

# Safety and Health Policy and Procedure Manual

## CHEMICAL HYGIENE PLAN Section 0030

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## SECTION 0030

### INTRODUCTION

On January 31, 1990 the Occupational Safety and Health Administration (OSHA) promulgated a final rule for occupational exposure to hazardous chemicals in laboratories. Included in the standard, which became effective on 1 May, 1990 is a requirement for all employers covered by the standard to develop and carry out the provisions of a Chemical Hygiene Plan (CHP).

A CHP is defined as, "a written program which sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace". Components of the CHP must include standard operating procedures for safety and health, criteria for the implementation of control measures, measures to ensure proper operation of engineering controls, provisions for training and information dissemination, permitting requirements, provisions for medical consultation, designation of responsible personnel, and identification of particularly hazardous substances.

This plan is the Chemical Hygiene Plan developed for UNCG located in Greensboro, NC. This CHP is maintained readily available to laboratory employees at UNCG. All laboratory personnel must know and follow the procedures outlined in this plan. All operations performed in the laboratory must be planned and executed in accordance with the enclosed procedures.

In addition, each employee is expected to develop safe personal chemical hygiene habits aimed at the reduction of chemical exposures to themselves and co-workers.

This document was developed to comply with paragraph (e) of the referenced [OSHA 1910.1450](#) standard. UNCG will maintain the facilities and procedures employed in the laboratory compatible with current knowledge and regulations in laboratory safety. This CHP will be reviewed, evaluated and updated at least annually and is readily available to employees, their representatives and any representative of the Assistant Secretary of Labor of OSHA.

Each department at UNCG using chemicals in a laboratory setting is required to appoint a Chemical Hygiene Officer. The Chemical Hygiene Officer is responsible for implementation of this Chemical Hygiene Plan.

A list of departments and Chemical Hygiene Officers is found in [Appendix I](#).

## I. STANDARD OPERATING PROCEDURES FOR LABORATORY CHEMICALS

### A. Chemical Procurement

1. The decision to procure a chemical shall be a commitment to handle and use the chemical properly from initial receipt to ultimate disposal.
2. Requests for procurement of new chemicals shall be submitted to the Chemical Hygiene Officer for approval. The form entitled New Chemical Purchasing Request, [Appendix C](#) to this plan, shall be used for this purpose. Information on proper handling, storage and disposal shall be known to all involved personnel prior to the procurement of the chemical. Chemicals utilized in the laboratory shall be those which are appropriate for the ventilation system.
3. All chemicals shall be received in a central location. Personnel who receive chemical shipments shall be knowledgeable of the proper procedures for receipt. Chemical containers shall not be accepted without accompanying labels, material safety data sheets (MSDS) and packaging in accordance with all appropriate regulations. All chemical shipments should be dated when received and opened. Refer to [Appendix B](#) if an MSDS is not received with the shipment.

### B. Chemical Storage

1. Received chemicals shall be immediately moved to their designated storage area. Large glass containers shall be placed in carrying containers or shipping containers during transportation.
2. Storage areas shall be well illuminated, with all storage maintained below eye level. Large bottles shall be stored no more than two feet from ground level.

3. Chemicals shall be segregated by hazard classification and compatibility in a well identified area, with local exhaust ventilation.
4. Mineral acids should be separated from flammable and combustible materials. Separation is defined by NFPA 49 as storage within the same fire area, but separated by as much space as practicable or by intervening storage from incompatible materials.
5. Acid-resistant trays shall be placed under bottles of mineral acids.
6. Acid-sensitive materials such as cyanides and sulfides, shall be separated from acids or protected from contact with acids.
7. Highly toxic chemicals or other chemicals whose containers have been opened, shall be stored in unbreakable secondary containers.
8. Storage areas shall not be used as a preparation or repackaging area.
9. Storage areas shall be accessible during normal working hours. Storage areas are under the control of the Chemical Hygiene Officers.
10. When chemicals are removed from a storage area, they shall be placed in an outside container or bucket.
11. Storage of chemicals at the lab bench or other work areas shall be limited to those amounts necessary for one operation. The container size shall be the minimum convenient. The amounts of chemicals at the lab bench shall be as small as practical. Chemicals in the workplace shall not be exposed to sunlight or heat.
12. Stored chemicals shall be examined at least annually by the Chemical Hygiene Officer for replacement, deterioration, and container integrity. The inspection should determine whether any corrosion, deterioration, or damage has occurred to the storage facility as a result of leaking chemicals.
13. Periodic inventories of chemicals outside the storage area shall be conducted by the Chemical Hygiene Officer. Unneeded items shall be properly discarded or returned to the storage area.

### **C. Chemical Handling**

Each laboratory employee with the training, education and resources provided by supervision, shall develop and implement work habits consistent with this CHP to minimize personal and co-worker exposure to the chemicals in the laboratory. Based on the realization that all chemicals inherently present hazards in certain conditions, exposure to all chemicals shall be minimized.

General precautions which shall be followed for the handling and use of all chemicals are:

1. Skin contact with all chemicals shall be avoided.
2. All employees shall wash all areas of exposed skin prior to leaving the laboratory.
3. Mouth suction for pipeting or starting a siphon is prohibited.
4. Eating, drinking, smoking, gum chewing, or application of cosmetics in areas where laboratory chemicals are present, shall be prohibited. These areas have been posted. Hands shall be thoroughly washed prior to performing these activities.
5. Storage, handling, or consumption of food or beverages shall not occur in storage areas or refrigerators also used for laboratory operations.
6. Risk determinations shall be conservative in nature.
7. Any chemical mixture shall be assumed to be as toxic as its most toxic component.
8. Substances of unknown toxicity shall be assumed to be toxic.
9. Laboratory employees shall be familiar with the symptoms of exposure for the chemicals with which they work and the precautions necessary to prevent exposure.
10. The intent and procedures of this Chemical Hygiene Plan shall be continuously adhered to.

11. In all cases of chemical exposure, neither the Permissible Exposure Limits (PELs) of OSHA or the Threshold Limit Values (TLVs) of the American Conference of Governmental Industrial Hygienists (ACGIH) shall be exceeded.
12. The engineering controls and safety equipment in the laboratory shall be utilized and inspected in accordance with [Appendix A](#) of this plan.
13. Specific precautions based on the toxicological characteristics of individual chemicals shall be implemented as deemed necessary by the Chemical Hygiene Officer (see [VII-b](#)). These special precautions are listed in [Section VII](#) of this plan.

#### **D. Laboratory Equipment and Glassware**

Each employee shall keep the work area clean and uncluttered. All chemicals and equipment shall be properly labeled in accordance with [Section I-G](#) of this plan. At the completion of each work day or operation, the work area shall be thoroughly cleaned and all equipment properly cleaned and stored.

In addition, the following procedures shall apply to the use of laboratory equipment:

1. All laboratory equipment shall be used only for its intended purpose.
2. All glassware will be handled and stored with care to minimize breakage; all broken glassware will be immediately disposed of in the broken glass container.
3. All evacuated glass apparatus shall be shielded to contain chemicals and glass fragments should implosion occur.
4. Labels shall be attached to all chemical containers, identifying the contents and related hazards.
5. Waste receptacles shall be identified as such.
6. All laboratory equipment shall be inspected on a periodic basis as specified in [Appendix A](#), and replaced or repaired as necessary.

#### **E. Personal Protective Equipment**

1. Safety glasses meeting ANSI Z87.1 are required for all persons in a laboratory and must be worn at all times, when a splash hazard is present. The decision to allow contact lenses in the laboratory shall be made by the Chemical Hygiene Officer based on hazards present.
2. Chemical goggles and/or a full face shield shall be worn during chemical transfer and handling operations as procedures dictate.
3. Sandals, perforated shoes, and bare feet are prohibited. Safety shoes, per ANSI 47 are required where employees routinely lift heavy objects.
4. Lab coats are recommended for use in the laboratory. Laboratory coats will be laundered on a periodic basis, at least monthly. Laboratory coats shall be removed immediately upon discovery of significant contamination. Short pants may not be worn in a laboratory.
5. Appropriate chemical-resistant gloves based on the table in [Appendix K](#) shall be worn at all times when there may be skin contact with chemicals. Used gloves shall be inspected and washed prior to re-use. Damaged or deteriorated gloves will be immediately replaced. Gloves shall be washed prior to removal from the hands. Disposable, single use gloves shall not be reused.
6. Thermal-resistant gloves shall be worn for operations involving the handling of heated materials and exothermic reaction vessels. Thermal-resistant gloves shall be non-asbestos and shall be replaced when damaged or deteriorated.
7. Respirator usage shall comply with the OSHA Respiratory Protection Standard, [29 CFR 1910.134](#), and the [UNCG Respiratory Protection Program](#).

#### **F. Personal Work Practices**

1. Department Heads and laboratory supervision must ensure that each employee knows and follows the rules and procedures established in this plan.
2. All employees shall remain vigilant to unsafe practices and conditions in the laboratory and shall immediately report such practices and conditions to the laboratory supervisor. The supervisor must correct unsafe practices and conditions promptly.
3. Long hair and loose-fitting clothing shall be confined close to the body to avoid being caught in moving machine/equipment parts, or flame.
4. Use only those chemicals appropriate for the ventilation system.
5. Avoid unnecessary exposure to all chemicals by any route.
6. Do not smell or taste any chemicals.

7. Encourage safe work practices in co-workers by setting the proper example. Horseplay is strictly forbidden.
8. Seek information and advice from knowledgeable persons, standards, and codes about the hazards present in the laboratory. Plan operations, equipment and protective measures accordingly.
9. Use engineering controls in accordance with [Section III](#).
10. Inspect personal protective equipment prior to use. Wear appropriate protective equipment as procedures dictate and when necessary to avoid exposure.

## G. Labeling

1. All containers in the laboratory shall be labeled. This includes chemical containers and waste containers. The label shall be informative and durable, and at a minimum, will identify contents, source, date of acquisition, storage location and indication of hazard.
  2. Portable containers shall be labeled by the individual using the container.
  3. Exemptions for labeling requirements shall be made for chemical transfers from a labeled container which is intended only for the immediate use by the employee who performed the transfer.
  4. The labeling program shall be periodically inspected by the Chemical Hygiene Officer to ensure that labels have not been defaced or removed. The form entitled Chemical Hazard Audit Checklist, [Appendix D](#) to this plan, shall be used for this purpose.
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## II. CRITERIA FOR IMPLEMENTATION OF CONTROL MEASURES

### A. Air Sampling

1. Air sampling for evaluating employee exposure to chemical substances shall be conducted periodically or as specified by specific codes or regulations. A list of chemicals requiring initial monitoring is found in [Appendix J](#). Monitoring is the responsibility of the Department and can be arranged through the Office of Safety.
2. Upon addition of new chemicals or changes in control procedures, additional air sampling will be considered to determine the exposures. Conduct air sampling if there is reason to believe that exposure levels for regulated substances that require sampling routinely exceed the action level, or in the absence of an action level, the PEL. Air sampling will be implemented when usage of highly toxic substances exceeds three times per week.
3. The results of air sampling studies performed in the laboratory are maintained and recorded on the form shown in [Appendix E](#) to this plan.

### B. Housekeeping

1. Each laboratory worker is directly responsible for the cleanliness of his or her work space, and jointly responsible for common areas of the laboratory. Department Heads shall insist on the maintenance of housekeeping standards.
2. The following procedures apply to the housekeeping standards of the laboratory:
  - (a) All spills on lab benches or floors shall be immediately cleaned and properly disposed of. Large spills will necessitate the implementation of the Emergency Action Plan per OSHA [1910.38](#) and [1910.120](#).
  - (b) The lab benches shall be kept clear of equipment and chemicals except those necessary for the work currently being performed.
  - (c) The work area shall be cleaned at the end of each operation and each day.
  - (d) All apparatus shall be thoroughly cleaned and returned to storage upon completion of usage.
  - (e) All floors, aisles, exits, fire extinguishing equipment, eyewashes, showers, electrical panels and other emergency equipment shall remain unobstructed.
  - (f) All labels shall face front.

(g) Chemical containers shall be clean, properly labeled and returned to storage upon completion of usage.

(h) All chemical wastes will be disposed of in accordance with [UNCG Hazardous Waste Disposal Procedures, Section 0060](#).

### **C. Safety and Emergency Equipment**

1. Telephone numbers of emergency personnel, supervisors and other workers, as deemed appropriate, have been posted.
2. All laboratory personnel will be trained in the proper use of fire extinguishers when hired and annually thereafter. Prior to the procurement of new chemicals, the Chemical Hygiene Officer shall verify that existing extinguisher and other emergency equipment are appropriate for such chemicals.
3. All employees who might be exposed to chemical splashes shall be instructed in the location and proper usage of emergency showers and eyewashes. The eyewash and emergency shower shall be inspected weekly. These inspections shall be performed by the laboratory employees. These inspections shall be in accordance with ANSI Z358.1 and manufacturer's specifications. Inspection records shall be maintained by the Chemical Hygiene Officer.
4. Location signs for safety and emergency equipment have been posted.

## **III. ENGINEERING CONTROLS**

### **A. Intent**

The engineering controls installed in the laboratory are intended to minimize employee exposure to chemical and physical hazards in the workplace. These controls must be maintained in proper working order for this goal to be realized.

### **B. Modification**

No modification of engineering controls will occur unless testing indicates that worker protection will continue to be adequate.

### **C. Improper Function**

Improper function of engineering controls must be reported to the Chemical Hygiene Officer immediately. The system shall be taken out of service until proper repairs have been executed.

### **D. Usage**

All employees shall follow proper work practices when using the engineering controls.

#### **1. Local Exhaust Ventilation:**

The following procedures shall apply to the use of local exhaust ventilation:

(a) Openings of hoods shall be placed as close as possible to sources of the air contaminant.

(b) Clear the screen on the face of the hood prior to usage.

(c) Hood fans shall operate when hoods are being used.

(d) After using hoods, operate the fan for an additional period of time sufficient to clear residual contaminants from the duct work.

(e) Prior to a change in chemicals or procedures, the adequacy of the ventilation system shall be determined by the Chemical Hygiene Officer.

## 2. Laboratory Hoods:

The laboratory hoods shall be utilized for all chemical procedures which might result in release of hazardous chemical vapors or dust. As general rule, the hood shall be used for all chemical procedures involving substances which are appreciably volatile and have a permissible exposure limit (PEL) less than 50 ppm.

The following work practices shall apply to the use of hoods:

- (a) Confirm adequate hood ventilation performance prior to opening chemical containers inside the hood. An inward flow of air can be confirmed by holding a piece of paper at the face of the hood and observing the movement of the paper.
- (b) Keep the sash of the hood closed at all times except when adjustments within the hood are being made. At these times, maintain the sash height as low as possible.
- (c) Storage of chemicals and equipment inside the hood shall be kept to a minimum. Laboratory hoods are not designed for the storage of chemicals.
- (d) Minimize interference with the inward flow of air into the hood.
- (e) Leave the hood operating when it is not in active use if hazardous chemicals are contained inside the hood or if it is uncertain whether adequate general laboratory ventilation will be maintained when the hood is non-operational.
- (f) The ventilation system shall be inspected annually. The hood face velocity shall be maintained between 75 and 125 feet per minute. A record of each inspection shall be maintained by the Chemical Hygiene Officer. Ventilation measurements can be performed by the Office of Safety.
- (g) The hood shall not be used as a means of disposal for volatile chemicals.
- (h) Prior to the introduction of new chemicals, the adequacy of hood ventilation systems shall be determined by the Chemical Hygiene Officer.

## 3. Glove Boxes and Isolation Rooms:

The exhaust air from a glove box or isolation room will pass through scrubbers or other treatment before release into the regular exhaust system.

## 4. Cold Rooms and Warm Rooms:

Prior to the storage of any temperature sensitive materials, emergency procedures must be developed and documented within this Chemical Hygiene Policy. These Procedures will insure the safety of the materials in the event of a cold room or warm room failure.

## 5. Storage Cabinets:

Storage cabinets for flammable and hazardous chemicals will remain closed and latched except when removing or replacing chemicals.

# IV. EMPLOYEE INFORMATION AND TRAINING

## A. Hazard Information

All employee will be apprised of the hazards presented by the chemicals in use in the laboratory. Each employee shall receive training at the time of initial assignment to the laboratory, prior to assignments involving new exposure situations, and at a regular frequency as determined by the Chemical Hygiene Officer.

## B. Training

This training shall include methods of detecting the presence of a hazardous chemical, physical and health hazards of chemicals in the lab, and measures employees can take to protect themselves from these hazards. The training shall present the details of the Chemical Hygiene Plan, and shall include:

1. the contents of the OSHA Laboratory Standard and its appendices ([Appendix L](#));
2. the location and availability of the Chemical Hygiene Plan;
3. the permissible exposure limits for OSHA regulated substances or recommended exposure values for other hazardous chemicals not regulated by OSHA which are present in the laboratory;
4. signs and symptoms associated with exposure to the chemicals present in the laboratory;
5. location and availability of reference material on chemical hygiene;
6. Training shall be conducted by the Chemical Hygiene Officer. The [Chemical Hygiene Training Checklist](#) must be completed and copies maintained in the Department with one copy forwarded to the Office of Safety.

## V. PRIOR APPROVAL OF LABORATORY ACTIVITIES

### A. Permit System

A permit system shall be used for laboratory activities which present specific, foreseeable hazards to the employees. These activities include off-hours work, sole occupancy of building, hazardous operations and unattended operations. The permit entitled Chemical Hygiene Permit is included in [Appendix H](#) to this plan and shall be executed prior to the performance of these activities.

#### 1. Sole Occupancy and Off-hours Work:

Laboratory work, involving chemicals, shall not be performed when the only person in the building is the laboratory person doing the work, unless a permit has been issued. The Chemical Hygiene Officer shall determine hours during which laboratory work involving chemicals may be conducted. These hours will be determined by considering the safety of the laboratory personnel, and the emergency help that will be available. Work performed outside of these hours will require a permit.

#### 2. Hazardous Work:

All hazardous operations are to be performed during a time when at least two personnel are present at the laboratory. At no time shall a laboratory person, while working alone in the laboratory, perform work which is considered hazardous. The determination of hazardous operations shall be made by the Chemical Hygiene Officer and permitted.

#### 3. Unattended Operations:

When laboratory operations are performed which will be unattended by laboratory personnel (continuous operations, overnight reactions, etc.), the following procedures will be employed:

- (a) The permit system shall be utilized.
- (b) The laboratory supervisor will review work procedures to ensure the safe completion of the operation.
- (c) An appropriate sign will be posted at all entrances to the laboratory
- (d) The overhead lights in the laboratory will be left on.
- (e) Precautions shall be made for the interruption of utility service during the unattended operation (loss of water pressure, electricity, etc.)
- (f) The person responsible for the operation will return to the laboratory at the conclusion of the operation to assist in the dismantling of the apparatus.

## **VI. MEDICAL CONSULTATIONS AND EXAMINATIONS**

### **A. Opportunity for Medical Attention**

An opportunity to receive medical attention is available to all employees who work with hazardous chemicals in the laboratory. The opportunity for medical attention will be made available to employees under the following circumstances:

1. Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory,
2. Medical surveillance programs will be established where exposure monitoring reveals an exposure level above the action level for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, and/or,
3. Whenever an event takes place in the laboratory such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the employee will be provided an opportunity for medical consultation for the purpose of determining the need for medical examination.

### **B. Cost**

These medical consultations and examinations shall be provided without cost to the employees, without loss of pay, and at a reasonable time and place. The cost of any medical surveillance will be the responsibility of the department. Any injury or illness must be reported in accordance with the [UNCG Occupational Injury Reporting Procedures](#).

### **C. Supervision**

These medical consultations and examinations shall be administered by or under the direct supervision of a licensed physician. A current list of available physicians is maintained by the Chemical Hygiene Officer. Employees seeking the opportunity of medical consultation should request the listing from the Chemical Hygiene Officer.

## **VII. CHEMICAL HYGIENE RESPONSIBILITIES**

### **A. Department Head**

The Department Head has the ultimate responsibility for chemical hygiene throughout the laboratory and with assistance of other program administrators, will provide continued support for chemical hygiene.

### **B. Chemical Hygiene Officer**

The Chemical Hygiene Officer shall:

1. work with administrators and other employees to develop and implement appropriate chemical hygiene policies and practices,
2. monitor procurement and use of chemicals in the lab, including determining that facilities and training levels are adequate for the chemicals in use,
3. perform regular, formal chemical hygiene and housekeeping inspections including inspections of emergency equipment,
4. help project directors develop precautions and adequate facilities,
5. maintain current knowledge concerning the legal requirements of regulated substances in the laboratory,
6. along with the other Chemical Hygiene Officers, review and improve the UNCG Chemical Hygiene Plan on an annual basis,
7. maintain overall responsibility for the laboratory operation,
8. ensure that workers know and follow the chemical hygiene rules,
9. determine the proper level of personal protective equipment, ensure that such protective equipment is available and in working order,
10. ensure that appropriate training has been provided to employees,
11. monitor the waste disposal program.

## **C. Laboratory Workers**

The laboratory workers are individually responsible for:

1. planning and conducting each laboratory operation in accordance with the Chemical Hygiene Plan,
2. developing good personal chemical hygiene habits,
3. reporting hazards to the Chemical Hygiene Officer.

## **VIII. SPECIAL PRECAUTIONS**

When laboratory procedures change to require the use of additional classifications of chemicals (allergens, embryotoxins, teratogens, carcinogens, etc.), additional special precautions shall be implemented as deemed necessary by the Chemical Hygiene Officer. The permit system shall be utilized for all special activities. All questions regarding the use of the permit system should be addressed to the Chemical Hygiene Officer.

### **A. Working with Allergens and Embryotoxins (Special Precautions)**

1. Suitable gloves to prevent hand contact shall be worn when exposed to allergens or substances of unknown allergen activity.
2. Women of child-bearing age will handle embryotoxins only in a hood with confirmed satisfactory performance and will use protective equipment to prevent skin contact as prescribed by the supervisor and Chemical Hygiene Officer.
3. Embryotoxins will be stored in adequately ventilated areas in unbreakable secondary containers.
4. The supervisor and Chemical Hygiene Officer will be notified of spills and other exposure incidents. A physician will be consulted when appropriate.

### **B. Working with Chemicals of Moderate Chronic or High Acute Toxicity (Special Precautions)**

1. Areas where these chemicals are stored and used are of restricted access and have special warning signs.
2. A special hood with a minimum face velocity of 60 linear feet per minute or other containment device will be used. Released vapors will not discharge with the hood exhaust, but will be trapped.
3. Gloves and long sleeves will be used. Hands and arms will be washed immediately after working with these chemicals.
4. Two people will always be present during work with these chemicals.

### **C. Working with Chemicals of High Chronic Toxicity (Special Precautions)**

1. All transfer and work with these substances shall be in a designated area: a restricted access hood, glove box or portion of lab.
2. Approval of the supervisor will be obtained before use.
3. Vacuum pumps must have scrubbers or high efficiency particulate absolute (HEPA) filters.
4. Any contaminated equipment or glassware will be decontaminated in the hood before removing them from the designated area.
5. For powders, a wet mop or vacuum with a HEPA filter will be used for cleanup.
6. The designated area will be marked with warning and restricted access signs.
7. Containers will be stored in a ventilated, limited access area in labeled, unbreakable, chemically resistant, secondary containers.

## **D. Working with Animals and Chemicals of High Chronic Toxicity (Special Precautions)**

1. For large scale studies, special facilities with restricted access will be provided.
  2. The substance will be administered by injection or gavage when possible rather than by diet. When diet is used, a caging system under negative pressure or under laminar air flow directed toward HEPA filters will be used.
  3. Procedures will be used to minimize contaminated aerosols from food, urine and feces:
    - HEPA filtered vacuum equipment for cleaning.
    - Moisten contaminated bedding before removal from cage.
    - Mix diets in closed containers in hood
  4. Plastic or rubber gloves and fully buttoned lab coats will be worn in the animal room.
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## **IX. RECORDKEEPING**

A. Accident investigations will be conducted by the supervisor with, if necessary, assistance from the Office of Safety and other personnel deemed necessary.

B. Accident reports will be retained indefinitely by the Office of Safety.

C. Exposure records for hazardous chemicals and harmful physical agents will be maintained for 30 years per [29 CFR 1910.1020](#). These records will be forwarded to the Office of Safety by the Chemical Hygiene Officer.

D. Medical records for employees exposed to hazardous chemicals and harmful physical agents will be maintained for the duration of employment plus 30 years per [29 CFR 1910.1020](#). These records will be forwarded to the Office of Safety by the Chemical Hygiene Officer.

E. Inventory and usage records for high risk substances (amounts of substances on-hand, amounts used and names of workers involved) shall be maintained for three years by the department and indefinitely by the Office of Safety. These records will be forwarded to the Office of Safety by the Chemical Hygiene Officer.

F. Records of inspections of equipment will be maintained for three years by the department and indefinitely by the Office of Safety. These records will be forwarded to the Office of Safety by the Chemical Hygiene Officer.

G. Records of employee training will be maintained for three years by the department and indefinitely by the Office of Safety. These records will be forwarded to the Office of Safety by the Chemical Hygiene Officer.

## **X. CHEMICAL SPILL, RELEASES AND ACCIDENTS**

In the event of a chemical spill, release or other accident, UNCG employees will adhere to the procedures outlined in the Emergency Response Plan as required by OSHA Standard [29 CFR 1910.38](#) and [1910.120](#).

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## **XI. ANNUAL CHEMICAL HYGIENE PLAN AUDIT**

The Chemical Hygiene Officer will conduct an audit of all phases of the Chemical Hygiene Plan each year. Results will be provided to the Department Head and the Office of Safety. Department Heads are responsible for taking corrective action. A meeting of Chemical Hygiene Officers and the Office of Safety should be scheduled whenever revisions to this plan are required.

## XII. REFERENCES AND RECOMMENDED READING

- National Research Council, Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Press, Washington, D.C. 1981.
- National Research Council, Prudent Practices for Disposal of Chemicals from Laboratories, National Academy Press, Washington, D.C., 1983.
- Freeman, N.T., Introduction to Safety in the Chemical Laboratory, Academy Press, 1982.
- Manufacturing Chemists Association, Inc., Guide For Safety In The Chemical Laboratory, D. Van Nostrand Company, Inc., 1954.
- Green, Michael E., Safety in Working With Chemicals, MacMillan Publishing co., Inc. 1978.
- Pipitone, David A., Safe Storage of Laboratory Chemicals, Wiley & Sons, Inc. 1984.
- Code of Federal Regulations, [29 CFR Part 1910 Subpart Z section 1910.1450](#), Occupational Exposure to Hazardous to Hazardous Chemicals in Laboratories, 1990.

**THE UNIVERSITY OF NORTH CAROLINA at GREENSBORO  
LABORATORY SAFETY EQUIPMENT INSPECTION SCHEDULE**

Laboratory:

Building/Address:

Phone:

Laboratory Manager:

**PURPOSE**

The purpose of this schedule is to assure that all laboratory safety equipment is inspected on a routine basis by competent personnel. Records in the form of inspection tags, stickers, or logs will be maintained for all equipment.

Equipment	Location	Frequency of Inspection	Reference, Standard, Code, Procedure	Inspector

Chemical Hygiene Officer: \_\_\_\_\_ Phone: \_334\_\_\_\_\_

**THE UNIVERSITY OF NORTH CAROLINA at GREENSBORO**

**MATERIAL SAFETY DATA SHEETS (MSDS's)**

**A. MSDS Format**

MSDS's are written or printed material concerning product hazard determination, which are prepared and distributed with chemicals by chemical manufacturers and distributors. MSDS's are written in English and contain the following information:

- Identity of the chemical as provided on the container label;
- Physical and chemical characteristics of the material;
- Physical hazards of the material;
- Health hazards of the material;
- Primary route(s) of entry;
- Exposure limits, Threshold Limit Value (TLV), OSHA Permissible Exposure Limit (PEL), or Supplier recommended limits;
- Whether or not the material or components have been found to be a potential carcinogen by the International Agency for Research on Cancer (IARC), National Toxicology Program (NTP), or by OSHA;
- Applicable precautions for safe handling and use;
- Applicable control measures;
- Emergency and first-aid procedures;
- Date of preparation or date of last change;
- Name, address, and telephone number of the chemical manufacturer, importer, employer, or other responsible party, who can provide additional information.

**B. Obtaining MSDS's**

On all Purchase Requisitions for any chemicals, the Chemical Hygiene Officer will verify: "MSDS on file", "MSDS required", or "Material Exempt".

Each Department Head is responsible for obtaining MSDS's for their respective areas. An MSDS should be available for every hazardous chemical listed on the inventory list.

Department Heads will adhere to the following MSDS procedures:

**UNCG Material Safety Data Sheet Program Procedures:**

1. A department representative shall be appointed to be responsible for the *Department Master Notebook*. The name of this person shall be forwarded to the Office of Safety as the "contact person" for the department. This person will be responsible for maintaining and updating the notebook.

2. Copies of the *Department Master Notebook* shall be made and distributed within the department as specified in the **Departmental Implementation Procedures**.
3. The *Department Master Notebook* and its chemical inventory shall be updated continually and reviewed no less than once per quarter. To document that the notebook has been reviewed and updated as necessary, a form is provided in the *Master Notebook*. This form is to be signed and dated by the department representative at the time of review.
4. Departmental Request for MSDS form is to be copied, completed, and returned to the Office of Safety whenever a new chemical is purchased. A copy of this form is provided in the back flap of the *Department Master Notebook*.
5. The Office of Safety, in cooperation with Accounts Payable and Purchasing, has developed a procedure to allow the monitoring of most chemical purchasing. This will allow the Office of Safety to receive most MSDSs directly and forward them to the appropriate department. However, any MSDSs received by a department in a shipment should be copied and sent to the Office of Safety for placement in the *UNCG Master Notebook*. (Please include department name and location with copy.)
6. In the event an MSDS is not available, the Office of Safety will use the procedures in Section C to obtain an MSDS.

### **Departmental Implementation Procedures**

1. The MSDS notebook provided to each department should be considered the *Department Master MSDS Notebook*. (The *Master Notebook* for departments using many chemicals may consist of several notebooks, but will be simply referred to as the *Master Notebook*.)

2. If the department has several remote locations where chemicals are being used, a copy of the MSDS for the particular chemical must be readily accessible to employees at each location. This requirement of the standard may make it necessary for the department to develop site specific notebooks using the *Master Notebook* as a source. Questions concerning specific requirements which may impact your department should be directed to the Office of Safety.

Ex.: A department using various chemicals in several laboratories should make copies of the MSDSs in the *Master Notebook* and distribute them to each location where the chemical is being used. Remember the MSDS must be available for timely use in an emergency.

A department using various commercial cleaning products at various sites on campus should make copies of the MSDSs from the *Master Notebook* and distribute them to various locations where specific chemicals are used. This may be a central location in the building which is accessible to the employees using the products.

3. The MSDS must be available to the employee during all hours when the employee is working with the chemical. The location of the *Master Notebook* and any site specific

notebooks developed by the department must be explained to each employee, prior to their assignment to duties involving chemicals. (Training in the safe use of the chemical and other facets of the North Carolina Hazard Communications Standard must also be explained to the employee.)

4. An inventory of the chemicals used by the department should be placed at the beginning of the *Master Notebook*. It may be helpful to have this inventory organized by chemical storage location.

5. Maintaining the *Master Notebook*, and any site specific notebooks is the most important step in ensuring regulatory compliance and a safe workplace.

### **C. Review of MSDS's**

The Chemical Hygiene Officer is responsible for reviewing all incoming data sheets for new and significant health/safety information. Any new information will be transmitted to Department Heads so appropriate measures can be taken to inform affected employees.

If deficiencies exist or additional information is needed concerning MSDS's, the chemical manufacturer or supplier will be contacted to obtain necessary information. This can be accomplished through the Office of Safety.

### **D. MSDS Maintenance**

The representative(s) appointed by the Department Head is responsible for maintaining the MSDS's.

The MSDS's for chemicals and the chemical inventory list are maintained by each department in a notebook titled *Department Master Notebook*. These are accessible to employees during each workshift.

If MSDS's are not available or new chemicals in use do not have MSDS's, employees should contact their immediate supervisor.

A master copy of the MSDS's and inventory list will be maintained by the Office of Safety.

**THE UNIVERSITY OF NORTH CAROLINA at GREENSBORO  
NEW CHEMICAL PURCHASING REQUEST**

1. Requesting Area: \_\_\_\_\_ 2. Requestor: \_\_\_\_\_

3. Chemical Substance: \_\_\_\_\_

4. Material Safety Data Sheet (MSDS) Attached: \_\_\_\_ Yes  
*This request cannot be processed unless the MSDS is attached.*

5. Proposed Chemical Use (amounts, duration, etc.):  
\_\_\_\_\_

6. Engineering Controls (enclosures, ventilation systems, etc.):  
\_\_\_\_\_

7. Storage Requirements:  
\_\_\_\_\_

8. Employee Exposure:  
\_\_\_\_\_

9. Expected Workplace Exposure Levels:  
\_\_\_\_\_

10. Personal Protective Equipment Required:

____ Respiratory Protection	_____
____ Eye and Face Protection	_____
____ Protective Clothing	_____

11. Required Medical Surveillance:

____ Pulmonary Tests	_____
____ Urine Analysis	_____
____ Blood Analysis	_____

12. Routine Monitoring Requirements:

A. Workplace Exposure Levels: \_\_\_\_\_

B. Medical Surveillance: _____
13. Request approval by Chemical Hygiene Officer: _____ Date: _____
14. Route a copy to: Office of Safety

**THE UNIVERSITY OF NORTH CAROLINA at GREENSBORO  
CHEMICAL HAZARD AUDIT CHECKLIST**

1. Chemical Substance Audited: \_\_\_\_\_

2. Work Area Audited: \_\_\_\_\_

3. Audit Performed By: \_\_\_\_\_

4. Reason for Audit: \_\_\_\_\_ Routine \_\_\_\_\_ Special -- Reason:  
\_\_\_\_\_

5. Date Audit Performed: \_\_\_\_\_ 6. Time of Audit: \_\_\_\_\_ am/ pm

7. Items Audited and Findings:

ITEM	FINDING	RECOMMENDATIONS
___ Current MSDS in work area.		
___ Engineering controls maintained.		
___ Employees trained.		
___ Labels appropriate.		
___ Local fire chief notified.		
___ Emergency procedures known.		
___ Personal protective equipment used.		
___ Workplace monitoring performed.		
___ Employees told of monitoring results.		
___ Required medical tests performed.		
___ Employee concerns, if any.		
___ Supervisory concerns, if any.		
___		

8. Other Comments: \_\_\_\_\_

9. Auditor's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

10. Route a copy to: Work Area Supervisor, Office of Safety

Appendix E, Section 0030

<b>THE UNIVERSITY OF NORTH CAROLINA at GREENSBORO AIR SAMPLING DATA</b>					
Department: _____ Location: _____					
Survey Date: _____					
AIR SAMPLING RESULTS FOR:					
Sampled by:					
TYPE SAMPLE:					
ANALYTICAL METHOD:					
SAMPLE MEDIA:					
ACGIH TLV-TWA:					
OSHA PEL:					
OSHA STEL:					
Date	Sample #	Sample Location	Time (minutes)	Volume (liters)	Sample Concentration
REMARKS:					
LEGEND:					
ppm - Parts of vapor or gas per million parts of contaminated air by volume at 25° C and 760 torr. mg/m <sup>3</sup> - Approximate milligrams of substance per cubic meter of air. C - Ceiling limit - limit which should never be exceeded even instantaneously.					





Appendix H, Section 0030

<b>THE UNIVERSITY OF NORTH CAROLINA AT GREENSBORO CHEMICAL HYGIENE PERMIT</b>			
Date: _____ Time: _____ Permit No.: _____			
Location: _____			
Person Requesting Permit: _____			
<b>POTENTIAL HAZARDS AND REQUIRED CONTROLS</b>			
<b>SAFETY</b>			
Hazards:			
Precautions	Y	N	NA
Provide guards			
Personal Protective Equipment			
Special safety training			
Special safety procedures			
Lockouts required			
Unattended operation			
Work alone			
Sole Occupancy			
Special Considerations:			
<b>HEALTH</b>			
Hazards:			
Precautions	Y	N	NA
Possible oxygen deficiency			
Special ventilation			
Toxic materials			
Personal Protective Equipment			
Special rescue procedures			
Lockouts required			
Exceed PELs			
Special Considerations:			
<b>FIRE</b>			
Hazards:			
Precautions	Y	N	NA
Fire extinguishers			
Open flame permit			
Explosion protection			
Remove combustibles			
Test atmosphere			
Emergency Egress			

Pyrophorics			
Unattended operation			
Special considerations:			
Additional Comments:			
Approval of Chemical Hygiene Officer: _____			
Name: _____ Date: _____			

**THE UNIVERSITY OF NORTH CAROLINA at GREENSBORO**

**LIST OF CHEMICAL HYGIENE OFFICERS**

<b>Department</b>	<b>Chemical Hygiene Officer</b>
Biology	Robert Caple
Chemistry	Dennis Burnes
Clothing and Textiles	Dr. Charles Kim
Exercise and Sport Science	Dr. Alan Goldfarb
Food, Nutrition, and Food Service Management	Dr. George Loo
Psychology	Dr. Walter Salinger
Student Health Service	Derrick Lankford

Appendix J, Section 0030

**THE UNIVERSITY OF NORTH CAROLINA at GREENSBORO**

**LIST OF CHEMICALS REQUIRING INITIAL MONITORING**

If your lab uses any of the following chemicals, initial monitoring is required. Contact the UNCG Office of Safety for more information.

- Asbestos
- Vinyl Chloride
- Inorganic Arsenic
- Lead
- Cadmium
- Benzene
- 1,2 Dibromo-3-chloropropane
- Acrylonitrile
- Ethylene Oxide
- Formaldehyde
- Methylene Dianiline

**THE UNIVERSITY OF NORTH CAROLINA at GREENSBORO**

**RESISTANCE TO CHEMICALS OF COMMON GLOVE MATERIALS**

CHEMICAL	NATURAL	NEOPRENE RUBBER	NITRILE	VINYL
Acetaldehyde	G	G	E	G
Acetic Acid	E	E	E	E
Acetone	G	G	G	F
Acrylonitrile	P	G	--	F
Ammonium Hydroxide (salt)	G	E	E	E
Aniline	F	G	E	G
Benzaldehyde	F	F	E	G
Benzene*	P	F	G	F
Benzyl Chloride*	F	P	G	P
Bromine	G	G	--	G
Butane	P	E	--	P
Butyraldehyde	P	G	--	G
Calcium Hypochlorite	P	G	G	G
Carbon Disulfide	P	P	G	F
Carbon Tetrachloride*	P	F	G	F
Chlorine	G	G	--	G
Chloroacetone	F	E	--	P
Chloroform*	P	F	G	P
Chromic Acid	P	F	F	E
Cyclohexane	F	E	--	P
Dibenzyl Ether	F	G	--	P
Dibutyl Phtalate	F	G	--	P
Diethanolamine	F	E	--	E
Diethyl Ether	F	G	E	P
Dimethyl Sulfoxide**	--	--	--	--
Ethyl Acetate	F	G	G	F
Ethylene Dichloride*	P	F	G	P
Ethylene Glycol	G	G	E	E
Ethylene Trichloride*	P	P	--	P

Fluorine	G	G	--	G
Formaldehyde	G	E	E	E
Formic Acid	G	E	E	E
Glycerol	G	G	E	E
Hexane	P	E	--	P
Hydrobromic Acid (40%)	G	E	--	E
Hydrochloric Acid (conc)	G	G	G	E
Hydrofluoric Acid (30%)	G	G	G	E
Hydrogen Peroxide	G	G	G	E
Iodine	G	G	--	G
Methylamine	G	G	E	E
Methyl Cellosolve	F	E	--	P
Methyl Chloride*	P	E	--	P
Methyl Ethyl Ketone	F	G	G	P
Methylene Chloride*	F	F	G	F
Monoethanolamine	F	E	--	E
Morpholine	F	E	--	E
Napthalene*	G	G	E	G
Nitric Acid (conc)	P	P	P	G
Perchloric Acid	F	G	F	E
Phenol	G	E	--	E
Phosphoric Acid	G	E	--	E
Potassium Hydroxide (sat)	G	G	G	E
Propylene Dichloride*	P	F	—	P
Sodium Hydroxide	G	F	G	E
Sodium Hypochlorite	G	P	F	G
Sulfuric Acid (conc)	G	G	F	G
Toluene*	P	F	G	F
Trichloroethylene*	P	F	G	F
Tricresyl Phosphate	P	F	--	F
Triethanolamine	F	E	E	E
Trinitrotoluene	P	E	--	P

(E= Excellent, G= Good, F= Fair, P= Poor)

\* Aromatic and halogenated hydrocarbons will attack all types of natural and synthetic glove materials. Should swelling occur, the user should change to fresh gloves and allow the swollen gloves to dry and return to normal.

\*\*No data on the resistance to dimethyl sulfoxide of natural rubber, neoprene, nitrile rubber, or vinyl materials are available, the manufacturer of the substance recommends the use of butyl rubber gloves.