USGS Missouri Cooperative Unit Chemical Hygiene Plan

The development and annual update of a **Chemical Hygiene Plan (CHP)** by the lab supervisor for each individual laboratory under his/her jurisdiction is required (29 CFR 1910.1450) by the Occupational Safety and Health Administration (OSHA). Please retain a hardcopy for immediate use by lab personnel and an electronic copy for your files.

Laboratory: Biological Laboratory of USGS Missouri Cooperative Unit – University of Missouri, Anheuser-Busch Natural Resources Building, room numbers: 24, 25, 26

Laboratory Supervisor: Craig Paukert (573-882-3524)

Laboratory Manager/Chemical Hygiene Officer (CHO): Danielle Fox (573-825-1488)

Approved By:

_____

(Signature of the Lab Supervisor)

Date: 18 August 2015
(Date this document was last reviewed and updated by the Lab Supervisor. With the addition of the required annual review and update a date change should be reflected with any addition of Lab personnel, operations etc. throughout the year.)

Emergency Numbers and Safety Contacts:

Laboratory Supervisor:	**Craig Paukert** (573) 882-3524
Environmental Health and Safety:	**Kevin Faskin** (573) 884-6668
Emergency Numbers:	**Police** (573) 874-7652 or 911 **Fire** 911

It is mandatory that all lab workers read the enclosed Chemical Hygiene Plan then initial the Training Log.

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CHEMICAL HYGIENE PLAN (CHP) RESPONSIBILITIES

1. Laboratory supervisor: The laboratory supervisor is assigned and has overall responsibility for chemical safety in the laboratory. The supervisor has the following specific responsibilities, as a minimum:

(a) Ensures that a CHP is prepared for the laboratory, employees know and follow the Plan, appropriate and proper personal protective equipment is available and used, and training has been conducted.
(b) Ensures that regular inspections are conducted and that substandard or hazardous acts or conditions are corrected.
(c) Ensures that good housekeeping practices are in effect and that equipment such as hoods, showers and eyewashes are in working order.
(d) Knows the current legal requirements of regulated chemicals and ensures that hazardous wastes are disposed of properly.
(e) Ensures that a chemical inventory is completed annually for those areas assigned.
(f) Reviews the Chemical Hygiene Plan annually to ensure that the Plan is up to date.

2. Laboratory Manager/Chemical Hygiene Officer (CHO):

(a) The CHO is responsible to verify that the laboratory supervisor performs all responsibilities.
(b) Assists employees in obtaining Safety Data Sheets.
(c) Identifies all unattended, overnight laboratory operations, reviewing and recommending failsafe devices or procedures designed to prevent an accident in the event of a component failure.
(d) Review and report all laboratory accidents involving hazardous materials and recommends steps to prevent recurrence of similar accidents.

3. Laboratory employee:

(a) Plans and conducts all laboratory operations in accordance with the Chemical Hygiene Plan for the laboratory.
(b) Participates in the completion of the annual chemical inventory.
(c) Practices good personal hygiene when working with hazardous chemicals, using required personal protective equipment and engineering controls.
(d) Make supervisor and others in authority aware of changing health/medical condition, which would make it necessary to reevaluate the Job Hazard for them. EXAMPLE- pregnancy.

Laboratory Operation: Room 24

Name of Lab: **USGS Missouri Cooperative Unit-University of Missouri**

Most of the activity in the laboratory is of a biological nature. Fish are measured and weighed. Critical swimming speed and hypoxia tests are run on fish. Temperature gradient tests are conducted on crayfish. Chemicals are used in hypoxia study (Sodium Sulphite Anhydrous), anesthetize fish (tricaine mesylate, MS-222), tank cleaning (acetic acid, bleach), water quality (ammonia, nitrate, nitrite, pH tests), laboratory maintenance (PVC pipe sealant, primer).

Potential Hazards for this laboratory:

1. Skin or eye irritation may occur if sodium sulfite anhydrous, bleach, or water quality chemicals are mishandled
2. MS-222 may cause irritation if inhaled
3. Electrical shock from hanging cords and open water

Laboratory Operation: Room 25

Name of Lab: **USGS Missouri Cooperative Unit-University of Missouri**

Most of the activity in the laboratory is of a biological nature. Fish are identified, categorized, and preserved in 70-90% ethanol or 10% formalin. Fish age structures (otoliths, fin rays, etc) are harvested.

Potential Hazards for this laboratory:

1. Diluting 95 – 100% ethanol to 70% ethanol. Ethanol is considered to be flammable; avoid use around open flames.

2. Use of 10% formalin may cause irritation in eyes, nose, throat, respiratory system; lacrimation (discharge of tears); cough; wheezing, dermatitis; [potential occupational carcinogen]. Formalin is considered a potential carcinogen and should be used in a well ventilated area (fumehood, etc).

3. Handling of fish tissues and fluids during dissection. All necessary PPE is required when conducting dissections (gloves, eye protection, lab coat).

Laboratory Operation: Room 26

Name of Lab: **USGS Missouri Cooperative Unit-University of Missouri**

Most of the activity in the laboratory is of a biological nature. Invertebrate species are identified, categorized, and preserved in 70-90% ethanol and eosin (dye). Hydrogen peroxide is used to separate invertebrates from dirt and debris.

Potential Hazards for this laboratory:

1. Diluting 95 – 100% ethanol to 70% ethanol. Ethanol is considered to be flammable; avoid use around open flames.

2. Hydrogen peroxide may be hazardous in case of eye contact (irritant). Slightly hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation (lung sensitizer). Non-corrosive for skin and eyes. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation.

A. CHEMICAL HYGIENE PLAN

1. General Guidelines for working with laboratory chemicals

    a) It is essential to minimize chemical exposure to the greatest extent possible. Because few laboratory chemicals are without hazards, precautions for handling all chemicals must be exercised. As a rule, skin contact with chemicals must always be avoided.
    b) Avoid an underestimation of risk. Exposure to laboratory chemicals must be minimized even for substances of no known significant hazard. Special precautions must be taken for substances with special health hazard risks. One must assume that any mixture of substances would be more toxic than either of its single components alone. One must also assume that all substances of unknown toxicity are toxic.
    c) Adequate ventilation must be provided. The best way to prevent exposure to hazardous substances is to prevent their escape into the atmosphere by use of fume hoods and other ventilation controls. Containers of volatile chemicals must be capped before and after contents are accessed
    d) Chemical storage areas must be annually inspected for outdated chemical stock and deteriorated, leaking, or broken containers. Such containers must be brought to the attention of the CHO and disposed of properly. All chemical substances that have the potential to become unstable with age must be disposed at the end of each school year, regardless of the quantity of each substance in inventory.

2. Protective apparel and equipment:

Personnel working in the laboratory should wear long pants and closed toe shoes, along with other appropriate attire. The wearing of shorts, open toed shoes, sandals, and loose fitting clothing is unacceptable. Protective equipment (eye protection and chemical resistant gloves) will be worn in the preparation of solutions involving ammonia, nitrite, nitrate, or bleach.

3. Signs and labels:

The eyewash station located in the sink (ABNR 24) is labeled. All primary and secondary bottles (i.e.: squirt bottles and storage jugs of diluted reagents) will be labeled.

4. Spills and accidents:

The major chemicals that concern this laboratory are: 1) bleach and ammonia; considered caustic chemicals which can cause burns on skin and eyes.

All laboratory personnel need to familiarize themselves with the appropriate spill kits prior to use. Use the same type of protective equipment and clothing to clean up spills as you use in the

preparation of the solutions. In case of small spills (less than 4 liters) use the appropriate spill kit to clean up the spill. Bag the contents of the spill into a sealable plastic bag and dispose into a collector (double containment). Notify the laboratory supervisor or the chemical hygiene officer if the laboratory supervisor is not available, about the spill. Document in writing the length of time to clean up the spill in case a medical follow-up is deemed necessary.

5. Emergency procedures:

Review the SOP on evacuation procedures posted on the main bulletin board in the hallway for all types of emergencies, and the evacuation route posted in hallway. Evacuation route is also posted in the laboratory and in the conference room. In case of an evacuation due to fire, or most other emergencies, use the closest safe exit available to you.

6. Laboratory storage:

1.6. Toxic substances must be segregated in a chemical storage cabinet off limits to unauthorized individuals.
1.7. Researcher must examine stored chemicals at least annually for replacement, deterioration and container integrity. Amounts will be stored in the smallest practicable quantity. Yearly inventories will be conducted and unneeded items will be disposed of properly.
1.8. Chemicals will be stored in accordance with accepted standards of compatibility. **Incompatibles must never be stored together.** An inventory list arranged alphabetically will be posted in the storage room. Safety Data Sheets will be arranged alphabetically and located in the storage room.
1.9. Do not store chemicals, reagents or apparatus on lab bench. Keep shelves organized with labels facing out.
1.10. Chemical storage shelves with closeable doors must be used for flammable and corrosive materials.
1.11. Sealed containers, such as for biological specimens, must be labeled, have an SDS, and employees must be trained in the hazard of the chemicals in the container. The label can be on the front of the cabinet or on the shelf under the containers providing the containers are always returned to the storage area at end of use.
1.12. Never store materials in aisle ways. Never store chemicals above eye level.
1.13. Stored waste will be labeled as to type of contents and located ABNR 25. No more than one container of waste per type must be stored at a time. Follow MU EHS Chemical Labeling instructions.
1.14. Fire control

- “Extinguishers" Suitable fire control devices, such as small hose or portable fire extinguishers, must be available at locations where flammable or combustible liquids are stored.
- "Sprinklers" When sprinklers are provided, they must be installed in accordance with 1910.159.
- "Open flames and smoking" Open flames and smoking must not be permitted in flammable or combustible liquid storage areas.
- “Water reactive materials" Materials which will react with water must not be stored in the same room with flammable or combustible liquids.

7. Waste disposal:

Identified unwanted hazardous material will be collected, segregated, stored and disposed of in compliance with all current local, state and federal regulations.

a) Contact Environmental Health and Safety (EHS) for proper disposal method
b) All containers of unwanted hazardous materials must be properly labeled and must be identified using the Hazardous Material Label (HML) http://ehs.missouri.edu/chem/labeling.html#hmls
c) All unwanted material must be kept in sealed containers at all times, unless you are actively pouring into the container
d) Do not mix incompatible unwanted hazardous material. Ensure the container is compatible with the unwanted hazardous material and use the appropriately sized container
e) Once a container is full, submit a Pick-Up Request Form (PURF) https://ehs.missouri.edu/haz/purf.html as soon as possible to arrange for a unwanted hazardous material disposal pickup

8. Maintenance and Cleanup:

Keep the laboratory clean. Generally the use of warm soapy water will be sufficient to keep counter tops clean, unless a spill occurs. If a spill occurs, follow the steps outlined in the spill kit.

9. Excess/ unusable Materials:

Keep excess of hazardous material to a minimum in the laboratory, and in the storage area.

Any chemicals that are either no longer used or have become outdated should be properly disposed. These items will be noted on an inventory as to what type of chemical was disposed, amount of chemical, date when chemical was picked up, and vendor or method.

10. Unattended operations:

It is the responsibility of the laboratory supervisor and personnel assigned to work in the laboratory to frequently check power cords or frays or other defects, monitor the oven for overheating.

11. General rules or procedures:

No horseplay, suctioning by mouth, or eating, drinking, or smoking will be permitted in the laboratory. Report all unsafe practices or conditions to the responsible supervisor or other authority. Other rules pertaining to laboratory safety are posted on the bulletin board in the laboratory.

B. CRITERIA TO REDUCE CHEMICAL EXPOSURES

1. Procurement and distribution: Before an extremely hazardous substance (e.g., high acute or chronic toxicity, class 1A flammable liquid, highly reactive chemical) is ordered, the supervisor will inform those who will be using the material on proper handling, storage, and disposal. Request a Safety Data Sheet (SDS) each time a different chemical is ordered. SDS are also available on the USGS Intranet Safety Home Page. Accept no container without an identifying label. If not in their original shipping containers, chemicals will be transported using a container such as a rubber acid bucket or other suitable device.

2. Chemical inventories: Conduct an annual chemical inventory of laboratory chemicals. A copy of the inventory will be kept in the laboratory, and electronic copies distributed to the Chemical Hygiene Officer and the Regional Safety Officer. The inventory will follow the format provided by the Regional Safety Officer. When chemicals are disposed of, ensure the inventory reflects the change appropriately.

C. EMPLOYEE INFORMATION AND TRAINING

1. Chemical Hygiene Plan:
   It is required that all lab personnel read, discuss with the lab supervisor, practice safety procedures listed within the CHP, and sign the training log within the CHP, signifying that they have read and understand the procedures and rules. All lab personnel must understand what to do in the event of an emergency, and where within the CHP to find hazard and/or chemical information, including MSDS information.

2. Frequency of training: Conduct laboratory safety training on a regular basis, integrating the training into the overall safety program. Employees using hazardous laboratory equipment or extremely hazardous chemicals will receive specialized training.

3. It is recommended that all persons working in this laboratory take a Laboratory Safety Course.

4. Requirements for Prior Approval of Laboratory Activities:

D. MEDICAL CONSULTATION

12. Seek medical consultation when an employee is exposed to a hazardous chemical due to failure of a laboratory hood or personal protective equipment, spill or other release, or environmental monitoring has determined the presence of an airborne contaminant above the recommended permissible exposure limit.
13. When medical consultation is required, provide the physician with specific information on the identity of the chemical, conditions under which the exposure occurred, and a description of the signs and symptoms of exposure.

E. FACILITY MAINTENANCE

1.1. Fire Extinguishers must be placed near escape routes and in areas of high hazards.
   1.1.1. The researcher in the room must conduct monthly visual inspections of fire extinguishers.
   1.1.2. The CHO must ensure that annual maintenance checks are conducted and records of annual inspections are maintain for one year after the last entry or life of the shell, whichever is less.
   1.1.3. Hydrostatic testing as required by 1910.157(f) must be performed and train personnel in the proper use of extinguishers.
   1.1.4. Employees expected to use extinguisher to put out incipient stage fires must receive training as required by 1910.157(g) initially and annually
   1.1.5. 1910.157 can be viewed on osha.gov, click on the regulations tab at the top of the page.
   1.1.6. Fire Extinguishers that are compatible with chemical hazards in the lab
1.2. Never block escape routes.
1.3. Never block a fire door opening.
1.4. Never store materials in aisle ways or on edges of counters.
1.5. Regularly inspect safety showers and eyewash stations to make sure they continue to be in working order and up to code.
1.6. Maintain records, whether it is monthly, quarterly, biannually or annually indicating inspections and/or changes to facility maintenance issues as stated by the CHP

F. GENERAL LABORATORY SAFETY

1.7. Review and understand the Chemical Hazards and Controls prior to beginning the lesson.
1.8. Do not smell or taste chemicals. Do not use chemical glassware as a container for food or drinks.
1.9. Never work alone in a science laboratory or storage area and do not allow students to work unsupervised.
1.10. Never eat, drink, smoke, chew gum, or tobacco in the laboratory environment.
1.11. Never store food in laboratory refrigerators.
1.12. Labels on incoming containers must not be defaced. Labels that have become difficult to read must be replaced.
1.13. Hazardous waste containers must be clearly marked as to type of contents, i.e. solvents, to prevent incompatible chemical mixtures. Containers must be closed unless in use.
1.14. Never pipette liquids by mouth.
1.15. Restrain loose clothing, long hair, and dangling jewelry. Students or researchers with skin exposed above the knee must wear a lab coat or apron when handling any hazardous chemical.
1.16. Never leave heat source unattended (gas burners, hot plates, mantels, etc.).
1.17. Do not mix chemicals in the sink drain or discard down drain
1.18. Always inform co-workers of plans to carry out hazardous work.
1.19. Avoid horseplay, practical jokes, and any other distracting behavior. Students are not allowed to take chemicals outside of the classroom setting.

1.20. Clear work area of non-required material and plan appropriate protective procedures and positioning of equipment before beginning any new operation. Be alert to unsafe conditions and correct them when detected.
1.21. Exercise great care in noting odors or fumes. Use a wafting motion of the hand to note a small amount of odor.
1.22. Use equipment only for its designated purpose. Use the fume hood when working with chemicals or process with potential for emitting harmful vapors.
1.23. Always add concentrated acid into water. Use care as it may splash out, and it generates a large amount of heat. Use concentrated acids in the fume hood.
1.24. Wear safety equipment as required on Personal Protective Equipment Hazard Assessment for the lesson.
1.25. Wash hands before and after work, and after spill cleanups.
1.26. Report all accidents, injuries, or near misses to researcher or the CHO.
1.27. Always keep work area clean and keep combustible material away from open flames.
1.28. Keep chemical containers and glassware well back of the edge of the bench or counter.
1.29. Know the location and how to use all the safety equipment in the laboratory.

G. EQUIPMENT

1.1. The facility provides adequate, well-ventilated classrooms, laboratory fume hoods, and sinks.
1.2. Other safety equipment includes eyewash stations and drenching showers.

H. VENTILATION

1.3. Modifications: Any alterations to the ventilation system must be made only by qualified personnel (HVAC engineer), and if testing indicates that worker protection from airborne toxic substances will continue to be adequate.
1.4. Fume Hoods
- Laboratory fume hoods during use must be operated with a minimum average 100 feet per minute face velocity at full open sash or sash stop position.
- When determining the minimum flow rate through the fume hood, the sash stop position may not be lower than 18 inches above the work surface.
- When operating the fume hood, the sash should be positioned to maximize the protection to the user.
- Vertical sash fume hoods operated at sash stop positions must have an alarm that gives a warning when the sash is raised above the sash stop position. Unless the flow rate is 100fpm average at full open sash position.
- Combination vertical/horizontal sash fume hoods must have an alarm that gives a warning when the sash is vertically raised from the fully lowered position.
  - ✓ Testing. Operable fume hoods must be tested annually for 100fpm minimum average face velocity.

I. CONTROL MEASURES: CRITERIA AND USE

1.5. Fume Hood:

1.5.1. Always use a fume hood when working with volatile substances, toxic vapors are produced, concentrated acids chemicals having a potential exothermic reaction, over flow and vapor or fume production, potential for exposures.
1.5.2. Never lean into the fume hood while hazardous chemicals are being used or when in use
1.5.3. Do not use the fume hood as a storage area or block the hood exhaust airflow
1.5.4. Verify that the exhaust system is operating before working in the hood. Taping a strip of paper, tissue, or ribbon at the face of the hood will indicate the direction of air flow
1.5.5. Regularly check the ventilation in hoods for proper airflow and that minimum flow alarm is in working order

1.6. Acids and Corrosives Cabinets:
1.6.1. Bottles of acid must be stored in an acid (corrosive) cabinet. While acids and bases are both considered to be corrosive, care must be taken to not store acids and bases in the same cabinet. It is particularly important to avoid storing ammonium hydroxide and strong mineral acids in the same cabinet
1.6.2. Oxidizing acids, such as nitric acid, must be stored separately, in a secondary container within an acid cabinet
1.6.3. Polypropylene boxes for use in acid cabinets are available commercially

1.7. Flammable Storage Cabinets:
1.7.1. Where incompatible flammable chemicals must be stored in the same cabinet steps will be taken to prevent mixing if containers leak or spill, such as placement in separate dish pans
1.7.2. Must not be used for non-flammable items

1.8. Disposal:
1.8.1. Liquid waste is segregated by compatibility containers are labeled as required in the Waste Disposal section. Containers are located ABNR 25
1.8.2. Liquid or soluble waste that can be disposed of down the sink drain must be discarded while the water is run at sufficient volume to dilute the substance as needed but not to create splashing of the concentrated substance outside of the sink
1.8.3. Flammable or combustible waste material and residues must be kept to a minimum, stored in closed metal waste cans, and disposed of daily

1.9. Heat:
1.9.1. Where heat is applied or generated only heat resistant glassware must be used
1.9.2. Sufficient goggles for splashing and heat resistant gloves must be provided
1.9.3. Protective heat resistant pads must be supplied to prevent direct contact with books or bench tops
1.9.4. Tongs or other mechanical means must be provided to allow manipulation of material or contents without contact.

J. STANDARD OPERATING PROCEDURES

14. PROCUREMENT

1.15. Before a new chemical is purchased:

1.15.1. Obtain and read the **Safety Data Sheet** for each hazardous chemical

1.15.2. When possible, a less hazardous chemical must be substituted

1.15.3. The minimum quantity necessary must be calculated and as close to that amount as possible must be purchased

1.15.4. Particularly hazardous chemicals (highly toxic, carcinogens, reproductive toxins, etc) will not be used without permission of the Chemical Hygiene Committee and/or the CHO, obtaining and/or implementing specific engineering and work practice controls and PPE as required by 1910.1450(e)(3)(viii)

1.15.5. Available PPE must be evaluated for resistance to the new chemical. If it is not sufficient either it must not be purchased or PPE known to be resistant to the chemical must be purchased, employees using the new chemical must be trained in the hazards and PPE. This must be completed prior to use of the chemical

1.15.6. Each individual researcher will be responsible for ordering the chemicals needed to perform their desired labs

1.15.6.1. Sealed containers, such as for biological specimens, must be labeled, have an SDS, and employees must be trained in the hazard of the chemicals in the container

1.15.6.2. Food items used in experiments must be clearly marked as “not for food use” and must have an SDS, where possible, for safe storage and use

K. STORAGE

1.16. Toxic substances must be segregated in a chemical storage cabinet off limits to unauthorized individuals.

1.17. Researcher must examine stored chemicals at least annually for replacement, deterioration and container integrity. Amounts will be stored in the smallest practicable quantity. Yearly inventories will be conducted and unneeded items will be disposed of properly.

1.18. Chemicals will be stored in accordance with accepted standards of compatibility. **Incompatibles must never be stored together.** An inventory list arranged alphabetically will be posted in the storage room. Safety Data Sheets will be arranged alphabetically and located in the storage room.

1.19. Do not store chemicals, reagents or apparatus on lab bench. Keep shelves organized with labels facing out.

1.20. Chemical storage shelves with closeable doors must be used for flammable and corrosive materials.

1.21. Sealed containers, such as for biological specimens, must be labeled, have an SDS, and employees must be trained in the hazard of the chemicals in the container. The label can be on the front of the cabinet or on the shelf under the containers providing the containers are always returned to the storage area at end of use.

1.22. Never store materials in aisle ways. Never store chemicals above eye level.

1.23. Stored waste will be labeled as to type of contents and located ABNR 25. No more than one container of waste per type must be stored at a time. Follow MU EHS Chemical Labeling instructions.

1.24. Fire control

1.24.1. “Extinguishers" Suitable fire control devices, such as small hose or portable fire extinguishers, must be available at locations where flammable or combustible liquids are stored.

1.24.2. "Sprinklers" When sprinklers are provided, they must be installed in accordance with 1910.159.

1.24.3. "Open flames and smoking" Open flames and smoking must not be permitted in flammable or combustible liquid storage areas.

1.24.4. “Water reactive materials" Materials which will react with water must not be stored in the same room with flammable or combustible liquids.

L. DISTRIBUTION FROM STORAGE AREA

1.25. When bulk quantities of chemicals are hand carried, the container will be placed in a bottle carrier or bucket.

1.26. When the need for the container has been concluded it must be returned to the storage area.

M. USE

1.27. Must be in compliance with the General Guidelines for Working with Laboratory Chemicals in Part II of this Plan.

1.28. Prior to performing a new procedure develop and implement safe work practices and emergency procedures, including the availability of engineering controls and PPE

1.29. Where changes are needed, CHO must be notified.

1.30. If a chemical is newly deemed particular hazardous chemicals (carcinogens, reproductive toxins, etc).

N. AIR MONITORING

1.31. Where required by an expanded OSHA standard air monitoring must be conducted.

1.32. Where there is potential for exposures to exceed exposure limits evaluation of new engineering controls, replacement of the chemical or process must be considered.

1.33. Where exposures still potentially exceed limits, air monitoring must be conducted.

1.34. Where air monitoring data shows an exposure above a limit the procedure must be discontinued until employee protection is developed and implemented.

O. HOUSEKEEPING

1.35. Formal housekeeping and inspections will be performed as defined in the plan

1.36. The purpose of this is to identify new or unforeseen hazards, assess control measures, and to ensure that the safety equipment is used and procedures are followed and maintained

1.37. Where control measures are found to be insufficient additional measures, such as ventilation, modified work practices or additional personal protective equipment must be obtained or developed and implemented.

P. PROTECTIVE EQUIPMENT AND APPAREL

1.38. PPE may include but not limited to the following.

1.38.1. Face shield or Safety glasses/goggles that meet ANSI Z87.1 Standards. Wear chemical safety goggles with face shield when using large quantities, or chemical safety goggles when using small quantities of liquids, safety glasses for solids.

1.38.2. Hair ties will be required to contain long hair. Floppy clothing must be restrained, either by wearing a lab coat or by other means.

1.38.3. Feet must be adequately covered to protect them from chemical hazards. Sandals or open toed shoes will not be allowed in the lab. Splashes of chemicals to shoes or clothing must be cleaned off immediately.

1.38.4. Wear a lab coat and/or rubber, neoprene, or PVC apron when using large quantities and splash potential exists. Lab coats and aprons must be discarded if damaged sufficiently to reduce protective quality.

1.38.5. The hazard assessment must be done in compliance with the OSHA standard on general requirements for personal protective equipment (29 CFR 1910.132).

1.38.6. Gloves are required to avoid skin contact with chemicals where burns or absorption of the material is possible. Change gloves after use or after chemical splashes.

1.38.7. Remove, rinse, or replace contaminated gloves before taking off safety glasses, using a writing implement, answering the phone, etc.

1.38.8. Never leave the laboratory with PPE on, especially contaminated PPE.

Q. SIGNS AND LABELS

1.39. Emergency telephone numbers will be posted in labs

1.40. Identifying labels must show contents of containers and associated hazards, including waste containers.

1.41. Signs to distinguish areas where food and beverages are prohibited and warnings at areas where unusual hazards exist will be posted.

1.42. Doors leading to a room, where chemicals are stored, will have the types of hazards, such as air reactive, associated with the chemicals being stored.

1.43. Label all chemicals accurately with date of receipt or preparation and any other precautionary information for handling.

1.44. Never use a reagent until the label has been read and contents checked.

R. RECORDS

1.45. Must be maintained by CHO and kept in ABNR 25.
1.46. Accident reports will be written and retained for all accidents involving injuries, property damage and near misses by chemical, biological or environmental exposure or improper handling.
1.47. Failure of engineering controls, PPE, containers, or safe work practices must be recorded and reviewed for accident prevention purposes by the Chemical Hygiene Committee and/or the Chemical Hygiene Officer.
1.48. Data from measurement of employee exposure or employee work areas and any medical consultations and exams that are conducted must be stored for the duration of employment plus 30 years.

S. INCIDENT CLEAN-UP PROTOCOL

1.49. Prompt response to chemical spills is critical to protect student and worker health & safety and to mitigate adverse effects to the environment. Familiarize, update and follow the following protocol.

1.50. For small spills, 30 ml of hazardous chemical or less, the researcher must clean up if the perceived risk is low.
  1.50.1. Notify CHO and have personnel in the area restricted access. If volatile materials are involved building manager (ABNR 103) must be notified to go to 100% outside air or turn off the HVAC to prevent contamination of recycled air.
  1.50.2. Eliminate all sources of ignition and turn off equipment if it is possible to do so safely.
  1.50.3. Review the SDS for the spilled material, or use your knowledge of the hazards of the material to determine the appropriate level of protection.
  1.50.4. Wear gloves and protective eyewear. Do not attempt cleanup if you feel unsure of your ability to do so or if you perceive the risk to be greater than normal laboratory operations. Cover spill with sodium carbonate or bicarbonate, or material in the spill kit. When reaction stops pickup with damp sponge or paper towels and put the contaminated absorbent in a labeled hazardous waste container.
  1.50.5. Spill kits must be applicable to the hazards and kept stocked by CHO.

1.51. If greater than 30 ml, or if it will take longer than 15 minutes for you to clean-up,
  1.51.1. Evacuate students, turn off equipment and take SDS book with you on the way out.
  1.51.2. Immediately call **CHO** to report the spill, and help with proper cleanup and disposal procedures.
  1.51.3. The CHO and researcher must restrict access to the area.
  1.51.4. The CHO must contact **EHS** for the cleanup and disposal of hazardous chemicals.

1.52. Incident Reporting & Follow-up:

1.52.1. Report all occupational injuries or illness to CHO as soon as possible. **CHO** or laboratory personnel must document the incidence and file with CHO.
1.52.2. Personnel are encouraged to report "near misses" as they are considered a precursor to actual incidents.
1.52.3. *Researcher and CHO* are to conduct (or coordinate) an investigation of all incidents and "near misses." The goal of the investigation is to identify and address any cause and avoid recurrence

APPENDIX A: JOB HAZARD ANALYSIS

JOB HAZARD ANALYSIS	**JOB ACTIVITY**: Working with Compressed Gas Cylinders	
BASIC JOB STEPS	HAZARDS	SAFE JOB PROCEDURE
1. Bringing compressed gas cylinders into the laboratory for the first time 2. The exchange of empty cylinders with filled cylinders 3. The proper use of a compressed gas cylinders in the laboratory	1. High pressure gas release, tipping over of cylinder 2. Incompatibility, leaking cylinders, tipping over of cylinders	1. Use a cylinder cart with security chain when transporting cylinders. Move cylinder with protective cap in place. Use proper lifting techniques to protect back from twisting and strain. 2. Ensure cylinder is secured tightly to wall or bench mount before removing protective cap. Review and use proper procedures to attached regulator. Wear safety glasses when opening regulator and to bleed the lines when switching out cylinders. 3. Check for leaks around the neck and valve using a leak detector before storing cylinders. Replace any cylinders that are leaking. Secure cylinders in proper cylinder cages with safety chains to prevent tipping. Do not store incompatible cylinders together. They must be stored at least 20 feet apart unless a fire wall exists between each cylinder cage. View safety video on compressed gas cylinders. 4. View safety video on compressed gas cylinders. View safety video on compressed gas cylinders.

APPENDIX B: DEFINITIONS

a. Caustics - a substance that capable of destroying or eating away by chemical action.

b. Combustible Liquids - A liquid having a flash point at or above 100 degrees F (37.8 degrees C) but below 200 degrees F (93.3 degrees C).

c. Compressed Gases – 1. A gas or mixture of gases having in a container, an absolute pressure exceeding psi at 70 F (21.1 C) or; A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 F (54.4 C) regardless of the pressure at 70 F (21.1 C) or; A liquid having a vapor pressure exceeding 40 psi at 100 F (37.8 C) as determined by ASTM D-323-72.

d. Extremely Hazardous Chemical – Any of the 406 chemicals identified by the EPA on the basis of toxicity, and listed under SARA Title III.

e. Flammable Liquid, Class 1A - Any chemical with a flashpoint below 73 degrees Fahrenheit and a boiling point below 100 degrees Fahrenheit.

f. Flashpoint - The minimum temperature at which a liquid gives off a vapor in sufficient concentration to burn in the presence of any ignition source.

g. Hazardous Chemicals - Any chemical that, upon exposure, is known or can reasonably be expected to produce acute or chronic physiological harm, for example corrosives, carcinogens, combustibles, water reactive, etc…

h. Hazardous Materials – Chemicals that fit within any of the hazard classes: Explosives, flammables, oxidizing materials, corrosives, gases, poisons, radioactive substances and agents capable of causing disease.

i. Hazardous Substances – Substances which are deemed to pose imminent and substantial danger to public health and welfare; for example hazardous wastes, water pollutants, air pollutants, and substances that risk damage to the environment.

j. Hazardous Waste – Hazardous waste displays any of the four regulated hazardous characteristics: ignitability, corrosivity, reactivity, and toxicity.

k. JHA (Job Hazard Analysis) – A listing of the job activities, basic job steps, hazards, and safe job procedures of the laboratory which is included in the CHP.

L. Laboratory - Any workplace where relatively small quantities of chemicals are used in a nonproduction basis, multiple chemical procedures or chemicals are used, and protective practices and equipment are available and in common use to minimize exposure to chemicals.

M. Oxidizers - A chemical other than a blasting agent or explosive that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

N. Perchloric Acid - a fuming corrosive strong acid $HClO_4$ that is the most highly oxidized acid of chlorine and a powerful oxidizing agent when heated.

O. Permissible Exposure Limit (PEL) - The concentration of a chemical that one can be exposed for 8 hours per day, 40 hours per week. (See 29 CFR 1910.1000 for existing PEL's.)

P. Select Carcinogen - Any chemical or substance that is known or reasonably expected to cause cancer in humans as recognized by the National Toxicology Program (Department of Health and Human Services) or the International Agency for Research Cancer Monographs.

APPENDIX C: INCOMPATIBILITY OF COMMON LABORATORY CHEMICALS

When certain hazardous chemicals are stored or mixed together, violent reactions may occur because the chemicals are unsuitable for mixing, or are *incompatible*. Classes of incompatible chemicals should be segregated from each other during storage, according to hazard class. Use the following general guidelines for hazard class storage:

- Flammable/Combustible Liquids and Organic Acids
- Flammable Solids
- Mineral Acids
- Caustics
- Oxidizers
- Perchloric Acid
- Compressed Gases

Before mixing any chemicals, refer to this partial list, the chemicals' SDS's to verify compatibility:

CHEMICAL	INCOMPATIBLE CHEMICAL (S)
Acetic acid	aldehyde, bases, carbonates, hydroxides, metals, oxidizers, peroxides, phosphates, xylene
Acetylene	halogens (chlorine, fluorine, etc.), mercury, potassium, oxidizers, silver
Acetone	acids, amines, oxidizers, plastics
Alkali and alkaline earth metals	acids, chromium, ethylene, halogens, hydrogen, mercury, nitrogen, oxidizers, plastics, sodium chloride, sulfur
Ammonia	acids, aldehydes, amides, halogens, heavy metals, oxidizers, plastics, sulfur
Ammonium nitrate	acids, alkalis, chloride salts, combustible materials, metals, organic materials, phosphorous, reducing agents, urea
Aniline	acids, aluminum, dibenzoyl peroxide, oxidizers, plastics
Azides	acids, heavy metals, oxidizers
Bromine	acetaldehyde, alcohols, alkalis, amines, combustible materials, ethylene, fluorine, hydrogen, ketones (acetone, carbonyls, etc.), metals, sulfur

Calcium oxide	acids, ethanol, fluorine, organic materials
Carbon (activated)	alkali metals, calcium hypochlorite, halogens, oxidizers
Carbon tetrachloride	benzoyl peroxide, ethylene, fluorine, metals, oxygen, plastics, silanes
Chlorates	powdered metals, sulfur, finely divided organic or combustible materials
Chromic acid	acetone, alcohols, alkalis, ammonia, bases
Chromium trioxide	benzene, combustible materials, hydrocarbons, metals, organic materials, phosphorous, plastics
Chlorine	alcohol's, ammonia, benzene, combustible materials, flammable compounds (hydrazine), hydrocarbons (acetylene, ethylene, etc.), hydrogen peroxide, iodine, metals, nitrogen, oxygen, sodium hydroxide
Chlorine dioxide	hydrogen, mercury, organic materials, phosphorous, potassium hydroxide, sulfur
Copper	calcium, hydrocarbons, oxidizers
Hydroperoxide	reducing agents
Cyanides	acids, alkaloids, aluminum, iodine, oxidizers, strong bases
Flammable liquids	ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Fluorine	alcohol's, aldehydes, ammonia, combustible materials, halocarbons, halogens, hydrocarbons, ketones, metals, organic acids
Hydrocarbons (Such as butane, propane benzene, turpentine, etc.)	acids, bases, oxidizers, plastics
Hydrofluoric acid	metals, organic materials, plastics, silica (glass), (anhydrous) sodium
Hydrogen peroxide	acetylaldehyde, acetic acid, acetone, alcohol's carboxylic acid, combustible materials, metals, nitric acid, organic compounds, phosphorous, sulfuric acid, sodium, aniline
Hydrogen sulfide	acetylaldehyde, metals, oxidizers, sodium
Hypochlorites	acids, activated carbon
Iodine	acetylaldehyde, acetylene, ammonia, metals, sodium
Mercury	acetylene, aluminum, amines, ammonia, calcium, fulminic acid, lithium, oxidizers, sodium
Nitrates	acids, nitrites, metals, sulfur, sulfuric acid

Nitric acid	acetic acid, acetonitrile, alcohol's, amines, (concentrated) ammonia, aniline, bases, benzene, cumene, formic acid, ketones, metals, organic materials, plastics, sodium, toluene
Oxalic acid	oxidizers, silver, sodium chlorite
Oxygen	acetaldehyde, secondary alcohol's, alkalis and alkalines, ammonia, carbon monoxide, combustible materials, ethers, flammable materials, hydrocarbons, metals, phosphorous, polymers
Perchloric acid	acetic acid, alcohols, aniline, combustible materials, dehydrating agents, ethyl benzene, hydriotic acid, hydrochloric acid, iodides, ketones, organic material, oxidizers, pyridine
Peroxides, organic	acids (organic or mineral)
Phosphorus (white)	oxygen (pure and in air), alkalis
Potassium	acetylene, acids, alcohols, halogens, hydrazine, mercury, oxidizers, selenium, sulfur
Potassium chlorate	acids, ammonia, combustible materials, fluorine, hydrocarbons, metals, organic materials, sugars
Potassium perchlorate (also see chlorates)	alcohols, combustible materials, fluorine, hydrazine, metals, organic matter, reducing agents, sulfuric acid
Potassium permanganate	benzaldehyde, ethylene glycol, glycerol, sulfuric acid
Silver	acetylene, ammonia, oxidizers, ozonides, peroxyformic acid
Sodium	acids, hydrazine, metals, oxidizers, water
Sodium nitrate	acetic anhydride, acids, metals, organic matter, peroxyformic acid, reducing agents
Sodium peroxide	acetic acid, benzene, hydrogen sulfide metals, oxidizers, peroxyformic acid, phosphorous, reducers, sugars, water
Sulfides	acids
Sulfuric acid	potassium chlorates, potassium perchlorate, potassium permanganate

APPENDIX D: LIST OF SELECT AND SUSPECTED CARCINOGENS

This list is provided as a guide and is not all inclusive. Carefully review safety data sheets before working with chemicals.

A-alpha-C
(2-Amino-9H-pyrido{2,3-b] indole)
26148-68-5

Acetaldehyde
76-07-0

Acetamide
60-35-5

Acetochlor
34256-82-1

2-Acetylaminofluorene
53-96-3

Acifluorfen
62476-59-9

Acrylamide
79-06-1

Acrylonitrile
107-13-1

Actinomycin D
50-76-0

Adriamycin (Doxorubicin hydrochloride)
23214-92-8

AF-2;
[2-(2-furyl)-3-(5-nitro-2-fur yl)]acrylamide
3588-53-7

Aflatoxins

Alachlor
15972-60-8

Aldrin
309-00-2

Allyl chloride
107-05-1

2-Aminoanthraquinone
117-79-3

p-Aminoazobenzene60-09-3

ortho-Aminoazotoluene
97-56-3

4-Aminobiphenyl
(4-aminodiphenyl)
92-67-1

3-Amino-9-ethylcarbazole hydrochloride
6109-97-3

1-Amino-2-methylanthraq uinone
82-28-0

2-Amino-5-(5-nitro-2-furyl)-1,3,4-thiadiazole
712-68-5

Amitrole
61-82-5

Aniline
62-53-3

ortho-Anisidine
90-04-0

ortho-Anisidine hydrochloride
134-29-2

Antimony oxide
(Antimony trioxide)
1309-64-4

Aramite
140-57-8

Arsenic (inorganic arsenic compounds)

Asbestos
1332-21-4

Auramine
492-80-8

Azaserine
115-02-6

Azathioprine
446-86-6

Azacitidine
320-67-2

Azobenzene
103-33-3

Benz[a]anthracene
56-55-3

Benzene
71-43-2

Benzidine [and its salts]
92-87-5

Benzo [b] fluoranthene
205-99-2

Benzo [j] fluoranthene
205-82-3

Benzo [k] fluoranthene
207-08-9

Benzofuran
271-89-6

Benzo [a] pyrene
50-32-8

Benzotrichloride
98-07-7

Benzyl chloride
100-44-7

Benzyl violet 4B
1694-09-3

Beryllium and beryllium compounds

Betel quid with tobacco

Bis(2-chloroethyl)ether
111-44-4

N,N,-Bis(2-chloroethyl)-2-naphthylamine (Chlornapazine)
494-03-1

Bischloroethyl nitrosourea (BCNU) (Carmustine)
154-93-8

Bis (chloromethyl) ether
542-88-1

Bitumens, extracts of steam-refined and air-refined

Bracken fern

Bromodichloromethane
75-27-4

Bromoform
75-25-2

1,3-Butadiene
106-99-0

1,4-Butanediol dimethanesulfonate (Busulfan)
55-98-1

Butylated hydroxyanisole
25013-16-5

beta-Butyrolactone
3068-88-0

Cadmium and cadmium compounds

Captafol
2425-06-1

Captan
133-06-2

Carbon tetrachloride
56-23-5

Carbon-black extracts

Ceramic fibers

Chlorambucil
305-03-3

Chloramphenicol
56-75-7

Chlordane
57-74-9

Chlordecone (Kepone)
143-50-0

Chlordimeform
115-28-6

Chlorendic acid
115-28-6

Chlorinated paraffins
108171-26-2

Chlorodibromethane
124-48-1

Chloroethane (Ethyl chloride)
75-00-3

1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea
13010-47-4

1-(2-Chloroethyl)-3-(4-methylcyclohexyl)-1-nitrosourea (Methyl-CCNU)
13909-09-6

Chloroform
67-66-3

Chloromethyl methyl ether
107-30-2

3-Chloro-2-methylpropene
563-47-3

4-Chloro-ortho-phenylene diamine
95-83-0

p-Chloro-o-toluidine
95-69-2

Chlorothalonil
1897-45-6

Chlorozotocin
54749-90-5

Chromium (hexavalent)

Chrysene
218-01-9

C. I. Acid Red 114
6459-94-5

C. I. Basic Red 9 monohydrochloride
569-61-9

Ciclosporin (Cyclosporin A; Cyclosporine)
59865-13-3;79217-60-0

Cinnamyl anthranilate
87-29-6

Cisplatin
15663-27-1

Citrus Red No. 2
6358-53-8

Cobalt metal powder
7440-48-4

Cobalt [II] oxide
1307-96-6

Conjugated estrogens

Creosotes
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para-Cresidine
120-71-8

Cupferron
135-20-6

Cycasin
14901-08-7

Cyclophosphamide (anhydrous)
50-18-0

Cyclophosphamide (hydrated)
6055-19-2

D&C Orange No. 17
346-83-1

D&C Red No. 8
2092-56-0

D&C Red No. 9
5160-02-1

D&C Red No. 19
81-88-9

Dacarbazine
4342-03-4

Daminozide
1596-84-5

Dantron (Chrysazin; 1,8-Dihydroxyanthraquinone)
117-10-2

Daunomycin
20830-81-3

DDD (Dichlorodiphenyldichloroethane)
72-54-8

DDE (Dichlorodiphenyldichloroethylene)
72-55-9

DDT (Dichlorodiphenyltrichloroethane)
50-29-3

DDVP (Dichlorvos)
62-73-7

N,N’-Diacetylbenzidine
613-35-4

2,4-Diaminoanisole
615-05-4

2,4-Diaminoanisole sulfate
39156-41-7

4,4’-Diaminodiphenyl ether (4,4’-Oxydianiline)
101-80-4

2,4-Diaminotoluene
95-80-7

Diaminotoluene (mixed)

Dibenz[a,h]acridine
226-36-8

Dibenz[a,j]acridine
224-42-0

Dibenz[a,h]anthracene
53-70-3

7H-Dibenzo[c,g]carbazole
194-59-2

Dibenzo[a,e]pyrene
192-65-4

Dibenzo[a,h]pyrene
189-64-0

Dibenzo[a,i]pyrene
189-55-9

Dibenzo[a,l]pyrene
191-30-0

1,2-Dibromo-3-chloropropane (DBCP)
96-12-8

p-Dichlorobenzene
106-46-7

3,3’-Dichlorobenzidine
91-94-1

1,4-Dichloro-2-butene
76441-0

3,3’-Dichloro-4,4’-diamino diphenyl ether
28434-86-8

1,1-Dichloroethane
75-34-3

Dichloromethane (Methylene chloride)
75-09-2

1,2-Dichloropropane
78-87-5

1,3-Dichloropropene
542-75-6

Dieldrin
60-57-1

Dienestrol
84-17-3

Diepoxybutane
1464-53-5

Diesel engine exhaust

Di(2-ethylhexyl)phthalate
117-81-7

1,2-Diethylhydrazine
1615-80-1

Diethyl sulfate
64-67-5

Diethylstilbestrol
56-53-1

Diglycidyl resorcinol ether (DGRE)
101-90-6

Dihydrosafrole
94-58-6

3,3’-Dimethoxybenzidine (ortho-Dianisidine)
119-90-4

3,3’-Dimethoxybenzidine dihydrochloride (ortho- Dianisidine dihydrochloride)
20325-40-0

Dimethylcarbamoyl chloride
79-44-7

1,1-Dimethylhydrazine (UDMH)
57-14-7

1,2-Dimethylhydrazine
540-73-8

Dimethylvinylchloride
513-37-1

1,6-Dinitropyrene
42397-64-8

1,8-Dinitropyrene
42397-65-9

2,4-Dinitrotoluene
121-14-2

1,4-Dioxane
123-91-1

Diphenylhydantoin (Phenytoin)
57-41-0

Diphenylhydantoin (Phenytoin), sodium salt
630-93-3

Direct Black 38 (technical grade)
1937-37-7

Direct Blue 6 (technical grade)
2602-46-2

Direct Brown 95 (technical grade)
16071-86-6

Disperse Blue 1
2475-45-8

Epichlorohydrin
106-89-8

Erionite

12510-42-8

Estradiol 17ß
50-28-2

Estrone
53-16-7

Ethinylestradiol
57-63-6

Ethyl acrylate140-88-5

Ethyl methanesulfonate
62-50-0

Ethyl-4-4’-dichlorobenzilate
510-15-6

Ethylene dibromide
106-93-4

Ethylene dichloride
(1,2-Dichloroethane)
107-06-2

Ethylene oxide
75-21-8

Ethylene thiourea
96-45-7

Ethyleneimine 151-56-4

Folpet
133-07-3

Formaldehyde
50-00-0

2-(2-Formylhydrazino)-4-(
5-nitro-2-furyl)thiazole
3570-75-0

Furazolidone
67-45-8

Furmecyclox
60568-05-0

Glu-P-1
(2-Amino-6-methyldipyrid
o[1,2-a:3',2'- d]imidazole)
67730-11-4

Glycidaldehyde
765-34-4

Glycidol
556-52-5

Griseofulvin
126-07-8

Gyromitrin (Acetaldehyde
methylformylhydrazone)
16568-02-8

HC Blue 1
2784-94-3

Heptachlor76-44-8

Heptachlor epoxide
1024-57-3

Hexachlorobenzene
118-74-1

Hexachlorocyclohexane
(technical grade)

Hexachlorodibenzodioxin
34465-46-8

Hexachloroethane
67-72-1

Hexamethylphosphoramid
e
680-31-9

Hydrazine
302-01-2

Hydrazine sulfate
10034-93-2

Hydrazobenzene
(1,2-Diphenylhydrazine)
122-66-7

Indeno [1,2,3-cd]pyrene
193-39-5

IQ
(2-Amino-3-methylimidaz
p[4,5-f]quinoline)
76180-96-6

Iron dextran complex
9004-66-4

Isosafrole
120-58-1

Lactofen
77501-63-4

Lasiocarpine
303-34-4

Lead acetate
301-04-2

Lead phosphate
7446-27-7

Lead subacetate
1335-32-6

Lindane

Mancozeb
8018-01-7

Maneb
12427-38-2

Me-A-alpha-C
(2-Amino-3-methyl-9H-pyr
ido[2,3-b]indole)
68005-83-7

Medroxyprogesterone
acetate
71-58-9

Melphalan
148-82-3

Merphalan
531-76-0

Mestranol
72-33-3

8-Methoxypsoralen with
ultraviolet A therapy
298-81-7

5-Methoxypsoralen with
ultraviolet A therapy
484-20-8

2-Methylaziridine (Propyleneimine)
75-55-8

Methylazoxymethanol
590-96-5

Methylazoxymethanol acetate
592-62-1

3-Methylcholanthrene
56-49-5

5-Methylchrysene
3697-24-3

4,4'-Methylene bis(2-chloroaniline)
101-14-4

4,4'-Methylene bis(N,N-dimethyl)benzenamine
101-61-1

4,4'-Methylene bis(2-methylaniline)
838-88-0

4,4'-Methylenedianiline
101-77-9

4,4'-Methylenedianiline dihydrochloride
13552-44-8

Methylhydrazine and its salts
13552-44-8

Methyl iodide
74-88-4

Methyl methanesulfonate
66-27-3

2-Methyl-1-nitroanthraquinone
129-15-7

N-Methyl-N'-nitro-N-nitrosoguanidine
70-25-7

N-Methylolacrylamide
924-42-5

Methylthiouracil
56-04-2

Metiram
9005-42-2

Metronidazole
443-48-1

Michler's ketone
90-94-8

Mirex
2385-85-5

Mitomycin C
50-07-7

Monocrotaline
315-22-0

5-(Morpholinomethyl)-3-[(5-nitro-furfurylidene)-amino]-2 -oxalolidinone
139-91-3

Mustard Gas
505-60-2

Nafenopin
3771-19-5

1-Naphthylamine
124-32-7

2-Naphthylamine
91-59-8

Nickel and certain nickel compounds

Nickel carbonyl
13463-39-3

Nickel subsulfide
12035-72-2

Niridazole
61-47-4

Nitrilotriacetric acid
139-13-9

Nitrilotriacetric acid, trisodium salt monohydrate
18662-53-8

5-Nitroacenaphthene
602-87-9

5-Nitro-o-anisidine
99-59-2

4-Nitrobiphenyl
93-93-3

6-Nitrochrysene
7496-02-8

Nitrofen (technical grade)
1836-75-5

2-Nitrofluorene
607-57-8

Nitrofurazone
59-87-0

1-[5-Nitrofurfurylidene)-amino]-2-imidazolidinone
555-84-0

N-[4-(5-Nitro-2-furyl)-2-thiazolyl]acetamide
531-82-8

Nitrogen mustard (Mechlorethamine)
51-75-2

Nitrogen mustard hydrochloride (Mechlorethamine hydrochloride
55-86-7

Nitrogen mustard N-oxide
126-85-2

Nitrogen mustard N-oxide hydrochloride
302-70-5

2-Nitropropane
79-46-9

1-Nitropyrene
5522-43-0

4-Nitropyrene
57835-92-4

N-Nitrosodi-n-butylamine
924-16-3

N-Nitrosodiethanolamine
1116-54-7

N-Nitrosodiethylamine
55-18-5

N-Nitrosodimethylamine
62-75-9

p-Nitrosodiphenylamine
156-10-5

N-Nitrosodiphenylamine
86-30-6

N-Nitrosodi-n-propylamine
621-64-7

N-Nitroso-N-ethylurea
759-73-9

3-(N-Nitrosomethylamino) propionitrile
60153-49-3

4-(N-Nitrosomethylamino) -1-(3-pyridyl)1-butanone
64091-91-4

N-Nitrosomethylethylamine
10595-95-6

N-Nitroso-N-methylurea
684-93-5

N-Nitroso-N-methylurethane
615-53-2

N-Nitrosomethylvinylamine
4549-40-0

N-Nitrosomorpholine
59-89-2

N-Nitrosonornicotine
16543-55-8

N-Nitrosopiperidine
100-75-4

N-Nitrosopyrrolidine
930-55-2

N-Nitrososarcosine
13256-22-9

Norethisterone (Norethindrone)
68-22-4

Ochratoxin A
303-47-9

Oxadiazon
19666-30-9

Oxymetholone
434-07-1

Panfuran S

Pentachlorophenol
87-86-5

Phenacetin
62-44-2

Phenazopyridine
94-78-0

Phenazopyridine hydrochloride
136-40-3

Phenesterin
3546-10-9

Phenobarbital
50-06-6

Phenoxybenzamine
59-96-1

Phenoxybenzamine hydrochloride
63-92-3

Phenyl glycidyl ether
122-60-1

Phenylhydrazine and its salts
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o-Phenylphenate, sodium
132-27-4

Polybrominated biphenyls

Polychlorinated biphenyls

Polygeenan
53973-98-1

Ponceau MX
3761-53-3

Ponceau 3R
3564-09-8

Potassium bromate
7758-01-2

Procarbazine
671-16-9

Procarbazine hydrochloride
366-70-1

Progesterone
57-83-0

1,3-Propane sultone
1120-71-4

beta-Propiolactone
57-57-8

Propylene oxide
75-56-9

Propylthiouracil
51-52-5

Reserpine
50-55-5

Saccharin
81-07-2

Saccharin, sodium
128-44-9

Safrole
94-59-7

Selenium sulfide
7446-34-6

Silica, crystalline

Streptozotocin
18883-66-4

Styrene oxide
96-09-3

Sulfallate
95-06-7

Talc' containing asbestiform fibers

Testosterone and its esters
58-22-0

2,3,7,8-Tetrachlorodibenzo-para-dioxin (TCDD)
1746-01-6

1,1,2,2-Tetrachloroethane
79-34-5

Tetrachloroethylene (Perchloroethylene)
127-18-4

p-a, a, a-Tetrachlorotoluene
5216-25-1

Tetranitromethane
509-14-8

Thioacetamide
62-55-5

4,4' - Thiodianiline
139-65-1

Thiourea
62-56-6

Thorium dioxide
1314-20-1

Toluene diisocyanate
26471-62-5

ortho-Toluidine
95-53-4

ortho-Toluidine hydrochloride
636-21-5

para-Toluidine
106-49-0

Toxaphene (Polychorinated camphenes)
8001-35-2

Trasulfan
299-75-2

Trichlormethine (Trimustine hydrochloride)
817-09-4

2,4,6-Trichlorophenol
88-06-2

Triphenyltin hydroxide
76-87-9

Trichloroethylene
79-01-6

Tris (aziridinyl)-para-benzoquinone (Triaziquone)
68-76-8

Tris (1-aziridinyl) phosphine sulfide (Thiotepa)
52-24-4

Tris (2-chloroethyl) phosphate
115-96-8

Tris (2,3-dibromopropyl) phosphate
126-72-7

Trp-P-1 (Tryptophan-P-1)
62450-06-0

Trp-P-2 (Tryptophan-P-2)
62450-07-1

Trypan blue (commercial grade)
72-57-1

Uracil mustard
66-75-1

Urethane (Ethyl carbamate)
51-79-6

Vinyl bromide
593-60-2

Vinyl chloride
75-01-4

4-Vinyl-1-cyclohexene diepoxide (Vinyl cyclohexene dioxide)
106-87-6

Vinyl trichloride (1,1,2-Trichloroethane)
79-00-5

2,6-Xylidine (2,6-Dimethylaniline)
87-62-7

Zineb
12122-67-7

APPENDIX E: LIST OF OSHA REGULATED SUBSTANCES

1,2-dibromo-3-chloropropane. (1910.1044)
2-Acetylaminofluorene. (1910.1014)
3,3'-Dichlorobenzidine (and its salts) (1910.1007)
4-Aminodiphenyl. (1910.1011)
4-Dimethylaminoazobenzene. (1910.1015)
4-Nitrobiphenyl. (1910.1003)
Acrylonitrile. (1910.1045)
alpha-Naphthylamine. (1910.1004)
Asbestos, tremolite, anthophyllite, and actinolite. (1910.1001)
Asbestos. (1910.1101)
Benzene. (1910.1028)
Benzidine. (1910.1010)
Beta-Naphthylamine. (1910.1009)
beta-Propiolactone. (1910.1013)
bis-Chloromethyl ether. (1910.1008)
Coal tar pitch volatiles; interpretation of term. (1910.1002)
Coke oven emissions. (1910.1029)
Cotton dust. (1910.1043)
Ethylene oxide. (1910.1047)
Ethyleneimine. (1910.1012)
Formaldehyde. (1910.1048)
Inorganic arsenic. (1910.1018)
Lead. (1910.1025)
Methyl chloromethyl ether. (1910.1006)
N-Nitrosodimethylamine. (1910.1016)