

**Research Service
VA Pittsburgh Healthcare System**

**Research Laboratory
Safety/Biosafety Manual and
Chemical Hygiene Plan**

*Ensuring Personnel Safety in Veterans
Health Administration Research*

Annual Review

The following representatives from Research and Development have developed the Research Laboratory Safety/Biosafety Manual and Chemical Hygiene Plan. This manual has been prepared for all employees in the VAPHS Research Program who may be exposed to biohazardous materials and use hazardous chemicals.

This manual has been written in accordance with the VA Handbook 1200.08 "Safety of Personnel Engaged in Research" and Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories.

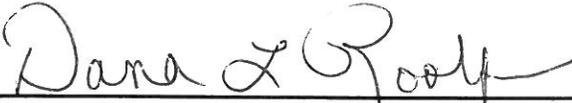
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PURPOSE OF RESEARCH SAFETY

VHA Handbook 1200.08 issued March 6, 2009 mandates that VA Research services must maintain a Research Safety Program that is consistent with VA policies, Federal, state and local statutes, and regulations from Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA), and the Nuclear Regulatory Commission (NRC).

In compliance with this mandate, a service-wide safety manual must be developed, updated, reviewed and approved *annually*.

This Research Safety/Biosafety Manual serves as a resource and reference to assist in the minimization of risk associated with the VA Research Service employees' daily responsibilities.

The Research Service policies and plans presented in this Safety/Biosafety Manual are in compliance with and complement the detailed policies utilized by the VA Pittsburgh Healthcare System (VAPHS) Hospital Emergency Management Plan and other Safety related programs. Detailed descriptions of individual VAPHS Hospital policies [referred to as Medical Center Memorandums (MCMs)] can be viewed on-line. Note EC-004 SAFETY/Environment of Care Committee has oversight responsibilities for Safety in all Services at VAPHS.

The Department of Veterans Affairs is committed to providing a safe environment for all employees, patients, volunteers and visitors. All employees must be aware of the risks they may face in carrying out their duties, the work practices that will minimize these risks, and the procedures to follow in the event of an accident. Research employees face unique risks associated with the laboratory setting. The information presented herein, will help researchers to:

- Prevent occupational injury due to accidents in the laboratory
- Prevent occupational illness caused by overexposure to hazardous materials
- Prevent occupational injury due to physical factors in the work environment
- Prevent fires that result in injury, death and damage to property
- Prevent the loss or corruption of valuable scientific data
- Safeguard the materials and property that have been entrusted to their care

EMPLOYEE RIGHTS AND RESPONSIBILITIES

Research Service Employee Rights

Your rights include but are not limited to:

- The right of access to copies of the VA's Occupational Safety and Health Standards and procedures, and injury/illness statistics.
- The right to comment on VA proposed alternate Occupational Safety and Health Standards.
- The right to assist in inspections of your laboratory. You are encouraged to tell inspectors about unsafe and unhealthful conditions in the workplace.
- The right to report and request inspections of unsafe or unhealthy working conditions by giving verbal or written notice. This does not prevent you from contacting VA Safety and Health Officials directly if you desire anonymity. You are protected from any discrimination, restraint, interference, coercion, or reprisal. If you have reason to believe your rights are being violated due to your participation in the program, you may raise such concerns with the facility Director or designee for appropriate investigation and decision.
- The right of appeal. If you are not satisfied with your supervisor's or the VAPHS Safety Staff disposition of your report, you are authorized to contact your VISN 4 Network Safety Manager, Scott Kager, at 814-860-2223 or Network Safety/Industrial Hygienist Richard Hofman at 717-272-6621 extension 4008.

Research Service Employee Responsibilities

Your responsibilities include but are not limited to:

- Participation in the VA's Occupational Safety and Health Program. Performance evaluations of any VA employee, regardless of position, shall include measure of the employee's performance in meeting the requirements of the VA's Occupational Safety and Health Program, consistent with the employee's assigned responsibility and authority.
- Completing VAPHS New Employee Orientation (sessions related to Safety), regardless of compensation status.
- Annual review of the Research Laboratory Safety/Biosafety Manual and Chemical Hygiene Plan. Employees must sign and date the record sheet located in the back of the Manual.
- Annual review of the online Research Safety web-based training program which includes completing and passing (>80%) the associated safety exam.
- Annual completion of the Radiation Safety Refresher course if you are a user of radioactive materials.
- Participation in the mandatory Mantoux Skin Test (Tb) Program sponsored by Employee Health (VA employees with patient contact).

RESEARCH SERVICE OVERSIGHT STRUCTURE

VA Director

The responsibilities of the VA Director outlined in VHA Handbook 1200.08 include but are not limited to:

- Ensuring that the research safety program is adequately staffed with appropriate administrative support to facilitate review, record keeping, and correspondence with investigators and has adequate space sufficient to provide privacy for conducting sensitive duties related to biosafety.
- Ensuring that all Research personnel are included in the facility Occupational Safety and Health program.
- Ensuring that Research space is inspected at least annually and that identified facility-related deficiencies are resolved.
- Ensuring that measures for the security of Research laboratories and surrounding space are developed in cooperation with the Associate Chief of Staff for Research and Development.

ACOS for Research and Development

The responsibilities of the ACOS for R & D outlined in VHA Handbook 1200.08 include but are not limited to:

- Ensuring that safety-related communications from the Chief Research and Development Officer are disseminated in a timely manner to appropriate personnel.
- Ensuring that responses to safety “holds” are received and that no research activity is conducted until a “hold” is lifted.
- Ensuring continuous development and evaluation of performance standards of the Research Safety Program.

Research and Development Committee (R & D)

The responsibilities of the R & D committee outlined in VHA Handbook 1200.08 include but are not limited to:

- Establishing an Institutional Biosafety Committee (IBC) to oversee the varying aspects of research safety including the development and implementation of a Chemical Hygiene Plan and review protocols that involve safety hazards to personnel and the environment.
- Appointing a Research Safety Coordinator (typically ACOS for Research and Development) who is responsible for supervising and operating the Research Safety Program.
- Appointing a Biological Safety Officer if conducting: (1) research programs involving the use of recombinant DNA at biological safety levels greater than 2 or (2) research programs using large scale (>10 liters) production activities involving viable organisms containing recombinant DNA.
- Ensuring that the IBC is adequately staffed with appropriate administrative support to facilitate review, record keeping, and correspondence with investigators and has adequate space sufficient to provide privacy for conducting sensitive duties related to biosafety.
- Ensure that the IBC reviews all Research and Development proposals for compliance with regulatory safety standards regarding personnel and/or the environment.
- Reviewing and acting upon the minutes of the IBC meetings.

- Appointing a Chemical Hygiene Officer to provide technical guidance on the implementation of the plan.

Research Safety Coordinator

Responsibilities

- Provide support and assistance to ensure compliance with various safety practices, regulations and policies.
- Assisting in addressing safety infractions and safety improvements.
- Assist the Principal Investigator (PI) with maintaining laboratory compliance.
- Act as a liaison to the Office of Environmental Health and Safety (OEHS) to assist with lab safety inspections, coordinate safety training, and maintain overall lab compliance, including hazardous waste management.

Institutional Biosafety Committee (IBC)

Responsibilities

The responsibilities of the IBC outlined in VHA Handbook 1200.08 include but are not limited to:

- Reviewing all proposed clinical or basic research studies to be performed at VAPHS for compliance with the Joint Commission, Occupational Safety and Health Administration (OSHA), Department of Transportation (DOT), Federal Aviation Administration (FAA), Centers for Disease Control (CDC), National Institutes of Health (NIH) and Department of Veterans Affairs safety-related regulatory standards.
- Providing a comprehensive review of proposals inclusive of risk assessment of the facilities, level of containment, laboratory procedures, practices, training and expertise of personnel consistent with the proposed use of biological (including but not limited to recombinant DNA technology, infectious or etiological agents, human-derived cell lines), chemical, physical, or radiation hazards.
- Submitting formal minutes of all IBC activities to the R & D committee.
- Review compliance with safety-related training requirements on an annual basis.
- Providing annual mandatory safety training to current research-related personnel.
- Conducting semi-annual safety inspections of all research laboratories and office areas for compliance with regulatory standards.
- Establishing and maintaining a chemical hygiene/infectious control program, including annual review of research laboratory chemical inventories, appropriate use of personal protective equipment, and research laboratory maintenance of current Material Safety Data Sheets.
- Developing policies and procedures for operations that involve hazardous chemicals.
- Serving as the NIH-registered and recognized IBC.

Membership

- Appointment of new members to the IBC requires review and approval by the IBC for forwarding to the VAPHS R&D Committee.
- R&D Committee recommendations are then forwarded to the Medical Center Director for final approval.
- The composition of the IBC will consist of at least 5 members, excluding ex-officio members, with expertise in chemical hygiene, etiologic agents, including bloodborne and airborne pathogens, chemical carcinogens and other chemical hazards, physical and radiation hazards, and recombinant DNA. In addition, an individual not affiliated with VAPHS will serve as a community representative.
- Membership will also include representatives from the Institutional Animal Care and Use Committee (IACUC) and/or the Animal Research Facility (ARF).
- The Administrative Officer (AO) for Research will be a non-voting member of the Research Safety Subcommittee.
- Term appointments to the IBC will be for three (3) years, with the possibility of reappointment.
- Appointment of the Chair of the IBC will be for one (1) year, with the possibility of reappointment.

Meetings

- The IBC will meet at least quarterly, with additional meetings called by the Chair as needed.
- IBC meetings will be conducted only in the presence of a quorum (>50% of voting membership).
- While maintaining a quorum, members with a conflict of interest will excuse themselves from the room prior to discussion and voting. If a quorum cannot be maintained, the topic under review will be tabled until a quorum can be established.
- IBC meeting agendas and minutes will follow the guidelines described in VHA Handbook 1200.08 Appendix D.

Review of Research Proposals

- All research-related studies require IBC approval prior to initiation.
- IBC review of a research study is obtained through submission of completed "Request to Conduct Research" forms (Part I and Part II) to the Research Office. Contact the Research Office (412-954-5381) for information regarding these forms.
- Submitted research protocols involving retrospective or prospective clinical data analyses will be reviewed by at least one member of the IBC with relevant expertise.
- Each research protocol reviewed by the IBC is discussed in open forum. A reviewed protocol may receive full subcommittee approval, may require modifications, or be disapproved by majority vote.
- The R&D Committee receives a list of all projects approved by the IBC. A project may not be initiated until the PI receives written notification from the ACOS/R&D indicating such.
- Minutes of the IBC are forwarded to the VAPHS R&D Committee for final approval.

- IBC approval of a research protocol is documented by Chair (or designee) authorization of the Request to Conduct Research, Part II form.
- Approval is valid for a maximum of one-year.

Annual Review of Research Proposals

- The IBC reviews all research protocol Safety/Biosafety Surveys annually.
- Investigators are forwarded a Continuing Review form approximately 8 weeks prior to termination of annual approval.
- Approval of Annual Continuing Review of Safety/Biosafety forms will be documented by Chair (or designee) authorization.
- Minutes of the IBC are forwarded to the VAPHS R&D Committee for final approval.
- Annual Project Renewal approval is valid for a maximum of one-year.

PRINCIPAL INVESTIGATOR

Responsibilities:

The Principal Investigator (PI) is directly and primarily responsible for the safe operation of his/her laboratory. The PI must be knowledgeable of the Safety/Biosafety guidelines described in this manual, the materials cited, and must apply these principles and procedures to protect the health and well-being of research staff and the general public against undesirable consequences of experimental work conducted at the VAPHS.

The minimal responsibilities of the PI include:

- a. Being aware of the properties of all chemicals and materials used in their labs and determining the biosafety level(s) appropriate to such materials and/or organism(s) being utilized. Ensuring that laboratory practices and techniques, containment equipment, personal protective equipment, and laboratory facilities are appropriate for the hazardous properties of reagents and biosafety levels, and are being maintained daily. [See guidelines on (1) general Risk Assessment for Biohazards, VA Handbook 1200.08, Appendix B, pp. B1-3 and (2) determining BSL [see below, pg. 39, and Handbook 1200.08, Appendix A, pp. A1-A2]
- b. Accurately completing Part II: Research Safety/Biosafety Subcommittee Protocol Survey and obtaining IBC and R&D approval before initiating research studies.
- c. Submitting to the Administrative Officer/ACOS for R&D annually the Hazardous-Select Agent Certification to verify the absence/presence of hazardous and/or select agents in use in their labs.
- d. Identifying staff requiring access to their laboratories by completing and submitting to the AO/ACOS "Request for Staff Access to Research Secured Area" update (additions or deletions) as needed.
- e. Establishing training procedures for personnel working with chemical and biohazardous materials and verifying the training of all personnel in the safe handling procedures, modes of infection/contamination, and the health hazards

associated with the agents encountered in the laboratory before they are authorized to work in the laboratory.

- f. Assuring signs and labels are posted in each lab advising personnel of:
 - 1. Emergency telephone numbers of emergency personnel, supervisors, and lab personnel.
 - 2. Location signs for safety showers, eyewash stations, and other safety and first aid equipment.
 - 3. Location of emergency exits.
 - 4. Location of MSDS binders.
 - 5. Warning signs to identify unusual hazards associated with their specific laboratory procedures.
- g. Ensuring a written laboratory response plan is followed in the event of a release of hazardous chemical or biological material(s) and verifying that all personnel have knowledge of their respective duties and are capable of executing their responsibilities.
- h. Reporting spills, accidents, and injuries involving chemical and/or biohazardous materials to the Industrial Hygienist and/or the Biosafety Officer and ensuring follow-up actions to prevent future recurrences.
- i. Assuring that personnel are enrolled in an Occupational Health program appropriate to the agents being used and reporting personnel illnesses possibly related to laboratory acquired infections or exposures to the Industrial Hygienist, the Biosafety Officer, or the VAPHS Infection Control Officer.
- j. Maintaining compliance with all applicable Federal, state, local, and VA rules and regulations.
- k. Cooperating with the Industrial Hygienist, Biosafety Officer, and members of the IBC in the conduct of laboratory inspections.
- l. Assuring that all waste materials, equipment, and clothing removed from the site are properly disinfected and disposed so that they do not pose a hazard.

CHEMICAL HYGIENE PLAN

Purpose

The Occupational Safety and Health Act provides standards and guidelines for workplace activities. The requirements for a Chemical Hygiene Plan results from a rule making and review process through which the Occupational Safety and Health Administration (OSHA) determined that laboratories differ from individual operations in their use and handling of hazardous chemicals. As a result, OSHA promulgated the Occupational Exposure to Hazardous Chemicals in Laboratories, 29 CFR 1910.1450, known as the Lab Standard.

Background

The lab standard applies to all laboratories handling hazardous chemicals when the following criteria are met:

- Chemical operations are carried out on a laboratory scale and no commercial quantities of materials are provided,
- Procedures are not part of or do not simulate a production process,
- Numerous chemicals or procedures are used, and
- Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

The purpose of the Chemical Hygiene Plan is to describe proper practices, procedures, equipment, and facilities that will help to ensure that all affected employees in the VAPHS are protected from the effects of hazardous chemicals.

Responsibility and Authority

The Chemical Hygiene Plan encourages and requires that employees exercise good judgment in chemical handling. There are real consequences to you and to others which could result from the disregard of laboratory practices or the recommendations in this plan. All laboratory employees must comply with the Chemical Hygiene Plan.

The VAPHS Director is ultimately responsible for implementation and support of all compliance efforts. However, primary accountability has been obligated to the ACOS/R&D and the AO/ACOS/R&D.

The lab standard requires the designation of one or more Chemical Hygiene Officers. The Chemical Hygiene Officer for Research is the Biosafety Officer. To implement this portion of the standard, the ACOS/R&D and the AO/ACOS/R&D are responsible for assisting the laboratory supervisors in the day to day operations and the implementation of the Chemical Hygiene Plan. The ACOS/R&D ensures that the Chemical Hygiene Officer conducts duties in accordance to VA and other Federal and state requirements and that the Deputy ACOS, AO and Compliance Officer support the Chemical Hygiene Officer in accomplishing those requirements.

The Chemical Hygiene Officer is qualified by training and/or experience to provide technical guidance in the development and implementation of the Chemical Hygiene Plan. The Chemical Hygiene Officer also has the authority to assist management with implementation of the Chemical Hygiene Plan.

The Chemical Hygiene Officer will assist the laboratory supervisors in their duties to achieve a variety of tasks necessary under the lab standard. These include but are not limited to:

- Helping to implement the VAPHS Chemical Hygiene Plan,
- Working with the laboratory supervisor to monitor the safe procurement, use and disposal of chemicals,
- Assisting with safety audits and training,
- Reviewing hazard assessments and engineering/process controls,
- Recommending protective equipment for laboratory personnel, and
- Providing guidance for the handling and ultimate disposal of hazardous waste.

Laboratory Supervisor/Principal Investigator (PI)

The laboratory supervisor/PI is the individual responsible for the laboratory area. Each laboratory must have a laboratory supervisor. The laboratory supervisor must:

- Ensure implementation of the Chemical Hygiene Plan.
- Determine what hazardous chemicals or regulated substances are in use in the lab.
- Maintain a close working relationship with the Industrial Hygienist and Biosafety Officer and report to him/her any incidents which may lead to personnel exposures or environmental contamination.
- Advise lab personnel in the conduct of lab procedures and in the handling of hazardous substances.
- Ensure that appropriate and required personal protective equipment is available and in working order.
- Ensure that available engineering controls, such as chemical fume hoods and biological safety cabinets, are used properly and in good working order.
- Arrange with the Industrial Hygienist for workplace air sampling or other sampling to document potential exposures as required.
- Provide for appropriate instruction and training in specific laboratory procedures;
- Conduct periodic laboratory inspections and at least one annually with the Biosafety Officer to ensure compliance with the Chemical Hygiene Plan and any Standard Operating Procedures.
- Assist lab personnel in the proper disposal of hazardous chemicals or waste;
- Ensure that chemical fume hood ventilation inspection stickers and laboratory chemical inventories are current.
- Provide laboratory personnel ready access to Material Safety Data Sheets (MSDSs).

Laboratory Personnel

Faculty and staff working in laboratories are subject to the requirements of the Chemical Hygiene Plan as directed by the laboratory supervisor. All laboratory personnel must:

- Attend required training sessions and complete online training.
- Consult with the lab supervisor before initiating non-standard or hazardous laboratory procedures.
- Understand the function and use of personal protective equipment.
- Use safety devices and engineering controls such as chemical fume hoods or biological safety cabinets as appropriate.
- Refer to the MSDS before handling a chemical which they are not familiar with.
- Report immediately to their supervisor any problems, accidents, or observations regarding chemical health and safety.
- Participate in inspections, training efforts, and other related activities.
- Develop good personal chemical hygiene habits.

Several other support services will assist in the compliance programs:

- Facilities Management will maintain engineering control systems according to the required specifications, maintain current criteria for lab design, and test and maintain safety showers.
- Acquisitions will track purchases of certain hazardous chemicals, while shipping and receiving personnel will deliver the chemical/product to the laboratory.
- Employee Health as well as our emergency team will render first aid in event of an emergency.

The Biosafety Officer will aid in training employees, inspect each laboratory at least annually and consult with the supervisors/lab personnel concerning the Chemical Hygiene Plan when questions arise.

Chemical Hygiene Plan Development

The VA Pittsburgh Healthcare System Chemical Hygiene Plan has been developed by the Institutional Biosafety Committee (IBC). Assistance in creating the Chemical Hygiene Plan was provided by the Safety department.

The IBC is responsible for ensuring that the Chemical Hygiene Plan meets the current requirements of 29 CFR 1910.1450, and that changes may be made to meet OSHA mandated updates on revisions which are recommended as a result of periodic inspections and an annual review. The Safety department will provide input to the Chemical Hygiene Plan through periodic and annual reviews.

Laboratory supervisors must ensure that their personnel covered by the Chemical Hygiene Plan are aware of its existence and importance, and that those individuals are trained regarding the nature of potential hazards in the laboratory and their personal role in eliminating or minimizing such hazards in the workplace. The Chemical Hygiene Plan must be reviewed annually by each laboratory employee.

IDENTIFICATIONS, CLASSIFICATION, AND STANDARD OPERATING PROCEDURES FOR HAZARDOUS CHEMICALS

The laboratory standard defines a hazardous chemical as any element, chemical compound, or mixture of the same which is a physical or health hazard.

Chemicals that are classified as physical hazards include organic peroxides, oxidizers, and chemicals that may be combustible, flammable, explosive, unstable, reactive, pyrophoric, or water reactive.

Health hazard chemicals are those materials for which there is statistically significant evidence that acute or chronic health effects may occur in exposed employees (based on at least one study completed in accordance with established scientific properties). This term covers a variety of health effects including actively toxic materials, carcinogens, irritants, reproductive agents, corrosives, and those chemicals which act on specific body organs such as the liver, kidneys, nervous system, blood, and reproductive system.

It is our goal to have all chemicals handled safely in our controlled laboratory environment. Some central guidelines for handling hazardous materials are listed below:

1. Know the potential hazards associated with the materials and procedures you are using.
2. Obtain and review Material Safety Data Sheets (MSDSs) before using chemicals.
3. Be prepared for emergencies and know what action to take. Ensure that necessary supplies and equipment are available for handling small spills or have the contact information posted for the Spill Team.
4. Know the location and proper use of locally available safety equipment such as emergency eye wash stations, fire extinguishers, and fire alarms. Know appropriate emergency telephone numbers. In the event of skin or eye contact with chemicals, immediately flush the area of contact with tepid water for 15 minutes. Remove affected clothing. Get medical help immediately.
5. Do not work alone in the laboratory if you are working with chemicals.
6. Purchase minimum amounts of hazardous materials necessary to accomplish work and dispense only amounts necessary for immediate use.
7. Use hazardous materials only as directed and for their intended purpose.
8. Never smell or taste any chemical as a means of identification.
9. Avoid direct contact with any chemical; use personal protective equipment to avoid exposures. Any special protection recommendations are stated in the MSDS.
10. Drinking, eating, storage of food, and the application of cosmetics are forbidden in areas where chemicals are in use.
11. Do not remove labels from original containers; replace if necessary.
12. Label all secondary containers with the HMIS chemical description and, if possible, any associated hazard(s).
13. Ensure ventilation is adequate for the materials being used. Where possible handle all materials in a chemical fume hood.
14. Electrically ground and bond containers using approved methods before transferring or dispensing a flammable liquid from a large container.
15. Store chemicals in compatible categories, i.e., flammable, corrosive

16. Handle and store laboratory glassware in a manner to avoid damage. Inspect all laboratory glassware prior to use. DO NOT USE damaged, cracked, or badly scratched glassware.
17. Use extra care with Dewar flasks or other evacuated glass apparatus; shield or wrap them to contain chemicals or fragments should implosion occur.
18. Use laboratory equipment only for its intended purpose.
19. Never use mouth suction for pipetting or to start a siphon.
20. Avoid practical jokes or other behavior which might confuse, startle, or distract other individuals.
21. Wash hands immediately after working with chemicals.
22. Never wear contact lenses in the laboratory even under protective eyewear.
24. Proper lab attire and personal protective equipment should always be worn. Sandals and open shoes are not permitted in the laboratories.

Toxic Materials

Toxic materials are defined as *acute toxins* or *chronic toxins*.

Acutely toxic materials are generally characterized by prompt (or slightly delayed) health effects, such as burns, allergic reactions, respiratory irritation, and immediate damage to organs such as the skin and eyes. Acutely or highly toxic materials are often defined as follows:

- Any chemical whose properties are unknown should be treated as though it is acutely toxic
- Those materials defined as “poisons” due to possessing one (or more) of the following toxicological parameters:
 - Oral LD50 of 50 mg/Kg or less;
 - Dermal LD50 of 200 mg/Kg or less;
 - Inhalation LC50 of 2 mg/L or 200 ppm or less.

To minimize exposures, it is necessary to determine the route (s) by which such exposures may occur and take the appropriate preventive measures.

The effects of an exposure to chronically toxic materials occur over a longer period of time and are characterized by cumulative damage to organs or the organ system. Chemicals which are defined as chronic toxins include: hepatotoxins (carbon tetrachloride, vinyl chloride), nephrotoxins (ethylene glycol), neurotoxins (acrylamide), agents which act on the hematopoietic system (benzene), and others which may affect specific organs.

Some general precautions to follow are:

1. Know the hazards of the materials you are using. Review Material Safety Data Sheets (MSDS) and gather additional information.
2. Use and store these substances only in designated areas, and use them in the smallest amount.
3. Store and transport such chemicals in secondary containment trays; use them in a

- chemical fume hood, or other containment device.
4. Be prepared for hazardous material emergencies, know what action (s) to take, and ensure that necessary supplies and equipment are available for handling small spills.
 5. Avoid skin contact by use of gloves, long sleeves and other protective apparel as appropriate. Refer to the MSDS.
 6. Contaminated wastes and materials from some experiments should be decontaminated chemically and/or stored in closed, suitable, labeled containers for proper disposal.
 7. Observe any additional general safety procedures for hazardous materials.
 8. Protect vacuum pumps against contamination by using scrubbers or suitable filters and vent into a local exhaust hood. Decontaminate vacuum pumps, glassware or other equipment before removing it from the designated areas.
 9. If using toxicologically-significant quantities (amount depends on the substance) on a regular basis, contact the Industrial Hygienist so that a determination to conduct personal air monitoring can be made.

Carcinogenic and Reproductive Hazards

Chemicals which fall under this category are also classified as chronic hazards. Select carcinogens are substances capable of producing cancer in mammals and are defined as follows:

- Regulated by OSHA as a carcinogen;
- Listed by the National Toxicology Program (NTP) as a carcinogen (or potential carcinogen) in its most recent Annual Report on Carcinogens;
- Listed by the International Agency for Research on Cancer (IARC) as a Group 1, 2A or 2B carcinogen.

The laboratory must inventory their laboratory chemicals and maintain a specific list of carcinogens and chemicals which are considered reproductive hazards.

Reproductive toxins are substances that affect either male or female reproductive systems or capabilities and include agents which damage the genetic materials (mutagens) or the developing fetus (teratogens).

All of the aforementioned precautions and handling procedures for acutely hazardous materials and chronic hazards should be followed, as applicable, when dealing with carcinogens and reproductive hazards. When chronic hazard materials, including carcinogens and reproductive toxins, are used in animal work, some additional special precautions should be considered:

- In the animal facility use a restricted area.
- Wear the required personal protective equipment.
- Dispose of contaminated tissues and wastes appropriately.

Flammables and Combustibles

Flammable and combustible materials are those chemicals which generate sufficient vapors to cause a fire when an ignition source is present. The minimum temperature at which a liquid gives off sufficient vapor to allow ignition is the “flashpoint”, a chemical property also used to categorize materials.

A flammable is a material that can generate sufficient vapors to ignite at temperatures below 100 degrees Fahrenheit (38°C). Combustibles are generally limited to materials with flashpoints less than 200 degrees Fahrenheit (93°C).

Vapor generation from a liquid is dependent on a material’s vapor pressure, a parameter which increases with increasing temperature. The degree of potential fire hazard depends upon having the three necessary elements present: fuel, ignition source, and oxygen. Safe handling procedures are based upon controlling one (or more) of the elements in the fire triangle.

OSHA and the National Fire Protection Association (NFPA) guidelines apply to the use of flammable and combustible materials in the laboratory. Information on and interpretations of these guidelines can be obtained from the Safety Department.

PRECAUTIONS

1. Eliminate ignition sources such as open flames, sparks from cutting, operation of electrical equipment, static electricity, and hot surfaces from the vicinity of flammable/combustible materials.
2. Minimize quantities of flammable/combustible liquids in the laboratory consistent with laboratory needs and the facilities fire code mandates.
3. Store these materials in approved flammable liquid containers (safety cans) and storage cabinets, or in a storage room designed for this purpose.
4. Flammable/combustible materials should be stored separate from oxidizers.
5. All refrigerators or freezers used for storage of flammable/combustible materials must be explosion-proof. Requirements for intrinsically safe design must also be considered.
6. When transferring or dispensing these liquids from large containers or drums, ensure that proper bonding and grounding is employed. Test such devices periodically.
7. Before using flammable/combustible liquids in a laboratory, ensure that appropriate fire protection equipment is available (i.e., ABC/BC fire extinguishers).

Corrosive Chemicals

Corrosive chemicals are those substances that, by direct chemical action, cause visible destruction or irreversible alterations of living tissue or deterioration of metal surfaces. Corrosive liquids and solids are responsible for most such injuries, while corrosive gases are also serious hazards because they can be readily absorbed into the body by skin contact, inhalation, or eye contact. Corrosive chemicals are those which fit the OSHA Hazard Communication Standard (29 CFR 1910.1200) definition of corrosive or with an MSDS that indicates a corrosive hazard.

Some categories of corrosive liquids include inorganic acids (e.g., hydrochloric/muriatic, nitric, sulfuric), organic acids (e.g., acetic, butyric), basic solutions (e.g., ammonia, sodium hydroxide), other inorganics (e.g., bromine, phosphorous trichloride), and other organics (e.g., acetic anhydride, liquefied phenol).

The following procedures should be followed while handling corrosive materials:

1. Eye protection and gloves appropriate for the material to be handled should always be worn when handling corrosive materials. Contact lenses should never be worn during work with any chemicals. Depending on the type of operation, quantity of chemical(s) used, and specific MSDS recommendations, a face shield and impervious apron/boots may also be appropriate.
2. As specified in OSHA Standard 29 CFR 1910.151(c), an eyewash and safety shower must be readily accessible to areas where corrosives are used and stored. First aid information from labels and the MSDS, especially the information related to skin and eye contact, should be made available to all lab personnel in advance of working with corrosives.
3. Always add acid to water. Dehydrating agents such as sulfuric acid, sodium hydroxide, phosphorous pentoxide, and calcium oxide should be mixed with water by adding the agent to water to avoid violent reaction and spattering.
4. Strong oxidizing agents such as chromic and perchloric acids should be clearly labeled, stored, and used in glass or other inert containers; corks and rubber stoppers should not be used.
5. Acids and bases must be stored separately. Organic acids can often be stored with flammables, but separate from oxidizers, including oxidizing acids. To transport strong acids and bases from location to location, use safety rubber bottle carriers or non-breakable PVC-coated bottles.

Compressed Gases

Compressed gases are comprised of three different types of gas products—compressed gases, liquefied compressed gases, and cryogenic liquefied gases. These are all considered “compressed gases” and they are defined as follows:

- A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 pounds per square inch (psi) at 70°F; or
- A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130°F, regardless of the pressure at 70°F, or;
- A liquid having a vapor pressure exceeding 40 psi at 100°F as determined by American Society for Testing Materials [ASTM] D-323-72.

Compressed gases may exhibit a variety of physical and health properties/hazards including corrosivity, flammability, toxicity, reactivity, and the ability to act as an asphyxiant. A safety hazard also exists when compressed gases are stored under high pressure.

Cryogenics such as liquid nitrogen and liquid helium may condense oxygen from air, thus creating an oxygen rich atmosphere and increasing the potential for fire or explosions. Other hazards

include embrittlement of materials, and skin or eye burns upon contact with the liquid.

The following handling precautions and guidelines must be considered when using compressed gas cylinders:

PRECAUTIONS

1. Familiarize yourself with Compressed Gas Association (CGA) cylinder markings for compatible gases and gas handling equipment.
2. Before using cylinders, read the label and MSDS information associated with the gas being used.
3. When storing or moving a cylinder, have the cap securely in place to protect the stem. Use suitable racks, straps, chains or stands to support cylinders during use, transportation or storage.
4. Use a suitable hand truck to move cylinders. Avoid dragging, rolling or sliding them, even short distances.
5. Do not store full and empty cylinders together.
6. To return empty or partially used cylinders, close pressure in the cylinder. Replace any valve outlet or protective cap, and store in a designated area for return.
7. Treat cylinders of compressed gases as high energy sources and use only in well ventilated areas.
8. Always use appropriate gauges, fittings, check valves, and materials which are compatible with the particular gas being handled. Never change the compatibility group of a fitting. Never use oil or grease on the high pressure side of compressed gas fittings. Do not lubricate an oxygen regulator or use a fuel gas regulator on an oxygen cylinder.
9. Never use the regulator as a shut-off valve to a cylinder.
10. Always wear goggles or safety glasses with side shields when handling compressed gases.
11. When handling cryogenics, always wear safety goggles and a face shield. If a splash or spray hazard exists, personal protective clothing should also include an impervious apron or coat and impervious thermal gloves.
12. Containers and systems containing cryogenics should have pressure relief mechanisms and be capable of withstanding extreme cold without becoming brittle.

Chemicals Which Form Peroxides

Chemicals that react with oxygen to make peroxides create materials that can explode with impact, heat or friction. Peroxide-forming compounds can be divided into three hazard categories based on method of reaction and storage time.

1. Compounds such as divinyl acetylene and isopropyl ether form peroxides that can spontaneously decompose.
2. There are a large number of compounds that can form peroxides, but require the addition of a certain amount of energy to decompose explosively. Examples of these chemicals include dicyclopentadiene, diethyl ether, dioxane, tetrahydrofuran, and vinyl ethers. Examples of these chemicals include dicyclopentadiene, diethyl ether, dioxane, tetrahydrofuran and vinyl ethers.
3. Materials which can form peroxide polymers. These are a highly reactive form of

peroxide which is extremely shock and heat sensitive. Representative compounds include butadiene, chloroprene, methyl methacrylate, vinyl pyridine, tetrafluoroethylene, acrylonitrile and styrene.

A variety of simple steps can be taken to ensure that peroxides are handled safely:

1. Date all peroxides upon receipt and upon opening. As a rule, maximum storage should be no more than one year.
2. Do not open any container which has obvious crystal formation around the lid and do not force open frozen lids.
3. Additional precautions similar to those used for flammable and combustibles materials should be used.

Reactive Chemicals

Reactive chemicals are substances which may undergo a variety of violent reactions with the spontaneous liberation of heat and/or gases in such a rapid fashion that safe dissipation is not possible. This category includes explosives, oxidizers, reducers, water/acid/air sensitive, and unstable chemicals.

Chemicals in this class are normally unstable and may readily undergo violent change without a detonator.

Pyrophoric chemicals (e.g., phosphorous, metal powders of magnesium, aluminum and zinc) will undergo spontaneous ignition in contact with air. Store in inert environments and prevent contact with air or water.

Polymerizable chemicals (e.g., divinyl benzene and acrylonitrile) will undergo spontaneous polymerization in contact with air. Such materials should be kept cool and contact with water must be avoided.

Oxidizers (e.g., perchloric and chromic acids) will undergo violent reactions when in contact with organic materials or strong reducing agents. Hazards can be minimized by using and storing minimal amounts, emphasizing proper storage away from organic and flammable materials, and reducing the amount of the chemical.

Chemicals in this class react violently with water and are those which create large amounts of heat when in contact with water or may decompose in moist air. Examples include sulfuric acid, chlorosulfonic acid, acetyl halides, phosphorous tri(pent)oxides and titanium tetrachloride.

These chemicals should be kept away from water and must be handled in laboratory chemical fume hoods. Contact with moist air is problematic. Most of these materials are corrosive, as are their decomposition products, so appropriate personal protective equipment must be worn when these chemicals are handled.

Chemical Spills

1. For small chemical spills, don the appropriate personal protective equipment (gloves, lab coat, protective eyewear) and clean the spill up if your health and safety is not in jeopardy.
2. The laboratory should have a chemical spill kit to clean up spills.
3. For larger spills, immediately contact the Spill Team Coordinator at 412-954-4898 or the Industrial Hygienist at 412-360-3705.
4. If there is a mercury spill, do not handle it. Again, contact the Spill Team Coordinator at 412-954-4898 or the Industrial Hygienist at 412-360-3705.
5. All spills and accidents related to chemical spills should be reported to the Spill Team Coordinator or the Industrial Hygienist.

CHEMICAL PROCUREMENT, DISTRIBUTION AND STORAGE

Chemical Procurement

All chemicals must be purchased in the smallest quantity consistent with the intended use. Chemicals should not be transferred from another facility. The using lab is responsible for having or obtaining a MSDS for the product.

The principal investigator or laboratory supervisor is responsible for notifying the shipping and receiving department if an order is placed for a chemical which requires special handling precautions, i.e., cold storage or extreme hazard.

Purchase and Use of Radioisotopes

The laboratory supervisor must submit all proposed uses of radioisotopes to the Radiation Safety Officer for approval. The Radiation Safety Officer must approve all purchases and transfers of all radioactive materials. The Radiation Safety Officer may be contacted at 412-360-3221. Once the radioisotopes are received, it will be placed in a locked refrigerator. The Radiation Safety Officer will be contacted who will contact the lab supervisor for pickup of the material(s).

Biohazardous Material

The laboratory must submit all proposed uses of biohazardous materials to the Research Office. A review of the biohazardous material(s) will be made during the IBC meeting.

Distribution and Storage

Initial receipt and storage at our shipping and receiving area will be conducted in accordance with written protocols on receipt, handling and storage of hazardous materials. The following distribution precautions will be taken:

- Transport chemicals in original box/container on a wheeled cart.
- If possible, chemicals should be transported on an elevator, as opposed to taking the stairs.
- Transport compressed cylinders using a hand truck specifically designed for that purpose and use a suitable strap, chain or other restraint during transportation. Compressed gas cylinders must be restrained with suitable racks, straps, chains or stands immediately on delivery.
- Ensure that all chemical containers are closed preventing vapors from being emitted.

Storage of Chemicals

Before storing any hazardous material, read the label and MSDS for more specific instructions on the storage and handling of individual chemicals, and ensure the container is in good condition. The following is general guidance relative to storing hazardous materials:

- Each laboratory must maintain a current inventory of chemicals.
- Chemicals must only be stored in compatible groups (i.e., flammable with flammable).
- Incompatible groups of chemicals must not be stored in close proximity to one another.
- Chemicals should not be stored on the floor or on tops of shelving units.
- Chemicals in refrigerators should be stored in containment pans or boxes.
- Shelves impervious to spills with anti-roll lips should be used.
- Chemicals should not be stored above eye level.
- Commonly recognized poisons should be stored in a locked cabinet.
- Store volatile solvents in a cool (<80°F) well vented area.
- Flammable laboratory solvents in excess of 10 cumulative gallons must be stored in an approved flammable materials storage cabinet. Keep cans, drums and other containers tightly closed
- Flammable materials storage cabinets must not exceed a total of 60 gallons of flammable solvents.
- Store reactive chemicals separately. This includes water reactive chemicals, oxidizing agents, and reducing agents.

The use and storage of unstable and potentially explosive chemicals including picric acid, perchloric acid, and ether is PROHIBITED.

Drug Enforcement Administration (DEA) controlled substances must be stored in a double-locked container.

Chemical Incompatibilities

Most chemicals have incompatible characteristics and should be stored separately both in the laboratory as well as in the storage area. Listed below are common laboratory chemicals and their incompatibilities:

Chemical

Incompatible substances

Alkali metals (calcium, potassium)	Water, carbon dioxide, carbon and sodium chloride, other chlorinated hydrocarbons
Acetaldehyde	Acetic anhydride, ethanol, acetone, acetic acid, sulfuric acid
Acetic Acid	Acetaldehyde, chromic acid, nitric acid, hydroxyl-containing compounds, ethylene glycol, perchloric acid, peroxides and permanganates
Acetylene	Copper (tubing), fluorine, bromine, chlorine, iodine silver, mercury and their compounds
Acetone	Concentrated sulphuric and nitric acid mixtures, nitric acid, perchloric acid
Acetonitrile	Nitric acid, chromic acid, peroxides
Ammonia (anhydrous)	Mercury, halogens, calcium, hypochlorite
Ammonium nitrate	Acids, metal powders, flammable liquids, chlorates, nitrates, sulphur and finely divided organics or combustibles
Aniline	Acetone, acrylonitrile, ethyl ether, hydrogen, nitric acid, hydrogen peroxide, rubber
Bromine	Ammonia, acetylene, butadiene, butane, hydrogen, fluorine, sodium carbide, turpentine and finely divided metals
Carbon Monoxide	Ammonia, acetylene, propane, hydrogen, benzene
Carbon Tetrachloride	Oxygen, fluorine
Chlorates	Ammonium salts, acids, metal powders, sulphur, finely divided organics or combustibles.
Chromic acid	Acetic acid, naphthalene, camphor, alcohol, glycerin, turpentine, and other flammables
Chlorine	Ammonia, acetylene, butadiene, benzene, and other petroleum fractions, hydrogen, propane, sodium carbides, turpentine, and finely divided powdered metals
Cyanides	Acids
Dimethylsulfoxide	Perchloric acid, acetyl chloride, benzenesulfonyl chloride, acetic anhydride.

Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid sodium peroxide, the halogens- bromine, fluorine, chlorine
Hydrogen Peroxide	Copper, chromium, iron, most metals or their respective salts, flammables, aniline, and nitro-methane
Hydrocarbons, general	Nitric acid, oxidizing gases
Iodine	Acetylene, ammonia
Mercury	Acetylene, fulminic acid, ammonia
Nitric Acid	Acetic, chromic, and hydrocyanic acids, aniline, carbon, hydrogen sulfide, flammables, readily nitrated substances
Oxygen	Oils, grease, hydrogen, flammables
Oxalic acid	Silver, mercury
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, ethanol, paper, wood and other organic materials, sulfuric acid.
Phosphorous pentoxide	Water
Potassium	Carbon tetrachloride, carbon dioxide, water
Potassium permanganate	Glycerin, ethylene glycol, benzaldehyde and sulfuric acid
Sodium cyanide	All acids
Sodium methanol	Any oxidizable substances, i.e., glacial acetic acid, carbon disulfide benzaldehyde, ethylene glycol, ethyl acetate, etc.
Sulfuric acid	Chlorates, cyanide, perchlorates, permanganates cyanide.

Substitute or Eliminate

The first step in evaluating an experiment, process or operation is to determine if there is a possibility of eliminating the use of hazardous materials or substituting a less hazardous chemical. For example, microclear may be substituted for Xylenes.

CONTROL MEASURES

The preferred method of minimizing employee exposures to hazardous materials is through the use of engineering controls. Principal investigators, laboratory supervisors and chemical users should maintain a continual awareness of the specific hazards associated with the chemicals being used. Also, once the engineering controls are installed, users should follow established procedures so that they obtain the full protection afforded by such controls. Promptly report to Facilities Management any suspected problems or malfunctions with installed engineering controls.

Ventilation and Fume Hoods

Laboratory chemical fume hoods in their different forms and types are extremely important in chemical laboratories. Serving as a local exhaust device, their primary function is to protect lab personnel from release of hazardous airborne contaminants. In addition, they may also protect property from small fires and explosions.

The primary measures of the hoods efficiency is its face velocity measures in linear feet per minute (1fpm) through the open sash.

A suggested face velocity through a working level sash height level is 80-100 1fpm. It should be noted that excessive ventilation rates may create turbulence and draft.

The chemical fume hood should display a current sticker with date of certification for the face velocity.

Laboratory employees should understand and comply with the following principles:

1. Once combinations of face velocity and sash height have been established, they are designated on the fume hoods as match arrows. The hoods must be equipped with a manometer or other hood monitor. This monitor should be used daily to check the hood function.
2. Chemical fume hoods are safety backup devices for condensers, traps and other devices that collect vapors and fumes. Do not use them to “dispose” of chemicals by evaporation.
3. Only apparatus and chemicals essential to the specific procedure or process should be placed in the hood. Do not use hoods for extended chemical storage.
4. The work or apparatus inside the hood should be placed at least six inches inside the hood.
5. Never remove hood sashes.
6. Lab personnel should be aware of the steps to be taken in the event of power failure or other hood failure (e.g., stop work, cover chemicals, close hood), contact Facilities Management.
7. Inspect fume hoods before use and ensure that the semi-annual ventilation sticker is current. Inspect fume hoods periodically, especially after repair or maintenance.
8. Drafts adversely affect the functioning of fume hoods. In most cases lab doors should remain closed to ensure proper hood face velocities.

In addition to chemical fume hoods, the laboratories have biological safety cabinets as well. A biological safety cabinet is much different than a chemical fume hood (air is re-circulated in a biological safety cabinet instead of directly vented like a chemical fume hood) and is used with potentially infectious materials. The biosafety cabinets are certified semi-annually with the chemical fume hoods.

Labs handling chemical materials that present an immediate and substantial risk of illness or injury must be monitored at all times by the laboratory supervisor. The potential for employee exposure to hazardous chemicals is reduced by restricting the use of such chemicals to a designated area equipped with engineering control devices. The device can be a glove box or a chemical fume hood.

In event of usage of a highly toxic chemical, the designated area must be identified by warning those entering the area that a specific hazardous material may be present.

Fire Safety Equipment

Fire protection equipment must comply with the facilities standards:

1. Flammables and combustible liquids shall be stored in approved flammable liquid storage cabinets.
2. Flammable liquids and/or gases requiring refrigeration shall be stored only in explosive proof refrigerators, approved by Underwriters Laboratories (UL).
3. A maximum of 10 gallons of flammable/combustible liquids is permitted to be stored outside of the flammable storage cabinet during working hours. At the end of the shift or work day, flammables and combustibles should be placed into an approved storage cabinet.
4. The maximum combined quantity of combustible and flammable liquids in a laboratory is 60 gallons per 5,000 square feet of floor space.
5. Each laboratory is equipped with an ABC fire extinguisher capable of extinguishing the type of fire that may be generated.
6. Fire extinguishers are inspected at least monthly by the Safety Department and annually by an outside contractor.

Emergency Showers and Eye Wash Stations

Eye wash stations and emergency body drench units are provided in each laboratory where the potential for eye or skin exposure to corrosive materials exist. Specific requirements are listed in American National Standard Institute (ANSI) Standard Z358.1-2004, "Standard for Emergency Showers and Eyewash Equipment."

Eyewash stations MUST be tested WEEKLY for proper function. Accurate logs must be maintained to verify compliance. If the eyewash station does not operate properly, contact the Industrial Hygienist at 412-360-3705 or place a work order directed to the VAPHS Plumbing Shop at 412-360-3723 University Drive; 412-954-4872 Highland Drive.

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment may be used to supplement available engineering controls, but should not be viewed as a substitute for them.

The Material Safety Data Sheet (MSDS) for a particular chemical will provide information on the personal protective equipment recommended for use with the chemical. MSDSs tend to address the most hazardous conditions, so all equipment listed on the MSDS may not be required for a specific job. In addition, MSDSs most often do not address specific respirators or glove types which are appropriate for the chemical. Experience, judgment, and assistance from the Industrial Hygienist may be required to ensure that proper personal protective equipment is selected.

For maximum protection from personal protective equipment, a variety of precautions must be adhered to:

PRECAUTIONS

1. Select personal protective equipment according to the greatest degree of hazard expected to be encountered.
2. The equipment must provide the kind and degree of protection appropriate for the chemical and the task.
3. The limitations of protective equipment must be understood.
4. The equipment must fit properly.
5. The equipment must be properly maintained.
6. Training of those who will use personal protective equipment is mandatory. Lab personnel must be instructed in the correct use and limitations of personal protective equipment. They must know when the equipment is needed and must be able to recognize when it needs to be serviced, cleaned, or replaced.

Protective Clothing

Skin contact is a potential source of exposure to toxic materials, so any unprotected skin surfaces should be covered. For most lab procedures, a specific type of glove will probably be required since hands are intimately involved in chemical reagent and glassware handling and apparatus manipulation. Even when there is minimal danger of skin contact, good hygiene practice dictates the use of lab coats, coveralls, aprons, or protective suits.

Protective gloves and garments are not equally effective for every hazardous chemical. The chemicals may penetrate, permeate or degrade the protective clothing. It is important to select the right protective equipment for the particular chemicals being handled and to check it periodically for wear.

Eye and Face Protection

Laboratory eye and face protection generally includes safety glasses with side shields, chemical

splash goggles and full face shields. All safety glasses must meet the requirements of the Practices for Occupational and Educational Eye and Face Protection .ANSI Z-287.1. Safety glasses that meet these requirements will be identified with a “Z 87” marked on the temple bar of the glasses. Goggles and face shields will have a similar marking located somewhere on the device. Face shields are always worn over primary protection such as glasses or goggles as they are not designed to withstand impact.

Eye and face protection is required whenever there is the potential for flying particles or splash of a hazardous chemical.

The level of eye protection required is based upon the chemical physical state, the quantities involved, the activity in the lab, and the toxicity or corrosivity of the chemicals used. Chemical splash goggles with additional protective devices such as a full face shield must be worn with the hazards posed by either the chemicals or operations involved.

Chemical goggles should fit properly to maximize eye protection. Before each use, eye and face protection should be inspected for damage. If deficiencies are identified, the equipment should be cleaned, repaired or replaced before working in the lab.

Contact lenses may be worn in the laboratory to correct vision. However, approved chemical splash goggles must be worn over contact lenses or glasses while working in the laboratory.

Respiratory Protection

Respiratory protective equipment may be necessary when ventilation is not adequate or a procedure cannot be performed in a laboratory chemical fume hood. Any such operation must be performed in an isolated area away from other occupants. There is a variety of respiratory equipment available, but no one device provides protection against all possible hazards. Types available include:

- Particulate removing air-purifying respirators
- Gas and vapor removing air-purifying respirators
- Atmosphere-supplying respirators

The Industrial Hygienist should be contacted if you feel you need a respirator. The VAPHS has a comprehensive Respiratory Protection Program which includes appropriate respirator selection, training on use and care, fit testing, medical surveillance, maintenance, and recordkeeping.

CHEMICAL HAZARD COMMUNICATION

A variety of hazard communication devices, including labels, signs and postings, and MSDSs are available for use in conjunction with other provisions of the Chemical Hygiene Plan.

Labels and Labeling

Labels are required on incoming containers of hazardous chemicals, and are not to be removed or defaced. All containers of chemicals should be labeled with, at a minimum, the following:

- identity of chemical(s) in the container;
- appropriate hazard warnings, and;
- name of the manufacturer or responsible party for additional information.

Unlabeled chemicals should be handled as hazardous waste.

All containers of chemical waste must be labeled in accordance with our Handling and Disposing of Hazardous Chemicals Policy. The Industrial Hygienist, 412-360-3705, may be contacted for guidance.

Chemicals developed in the laboratory must be assumed to be toxic if no data is available and suitable handling procedures must be prepared and implemented. All containers of chemicals prepared in the laboratory must be marked with the Hazardous Material Information System (HMIS). A Hazardous Material Identification Guide, which includes information required on the HMIS labels, must be posted for review in the laboratory.

Posters and Signs

A variety of postings and signs should be used appropriately to warn employees of potential hazards. Several examples are:

- 1) Emergency notification signs which contain information on contacts and their phone numbers to facilitate the handling of fires and other emergencies.
- 2) Location signs for safety devices such as drench hoses, safety showers, and fire-extinguishers must be posted as appropriate.
- 3) Hazard signs warning of severe or unusual hazards such as unstable chemicals, carcinogens, lasers, radioactive agents, and biohazardous agents must also be posted as appropriate.

Hazardous Material Information System (HMIS)

Each Research Service laboratory that uses or stores chemicals must have HMIS rating information posted. The HMIS provides clear, recognizable information to employees by standardizing the presentation of chemical information. This is accomplished by the use of color codes corresponding to the hazards of a product which are assigned numeric ratings indicating the degree of hazard (with 0=Minimal Hazard, 1=Slight Hazard, 2=Moderate Hazard, 3=Serious

Hazard, and 4=Severe Hazard). Alphabetical codes designating appropriate personal protective equipment (PPE) employees should wear while handling the material are noted in the white section.

The alphabetical designations are:

- A safety glasses*
- B safety glasses and gloves*
- C safety glasses, gloves and an apron*
- D face shield and eye protection, gloves and an apron*
- E safety glasses, gloves and a dust respirator*
- F safety glasses, gloves, apron and a dust respirator*
- G safety glasses, gloves, and a vapor respirator*
- H splash goggles, gloves, apron and a vapor respirator*
- I safety glasses, gloves and a dust and vapor respirator*
- J splash goggles, gloves, apron and a dust and vapor respirator*
- K airline hood or mask respirator, gloves, full suit and boots*
- L - Z custom PPE specified by employer*

The Research and Development Office will provide HMIS informational posters and HMIS labels for your labs. The HMIS labels (see below) must be used to convey hazardous chemical and warning information for all chemical containers in your laboratory that are without a standard manufacturers label.



Material Safety Data Sheets (MSDSs)

Material Safety Data Sheets (MSDSs) should be obtained for each chemical before use in the laboratory. It is the laboratory supervisor's responsibility to maintain a complete chemical inventory of their workplace chemicals with corresponding MSDSs.

EDUCATION AND TRAINING

Responsibilities and Training

- Investigators proposing to work with potentially hazardous materials must first receive approval to conduct such studies from the Institutional Biosafety Committee (IBC). Research studies may not begin until approval is obtained from the VAPHS Research & Development Committee.
- General chemical and biological safety awareness training is provided at the time of an employee's initial assignment (New Employee Orientation and by their immediate supervisor). Each new employee is oriented with regard to hazard communication standards, fire, severe weather, and disaster plans.
- Chemical and biological safety training required for a specific laboratory application is the responsibility of the employee's immediate supervisor.
- Annual training is required to assure that all employees at risk for chemical or biological hazards are adequately informed prior to assignments involving new exposure situations.

New Employee Orientation

- VAPHS New Employee Orientation training seminars covering Administrative Structure, Safety and Infection Control Guidelines, Computer Security, and Human Resources Expectations are offered monthly.
- All new Research Service employees (regardless of compensation status) are required to attend the sections of this orientation.
- New employees are required to complete the Research Safety web-based training program, pass (>80%) the associated exam, and forward certificate of completion to the Research Office at 412-954-5386.
- PI or laboratory supervisors must ensure new employees are made aware of any particular hazards related to the general work of the laboratory and the specific procedures to which they are assigned.

Mandatory Training

All Research Service employees, regardless of compensation status, are required:

- To review annually the Research Safety web-based training program, complete and pass (>80%) the associated exam.
- To review annually the Research Laboratory Safety/Biosafety Manual and Chemical Hygiene Plan, and sign and date the log located at the end of the manual.
- To participate in hospital-wide emergency drills including but not limited to fire and disaster exercises.
- To pass unannounced safety inspection exercises that include, but are not limited to, a comprehensive evaluation of safety procedures covering fire, weather alert, or disaster, knowledge of the RACE procedure, knowing where the nearest fire escape and fire extinguishers are located, knowledge of emergency phone numbers, and knowledge of what an MSDS is and where they are located.

Presence of Hazards

The OSHA Lab Standard requires that employees be informed of the presence of hazardous chemicals when assigned to an area and prior to a new exposure situation involving new hazardous chemicals and/or new work procedures. The training is provided by the laboratory supervisor.

The training includes:

1. Provisions of the OSHA Lab Standard
2. Content, location and availability of the Chemical Hygiene Plan
3. Hazardous chemicals in the laboratory workplace
4. Physical and health hazards of these materials
5. Protective measures for handling these materials
6. Proper chemical handling procedures for the classes of materials being used
7. Labels and other warnings
8. MSDS: location, interpretation and use
9. How to detect the presence or release of hazardous chemicals in the lab (e.g., air monitoring, visual appearance, odor)
10. Legal and recommended exposure limits
11. Correct use of engineering controls, personal protective equipment, and any other methods used to reduce or eliminate exposure
12. Signs and symptoms of overexposure
13. Emergency and first aid procedures

WASTE DISPOSAL

When a material has no further use and has been deemed a waste by the user, it must be clearly labeled as waste. The proper disposal of waste chemicals at the facility is a serious concern and every effort should be made to do it efficiently and safely. The responsibility for identification and handling of hazardous waste belongs to those who have created the waste. Procedures outlined in the Occupation Safety, Health and Fire Protection Manual must be referred to.

Hazardous Waste

Hazardous waste is regulated by the Environmental Protection Agency (EPA) under 40 CFR 260-270. A material can be defined as a hazardous waste either because of its general characteristics or because of a special listing.

Hazardous Waste – General Characteristics

Wastes exhibiting any of these characteristics are hazardous:

1. Ignitability (EPA Code D001) describes:

- Liquids with a flashpoint below 60° C (140°F) - e.g., most organic solvents
 - Solids capable of causing fire by friction, absorption of moisture, or spontaneous chemical change and when ignited burn vigorously and persistently to create a hazard (e.g., picric acid)
 - Flammable, compressed gasses (e.g., hydrogen, methane)
 - Oxidizers (e.g., potassium permanganate)
2. Corrosivity (EPA Code D002) describes:
 - Aqueous solutions with pH less than 2 or greater than 12.5
 - Liquids capable of corroding steel at a specific rate
 3. Reactivity (EPA Code D003) describes:
 - Substances that react with water violently and may produce toxic gases (e.g., potassium, sodium)
 - Substances that are normally unstable
 - Chemicals containing cyanide or sulfide that generate toxic gases
 4. Toxicity (EPA Code D Series) describes:
 - Wastes which have certain heavy metals (silver, cadmium, mercury), and/or one or more of 23 organics and 8 pesticides (Toxicity Characteristic Leaching Procedures, e.g., DDT)

In order to comply with Federal regulations and personnel safety requirements, it is important not to have unknown waste materials. This can be achieved by labeling all containers of chemicals or reaction mixtures.

DO NOT dispose of chemical waste in the sanitary sewer.

DO NOT dispose of chemical waste in the regular trash.

DO NOT place chemical waste in red biohazard bags.

Contact the Industrial Hygienist at 412-360-3705 for proper disposal of solid and liquid hazardous waste materials.

Hazardous Waste Containers

Hazardous Waste should be collected in a container that is in good condition and appropriate for the waste type. Containers should not be overfilled and must be capped at all times unless filling with waste. Chemical waste should not be co-mingled or mixed together.

Hazardous Waste Labels

Hazardous chemical waste must always be labeled to ensure safety, to prevent waste from becoming an unknown, for regulatory compliance, and to improve the efficiency of handling.

The following labeling procedures should be adhered to:

- All waste chemicals must be identified and labeled.
- A “Hazardous Waste” label should be filled out and placed on the bottle/container.
- Common chemical names should be used on labels (no formulas or abbreviations).

- List all known chemical constituents for each container (for example, do not label as “solvent waste”, “halogenated/non-halogenated waste”, etc.).
- Hazardous waste labels can be obtained from the Biosafety Officer at 412-954-5342.

Hazardous Waste Storage

Hazardous chemical waste must be stored properly:

- Chemicals must only be stored in compatible groups (i.e., flammable with flammable). Consult the Material Safety Data Sheet for the materials to determine compatible groupings.
- Incompatible groups of chemical waste must not be stored in close proximity to one another.
- Chemical waste can be stored under the chemical fume hood, however there must be enough space to allow personnel to perform work in the fume hood.
 - Chemical waste can be stored under the chemical fume hood in designated areas for “Hazardous Waste”.
 - Personnel should use the smallest containers possible for small amounts of chemical waste; smaller containers fill more quickly and do not sit for long periods of time.
 - Duplicate containers of the same waste may not be stored under the chemical fume hood. When an increase in chemical waste is experienced, laboratory supervisors must call the Industrial Hygienist (412-360-3705) for more frequent pick-ups.
 - Chemical storage requirements can be reviewed during the semi-annual laboratory inspections.

Hazardous Waste Reduction

The VAPHS generates significant quantities of hazardous waste. One of our goals through our Green Environmental Management System (GEMS) Program is to reduce the amount of waste generated. By reducing the amount of hazardous waste, we can reduce environmental contamination and decrease the cost for hazardous waste disposal.

Some common techniques to reduce wastes are:

- Product substitution - use less hazardous or non-hazardous materials,
- Segregate waste - keep non-hazardous waste out of the hazardous stream, and
- Purchase small quantities and try to redistribute surplus chemicals.

BIOLOGICAL SAFETY

Biosafety Officer for Research (412-954-5342)

General Precautions

Research Service employees that work with or are exposed to human or non-human primate blood, bodily fluids/materials or with pathogenic organisms or agents including but not limited to certain fungi, protozoan parasites, bacteria, viral agents, etc. are at risk for infectious disease transmission and must observe the following:

- Employees must receive specific training in the safe handling, use, containment, and disposal of the potentially pathogenic materials or agents. Training is the responsibility of the employee's immediate supervisor and must occur before the employee is allowed to work with the agent. Web-based Bloodborne Pathogens training is required annually.
- Research Service laboratories using biohazardous materials must display appropriate biohazard signage at all times. Personnel entering laboratories where infectious materials are present are at risk of exposure.
- Manipulation of biohazardous materials must only be performed in currently certified biological safety cabinets appropriate for the agents' biosafety level (BSL).
- All specimens from humans or non-human primates (e.g., blood, saliva, urine, feces, exudated tissues, and tissue cultures) must be handled using Standard Precautions. NEVER work with biohazardous materials without wearing appropriate personal protective equipment. Hands must be thoroughly washed following removal of gloves and before leaving the laboratory area.
- Inspect centrifuge tubes for micro-fractures or other signs of defaults that may result in tube disintegration during centrifugation of biohazardous materials.
- Store infectious materials in clearly marked containers with legible identification and biohazard warning symbols. Infectious materials must be stored only in non-food containing refrigerators or cold rooms.
- NEVER dispose of biohazardous waste in regular office trash containers. Contaminated solid waste must be disposed of in the RED biohazard bags. Contaminated liquid waste must be decontaminated with a 10% bleach solution or other approved EPA-registered disinfectant for the appropriate contact time before disposal.
- Dispose of contaminated sharps (needles, razor blades, scalpel blades) and contaminated glass or plastic pipettes in sharps containers. NEVER re-cap needles. DON'T pick up contaminated broken glass with hands; use tongs or forceps.
- Contaminated radioactive biohazardous solid waste (including animal carcasses) should be disposed of in separately identified RED biohazard bags or containers. Consult with the Radiation Safety Officer (412-360-3221) to develop a specific protocol prior to generating radioactive biohazardous waste.
- Routinely sterilize work areas and equipment with disinfectants. A freshly prepared 10% bleach solution or other approved EPA-registered disinfectant must be used to decontaminate any accidental spills.

Standard Precautions

Consult OSHA 29 CFR 1910.1030, the Bloodborne Pathogens Standard, for detailed Occupational Safety and Health Standards.

To reduce the risk of transmission of microorganisms from both recognized and unrecognized sources, Research Service employees working with or exposed to biological hazards (blood, all body fluids, secretion and excretions) must observe the following Standard Precautions:

- Personal protective equipment (PPE) such as gloves, gowns, aprons, shoe covers, masks, face shields or goggles are to be worn at all times when handling biohazardous materials. PPE must be available in designated Research laboratory areas.
- Gloves must be worn when there is significant risk of contamination with blood or any body fluid, secretions or excretion, or when handling human tissue. If an employee has an allergy to latex gloves, a suitable alternative will be provided.
- The use of gloves is not a substitute for hand washing. Hands must be washed immediately after gloves are removed and before touching items or environmental surfaces. Hands must always be washed after contact with potentially contaminated surfaces, or after inadvertent contact with blood, body fluids, secretions or excretions. Specific instructions for hand washing can be found in the VAPHS MCM IC-011 Hand Hygiene Guidelines.
- Laboratory coats, aprons, or gowns must be worn in the laboratory when there is significant risk of contaminating clothing with blood, body fluids, secretions or excretions. Laboratory clothing should not be worn outside the lab, and must be disinfected or clearly labeled as infective before removal from the lab.
- Protective eyewear and face-wear must be worn when there is significant risk to personnel resulting in splashes or sprays of blood, body fluids, secretions or excretions into the facial area. Contact lenses should not be worn in the laboratory as they may impede removal of foreign objects and entrap materials beneath them.
- Eating, drinking, storing food and applying cosmetics are not permitted in laboratory work areas. Food may not be stored in refrigerators or freezers used to store biohazardous materials.
- Mechanical pipetting aids are to be used for pipetting all materials. Mouth pipetting is prohibited.
- Researchers should decontaminate their work area prior to and following work with biohazardous materials and immediately after any spill. The laboratory area should be kept free of materials not pertinent to the work.
- All procedures should be performed in a manner to reduce the generation of aerosolized material that may enter the body via inhalation. Procedures or activities expected to produce infectious aerosols must be performed in certified biological safety cabinets when feasible. Operations including centrifugation, sonication, blending, or vortexing are known to generate aerosols.
- Personnel should not work alone on hazardous projects. The 'buddy system' should be instituted in all laboratories.
- An insect and rodent control program should be maintained for the laboratory.

Specimen Transport and Handling

Employees transporting biohazardous specimens (human blood, tissue, bodily fluids) from patient areas to Research Service laboratories must always exercise Standard Precautions and observe the following:

- Specimens to be transported must be placed in separately labeled biohazard specimen transport bags. Sealed transport bags (secondary containment) should then be placed in a biohazard-labeled cushioned container during transport. This secondary container should be leak-proof with a tight fitting lid and should be made of a material that can be decontaminated in case of a spill.
- Employee must dispose of gloves prior to transport. Specimen bags will be used once and discarded.
- ALWAYS use Standard Precautions and appropriate biological safety equipment when handling biohazardous specimens. Specimen samples should be transferred using disposable hand suction pipettes to avoid spillage and contamination. Do NOT pipette by mouth.
- It is highly recommended that employees consult the Occupational Safety and Health Administration (OSHA) regulation, 29 CFR 1910.1030, and OSHA publication 3127 (1996 revised) before working with bloodborne or related pathogens.

Employees transporting biohazardous specimens must be trained and a video training course can be obtained in the Research Office 412-954-5386. This training is required every two years.

Restricted Agents (Select Agents)

In compliance with the Office of the Inspector General and the Departments of Agriculture, Defense, Energy, Health and Human Services, and Veterans Affairs, the use of Select Agents in research studies performed at VAPHS will be strictly regulated. Research studies proposing to use restricted agents must receive prior approval from the VAPHS Research & Development Committee.

Select agents are specifically described as having the potential to pose a severe threat to public health and safety. Biological agents are microorganisms, or their toxins, that cause or may cause human disease. Pathogens are high consequence biological agents that have the potential to pose a severe threat to human, animal, or plant health.

The Centers for Disease Control and Prevention has identified 41 biological agents as Select Agents, and the Department of Agriculture has identified 33 additional biological agents as pathogens. For a comprehensive viewing of the CDC select agent program including a complete listing of biological agents and toxins, consult the CDC website. All PI's are required to complete Hazardous-Select Agent Certification annually to verify the absence/presence of hazardous and/or Select Agents in use in their labs. The form must be completed and submitted to nicholas.squeglia@va.gov.

Studies Involving Recombinant DNA

The VAPHS Institutional Biosafety Committee (IBC) is an NIH-recognized Institutional Biosafety Committee that is responsible for ensuring that ALL VAPHS basic and clinical research studies involving recombinant DNA, including the creation and use of organisms and viruses containing recombinant DNA, follow the NIH Guidelines safety practices and containment procedures.

- Investigators proposing to use recombinant DNA must have their work reviewed and approved by the VAPHS IBC prior to initiating the study by completing Part II of the Request to Conduct Research application.
- Modifications to any research program involving recombinant DNA must be submitted to the VAPHS IBC for approval prior to the study modification.
- Failure to notify the IBC of studies involving recombinant DNA may result in cessation of ALL laboratory-related activities and revocation of research funds.

The deliberate release of transgenic organisms into the environment is strictly prohibited without prior approval from the VAPHS IBC and the VAPHS Research and Development Committee.

Experiments that employ recombinant DNA with the characteristics listed below are generally exempt from the NIH Guidelines unless they also involve:

- The deliberate transfer of a drug resistance trait to microorganisms that are not known to acquire the trait naturally, if such acquisition could compromise the use of the drug to control disease agents in humans, veterinary medicine or agriculture.
- The deliberate formation of recombinant DNA containing genes for the biosynthesis of toxin molecules lethal for vertebrates at an LD50 of less than 100 nanograms per kilogram of body weight.
- The deliberate transfer of recombinant DNA, or DNA or RNA derived from recombinant DNA into one or more human research subjects.

Experiments are exempt when they involve recombinant DNA that is:

- Not in organisms and viruses.
- Entire DNA segments from a single non-chromosomal or viral DNA source.
- Entirely from a prokaryotic host including its indigenous plasmids or viruses when propagated only in that host or when transferred to another host by well-established physiological means.
- Entirely from a eukaryotic host including its chloroplasts, mitochondria, or plasmids when propagated only in that host or a closely related strain of the same species.
- Entirely segments from different species that exchange DNA by known physiological processes, though one or more may be a synthetic equivalent.
- Not a significant risk to health or the environment as determined by the NIH Director. See Appendix C of the NIH Guidelines for a detailed listing.

The following experiments may not be conducted unless approved by the HHS Secretary after consultation with experts:

- Experiments using recombinant DNA that involve the deliberate transfer of a drug resistance trait to select agents that are not known to acquire that trait naturally, if such acquisition could compromise the use of the drug to control disease agents in human,

Biological Safety Cabinets

Work with almost any biological hazardous substance can be performed safely with minimal risk when using an appropriate class of biological safety cabinet. Biological safety cabinets are NOT to be used as chemical fume hoods. The purpose of a safety cabinet is to protect laboratory personnel from particulates and aerosols generated by manipulation of biohazardous microorganisms. High-efficiency particulate air (HEPA) filters within in the biological safety cabinets remove contaminants from the air but are ineffective against gaseous chemicals.

- Class I Biological Safety Cabinet
 - Appropriate for Biosafety level 1.
 - Open-front primary barrier that offers significant levels of protection to lab personnel and to the environment when used with standard microbiological techniques.
 - Does NOT protect materials within the cabinet.
 - Minimum face airflow velocity of 75 fpm required.

- Class II Biological Safety Cabinet
 - Appropriate for Biosafety Levels 2, 3 moderate risk agents.
 - Open-front laminar flow primary barrier that provides protection to lab personnel and the materials within the cabinet.
 - Minimum face airflow velocity of 75 pm required.
 - Class II Type A2 cabinets, 70% of air is re-circulated. Airflow not ducted to outside.
 - Class II Type B1 cabinets, 30% of air is re-circulated. Airflow is directly exhausted to outside.
 - Class II Type B2 cabinets, high inflow air rate. All of airflow is directly exhausted to outside; no recirculation of air.

- Class III Biological Safety Cabinet
 - Appropriate for Biosafety Level 3, 4 high-risk agents.
 - Negative pressure sealed cabinet (glove box). Materials placed in cabinet prior to beginning work. Materials removed through a double-door autoclave, an air lock for decontamination, or through a chemical dunk tank.
 - Minimal velocity requirements.

- Additional Biological Safety Equipment
 - Safety centrifuge cup - an enclosed container designed to prevent aerosols from being released during centrifugation.
 - Safety pipettors. The contents of pipettes and syringes should be expelled slowly to avoid the formation of aerosols in transferring infectious material.

First Aid Following Exposure to Biological Hazards

In the event of contact of biohazardous materials with the eyes:

- Call out for assistance and immediately flush eyes with water and continue to flush for 15 minutes.
 - The one and only emergency treatment is to dilute the biohazardous material immediately by complete flushing with water. The patient's eyelids may have to be forced open, so that the eyes may be flushed.
 - Consult the precautionary warning on the product label for full first-aid information.
- Contact Employee Health (UD – 412-360-3556; HD – 412-954-4976) or the Emergency Room (UD – 412-360-6322) for medical instructions.

In the event of contact with the skin:

- Call out for assistance and immediately flush the affected skin with water.
- If clothing is contaminated, remove and discard in a RED biohazard bag. Do NOT remain in contaminated clothing. Continue to flush the affected area.
- Contact Employee Health (UD – 412-360-3556; HD – 412-954-4976) or the Emergency Room (UD – 412-360-6322) for medical instructions.

In the event of accidental ingestion:

- Call out for assistance and immediately call Employee Health (UD – 412-360-3556; HD – 412-954-4976) or the Emergency Room (UD – 412-360-6322) for medical instructions.

Disposal of Hazardous Biological Waste

Research Service employees must dispose of any contaminated solid or liquid biohazardous waste as follows:

- Contaminated solid waste must be disposed of in RED biohazard bags. Seal 3/4 full RED biohazard bags and contact Environmental Management Service (EMS) (UD – 412-360-3685/3686; HD – 412-954-4853) for disposal. Biohazard bags are available from EMS.
- Dispose of contaminated sharps (hypodermic needles, razor blades, scalpel blades, broken glass including microscope slides) and contaminated glass or plastic pipettes in sharps containers. NEVER re-cap needles. DON'T pick up contaminated broken glass with hands; use forceps or tongs. When sharps container is approximately 3/4 full, contact EMS (UD – 412-360-3685/3686, HD – 412-954-4853) for disposal.
- Contaminated radioactive biohazardous solid waste (including animal carcasses) should be disposed of in separately identified RED biohazard bags or containers. Consult with the VAPHS Radiation Safety Officer (412-360-3221) prior to generating radioactive biohazardous waste.
- Decontaminate liquid biohazardous wastes by treating with bleach to a final 1:10 dilution or with an approved EPA-registered disinfectant solution. After appropriate contact time (30 minutes for bleach solution), decontaminated waste may be disposed of down the sink by flushing with copious amounts of water.

Biohazard Spill (For Biosafety Level 2 spills refer to BSL-2 Manual)

In the event of a biohazardous spill:

- Small spills:
 - Don the appropriate personal protective equipment (gloves, lab coat/gown, eyewear)
 - Contain the spill with absorbent pads/pillow or paper towels.
 - Spray a 10% bleach solution or other approved EPA-registered disinfectant onto spill and let stand for the appropriate contact time.
 - Wipe up the disinfectant using absorbent material.
 - Discard the absorbent material into a RED biohazard bag.
 - Discard contaminated protective equipment into a RED biohazard bag.
 - Absorbent spill kits should be available in each laboratory.
 - Contact EMS (UD – 412-360-3685/3686; HD – 412-954-4853 for disposal.
- Large spills: Immediately call the VAPHS Spill Team (UD – 412-360-3705; HD – 412-954-4898). If the spill occurs outside of normal working hours, contact the Operator who will initiate the chain call system to contact members of the Spill Team.
- Decontaminate spill area with a 1:10 dilution of freshly prepared household bleach or approved EPA-registered disinfectant solution and let stand for the appropriate contact time. Wipe up the disinfectant using absorbent material. Discard the absorbent material into a RED biohazard bag. Discard contaminated protective equipment into a RED biohazard bag.
- WASH HANDS thoroughly.
- Contact EMS (UD – 412-360-3685/3686; HD – 412-954-4853) for disposal of RED biohazard bags.
- All spills and accidents must be reported to the Industrial Hygienist (412-360-3705) immediately.

Animals in Research

Animal Research Facility, Building 6, Ground floor (412-360-6107)

Animals in research present unique biological health hazards, including but not limited to allergies.

- Adverse immune reactions (allergies, asthma) to animal dander/dust can be fatal.
- If you have an allergy to animals or are asthmatic and are required to work with or will be exposed to laboratory research animals, NOTIFY Employee Health (UD – 412-360-3556; HD – 412-954-4976) for medical advice from an Occupational Health and Safety physician BEFORE working with research animals.

Research Service employees that work with or are exposed to laboratory animals are required by the VAPHS Animal Care and Use Committee (IACUC):

- To be specifically trained in the care and use of animals in research including but not limited to the handling, manipulation, and euthanasia of the species utilized in IACUC-approved laboratory research protocols. Individuals expected to work with experimental animals without previous experience must receive additional instruction by the ARF or other IACUC-approved sources.
- To be listed on all relevant and IACUC-approved Animal Component of a Research Protocols (ACORPs).

- To be familiar with the relevant ARF Standard Operating Procedures of animal care and use.
- To review and pass the examination associated with the web-based training course “Working with the VA IACUC” and species-specific training related to their work.
- To be enrolled in the VAPHS Animal Exposure Preventive Medical Program (AEPMP). Contact the IACUC Coordinator at 412-954-5382 with questions about enrollment.

Zoonotic Diseases

Zoonotic organisms have the unique ability to cross species barriers and infect humans with potentially life-threatening consequences. Unless specifically justified and approved by the IACUC, experimental animals used in research protocols are required to be “specific-pathogen free.” The risk of acquiring infectious agents from laboratory animals is relatively low in healthy adults. However, individuals with reduced immune function are at risk of acquiring a zoonotic disease.

Research Service employees working with laboratory animals should have a current tetanus immunization. The following apply to all users of laboratory animals:

- To minimize the risk of zoonotic disease transmission, ALWAYS use Standard Precautions and wear personal protective equipment such as gloves, gowns, aprons, shoe covers, masks, face shields or goggles when handling laboratory animals.
- Employees working with random source dogs or other high risk animals may be requested to receive additional vaccinations for viral diseases such as Rabies. The employee should make this decision with the assistance of their Supervisor and Employee Health.
- Cats, including purpose-bred cats, are a source of *Bartonella henselae*, the causative agent of Cat Scratch Disease. If you are scratched or bitten by a laboratory cat, immediately notify your supervisor and contact Employee Health for medical instructions.
- Cats are also a source of *toxoplasmosis*, an organism that can cause spontaneous abortions in humans. If you are pregnant or think you may be pregnant, contact Employee Health for medical advice BEFORE working with laboratory cats.
- Disease agents can be transmitted directly through contact with animal saliva, feces, urine, other body secretions, bites, scratches, aerosols, or excised body tissues.
- Disease agents can be transmitted indirectly involving fomites (inanimate objects such as cages, instrumentation, toys, cleaning supplies) or involving mechanical (syringe needle) or biological vectors (insects).
- Disease agents may live for years on non-disinfected fomites.
- Routes of exposure may include ingestion, inhalation, contact with mucus membranes, or parenteral injections.

Animal Bites

If bitten by a laboratory animal:

- Call out for assistance and immediately call Employee Health (UD – 412-360-3556) or the Emergency Room (UD – 412-360-6322) for medical instructions.
- Do NOT euthanize the animal. Confine the animal to a separate cage and report the

incident and the animal to the ARF office.

- Laboratory rats and mice pose minimal risk for rabies.
- If the animal is considered healthy at the discretion of the director of the ARF, the animal may be released and experimental protocols can resume as normal. If the animal is determined to be unhealthy, dies, or is euthanized during this period, additional testing of the animal at Allegheny County Rabies Control may be required.

Shipment of Hazardous/Infectious Materials Training

- In compliance with Department of Transportation (DOT)-mandated regulations, VAPHS personnel must obtain training prior to the shipment or receipt of hazardous or infectious materials. Since dry ice is considered a hazardous chemical by the DOT, personnel receiving or shipping material on dry ice must also receive Hazardous/Infectious Materials Shipping/Transport Training.
- A video Training course can be obtained in the Research Office, 412-954-5386.
- Re-certification must be completed every two years.

General Procedure for Decontamination, Disinfection and Disposal

In the event you contaminate laboratory surface areas or laboratory equipment:

- Impermeable work surface areas must be decontaminated/disinfected with a 1:10 dilution of freshly prepared household bleach (5.25% sodium hypochlorite) or other approved EPA-registered disinfectant. The disinfectant must be allowed to disinfect the work surface for the appropriate contact time.
- Large pieces of laboratory equipment or research property that have been contaminated must be cleaned with a 1:10 dilution of freshly prepared household bleach or other approved EPA-registered disinfectant. Again, the disinfectant must be allowed to disinfect the work surface for the appropriate contact time.

Disposal of Sharps and Broken Glass

Hypodermic and surgical needles, scalpel blades, razor blades, glass histology slides or other “sharps” materials frequently cause injuries and represent an infectious transmission hazard.

- NEVER dispose of sharps in office trash containers. All sharps must be disposed of in anti-spill Sharps containers.
- Sharps container opening must always be clear. NEVER push items into the container.
- Avoid needle-stick injuries. NEVER re-cap, bend, or break needles. Use the syringe/needle in one application and discard in Sharps container (Do NOT save).
- Contact EMS (UD – 412-360-3685/3686; HD – 412-954-4853) for disposal of 2/3 full Sharps containers.
- DON'T pick up broken glass with bare hands; use forceps or tongs. Discard broken glass in approved, labeled Sharps containers. When 2/3 full, alert EMS (UD – 412-360-3685/3686; HD – 412-954-4853) for removal.
- Sharps or broken glass contaminated with biohazardous materials must be placed in a

separate anti-spill sharps container.

- Sharps or broken glass contaminated with radioactive materials must be placed in a separate anti-spill sharps container. Label the container as radioactive and identify the isotope source. Consult with the Radiation Safety Officer (412-360-3221) prior to generating radioactive waste.

Hand Washing

Hand washing is the single most effective technique to prevent the spread of infection and biohazard contamination. Research Service employees must observe the following:

- Hand washing is required after any activity that involves contact with biohazardous materials. The use of gloves is not a substitute for appropriate hand washing. ALWAYS wash your hands after removing gloves.
- Research Service laboratories must have dedicated sinks for hand washing. Knee or foot-operated sinks are recommended.
- ALWAYS follow standardized practices:
 - Do not touch faucet handles during hand washing.
 - Apply a small amount of soap in the palm of one hand.
 - Rub hands together vigorously for at least 30 seconds.
 - Rinse hands by allowing water to flow from wrists downward over hands.
 - Dry hands with paper towels obtained from a dispenser. Do NOT dry hands with paper towels from a potentially contaminated location.
 - Turn off faucet handles with paper towels.

Laboratory Coats

- Laboratory coats must be worn by Research Service employees at all times while performing tasks in Research Service Laboratories.
- To minimize contamination of the work environment, the laboratory coat must be removed BEFORE leaving the laboratory and must remain in the laboratory.
- Research Service employees are encouraged to wear disposable aprons over laboratory coats while working with biohazardous materials. Contaminated aprons must be disposed of in RED biohazard bags.

Glove Use

- Latex, nitrile, or vinyl disposable gloves are to be worn as a supplement to appropriate hand washing and as an added barrier to minimize infection transmission. The use of gloves is not a substitute for appropriate hand washing.
- Latex gloves may be hazardous to some individuals. If you are sensitive to latex, inform your supervisor.
- Gloves must be worn when there is a risk of contact with biohazardous specimens including but not limited to human blood, bodily fluids, secretions or excretions.
- Gloves are to be used once and discarded in RED biohazard bags followed by appropriate hand washing.

Food, Refrigerators, Freezers

For storage and consumption of food:

- Store perishable food items in refrigerators/freezers designed exclusively for that purpose. Do NOT store food items in laboratory refrigerators or freezers.
- Refrigerator/freezers approved for food storage should be cleaned when visibly soiled.
- Food items should be used within two or three days or discarded in a timely manner.
- Refrigerators/freezers approved for food storage must display appropriate signage.

Water and Ice

- Research Service distilled or deionized water sources are for research use ONLY and are NOT to be used for human consumption. Water for human consumption is available from designated fountains throughout the Medical Center.
- Ice machines located within Research Service areas are for research use ONLY. Ice produced by these machines is NOT for human consumption.
- Food or beverages of any kind are NOT allowed in Research Service laboratories.
- Lunchroom facilities are available to Research Service employees

RADIATION SAFETY

Radiation Safety Officer (412-360-3221)

VAPHS Radiation Safety Committee Chair (412-360-3275)

Radioisotopes

Regulations for safe use of radioisotopes are detailed in the VAPHS Radiation Safety Manual, the Research Radiation Safety Policy, and MCM EC-008 POLICY FOR RADIATION SAFETY IN ALL AREAS INVOLVED IN IONIZING RADIATION at VAPHS. A copy of the Research Policy manual must be available in all labs designated for radioisotope use. Authorization to use radioisotopes in laboratory and/or animal research is obtained by completion and Radiation Safety Committee approval of Part V: Application to Use Radioactive Materials.

The following apply to all users of radioisotopes:

- Research Service employees are PROHIBITED from working with radioactive materials without first receiving appropriate training.
- Authorized radiation users must complete annual radiation safety review training
- Only authorized users may order, possess, or supervise the use of radioactive materials. Radioisotope orders must be approved, and upon receipt, be inspected and inventoried by the Radiation Safety Officer (RSO). Under NO circumstances are radioisotopes to be delivered directly to Research Service laboratories.
- Users of radioactive materials MUST secure the material from un-authorized use.
- All radioactive material use areas are restricted areas. These laboratories MUST remain locked and secured when no one is present. Unauthorized personnel MUST be escorted.
- NEVER store radioisotopes in common resource laboratories.

- NEVER discard radioisotopes in housekeeping trash containers. See below for appropriate disposal of radioactive waste.
- Use radioisotopes ONLY for procedures for which approval has been received from the IBC and Radiation Safety Committees.
- Use and store radioisotopes ONLY in approved laboratory locations bearing appropriate warning signage.
- Personal radiation dosimeters and ring badges must be worn when working with gamma emitting or high-energy beta emitting isotopes. Contact the RSO (412-360-3221) for additional information. ALWAYS wear personal protective equipment (minimally, gloves, laboratory coat) when working with radioisotopes.
- Persons working with volatile isotopes (^{125}I , ^{35}S -Methionine, ^3H -Water) must follow additional safety precautions (e.g. working in an approved chemical fume hood) and must have additional training in the safe use of these isotopes.
- Label all relevant storage and working containers with radioisotope labeling tape.
- Cover all work surface areas with absorbent plastic-backed pads.
- ALWAYS use appropriate protective barriers (lead blocks, beta block shield) to minimize radiation exposure. Keep the radioisotope at the greatest possible distance from you. Limit your time of exposure to the radioisotope to the shortest time possible.
- Surveys and wipe tests must be performed in each radioactive materials work area after each use (at the end of the day) as specified in the VAPHS Research Radiation Safety Policy manual.
- Submit Monthly Reports of Isotope Inventory, Use, Disposal, etc. as outlined in the Radiation Safety Policy manual to the RSO.
- If the radioactive material is not in use for more than two years, the authorization expires. The radioactive material must be surrendered to the RSO for disposal (412-360-3221).

Disposal of Radioactive Waste

Radioactive wastes must be segregated into either liquid, solid or liquid scintillation vial containers.

- Liquid radioactive waste:
Cannot be disposed of in the sink. Liquid radioactive wastes must be poured into a plastic or glass container that has a sealable threaded cap (e.g. solvent bottle). Label the liquid waste container with the radiation symbol or “Caution Radioactive Material” tape and include the isotope(s) and activities present in the liquid waste. A complete chemical description of the solution must be written on the liquid waste container.
Label correctly (Use “VAPHS – Record for Radioactive Waste Disposal”).
- Solid radioactive waste:
Seal bags of like solid waste (e.g., gloves, pipette tips, bench paper).
All bags should be labeled with the radiation symbol or “Caution Radioactive Material” tape and include the isotope(s) present in the solid waste.
Store the sealed bags in appropriately labeled 5-gallon buckets in the designated radioactive waste storage area of your laboratory (e.g., 2W118).
Label correctly (Use “VAPHS – Record for Radioactive Waste Disposal”).

- **Liquid Scintillation Vials/Fluids:**
Liquid scintillation vials containing $< 0.05 \mu\text{Ci/ml}$ of ^3H or ^{14}C are classified as Deregulated and are stored in 5-gallon buckets separate from Regulated liquid scintillation vials, i.e. those containing $> 0.05 \mu\text{Ci/ml}$ of any radionuclide.
Store separated wastes in appropriately labeled 5-gallon buckets in the designated radioactive waste storage area of your laboratory (e.g., 2W118).
Label correctly (Use “VAPHS – Record for Radioactive Waste Disposal”).

Contact the RSO at 412-360-3221 for assistance or to schedule a waste pick up.

Radioactive Spill

In the event of a radioactive spill:

- Immediately alert co-workers to the location of the spill and confine the area.
- Report the spill to your immediate supervisor and to the RSO (412-360-3221).
- Wearing personal protective equipment (e.g., gloves, lab coat, and shoe covers) and personal radiation dosimeter, clean small, contaminated areas with absorbent pads. Scrub contaminated area and non-disposable equipment with appropriate detergent/wash solution using paper towels, Kim Wipes or gauze. Start from the outer edges of the spill and work inwards into the most concentrated area of the contamination to minimize area spread.
- Survey the decontaminated area. Continue cleaning until survey registers background radioactivity. If area cannot be cleaned to background, confine the area and inform the RSO (412-360-3221).
- ALWAYS monitor clothes, including bottoms of shoes, for contamination (swipe test or Geiger counter) when finished.
- For large spills, do NOT attempt to clean up the area. Confine the area and immediately call the RSO (412-360-3221) for instructions.
- In the event of skin contamination:
 - Call out for assistance and immediately wash skin with mild soap in warm water and flush with large volumes of water.
 - Take care not to scrape the skin.
 - Remove any contaminated clothing and wash skin.
 - Call RSO at 412-360-3221 for instructions.
- Collect any contaminated solid waste (absorbent pads, clothing, gloves, shoe covers) for proper radioactive waste disposal.

X-Ray Sources

- Purchase and use of X-ray sources and devices must be approved by the Radiation Safety Committee (call Radiation Safety Office for instructions – 412-360-3221).
- All X-ray sources and devices must be tested annually for beam characteristics and radiation leakage.

- Laboratory areas where X-rays are used must be shielded or isolated in order to minimize exposure to personnel in adjacent areas. Beam stops, operator barriers and personnel shielding devices (lead aprons, lead gloves) must be utilized where appropriate to minimize radiation exposure.
- Personnel shielding devices must be examined before each use for signs of wear or damage and must be radiographically tested at least annually.
- Research personnel operating X-ray devices must obtain a personal radiation dosimeter from the RSO (412-360-3221).

Lasers Radiation

Lasers emit potentially harmful non-ionizing radiation that can result in serious injury to the eye or cause burns to affected tissue. Some laser devices present electrical shock hazards whereas others are fire hazards, emitting energy capable of igniting combustible solvents. Energy emissions from some lasers operate at infrared wavelengths and thus present an invisible health hazard.

- Laser Classification
 - Class 1: Low energy visible emitter. Eye safe.
 - Class 2: Low energy (< 1mW) visible emitter. Minimum potential to injure eye at exposure times > 0.25s. May exceed Class 1 accessible exposure limit.
 - Class 2a: Low energy visible emitter (Bar Code Scanner). Eye safe. Does not exceed Class 1 accessible exposure limit.
 - Class 3a: Low energy (up to 5 mW) visible emitter. Minimum potential to injure eye.
 - Class 3b: Moderate energy (5 mW-500 mW) visible emitter. Moderate potential to injure eye.
 - Class 4: High energy (>500 mW) emitter. High potential to injure eye and burn skin. Ignition hazard (radiant power > 2W/cm²). Shock hazard. May create airborne contaminants.
- Any potential use of Lasers should be noted on Part II: Research Institutional Biosafety Committee Protocol Survey. Operators of Class 3 and Class 4 lasers will be provided with a baseline eye examination and will be followed in a medical surveillance program as needed.
- NEVER direct the laser beam at the eye. Stay clear of the laser beam, the pump source or specular reflections. Protective goggles or glasses must be worn at all times when working with lasers. Protective goggles or glasses may not completely protect against eye injury.
- In the event of laser-dependent injury:
 - Call out for assistance and immediately call Employee Health (UD – 412-360-3556; HD – 412-954-4976) or the Emergency Room (UD – 412-360-6322) for medical instructions.

Ultraviolet Radiation

This low penetrating electromagnetic non-ionizing radiation is generated either from gas/vapor excitation (e.g., fluorescent lamps are commonly used in medical facilities) or from incandescence (e.g., heating elements). Users of ultraviolet emitting sources are cautioned:

- Common laboratory sources of UV radiation include but are not limited to leakage from fluorescent microscopes, spectrophotometers, column monitors, or from sterilization lamps found in biological safety cabinets. UV crosslinkers, transilluminators, UV boxes, and hand-held UV units are also frequent sources of UV exposure in laboratories.
- NEVER expose the unprotected eye to UV radiation. The eye is susceptible not only to direct UV radiation, but also to reflected radiation.
- ALWAYS wear personal protective equipment (e.g., eyewear, opaque clothes, vinyl gloves) and keep hands and arms covered when working with UV emitting sources. Protective goggles or glasses may not completely protect against UV-mediated eye injury. Use safety viewing boxes with UV absorbing windows to minimize exposure.
- Biological hazardous effects of UV radiation are limited to body surface injury including skin and eyes. Symptom onset is often delayed.
 - UVA: 400 - 315 nm, near the visible spectrum. Minimum potential to harm the skin and eye. Absorption of UV-A in the lens may be a factor in producing cataract.
 - UVB: 315 - 280 nm, actinic UV. Major biological hazard. High potential to burn the skin and harm the eye. Maximum absorption by the cornea occurs around 280 nm. Prolonged exposures increase the risk of skin cancer.
 - UVC: <280 nm, far UV. High photonic energy (>12eV) generated by the Sun and some man-made devices. Maximum potential to harm the skin and eye. Absorbed by the Earth's atmosphere (ozone), thus resulting in a net minimum natural health hazard.
- Some medications act as photosensitizing agents and enhance the effect of UV radiation. Such agents include thiazide diuretics (drugs which cause excessive urine production), drugs used in the treatment of high blood pressure, certain antibiotics (tetracyclines, sulfonamides), cosmetics, and thiazine tranquilizers.
- Various plants such as carrot, celery, dill, fig, lemon and some types of weeds are known to cause photosensitivity. Exposure to fluids from these plants followed by exposure to UV radiation can cause dermatitis.

Microwave Heaters

- Burn hazard. Operate only shielded microwave emitters.
- Transmission hazard. May disrupt biological implant electronic signals including pacemakers.
- Make sure your microwave is CLEAN; a dirty microwave is a significant fire hazard.
- Microwaves located in research laboratories must be labeled as "Not for Food or Drink".

Ultrasonic Devices

- Hearing hazard. May produce hearing impairment with extended use. ALWAYS wear protective personal equipment, including ear shield or plugs, when operating ultrasonic devices such as sonicators.
- Alert co-workers before using ultrasonic devices. Shield area if possible to minimize hearing hazard.

ELECTRICITY AND LABORATORY EQUIPMENT

The integrity of fans, coffee pots with automatic shutoffs or timers, toasters and hot plates must be verified before use at VAPHS. Research Service employees should be aware of the following:

- Electricity in the work place represents a very serious potential health hazard.
- Circumstances that permit a connection to be made between a person and a live source of electricity will result in a shock that could have serious, even fatal, consequences.
- It is not necessary to touch a live wire directly to be shocked. Even a thin film of water on the floor or on a bench-top can complete the circuit with fatal results.
- Some types of laboratory electrical equipment contain components that transform ordinary line voltages into much higher voltages (e.g., electrophoresis apparatus).
- A combination of explosive flammable vapors and an electrical spark can have devastating effects in a confined environment.
- Portable space heaters are prohibited at VAPHS.

Avoiding Electrical Accidents

Recognizing the potential for electrical accidents is the first step towards minimizing the risk of accident and injury.

- Equipment with frayed or otherwise damaged wiring, brittle insulation, or ill-fitting plugs and receptacles should NOT be used under any circumstances. Call the Research Office at 412-954-5401 or 412-954-5392 to place a work order for repair of damaged item or contact the Electric Shop at UD – 412-360-3719; HD – 412-954-4872.
- Protect wires and equipment against immersion or spills. Do NOT operate electrical equipment near a source of water. Avoid working with electrical equipment when the floor or workbench is wet.
- Electrical outlets located near sources of water must be GFCI (ground fault circuit interrupted) protected outlets.
- Do NOT operate electrical equipment that is wet, that sparks, or emits smoke or an odor.
- High voltage equipment must be identified with a “warning” sign and must never be left unattended while operating. Disconnect when not in use.
- All electrical equipment must be fitted with grounded (three pronged) plugs.

EXPOSURE ASSESSMENT AND MEDICAL SURVEILLANCE

Exposure Assessment

The OSHA Laboratory Standard requires that if an overexposure is suspected, an exposure assessment must be performed. If this assessment indicates that an employee could have been exposed to a hazardous chemical in a manner that may have caused harm, a medical consultation

and a subsequent examination will be made available at no cost to the employee. The Industrial Hygienist 412-360-3705 must be immediately notified by the laboratory supervisor of any instance where an overexposure is suspected. The supervisor will contact Employee Health (UD – 412-360-3556, HD – 412-954-4976) or the Emergency Room (UD – 412-360-6322) for medical attention.

An exposure assessment will be performed by the Industrial Hygienist to determine if there was an exposure that might have caused harm and to identify the chemical(s) involved.

The following examples indicate when to suspect an overexposure and an assessment will be made:

1. When working with a chemical, an employee exhibits symptoms which may include; headache, rash, nausea, coughing, tearing, irritation or redness of the eyes, irritation of the nose or throat, dizziness, loss of neuromuscular control.
2. Two or more persons in the same laboratory work area have similar complaints.
3. A hazardous chemical leaked, spilled, or was otherwise rapidly released in an uncontrolled manner.
4. A laboratory employee had direct skin or eye contact with a hazardous chemical.

While an exposure assessment may trigger environmental monitoring, there are requirements for sampling specified in the lab standard:

- Initial monitoring will be performed if there is reason to believe that exposure levels for a substance routinely exceed the action level (or in the absence of an action level, the permissible exposure limit [PEL]);
- Periodic monitoring will be performed if the initial monitoring discloses employee exposure over the action level (or the PEL). Such monitoring will be in compliance with the exposure monitoring provisions of the relevant OSHA Standard.

To request monitoring, contact the Industrial Hygienist 412-360-3705.

The employee will be notified of results in writing either by the Industrial Hygienist or by posting. A copy of the monitoring results will also be provided to Employee Health for placement into the employee's health folder.

Medical Examination Criteria and Frequency

Whenever an event takes place in the work areas such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee(s) shall be provided an opportunity for a medical consultation under the direct supervision of a licensed physician. Such consultations will be made through Employee Health (UD – 412-360-3556; HD – 412-954-4976) or the Emergency Room (UD – 412-360-6322).

If an examination is indicated after the consultation, it must also be under the direct supervision of a licensed physician and must be provided at no cost to the employee.

The physician must be informed of the identity of the chemical, the conditions of exposure, and the symptoms as reported by the employee. A written opinion discussing only exposure-related findings will be obtained by the Industrial Hygienist from the examining physician.

First-Aid

Neutralizers and solvents (alcohol, etc.) should NOT be used as first aid. The spread of skin-absorbing corrosive chemicals, like phenols, can be fatal. Minimizing duration of contact is essential.

In the event of *contact* with the *eyes*:

- Call out for assistance and immediately flush eyes with water and continue to flush for 15 minutes.
 - The first few seconds after contact are critical and immediate flushing of the eyes may prevent permanent damage. The one and only emergency treatment is to dilute the chemical immediately by complete flushing with water. The patient's eyelids may have to be forced open, so that the eyes may be flushed.
 - Consult the precautionary warning on the product label for full first-aid information.
- Contact Employee Health (UD – 412-360-3556; HD – 412-954-4976) or the Emergency Room (UD – 412-360-6322) for medical instructions.

In the event of *contact* with the *skin*:

- Call out for assistance and immediately flush the affected skin with water.
- If clothing is contaminated, remove and discard. Do NOT remain in contaminated clothing. Continue to flush the affected area. In the case of contact by sulfuric acid, remove clothes first.
- Contact Employee Health (UD – 412-360-3556; HD – 412-954-4976) or the Emergency Room (UD – 412-360-6322) for medical instructions.

In the event of *chemical ingestion*:

- Call out for assistance and immediately call Employee Health (UD – 412-360-3556; HD – 412-954-4976) or the Emergency Room (UD – 412-360-6322) for medical instructions.

RECORDKEEPING

On the VA air sampling form 10-0018 or equivalent, the Industrial Hygienist will establish and maintain an accurate record of all measurements taken to monitor employee exposures to any hazardous chemical. Medical records as a result of examinations will be kept in Employee Health personnel files. All required records will be made available in accordance with 29 CFR 1910.1020 Access to Employee Exposure and Medical Records.

FACILITY ACCESS AND SECURITY

Access to Research Service areas is restricted to Research Service and Hospital employees. ALL visitors must be escorted. To secure access to Research Laboratories the PI must complete and submit to the Research Office “Request for Staff Access to Research Secured Area”, and each Researcher must complete and submit the “Application for Access to Research Secured Area”.

- Access doors to Research Laboratory areas must be closed at all times.
- Research Service laboratories must be secured (occupied or locked) at all times.
- Identification Badges must be worn at all times when on station.
- Minimize theft:
 - NEVER leave personal belongings (purse, computer lap tops, and calculators) unattended.
 - Do NOT ignore the presence of unauthorized personnel. ALWAYS ask if assistance is required. If confrontational, do NOT attempt to further intervene. Contact Police immediately (UD – 412-360-6911; HD – 412-954-5410).

EMERGENCY MANAGEMENT PLAN

The Emergency Management Plan for Research Service works in concert with the VAPHS overall Emergency Management Plan toward achieving a safe and secure working environment for all Research Service employees. Consult and become familiar with the Emergency Response Plan contained in the Emergency Management Program binder in your laboratory area.

Emergency Phone Numbers & Contact Information

<u>Emergency Phone Numbers</u>	<u>University Drive</u>	<u>Highland Drive</u>
Fire	911	911
Police	412-360-6911	412-954-5410
Cardiac Arrest	911	911
Emergency Room	412-360-6322	
Employee Health	412-360-3556	412-954-4976

EMERGENCY SIGNAL REFERENCE GUIDE:

<u>Nature of Emergency</u>	<u>Signal (UD)</u>	<u>(HD)</u>
Internal/External Disaster	PA Announcement	PA Announcement
Severe weather alert	PA Announcement	PA Announcement
Fire, “Code Orange”	Bldg #1, voice announced location; all other Bldgs, bell coded fire alarm	Voice announcement, Code Orange + location; Bldgs #5,6,7,8,9,13,14,15, and 16 have general evacuation signal.

SAFETY PHONE NUMBERS:

<u>Position</u>	<u>Contact Information</u>
VAPHS Safety Manager	412-360-3076 (UD) 412-954-4899 (HD) 412-949-1323 (Pager)
VAPHS Industrial Hygienist	412-360-3705 (UD) 412-954-4898 (HD)
VAPHS Radiation Safety Officer	412-360-3221
VAPHS Fire Safety Specialist	412-360-3705 (UD) 412-954-4900 (HD)
VAPHS Safety Specialist	412-360-3703 (UD) 412-954-4903 (HD)
Biosafety Officer for Research	412-954-5342
VAPHS Research Administrative Officer	412-954-5387

DISASTER PROTECTION PLAN

In the event of weather-related or non-weather-related damage or destruction of property or injury to patients, visitors and/or employees, local warnings as noted above will alert you to follow the DISASTER PLAN.

All research personnel not immediately involved with a disaster in their respective laboratories must report to ‘Manpower Reserves’, Conference Room B (UD), sign the emergency response register, and wait for further instructions by the assigned Manpower Coordinator.

Personnel

Coordinator: Associate Chief of Staff for Research
Alternate: Administrative Officer for Research
Response Location: Conference Room B, Building 1, UD

Research Service Personnel should be prepared to:

- Assist the Hospital Safety Officer in the event of a chemical disaster.
- Assist the Radiological Effects Team.
- Assist Clinical or Administrative teams.
- Perform tasks as assigned by the Manpower Coordinator

FIRE PROTECTION PLAN & INTERIM LIFE SAFETY

In the event of smoke or a fire, local warning bells or announcements will alert you to follow the FIRE PLAN.

- **Rescue** visitors, employees and/or patients from immediate danger.
- **Alarm** – Call out Code ORANGE as loudly as possible to alert others. Immediately turn off all unnecessary electrical and gas appliances.
- Immediately invoke the **RACE** procedure.
 - Activate the nearest fire alarm and notify the Operator (give location and nature of fire) by dialing 911. Do NOT use the phones for any other purpose during a disaster.
 - **Confine** fires by closing all smoke and fire barriers in the immediate area.
 - **Extinguish** small fires, if possible, using available fire extinguishers. *Identify multiple escape routes from your immediate area.*
 - **Evacuate** the area by moving beyond fire barriers or into stairwells. Do NOT use the elevators.
- Wait until you are informed that the area is clear before returning to your work area.

Extinguish fires using the **PASS** procedure. *Know the location of fire extinguishers in your immediate area.*

- **Pull** out the safety pin.
- **Aim** the nozzle of the fire extinguisher at the BASE of the fire.
- **Squeeze** the handle of the fire extinguisher.
- **Sweep** the nozzle of the fire extinguisher from side to side across the BASE of the fire.

All Research Service employees are required to know alternative escape routes in your immediate area during times of construction (Interim Life Safety). Work areas must always have unobstructed access to emergency services (Fire, Police).

LIFE SAFETY PROTECTION

In the event of a life-threatening emergency such as Cardiac or Respiratory Arrest:

- Immediately dial 911.
- Specify the location and nature of the emergency to the operator.
- If trained, initiate CPR or assist the patient until help arrives.
- For non-life-threatening injuries that occur on the job during regular business hours (8:00am-4:00pm), immediately report to Employee Health at University Drive Building 1, room 1A249, or Highland Drive Building 1, room 5018W for appropriate medical care. After regular business hours, report to the Hospital Emergency Department (UD - 1N44C, 412-360-6322).

SUSPICIOUS OBJECTS & BOMB OR TERRORIST THREAT

(See MCM EC-038 BOMB THREAT PROCEDURE for more specific details of the VAPHS procedures)

If a suspicious object is found, under NO circumstances should Hospital visitors, employees or patients attempt to remove the object or make any recommendations regarding the situation.

- Immediately notify the Director's office (412-360-6391) during administrative workweek, or the Police if outside of Administrative hours (UD: 412-360-6911; HD: 412-954-5410) and report the location and type of object.
- Clear and confine the area.
- Evacuate the confined area.

Bomb or terrorist threats received by mail:

- Immediately take the mail to the Police or to the Hospital Director's Office.

In the event of a bomb or terrorist threat received by phone during or after business hours:

- Do NOT interrupt the caller.
- Record details of your conversation including specific wording, voice style, and mannerisms of the caller using the following Bomb Threat Report (see below).
- After receiving the bomb threat, immediately report to the Directors Office (412-360-6391) or the Police (after hours UD: 412-360-6911, HD: 412-954-5410) and report the incident.

Bomb and Terrorist Threat Report

Questions to ask:

Exact wording of the reply:

- | | |
|-----------------------------------|-------|
| 1. When is bomb going to explode? | _____ |
| 2. Where is it right now? | _____ |
| 3. What does it look like? | _____ |
| 4. What kind of bomb is it? | _____ |
| 5. What will cause it to explode? | _____ |
| 6. Did you place the bomb? | _____ |
| 7. Why? | _____ |
| 8. What is your address? | _____ |
| 9. What is your name? | _____ |

10. Sex of caller _____ Age _____ Race _____
Length of call _____

Caller's Voice:

_____ Calm _____ Laughing _____ Lisp _____ Disguised
_____ Angry _____ Crying _____ Raspy _____ Accent
_____ Excited _____ Normal _____ Familiar

If familiar, whom did it sound like? _____

_____ Slow _____ Distant _____ Ragged
_____ Rapid _____ Slurred _____ Clearing throat
_____ Soft _____ Nasal _____ Deep breathing
_____ Loud _____ Stutter _____ Cracking voice

Background Sounds:

_____ Street noises _____ House _____ Clear _____ Animals _____ Dishes _____ Motor
_____ Static _____ Voices _____ PA System _____ Music

Machinery: _____ Office _____ Factory
Phone: _____ Local Phone _____ Phone booth _____ Long Distance

Other:

Threat Language:

_____ Well Spoken (educated) _____ Foul _____ Incoherent _____ Irrational
_____ Message read by threat maker _____ Taped

Remarks:

**Report call immediately to: Police Service, 412-360-6911 UD; 412-954-5410 HD
Director's office, 412-360-6391**

Fill out completely, immediately after bomb threat.

Date: _____ / _____ / _____

Time of call: _____

Phone number where threat received: _____

Name, location, and position of recipient _____

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UTILITY SYSTEM FAILURE IMMEDIATE RESPONSE PLAN

Electrical Power Failure

When normal power fails in Research Service, emergency lighting and power will be activated within 10 seconds in some areas. When a failure occurs:

- Immediately contact the Electric Shop, 412-360-3719 (UD); 412-954-4872 or 412-954-4873 (HD). After hours, 412-360-3160 or 412-360-6139 (UD); 412-954-4859 (HD).
- Power to essential equipment (e.g., -80°C freezers) may be restored by plugging into outlets covered by a RED receptacle cover.
- Unplug non-essential equipment to prevent potential power-surge damage during power restoration.

Flooding

Flooding due to infrastructure failure (e.g., frozen pipes) can cause substantial damage and is often avoidable. All Research Service employees are required to:

- Close all windows and doors in your immediate work area before going home.
- Immediately report leaks/floods to the Research Service (412-954-5386) or Plumbing Shop, UD 412-360-3723; HD 412-954-4872 or 412-954-4874. If it is after hours, contact the Boiler Plant, UD 412-360-6139; HD 412-954-4859.

HVAC System Failure (Animal Research Facility)

Damage to or failure of the Heating Ventilation and Air Conditioning (HVAC) system located within the ARF can have devastating effects on animal welfare and scientific productivity. All Research Service employees who use animals in their research programs are asked to:

- Be aware of ambient room temperatures and humidity in your assigned animal rooms.
- Immediately report extreme fluctuations to Animal Care Personnel (412-360-6107) or the Air Conditioning Shop at 412-360-3735 or 412-360-6139.

EMPLOYEE HEALTH & INFECTION CONTROL

Location: Building 1, Room 1A249 (UD)
Building 1, Room 5018W (HD)
Phone: 412-360-3556 (UD)
412-954-4976 (HD)
Hours: 8:00am-4:00pm (UD)
8:00am-4:30pm (HD)

See MCM HR-047 EMPLOYEE HEALTH SERVICE and HR-033 EMPLOYEE ASSISTANCE PROGRAM for details of services provided at VAPHS.

Mandatory Mantoux (PPD) Skin Test Program

- All Research Service employees *with patient contact* are required to have a Mantoux (PPD, Tuberculosis) skin test *prior* to employment unless they are able to provide evidence of a negative test within 90 days prior to entry on duty or a prior positive test.
- All Research Service employees are required to be re-tested annually. Employee Health will notify employees requiring testing.
- Failure to have such testing may result in the employee being restricted from duty.
- Employees who demonstrate conversion as a result of an exposure episode will be offered appropriate therapy.

Optional Vaccination Programs

- Influenza vaccinations will be offered each fall to VA employees (as vaccine is available).
- Hepatitis B vaccinations will be offered to employees who have occupational exposure risk as defined by the OSHA Bloodborne Pathogen Standard. Contact Employee Health for eligibility requirements. Immunization is voluntary but employees at risk are strongly urged to receive the vaccine. Employees who decline vaccination must sign a declination form. Employees may reconsider at any time.
- Rabies vaccinations, while offered to employees who have occupational exposure risk, are not protective and vaccinated individuals exposed to the rabies virus must receive immediate treatment.

Accidental Exposure to Blood or Other Infectious Bodily Fluids/Materials

- Immediately alert your supervisor and report to the Employee Health or to the Emergency Department (after hours). Do NOT delay.
- Screening tests for exposure to HIV, hepatitis B virus or hepatitis C virus, which may be needed, will be offered. Based on the incident and the results of the testing, the employee will be offered appropriate treatment.
- If the source patient can be determined, he/she will be consented for testing for evidence of current infection with HIV, hepatitis B virus or hepatitis C virus.
- Follow-up testing will be offered to the employee as necessary.
- Refer to these VAPHS MCM for more details:
 - IC-006 OCCUPATIONAL EXPOSURE TO BLOODBORNE PATHOGENS (HBV, HCV, HIV)
 - IC-007 BLOOD BORNE PATHOGENS STANDARD (BBPS) EXPOSURE CONTROL PLAN
 - IC-009 MANAGEMENT OF HEALTH CARE PERSONNEL (HCP) INFECTED WITH BLOODBORNE PATHOGENS (HIV, HEPATITIS C, HEPATITIS B)

Exposure to a Communicable Disease Other Than Tuberculosis

- Employees accidentally exposed to a communicable disease other than tuberculosis must immediately report the incident to their supervisor. The supervisor must notify the VAPHS Infection Control Officer at 412-360-1696 or Infection Control at 412-360-1869.

- Employees reporting such an incident will be screened, along with personal contacts of the employee, by Employee Health to determine their immune status. Infected employees may be restricted from duty.
- Employees who refuse to complete necessary screening tests will be restricted from duty during the period of time they might be contagious.
- See MCM IC-005 IC, INFECTION CONTROL PROGRAM and IC-008 COMMUNICABLE DISEASE REPORTING for more details.

Exposure to Pulmonary Tuberculosis

- Employees accidentally exposed to tuberculosis or with a clinical case of pulmonary tuberculosis must report the details of this exposure or illness to his/her supervisor immediately. The supervisor must notify the VAPHS Infection Control Officer at 412-360-1696 or Infection Control at 412-360-1869.
- An employee with suspected or diagnosed pulmonary tuberculosis that is not placed promptly into Respiratory Precautions or masked presents significant risk of exposure to others.
- See MCM IC-003 TUBERCULOSIS CONTROL POLICY and IC-010 EMPLOYEE TUBERCULOSIS SURVEILLANCE PROGRAM for more details.

Exposure to Chemical or Biological Hazards

Employees who work with hazardous chemical or biological material have an opportunity to receive emergency medical treatment, medical consultation and examination when:

- Employees develop signs or symptoms associated with the on-the-job use of a hazardous agent.
- Monitoring, routine or otherwise, suggests that there could have been an exposure above the Action Limit.
- There is a spill, leak, or other uncontrolled release of a hazardous agent that may have resulted in an increased or unacceptable occupational exposure.
- See the following Medical Center Memorandums (MCMs) for additional information:
 - HR-047 EMPLOYEE HEALTH SERVICE
 - TX-042 EMERGENT CARE CENTER POLICY (ECC) for details of VAPHS services.

Exposure to Animals or Waste Anesthetic Gases (WAGs)

All VAPHS employees (including without compensation [WOC] appointments**) are required to participate in the VAPHS Animal Exposure Preventative Medicine Program (AEPMP) if they:

- are involved in the care of animals or their living quarters; or
- have contact with animals (live or dead), their un-fixed tissues, body fluids, or waste,
- are exposed to WAGs **AND** are not currently enrolled in the University of Pittsburgh Animal Exposure Surveillance Program (AESP) (see MCM TX-138 WASTE ANESTHESIA GASES AND VAPORS for details of hazards associated with WAGs and VAPHS policy details).

The purpose of the AEPMP is to provide:

- Occupational health and safety information related to use and care of animals;
- Occupational health and safety information and monitoring related to exposure to waste anesthetic gases (WAGs), when indicated;
- Occupationally indicated immunizations; and
- Clinical evaluation and treatment for individuals with animal related injuries or illnesses.

The AEPMP currently addresses the needs of individuals working with small animals, such as rodents and rabbits. Should research at VAPHS expand to cover other categories of animal exposure (large animals, nonhuman primates, or nonhuman primate tissues) the program will address the needs of those researchers as necessary.

The Services Offered to all AEPMP participants (i.e. those working with small animals) include:

A. An initial physical exam which shall include an EKG, complete blood profile, serum chemistries and urinalysis, and a medical evaluation that includes an occupational medical history, safety and health counseling, and appropriate immunizations. The occupational medical history includes a review of:

- The functional demands and environmental factors associated with the proposed position.
- The type of animal(s) contacted.
- Other potential work-site health hazards, including exposure to anesthetic gases.
- The individual's medical history and an evaluation of capability for the demands of the position.

The participant is counseled regarding:

- The bloodborne pathogen exposure control program,
- Medical evaluation and treatment for occupational injuries and illnesses, including allergies
- Relevant zoonoses based upon the animals used at the work site,
- Pertinent safety and health risks and other infection control guidelines,
- The reporting of any gastrointestinal, respiratory, or dermal illness with signs or symptoms that resemble those occurring in the animals for which they care.

B. Participants are offered a booster dose of tetanus/diphtheria (Td) toxin, if indicated.

C. If exposed to anesthetic gases, participant is counseled as to potential signs or symptoms of overexposure and enrolled in the VA Surveillance program which includes annual update on medical and reproductive histories, CBC and differential, liver profile, and renal profile. Completion and discussion of the Annual Review Form provides continuing Medical Surveillance for any potential side effects. Medical examination and counseling will be provided if the employee develops signs or symptoms indicating possible overexposure to WAGs, or desires medical advice concerning the effects of past exposure to WAGs, or the employee's ability to produce a healthy child. Participants exposed to WAGs will be required to return to Employee Health for a complete physical exam if equipment/room monitoring indicates that the VAPHS Animal Research Facility (ARF) surgical facilities exceed NIOSH acceptable limits for WAGs OR in the case of an accidental release.

D. During the AEPMP enrollment, the VAPHS screens employees at risk for developing work related allergies by requesting a history of pre-existing allergies, asthma, seasonal rhinitis, or eczema. Enrollees are advised of the availability of clinical care and are encouraged to seek evaluation and treatment if they develop symptoms suggestive of a work related allergy.

Personnel return to the VAPHS Employee Health Clinic annually for a review of the above considerations as applicable to their work.

Contact the Research Office 412-954-5381 with any questions about your enrollment/involvement in this plan.

REPORTING EMPLOYEE ACCIDENTS

When an accident occurs, the employee should immediately notify his/her supervisor and obtain first aid from either Employee Health (UD - 412-360-3556, Building 1, room 1A249; HD – 412-954-4976, Building 1, room 5018W) during business hours or the Emergent Care Center (ECC): (UD – 412-360-6322, Building 1, room 1N44C) after hours.

- The EMPLOYEE is responsible for immediately reporting an accident/illness to their supervisor.
- The SUPERVISOR will contact the Administrative Officer/ACOS for the Research and Development Department, (412-954-5387; office location HD room 2045W-2), who will assist in creating an Accident/Illness report within 2 working days of the incident using the ASISTS Program.
 - Consult the Occupational Safety, Health, and Fire Protection Manual for more specific details about this procedure.
- The employee may elect to file a Workers Compensation claim.
 - The employee and the AO/ACOS/R&D must complete, validate and sign the CA1/CA2 report.
 - A signed paper copy is needed if your report is sent to the Office of Worker's Compensation for claims processing. The following are available for assistance when completing the forms/report:
 - Safety Manager 412-954-4899
 - OWCP Specialist Pager: 412-949-1323
412-360-6163
 - The Research Office will forward a signed paper copy of the report to the Office of Workers Compensation, as appropriate.

ACKNOWLEDGEMENT AND REFERENCES

Several sections of this reference manual (pages 5-9) were adapted, with permission, from the *Hines VA Safety Manual and Chemical Hygiene Plan (2004-2005)*.

The material presented in this manual has been adapted, reproduced, or referenced from the following reference sources:

- Centers for Disease Control and National Institutes of Health. (2009) Biosafety in Microbiological and Biomedical Laboratories. U.S. Department of Health and Human Services. Public Health Service. 5th Edition, U.S. government Printing Office. Washington, 2008.
- Furr AK. (2000) CRC Handbook of Laboratory Safety. 5th Edition. CRC Press LLC, Washington, D.C.
- Occupational Safety and Health Administration (OSHA)
- Centers for Disease Control and Prevention
- Centers for Disease Control Select Agent Program
- Recombinant DNA and Gene transfer guidelines: *NIH Guidelines*
- NIH Primary Containment for Biohazards
- Working with the VA IACUC: [Citiprogram](#) website

- VAPHS Safety related Medical Center Memorandums:
 - EC-001 HAZARD COMMUNICATION
 - EC-004 SAFETY COMMITTEE
 - EC-008 POLICY FOR RADIATION SAFETY IN ALL AREAS INVOLVED IN IONIZING RADIATION
 - EC-038 BOMB THREAT PROCEDURE
 - HR-033 EMPLOYEE ASSISTANCE PROGRAM
 - HR-047 EMPLOYEE HEALTH SERVICE
 - IC-006 OCCUPATIONAL EXPOSURE TO BLOODBORNE PATHOGENS (HBV, HCV, HIV)
 - IC-008 COMMUNICABLE DISEASE REPORTING
 - IC-003 TUBERCULOSIS CONTROL POLICY
 - IC-004 DISEASE/VOLUNTARY HIV ANTIBODY TESTING POLICY
 - IC-005 IC, INFECTION CONTROL PROGRAM
 - IC-006 OCCUPATIONAL EXPOSURE TO BLOODBORNE PATHOGENS (HBV, HCV, HIV)
 - IC-007 BLOOD BORNE PATHOGENS STANDARD (BBPS) BB PATHOGENS
 - IC-008 COMMUNICABLE DISEASE REPORTING
 - IC-009 MANAGEMENT OF HEALTH CARE PERSONNEL (HCP) INFECTED WITH BLOODBORNE PATHOGENS (HIV, HEPATITIS C, HEPATITIS B)
 - IC-010 EMPLOYEE TUBERCULOSIS SURVEILLANCE PROGRAM
 - IC-OIL HAND HYGIENE GUIDELINES
 - EC-008 POLICY FOR RADIATION SAFETY IN ALL AREAS INVOLVED IN IONIZING RADIATION
 - TX-042 EMERGENT CARE CENTER POLICY (ECC)
 - TX-138 WASTE ANESTHESIA GASES AND VAPORS

Other VAPHS Research Safety documents:

- Occupational Safety, Health & Fire Protection Manual (April 2010)
- Research Lab Hazardous Agents Control Program (September 2004)
- VAPHS Safety and Fire Training, Information (March 2007)
- VAPHS Animal Exposure Preventive Medicine Program (AEPMP) (2010)
- Radiation Safety Policy (May 2004)

**SAMPLE VAPHS RESEARCH AND DEVELOPMENT OFFICE
SEMI-ANNUAL LABORATORY INSPECTION**

Date: _____
Location(s): _____
Principal Investigator: _____
Lab Contact(s): _____
R&D Staff: _____
Purpose of Visit: _____

Biological agents: _____

Plasmids, <i>E. coli</i>	Human cell lines	Human blood & tissue
Non-human primate blood and tissue		Toxins of biological origin
Viruses	Lentiviruses	Mammalian cell culture

Chemical agents: _____

Carcinogens	Gaseous anesthetics	Chemotherapeutics
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Animals: _____

Animals are transported to the lab? _____

Security, Training, Documentation	
Secured and locking doors limit access to the facility. Doors should be closed when experiments with BSL-2 agents are in progress. Doors should be closed when animals are in the lab.	
Before working, lab personnel receive: <ul style="list-style-type: none"> • Training through PI about the hazards associated with work with biohazardous and chemical agents (includes awareness of OSHA PELs and how to detect release of hazardous chemicals), • Information on necessary precautions to prevent exposures & exposure evaluation procedures (includes awareness of signs and symptoms of chemical exposures), • Annual updates or additional training for procedural or policy changes <p>Lab personnel must demonstrate proficiency in practices and operations specific to the lab facility.</p>	
Lab personnel have completed required VAPHS training programs. Personnel receive immunizations or tests for the agents handled.	
Life safety training includes review of PASS and RACE. For all emergencies, lab personnel should dial 911.	
Lab personnel have read and understood the following: <ul style="list-style-type: none"> • research protocols or grant applications, • IACUC, IRB, and/or IBC protocol(s) 	
A BSL-2 Safety Manual must be prepared for the laboratory and approved by the Biosafety Officer for Research. (BSL-2)	
PI permits entry only by persons who meet specific entry requirements (respirators, immunization, etc.). Individuals who feel that they may be at increased risk of infection must contact Employee Health.	
Lab personnel are familiar with procedures for medical attention and accidents.	
Lab personnel have a copy of the Research Laboratory Safety/Biosafety Manual and Chemical Hygiene Plan. All lab personnel review the plan and sign the signature page. Lab personnel have reviewed the VHA Handbook 1200.08.	
Laboratory Safety Design	
A biohazard-warning label [and label for other hazard(s)] is completed and attached to the main entrance door(s).	
Emergency response information is posted. A 24 hour phone is identified.	
A telephone is readily available for emergencies.	
Windows do not open.	
Laboratory furniture (chairs, curtains, etc.) is sturdy, and spaces between benches, cabinets, and equipment are accessible for cleaning. Furniture must be made of a material that can be decontaminated.	

Electrical outlets within six feet of water sources have ground fault circuit interrupters.	
At least 18" of ceiling clearance must be maintained. Materials are stored so as not to disrupt a clear plane 18" below sprinkler heads.	
Cardboard boxes and supplies must be stored off of the floor. (Occupational Safety and Fire Protection Manual, General Safety Policies, p. 23)	
Lab personnel are aware of location of fire alarm pull stations and fire extinguishers. Emergency equipment (i.e., fire extinguishers, safety showers) is not blocked.	
Occupants know emergency exit routes.	
Doorways and aisles have 44" minimal clearance.	
The laboratory is reasonably clean, with no pest management issues. Floors and bench tops should be uncluttered.	
Hygiene and Personal Protective Equipment (PPE)	
PPE Hazard Assessments are documented that identify hazards to employees and specifies the personal protective equipment (PPE) used to protect employees during work activities.	
Face protection (goggles, mask, face shield or other splatter guards) is available and used for anticipated splashes or sprays of microorganisms and/or chemicals. If potentially infectious materials are used outside of containment, appropriate full face protection is worn.	
Respirators are available and worn in the lab. Personnel who wear respirators have been fit-tested and properly trained.	
Protective coats/gowns/smocks/uniforms are worn in the lab. Chemical aprons are used, if necessary. All body protection remains in the lab. Proper foot wear is worn.	
Gloves are worn when hands may contact biohazardous materials/contaminated surfaces. Gloves are worn when handling hazardous chemicals and are appropriate for the chemical agent(s) used.	
Eating, drinking, handling contact lenses, and applying cosmetics are not permitted in the research laboratories. Food and drink are stored outside the work area in designated cabinets or refrigerators only.	
Each laboratory contains a sink for hand washing and hand washing materials are available. If a sink is not available, waterless disinfectant is stored in the lab.	
Persons wash their hands after they handle viable materials, after removing gloves, and before leaving the	

laboratory. Gloves are disposed of when they become contaminated and when work with infectious materials is completed.	
An eyewash facility is available and is checked weekly. The eyewash is not blocked.	
Basic first aid supplies are available, and lab personnel are aware of VAPHS procedures and reporting locations in case of on-the-job injuries.	
Lab personnel are aware of the location of the safety shower. The safety shower is not blocked.	
Laboratory Practices	
PI has a policy in place for working alone in the lab.	
Mechanical pipetting devices are used. Use of mechanical pressure units should be substituted for mouth pressure during experiments involving patch-clamp electrophysiology.	
Cultures, tissues, or other potentially infectious materials are placed in a labeled secondary container that has a secure lid and prevents leakage during transport between laboratories or on-campus facilities. If potentially infectious materials are transported, the secondary container is labeled as biohazardous.	
<u>Import of specimens:</u> (BSL-2) Biohazardous materials that are shipped or couriered to the lab are received in appropriate packaging and are labeled properly as to the contents.	
<u>Export of specimens:</u> (BSL-2) Biohazardous materials that are shipped or couriered out of the lab are shipped in appropriate packaging and are labeled properly as per shipping requirements. Anyone shipping dangerous goods must undergo the Hazardous/Infectious Materials Shipping/Transport Training (required every 2 years).	
The Research and Development Department requires that a Material Transfer Agreement (MTA) be filed for PI's that want to ship or receive biological agents and/or chemical agents.	
PI possesses permits for transport of biological agents between states or into/out of the country: <ul style="list-style-type: none"> • USDA requires permits for interstate transport or receipt of animal and plant pathogens. • CDC requires permits for importation or transport of some infectious agents. 	
<u>Controlled Substances (DEA):</u> PI maintains a current DEA registration for the possession and usage of DEA Schedule I-V Controlled Substances. <ul style="list-style-type: none"> • Inventory is maintained with a complete and accurate record of all controlled substances on hand. • The inventory must include the substance name, date received, quantity received, dates and quantities used. • Schedule I and II Controlled Substances are stored in a safe or steel cabinet per regulations. • Schedule III-V Controlled Substances are stored in accordance with regulations (locked cabinet/drawer). • Access to Controlled Substances inventory limited to PI and maximum of 1-2 Authorized Agents of the PI. • Use of Controlled Substances is restricted to only authorized personnel. • If the controlled substance expires, the VA Pharmacy is contacted for proper disposal procedures. 	

Compressed gas cylinders are labeled and secured with approved straps, chains, or floor brackets.	
Glassware safety is practiced by using plastic ware when possible, by handling glass with safety devices, and by using a designated broken glass container for disposal. It is recommended that BSL-2 agents be handled in plastic, not glass.	
Biological Safety Equipment	
Biohazard labels are affixed to equipment used to handle or store potentially infectious materials.	
Biological Safety Cabinets (BSCs) are used for: <ul style="list-style-type: none"> • all manipulations of potentially infectious materials, • procedures with a potential for creating infectious aerosols, or splashes, • work with high concentrations or large volumes of infectious agents. 	
All biosafety cabinets are certified semi-annually.	
Bunsen burners must not be used in BSCs; touch-plate burners should be used on a limited basis. Lab personnel must rely on chemical disinfection in the BSC.	
Chemicals are not stored in the BSCs. A minimal amount of work materials can be stored in the BSCs, however, the supplies cannot be blocking the front or back grilles.	
Centrifugation of biohazardous materials can be conducted in the open laboratory if sealed safety cups or sealed rotor heads are used. If sealed safety cups or sealed rotor lids are not available, then the rating of centrifuge tubes should be higher than the speed routinely used to centrifuge the biohazardous materials. (BSL-2)	
Biological Spill and Infection Control	
Spill cleanup procedures are posted for biohazardous agents and biological spill cleanup materials are available. Spills and accidents of biological materials are immediately reported to the PI. (BSL-2)	
Equipment and work surfaces are decontaminated with an appropriate EPA-registered disinfectant on a routine basis, after work is finished, and after overt spills, splashes, or other contamination by infectious materials.	
Liquid biological wastes are decontaminated for the appropriate contact time and then disposed down the sink. Glass flasks that are stored on the floor and are used to collect liquid cell culture wastes should be placed in appropriate secondary containment.	
Solid biological wastes are appropriately decontaminated and disposed for pickup by EMS. Containers of solid biological wastes are labeled with the biohazard symbol.	
Needle Safety	
Safety-engineered Sharps devices (syringes that re-sheathe the needle, needle-less systems, or blunt needles) are recommended for use when working with potentially infectious materials in a BSL-2 lab.	

Safety-engineered Sharps devices are recommended for use at ABSL-2.	
Used disposable needles and sharps are carefully placed in approved "Sharps" containers which are disposed when 3/4 full.	
Needles or other Sharps used with chemical agents should be disposed in an approved Sharps container. A chemical waste disposal sticker should be placed over the biohazard sign on the Sharps container.	
Used disposable needles are never bent, sheared, broken, recapped, removed from disposable syringes, or otherwise manipulated by hand before disposal. Blood tube holders are not reused.	
Blood draws are performed in the laboratory. Provide the names of any lab personnel with direct patient contact.	
Chemical Safety Equipment	
Chemical fume hoods or vented safety enclosures are used whenever possible to handle chemicals. Dry forms of toxic, carcinogenic, and chemotherapeutic agents should be handled in the chemical fume hood at all times. If possible, highly hazardous chemicals should be purchased in liquid form or in injectable or mixable vials.	
All chemical fume hoods are certified semi-annually. The fume hood alarm is working properly.	
Chemicals and work materials are not stored in the chemical fume hood. Only testing equipment used on a regular basis is permitted to be stored in the chemical fume hood.	
Chemical Use and Storage	
A chemical inventory list is available and updated annually. The inventory is reviewed for select carcinogens and reproductive hazards. A printed copy of the chemical inventory list should be available in case of an emergency.	
MSDSs are available for hazardous chemicals, especially for agents that are toxic, carcinogenic, or chemotherapeutic. MSDSs must be in hard copy and lab personnel are aware of how to obtain them. Lab personnel are aware of the hazards involved in handling these agents.	
Lab personnel are familiar with the Hazardous Material Information System (HMIS) and information on the HMIS is posted in the lab.	
Chemicals are segregated as per type (acids vs. alkalis, etc.), stored properly, and storage areas are labeled.	
Flammable solvents are only handled in areas with adequate ventilation and not near ignition sources. Maximum of a single 5-gallon storage container is permitted in the laboratory outside of an approved flammable materials storage cabinet or fire-rated safety can. Not more than 10 gallons (40 liters) of flammable solvents may be stored in a lab outside of approved fire-rated cabinets, approved flammable materials storage rooms, or laboratory-safe/flammable material refrigerators.	
Secondary chemical containers must be labeled with content, concentration, date of preparation, and expiration date if applicable. All secondary containers must also be marked with the HMIS label.	

Secondary pharmaceutical containers are also labeled with name of preparer.	
Hazardous chemicals or glass bottles are not stored above eye level and are secured in cabinets with doors. Only non-hazardous chemicals and plastic bottles should be stored on pass-through shelves without safety lips.	
Old/unused or expired chemicals are not used and are disposed of upon expiration. Chemicals that become increasingly hazardous over time, such as peroxide-forming ethers and dry picric acid, are monitored and disposed as per the manufacturer's expiration.	
Acid and base neutralizers and sorbent materials are readily available for cleanup of chemical spills. Lab personnel are aware of the location of chemical spill kits or sorbent materials.	
Chemical Waste Disposal	
Hazardous chemical waste is collected in containers that are appropriate for the type of waste and are properly labeled. The waste is disposed through the VAPHS Safety Department.	
Flammable solvents and corrosives, including diluted solutions, are collected as chemical waste and are not disposed down the drain. All solid chemical wastes (ex: gels containing ethidium bromide, gloves, pipette tips, etc.) are properly labeled and are disposed as chemical waste.	
Wastes associated with toxic, carcinogenic, or chemotherapeutic agents are disposed as appropriate, either through the hazardous waste disposal program or as chemotherapeutic wastes.	
Laser Safety	
<u>Use of lasers:</u> Lasers are located and/or used in the lab. <ul style="list-style-type: none"> • The laser is contained in a housing or containment unit. • A laser warning sign is completed and attached to the main entrance of the lab. • Lab personnel wear appropriate personal protective equipment, including eye protection. • Lab personnel are familiar with the Laser Safety Officer and have registered Class 3b or Class 4 lasers. 	
Animal Use and Special Instructions	
Lab personnel understand risks associated with animals/agents involved and are familiar with procedures for addressing injuries associated with them.	
Each laboratory to where animals are transported contains a sink for hand washing. Hands are washed after handling animals in the lab.	
When working with animals or animal tissue in the lab, the PPE worn is appropriate to the animal species and/or biological agents and chemicals being handled.	
Anesthetic gases are used with animals. Appropriate engineering controls are in place for work with anesthetic gases in the lab or in the animal facility.	

Animals are housed in primary containment equipment (ex: filter-top cages) appropriate for the species.	
Animals are transported to the laboratory in appropriate equipment.	
PI notes the biological and/or chemical agent(s) administered on post-procedure cards. Biohazard or chemical use stickers should be posted on cage cards. Investigator must ensure that animal facility supervisor is aware of hazard(s) and the hazard(s) should be posted on the entrance to the housing room.	
All animals and animal-related materials (cages, bedding, and waste) are handled, decontaminated or inactivated, and disposed of as appropriate to the biological agents and/or chemicals in use, and the risk of exposure.	

Research Laboratory Annual Review of Safety/Biosafety Manual and Chemical Hygiene Plan

Research Laboratory:

Location(s) _____

Principal Investigator _____

Lab Supervisor/ Safety Officer _____

I have reviewed the Research Laboratory Safety/Biosafety Manual and Chemical Hygiene Plan, understand the contents, and have been made aware of any particular hazards related to the general work of this laboratory and the specific procedures to which I am assigned.

NAME (Legible Signature)

DATE

1 _____	_____
2 _____	_____
3 _____	_____
4 _____	_____
5 _____	_____
6 _____	_____
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