulting from the production or use of antineoplastic agents used for the purpose of inhibiting or stopping the growth of malignant cells, or killing malignant cells. This class of waste does not include waste that contains antineoplastic agents—these are hazardous wastes.

This class of biomedical waste is often collected in yellow bags, hence the term Biomedical Yellow Bag Waste. These yellow bags must be placed in a specially-designated area for pickup.

Treatment and Collection

Sharps must be collected in a sturdy, puncture-proof, and leak-proof container marked with the universal biohazard symbol and labeled in accordance with state requirements. In Pennsylvania, they must be labeled "chemotherapeutic waste." This class of biomedical Waste—except boxed sharps—must be placed in a plastic bag with sufficient integrity to contain the waste. Boxes or bags must be combustible and should not be made of polyvinyl chloride (PVC) or other halogenated materials. Boxed sharps and bagged Wastes are then placed in a designated area of the building for pick-up by the EHS-designated groups.

Storage

This class of biomedical Waste—excluding used sharps—may be stored in a manner that maintains the integrity of the container; prevents the spread of chemical agents; and maintains the waste in a non-putrescent state using refrigeration or freezing when necessary. This may be stored up to a maximum of one year.

Disposal

Bags containing waste and sharps containers are placed in specially-marked boxes that are lined and appropriately labeled. These are normally incinerated either on-site, or transported to an outside incineration facility. Accordingly, the inclusion of PVC plastic must be kept to a minimum.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 2.6 Interim
TITLE: Management of Sterile Biomedical Waste	**DATE:** 1/2001

This category of waste—often called Black Bag Waste—consists of garments; gloves; drapes; unused sharps; broken glassware; and other non-regulated biomedical waste materials that have a low probability of contamination, but require special attention.

Sharps, broken glassware, and rigid plastic pipettes must be prepackaged in a cardboard box or in a puncture-resistant container. This class of waste—including prepackaged materials—must be bagged and placed in a specially-designated area of the building for pick-up. This waste is disposed of in a socially and environmentally acceptable manner—preferably by incineration.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 2.7 Interim
TITLE: Generic Radioactive Waste Policy	**DATE:** 1/2001

Radioactive waste is picked up by the EHS staff within three working days of notification. Due to the specific requirements of storage and disposal, various radionuclides and waste forms must be segregated as described in the Radiation Safety Guide.

At most research, teaching, and health care facilities there are four methods of radioactive waste disposal as follows:

Decay in Storage

This method consists of storage of waste long enough to assure the decay of radioactive materials. Accordingly, the waste is stored in specifically designated facilities and is periodically checked. Radionuclides with a half-life of about 65 days or less are usually stored and subsequently disposed of as biomedical or other waste. As a general rule, the decay rate is computed and measured before a waste is reclassified.

Incineration

Certain wastes, notably those containing small quantities of ceratin radionuclides such as ^{14}C and ^{3}H, are incinerated. In this case, an environmental monitoring program assures safe operation of the incinerator.

Sewer Disposal

Waste containing certain radionuclides—notably ^{14}C and ^{3}H—may be disposed of in the sanitary sewer. In every case, authorization from the EHS is required to dispose of radioactive waste in the sanitary sewer. Details of the information on the chemical and physical form of waste—along with the nature and quantity of radionuclides—are available from the EHS.

Burial

Waste which cannot be disposed of using decay in storage, incineration, or sewer disposal must be disposed of in a licensed disposal facility. Included in this group are radionuclides with half lives in excess of 65 days.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY

RADIOACTIVE WASTE DISPOSAL LOG

Date: _____ Authorized User: _____

Building: _____ Room No: _____

Department: _____ Phone No: _____

DATE	RADIONUCLIDE	QUANTITY(mCi)	CHEMICAL FORM	INITIALS

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 3.1 Interim
TITLE: Hazard Communication Program	**DATE:** 1/2001

The regulations of the Occupational Safety and Health Administration (OSHA) require that all employees who are potentially exposed to chemicals are provided with appropriate training and information to assure that they are aware of potential hazards at the workplace. Elements of the Hazard Communication Program are as follows:

Chemical List

A list of chemicals must be placed in an area readily accessible to the employees. This chemical inventory list is updated periodically and provided to the regulatory agencies as necessary. According to OSHA regulations, the chemical inventory list is required at the work site of employees identified as level II (definition of level II employees is given in Policy No. 3.2).

Material Safety Data Sheets

A centralized computer-based Material Safety Data Sheet (MSDS) is required. ICESH provides access to all available MSDSs.

Labels

The recipient of any hazardous material must verify that the container is properly labeled as to the content and hazards associated with that material. Each Safety custodian must ensure that all secondary containers are appropriately labeled. The adequacy of labeling is evaluated during the routine inspection program conducted by the EHS.

Other Provisions

The Hazard Communication Program should include several other policies and guides as follows:

Organization of the EHS	Policy No. 1.4
Safety Custodians	Policy No. 1.5
Vacating a Space Containing Hazardous Material	Policy No. 1.6
Assurance on Hazardous Procedures	Policy No. 1.7
Prohibition of Certain Activities Related to Hazardous Materials	Policy No. 1.8
Risk Based Safety Management	Policy No. 1.11
Generic Waste Policy	Policy No. 2.2
Hazardous/Chemical Waste Removal	Policy No. 2.3
Hazard Communication Training	Policy No. 3.2
Chemical Hygiene Plan	Policy No. 5.1
Chemical Hygiene Officer	Policy No. 5.3
Emergency Response Program	Policy No. 7.1
Chemical Hygiene Guide	
Description of medical support	

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 3.2 Interim
TITLE: Hazard Communication Training	DATE: 1/2001

Federal and state regulations require that all employees who may be exposed to chemicals in the workplace must be informed of the potential hazards associated with such an exposure. Accordingly, they must receive hazard communication training as soon as they start to work.

Content of the Training

The training content for hazard communication consists of one or more of the following training modules:

HC 1: A document containing relevant information on chemical hygiene and requirements of OSHA. It also includes a brief description of MSDSs, and where they can be obtained. Furthermore, certain toxicological information is also provided.
HC 2: A lecture covering services offered by the EHS.
HC 3: A brief discussion on fire safety, biosafety, and radiation protection.
HC 4: An Overview of MSDSs; their content with emphasis on human health effects; preventive measures; and emergency preparedness.
HC 5: An Explanation of a specific MSDS with emphasis on areas of particular concern for that chemical.
HC 6: A brief description on where MSDSs are located and how to obtain them.
HC 7: An Explanation of signs and placarding.
HC 8: A Question and answer period.

Classification of Employees

Consistent with requirements of OSHA, training requirements vary depending upon the nature of the exposure; the education of employees; and other relevant parameters. Accordingly, employees are classified into four groups as follows:

Level I: Those who are unlikely to be exposed to hazardous materials, such as the administrative staff. This group is provided with HC 1 and HC 8.
Level II: Those who may be exposed to a limited number of agents, such as workers at the mechanical or electrical shops. This group is covered by Hazard Communications Standards of OSHA. This group receives HC 1 to HC 8, emphasizing HC 5.
Level III: Those who work in the chemical laboratories and other areas where industrial chemicals are used except those covered under level IV. The training of this group is more generic, and covers HC 1 to HC 8, emphasizing HC 4.
Level IV: Research managers, faculty members, and others with advanced scientific degrees. Due to the educational background of this group, the coverage of the training consists of HC 1 to HC 8, emphasizing HC 8.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 3.3 Interim
TITLE: Radiation Safety Training	DATE: 1/2001

Regulations of the U.S. Nuclear Regulatory Commission; relevant state agencies; and prudent practices require that all radioactive material users must successfully complete a radiation safety training course consisting of two parts: Fundamentals of Radiation Protection and Radiation Protection Standards.

Part 1 - Fundamentals of Radiation Protection

This part of the radiation protection course requires approximately four lecture hours and consists of the following topics:

1. Radioactivity and radioactive decay.
2. Sources of ionizing radiation.
3. Interaction of radiation with matter.
4. Radiation detection and measurement.
5. Biological effects of ionizing radiation.
6. Contamination and decontamination.
7. Practical aspects of working with radioactive materials.
8. Other subjects that to the judgment of the Radiation Safety Committee or the EHS would be beneficial to the audience.

Part 2 - Radiation Protection Standards

This part of the course consists of approximately two lecture hours, and consists of the following topics:

1. An overview of institutions's environmental health and safety.
2. Description of the concept of "as low as reasonably achievable" (ALARA) and its application.
3. Description of dose limits; signs; and other legally-mandated requirements.
4. Conditions of licenses and their application.
5. Other subjects related to radiation protection standards.

Implementation

All radioactive material users are required to attend the radiation safety training course—parts 1 and 2—within 60 days of registering with the EHS in accordance with Policy No. 4.13. Prospective radioactive material users who have received radiation safety training elsewhere are required to attend part 2—Radiation Protection Standards—of the radiation safety course.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 3.4 Interim
TITLE: Bloodborne Pathogens Training	**DATE:** 1/2001

All employees who are potentially exposed to bloodborne pathogens in the workplace have a legal right to receive training on relevant subjects. Policy No. 6.5 identifies those who are potentially exposed, and thus, must receive training. This training must be provided as quickly as possible, and within 90 days of initial employment. All employees must receive annual retraining.

Content of Training

The training for employees will consist of several of the following modules:

BBP1 - Description of regulation: This module consists of an explanation of the regulatory text of OSHA's Bloodborne Pathogens standard. Also included is an explanation of signs, labels, and color coding required by the regulation. Employees also need to be made aware that the Hepatitis B vaccine is offered to them free of charge.

BBP2 - Bloodborne Diseases: This module is a general explanation of the epidemiology and symptoms of bloodborne diseases; and a discussion on the modes of transmission of bloodborne diseases. It also includes a discussion on the Hepatitis B vaccine; its efficacy; safety; administration; and benefits of the vaccination process.

BBP3 - Exposure Control Plan: An explanation of the employer's written exposure control plan is given in this module. Furthermore, biomedical waste management policies are described. It also includes information on how an employee can obtain a copy.

BBP4 - Exposure Potential: This module is a description of how to recognize situations/activities that may expose employees to blood and other potentially-infectious materials.

BBP5 - Preventive Measures: This module explains the use and limitations of methods used to prevent or reduce exposure to bloodborne pathogens. This module should include a discussion of work practices; universal precautions; engineering controls; and personal protective equipment (PPE). This module also will present information on the types; selection of; proper use; removal; handling; decontamination; and disposal of PPE.

BBP6 - Exposure Management: This module will contain information on the appropriate actions to take in an emergency situation involving blood or infectious material. It also includes an explanation of the procedure to follow in the case of an exposure incident. This explanation should include the method of reporting and the medical follow-up after an exposure occurs. Also included is information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee after an exposure incident.

BBP7 - Biomedical Waste Management: This module describes policies on biomedical waste management and their implications for various operational units.

Extent of Training

It is recognized that the diversity of education and experience of employees requires flexibility to ensure that the need for information is appropriately met. Accordingly, this policy makes a distinction between those who have

formal training or appropriate experience, and those who have little or no previous training or experience. For the purpose of this policy—and consistent with Policy No. 3.2—two categories of employees are identified:

1. Level III are those employees who have little or no previous training in infectious diseases and biosafety.

2. Level IV are those who have formal education and/or experience in infectious diseases, such as those with a medical degree.

Initial training for Level III employees consists of a two-hour training class covering BBP1 through BBP7 modules. Annual retraining for Level III employees will consist of a training class covering BBP1 through BBP7, emphasizing BBP1, BBP3, BBP5, and BBP6.

Initial training and annual retraining for Level IV employees will consist of training covering BBP1, and an abbreviated description of other modules.

In every case, an opportunity will be provided to ask questions. Furthermore, appropriate specialized training will be provided for those who request it.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 3.5 Interim
TITLE: Chemical Hygiene Training	DATE: 1/2001

All employees who are engaged in the laboratory use of hazardous chemicals in the workplace have a legal right to receive training on relevant subjects. All employees engaged in the use of hazardous chemicals must receive training as quickly as possible. Hazard Communication training is a prerequisite to Chemical Hygiene training.

Content of Training

The training for employees consists of several of the following modules:

CHP1 - Description of regulation: This module consists of an explanation of the regulatory text of OSHA's Occupational Exposure to Hazardous Chemicals in the Laboratory Standard—known as the Lab Standard. Also included is an explanation of signs and labels required by the regulation.

CHP2 - Chemical Hygiene Plan: An explanation of the chemical hygiene plan and hazardous material management policies is given in this module.

CHP3 - Chemical Hygiene Officer: This module introduces the concept, duties, and identity of the Chemical Hygiene Officer.

CHP4 - Prudent Practices: This module is a brief description of materials included in the Chemical Hygiene Guide. Included are personal protective equipment; proper work practices; storage of chemicals; compatible/incompatible chemicals; and working with highly toxic materials.

CHP5 - Exposure Management: This module will contain information on the appropriate actions to take in an emergency situation involving hazardous chemicals. It also includes an explanation of the procedure to follow in the case of an exposure incident. This explanation should include the method of reporting, and the medical follow-up after an exposure occurs. Also included is information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee after an exposure incident.

CH6 - Chemical Waste Management: This module describes policies on chemical waste management and their implications for the operation of various units.

Extent of Training

It is recognized that the diversity of education and experience of employees requires flexibility to ensure that the need for information is appropriately met. Accordingly, this policy makes a distinction between those who have formal training or appropriate experience, and those who have little or no previous training or experience. For the purpose of this policy—and consistent with Policy No. 3.2—two categories of employees are identified:

1. Level III are those employees who have little or no previous training involving hazardous chemicals.

2. Level IV are those employees who have formal education and/or experience involving hazardous chemicals such as those with a chemistry degree.

Initial training for Level III employees consists of a training class covering CHP1 through CHP6 modules.

Initial training for Level IV employees consists of a training class covering CHP1, and an abbreviated description of other modules. Level IV employees may attend courses offered for Level III, if they so desire.

In every case, an opportunity will be provided to ask questions. Furthermore, appropriate specialized training will be provided for those who request it.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.1 Interim
TITLE: Radiation Safety Program	**DATE:** 1/2001

Requirements of radiation safety are provided by the U.S. Nuclear Regulatory Commission (USNRC); the U.S. Environmental Protection Agency (EPA); the recommendations of the International Commission on Radiological Protection (ICRP); and the National Council on Radiation Protection and Measurements (NCRP). Elements of the radiation safety program and ensuing policies are included in the following sections of the ICESH Handbook:

Generic Radioactive Waste Policy	2.7
Radiation Safety Training	3.3
Radiation Safety Program	4.1
Radiation Safety Officer	4.2
Radiation Safety Committee	4.3
Radioactive Material Authorizations	4.4
Radiation Dosimetry	4.5
ALARA	4.6
Radioactive Materials Procurement	4.7
Radiation Safety Inspections	4.8
Radiation Exposure Limits	4.9
Caution Signs and Labels	4.10
Radioactive Sealed Sources	4.11
Surveys and Monitoring	4.12
Radiation Worker Registry	4.13
Management of Radioactive Waste	4.14
Disposal of Radioactive Materials into Sanitary Sewer	4.15
Disposal by Storage for Decay	4.16

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.2 Interim
TITLE: Radiation Safety Officer	**DATE:** 1/2001

The Radiation Safety Officer is responsible for implementation of the radiation safety program. In that capacity, the Radiation Safety Officer ensures that all activities involving radioactive materials; x-ray producing machines; and equipment capable of producing ionizing and non-ionizing electromagnetic radiation are performed in accordance with approved policies and regulatory requirements. The Radiation Safety Officer is authorized to stop an operation if—in the Radiation Safety Officer's judgment—that operation is in violation of policies at Action Level I (Policy No. 1.11). Furthermore, the Radiation Safety Officer may require specific actions to assure compliance with relevant policies and regulations.

The Responsibilities of the Radiation Safety Officer include:

1. General surveillance of all radiation safety activities including: investigations of overexposures; accidents; spills; losses; thefts; unauthorized receipts; uses; transfers; disposals; misadministrations; and other deviations from approved radiation safety practices and implementation of corrective actions.

2. Approving radioactive material authorizations.

3. Authorizing the purchase of radioactive material; receiving, opening, and distributing radioactive material packages; and keeping an inventory record of radioactive material.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.3 Interim
TITLE: Radiation Safety Committee	DATE: 1/2001

The Radiation Safety Committee develops policies and performs oversight functions. Depending upon the need and the work load, it may form permanent and ad hoc committees to perform specific functions. These subcommittees may include medical use; research; non-ionizing radiation; and the Radioactive Drug Research Committee.

The members and Chair of the Radiation Safety Committee and subcommittees are appointed by the top management for a finite time, such as 3 years.

Examples of specific administrative requirements of the Radiation Safety Committee for a research, teaching, and health care organization are as follows:

1. Membership must include: at least one authorized user for each type of use; the Radiation Safety Officer; a representative of the nursing service; and a representative of management who is neither an authorized user nor the Radiation Safety Officer.

2. The Committee must meet at least quarterly.

3. Half of the members must be present, including the Radiation Safety Officer (or designee) and the management's representative (or designee) to constitute a quorum.

4. The minutes must include the date of the meeting; a list of members present and absent; a summary of deliberations and discussions; recommended actions; numerical results of all ballots; and ALARA program reviews.

5. The minutes must be promptly provided to each member of the Committee, and a copy must be maintained for the duration of the license.

Specific functions of the Radiation Safety Committee are as follows:

1. To ensure that radioactive material will be used safely. This includes: review of training programs, equipment, facilities, supplies, and procedures.

2. To ensure that radioactive material is used in compliance with federal and state regulations, and the institution's licenses.

3. To ensure that all persons whose duties may require them to work in or frequent areas where radioactive materials are used are appropriately instructed, as required by the regulations. These include security and housekeeping.

4. To ensure that the use of radioactive materials is consistent with the ALARA Policy No. 4.6.

5. To identify program problems and solutions.

Specific duties and responsibilities of the Radiation Safety Committee include:

1. Familiarity with all pertinent state and federal regulations; the license application; the license(s); and amendments.

2. Review the training and experience of the proposed authorized users or operators of radiation-producing machines to determine that their qualifications are adequate to use radioactive materials safely, and in accordance with the regulations and the license.

3. Review and recommend approval or denial—consistent with the limitations of the regulations; the license(s); and ALARA Policy No. 4.6—of all requests for authorization to use radioactive materials within the institution.

4. Recommend special conditions that will be required during a proposed method of use of radioactive materials, such as requirements for bioassay and special monitoring procedures.

5. Review at least quarterly the Radiation Safety Officer's report of the occupational radiation exposure records of all personnel, giving attention to individuals or groups of workers whose exposure appears excessive or unusual.

6. Review at least quarterly all incidents involving radioactive material to determine their causes and actions to be taken to avoid their reoccurrence.

7. Review at least annually the Radiation Safety Officer's summary report of the entire radiation safety program to determine that all activities are being conducted safely, and in accordance with federal and state regulations and the conditions of the licenses, and consistent with the institution's ALARA policy. The review will include an examination of records; reports from the Radiation Safety Officer; results of inspections; written safety procedures; and the adequacy of the management control system.

8. Recommend remedial action to correct any deficiencies identified in the radiation safety program.

9. Ensure that the institution's licenses are amended when required.

10. Review and approve or disapprove changes in radiation safety policies.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.4 Interim
TITLE: Radioactive Material Authorizations	**DATE:** 1/2001

No person shall manufacture; produce; acquire; receive; possess; use; or transfer radioactive material except in accordance with a specific authorization approved by the Radiation Safety Committee, and implemented by the Radiation Safety Officer.

Application for New Uses

Any individual who wishes to become an Authorized User of radioactive materials must submit an application to the Radiation Safety Officer. The application must contain the following information:

1. The proposed use.

2. The radionuclides; chemical and physical forms; and possession limits needed.

3. The facilities where radioactive material will be used or stored.

4. A list of the radiation measuring equipment available to the applicant.

5. A statement of the applicant's training and experience.

6. A description of radiation safety procedures to be employed.

7. The availability of any special safety devices.

8. Proposed waste disposal methods.

Application for An Amendment

Proposed changes to an Authorization must be requested in the form of an application to the Radiation Safety Officer.

Application for Renewal

An application for renewal of an Authorization must be initiated by the Authorized User prior to the assigned expiration date.

Upon approval by the Radiation Safety Committee, an authorization will be issued by the Radiation Safety Officer. Authorizations not involving research in humans are usually valid for up to four years. Authorizations for research in humans are usually valid for a period of up to one year.

Appropriate forms are available from the EHS for all applications.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.5 Interim
TITLE: Radiation Dosimetry	DATE: 1/2001

The radiation dosimetry program requires several management decisions, each having operational consequences. These include: who should be covered by the program; the nature of dosimeters; and decisions points related to the level of exposure.

Classification of Dosimeters

Four methods of radiation dosimetry are commonly used as follows:

1. External dosimeters (whole body) are used to measure deep dose equivalent expressed in units of rem or Sievert (Sv).

2. Special external dosimeters such as ring; wrist; ankle; eye; or abdomen dosimeters are used in cases where external exposure to hands or other specific areas are likely to exceed whole body exposure.

3. The internal dosimetry (bioassay) program covers a potential intake of radionuclides.

4. Direct reading external dosimeters are used for short-term exposure at high radiation areas.

Classification of Individuals Addressed by the Dosimetry Program

A reasonably designed radiation dosimetry program is based on the following decisions:

1. Limits are expressed in total effective dose equivalent (TEDE), which includes internally deposited radionuclides.

2. A threshold of 10% of the applicable dose limit used for a number of management decisions.

3. The program covers three groups of individuals:

Exposure monitored (EM): This group covers the following individuals:

1. Adults who are likely to receive an annual TEDE of 500 mrem (5 mSv).

2. Minors who are likely to receive an annual TEDE of 50 mrem (0.5 mSv), or declared pregnant women who are likely to receive a TEDE of 50 mrem (5 mSv) during gestation.

Potentially exposed (PE): group covers individuals whose radiation exposures are being evaluated.

Discretionarily monitored (DM): This group consist of following individuals:

1. Adults who are likely to receive a radiation exposure, but their annual TEDE is likely to be less than 500 mrem (5 mSv).

2. Minors and declared pregnant women who work in the vicinity of a radiation source, but are unlikely to receive an annual TEDE of 50 mrem (0.5 mSv).

Assessment Process

It is recognized that a great deal of judgment is required to place an individual in the EM, PE, or DM group, and to apply a specific method of monitoring. These decisions are made by the Radiation Safety Officer based on the following criteria:

1. Exposure history

2. Work habits

3. Nature of work

4. Quantity of radioactive materials and/or strength of radiation source

5. Other relevant parameters

The placement of an individual is re-assessed at least annually by the Radiation Safety Officer. The Radiation Safety Committee reviews these decisions.

Declared Pregnant Workers

Radiation protection relies upon the ALARA principle (Policy No. 4.6), thus reducing the necessity for a special policy for pregnant women. However, there is recognition that a pregnant worker may require specific information to make an informed decision. Therefore, the following actions are necessary:

1. The Radiation Safety Officer provides all women in the EM, PE, or DE groups, written information on radiation exposure during the pregnancy period as well as necessary precautions.

2. A woman may declare her pregnancy by providing written notification to the Radiation Safety Officer. This notification must include the estimated date of conception.

Exposure Reports

The Radiation Safety Officer reviews exposures on a regular basis. Subsequently, high or unusual exposures are reported to the Radiation Safety Committee (Policy No. 4.3). All individuals included in the EM group receive their respective exposure reports annually.

Enforcement of External Dosimetry Program

External dosimeters will be provided to individuals placed in the EM group on a monthly basis (unless internal exposures only contribute to the TEDE). All monitored individuals in this group are required to promptly return the dosimeters. A delay by more than one month in returning the dosimeter is considered an AC II (Policy No. 1.11) violation and may lead to the revocation of authorization to use radioactive materials.

Dosimeters are also provided to the PE group. This group is also expected to return the dosimeter promptly. Failure to return a dosimeter by more than one month is considered a AC III violation, and by more than two months it is a AC II violation.

The enforcement policy for the DM group requires a return of the dosimeter promptly on a quarterly basis. Failure to do so by more than one month is considered an AC V violation; and by more than two months it is an AC IV violation. Failure to return a dosimeter later than three months may lead to termination of the coverage. Furthermore, if the dosimeter is damaged or lost the individual is responsible for replacement costs.

Enforcement of Internal Dosimetry Program

The method and the frequency of bioassay depends upon the nature—including the physical and biological half-life—of the radioactive material. Authorized users are required to participate in the bioassay program subsequent to the performance of specific procedures. Failure to have the appropriate bioassay performed within a specific time frame constitutes a violation of radiation safety requirements. Delays exceeding the following values have the corresponding Action Classes.

Radionuclide & Quantity/Procedure	AC IV	AC III	AC II
^{131}I Radiopharmaceutical Therapy			3 days
^{131}I or ^{125}I Radio-iodination	1 day	1 week	3 weeks
^{3}H - HTO (>10 mCi)	1 day	1 week	3 weeks
^{3}H - other material (>20 mCi)	1 day	1 week	3 weeks

The frequency of other bioassays shall be decided by the Radiation Safety Officer. Enforcement will follow the above table with the appropriate interval (e.g. 14 days).

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.6 Interim
TITLE: ALARA	DATE: 1/2001

Radiation exposure (individual radiation exposure as well as collective dose equivalent) must be kept as low as reasonably achievable. This so-called "ALARA" principle has been adopted by the entire radiation protection community and has been introduced into regulations of the U.S. and state agencies.

The Radiation Safety Committee is provided with radiation exposure and other appropriate information on a regular basis. This information is used by the Radiation Safety Committee to assess compliance with the ALARA principle. In particular, the Radiation Safety Committee performs a formal annual review of the radiation safety program, including adherence to the ALARA principle. This includes: reviews of operating procedures; past exposure records; and other exposure-related information. Based on the recommendations of the Radiation Safety Committee, efforts are made to modify operating and maintenance procedures; equipment; and facilities. An important part of ALARA is to assure that the collective dose equivalent is minimized. It would be undesirable to reduce the exposure of an individual whose exposure is within legally-permitted limits, while increasing the sum of exposures of all involved individuals and thus, increasing the collective dose equivalent.

All exposure data are monitored at least once every calendar quarter, and if an individual's exposure exceeds a certain limit, appropriate actions are taken to assure compliance with the ALARA principle. The following table provides quantitative data for the implementation of this policy.

Table 4.6.1. Exposure limits in total effective dose equivalent per month.

Exposed Organs	AC V mrem	AC IV mrem
Whole body (head, trunk including gonads, arms above the elbow, and legs above the knee).	>40	>120
Lens of the eye	>125	>375
Skin averaged over 1 cm^2, any extremity, any individual organ or tissue other than the lens of the eye.	>400	>1,200

Exposures at AC V are reported to the Radiation Safety Committee with the objective of evaluating potential areas of improvement. In addition, the exposed individual is given appropriate guidance and support as necessary, to assure that the ALARA principle is followed.

For exposures at AC IV (Policy No. 1.11), a review is conducted by the Radiation Safety Officer to evaluate the causes of the exposure. The results of this investigation are presented to the Radiation Safety Committee, with the request to provide guidance to the Radiation Safety Officer for possible corrective actions, who in turn implements the recommendations of the Radiation Safety Committee. In every case, the investigator will be asked to reduce the radiation exposure unless the investigator can demonstrate that the radiation exposure leading to AC IV was necessitated by a specific process or activity.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.7 Interim
TITLE: Radioactive Materials Procurement	DATE: 1/2001

The acquisition of radioactive materials by purchase, transfer, or as a gift requires prior approval of the Radiation Safety Officer. Unless otherwise approved by the Radiation Safety Committee, all radioactive materials are received by the Radiation Safety Officer. All arriving radioactive materials are evaluated for contamination, and the necessary information is entered into a campus-wide inventory database.

Procurement of Radioactive Material

Requisitions prepared by authorized users must be submitted to the Radiation Safety Officer for review and approval. Approved requisitions will be processed as appropriate.

Transfer of Radioactive Material to Other Recipients

The shipper of radioactive material must notify the Radiation Safety Officer of the proposed transfer, and provide the Radiation Safety Officer with a contact person to provide evidence that the recipient is licensed by the U.S. Nuclear Regulatory Commission and/or the relevant agreement state to receive that radioactive material. The radioactive material must be delivered to the Radiation Safety Officer with appropriate packaging and a description of the article including: the radionuclide(s); the chemical form; the quantity (activity); the name; and the shipping address.

Transfer of Radioactive Materials between Authorized Users

Radioactive materials can be transferred between authorized users with prior written approval from the Radiation Safety Officer.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.8 Interim
TITLE: Radiation Safety Inspections	DATE: 1/2001

A properly-managed radiation safety program requires a comprehensive internal inspection program. Types and frequencies of these inspections depend on many factors such as the nature, quantity, and use of radioactive materials. The inspections are designed for the specific users and facilities involved to assist authorized users in maintaining a safe environment.

Nature of Inspections

The inspections will consist of items applicable to the specific authorization and may include:

1. A review of the authorization file to ascertain that all requirements are observed and completed.

2. A review of inventory of radioactive materials to ensure that only authorized radionuclides are present in quantities equal to or less than the authorization limits.

3. An examination of postings and labeling in applicable locations.

4. Availability of proper instrumentation to conduct authorized activities.

5. A review of contamination survey records to ensure that surveys are conducted in accordance with Policy No. 4.12.

6. An observation of procedures to determine compliance with safety policies and reliance upon appropriate guidelines.

7. A review of radioactive waste disposal procedures and records to determine compliance with applicable regulations and policies.

8. A review of the acquisition and use of personnel-monitoring equipment in accordance with Policy No. 4.5.

9. Assurance that individuals using radioactive materials are registered as radiation workers in accordance with Policy No. 4.9.

10. Assurance that individuals using radioactive materials are properly instructed, consistent with Policy No. 3.3.

11. Assessment of any potential contamination.

Routine Inspections

Each authorization for the possession and use of radioactive material will be routinely inspected by the Radiation Safety Staff. Authorizations for the use of radioactive material in medical diagnosis or therapy will be inspected at approximate monthly intervals. All other authorizations will be inspected at a frequency determined by the Radiation Safety Officer. However, these inspections will be conducted at least semi-annually.

Special Inspections

These are designated for the resolution of any complaints; allegations; incidents; or as a follow-up of previous non-compliance issues. These inspections will be conducted at the discretion of the Radiation Safety Officer.

Inspection Findings and Enforcement

The inspection findings are reviewed by the Radiation Safety Officer and a report is sent to the authorized user responsible for the inspected activity. All noncompliance items will be categorized and enforced in accordance with Policy No. 1.11, "Classification of Safety Infractions".

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.9 Interim
TITLE: Radiation Worker Registry	**DATE:** 1/2001

Federal and Pennsylvania regulations require that those who work with radioactive materials or x-ray producing machines, are provided training and are monitored for potential radiation exposure. In order to assure that the requirements of these regulations are met, a Radiation Worker Registry is maintained by the EHS. This registry includes—but is not limited to—those who are addressed by the Radiation Dosimetry Program.

Failure to register in the Radiation Worker Registry is considered an Action Level II safety infraction.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.10 Interim
TITLE: Caution Signs and Labels	DATE: 1/2001

All personnel must be alerted of the presence of radioactive materials; radiation-producing machines; and potential radiation hazards. This is accomplished, in part, by posting and labeling areas with appropriate caution signs.

Posting Areas or Rooms Where Radioactive Materials Are Used or Stored

Areas or rooms with radioactive materials exceeding the quantities in the following table are required to be posted with a **CAUTION: RADIOACTIVE MATERIAL** sign.

Labeling Containers of Radioactive Materials

Containers of radioactive materials exceeding the quantities or concentrations given in the following table must be labeled with a **CAUTION: RADIOACTIVE MATERIAL** label. The label must also indicate the radionuclide(s); activity; assay date; and/or other information (e.g., radiation level) to permit appropriate precautions to minimize radiation exposure.

Labels are not required:

1. On containers labeled for transportation when labeled according to U.S. Department of Transportation regulations.
2. On containers attended by an individual.
3. On containers accessible only to individuals authorized to handle them. A written record identifying these sources must be available. An example of these sources are those in a storage vault.

Table 4.10.1

Radionuclide	Container Labels Required		Room Posting
	Activity (μCi)	Concentration (μCi/mL)	Activity (μCi)
^{3}H	1,000	1×10^{-2}	10,000
^{14}C	1,000	3×10^{-4}	10,000
^{32}P	10	9×10^{-5}	100
^{33}P	100	8×10^{-4}	1,000
^{35}S	100	1×10^{-3}	1,000
^{36}Cl	10	2×10^{-4}	100
^{45}Ca	100	2×10^{-4}	1,000
^{51}Cr	1,000	5×10^{-3}	10,000
^{125}I	1	2×10^{-5}	10
^{131}I	1	1×10^{-5}	10

Note: For labeling requirements of other radionuclides, contact the Radiation Safety Officer.

Posting in Radiation Areas

Any area where radiation levels exceed 5 mrem/hr at 30 cm from the radiation source shall be posted with a **CAUTION: RADIATION AREA** sign.

Posting in High Radiation Areas

Any area where radiation levels exceed 100 mrem/hr at 30 cm from the radiation source shall be posted with a **CAUTION: HIGH RADIATION AREA** sign.

Posting in Very High Radiation Areas

Any area which is accessible to an individual with radiation levels exceeding 500 rem/hr shall be posted with a **GRAVE DANGER: VERY HIGH RADIATION AREA** sign.

Posting in Areas Where Airborne Radioactivity Are Present

Areas which have airborne radioactivity in excess of the derived air concentrations specified in the USNRC regulations shall be posted with a **CAUTION: AIRBORNE RADIOACTIVITY AREA** sign.

Nuclear medicine rooms where radioactive gases or aerosols are administered shall be posted with the amount of time for the concentration of radioactive material after an accidental release to be reduced to less than the derived air concentration. Appropriate safety measures to be followed after a release shall be posted.

Posting in Brachytherapy and Radiopharmaceutical Therapy Patient Rooms

The door to the patient's room shall be posted with a **RADIOACTIVE MATERIALS** sign.

Labeling of Radiation-Producing Machines

Radiation-producing machines—including electron microscopes—must be labeled **CAUTION: RADIATION, THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED**. The label should be on the control panel or near any switch which energizes the unit. Analytical x-ray machines must have a **CAUTION: HIGH INTENSITY X-RAY BEAM** warning sign or label on the source housing, and an illuminated, fail-safe warning light with the words **X-RAY ON**, which is on when the x-ray tube is energized.

The Radiation Safety Office maintains a supply of caution signs and labels for posting areas and rooms. Note that most caution labels and signs have specific color and design requirements, therefore, custom or hand-made signs need to conform to these requirements.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.11 Interim
TITLE: Radioactive Sealed Sources	**DATE:** 1/2001

Any radioactive material encased in a capsule designed to prevent leakage or escape of radioactive material is defined as a sealed source. All radioactive sources sealed or encapsulated must be properly accounted for, and must be periodically checked for leakage.

Registration of Sources

All sources of radioactive material that are sealed or encapsulated—regardless of the activity—must be registered with the Radiation Safety Office. This requirement applies to sources such as low activity check sources, or sources which are incorporated into machines or devices.

Leak Testing of Sealed Sources

All sealed sources containing 100 μCi or more of beta or gamma emitting radionuclides, or 10 μCi or more of alpha-emitting material in any form other than gas, will be tested for leakage and contamination by the Radiation Safety Officer at intervals not to exceed six months. Exceptions are as follows:

1. Sources containing exclusively ^{3}H.

2. Sources containing radionuclides with a half-life of less than 30 days.

3. Iridium-192 seeds in nylon ribbon.

4. Sealed sources that are in storage.

Inventory Control

A physical inventory of all sealed sources used in medicine will be conducted quarterly by the Radiation Safety Office. A physical inventory of all sealed sources must be conducted annually by the Authorized User. The Radiation Safety Office prepares an inventory of all sealed sources requiring leak testing and in-storage on a semiannual basis. The inventory consists of the model; serial number, if any; location (room, building) of the source; and initials of the individual conducting the inventory. Additionally, the signature of the Radiation Safety Officer is required on the physical inventory of the sealed sources used in medicine, and sources requiring leak testing.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.12 Interim
TITLE: Surveys and Monitoring	DATE: 1/2001

Radiation surveys are required to identify and quantify radiation exposure situations, and to provide the basis for remedial actions to reduce exposure to (ALARA). The instruments used in these surveys must be suited to the measurement of the type, energy, and source of radiation expected to be encountered. Each Authorized User of radioactive material is responsible for the conduction of periodic contamination surveys in those facilities where radioactive materials are present. A record of each survey must be maintained by the user. These records will be subject to periodic review by the Radiation Safety Officer and federal and state officials.

Contamination Levels

Areas which show removable contamination in excess of 200 dpm should be decontaminated as soon as possible, and resurveyed until removable contamination is below 200 dpm/100 cm^2 (Action Level III). If any wipes indicated contamination in excess of 1,000 dpm (Action Level II), the areas should be immediately decontaminated and resurveyed until removable contamination is below 200 dpm/100 cm^2. The Radiation Safety Office should be notified immediately if contamination exceeding 5,000 dpm (Action Level I) is found.

The activity in dpm is determined by dividing the net counts per minute (gross counts, background) by the detection efficiency of the instrument being used.

Radiation Dose Rate Measurements (RDM)

Certain uses of radioactive material may result in exposure to individuals from external sources. Radiation dose measurements are required to be performed by Authorized Users in those instances where the exposure to the whole body may exceed 2 mrem/hr, or exposure to the extremities may exceed the maximum permissible shallow-dose equivalent for that extremity. An example is the handling of high energy beta emitting radionuclides such as ^{32}P or ^{86}Rb. The exposure to the hands from these handling procedures may exceed 100% of the maximum permissible shallow-dose equivalent of 50 rem for hands when utilizing as little as 500 μCi. Therefore, radiation dose measurements are indicated.

The proper type of survey instrument should be chosen, and measurements should be made at all points where exposure may occur. If the exposure is at the contact point, then the measurement point should be at the contact point. Conversely, if the exposure is at about 1 m from the source, then the measurement point should be at 1 m. The minimum limit of detection of the survey instrument should be 0.1 mrem/hr.

Classification of Facilities

Individual circumstances vary widely with regard to maximum activity; physical and chemical forms of radionuclides; and the applied procedures. Therefore, a classification of facilities where radionuclides are used is necessary to determine how frequently they should be surveyed. Three levels of survey frequencies are designated based on the nature of the radionuclide; its activity; and its use. The concept relies upon the principle that certain radionuclides are more hazardous than others, and thus require more frequent monitoring. Furthermore, each application is associated with certain risks, so the nature of operation dictates the frequency of monitoring. Finally, the larger the quantity of a radionuclide, the more the need for frequent monitoring.

Survey Requirements for Medical Facilities

The requirements of radiation surveys at medical facilities includes the following:

1. All areas where radiopharmaceuticals are routinely prepared for use or administration, must be surveyed at the end of the day with a radiation detection survey instrument.
2. All areas where radiopharmaceuticals or radiopharmaceutical wastes are stored, must be surveyed once each week with a radiation detection survey instrument.
3. All areas where radiopharmaceuticals are routinely prepared for use, administration, or storage must be surveyed for removable contamination.
4. Patients undergoing radiopharmaceutical therapy must be surveyed to ensure that the dose rate at 1 m is less than 5 mrem/hr, or that the activity is less than 30 mCi prior to releasing the patient from the hospital.
5. A survey of the dose rates in contiguous areas of radiation therapy must be performed promptly after sources are implanted in a patient.
6. A survey must be performed with a radiation detection survey instrument to confirm that all radiation therapy sources have been removed immediately after removing the last temporary implant source from a patient.
7. Dose rates must be measured in all areas where brachytherapy sources are stored at least quarterly.
8. Patients undergoing permanent brachytherapy implants must be surveyed to ensure that the dose rate at 1 m is less than 5 mrem/hr prior to releasing the patient from the hospital.

Survey Requirements for Non-Medical Facilities

The requirements of radiation surveys at non-medical facilities are discussed below.

Table 4.12.1 contains the classification of radionuclides into four hazard groups. Table 4.12.2 contains the handling factors for specific operations. Table 4.12.3 contains the frequency of monitoring based on the adjusted quantity of the four radionuclide groups. For example, if 9 mCi of ^{3}H (Group III in Table 4.12.1) is used for exchange labeling, the handling factor would be 10 (Table 4.12.2), then the adjusted quantity is 90 mCi-equivalents (mCi-eq) (9 mCi multiplied by a handling factor of 10) requiring weekly monitoring. Radionuclide facilities should be reviewed periodically by the Authorized User, to determine if any factors have changed that would alter the assigned survey frequency. Any changes should be reported to the Radiation Safety Office.

Table 4.12.1. Classification of radionuclides according to relative radiotoxicity.

GROUP I

^{210}Pb	^{210}Po	^{226}Ra	^{227}Ac	^{227}Th	^{228}Th	^{230}Th	^{231}Pa
^{230}U	^{232}U	^{233}U	^{234}U	^{237}Np	^{238}Pu	^{239}Pu	^{240}Pu
^{241}Pu	^{241}Am	^{243}Am	^{242}Cm	^{234}Cm	^{244}Cm	^{245}Cm	^{246}Cm

GROUP II

^{22}Na	^{36}Cl	^{45}Ca	^{46}Sc	^{54}Mn	^{60}Co	^{89}Sr	^{90}Sr
^{91}Y	^{95}Zr	^{105}Ru	^{110m}Ag	^{115m}Cd	^{114m}In	^{124}Sb	^{125}Sb
^{127m}Te	^{129m}Tc	^{123}I	^{125}I	^{126}I	^{129}I	^{131}I	^{134}Cs
^{137}Cs	^{140}Ba	^{144}Ce	^{160}Tb	^{170}Tm	^{181}Hf	^{182}Ta	^{192}Ir
^{204}Ti	^{207}Bi	^{210}Bi	^{211}At	^{212}Pb	^{224}Ra	^{228}Ac	^{230}Pa
^{234}Th	^{236}U						

GROUP III

^{3}H	^{14}C	^{18}F	^{24}Na	^{32}P	^{33}P	^{35}S	^{42}K
^{43}K	^{47}Ca	^{47}Sc	^{51}Cr	^{52}Mn	^{55}Fe	^{59}Fe	^{57}Co
^{58}Co	^{63}Bi	^{65}Ni	^{65}Zn	^{72}Ga	^{73}As	^{74}As	^{76}As
^{77}As	^{75}Se	^{82}Br	^{85m}Kr	^{86}Rb	^{85}Sr	^{87}Kr	^{90}Y
^{95}Nb	^{99}Mo	^{97}Tc	^{99}Tc	^{97}Ru	^{103}Ru	^{105}Rh	^{109}Pd
^{105}Ag	^{111}Ag	^{109}Cd	^{113}Sn	^{105}Rh	^{109}Pd	^{105}Ag	^{111}Ag
^{109}Cd	^{113}Sn	^{122}Sb	^{129}Te	^{131m}Te	^{132}Te	^{127}Xe	^{131}Ba
^{140}La	^{141}Ce	^{143}Ce	^{143}Pr	^{147}Nd	^{149}Nd	^{147}Pm	^{149}Pm
^{151}Sm	^{153}Sm	^{155}Eu	^{159}Cd	^{165}Dy	^{166}Ho	^{169}Fr	^{171}Er
^{171}Tm	^{175}Yb	^{177}La	^{186}Re	^{190}Ir	^{194}Ir	^{191}Pt	^{197}Pu
^{197}Pt	^{196}Au	^{198}Au	^{197}Hg	^{197m}Hg	^{203}Hg	^{201}Ti	^{202}Ti
^{203}Pb	^{222}Rn	^{231}Th					

GROUP IV

^{15}O	^{37}A	^{58m}Co	^{59}Ni	^{69}Zn	^{71}Ge	^{85}Kr	^{85m}Sr
^{87}Rb	^{91m}Y	^{93}Zr	^{97}Nb	^{96m}Tc	^{99m}Tc	^{103m}Rh	^{113}In
^{131m}Xe	^{133}Xe	^{134m}Cs	^{135}Cs	^{147}Sm	^{187}Re	^{191m}Os	^{193m}Pt
^{197m}Pt	^{232}Th	^{235}U	^{238}U	^{Nat}U			

Table 4.12.2. Handling factors.

Operation	Handling Factor
HF(0.1)[a]	0.1
HF(1)[b]	1
HF(10)[c]	10

a. HF(0.1) consists of infrequent operations or those requiring uCi quantities of radionuclides.
b. Routine laboratory procedures requiring mCi quantities of radionuclides.
c. Operations requiring complex procedures or those involving volatile radionuclides.

Examples:

Operation	Activity
HF(0.1)	storage
HF(0.1)	sample counting
HF(0.1)	radioimmunoassay
HF(1)	uptake studies
HF(1)	metabolic studies
HF(10)	radioiodinations
HF(10)	^{3}H exchange labeling

Table 4.12.3. Frequency of monitoring for certain radionuclides based on their adjusted quantity in mCi-eq.

	Monthly	Weekly			Daily
Group I	<0.01	0.01	to	1	>1
Group II	<1.0	1.0	to	10	>10
Group III	<10.0	10	to	100	>100
Group IV	<100.0	100	to	1000	>1000

The radiation exposure limits are shown in table 4.13.1.

Table 4.13.1. Radiation Exposure Limits.

Exposed Organ	Dose Limit mrem/month	Dose Limit rem/year
Whole Body (head, trunk, gonads, arms above the elbow, legs above the knee)	400	5
Lens of the eye	400	5
Skin of the whole body	2,500	30
Extremities (hands, wrists, forearms, feet, ankles, and lower legs)	4,000	50
Embryo/fetus of a declared pregnant woman	50	0.5

The whole body dose is the TEDE which is the sum of external and internal radiation doses. The contribution from internal radiation doses is the product of the total dose that an organ will receive from an intake, and organ-specific weighting factors. Note that for long-lived and long-retained radionuclides, a 50 year summation of the internal dose is assigned to the individual in the year that the uptake occurred.

A total effective dose equivalent limit of 100 mrem per year applies for individual members of the public.

Table 4.13.2 categorizes Action Classes (Policy No. 1.11) for specific radiation exposures.

Table 4.13.2 Categorization of Action Classes for Specific Radiation Exposures.

Exposed Organ	AC II rem		AC I rem	
	Month	Quarter	Month	Quarter
Whole body	>0.4	>1	>1	>2.5
Lens of eye	>0.4	>1	>1	>2.5
Skin, extremity, any organ or tissue except eye	>2.5	>6	>6	>3.75

	AC II mrem through 2nd trimester	AC I mrem during pregnancy
Embryo/fetus of declared pregnant worker	300	450

For exposures at AC II, the authorized user is required to take appropriate and necessary steps to reduce radiation exposures.

For exposures at AC I, the Radiation Safety Officer shall remove the exposed individual from further work with or near sources of radiation and, if appropriate, shall stop further operations/activities with the source until positive steps to prevent radiation exposures at this level have been performed. The exposed individual shall not be permitted to work with sources of radiation until it is clear that an overexposure will not occur.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.14 Interim
TITLE: Management of Radioactive Waste	**DATE:** 1/2001

Ideally, radioactive waste should be picked up by the EHS staff within three working days of notification. Due to the specific requirements of storage and disposal, various radionuclides and waste forms must be segregated as described in the Radiation Safety Guide.

There are four acceptable methods of radioactive waste disposal:

1. Sewer Disposal (Described in Policy No. 4.15).

2. Decay in Storage (Described in Policy No. 4.16).

3. Incineration: Animal carcasses containing ^{14}C and ^{3}H in concentrations less than 0.05 μCi/g may be incinerated.

4. Transfer to Disposal Site: Waste containing certain radionuclides may be disposed of only in a U.S. Nuclear Regulatory Commission licensed disposal facility.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.15 Interim
TITLE: Disposal of Radioactive Materials into Sanitary Sewer	**DATE:** 1/2001

Unless specifically authorized by the Radiation Safety Officer, radioactive waste may not be disposed into the sanitary sewer. Special waste containers provided by the EHS are to be used for the disposal of liquid radioactive waste. The EHS staff will collect full liquid waste containers upon request. All pertinent information requested on the waste tag must be completed for the waste to be removed. The EHS may dispose of the waste by sewer disposal; solidification and transfer to a disposal site; or by decay.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 4.16 Interim
TITLE: Disposal by Storage for Decay	DATE: 1/2001

Disposal by storage for decay is the method of choice for short-lived radionuclides. This method relies on the exponential physical decay of radioactive material. Radionuclides with half-lives up to 65 days, and certain specific radionuclides with half-lives between 65 and 100 days, may be disposed of by storage for decay.

The radioactive material users authorized for more than one radionuclide are responsible for segregating radioactive waste by half-life as follows:

1. A radionuclide with a half-life of less than one day is stored on-site of its generation.

2. Radionuclides with half-lives more than a few hours bust less than 65 days are picked up by the EHS for decay in-storage.

Placing short-lived radionuclides into longer-lived radioactive waste is a violation of this policy with a severity of AC III. Placing long-lived radionuclides into shorter-lived radioactive waste is a violation of this policy with a severity of AC II.

The EHS will collect waste for disposal by storage for decay; store the waste for the appropriate length of time; and dispose of the material in accordance with the general radioactive waste Policy No. 4.15 and appropriate hazardous waste policies.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	**NO.:** 5.1 Interim
TITLE: Chemical Hygiene Plan	**DATE:** 1/2001

This policy includes the requirements of laboratory safety, chemical hygiene, and hazard communication. Elements of the chemical hygiene plan and ensuing policies are included in the following sections of the ICESH/EHS Handbook.

1.	Hazardous/Chemical Waste Removal	2.3
2.	Hazard Communication Program	3.1
3.	Chemical Inventory	5.2
4.	Chemical Hygiene Officer	5.3
5.	Chemical Hygiene Committee	5.4
6.	Chemical Laboratories Inspection Program	5.5
7.	Management of Spills of Chemical Compounds	5.6
8.	Emergency Response Program	7.1
9.	Chemical Hygiene Guide	

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 5.2 Interim
TITLE: Chemical Inventory	**DATE:** 1/2001

As a part of emergency preparedness, it is necessary to establish an inventory of chemicals. The regulatory agencies have recognized the complexity of the operation of a university, and have permitted significant flexibility in developing a chemical inventory. The chemical inventory should consider the classification of several regulatory agencies. According to this policy, chemicals with similar properties of significance to emergency preparedness are grouped together as follows:

Flammable: F (Flash Point: less than 140°F - 60°C)
Combustible: C (Flash Point between 140 and 200°F)
Explosive: E
Reactive, oxidizer, and corrosive: ROC
Toxic: T (EPA's acute hazardous and low LD50 materials)

The quantity of each group is approximated as 0 kg, <1 kg, 10-20 kg, 20-50 kg and >50 kg. Furthermore, for the purpose of the inventory, the units may be approximated as 1 gallon = 4 L and 1 L = 1 kg = 1 quart = 2 lb.

All Safety Custodians are required to fill-out the chemical inventory form (ICESH 5.2F-001) annually. Laboratories with a total inventory in excess of 20 kg are required to fill-out the chemical inventory form semi-annually, and those with a total inventory in excess of 50 kg are required to fill-out the form quarterly. The EHS compiles these forms and makes them available to the emergency personnel.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY

FACILITY CHEMICAL INVENTORY

Date: _____ Custodian: _____

Building: _____

Floor: _____ Department: _____

Room number: _____ Phone: _____

Classification	None	<1 kg	1-10 kg	10-20 kg	20-50 kg	>50 kg
FLAMMABLE (F) flash point < 140^{N}F (< 60^{N}C)						
COMBUSTIBLE (I) flash point between 140 and 200^{N}F (60 and 93.4^{N}C)						
EXPLOSIVES (E)						
REACTIVE OXIDIZER & CORROSIVE (ROC)						
TOXIC (T) (EPA's acutely hazardous and low LD50 materials)						

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 5.3 Interim
TITLE: Chemical Hygiene Officer	**DATE:** 1/2001

An individual appointed as the Chemical Hygiene Officer is responsible for implementation of the chemical hygiene program, and ensuring that chemical operations are being performed in accordance with approved policies and regulatory requirements. The Chemical Hygiene Officer is authorized to stop an operation if—in the Chemical Hygiene Officer's judgment—that operation is in violation of policies at Action Class I (see Policy No. 1.11), and may require specific actions to assure compliance with appropriate policies and regulations.

The responsibilities of the Chemical Hygiene Officer include:

1. General surveillance of all activities including: investigations of overexposures; accidents; spills; losses; thefts; uses; transfers; disposals; and other deviations from approved chemical hygiene practice and implementation of corrective actions as necessary.

2. Evaluating equipment, physical facilities, operational techniques, and procedures

3. Evaluating personnel monitoring equipment; establishing requirements for special monitoring procedures; and keeping records of personnel exposure.

4. Assuring that personnel who work with chemicals receive appropriate training.

5. Monitoring disposal of chemical waste and maintaining required disposal records.

6. Providing advice and supervision for decontamination.

7. Preparing an annual report on chemicals in accordance with applicable requirements.

8. Actively participating in the Chemical Hygiene Committee.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 5.4 Interim
TITLE: Chemical Hygiene Committee	**DATE:** 1/2001

The Chemical Hygiene Committee consists of representatives of various components of the organization with specific functions as follows:

1. To assist the Chemical Hygiene Officer in ensuring that chemicals are used safely.

2. To review and approve chemical hygiene policies.

3. To review and approve policies related to management of chemical/hazardous waste.

4. To assist the Chemical Hygiene Officer in the development and implementation of a chemical hygiene plan.

5. To assist the Chemical Hygiene Officer in the development and implementation of hazard communication and chemical hygiene training.

6. To review and approve the Chemical Laboratory Inspection Program.

7. To be the focal point for conflict resolution in matters related to chemical hygiene.

8. To discuss topics and take appropriate actions that in the judgement of the Chemical Hygiene Committee, would enhance the chemical hygiene at the organization.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 5.5 Interim
TITLE: Chemical Laboratories Inspection Program	**DATE:** 1/2001

Consistent with federal and state regulations, the chemical laboratories inspection program must cover all areas where chemicals are present or used. For the purpose of this policy, an area is defined to mean a laboratory; a corridor; an office; a storage facility; a room; or any other facility. Typically, an area is assigned to a Safety Custodian (see Policy No. 1.5). The chemical laboratories inspection program consists of a number of segments.

General Inspection

The EHS staff performs a comprehensive inspection periodically in every area as described below.

Spot Inspection: From time to time, the EHS selects certain areas and inspects them in a manner similar to their initial inspection. As a general rule, spot inspection is based on random selection. However, Safety Custodians with previous safety violations—those having large chemical inventories, and those who do not take corrective actions—will rapidly be favored.

Frequency of Inspection: All areas will be inspected approximately annually. Custodians with a total chemical inventory in excess of 50 kg will be required, on a quarterly basis, to provide the EHS with the completed form 5.2F-001. Additionally, form 5.2F-001 will be required to be completed and provided to the EHS on a semi-annual basis by custodians with an inventory of 20 Kg in any one of the six categories of this form.

Inspection Content: The Chemical Laboratory Inspection program includes: items on chemical hygiene; chemical compatibility; flammable materials; equipment safety; personnel protective devices; compressed gases; good housekeeping; general hygiene; signage; fire safety including fire safety equipment; electrical safety; and chemical waste.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 5.6 Interim
TITLE: Management of Spills of Chemical Compounds	**DATE:** 1/2001

The policy on chemical hygiene relies upon prevention of uncontrolled release of chemical compounds. However, it is recognized that policies must be available to respond to potential spills and emergency situations.

In organizations with diverse operations, those who are involved with specific operations; specific chemicals; or unique operations are best qualified to respond to spills and potential emergencies. Accordingly, Safety Custodians (Policy No. 1.5) are responsible for responding to a spill or an emergency. If necessary, Custodians can request and will receive the assistance of the EHS personnel in responding to these situations.

In the case of a spill of a chemical compound, Safety Custodians must assure that the clean-up occurs as quickly as possible. They must also assure that no unauthorized person enters the facility before the cleanup is completed. In most organizations, the housekeeping personnel are instructed not to enter a facility where uncontrolled chemicals are present.

A spill occurring during the transportation of chemicals in corridors follows the same criteria outlined for laboratories. The owner of the spilled chemical is responsible for its cleanup. In cases of ambiguity or whenever the Safety Custodian needs assistance, the EHS will assist in the cleanup.

Each Safety Custodian is required to have an appropriate spill control kit in the area to be used for cleanup of chemical spills.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 6.1 Interim
TITLE: Registration of Materials Potentially Infectious for Humans	**DATE:** 1/2001

Biomedical Research and health care facilities must maintain a registry of laboratories and personnel working with human pathogens or human blood; tissues; and body fluids. For purposes of this registration, a pathogen is defined as any organism known to cause—or suspected of causing—infection in humans. The Principal Investigator (PI) is responsible for completing the appropriate parts of the "Human Pathogen Registration Document" (HPRD form ICESH 6.1F-001). This is needed to maintain a listing of persons at risk of exposure to the pathogen, and for use by Occupational Health in maintaining personal medical records. The registration document is to be forwarded to ICESH prior to the initiation of work with the organism(s). Each person listed should initial this document to indicate that he/she has been informed of: the potential hazards associated with this work; occupational medical programs; and applicable educational opportunities. The PI is also responsible for notifying the EHS when work with the organism is terminated, or when other significant changes occur such as changes in personnel, or relocation of the laboratory. The EHS conducts an annual survey of registered areas to review practices and procedures associated with this work. The survey is not intended to take the place of the responsibilities of the PI in supervising the daily work with the pathogen.

ICESH: ENVIRONMENTAL, HEALTH AND SAFETY

INSTRUCTIONS FOR COMPLETION OF HPRD

Biomedical research and health care facilities maintain a listing of all human pathogens in use at their facilities in order to identify research areas where biohazards may exist. Principal Investigators file the information with the EHS which normally manages the system. The EHS uses the information to:

1. Seek advice from the Biosafety Committee. This committee assists the EHS in developing policies and procedures; reviewing specific projects if necessary; and evaluating responses to potential emergencies.

2. Notify the Medical Support Service of persons who are working with human pathogens. The Medical Support Service will review the individual's potential for occupational exposure to specific microorganisms; identify applicable surveillance programs; and provide employees with the opportunity for the appropriate immunizations, if applicable.

3. Specifically review safety-related procedures and practices, and to request laboratories to post appropriate Biosafety Level signs. These signs serve to notify all persons entering the laboratory of the procedures for entry.

4. Inform emergency response personnel of potential hazards within a particular area should it be necessary to respond to accidents; fires; or other catastrophic events.

As an integral part of this registration, Principal investigators are responsible for:

1. Determining the Biosafety Level to be used for work with the organism in accordance with EHS policy. Copies of the biosafety policy are available from the EHS.

2. Informing personnel at risk of potential exposure of the practices, procedures, and equipment required for the safe conduct of work with the organism.

3. Informing personnel at risk of occupational exposure of the signs and symptoms associated with infection by the organism.

4. Informing personnel of the necessity to report promptly to both the Principal Investigator and the EHS, any known or suspected exposure to the organism.

5. Reporting accidents with the organism to the EHS, who will notify the appropriate personnel for follow-up.

6. Notifying the EHS when changes in personnel occur; when the laboratory changes location; or when work with the human pathogen ends so that the records of the EHS can be up-dated.

Human blood and body fluid registration document

Investigators may need to work with human blood, tissue, or other body fluids even though the materials are considered to be "normal" (i.e., not originating from persons with known infectious diseases). The information gathered by this document is used in much the same manner as that obtained through the Human Pathogen Registration document. The Principal Investigator is asked to complete appropriate parts of the Registration Document and return it as previously described.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY

HUMAN PATHOGEN REGISTRATION DOCUMENT (HPRD)

This registration document is to be forwarded to EHS prior to the initiation of work.

Part A (To be completed for each laboratory)

Please check your organizational unit:

G Dental G Graduate G Medical G Nursing G Pharmacy G Other (specify) _____

Building	Laboratory Room(s) involved	Telephone(s)

Mailing Address, if different:

Building	Room	Telephone

For all persons under your supervision working with the registered materials, provide requested information in space below (Please Print)

Last Name	First Name	Social Security Number	Employee's Initials*
(PI)			

*Indicates employee has been informed of potential hazards, safe work practices, availability of medical surveillance and training opportunities. (Attach additional sheets as necessary.)

Part B (To be completed by laboratories handling human pathogens. Provide information for each microorganism in use in your laboratory.)

Type of organism: G Bacteria G Virus G Parasite G Other _____

Organism(s): Attach list if necessary _____ Specific Strains _____

Is antibiotic resistance expressed? G No G Yes	Other Markers	
Largest volume of organisms used is: _____ liter(s)	Is a toxin produced? G No G Yes	Work with toxin? G No G Yes
Organism inactivated prior to other laboratory manipulations? G No G Yes	Specify methods: G Heat G Chemical G Radiation G Other _____	
Do you concentrate the organism? G No G Yes	Specify methods: G Centrifugation G Precipitation G Filtration G Other _____	

Containment equipment available:
Biological Safety Cabinet: G Class I G Class II G Class III G Chemical Fume Hood G Containment Centrifuge

Other _____

Does the work involve radioactivity? G No G Yes[1] Radionuclide _____	Where is the radioactivity work done? Building: _____ Room: _____	Do you work with acutely toxic materials? (See the EHS list) G No G Yes Material: _____

[1]**Call Radiation Safety for assistance.**

Do you inject animals with the live organism? G No G Yes*	Specify animals: G Mice G Rats G Rabbits G Non-human Primates (specify) _____ G Others (specify) _____
*Call Animal Laboratory, 2-3137 about Animal Care and Use requirements.	Routes of administration: G SC G IM G IP G IV G IC G Aerosol G Other _____

Where are animals located? Building: _____ Room: _____

Work with following tissues: _____

I accept responsibility for the safe conduct of work with this organism at Biosafety Level _____ (indicate appropriate level) and have informed all personnel who may be at risk of potential exposure to the organism of the conditions of this work.

_____ _____

Principal Investigator (signature) Date

Part C (To be completed by laboratories handling human blood, tissues or fluids.)

Human samples manipulated:	Frequency of manipulations:	Types of manipulations:
G Blood G Serum G Urine G Feces G Spinal fluid G Semen G Tissues G Other	G Daily G Weekly G Other _____ Do you use acutely toxic materials? (See ICESH list) G No G Yes	G Centrifugation G Sonification G Blending/Mixing G Pipetting G Dissection G Other _____

Do you radioactively label the materials?	Containment equipment available:
G No G Yes* Radionuclide used: _____	Biological Safety Cabinet: G Class 1 G Class II G Chemical Fume Hood
*Call Radiation Safety 2-4927 for assistance.	G Containment Centrifuge G Other _____

I accept responsibility for the safe conduct of work with the above mentioned human blood, body fluids and/or tissues using Biosafety Level 2 practices and procedures. I have informed all personnel who may be at risk of potential exposure to these materials of the appropriate procedures for this work.

_____ _____

Principal Investigator (signature) Date

Part D (to be completed by EHS)

Reviewer's comments: _____

Part A and B of this registration document was reviewed by the Biosafety Officer on _____, and work can proceed in a BL _____ facility using BL _____ practices and procedures.

_____

Biosafety Officer

Date of Certification	BL	Biosafety Officer

(To be completed by EHS upon notification that this work is terminated.)

Date registration document inactivated _____

by: _____

Return completed form to: EHS

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 6.2 Interim
TITLE: Biosafety Inspection Policy	**DATE:** 1/2001

In order to assure that operations dealing with microorganisms are conducted safely and in accordance with federal and state regulations, policies must be available that define criteria for inspections. The policy on biosafety inspections is based on biosafety levels (BSL I, BSL II, and BSL III) of facilities and organisms as defined in the Laboratory Biosafety Guide of the ICESH/EHS Handbook.

1. The Biosafety Committee or the biosafety officer may require an assessment of the facilities, procedures, and qualifications of personnel of any laboratory working with biohazardous materials. Assessment will be made following biosafety policies and the Biosafety Guide published in the ICESH Handbook.

2. All facilities at BSL III, and all laboratories working with organisms listed in the Laboratory Biosafety Guide as belonging to BSL III will be inspected annually for adequacy of facilities; procedures and training; and qualifications of personnel.

3. Newly-established BSL III facilities will receive a biosafety evaluation of the qualifications of personnel; adequacy of facilities; and appropriateness of written procedures and standard operating procedures prior to the commencement of work in the facility.

4. Biosafety and general safety inspections will be conducted whenever required by a funding agency. Inspection may include certification of adequacy of facilities and procedures, and/or the qualifications and training of investigators and supporting personnel.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 6.3 Interim
TITLE: Good Laboratory Practices	DATE: 1/2001

Regulations of the Food and Drug Administration dealing with Good Laboratory Practices (GLP) are prerequisites for acceptability of the results of certain studies. These regulations (21 CFR 58) contain detailed descriptions of personnel; facilities; equipment; operation; quality assurance; and a number of other areas. As a matter of policy, a GLP Committee should be established for each study. All GLP committees are functional sub-committees of the Biosafety Committee.

Composition of the GLP Committee

Each GLP Committee should consist of a staff member of the EHS and at least two other members. The GLP Committee is appointed by the organization's Safety Officer in consultation with the Biosafety Committee.

Function and Operation of the GLP Committee

The GLP Committee is established upon the request of the Study Director. It assures compliance with GLP requirements. For example, it acts as the Quality Assurance Unit specified in GLP regulations. It reviews each study prior to its initiation, after its completion, and as it deems necessary. The GLP Committee reports its findings to the Biosafety Officer, who maintains a file on GLP. The Biosafety Officer provides the findings of the GLP Committee to the Biosafety Committee for review and appropriate action.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 6.4 Interim
TITLE: Biosafety Universal Precautions	DATE: 1/2001

Federal and state regulations require the development and implementation of precautions to avoid infection of those who may be in contact with potentially-contaminated biological materials. Because a microbiological analysis of every biological sample is impractical, as a matter of policy and consistent with appropriate regulations it is assumed that blood and certain other body fluids are contaminated with infectious agents. In addition, tissues; various body fluids; materials derived from cultures containing infectious materials; and equipment that have been in direct contact with infectious materials are considered to be contaminated.

Both federal and state regulations specify universal precautions, engineering controls, and personal protective equipment that can be applied for protection of those who may be in contact with potentially-contaminated materials. For the purpose of this policy, sections LBG II and LBG III in the Laboratory Biosafety Guide are considered as universal precautions.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 6.5 Interim
TITLE: Exposure Control Plan	DATE: 1/2001

Federal and state regulations on bloodborne pathogens describe certain requirements to control exposure to bloodborne pathogens. The policy for control of hazardous materials—including bloodborne pathogens—relies upon the following principles:

1. The concept of keeping exposure to hazardous materials ALARA must be applied to the design and performance of all activities.

2. Safety Custodians must assure that all activities in their respective areas are conducted safely (Policy No. 1.5).

3. The severity of response to a problem must be consistent with its potential impact (Policy No. 1.11).

4. Each individual is fundamentally responsible for his/her actions.

5. Employees must be provided with the appropriate personal protective equipment and training.

6. Engineering controls must be in place.

Accordingly, an acceptable Exposure Control Plan should consist of the policies discussed below.

Exposure Determination

Policy No. 6.8 provides criteria for exposure determination. Each administrative unit (department; division, etc.) will be provided a list of employees, with the request to identify those that have an exposure potential to bloodborne pathogens. This process will be repeated quarterly.

Training

All employees with exposure potential to bloodborne pathogens will receive initial training and annual retraining. The core of training should be the initial training provided for Level III employees (Policy No. 3.4). However, Level IV employees and those with previous training receive an abbreviated training.

Universal Precautions

The ICESH Biosafety Guide contains essential elements of universal precautions; engineering controls; and personnel protective equipment. Policy No. 6.4 incorporates relevant sections of that guide by reference.

HBV Vaccination

The Hepatitis B virus (HBV) vaccination must be provided to all who are potentially exposed to bloodborne pathogens. Policy No. 6.7 describes this process.

HIV Research Laboratories

Certain laboratories engaged in research in HIV must undertake additional actions beyond those required for other facilities. Policy No. 6.10 describes these requirements.

Post-Exposure Follow-up

Despite best efforts to avoid exposure to bloodborne pathogens, provisions must be made to treat those who may have been exposed to these pathogens. Policy No. 6.10 describes the details of the implementation of this requirement.

Biomedical Waste

The management of biomedical waste is described in Policy Nos. 2.4, 2.5, and 2.6.

All policies in the ICESH/EHS Handbook—including those related to biosafety—are periodically reviewed and revised, if necessary.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 6.6 Interim
TITLE: Management of Spills of Biological Materials	**DATE:** 1/2001

The proper policy on biosafety relies upon prevention of the release of blood; other biological fluids; and other materials that may contain live microorganisms. However, it is recognized that policies must be available to respond to potential spills and emergency situations.

In biomedical research and health care organizations, those who are involved with specific operations, specific microorganisms, or unique operations are best qualified to respond to spills and potential emergencies. Accordingly, Safety Custodians (Policy No. 1.5) are responsible for responding to a spill or an emergency. If necessary, Safety Custodians can request and will receive the assistance of EHS personnel in responding to these situations.

In case of a spill of blood or other biological liquids in laboratories, Safety Custodians must assure that the cleanup occurs as quickly as possible. They must also assure that no unauthorized persons enter the laboratory before the cleanup is completed. The housekeeping personnel is normally instructed not to enter a laboratory where uncontrolled biological material is present.

When there is a need for plumbing work in a laboratory, the Safety Custodians must assure that materials in the sink and in the piping are either flushed out; appropriately disinfected; or removed before the plumbing personnel can work on the piping system.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 6.7 Interim
TITLE: Hepatitis B Vaccination	DATE: 1/2001

Federal and state regulations require that the Hepatitis B vaccine be provided to all who are potentially exposed to bloodborne pathogens (Policy No. 6.5). The Hepatitis B vaccination series must be offered at no cost to appropriate employees within 10 working days of their initial assignment to work. Employees whose previously-administered antibody testing indicates an adequate immunity, or those who may not be vaccinated for medical reasons, are exempted from the HBV vaccination.

Employees have the right to refuse the vaccination. Those who decline the HBV vaccination must fill-out form ICESH 6.7F-001. Those who initially decline the HBV vaccination may be administered the vaccine at a later date, if they so desire.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY

HEPATITIS B VACCINE DECLINATION

I understand that due to my occupational exposure to blood or other potentially infectious materials, I may be at risk of acquiring the Hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with the Hepatitis B vaccine at no charge to me. However, I decline the Hepatitis B vaccination at this time. I understand that by declining this vaccination, I continue to be at risk of acquiring Hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially-infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.

NAME: _____
First MI Last

SOCIAL SECURITY NO.: _____-_____-_____

DATE: _____ SIGNATURE: _____

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 6.8 Interim
TITLE: Exposure Determination for Bloodborne Pathogens	DATE: 1/2001

In order to assure that individuals who have an exposure potential to bloodborne pathogens receive appropriate training, information, and support, it must be determined who is covered by the policy. In biomedical research and health care facilities, it is often impractical to identify job categories that are exposed to bloodborne pathogens. Instead, broad categories of jobs can be identified realizing that not all employees in those categories have exposure potential to human blood or other potentially-infectious material. The text of regulations of OSHA contain a listing of specific groups of individuals with exposure potential. For the purpose of this policy, the following criteria are used to determine the exposure potential to bloodborne pathogens:

1. All, who in the course of their employment, come in contact with patients (health care workers).

2. All, who in the course of their employment, come in contact with developmentally-disabled persons.

3. All who work, or come in contact with blood or other potentially-infectious materials.

4. Safety and emergency personnel.

The following individuals are not covered by this policy because they are not considered to be potentially exposed to bloodborne pathogens:

1. Medical and nursing faculty and staff who do not come in contact with patients, such as epidemiologists, whose entire work deals with statistical assessment of data.

2. Employees of Facilities Management, including personnel involved in housekeeping, plumbing, heating, ventilation, and air conditioning (see Policy No. 6.6).

3. All Level I administrative staff (see Policy No. 3.2).

Table 6.8.1 contains a listing of selected Level III and Level IV job categories. All administrative units are asked to identify employees in those job categories with an exposure potential based on criteria identified in this policy.

Table 6.8.1. Selected Level III and Level IV Job Categories.

Employees having the following job classifications have occupational exposure to blood or other potentially-infectious materials:

1. Physicians

2. Dentists; Dental Laboratory Technicians; Dental Assistants

3. Nurses (Registered nurses; licensed practicing nurses)

4. Nurses' Aides

Table 6.8.1. cont'd.

5. Clinical Laboratory Technologists; Technicians; Aides at Hospitals
6. Clinical Dental Hygienists
7. Physical Therapists
8. Occupational Therapists
9. Sports Trainers
10. Housekeeping Staff responsible for patient areas and laboratories in a hospital; dental and medical facilities
11. Student Health Staff
12. Pathologists
13. Phlebotomists
14. Paramedics
15. Blood Bank Technicians
16. Security

Certain employees in the following job classification may have exposure to blood or other potentially infectious materials, especially if their duties include contact with blood or other infectious materials or performing patient care:

1. Faculty in the School of Medicine
2. Staff of the EHS
3. Fire safety personnel
4. Housekeeping Staff responsible for areas related to athletes
5. Dialysis Personnel
6. Maintenance
7. Biomedical Engineering

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 6.9 Interim
TITLE: Steam Sterilizer Inspection and Monitoring	**DATE:** 1/2001

Steam sterilization of infectious material utilizes saturated steam within a pressure vessel (known as a steam sterilizer) at temperatures sufficient to kill infectious agents present. Various government agencies and consensus organizations have recommended periodic inspection of steam sterilizers. Accordingly, this policy requires an annual inspection of steam sterilizers as well as more frequent monitoring of steam sterilizers to ensure effective treatment.

The custodians of steam sterilizers are required to ensure that steam sterilizers are inspected at least annually. The inspection should consist of a calibration for temperature and pressure, using an instrument approved by the National Institute of Standards and Technology. In addition, the steam sterilization process should also be monitored on a weekly basis with a chemical or biological indicator. The custodians are required to maintain records on the annual inspection and other monitoring activities.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 6.10 Interim
TITLE: HIV Research Laboratories	DATE: 1/2001

Certain laboratories engaged in studies using HIV must take additional precautions to assure a safe operation. For the purpose of this policy, an HIV laboratory is defined as a facility engaged in the culture; production; concentration; experimentation; or manipulation of HIV. However, clinical or diagnostic laboratories engaged solely in the analysis of blood, tissues, organs, or body fluids are not included in this policy.

Laboratories covered by this policy must follow the requirements of the exposure control plan (Policy No. 6.5) and associated requirements included in that policy. Furthermore, they must follow all relevant biosafety policies, such as registration (Policy No. 6.1). They must develop a written training outline applicable to their operations. In addition, these laboratories must follow legal requirements promulgated by OSHA.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 7.1 Interim
TITLE: Emergency Response Program	DATE: 1/2001

Prudence suggests heavy reliance upon prevention of accidents. Accordingly, policies must be developed and implemented to assure a reduction in the probability of accidents, including those resulting in fire or spills of chemical, radiological, or biological agents. However, it is recognized that a plan is necessary to respond to potential emergencies. Response to specific emergencies requires specific actions as discussed below.

Fire

In most facilities, fire alarms are located in strategic locations which can be activated in cases of fire. Upon activation of a fire alarm, the building must be evacuated.

Fire in laboratories requires a knowledge of the nature and quantities of biologic agents, chemicals, and radioactive materials present in each laboratory. All Safety Custodians are required to provide the EHS with an inventory of chemicals present in their laboratory (Policy No. 5.2). The inventory of radioactive materials is derived from radioactive materials authorization (Policy No. 4.4), and the inventory of biological agents is prepared from the Human Pathogen Registration Document (Policy No. 6.1).

In organizations where a large number of hazardous materials are present, a Hazardous Materials Inventory (HMI) database is maintained which contains information on chemical, biological, and radiological agents and is updated periodically. The emergency personnel must be provided with HMI to assure proper response to emergencies.

Chemical Spills

As a general rule, the purchase and storage of large quantities of chemicals should be discouraged. The requirements for clean-up of chemical spills are outlined in Policy No. 5.6.

If there is a need for assistance during normal working hours, EHS personnel will provide assistance. If an emergency occurs after normal working hours, the emergency personnel must be provided with names and telephone numbers of individuals to be called.

Radiological Emergencies

Emergencies dealing with radioactive materials are handled by the EHS. During working hours, EHS personnel will respond to emergencies. The process for emergencies occurring after working hours is identical to that described for chemical spills.

Medical Support Service

Each organization with potential emergencies has a Medical Support Service which provides emergency medical services, and is called upon for treatment of injured individuals for all emergencies requiring immediate attention.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 7.2 Interim
TITLE: Emergency Action Plan	**DATE:** 1/2001

An emergency is a non-routine event with a potential for causing human injury or property damage. Because the consequences of an emergency are not always apparent, it is necessary to attend to all emergencies urgently and promptly. Efficient and effective handling of an emergency requires a carefully-planned approach. Accordingly, the Emergency Action Plan includes the elements of notification, first response, and mitigation.

Notification and Response

Each organization where hazardous materials are present has a primary emergency contact. Ideally, on every telephone a label has been affixed with appropriate emergency telephone numbers.

Mitigation

Since no two accidents are alike, the mitigation of an emergency requires judgment, knowledge, and training. Mitigation may include: clean-up of spills; assessment of exposure to personnel; collection and analysis of bioassay samples; and/or similar efforts. In most cases, mitigation of an emergency is performed under the oversight of appropriate EHS personnel, and often in cooperation with others. If a large-scale accident occurs, city and state emergency personnel will be called upon for mitigation. The HMI—a system that provides first respondents with computer-based information—identifies the quantity and nature of various hazardous materials in specific locations.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 7.3 Interim
TITLE: Corridor Utilization Policy	DATE: 1/2001

A safe working environment requires that corridors; stairwells; and areas accessible to employees and members of the general public can be readily used during an emergency. Numerous complex regulations, codes, and standards cover these areas, and many of them are subject to considerable change.

Definition of Corridors

The function of corridors is to allow uninhibited movement of people among offices, laboratories, rooms, and other facilities. A number of Fire Codes make a distinction between common corridors and limited-access corridors. Common corridors are used by those who are not necessarily working in the adjacent offices, laboratories, and other facilities. Limited-access corridors are frequented primarily or entirely by those who work in adjacent offices, laboratories, and other facilities.

Common Corridors

Many cities prohibit storage in common corridors. Materials in transit may be temporarily stored in common corridors, provided the storage is a necessary part of transport.

Clearance in Corridors and other Areas

Storage in limited-access corridors is discouraged. However, storage in these corridors is permitted, provided there is a minimum width of 44 inches of unobstructed passage, and the storage is on one side of the corridor. A minimum of 36 inches is required for passages in an office, laboratory, or any other area.

Storage of Hazardous Materials

Certain hazardous materials may not be stored in corridors. These are flammable materials (flashpoint less than 140°F = 60°C); explosives; concentrated acids and bases; and biological agents at or above biosafety Level 2, or those requiring P2 or higher physical containment.

Storage of Pressurized and Liquified Gases

Corridor custodians must identify specific areas for storage of pressurized and liquified gases. These areas must be clearly identified and must meet the safety requirements for storage of these materials.

Freight Elevator Lobbies

Storage and/or operation of equipment is restricted to alcove areas in freight elevator lobbies. Materials or equipment—other than that in transit—may not encroach on the passage width so as to restrict the reasonable movement of supplies, materials, or equipment.

Electrical Outlets

Electrical supply to authorized equipment must be provided by permanent installation of an easily-accessible fused outlet, located adjacent to the equipment. Extension cords do not replace permanent wiring.

Stairwells, Horizontal Exits, and Designated Areas of Refuge

Materials and equipment not required for emergency response may not be located or used in stairwells, horizontal exits, or designated areas of refuge.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 7.4 Interim
TITLE: Fire Drills	DATE: 1/2001

Fire Drill Policy is based upon the requirements of the local Code and applies to all buildings. For hospitals and other health care facilities, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) imposes additional requirements on fire drill policy for hospitals.

All Buildings Except Hospitals

Frequency of Fire Drills: A fire drill in every building must be performed periodically. These drills are conducted during normal business hours.

Fire Drill Notice: Notice of an impending fire drill is given three to four days prior to the drill. Notice is posted in visible areas such as elevators, entrances, and lobbies.

Building Evacuation: Everyone must evacuate the building. Occupants of the building must exit according to predetermined escape routes. Diagrams of these escape routes are attached to walls at various locations. Once outside the building, all people must stand clear of the entrances. Return to the building is permitted only after the fire marshall evaluates the situation; ends the fire drill; and says people may return.

Hospitals

Frequency of Fire Drills: Quarterly fire drills are required for every work shift.

Fire Drill Notice: The hospital operator and hospital security are notified concerning the time of the next scheduled fire drill. Once notified, the drill is conducted.

Building Evacuation: During a fire drill, all visitors are expected to evacuate the building according to predetermined escape routes. Diagrams of these escape routes are attached to walls at various locations. Patients and hospital staff are not evacuated during a drill.

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 8.1 Interim
TITLE: Structure of a Site-Specific EHS Program	**DATE:** 1/2001

Safety Officer:

Telephone: E-mail: Pager:

Fire & Emergency Manager:

Telephone: E-mail: Pager:

Chemical Hygiene Officer:

Telephone: E-mail: Pager:

Biosafety Officer:

Telephone: E-mail: Pager:

Radiation Safety Officer:

Telephone: E-mail: Pager:

ICESH: ENVIRONMENTAL HEALTH AND SAFETY	NO.: 8.2 Interim
TITLE: Emergency Telephone Contacts	**DATE:** 1/2001

Safety Officer	Alternate 1	Alternate 2
Name: Telephone: Pager:		

Fire & Emergency Manager	Alternate 1	Alternate 2
Name: Telephone: Pager:		

Chemical Hygiene Officer	Alternate 1	Alternate 2
Name: Telephone: Pager:		

Biosafety Officer	Alternate 1	Alternate 2
Name: Telephone: Pager:		

Radiation Safety Officer	Alternate 1	Alternate 2
Name: Telephone: Pager:		