

GUILFORD TECHNICAL COMMUNITY COLLEGE
CHEMICAL HYGIENE PLAN

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SECTION 1

STANDARD OPERATING PROCEDURES

INTRODUCTION

Persons who work in Guilford Technical Community College chemical laboratories shall be safety minded. It is the policy of Guilford Technical Community College that safety awareness become part of each employee's daily work habits. In order to achieve the highest level of safety, Guilford Technical Community College employees shall review the Chemical Hygiene Program quarterly. The Chemical Hygiene Officer shall encourage and support this effort.

Each individual shall accept responsibility for conducting their individual work practices in accordance with the Chemical Hygiene Plan as well as any other good safety practices. All personnel shall familiarize themselves with the safety and emergency equipment available, its location, and appropriate use. Personnel shall also

- practice good housekeeping,
- wear personal protective equipment (PPE) (safety goggles, aprons, gloves, etc.), and
- refrain from smoking, eating, drinking or applying cosmetics where chemicals are present.

Advance planning is one of the best ways to avoid serious incidents. Before beginning any procedures or experiments, laboratory workers shall consider the worst case scenario and be prepared to handle any potentially hazardous situation. Familiarity with specific chemicals or procedures can result in underestimating or overlooking the hazards involved. Casual attitudes can lead to a false sense of security, which may result in carelessness. Each and every laboratory worker has a basic responsibility to themselves and their colleagues to plan and execute laboratory operations in a safe manner.

SELECTION OF CHEMICALS

Laboratory experiments and/or procedures shall be reviewed periodically to determine if alternate experiments or procedures could accomplish the same principle using less toxic or less physically hazardous chemicals. Special attention shall be given to eliminate the use of highly acute toxins, carcinogens, and reproductive toxins. The quantity of chemicals stored shall be minimized by ordering only what is needed for a specific period of time. It is important that employees ordering chemicals confirm that a disposal route is available for the material before ordering.

LABELING AND TRANSPORTING CHEMICALS

Chemicals obtained from outside suppliers shall be properly labeled, and care shall be taken not to deface the label and render it illegible. The product name or the chemical name on the label shall correspond with the name on the Material Safety Data Sheet (MSDS). Labels shall also convey the hazards associated with that chemical (such as toxicity, flammability, or reactivity). If a chemical is transferred into a new container, then that container of mixtures and/or newly created compounds shall also be labeled in accordance with the OSHA Hazard Communication standard (29 CFR 1910.1200).

Foodstuffs intended for use in the laboratory will be identified with a label like:

**NOT FOR CONSUMPTION.
FOR LABORATORY USE ONLY.**

Transporting chemicals shall be accomplished in such a manner that the risk of exposure or a spill is minimized. If transportation involves moving chemicals through the corridors or other public areas, the move shall employ a solvent bottle carrier or other means of secondary containment. The number of chemicals moved and the quantities shall be kept to a minimum.

STORAGE OF CHEMICALS

The primary concerns with the storage of chemicals at Guilford Technical Community College are contact between incompatible chemicals, and the elimination of dangerous storage conditions (i.e. heat, electrical shorts, light, etc.). The following protocols shall be followed:

- Flammable/combustible chemicals (those with flashpoints below 200° F) shall be stored in specifically designed flammable storage cabinets or refrigerators. Flammable materials shall never be stored in refrigerators not designed or modified for flammable material storage.
- Chemical storage shelves shall have a raised lip of at least 1/4" in height at the front edge of the shelf. Other means of preventing containers from moving or falling over the edge may be used only with the permission of the Chemical Hygiene Officer or the Environmental Safety Coordinator.
- Photosensitive chemicals shall be stored away from light.
- Incompatibles, such as acids and sodium cyanide, acids and bases, or ethyl ether and oxidizers, shall be segregated. Acids and bases shall not be stored in the same cabinet or adjacent on the same shelf; oxidizers and flammables shall not be stored together in the same cabinet or adjacent on the same shelf. Chemicals will be organized in accordance with the Fisher Scientific color-code system or an equal system.

- Stored chemicals shall be periodically inspected (at a minimum, once each year).

PERSONAL HYGIENE

The employee shall be responsible for implementing the following personal hygiene practices whenever working in the laboratory.

- Don safety glasses or goggles immediately upon entering the laboratory.
- Avoid skin contact as a cardinal rule whenever handling chemicals.
- PPE shall be worn at any time an employee is manipulating chemicals.
- Personnel shall consult Material Safety Data Sheets (MSDSs) to determine specific PPE requirements.
- Loose clothing shall be confined when working in the laboratory.
- Long hair shall be tied back and/or confined when working in the laboratory.
- Mouth suction, when pipetting liquid chemicals or starting a siphon, shall not be used. A pipet safety bulb or aspirator shall be used.
- Breathing gases, vapors or mists that may be toxic shall be avoided. OSHA 29 CFR 1910.1000 Subpart Z, Appendix C shall be used to determine Permissible Exposure Limits (PEL). Fume hood(s) or confinement apparatus shall be used when required.
- Unsafe conditions or actions shall be called to the attention of the Chemical Hygiene Officer so that immediate or timely corrections can be made.
- Equipment shall be used only for its intended purpose.
- Distracting or startling others in the laboratory shall be avoided.
- Horseplay or practical jokes in the laboratory or storage areas will not be tolerated.
- Exposed skin areas shall be thoroughly washed before leaving the laboratory.
- Employees shall not smoke or apply cosmetics in areas where chemicals are used or stored.

FOOD HANDLING

Food and beverage intended for consumption is prohibited in areas where chemicals are being used or stored. Areas where food or drinks intended for consumption are permitted shall be clearly marked with a sign. Hazardous chemicals SHALL NOT be allowed within that area.

Glassware used for laboratory operations shall not be used for food or beverage consumption. Containers that were used for food or beverage shall not be used to store laboratory chemicals. Laboratory refrigerators or ice chests shall not be used to store food, even if the food containers are sealed. Refrigerators and microwaves intended for chemical use should be labeled with the following verbiage or equivalent:

NOT FOR FOOD OR DRINK

GLASSWARE

Careful storage and handling procedures shall be used to avoid damaging glassware. Damaged glassware shall be discarded. Hand protection shall be worn when inserting glass tubing into rubber or cork stoppers, or when placing rubber/plastic tubing on glass tubing or connections. All glass tubing shall be fire polished or rounded, and lubricated when making connections. Vacuum-jacketed glass apparatus, such as Dewar flasks, shall be wrapped with plastic webbing or tape and handled with extreme caution to prevent implosions. Tongs, broom and dustpan, or cotton swabs shall be used to pick up broken glass. Employees SHALL NEVER pick up broken glass using their hands.

LABORATORY EQUIPMENT

Equipment shall be inspected and maintained on a regular basis following the manufacturers' recommendations. Prior to repair, faulty equipment shall be secured (locked, tagged and/or removed from the laboratory) so that accidental use is not possible. Equipment with exposed moving parts shall be equipped with guards or safety shields. Safety shields shall be used during experiments or operations where danger of explosion or release of high pressure exists. If electrical devices are used in proximity to high moisture conditions, a Ground Fault Interrupter Device (GFID) shall be installed. Pressurized apparatus (i.e. high-pressure cylinders) shall be equipped with an appropriate relief device and be secured (chained) in an upright position to a stationary object at all times.

FLAMMABLE SUBSTANCES

An open flame shall never be used to heat a flammable liquid or distill materials under reduced pressure. Prior to lighting any flame, flammable substances shall be removed from the area or shall be sealed in containers away from the heat. Open flame shall be used only when necessary and extinguished as soon as no longer needed. When volatile flammable chemicals are present, only intrinsically safe or non-sparking electrical equipment shall be used. All combustible substances (flashpoint below 200°F) which are stable at room temperature shall be stored in an approved flammables cabinet.

WASTE DISPOSAL

Chemical wastes should be collected in suitable containers that are clearly labeled. Incompatible wastes shall not be mixed. Waste containers should be kept closed unless waste is being added or removed. Evaporation of chemicals is not an acceptable means of disposal. Measures shall be taken to avoid the accidental ignition of flammable and combustible wastes. Waste disposal should be scheduled periodically with a licensed chemical waste vendor; chemical wastes should not be stored indefinitely. Hazardous waste regulations may require specific labeling and limit accumulation times depending on the generator status of the community college.

All disposals shall be in accordance with Federal, State and local regulations. No hazardous waste, as defined by the EPA in 40 CFR 261, shall be disposed except at an EPA permitted facility. Other materials that may be hazardous but do not meet the definition of hazardous waste shall be disposed of in an environmentally responsible manner. Before any chemicals are disposed by way of sanitary sewer ("down the drain"), prior approval by the local wastewater treatment plant shall be granted. Students and other unnecessary persons shall not be present in the laboratory or disposal area during disposal of any chemicals. This includes either disposal by a licensed chemical waste vendor or sanitary sewer disposal by Guilford Technical Community College personnel.

SECTION 2

RESPONSIBLE PARTIES

CHEMICAL HYGIENE OFFICER

The Chemical Hygiene Officer is listed in Appendix F.

The Chemical Hygiene Officer shall,

- work with administrators and employees to implement the Chemical Hygiene Plan, monitor chemical purchase, use, and disposal, and maintain appropriate audits,
- help personnel develop precautions and adequate facilities,
- know current legal requirements concerning regulated substances, and
- continue improving the Chemical Hygiene Program.

ENVIRONMENTAL SAFETY COORDINATOR

The Environmental Safety Coordinator is listed in Appendix F.

The Environmental Safety Coordinator shall meet with the Chemical Hygiene Officer on a quarterly basis to discuss any changes that may occur in laboratory procedures. They shall also meet when task assignments or personnel duties change. The Environmental Safety Coordinator shall work with the Chemical Hygiene Officer in order to implement both the Chemical Hygiene Plan and Appendix A, "Prudent Practices in a Chemical Laboratory", of 29 CFR 1910.1450.

CHEMICAL HYGIENE COMMITTEE

Guilford Technical Community College Chemical Hygiene Committee is listed in Appendix F.

Subjects addressed during meetings of the Chemical Hygiene Committee include, but are not limited to,

- minimization of stored chemicals,
- hazardous chemical disposal,
- laboratory health and safety issues, and
- regulatory compliance.

SECTION 3

PRIOR APPROVAL POLICY

Due to significant or inherent hazards, certain chemical experiments or procedures may require prior approval. Prior approval for the purchase of a chemical or the exercise of a procedure or experiment shall be the responsibility of the Chemical Hygiene Officer and/or the Environmental Safety Coordinator. At such time as chemical experiments, which may contain significant and/or inherent hazards, are implemented, the Chemical Hygiene Officer and the Environmental Safety Coordinator shall identify those employees approved to perform the experiment and write an appropriate protocol as follows,

The Chemical Hygiene Officer will

- develop a list of ALL hazardous procedures performed in the lab,
- develop specific procedures for each operation, and
- evaluate and approve all employees who may be required to perform the task.

The Prior-Approval Form will be completed and maintained for each procedure (see Prior Approval Form, Page 13). No hazardous procedure will be performed without prior approval. The responsible personnel shall consider the following factors when determining whether prior approval shall be required:

Elements of Assessment (worst case scenario)

- If the operation were performed in the most inappropriate manner, what is the worst possible consequence?
- What is the experience level of the employee carrying out the procedure? (i.e. Are the employees involved in the operation significantly less familiar with the hazards, their causes, or the logistical operation of the lab than the senior person)?
- What are the best preventive measures possible and what are the key elements in carrying out the procedure safely?

Key Elements for Experiments

Key elements for carrying out any experiment shall include, but not be limited to the following:

- PPE - all participating persons shall don appropriate Personal Protective Equipment (PPE). This may include, but not be limited to, safety goggles, face shields, latex or nitrile gloves, and aprons or lab coats.
- SAFETY EQUIPMENT - safety equipment shall be inspected to determine its location and condition (fire extinguisher, fume hood, eyewash and shower, and first aid kit),
- EQUIPMENT - the appropriate equipment shall be assembled. This may include, but not be limited to glassware specifically designed for use in a chemical laboratory,
- VISUAL INSPECTION - each chemical container shall be visually inspected to determine the condition of the chemical (i.e. out of date, damaged container, etc.),
- THE LABEL - the label on the chemical container shall be reviewed to determine any health hazards or physical hazards attributed to the chemical. If the label is illegible, the contents shall be confirmed and a new label attached prior to use,
- MATERIAL SAFETY DATA SHEET - The MSDS shall be reviewed to confirm any health or physical hazard, and to determine emergency or spill control measures,
- SPILL CONTROL - recommended absorbents and clean-up materials shall be assembled and placed in an accessible location,
- INCOMPATIBLES - any incompatible chemicals present shall be removed from the experiment area prior to beginning the procedure,
- STAFF EXPERIENCE - the experiment shall be conducted by persons approved in the conduct of the experiment,
- DECONTAMINATION - at the conclusion of the experiment, chemicals shall be returned to their appropriate storage locations, all laboratory equipment shall be thoroughly washed, and the area decontaminated.
- PERSONAL HYGIENE - disposable PPE shall be disposed and all persons shall follow personal decontamination procedures (washing of exposed skin areas).

GUILFORD TECHNICAL COMMUNITY COLLEGE PRIOR APPROVAL FORM

Revised: _____

Circumstances requiring pre-approval: _____

Description of procedure or operation: _____

To be carried out ONLY by the following employees: _____

Protocol for this operation (employee initial each item as reviewed with supervisor):

1. _____
2. _____
3. _____
4. _____
5. _____

I have reviewed the above protocol: _____
(Employee)

Approved for this operation: _____
(Supervisor)

SECTION 4

CONTROL MEASURES AND PROTECTIVE EQUIPMENT REQUIREMENTS

DETERMINING CONTROL MEASURES

The decision to implement control measures such as fume hoods or protective clothing shall be determined by the specific operation or experiment. Control measures shall be determined for groups¹ of chemicals such as acids, oxidizers, or acute toxins, which are highly reactive or can result in acute or chronic exposure.

Chemicals with a PEL of 50 ppm or less, shall be manipulated only with the use of a fume hood so that fumes are not released into the general laboratory. Corrosive chemicals, toxic chemicals, or any chemical that may cause damage to or be absorbed through the skin, require the use of gloves and safety goggles. In potential splash situations, an apron or lab coat and face-shield shall be used.

CONTROL MEASURES

AT THE SOURCE (Controls At The Chemical)

A less hazardous chemical that will accomplish the same purpose shall be substituted. The operation or experiment shall be enclosed to prevent release into the general work area. Changes in the process shall be implemented where possible to prevent the creation of unnecessary hazards. Stored chemicals shall be kept at a minimum.

IN THE PATH (Controls in The Environmental Pathway Between The Chemical And The Employee)

Laboratory hoods are the primary control in the environmental pathway. Where required by the OSHA PEL, the fume hood shall be used. General ventilation may be adequate for most operations involving chemicals with little or no toxicity or which are amply confined. General ventilation shall exchange the air within each laboratory room a minimum of four (4) times per hour.

BY THE EMPLOYEE (Controls The Employee Shall Take Involving Actions)

Guilford Technical Community College employees shall avoid working alone in the lab. Employees shall always wear appropriate PPE such as safety goggles, gloves, and aprons. Employees shall receive appropriate instruction and/or training prior to conducting a specific procedure.

¹ EXCEPTION: Chemicals, listed by the EPA as "extremely hazardous substances" under SARA Title III Section 302 and 304, shall be considered individually. See "EHS" column on the quarterly inventory.

PROTECTIVE EQUIPMENT

All Guilford Technical Community College laboratories shall be equipped with an emergency shower, eye wash station, fire blanket, fire extinguisher, and first aid kit. Signs indicating the location of each shall be posted and clearly visible and legible from all areas of the laboratory. In addition, all exits will be labeled "EXIT." Laboratory diagrams shall be posted in each laboratory indicating evacuation routes and the current location of the safety equipment.

All laboratory safety equipment will be inspected on a regular basis in accordance with appropriate OSHA regulations. Eyewash equipment and emergency showers shall be inspected and tested in accordance with the American National Standards Institute (ANSI) Standard, ANSI Z358.1-1998, National Standard for Emergency Eyewash and Shower Equipment.

PERSONAL PROTECTIVE EQUIPMENT

Guilford Technical Community College shall provide, at no cost to the employee, appropriate PPE for the chemical to be used as called for in the protocol in which the chemical is used. PPE may include, but not be limited to,

- goggles
- disposable gloves
- respirators
- lab coats
- aprons

It is the responsibility of each employee to be aware of the appropriate PPE required, the location of the PPE, and to wear the appropriate PPE for the assigned task.

EMPLOYEE EXPOSURE MONITORING

If there is reason to believe that the PEL or other published recommended exposure limits are being exceeded, then Guilford Technical Community College will provide monitoring for that exposure.

A qualified person using the appropriate monitoring equipment shall perform monitoring.

Should the results of the monitoring indicate that any specific PEL is being exceeded, Guilford Technical Community College will take measures to eliminate the exposure potential.

SECTION 5**EVALUATION OF VENTILATION AND FUME HOODS**

Ventilation evaluation shall measure the quality and quantity of ventilation in the laboratory. Airflow shall be consistent, with no areas in the lab exhibiting static or high velocity airflow.

Adequate ventilation systems change the room air at least four (4) times per hour. Higher air exchange rate may be needed depending upon chemicals being used. Airflow paths can be monitored with use of smoke tubes, however these do not determine velocities. Pitot tubes are used for measuring duct velocities, and anemometers or velometers are used to measure airflow rates within rooms and at the faces of fume hoods.

Any experiment that uses a chemical with a PEL of 50 parts per million (ppm) or less requires the use of a fume hood or an experiment seal. The locations of Guilford Technical Community College's fume hoods are shown in the Lab Diagrams. The fume hoods shall be inspected and labeled biannually, or when any changes have occurred that may alter fume hood operation.

An accepted method of evaluation is the anemometer or velometer, which measures the velocity of air across the face of the hood. Measurements shall be taken at multiple points along the hood and averaged. Minimum face velocity is 60 linear feet per minute (lfm). A program of biannual measurements and a performance of 100 lfm shall be considered acceptable for toxins and carcinogens.

Fume hoods equipped with fixed air velocity monitoring devices will be properly inspected, monitored, and calibrated for proper operation in accordance the manufacturer's recommendations. Any fume hood or monitoring device found to be not in proper operating condition will be labeled:

**FAIL
OUT OF SERVICE**

SECTION 6

EMPLOYEE INFORMATION & TRAINING

Employees shall be informed that a current Chemical Hygiene Plan shall be maintained and available for review. The Plan shall be readily available to employees, employee representatives, and upon request, the Assistant Secretary of Labor for Occupational Safety and Health, Department of Labor. The location of the plan is listed in Appendix F.

In addition to the Chemical Hygiene Program, Guilford Technical Community College shall provide and maintain an awareness program for employees regarding any hazards and controls in their work areas. The awareness program, "Hazard Communication" OSHA 29 CFR 1910.1200, is also intended to inform employees of basic occupational health and safety. Training in Chemical Hygiene and Hazard Communication shall be provided to regulated personnel upon employment.

The contents of the Occupational Exposure to Hazardous Chemicals in Laboratories Standard (29 CFR 1910.1450) can be found at http://www.osha-slc.gov/OshStd_data/1910_1450.html or by using the CFR search capability at <http://www.access.gpo.gov/nara/cfr/cfr-retrieve.html#page1>. The location of a written copy of the standard on campus is noted in Appendix F.

Permissible Exposure Limits (PEL) for OSHA regulated substances and/or recommended exposure limits for other hazardous chemicals, when no OSHA standard exists, are to be found on the Material Safety Data Sheets (MSDSs) for the substance.

All employees will refer to the MSDS for exposure limits prior to working with a chemical.

Appendix A lists "Extremely Hazardous Substances" according to Section 302 of SARA Title III, found on the Guilford Technical Community College's campus. Further information regarding these substances and other chemicals found on campus can be obtained from the Material Safety Data Sheets (MSDSs).

SECTION 7

MEDICAL EXAMINATION AND CONSULTATION

Guilford Technical Community College shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:

- Personal symptoms. Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination.
- Monitoring levels. Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.
- Emergency exposure. Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical examination.
- All medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place.
- Information provided to the physician. This employer shall provide the following information to the physician:
 - The identity of the hazardous chemical(s) to which the employee may have been exposed.
 - A description of the conditions under which the exposure occurred including quantitative exposure data, if available.
 - A description of the signs and symptoms of exposure that the employee is experiencing, if any.
- Physician's written opinion. The written opinion shall not reveal specific findings of diagnoses unrelated to occupational exposure. For examination or consultation required under 29 CFR 1910.1450 and this standard practice instruction, this

employer shall obtain a written opinion from the examining physician which shall include the following:

- Recommendations for further medical follow-up.
- The results of the medical examination and any associated tests.
- Any medical condition which may be revealed in the course of the examination, which may place the employee at increased risk as a result of exposure to a hazardous chemical found in the workplace.
- A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

The medical report will be filed in a confidential medical file, separate from the employee's other personnel records. This report will be maintained by the Community College for a period 30 years. At any time during this period, the employee may review his/her file. If the employee is not able to review the file in person, he/she may send his/her designated representative to review the file.

SECTION 8

PROCEDURES FOR WORKING WITH CARCINOGENS, REPRODUCTIVE TOXINS, AND HIGHLY ACUTE TOXINS

Additional protection for work with particularly hazardous substances like toxins and carcinogens shall be given specific consideration where appropriate.

WORK PROCEDURES

1. Establishment of a Designated Area.

Designated areas shall be established in each laboratory for the use and manipulation of hazardous chemicals. The designated area shall be posted, and all employees working there shall be informed of the hazards.

2. Use of Containment Devices

Containment devices, such as fume hoods and glove boxes, shall be used

- when working with a hazardous substance,
- if the potential exists for the use of the chemical to result in the generation of aerosols, or
- if the process has the potential to result in an uncontrollable release of the substance.

3. Procedures for Safe Removal of Hazardous Waste

Hazardous waste shall be disposed of in accordance with all federal, state and local regulations.

4. Decontamination Procedures

Decontamination procedures shall include, but not be limited to the following:

- Proper cleaning of the work area before and after chemical use or manipulation
- Remove outer protective gear (gloves, apron, etc.) and place in labeled container for proper cleaning or disposal
- Wash hands and face, remove inner protective clothing and place in labeled container for proper cleaning or disposal
- Place contaminated equipment into labeled containers for proper cleaning

- Check for skin contamination

Employees may add additional steps as needed.

CARCINOGENS - KNOWN AND SUSPECTED WHICH ARE FOUND AT GUILFORD TECHNICAL COMMUNITY COLLEGE

IDENTIFYING CARCINOGENS

Various regulatory agencies and programs have identified specific chemicals as carcinogenic or potentially carcinogenic. These agencies are,

1. Occupational Safety and Health Administration (OSHA)- Carcinogenic chemicals that OSHA has specifically designated as carcinogens or cancer suspect agents and for which standards have been written (e.g. 29 CFR 1910.1003 – “13 Carcinogens” or 29 CFR 1910.1017 – “Vinyl Chloride”).
2. National Toxicology Program (NTP)-Chemicals listed in the "Annual Report on Carcinogens" published by NTP as "Known to be Carcinogens" or "Reasonably Anticipated to be Carcinogens".
3. International Agency for Research on Cancer Monographs (IARC)- All chemicals listed in the publication "International Agency for Research on Cancer Monographs" (IARC) under the lists titled:
 - Group 1 – “Carcinogenic to Humans.”
 - Group 2A – “Probably Carcinogenic to Humans”
 - Group 2B – “Possibly Carcinogenic to Humans”

KNOWN TO BE OR SUSPECTED CARCINOGENS

TABLE OF CAMPUS BUILDING ABBREVIATIONS

**CHEMICAL HYGIENE PLAN FOR:
DATE REVISED:**

ADDITIONAL EMPLOYEE PROTECTION FOR SPECIAL HAZARDS:

Hazard Category:	Select carcinogen:	Cited authority:
	Reproductive toxin:	Cited source:
	High acute toxin:	LD ₅₀ /LC ₅₀ data (source):

PROTECTION CONSIDERED AND ACTIONS TAKEN:

1. Designated Area:
2. Containment Devices:
3. Waste Disposal Policy:
4. Decontamination Procedures:

APPENDIX A

EXTREMELY HAZARDOUS CHEMICALS

APPENDIX B

DEFINITIONS OF SELECTED TERMS

DEFINITIONS OF SELECTED TERMS

Acute	Immediate response to exposure.
Acute Toxicity	Employer shall make provisions for "additional protection" where appropriate if any of the following conditions are met: Median LD ₅₀ of 50 mg/kg orally in albino rats, 200-300 grams. Median LD ₅₀ of 200 mg/kg by continuous contact with the bare skin of albino rabbits 2-3 kgs. Median LD ₅₀ in air of 200 PPM (2 mg/L) continuous inhalation for one hour.
Carcinogen	A cancer-causing agent.
Chronic	Delayed response to exposure.
Combustible	Materials that "flash" above 100°F but less than 200°F.
Flammable	Materials that release sufficient vapor to burn or flash below 100°F.
Flashpoint	The minimum temperature at which a liquid gives off a vapor in sufficient amounts to ignite.
Hazardous Chemical	A chemical for which there is statistically significant evidence in at least one study that acute or chronic health effects may occur in employees exposed to that chemical.
IDLH (Immediately Dangerous to Life and Health)	Atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would interfere with an individual's ability to escape from a dangerous atmosphere.
Laboratory Type Hood	A device enclosed on five sides with a movable sash of fixed glass partially enclosed on the remaining side. It is designed to draw air from the lab and prevent contaminants from entering the lab.
PEL (Permissible Exposure Limit)	The 8-hour time weighted average measured in parts per million and established by OSHA. Workers may not exceed the PEL for any specific chemical.
Physical Hazard	A chemical for which there is scientific evidence that it is a combustible liquid,

	compressed gas, explosive, flammable, an organic peroxide, or oxidizer, pyrophoric, reactive or water reactive.
Reproductive Toxin	Chemicals that affect the reproductive capabilities including chromosomal change (mutation) and effects on fetuses (teratogenesis).
TLV (Threshold Limit Value)	The time-weighted average concentration of a substance for a normal 8-hour workday and a 40-hour work week to which nearly all workers may be exposed day after day without adverse effect.
Water-reactive	A chemical which releases a flammable or hazardous gas when it reacts with water.

APPENDIX C

CURRENT LABORATORY INVENTORY

APPENDIX D

LABORATORY DIAGRAMS

APPENDIX E
GUIDELINES FOR FORMALDEHYDE USE

GUIDELINES FOR FORMALDEHYDE USE²

SAMPLING STRATEGY AND DETERMINATION OF THE NEED FOR EXPOSURE MEASUREMENTS

To protect the health of employees, exposure measurements need to be unbiased and representative of employee exposure. There is no one correct way to determine employee exposure. Obviously measuring the exposure of every employee exposed to formaldehyde will provide the most information on any given day.

Guilford Technical Community College has determined that some employees have the potential to be exposed to concentrations in excess of the action level (0.5 ppm TWA). Departments with employees that work with formaldehyde are listed in Appendix F.

WORKPLACE MATERIAL SURVEY

Work tasks that involve the use or manipulation of Formaldehyde are listed in Appendix F.

WORKPLACE OBSERVATIONS

In many circumstances, sources of formaldehyde can be identified through the sense of smell. However, this method of detection is used with caution because of olfactory fatigue.

Certain high temperature operations give rise to higher evaporation rates. The location of open doors and windows provides natural ventilation that tends to dilute formaldehyde emissions. General room ventilation also provides a measure of control.

EXPOSURE RISK

Guilford Technical Community College has determined that there is limited potential for a substantial employee exposure to formaldehyde

1. Employees who are present during a leak or spill event will be considered exposed and receive medical evaluations in keeping with the terms of the Chemical Hygiene Plan.
2. Dissection or preservation of laboratory specimens. Guilford Technical Community College will conduct badge sampling during a representative dissection task, and again whenever there are significant changes to the methods used for dissection (either in terms of procedure or engineering controls).

² Wherever the name "Formaldehyde" is used, it shall be interpreted to mean Formaldehyde (CAS # 50-00-0), Formalin, or Formaldehyde by any other chemical or preservative name.

MONITORING AND MEASUREMENT PROCEDURES

Evaluation of 8-hour Exposure: Measurements taken for the purpose of determining time-weighted average (TWA) exposures will be taken with samples covering the full shift. Samples collected will be taken from the employee's breathing zone air.

Short-term Exposure Evaluation: If there are tasks that involve brief but intense exposure to formaldehyde, employee exposure will be measured to assure compliance with the STEL. Sample collections are for brief periods, only 15 minutes. Several samples may be needed to identify the peak exposure.

Guilford Technical Community College will conduct "badge sampling" with the cooperation of employees who perform tasks that may expose them to Formaldehyde. If the samples indicate that the levels of Formaldehyde warrant further tests, Guilford Technical Community College will conduct additional tests in keeping with OSHA standards. Should the additional tests show that Formaldehyde levels exceed the PEL set by OSHA, Guilford Technical Community College will take measures to increase engineering controls or otherwise lessen the exposure of employees to formaldehyde.

Notification of Results: Guilford Technical Community College will inform employees of the results of exposure monitoring representative of their job. The results will be in writing.

ENGINEERING CONTROLS

Because ventilation is the most widely applied engineering control method for reducing the concentration of airborne substances in the breathing zone, the following protocol will be followed:

1. **Work Practices:** Work practices and administrative procedures are an important part of a control system. If an employee is asked to perform a task in a certain manner to limit his/her exposure to formaldehyde, it is extremely important that the employee follows procedures and wears Personal Protective Equipment (PPE).
2. **Fume Hood:** Fume hood ventilation is designed to capture airborne contaminants as near to the point of generation as possible. To protect the employee, the direction of contaminant flow must always be toward the local exhaust system inlet and away from the employee. A fume hood will be used when pouring or otherwise manipulating Formaldehyde.
3. **General (Mechanical):** General dilution ventilation involves continuous introduction of fresh air into the workroom to mix with the contaminated air and lower the breathing zone concentration of formaldehyde. Effectiveness depends on the number of air changes per hour. Where students are dissecting specimens that are emitting formaldehyde over a large area of the laboratory, general dilution ventilation may be the only practical method of control. When possible, windows may be opened for additional vapor dilution.

MEDICAL SURVEILLANCE

Guilford Technical Community College will make a medical surveillance program available at no expense, and at a reasonable time and place for any employee exposed to formaldehyde at concentrations above 0.5 ppm as an 8-hour average or 2 ppm over any 15-minute period. Employees will be offered medical surveillance at the time of their initial assignment and once a year afterward as long as their exposure is at least 0.5 ppm (TWA) or 2 ppm (STEL). Even if employee exposure is below these levels, the employee is required to inform Guilford Technical Community College if he/she notices signs/symptoms recognized through employee training, and related to formaldehyde exposure.

The surveillance plan includes:

- A medical disease questionnaire
- A physical examination if the physician determines this is necessary. The physician will collect all information needed to determine if the employee is at increased risk from his/her exposure to formaldehyde. At the physician's discretion, the medical examination may include other tests, such as a chest x-ray, to make this determination.
- After a medical examination the physician will provide Guilford Technical Community College with a written opinion which includes any special protective measures recommended and any restrictions on the exposure. The physician must inform the employee of any medical conditions he/she has which would be aggravated by exposure to formaldehyde.

All records from the employee's medical examinations, including disease surveys, will be retained at the expense of Guilford Technical Community College.

EMERGENCIES

If a spill of appreciable quantity occurs, employees will isolate the spill (close doors) and leave the area quickly. Guilford Technical Community College's emergency procedures will be followed.

Spill, Leak and Disposal Procedures

For small spills, designated employees will place the leaking container in a well-ventilated area and either follow established clean-up procedures or contact a licensed chemical waste vendor regarding disposal.

Employees exposed to formaldehyde as the result of an emergency in designated workplaces and who develop signs or symptoms associated with acute toxicity from formaldehyde exposure will be provided a medical examination as soon as possible. This

medical examination will include all steps necessary to stabilize the employee's health. Affected employees may be kept in the hospital for observation if symptoms are severe.

APPENDIX F
COLLEGE-SPECIFIC INFORMATION

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Issues Required by the OSHA Standard	College Information for Compliance
Designation of Chemical Hygiene Officer (mandatory)	Nouroll Naser-Shirzadi
Designation of Chemical Hygiene Committee (optional)	Members: 1.George Matthews 2.Nouroll Naser-Shirzadi 3.Felix Boggan 4.Sandra Lindsay-Hardge 5. 6.
Frequency of Committee Meetings (optional)	Circle one: Monthly Quarterly Biannually Annually
Designation of Environmental Safety Coordinator (optional)	
Location of Chemical Hygiene Plan (mandatory – must be accessible to employees)	Felix Boggan - Electronics 217 George Matthews – Electronics 209
Location of 29 CFR 1910.1450 Standard (mandatory – must be accessible to employees)	Felix Boggan – Electronics 217 George Matthews – Electronics 209
Departments that use Formaldehyde Formaline	1.Biology Department 2. 3. 4.
Work tasks involving Formaldehyde Formaline	1.Dissecting Animals 2.Packaged in Formaline 3. 4. 5. 6.