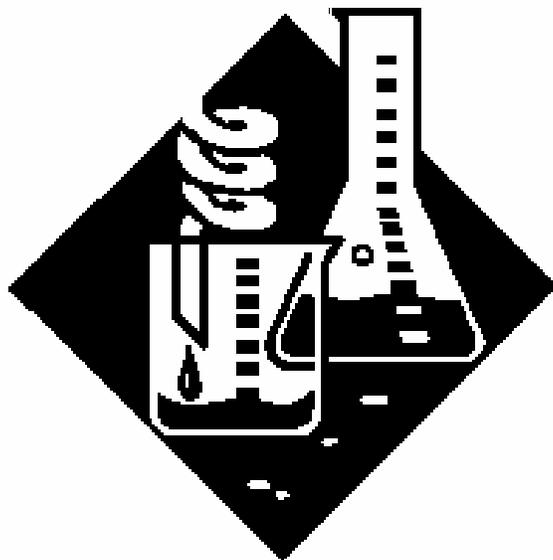


PPRL

SAFETY

PLAN



October 2005

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SAFETY PLAN FOR

USDA/ARS POISONOUS PLANT RESEARCH LABORATORY

Safety is an integral part of the research mission of the Poisonous Plant Research Laboratory (PPRL). As used in this plan, “safety” includes occupational health concerns (hazardous chemicals, physical hazards), industrial hygiene, environmental concerns, and accident prevention.

This Safety Plan covers nine major areas: hazard communication and chemical hygiene; office safety; vehicle/equipment safety; animal handling; radiation safety; biological safety; reporting emergencies, accidents, or spills; evacuation procedures; and security. The goal is to provide a workplace free of recognizable hazards to the employees and the environment. Proper equipment and training to safely perform the work will be provided. Compliance with Local, State, and Federal safety standards will be ensured.

Safety is the responsibility of everyone (ARS Directive 230.0). All employees must perform their work in a safe manner and observe the established safety and hygiene standards at all times. The employees assume the responsibility of working safely and protecting themselves and others from possible hazardous situations. PPRL will provide, or arrange for, the appropriate health and safety training for working with hazardous materials as required by the Hazard Communication Standard (29 CFR 1910.1200), the Chemical Hygiene Standard (29 CFR 1910.1450), the ARS Safety, Health, and Environmental Management Program (ARS Manual 230.0), and other recognized health and environmental standards. Emergency procedures and medical assistance are outlined. The final responsibility for safety lies with the laboratory director who, along with the Safety Team, will have a visible continuing commitment to the safety program.

A ‘New Employee Safety Information and Training Checklist’ is available for new and current employees. This introduces employees to the laboratory and tells where the safety resources are kept, where potential hazards exist, etc. This checklist should be completed within one month of the start of employment. Checklists will be provided in the new employee packet from the secretary; copies are also in the Safety Files (Office 127).

The overall thrust of this Safety Plan is to provide a safe research environment that allows productive research to be done with the lowest possible risk to people, animals, and the environment. Above all, **think first, then act.**

Safety Team Members (October 2005):

Terrie Wierenga, Facilitator, CHO, BSO

Kermit Price

Rex Probst

Dale Gardner

Location of Safety Records and Resources

Safety records and resources are located in Terrie's office (Room 127). The Safety Files contain hard copies of the Location Safety Committee records; results of inspections; PPRL Safety Team records; various directives, plans, and resources; MSDS (material safety data sheets); and various safety-related catalogs and computer disks. Books such as 29 CFR 1910 (OSHA Hazards Communication and Chemical Hygiene Standards), Biosafety Guidelines, the OSHA Voluntary Compliance program, and ARS Manual 230.0 (Safety, Health, and Environmental Management Program) can be found on the bookshelves in the office. In addition, various safety videotapes are in the bottom drawer of a video cabinet in Room 125. Hard copies of the MSDS for chemicals used in the lab are located in binders in Room 127, as well as a print-out of the chemical inventory. The Safety Plan Binder contains copies of the PPRL Safety Plan and plans for a variety of topics: hearing conservation, confined spaces, hazardous materials handling, respirator management, etc. Several reference books are also located there.

The chemical inventory is updated annually and the database is located on the safety computer. The list is published on the PPRL server. See Terrie if you need help accessing these programs.

CHAPTER ONE

CHEMICAL HYGIENE PLAN

The general intent of the chemical hygiene plan for the USDA-ARS Poisonous Plant Research Laboratory is:

1. to protect laboratory employees from health hazards associated with the use of hazardous chemicals in our laboratory, and
2. to ensure that our laboratory employees are not exposed to substances in excess of the permissible exposure limits as defined by OSHA in 29 CFR 1910 subpart Z.

The plan will be available to all employees for review and a copy will be located in the following areas: Safety Plan Binder and Safety Files (Room 127); and Animal Caretakers Office (Building 25).

This plan will be reviewed annually by the PPRL Safety Team and updated as necessary.

I. STANDARD OPERATING PROCEDURES FOR USING CHEMICALS

A. General Rules for Laboratory Work with Chemicals

1. General Principles

Every laboratory worker will observe the following rules:

- a. Know the safety rules and procedures that apply to the work being done. Determine the potential hazards (e.g. physical, chemical, biological) and appropriate safety precautions before beginning any operation.
- b. Know the location of, and how to use, the emergency equipment in your area, as well as how to obtain additional help in an emergency. Be familiar with emergency procedures.
- c. Know the types of protective equipment available and use the proper type for each job.
- d. Be alert to unsafe conditions and actions and call attention to them so that corrections can be made as soon as possible. Someone else's accident can be as dangerous to you as any you might have.
- e. Do not consume food and beverages, chew gum, smoke, or apply cosmetics in areas where chemicals are being used or stored.

- f. Avoid hazards to the environment by following laboratory waste disposal procedures. Chemical reactions may require traps or scrubbing devices to prevent the escape of toxic substances.
- g. Be certain all chemicals are correctly and clearly labeled. Post warning signs when unusual hazards such as radiation, flammable materials, biological hazards, or other special problems exist.
- h. Remain out of the area of a fire or personal injury unless it is your responsibility to help meet the emergency. Curious bystanders interfere with rescue and emergency personnel and endanger themselves.
- i. Avoid distracting or startling any other worker in the lab. Practical jokes or horseplay will not be tolerated.
- j. Use equipment only for its designated purpose.
- k. Position and clamp reaction apparatus thoughtfully in order to permit manipulation without the need to move the apparatus until the entire reaction is completed. Combine reagents in appropriate order, avoiding adding solids to hot liquids and water to acids.
- l. Above all, **think, act, and encourage safety** until it becomes a habit.

2. Health and Hygiene

Laboratory workers will observe the following health practices:

- a. Wear required and appropriate eye protection at all times. The research protocol or risk assessment will indicate what eye protection (and other personal protective equipment) is necessary for specific procedures.
- b. Use protective apparel, including face shields, gloves, and other special clothing or footwear, as needed.
- c. Confine long hair and loose clothing when in the laboratory.
- d. Never use mouth suction to pipette chemicals or to start a siphon; a pipette bulb or an aspirator should be used to provide a vacuum. Cotton plugs in the pipette do not adequately protect you from any aerosols.
- e. Avoid exposure to gases, vapors, and aerosols. Use appropriate safety equipment whenever such exposure is likely.
- f. Wash well before leaving the laboratory area. However, avoid the use of solvents for washing the skin. They remove the natural protective oils from the skin and can cause irritation and inflammation. In some cases, washing with a solvent might facilitate absorption of a toxic chemical.

3. Food Handling

Contamination of food and drink or smoking are potential routes for exposure to toxic substances. Food is to be stored, handled, and consumed only in areas designated as free of hazardous substances (offices, break room). Do not drink

or use for food preparation any water from lab faucets.

4. Housekeeping

There is a definite relationship between safety performance and orderliness in the laboratory. When housekeeping standards fall, safety performance inevitably deteriorates. The work areas are to be kept clean, and chemicals and equipment should be properly labeled and stored.

- a. Work areas are to be kept clean and free from obstructions and dust. Cleanup follows the completion of any operation or at the end of each day.
- b. Deposit waste in the appropriate receptacle.
- c. Spilled chemicals are cleaned up immediately and disposed of properly. Disposal procedures are established and all laboratory personnel should be familiar with them.
- d. Unlabeled containers and chemical wastes are to be disposed of promptly, using appropriate procedures. Such materials, as well as chemicals that are no longer needed, should not accumulate in the laboratory. Containers with tissues in formalin are to be stored in the Tissue Archives, Gold Building. Only bring into the laboratory the containers with the tissues you need to currently process.
- e. Floors are swept twice weekly, if not sooner; frequency of sweeping, mopping, or waxing is dependent on use. Accumulated dust and other assorted chemicals pose respiratory hazards.
- f. Hallways are not to be used as storage areas.
- g. Access to exits, emergency equipment, controls, and such is not to be blocked.
- h. Equipment and chemicals are to be stored properly; clutter is to be minimized.

5. Equipment Maintenance

Good equipment maintenance is important for safe, efficient operations. Equipment is to be inspected before each use and maintained according to manufacturer's recommendations. Servicing schedules depend on the equipment being serviced. Quarterly and annual servicing are used as minimum guidelines. Testing equipment is maintained and calibrated based on manufacturer's requirements and is outlined in the Quality Control Section of the PPRL Safety Plan.

6. **Shielding Equipment**
Safety shielding should be used for any operation having the potential for explosion such as (a) whenever a reaction is attempted for the first time (small quantities of reactants should be used to minimize hazards), (b) whenever a familiar reaction is carried out on a larger than usual scale (5-10 times more material), or (c) whenever operations are carried out under nonambient conditions. Shields must be placed so that personnel and other equipment in the area are protected from hazard.

7. **Glassware**
Accidents involving glassware are a leading cause of laboratory injuries. Damaged glassware is to be discarded or repaired immediately. Use proper hand protection when inserting glass tubing into rubber stoppers, corks, or rubber tubing. Vacuum-jacketed glass apparatus should be handled with extreme care to prevent implosion. Only glassware designed for vacuum work will be used for that purpose. Detailed instruction is given by the supervisor on the proper use of glass equipment designed for specialized tasks, which can represent unusual risks for the first-time user.

8. **Hoods**
All work with hazardous or volatile chemicals must be done in a laboratory fume hood. They are secondary safety devices; primary controls are proper design of experiments and good work practices. Hood sashes can be used as a protective shield and the minimum opening will be used when working in the hood. Before using a laboratory fume hood, it should be checked to see that it is turned on and operating properly. The USU Environmental Health and Safety Office will perform annual tests on all hoods at PPRL; ratings are posted by each hood. The Safety Team will inspect all hoods at least quarterly.

9. **Waste Disposal**
Waste disposal procedures for routine and emergency situations have been established in the PPRL Hazardous Materials Plan. Workers are to follow these procedures with care, to avoid any safety hazards or damage to the environment.
 - a. **Formaldehyde (Formalin) Disposal:** Formalin is used in pathology to preserve tissues. Containers for storing waste formalin are in the Solvent Storage Building (Building 45). As a container is filled, contact the CHO

(Chemical Hygiene Officer; Terrie). The CHO will contact a certified company for final disposal.

- b. Organic Solvents: Methanol, ethanol, chloroform, and methylene chloride are solvents used in several plant extractions. Barrels for these waste solvents (clearly and individually labeled) are in the Solvent Storage Building. The CHO will monitor these monthly and arrange for disposal as they are filled.
- c. Other Hazardous Waste: Hazardous chemicals that cannot be neutralized or otherwise rendered harmless in the course of the procedure must be properly disposed of. The research protocols must list how any chemical waste is to be disposed of. The CHO will do a monthly inventory of the chemicals ready for disposal and will arrange for such.

10. Unattended Operations

Frequently, laboratory operations are carried out continuously, overnight, or over a weekend. It is essential to plan for interruptions in utility services and to provide for checks on the procedures over the weekend. Operations should be designed to be safe, and plans should be made to avoid hazards in case of failure. Whenever possible, arrangements for routine inspection of the operation should be made. An appropriate sign should be placed on the door informing who is to be called in case of an accident, what the procedure is, and what hazards may be present.

11. Working Alone

It is prudent to avoid working in a laboratory building alone. Under normal working conditions, arrangements must be made between individuals working in separate laboratories outside of working hours to cross check periodically. Experiments known to be hazardous are **not** to be undertaken by a worker who is alone in the lab. The supervisor has the responsibility for determining whether the work requires special safety precautions. At a minimum, the safety precautions will be the same as those required when working during 'normal' (7:30 am to 4:30 pm) hours.

12. Special Procedures

Day to day work at PPRL occasionally involves the use of chemicals which require special procedures. Before undertaking work with any chemical, review its use, hazards, and spill cleanup/disposal procedures. Consult the label or the Material Safety Data Sheet (MSDS) to identify clearly the hazards of the

material. MSDS are located in the notebooks on the Safety Shelves (Room 127). Additional questions may be referred to the Safety Team. All experiments involving the use of hazardous chemicals should be reviewed by the Safety Team for suggestions on safe handling procedures.

13. Spills and Releases

Experience has shown that the accidental spill and release of hazardous substances are common enough occurrences to require procedures that will minimize exposure of personnel and contamination of property. Such procedures may range from having available a sponge mop and bucket to having an emergency spill-response team, complete with protective apparel, safety equipment, and materials, to contain and clean up the spill. Before starting an experiment or procedure, plan how to respond to any spill or release that could occur; include this in the SOP (standard operating procedure). Make sure that materials needed for cleaning up any spills are on hand. The Chemical Hygiene Officer will be informed of all spills and releases of a chemical.

Please refer to the Spill Response Plan for procedures to follow and people/agencies to notify.

- a. Incidental spills are spills that result in a minor exposure. These can generally be cleaned up with a minimum of equipment. In the protocol for each experiment, procedures for spill hazards and cleanup will be given. Amounts for incidental spills will be included in the protocol.
- b. Larger spills that result in exposures above acceptable limits (as defined by OSHA, EPA, etc.) require an emergency response team to clean up. The USU Emergency Response Team or the Fire Department Response Team will be called in these cases.

14. Additional procedures for emergencies such as fire, earthquake, ruptured gas or water lines, etc. are listed in Chapters 7 and 8 of the PPRL Safety Plan. Evacuation plans and emergency phone numbers are posted throughout the laboratory facilities.

15. Compressed gas is used in some procedures (welding, HPLC, GC, GC/MS). Gas cylinders will be secured to prevent tank rupture due to falls. Valve caps must be on when the cylinder is not in use. Clamps and straps for securing cylinders are available; special carts designed for transporting cylinders must be used. Cylinders will be inspected regularly by the identified user for leaky valves, etc. Proper handling procedures as outlined by OSHA, CGA

(Compressed Gases Association), and in other safety manuals will be followed.

16. Report any chemical spill, personal injury, or building deficiency (leaky roof, broken window, etc.) to the Safety Team. Injuries must be reported to your supervisor, then to the Research Leader (Lynn James) and Secretary (Pat Bradfield); building deficiencies should be reported to Lynn James.

II. CONTROL MEASURES TO REDUCE EXPOSURE

- A. All procedures using volatile substances will be performed in an appropriate fume hood. Weighing of ground or extracted plants will be done in the hood. Remember that dust can be highly explosive. Since we work with poisonous plants, toxin levels in the plant dust can be high enough to harm you (i.e., selenium-accumulating plants such as locoweed). Use proper protective equipment for the toxin (HEPA respirators with seleniferous plants, gloves for working with conium tubers). A SOP for grinding plants is located in the Safety Plans Binder.
 1. When large amounts of plant are being ground (amount requires use of large mill grinder), the grinder will be positioned in the open air and operator(s) will stand upwind. Dust respirators, gloves, and protective eyewear will be worn during grinding; other protective equipment will be used as necessary.
 2. For small quantities of plant (using Wiley mill or cyclone grinder), grind samples in a well-ventilated area or in a hood. Dust masks or other protective equipment will be worn as necessary. When using the cyclone grinder, always wear a dust mask.
 3. When weighing or administering ground plant, mix in a well-ventilated area or use the portable hood to control the dust. Wear protective equipment, especially dust masks for nuisance dust.
- B. Respirators shall be used in accordance with the respiratory protection policy of PPRL and with the OSHA respirator standard 29 CFR 1910.134. This policy and associated documentation are in the Safety Files and in the Safety Plans Binder.

- C. Appropriate protective apparel compatible with the required degree of protection for substances handled shall be used. The supervisor will do a Risk Assessment for each procedure or research project and advise employees on glove, gown, eye protection, lab coat, etc. use. Permeability charts are available in the Safety Files.
- D. Employees will be instructed on the location and use of eyewash stations and safety showers. The PPRL Safety Team is responsible for this instruction.
- E. Employees will be trained annually on the use of fire extinguishers and other fire protection systems, the evacuation plan, and emergency response measures.

III. MAINTENANCE OF PROTECTIVE EQUIPMENT

- A. Fume hoods will be inspected regularly by the PPRL Maintenance Personnel (Jason Tuttle) to see that they are operating properly. Adequacy of face velocity will be determined by the USU Environmental Health and Safety Office annually. Interim velocity measurements will be made by the PPRL Safety Team. Reports of hood inspections are filed in the Safety File for employee review. All hoods are equipped with monitors. Notify Jason when a hood goes into alarm or breaks down; he and the Safety Team are responsible for notifying the research leader of the need for repair.

Hoods are also found in many of the ancillary buildings (Treatment Room, Richmond Farm, Animal Physiology & Surgery Building, etc.). Since these areas are used infrequently, ensure that hoods are operating properly before starting your work. Terrie has an anemometer to measure hood flow velocity.

- B. Safety showers and eyewash stations are available in all labs as well as the ancillary buildings and Richmond Farm labs. Check the eyewash drench hose every week to keep fresh water in the line and to avoid the buildup of any bacteria, mold, or fungi. The maintenance personnel will be responsible for testing the flow and flushing the wall-mounted units on a quarterly basis.

IV. EMPLOYEE INFORMATION AND TRAINING

- A. Each employee covered by the laboratory standard or the hazard communication standard will be provided with information and training so that

they are appraised of the hazards of chemicals present in their work area. This training will be given at the time of initial assignment and prior to new assignments involving different exposure situations. Refresher training will be given annually.

- B. The training/information sessions shall include:
 - 1. The contents of 29 CFR 1910.1200 and 1910.1450 and their appendices. These shall be available to employees at the PPRL and are located in the Safety File.
 - 2. The availability and location of the written Chemical Hygiene and Hazard Communication Plans and PPRL Safety Plan.
 - 3. Information on OSHA permissible exposure limits (PELs) where they exist and other recommended exposure limits.
 - 4. Signs and symptoms associated with exposure to hazardous chemicals in laboratories.
 - 5. Location of reference materials, including all MSDS, on the safe handling of chemicals in laboratories.
 - 6. Methods to detect the presence or release of chemicals.
 - 7. The physical and health hazards of chemicals in laboratory work areas.
 - 8. Measures to protect employees from these hazards, including:
 - a. Standard operating procedures
 - b. Work practices
 - c. Emergency procedures
 - d. Personal protective equipment
 - e. Details of the chemical hygiene and hazard communication plan
- C. The PPRL Safety Team and the supervisor are responsible for conducting the training sessions which will consist of lectures, videotapes, protocols, etc. Outside trainers (especially USU EH&S instructors) will also be used. An outline of the training program is in Appendix A.
- D. Each employee will sign a form documenting when they have received and understood the necessary training. Written tests may be used to evaluate the

effectiveness of such training.

- E. The research scientist is responsible for developing standard operating procedures and doing the risk assessment; the PPRL Safety Team is responsible for training on general lab procedures.

V. CHEMICALS OF UNUSUAL HAZARD POTENTIAL

Certain laboratory procedures which present a serious chemical hazard include work with select carcinogens, teratogens, and acutely hazardous chemicals. A large part of the research at PPRL is with plants known or suspected to be poisonous to animals. The hazards to humans are not always known. Therefore, assume the plant to be hazardous until proven otherwise (wear protective equipment, receive regular medical exams, etc.). In addition, herbicides are used for some experiments and for weed control on the PPRL grounds. Follow label directions for correct handling, use, and disposal. Chemicals known to be hazardous that are currently used (on an occasional basis) include:

- A. Select carcinogens: benzene, chloroform, dichloromethane, 17 β -estradiol, formaldehyde, hydrazine sulfate, progesterone, testosterone
- B. Teratogens/reproductive toxins: aminopterin, methotrexate, 6-aminonicotinamide, hydrocortisone, testosterone
- C. Acutely toxic: formaldehyde, certain plant alkaloids

VI. MEDICAL CONSULTATION AND EXAMINATION

PPRL shall provide, to affected employees, medical attention including follow-up examinations which the employee's physician determines are necessary under the following circumstances:

- A. Whenever an employee develops signs and symptoms associated with a hazardous chemical to which they may have been exposed or a work condition, the employee shall be provided an opportunity to receive appropriate medical examination.
- B. Where exposure monitoring reveals an exposure level routinely above the OSHA action level or PEL for OSHA-regulated substances for which there are medical monitoring and medical surveillance requirements, medical

surveillance shall be established for that employee. Our laboratory currently uses formaldehyde, methylene chloride, and methanol and, infrequently, benzene; all of these have a separate OSHA standard with medical surveillance requirements (information located in Safety Files).

- C. Whenever an event takes place in the work area, such as a spill, leak, explosion, personal injury, or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. This consultation is for the purpose of determining the need for a medical examination. Notify the Safety Team of such occurrences so they may provide the physician or other emergency response personnel with pertinent information. This also allows the Safety Team to maintain an accurate record of all exposures or incidents.
- D. All medical examinations and consultations are provided by the employee's physician or by an occupational health clinic. All aspects of these examinations are provided by a licensed physician or supervised by a licensed physician. These examinations are provided without cost to the employee, without loss of pay, and at a reasonable time and place.
- E. The supervisor or Safety Team will provide the following information to the physician:
 - 1. Identity of the hazardous chemical the employee may have been exposed to.
 - 2. A description of the conditions of the exposure, including exposure date if available.
 - 3. A description of signs and symptoms of exposure that the employee is experiencing (if any).
- F. The written opinion that PPRL receives from the physician shall include:
 - 1. Recommendations for future medical follow up.
 - 2. Results of examination and associated tests.
 - 3. Any medical condition revealed which may place the employee at increased risk as the result of a chemical exposure.
 - 4. A statement that the employee has been informed by the physician of the results of the examination/consultation and told of any medical conditions that may require additional examination or treatment.
- G. The material returned to PPRL by the physician shall not include specific findings and diagnoses which are unrelated to occupational exposure.

VII. RESPONSIBILITIES UNDER THE CHEMICAL HYGIENE PLAN

The Safety Team shall nominate the Chemical Hygiene Officer (CHO); the Research Leader will appoint the CHO. Responsibility for chemical hygiene rests at all levels. The supervisor is responsible for choosing protocols that pose the least risk to workers; the technician is responsible for developing safe work habits and following established operating procedures. The Chemical Hygiene Officer is responsible for monitoring the procurement, use, and disposal of chemicals in the lab; knowing the current legal requirements concerning regulated substances; developing ways to improve the chemical hygiene program; and helping research scientists develop precautions and adequate facilities.

VIII. HAZARD COMMUNICATION

Under 29 CFR 1910.1200, OSHA established certain requirements for communicating hazards associated with chemical products to the user. All chemical containers must be labeled as to the contents, any hazards, and appropriate first aid procedures. This standard also requires that supervisors communicate any physical hazards associated with the work environment to the employee. All employees at PPRL will receive the same general training as outlined in Appendix A. Job hazard analyses/risk assessments will be performed for all work areas and procedures. Copies of these will be kept by the supervisors and in the Safety Files. Refer to the Hazard Communication Plan for more information.

CHAPTER TWO

OFFICE SAFETY/ERGONOMICS

Hazards exist in the office and should be recognized and eliminated. Since the office workers are in the same building as the chemical laboratories, exposure to chemical hazards can occur. Physical hazards (electrical, repetitive motion) also exist. Office personnel should be familiar with the PPRL Safety Plan and recognize possible hazards. Areas where chemicals are handled should be avoided by the office workers. Chemical use or storage is not permitted in the office areas.

Office workers must read the operation manuals for the equipment and follow the guidelines for safe use. The majority of equipment used is electrical and certain precautions must be taken. Don't store water sources next to electrical outlets or equipment; if they leak or spill, a shock hazard can exist. Properly ground all equipment. Don't overload circuits. If cords must be run across a traveled area, have them in a cord protector to keep people from tripping over them and causing themselves, and the equipment, harm. Consider rearranging the office to avoid this. Static electricity, especially in carpeted rooms, is a special concern. Install static guards to prevent static electricity discharges that can harm personnel, equipment, or software.

File cabinets often cause injuries when more than one drawer is opened at a time or when a drawer is left open while not in use. Load file drawers from the bottom up to decrease the risk of tipping a loaded file cabinet on yourself. Shelves should be loaded with the heavier items at or below waist level, depending on shelf height. Heavy items should not be placed on top shelves since there is a greater risk of the items falling on personnel or causing muscle strain when trying to lift them down.

Many office practices involve repetitive motions such as typing at a keyboard or using a mouse. Make sure the chair is at the correct height (feet resting on the floor, back supported properly). When using the computer keyboard or mouse, adjust the height so your wrists are level with your elbows. Use wrist supports. Adjust the monitor to relieve eye and neck strain; avoid light glaring off the screen or strong backlighting of the monitor. Take breaks every hour: stretch and flex your arms, legs, and neck; walk around for a few minutes. More guidelines and suggested exercises are found in the Safety File folder labeled 'Ergonomics'. An online training program for office safety is available; see Terrie for details.

CHAPTER THREE

VEHICLE AND EQUIPMENT SAFETY

1. Vehicle Safety (car, truck, pickup, trailer)

Every employee of PPRL will, at some time, probably be required to operate a government vehicle. Adherence to all road and traffic rules shall be observed. When operating a government-owned vehicle, the individual is responsible for its care. All employees operating government-owned vehicles must have a valid driver's license and be qualified to operate the vehicle. Except in emergency situations, no unauthorized or non-government employee shall be permitted to operate or ride in the vehicle. No smoking is permitted in government vehicles. Drug or alcohol use will not be tolerated. Drunken driving is the leading cause of automobile fatalities in the country. Any employee who uses drugs or alcohol while operating a vehicle on official business will be terminated.

Seatbelts are installed in all vehicles. Use them any time you are operating the vehicle, even for short trips up to campus or down to the motor pool. Never carry more passengers than seatbelts unless it is an emergency situation. It is the driver's responsibility to insure that all passengers are using seatbelts.

Gooseneck trailers and sheep camps are often used in the field research of PPRL. The supervisor or Vehicle Officer will check that employees using such equipment are familiar with and qualified in its operation.

Before taking any vehicles, each employee should perform a basic check of that vehicle's worthiness. At a minimum, visually check the condition of the tires and make sure you have enough fuel in the vehicle. When taking vehicles and other equipment out in the field or on extended trips, make sure all necessary tools, repair supplies, first aid/emergency kits, etc. are present. Clean out the vehicle, trailer, etc. when you return from your trip. Make arrangements with the Vehicle Officer for refueling and any necessary servicing on the vehicle or refuel it yourself at the USU Motor Pool.

Any defective equipment on the vehicle (low tires, burned out lights, old wiper blades, leaks, chipped windshields, etc.) must be reported and repaired immediately. Report such things to the Vehicle Officer for PPRL. Any accidents must be reported promptly to the appropriate law enforcement personnel and to the Research Leader. In addition to reports filed with the highway patrol or city police officers, an accident report form (see Appendix B) must be filed. These forms are located in the vehicles or can be obtained from Pat.

2. Farm Equipment (tractors, loaders, scrapers, grinders)

Tractors with loaders or scrapers are used on a regular basis for feeding animals, transporting animals and plants, cleaning pens, and grinding plant material. Employees must be trained and qualified to use this equipment; the Vehicle Officer will ensure that this training has occurred. Tractors with loaders are especially unstable. Operators must be aware of the need for proper loading and weight distribution for safe operation. Check the hydraulic

system for leaks before operating the equipment. Seatbelts are provided; use them. Hearing protection is also available.

Grinders are used to process dried plant material for use in PPRL research programs. The PTO must be properly guarded and precautions taken when plant is being ground. Operate the equipment in a well-ventilated area, preferably outdoors. Wear appropriate protective apparel (gloves, mask or respirator, eye protection, and coveralls are required). Do not wear baggy clothes while operating the grinder or any equipment where the clothing could be caught in a rotating or moving part of the equipment.

3. Other Equipment

A variety of equipment is used throughout the laboratory for research purposes. Before using an unfamiliar piece of equipment, read the instruction manual. Ask a person who is familiar with the machine to train you in its basic operation. Instruction manuals for most of the equipment are located either next to the machine or in the files in the lab the machine is in.

At times, people from outside the lab will be using the equipment (grad students, cooperating researchers, etc.). Once they have been given permission to use the equipment (from the Research Leader), they must also read the Safety Plan and know where and how to report emergencies, spills, or other accidents. Their contact person is responsible for this training and for making sure they clean up afterwards and that they follow the established waste disposal procedures.

CHAPTER FOUR

SAFE HANDLING OF ANIMALS

Safe handling of animals is necessary to prevent injuries to both animals and people and to perform the research in an acceptable manner. Properly restrain the animal before trying to collect blood or administer plant material. The animal must be restrained to reduce the likelihood of injury to itself or the people working with it. Don't get hands caught between the animal and the chute or tangled up in the halter. Release the animal only when people are out of the way of a swinging head or the animal's path to the pen.

Working with the small animals (rats, mice, hamsters, rabbits) requires much the same guidelines. Properly restrain the animal so it cannot bite or scratch while it is being treated.

Report animal bites immediately to your supervisor and/or the Safety Team and obtain medical care (disinfection, tetanus shot, etc.). See the Biosafety Plan (Safety Plan binder) for more information.

Protective equipment is provided: lab coats, respirators, gloves, coveralls, rubber boots, steel-toed boots, etc. Contact your supervisor or a Safety Team member for obtaining your personal protective equipment; if a respirator is needed, you will need further training and a pulmonary function test before using it.

CHAPTER FIVE

RADIATION LABORATORY SAFETY

Radioisotope-labeled compounds are used in radioimmunoassay (RIA) kits to measure levels of reproductive hormones and other compounds. All radioisotope work will be done in Room 135. Radioisotopes are classified by type (i.e., particle size) and energy level. ^3H (or tritium) is a form of radiation known as a beta emitter; tissue damage is caused mainly when the labeled substance is ingested. The particle is low energy and large (comparatively speaking) and is easily stopped by unbroken skin. ^{125}I is a gamma-ray emitter and can penetrate further and cause more tissue and body damage than can ^3H or ^{14}C compounds. However, it also has a fairly short half-life (the amount of time necessary to decay one-half the radioactive material present). ^{125}I waste can be stored for 10 half-lives (or 20 months) and disposed of as chemical waste. Tritium has a much longer half-life and is usually disposed of by burial in an approved landfill or by incineration. Our approval to use radioisotopes is through USU and the state of Utah regulations.

1. Do not eat, store or prepare food, smoke, chew gum, or apply cosmetics in areas where radioactive materials are stored or used.
2. Avoid direct contact with radioactive materials by using protective clothing (lab coats, disposable gloves), safety pipettors, etc.
3. Determine safe working distances and shielding requirements before beginning work. We are licensed to use ^{125}I - and ^3H -compounds for analyzing biological samples. If you are wearing proper protective apparel (lab coat and gloves), you will be protected adequately.
4. A film badge may be worn when working with ^{125}I although it is not required..
5. All work should be done on bench tops (or in a radiochemical hood for volatile compounds) covered with absorbent paper to contain minor spills. Additionally, absorbent paper-lined plastic trays can be used if a procedure is more likely to cause spills.
6. Any spill of radioactive material must be reported immediately to either Kip or Terrie; they will determine the response level (see the USU Radiation Safety Handbook).
7. Liquid radioactive waste must be stored in properly identified containers until final disposal. Solid radioactive waste is stored separately from other waste. The yellow and magenta warning sign will be prominently displayed on all containers. **DO NOT** dispose of other trash in these containers.
8. Radioactive waste material is picked up by the USU Radiation Safety Tech as containers are filled.
9. Before leaving the laboratory after working with radioactive materials, wash your hands and monitor with the survey meter. All laboratory glassware and

equipment must be checked and decontaminated, if necessary, before use in the general lab.

10. Laboratory work surfaces must be monitored after each handling of radioactive material and these results kept in a permanent record for inspection.
11. Complete and accurate records of receipt and disposal of radioactive materials and laboratory surveys must be maintained. Terrie and Kip are responsible for recordkeeping and filing reports to USU.

For further information on regulations governing the use of radioactive materials, see the “USU Radiological Safety Handbook” (located in Room 135).

CHAPTER SIX

BIOLOGICAL SAFETY

PPRL uses a great deal of biological material in its research. This includes animal blood, fecal material, urine samples, and tissue collections. Plant material which contains toxic substances is also used on a regular basis. Several of the kits used in analyses include human source material such as serum calibrators. By wearing proper protective apparel and following safe handling procedures, risk is minimized.

If you have any cuts or abrasions, especially on your hands, wear gloves to keep out any biological fluid. Since blood and urine are already liquid, they can easily enter through broken skin and cause bacterial infections or transmit viral diseases. Plant dust, plant extracts, and fecal material will also transmit hazardous substances through broken skin. If there is a likelihood that you will be splashed in the eyes or on your face during a procedure, wear appropriate protection (goggles or face shield).

Puncture-resistant containers for disposal of used needles, razor and scalpel blades, other sharps, and used syringes are placed throughout the lab facility. Use them. To prevent any chance of contamination, these containers are autoclaved before disposal. Do not dispose of glass in general waste containers; put it in the containers for broken glass. Place biohazardous waste in the labeled bags and containers.

Dust from dried plant or fecal material is another hazard. Work with this material in a hood if at all possible. When grinding large amounts of plant, use the grinder outside and stay upwind. Wear dust masks or respirators, gloves, and other protective apparel (coveralls). See the SOP for grinding plant material for more information.

Dispose of used blood tubes (animal sources only) by placing them in a Ziploc bag or other plastic bag that can be sealed to prevent leakage of blood clots or serum and put in the general waste. Other biological samples that are not contaminated with hazardous material can also be disposed of through normal waste routes (at the present time, this does not violate any regulations or rules at the Logan Landfill). In certain cases, we are also able to use the incinerator at the State Diagnostic Lab.

If you will be working in areas with mice or their droppings (plant collections, field trials, cleaning buildings), take a few basic precautions. Spray down the area with a disinfectant; wear appropriate respirators and gloves. A copy of the USU bulletin on hantavirus is in the Safety Files. Although hantavirus pulmonary syndrome is fairly rare, take precautions. The two primary routes of exposure are through breathing dust from contaminated excreta or through a rodent bite. Another item to consider is that many rodents also carry the bacterium that causes plague; fleas on the rodent can transmit this to humans. Pest control measures should include control of fleas. For more information, read the Biosafety Plan in the Safety Plan binder.

CHAPTER SEVEN

EMERGENCY RESPONSE

The first consideration in any emergency is the safety of personnel; second is protection for research, equipment, facility, community, and environment. Emergency phone numbers are posted throughout the facility. When in doubt as to what course of action to follow, leave the area, call for help, then secure the area. Emergencies consist of fires, earthquakes, spills, explosions, and other laboratory accidents.

In general, render assistance to injured persons and remove them from exposure to further injury if necessary. If they are not in immediate danger, do not move them. Warn workers in adjacent areas of the hazard. Render first aid (CPR, wound treatment, washing under a safety shower, etc.) only if you will not place yourself in danger.

In the case of small fires, follow local rules for dealing with it. Portable extinguishers are placed throughout the facility to use for extinguishing such fires. Report any fire immediately so that trained assistance is summoned. Know how to use the extinguisher; courses will be offered annually (scheduled by the Safety Team). For any fire, contact the Logan Fire Department at 911 and the USU police at 797-1939.

Fires may create toxic smoke or chemical fumes that require the area or building to be evacuated. Be aware of this possibility before using a chemical or performing a procedure. Determine in advance how you will respond if a fire should occur. The Safety Team Leader or designate will inform the fire company chief of any hazardous chemical condition at the time of arrival. The Safety Team will work with the Fire Department to inform them of hazards they may possibly face if required to respond to a fire at PPRL.

For medical emergencies summon trained medical help immediately, either personnel with first aid training or an emergency squad. The Chemical Hygiene Plan (Chapter 1) lists the procedures to use for medical monitoring, treatment, exposure records, etc. All personnel are encouraged to attend First Aid and CPR courses as offered.

Accidental spills or releases of hazardous material will occur. Before you start using the hazardous material, determine how you will respond in the case of a spill. Know the hazard you will be dealing with and have spill response equipment in place. This equipment could be a broom and dustpan, sponge mop and bucket, spill control kit, or emergency spill response team. The MSDS will provide information on cleaning up spills. Read it. Report spills and releases to Terrie for proper recordkeeping and response. Refer to the Hazardous Materials Handling Plan for detailed procedures to follow in the case of a chemical spill.

Hazardous emergencies also occur due to loss of utility service (electricity, water), severe weather, or earthquakes. Loss of water affects the safety showers, eyewash stations, water-cooled apparatus, and water for cleanup. Loss of electricity affects all electrical equipment, as does the sudden return of power. The main lab is on an emergency backup generator, but there is an eight-second lag before it kicks in. Some equipment may not be

able to handle restarts without following a certain procedure. In those cases, special manual restarts must be installed so that once the equipment is off, it requires a person to restart it. Any hazardous laboratory work should be stopped until service is restored. In the case of severe weather, contact the Research Leader or your supervisor if you are unable to travel to the lab. Listen to the local radio stations for announcement of any closures at those times.

Drills will be held periodically for proper response to emergencies such as fire, hazardous chemical release, or earthquake. Emergency routes are posted throughout the facility; training will be given annually and when people are first hired to work at the facility. Don't wait until the emergency occurs before finding out how to evacuate.

Any accident resulting in property damage, lost time, or personal injury must be reported (see Appendix B). Forms for doing so can be obtained from Pat. Also let the Safety Team know so that the incident may be investigated and, if possible, the situation remedied. You also need to notify Lynn James (all incidents, building deficiencies, vehicle damage). All accidents must be investigated by the Safety Team or the Location Safety Committee. Near misses (those times when you say "Wow! That was close!") are also important; let the Safety Team or your supervisor know about these so changes in procedure, etc. can be made if necessary to avert a more serious outcome.

Emergency phone numbers are posted by all phones for reporting fires, accidents, and other emergencies (see Appendix C). An emergency response notebook has been prepared that includes maps of each room in each building, showing utility cutoffs, chemical and physical hazards, electrical equipment, and response equipment. Copies of this notebook have been distributed to university and community emergency response groups. Our copy is located with the other safety notebooks on the Safety Shelves.

CHAPTER EIGHT

EVACUATION PROCEDURES

Currently, PPRL has an emergency alarm system installed only in the new office and laboratory building and the headhouse. If an emergency occurs, let others in the area know by shouting what kind of emergency (chemical spill, fire). Leave the area, notify others and secure the area. Decide at that time if the surrounding rooms, the building, or the entire facility needs to be evacuated. In the case of fire, call the Fire Department first before attempting to control it, regardless of how minor the blaze may seem.

Evacuation routes for each building are posted in each room of each building. An outside assembly area for evacuated personnel is designated on each map. Visitors to the lab must be taken to the assembly area by the employee they are visiting. Roll call will be taken by the Safety Team Facilitator or designate to ensure that all personnel are accounted for. If time permits, close the doors as you leave. Close hood sashes and turn off electrical equipment.

Re-entry to laboratory areas will be allowed only after power has been restored and a suitable amount of time for ventilation of the area has occurred. The Safety Team and supervisor are to be notified of the situation.

All fires, regardless of size, will be reported to the Logan Fire Department (911). Small fires that can be easily extinguished without evacuating the laboratory should be handled by immediate use of a portable fire extinguisher if you feel comfortable in doing so. For larger fires, pull the alarm, evacuate the building, and call 911. The fire company chief will be told of any hazardous chemical situations at the time of his/her arrival by the Safety Team Facilitator or designate.

Drills will be held to practice emergency response. Lab work during a drill may continue in some areas with the approval of the Safety Team and Research Leader. Evacuation plans and emergency procedures will be reviewed annually or whenever work is begun in an area not previously covered.

CHAPTER NINE

SECURITY

Security is also a part of safety. If you are working after hours or away from the lab, proper security measures are a must. Locks are on the doors and gates to keep you safe from personal violence. Use the locks. When working at the facility, especially at night or on weekends, lock the gates and doors behind you. If you see someone you don't know in the buildings or on the grounds, ask them to identify themselves or call the USU Police Department. Make sure that areas you are responsible for are secured when you leave. Let the rest of the PPRL staff know when 'outsiders' will be working in the lab or at the facility.

Other animal research facilities in the valley have been vandalized and, in some cases, even bombed. Procedures have been established detailing what to do when a bomb threat is made. These are located in the Safety Plans Binder and by the secretary's phone.

Computer (as well as research files, etc.) security is also a concern. A tape backup system is available to make backup copies of all computer files. Large capacity disks are also available for backup records. These backups should be done on a regular basis and stored in a safe place (preferably off the facility) so that data, manuscripts, etc. could be recovered if necessary.

APPENDIX A

TRAINING PROGRAM FOR LABORATORY STANDARDS

- I. Occupational Exposure to Hazardous Chemicals in Laboratories standard (29 CFR 1910.1450), Hazard Communication Standard (29 CFR 1910.1200), and ARS Safety, Health, and Environmental Management Program (ARS Manual 230.0)
 - A. Content of the standards and appendices and ARS SHEM Manual
 - B. Location and explanation of the PPRL Safety Plan and associated policies and programs (hazardous materials program, respirator management, noise, etc.)
 - C. Location of reference materials and MSDS (material safety data sheets)

- II. Physical Hazards
 - A. Combustible, flammable, or explosive compounds
 - B. Compressed gas
 - C. Unstable compounds (peroxides)
 - D. Noise
 - E. Flying particles and pieces (drilling, grinding, etc.)
 - F. Crushing, pinching, and other impact hazards
 - G. Radiation (gamma, electromagnetic, etc.)

- III. Health Hazards
 - A. Local (irritants, corrosives)
 - B. Systemic (nervous, respiratory, and reproductive system effects)
 1. Toxins
 2. Carcinogens
 3. Teratogens
 4. Mutagens
 5. Acute/chronic
 - C. Sensitizers
 - D. Biohazards

- IV. Routes and Means of Exposure
 - A. Inhalation
 - B. Skin absorption (includes mucous membranes)
 - C. Ingestion
 - D. Gases, vapors, particulates (dust, mist)

- V. Dose

- A. Work practices (SOP, risk assessment, job hazard analysis)
 - B. Personal hygiene
 - C. Physical factors (weight, height, gender, etc.)
 - D. Administrative and engineering controls (hoods, substitution, etc.)
 - E. Duration of exposure
 - F. Exposure limits (PELs, TLVs, etc.)
 - G. Personal protective equipment
 - 1. When to use
 - 2. How to choose and use
 - 3. Fit tests
 - 4. Maintenance
- VI. Monitoring Exposure
- A. Air sampling
 - B. Personnel monitoring
 - C. Medical surveillance
- VII. Specific SOP's (Standard Operating Procedures)
- A. Using MSDS
 - B. Chemical inventory
 - 1. Ordering, using, and disposal of chemicals
 - 2. Who maintains records
 - C. Research protocols (IACUC, work records)
 - D. Hazardous waste management and disposal
 - E. Vehicles and equipment
 - 1. Qualified operators
 - 2. Trip reports/vehicle checklists
 - F. Emergency procedures
 - G. Reporting accidents, injuries, illnesses, and near misses
- VIII. Safety Concerns
- A. Safety-related responsibilities
 - 1. Supervisors
 - 2. Employees
 - B. Safety questions (who to ask)
 - C. Documentation of concerns
 - D. What to do if concerns are not addressed
 - E. Refusal to work

APPENDIX B

ACCIDENT REPORT FORMS

Claim for Damage, Injury, or Death - Standard Form 95

Federal Employee's Notice of Traumatic Injury and Claim for Continuation of Pay/Compensation - Form CA-1

Disability Benefits for Employees under FICA - Form CA-2

These forms (and any others needed) are available from the secretary (Pat) or from the Location Administration Officer (John Watterson).

APPENDIX C

EMERGENCY PHONE NUMBERS

EMERGENCY SERVICES : TELEPHONE NUMBERS

Logan Fire Department	:	911
USU Police Department	:	797-1939
Poison Control	:	800-456-7707
Cache County Environmental Health	:	753-5135
Utah Highway Patrol	:	752-1110
USU Safety Office	:	797-2892

OTHER CONTACTS : TELEPHONE NUMBERS

Lynn F. James	:	563-5979
Kip Panter	:	258-5349
Jason Tuttle	:	760-7760
Al Maciulis	:	245-4817

Chemical Emergency

Dale Gardner	:	563-0320
Terrie Wierenga	:	258-3777 or 770-9061

Always notify Lynn James immediately

ADDITIONAL INFORMATION

Name	:	USDA-ARS Poisonous Plant Research Laboratory
Street Address	:	1150 East 1400 North, Logan
Phone Number	:	752-2941

