University of North Carolina Greensboro
Laboratory Safety Plan

Building and Room(s)/Lab#(s): **Chemical Safety Facility/ 001, 002, 003**

This form is to be used by Principle Investigators or Teaching Laboratory Instructors to describe work involving: hazardous chemicals, radioactive materials, x-rays, lasers, biological hazards and other hazards associated with laboratories. This document is meant to comply with the UNCG Chemical Hygiene Policy and all applicable state and federal regulations. Multiple rooms and labs under the control of the PI or Instructor maybe listed in the same plan if the hazards are consistent. When complete, this Laboratory Safety Plan, all training, and laboratory operating procedures will be printed and kept in a notebook in each laboratory. This plan is intended to be reviewed on a regular basis to accommodate for changes related to: personnel, operations, and resources.

I. Laboratory Project Information

Contact Information

Principle Investigator/Teaching Lab Coordinator:

Name:	**Eric Zack**
Department:	**Environmental Health & Safety**
Phone Number:	**336-334-4357**
After Hours Phone:	

Safety Supervisor (Person responsible for safety in absence of the PI):

Name:	**Daniel Todd**
Department:	**Environmental Health & Safety**
Phone Number:	**336-334-4357**
After Hours Phone:	

PI/Teaching Lab Coordinator Signature/Date	**Department Head Signature/Date**	**EH&S Department Signature/Date**
(Hard Copy Only)	(Hard Copy Only)	(Hard Copy Only)

II. Laboratory Personnel

List all personnel (i.e., UNCG employees, UNCG students, and other employees) under Eric Zack's supervision that use hazardous materials, or work in close proximity to hazardous materials in Chemical Safety Facility/ 001, 002, 003.

Please update (as needed) to account for changes in laboratory personnel.

Chemical Hazards- Works with or in an area where chemicals are used or stored
Biological Hazards- Works with or in an area where Biosafety Level 1,2, or 3 materials are used or stored.
Human Blood-Works with human blood, body fluids, cell lines or other potentially infectious materials.
Radioactive Materials/X-Ray- Works with or in an area where radioactive materials or X-rays are used.
Nanoparticles- Works with or in an area where nanoparticles are used.
Lasers-Works with or in an area where lasers are used.

			Employee may come in contact with: Training complete:					
Employee Name	Student?		Chemical Hazards	Biological Hazards	Human Blood	Radioactive Material/X-Ray	Nano-particles	Lasers
Tim Slone	No	Contact?	✓			✓		
		Training?	✓			✓		
Eric Zack	No	Contact?	✓	✓	✓	✓		✓
		Training?	✓	✓	✓	✓		✓
Daniel Todd	No	Contact?	✓	✓	✓			
		Training?	✓	✓	✓			
Todd Beck	No	Contact?	✓					✓
		Training?	✓					✓
		Contact?						
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1/22/2013

Employee Training - Employee training is required for each box checked. Training can be provided by the EH&S Dept., Researcher/Teaching Coordinator or Department. Please contact EHS to determine the minimum that must be covered during training. Complete or attach (Departmental Training Roster) or a training roster for each employee who has completed training. This training roster should be kept in the Lab Safety Plan located in the laboratory.

Roster attached: ☐

III. Hazard Assessment / Laboratory Operating Procedures

Description of Potential Hazards in Research/Teaching activities:

Research in this lab draws on methodologies from both organic chemistry and biochemistry. Researchers (P.I, undergrad and grad students) may have potential exposure to flammable solvents, corrosives and caustics, suspect carcinogens and other toxic chemicals, as well as reactives and mild oxidizing agents. Biological exposures are minimal, nonhazardous and limited to work with commercially provided animal tissues (e.g., rabbit livers) during enzyme purification experiments. There will be no exposure to live animals or human blood or tissues.

Appendix A. Required Laboratory Operating Procedures

If applicable to your specific laboratory, chemical use procedures are required at UNCG for:

- Flammable Liquids
- Carcinogens
- Corrosives
- Oxidizers
- Reactives

Additionally, the following operating procedures are required for each laboratory at UNCG:

- Chemical Storage And Segregation Procedures
- Chemical Waste Procedures
- Emergency Closure Procedures
- Regulated Chemical Identification

Building	Rooms	Flammable Liquids	Carcinogens	Corrosives	Oxidizers	Reactives	Toxic/ Poison	BSL-1	BSL-2	Compressed Gas	Rad/ XRay	Laser
Chemical Safety Facility	1	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Chemical Safety Facility	2	☑	☑	☑	☑	☑	☐	☐	☑	☐	☐	☐
Chemical Safety Facility	3	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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UNCG Laboratory Operating Procedures / Flammable Liquids Use Procedures

PI / Teaching Lab Coordinator: Eric Zack
Lab / Room #: Chemical Safety Facility/ 001, 002, 003

Flammable Liquids: are chemicals that have a flash point below 100 degrees F (38.7 degrees C) and a vapor pressure that does not exceed 40 psig at 100 degrees F. The Global Harmonization Standard (GHS) currently defines a flammable liquid as a liquid having a flash point of no greater than 93 C.
Process Description: Mixing / transferring / using various concentrations of flammable liquids.
Risk Assessment: The most common fire hazard in the lab is flammable liquids and the vapors produced from such liquids. Although the primary hazard arises from the solvents property of being highly or extremely flammable, several are also described as harmful and/or toxic. Solvents frequently affect the central nervous system and at high concentration can cause sedation, coma, and death. For these reasons, flammable solvents should be regarded as very hazardous. Flammable solvents frequently found in most laboratories include, but are by no means limited to, acetone, methanol, ethanol, etc.
Safety Equipment:
Engineering / Ventilation Controls: A safety shower and eyewash must be available and accessible when working with flammable liquids. Experiments involving greater than 500 mL of flammable liquids should be carried out in a fume hood. Always attempt to handle large quantities of flammable liquids in your fume hood. Special ventilation may be required when handling flammable liquids outside of a fume hood. Please contact the Office of Safety if there are any concerns regarding flammable liquid operations.

PPE: Nitrile, PVC, or neoprene gloves can provide effective skin protection. Wear safety glasses or chemical splash goggles with face shield when using large quantities, or chemical safety goggles when using small quantities. Wear rubber, neoprene, or PVC apron when using large quantities and splash potential exists. Safety shielding is required at any time there is a risk of explosion or a highly exothermic reaction. All manipulations of flammable liquids which pose this risk must occur in a fume hood with the sash in the lowest feasible position.
Designated Use Area: Flammable liquids will be used throughout the laboratory. Special caution should be taken to avoid contact with hot surfaces or flame. Quantities over 500 mL will be conducted in a fume hood. Mixing or dispensing should be done in a fume hood with all ignition sources eliminated.

Special Handling / Storage Requirements:
· The storage of flammable and combustible liquids in a laboratory, shop or building area must be kept to the minimum needed for research and/or operations. If more than 25 gallons of flammables are present outside of safety cans per 100 square feet of area, a flammable liquids storage cabinet is required.
· All flammable liquids must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.
· Where feasible (if the quality of the solvent will not be adversely affected) transfer flammable liquids from glass bottles into metal safety cans.
· Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate release. The exhaust for the pumps must be vented into an exhaust hood. Vacuum pumps should be rated for use with flammable liquids.
· If flammable liquids are stored in a refrigerator or freezer it must be a certified explosion proof device.
Emergency Procedures:

Skin exposure: Rinse affected skin with plenty of water while removing contaminated clothing and shoes.
Eye exposure: Wash eyes for at least 15 minutes, lifting the upper and lower eyelids. Seek medical attention immediately.

Small spills: 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. Spill cleanup should be derived from the materials MSDS sheet. Flammable spill response is meant to control the liquid portion of the spill and minimize vapor production. For this reason, do not use paper towels on large area spills or flammable liquids because it exacerbates vapor production.

Large spills: Notify others in area of spill. Turn off ignition sources in area. Evacuate area and post entrance ways to spill area. Call the UNCG Police 4-4444. Restrict persons from area of spill or leak until cleanup is complete. Remain in area in safe location to assist the Police with response.

Step By Step Operating Procedure: Please include any lab specific operating procedures.

UNCG Laboratory Operating Procedures / Carcinogens (poisons) Use Procedures

PI / Teaching Lab Coordinator: Eric Zack
Lab / Room #: Chemical Safety Facility/ 001, 002, 003

Process Description: Carcinogens will be used in the laboratory. The UNCG Safety Office must be informed of carcinogen use in a laboratory.

Risk Assessment: A carcinogen commonly describes any agent that can initiate or speed the development of malignant or potentially malignant tumors, malignant neoplastic proliferation of cells, or cells that possess such material. The Global Harmonization Standard (GHS) currently defines a carcinogen as a chemical substance or a mixture of chemical substances which induce cancer or increase its incidence. A listing of carcinogenic materials can be found in the UNCG Required Chemical Reporting Document.

Safety Equipment:
Engineering / Ventilation Controls: Manipulation of carcinogens should be carried out in a fume hood. Manipulation of carcinogens outside of a fume hood may require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to carcinogens in the laboratory and are the preferred ventilation control device. When possible, handle carcinogens in a fume hood. If the use of a fume hood proves impractical, attempt to work in a glove box or on an isolated area on the bench top.

PPE: Eye protection in the form of safety glasses must be worn at all times when handling carcinogens. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn. Gloves should be worn when handling carcinogens. Nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals. However, when larger quantities are handled or regular contact is involved more protective gloves should be used. Appropriate lab attire (lab coats, closed- toe shoes and long- sleeved clothing) should be worn when handling carcinogenic materials. Additional protective clothing should be worn if the possibility of skin contact is likely.
Designated Use Area: Manipulation of carcinogens should be carried out in a fume hood. If the use of a fume hood proves impractical refer to the section on special ventilation.

Special Handling / Storage Requirements: Carcinogens must be stored in a designated area.

Emergency Procedures: Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This should occur prior to the use of any carcinogen. In the event of a spill alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of carcinogenic material. Vacate the laboratory immediately and call for assistance. Call the UNCG Police 4-4444. Restrict persons from area of spill or leak until cleanup is complete. Remain in area in safe location to assist the Police with response.

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UNCG Laboratory Operating Procedures / Corrosives Handling / Use Procedures

PI / Teaching Lab Coordinator: Eric Zack
Lab / Room #: Chemical Safety Facility/ 001, 002, 003

Corrosive Chemicals: are substances that cause visible destruction or permanent changes in human skin tissue at the site of contact. The major classes of corrosives include strong acids, bases, and dehydrating agents.
Process Description: Mixing / Transferring / Using various concentrations of aqueous corrosive solutions.

Risk Assessment: Avoid skin contact, serious burns may result. Avoid eye contact or serious burns may result.
Safety Equipment:
Engineering / Ventilation Controls: Use concentrated corrosives in a fume hood. A safety shower and eyewash must be available and accessible when working with corrosive liquids.
PPE: Safety goggles, nitrile, PVC, or neoprene gloves can provide effective skin protection.Wear safety glasses or chemical splash goggles with face shield when using large quantities, or chemical safety goggles when using small quantities. Wear rubber, neoprene, or PVC apron when using large quantities and splash potential exists. Lab coats, closed toe shoes, and long sleeved clothing should be worn if the possibility of skin contact is likely.
Designated Use Area: Concentrated corrosives are to be used exclusively in the fume hood. Dilute concentrations will be used throughout the laboratory.

Special Handling / Storage Requirements: Store mineral acids together, separate from oxidizing agents and organic materials. Store acetic acid and other organic acids with the combustible organic liquids. Segregate the various types of corrosives i.e. acids and bases. Liquids and solids should be separated. Corrosive resistant cabinets should be used for storage of large amounts of corrosive materials. Do not store on high cabinets or shelves.
Emergency Procedures:
Skin exposure: Rinse affected skin with plenty of water while removing contaminated clothing and shoes. Rinse for at least 15 minutes. Seek medical attention.
Eye exposure: Splashes may cause tissue destruction. Wash eyes for at least 15 minutes, lifting the upper and lower eyelids. Seek medical attention immediately.
Small spills: 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 broad spectrum absorbent. When absorbent is removed, wash contaminated area.
Large spills: Notify others in area of spill. Turn off ignition sources in area. Evacuate area and post entrance ways to spill area. Call the UNCG Police 4-4444. Restrict persons from area of spill or leak until cleanup is complete. Remain in area in safe location to assist the Police with response.
Decontamination: May vary based on material some materials may be neutralized with other reagents. Special neutralizing agents should be on hand to decontaminate area.

Step By Step Operating Procedure: Please include any laboratory specific operating procedures.

UNCG Laboratory Operating Procedures / Oxidizer Use Procedures

PI / Teaching Lab Coordinator: Eric Zack
Lab / Room #: Chemical Safety Facility/ 001, 002, 003

Process Description: Oxidizers are to be used in the laboratory. The following is meant to serve as guidelines for their use.
Risk Assessment: Oxidizing chemicals are materials that promote combustion or spontaneously evolve oxygen at room temperature or with slight heating. The Global Harmonization Standard (GHS) currently defines an oxidizing material as a solid liquid or gas , while in itself not necessarily combustible may by yielding oxygen, cause, or contribute to, the combustion of other material. This class of chemicals includes peroxides, chlorates, perchlorates, nitrates, and permanganates. Strong oxidizers are capable of forming explosive mixtures when mixed with combustible, organic or easily oxidized materials.
Safety Equipment:

Engineering / Ventilation Controls: Not applicable.

PPE: Eye protection in the form of safety glasses must be worn at all times when handling oxidizing chemicals. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn. (goggles, face shields, etc.) Gloves should be worn when handling oxidizing chemicals. Nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals. However, when larger quantities are handled or regular contact is involved more protective gloves should be used. Appropriate lab attire (lab coats, closed- toe shoes and long-sleeved clothing) should be worn when handling oxidizing chemicals. Additional protective clothing should be worn if the possibility of skin contact is likely.

Designated Use Area: Oxidizers will be used throughout the laboratory.

Special Handling / Storage Requirements: Oxidizers should be stored in a cool and dry location. Keep oxidizers segregated from all other chemicals in the laboratory. Minimize the quantities of strong oxidizers stored in the laboratory. Never return excess chemicals to the original container. Small amounts of impurities may be introduced into the container, which may cause a fire or explosion.

Emergency Procedures:
Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This should occur prior to the use of any oxidizing chemicals. Spill control materials for oxidizers are designed to be inert and will not react with the reagent. Never use paper towels or other inappropriate materials, which are combustible. The waste materials generated during spill cleanup may pose a flammability risk and should not remain in the laboratory overnight unless it is stored in an appropriate container. In the event of a spill, alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of oxidizing chemicals. Vacate the laboratory immediately and call the UNCG Police 4-4444 for response.
Step By Step Operating Procedure: Please include any laboratory specific operating procedures.

Laboratory Operating Procedures / Reactive Chemical Use Procedures

PI / Teaching Lab Coordinator: Eric Zack
Lab / Room #: Chemical Safety Facility/ 001, 002, 003

Reactive Chemicals: Highly reactive chemicals are to be used in this laboratory. The following is meant to serve as guidance for their use.
Process Description: Mixing / transferring / using various concentrations of reactive chemicals.

Risk Assessment: Highly reactive or unstable materials are those that have the potential to vigorously polymerize, decompose, condense, or become self-reactive under conditions of shock, pressure, temperature, light, or contact with another material. The Global Harmonization Standard (GHS) currently further defines "self-reactive" chemicals as thermally unstable liquids or solids liable to undergo a strongly exothermic thermal decomposition even without participation of oxygen. Major types of highly reactive chemicals are explosives, peroxides, water-reactives, and pyrophorics.

Safety Equipment:
Engineering / Ventilation Controls: As many reactive materials liberate combustible and/or toxic gas when exposed to water vapor or air, they should be used in a lab hood to prevent hazardous buildup of gases.

PPE: At minimum, safety glasses, lab coat, long pants, and closed toed shoes are to be worn when entering laboratories having hazardous chemicals. Additionally: Utilize shields and barricades, and personal protective equipment (such as face shields with throat protectors and heavy gloves) whenever there is a possibility of explosion or vigorous chemical reaction. When handling hazardous chemicals or contacting potentially contaminated surfaces, protective gloves are to be worn. Goggles (not safety glasses) are appropriate for processes where splash or spray is foreseeable. For hazardous chemicals that are toxic via skin contact/ absorption, additional protective clothing (i.e., faceshield, apron, oversleeves) is appropriate where chemical contact with body/skin is foreseeable.
Designated Use Area: Highly reactive chemicals should be handled in the fume hood. If fume hood use is not possible please describe use areas within the laboratory.

Special Handling / Storage Requirements: Ensure careful handling of handling materials that may be sensitive to shock, heat, friction, or light.
Ensure secondary containment and segregation of incompatible chemicals per guidance within the Chemical Segregation section of the Laboratory Safety Plan. Also, follow any substance-specific storage guidance provided in MSDS documentation.
Label all chemicals with date received and date opened and if an appropriate expiration date does not exist, assign one
Any chemicals with crystallization, visible discoloration, or liquid stratification potentially have undergone peroxidation and must not be used or otherwise disturbed. Please contact the EH&S if this has occurred (4-4357)
Emergency Procedures: Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This should occur prior to the use of any oxidizing chemicals. Spill control materials for oxidizers are designed to be inert and will not react with the reagent. Never use paper towels or other inappropriate materials, which are combustible. The waste materials generated during spill cleanup may pose a flammability risk and should not remain in the laboratory overnight unless it is stored in an appropriate container. In the event of a spill, alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of oxidizing chemicals. Vacate the laboratory immediately and call the UNCG Police 4-4444 for response.

Step By Step Operating Procedure: Please include any laboratory specific operating procedures.

Chemical Storage and Segregation Procedures

The following is meant to serve as the chemical storage guidelines for the above referenced laboratory.

All chemicals kept in this space shall be stored according to the description below.

General and Principles of Safe Chemical Storage

• A designated storage place for each compound.
Each stock container of a chemical compound should be returned to that location after each use. Storage locations can be marked on containers.

•Not on the bench top
Do not store stock supplies of chemicals on bench tops where they are unprotected from ignition sources and more easily knocked over. Only chemicals in use should be on bench tops.

• Not in the fume hood
Do not maintain large stock supplies of chemicals in fume hoods. They may interfere with air flow in the hood, and provide fuel if there is a fire.

• Not in alphabetical order except within "Chemical Storage Groups"
Do not store chemicals in alphabetical order except within "Chemical Storage Groups". Alphabetical arrangement of randomly collected chemicals often increases the likelihood of dangerous reactions by bringing incompatible materials into close proximity.

• Away from sun and heat
Storage areas should not be exposed to extremes of heat or sunlight.

• Not under the sink
Do not store any chemicals except bleach and compatible cleaning agents under the sink.

• Label chemicals properly
All containers within the lab must be labeled. Suspect and known carcinogens must be labeled as such and segregated within trays to contain leaks and spills.

• Safeguard against theft
This plan does not require security measures (i.e., locked cabinets) to prevent theft, but lab workers should make sure that lab doors are locked when unattended. Use of chemicals regulated by Drug Enforcement Agency may require registration and secured controlled storage.

• Liquid chemicals
Storage of liquid chemicals is more hazardous than storage of solids and is subject to numerous and varied storage requirements.

Overview of the Chemical Storage Group

In this plan there are nine storage groups. Seven of these groups cover storage of liquids because of the wide variety of hazards posed by these chemicals. Specific instructions must be followed for metal hydrides (Group VIII) and certain individual compounds, but otherwise, dry solids are in Group IX.

Many liquid chemicals pose hazards that correspond to more than one storage group. These chemicals should be stored in the lowest group number.

PLEASE SELECT THE CHEMICAL TYPES STORED IN **Chemical Safety Facility/ 001, 002, 003**

☑ Group I-Flammable/Combustible Liquids

Examples: all alcohols, acetone, acetaldehyde, acetonitrile, amyl acetate, benzene, cyclohexane, dimethyldichlorosilane, dioxane, ether, ethyl acetate, histoclad, hexane, hydrazine, methyl butane, picolene, piperidine, propanol, pyridine, scintillation liquids, all silanes, tetrahydrofuran, toluene, triethylamine, and xylene

Primary Storage Concern: To protect from ignition

Recommended Facilities/Measures: 1. Flammable cabinet 2. Refrigerator for containers less than 1 liter. Explosion proof/ Lab Safe Refrigerator

Compatible Storage Groups: Volatile poisons may be in the same compartment of the flammable cabinet as flammables if bases are not present. Glacial acetic acid should be stored in flammable cabinets.

☑ Group II-Volatile Poisons

Includes poisons, toxics and known and suspected carcinogens with strong odor or evaporation rate greater than 1 (butyl acetate = 1): Examples: carbon tetrachloride, chloroform, dimethylformamide, dimethyl sulfate, formamide, formal dehyde, halothane, mercaptoethanol, methylene, chloride, phenol.

Primary Storage Concern: To prevent inhalation exposures.

Recommended Facilities/Measures: 1. Flammable cabinet 2. Refrigerator: for containers less than 1 liter.

Compatible Storage Groups: Volatile poisons may be in the same compartment of the flammable cabinet as flammable if bases are not present.

☑ Group III-Oxidizing Agents

All oxidizing acids are highly reactive with most substances and each other. Examples: nitric, sulfuric, perchloric, phosphoric acids, and chromic acids.

Primary Storage Concern: Preventing contact and reaction with each other and other substances and corrosive action on surfaces.

Recommended Facilities/Measures: 1. Safety (Corrosives) Cabinet. Each oxidizing acid must be double-contained, i.e., the primary container must be kept inside canister, tray or tub.

Compatible Storage Groups:
Oxidizing acids must be double-contained and should be segregated in their own compartment in a safety cabinet. When quantities are small (e.g., 1 or 2 bottles) they do not warrant a separate compartment. Small quantities may be double-contained and stored with Group 4 Organic and Mineral Acids. Store oxidizing acids on bottom shelf below Group 4.

☑ Group IV-Organic and Mineral Acids

Examples: acetic, butyric, formic, hydrochloric, isobutyric, mercaptoproprionic, proprionic, trifluoroacetic acids.

Primary Storage Concern: To prevent contact and reaction with bases and oxidizing acids and corrosive action on surfaces.

Recommended Facilities/Measures: 1. Safety (Corrosives) cabinet.

Compatible Storage Groups: Small amounts of double-contained oxidizing acids can be stored in the same compartment with organic acids if the oxidizing acids are stored on the bottom shelf. Exceptions: acetic anhydride and trichloroacetic anhydride are corrosive. These acids are very reactive with other acids and should not be stored in this group. It is better to store these with organic compounds as in Group 7 Non-volatile Liquid Poisons.

☑ Group V-Liquid Bases

Examples: sodium hydroxide, ammonium hydroxide, calcium hydroxide, glutaraldehyde

Primary Storage Concern: Preventing contact and reaction with acids.

Recommended Facilities/Measures: 1. Safety (corrosives) cabinet; 2. In tubs or trays in normal cabinet.

Compatible Storage Groups: Liquid bases may be stored with flammables in the flammable cabinet if volatile poisons are not also stored there.

☑ Group VI-Oxidizing Liquids

Oxidizing liquids react with everything potentially causing explosions or corrosion of surfaces. Examples: ammonium persulfate, hydrogen peroxide (if greater than or equal to 30%)

Primary Storage Concern: To isolate from other materials.

Recommended Facilities/Measures: 1. Total quantities exceeding 3 liters should be kept in a cabinet housing no other chemicals. 2. Smaller quantities must be double-contained if kept near other chemicals, e.g., in a refrigerator.

Compatible Storage Groups: None

☑ Group VII-Non-Volatile Liquid Poisons

Includes highly toxic (LD50 oral rat < 50 mg/kg) and toxic chemicals (LD50 oral rat < 500 mg/kg), known carcinogens, suspected carcinogens and mutagens Examples: acrylamide solutions; diethylpyrocarbonate; diisopropyl fluorophosphate; uncured epoxy resins; ethidium bromide; triethanolamine

Primary Storage Concern: To prevent contact and reaction with liquids and, in some cases, air.

Recommended Facilities/Measures: 1. Secure, water-proof double-containment according to label instructions. 2. Isolation from other storage groups.

Compatible Storage Groups: If securely double-contained to prevent contact with water and/or air, metal hydrides may be stored in the same area as Group 9 Dry Solids.

☑ Group VIII-Reactives

Most metal hydrides react violently with water, some ignite spontaneously in air (pyrophoric). Examples of metal hydrides are sodium borohydride, calcium hydride, lithium aluminum hydride. Other pyrophorics are boron, diborane, dichloroborane, 2-Furaldehyde, diethyl aluminum chloride, lithium, white or yellow phosphorus and trimethyl aluminum. Other water reactives include aluminum chloride-anhydrous, calcium carbide, acetyl chloride, chlorosulonic acid, sodium, potassium, phosphorous pentachloride calcium, aluminum tribromide, calcium oxide, and acid anhydrides.

Primary Storage Concern: To prevent contact and reaction with liquids and, in some cases, air.

Recommended Facilities/Measures: 1. Secure, water-proof double-containment according to label instructions. 2. Isolation from other storage groups.

Compatible Storage Groups: If securely double-contained to prevent contact with water and/or air, metal hydrides may be stored in the same area as Group 9 Dry Solids.

☑ Group IX-Dry Solids

Includes all powders, hazardous and non-hazardous. Examples: benzidine, cyanogen bromide, ethylmaleimide, oxalic acid, potassium cyanide, sodium cyanide

Primary Storage Concern: To prevent contact and potential reaction with liquids.

Recommended Facilities/Measures:

- Cabinets are recommended, but if not available, open shelves are acceptable. If solid oxidizers are stored on wood shelves they should be in secondary containment.
- Store above liquids.
- Warning labels on highly toxic powders should be inspected and highlighted or amended if they do not cause the containers to stand out against less toxic substances in this group.
- It is recommended that the most hazardous substances in this group be segregated.
- It is particularly important to keep liquid poisons below cyanide-or sulfide-containing poisons (solids). A spill of aqueous liquid on cyanide - or sulfide - containing poisons would cause a reaction that would release poisonous gas.

Compatible Storage Groups: Metal hydrides, if properly double-contained may be stored in the same area.

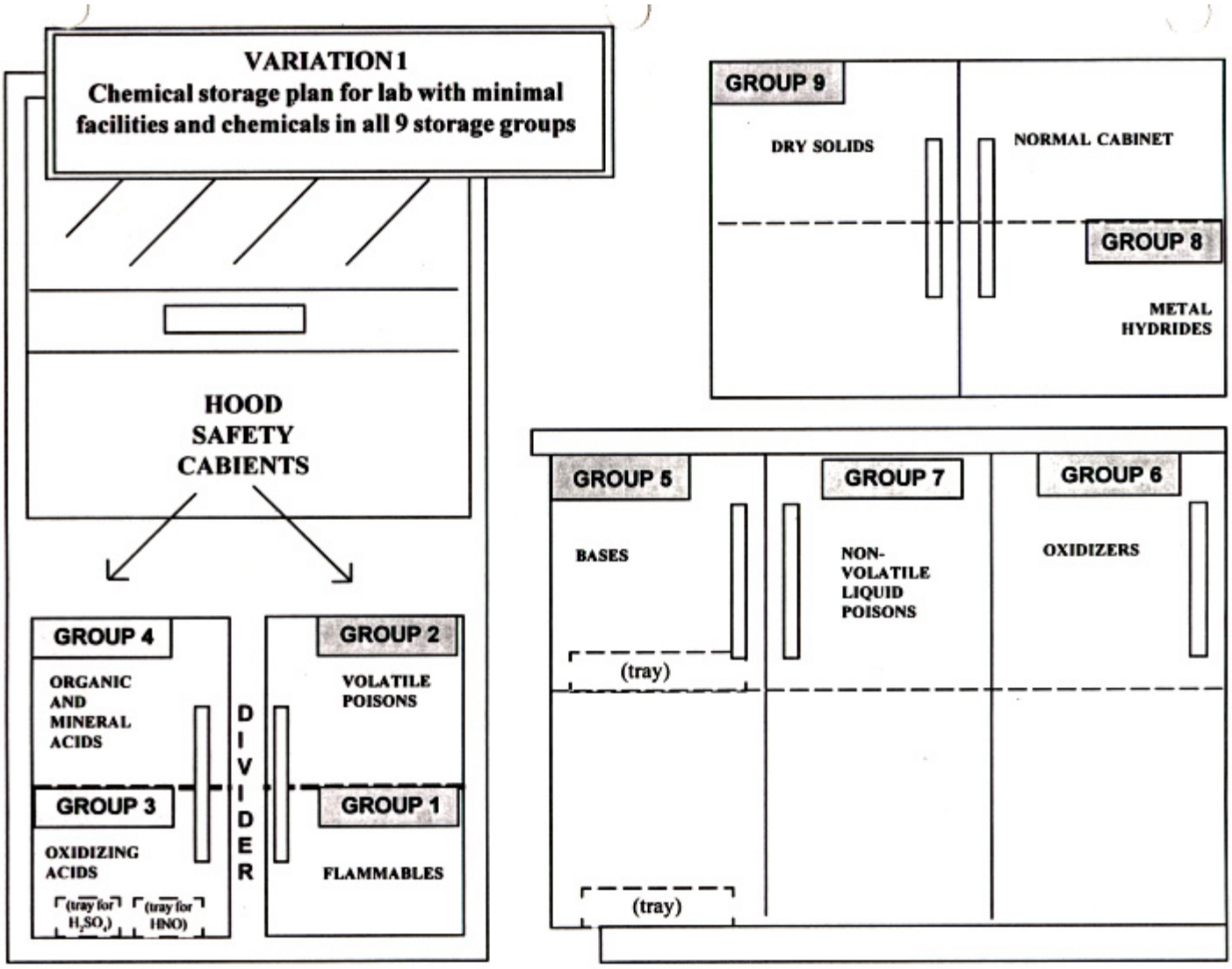
Exceptions: Solid picric or picricsulfonic acid can be stored with this group, but should be checked regularly for dryness. When completely dry, picric acid is explosive and may detonate upon shock or friction. Picric acid in contact with some metals may form explosive metal picrates. Use non-metal caps.

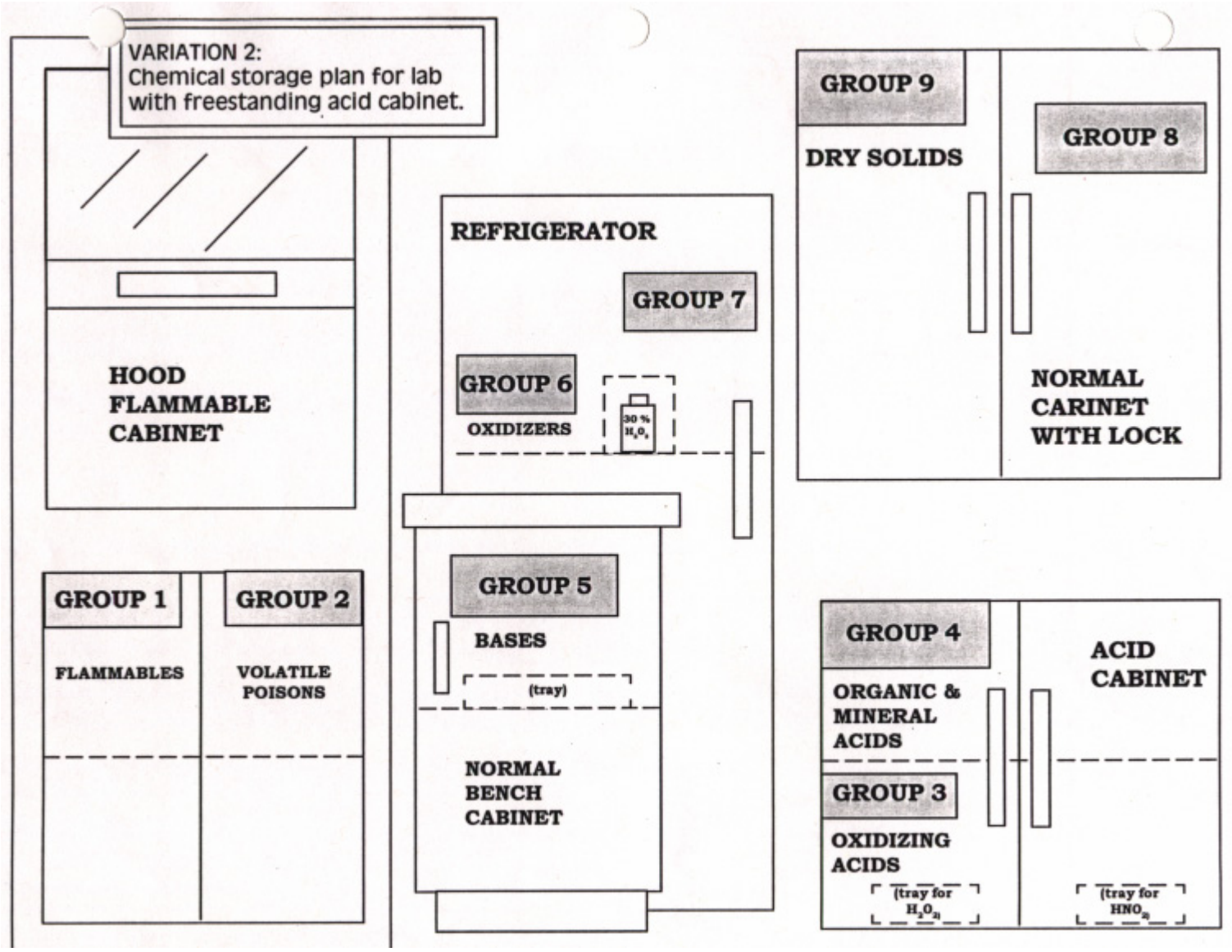
Part III: Storage Plan Variations for Different Lab Facilities

On the following pages are illustrations of possible chemical storage arrangements for two types of lab facilities. They are provided merely as examples of arrangements which satisfy the recommendations of the chemical storage plan. They are not intended to restrict storage designers to the particular arrangements and facilities depicted.

Variation 1:
Chemical storage plan for lab with minimal facilities and chemicals in all 9 storage groups.

Variation 2:
Chemical storage plan for lab with freestanding acid cabinet.




VARIATION 2:
Chemical storage plan for lab with freestanding acid cabinet.
HOOD
FLAMMABLE
CABINET
GROUP 1
FLAMMABLES
GROUP 2
VOLATILE
POISONS
REFRIGERATOR
GROUP 7
GROUP 6
OXIDIZERS
30 % H2O2
GROUP 5
BASES
(tray)
NORMAL
BENCH
CABINET
GROUP 9
DRY SOLIDS
GROUP 8
NORMAL
CARINET
WITH LOCK
GROUP 4
ORGANIC &
MINERAL
ACIDS
ACID
CABINET
GROUP 3
OXIDIZING
ACIDS
(tray for H2O2)
(tray for HNO3)

UNCG Laboratory Operating Procedures / Chemical Waste Procedures

PI / Teaching Lab Coordinator : Eric Zack
Lab / Room #: Chemical Safety Facility/ 001, 002, 003
The following is meant to serve as the chemical waste management guidelines for the above referenced laboratory. All chemical waste in this space shall be managed according to the guidelines below. For additional information please see the UNCG Hazardous Waste Management Policy at www.uncg.edu/sft/pdfs/safety_manual/section0060.pdf.
All UNCG laboratories are managed as Hazardous Waste Satellite Accumulation Areas. This allows us to minimize regulatory burden on laboratories while still operating in complete compliance of Federal and state regulations. The PI is responsible for insuring the following guidelines are met and maintained for their laboratory. Please do not hesitate to call EHS for assistance regarding the management of chemical waste.

Storage and Labeling

- Label the hazardous waste containers with a completed UNCG Hazardous Waste Label immediately when the first drop of waste is added to a container or when a material is considered a "waste". No accumulation start date is necessary until the container is removed from the Satellite Accumulation Area by EHS, or the quantity limitation is exceeded. Inspect labels for deterioration and replace as necessary.

- If a Hazardous Waste container is not in good condition, or if it begins to leak, carefully transfer the hazardous waste to a container that is in good condition.

*Good condition means clean containers with no sign of spillage.

- Use a container made of a material that will is compatible with the hazardous waste to be stored, so that the ability of the container to contain the waste is not impaired.
- A container holding hazardous waste must always be sealed during storage, except when it is necessary to add or remove waste.
- **Never exceed storage quantities of 55 gallons of hazardous waste or 1 quart of acutely hazardous waste in a satellite accumulation storage area.** Request a pickup of the waste material within three days if 55 gallons is exceeded.
- Practice safe handling and storage. Segregate incompatible waste (flammable, oxidizers, corrosives, etc.) Do not store flammable waste near heat or flame. Do not store reactive waste near incompatible elements (ex: water reactive materials under sink). Only store containers in hood if storage is the hood's sole purpose.
- Label the area or cabinet with a label that reads "Hazardous Waste Satellite Accumulation Area". Provide secondary containment for hazardous waste containers capable of holding amount being stored. Plastic bins are available to use as secondary containment.

Inspections

- Visually inspect chemical waste storage areas for signs of leaking containers, proper labeling, open containers, and chemical compatibility. Correct improper management issues immediately.

Chemical Waste Removal

- For removal of waste, complete a Chemical Waste Removal Form and fax (334-4206) or mail the form to EHS. The information that you provide on this form is very important for insuring that the university's hazardous waste is handled safely and effectively. Unreadable forms will be returned for correction. The Chemical Waste Removal Form is available through EHS.

- Controlled Substances, Radioactive Materials, Biological Materials or pathogens cannot be disposed of through the Chemical Waste Management Program. Unknown chemicals may be disposed of, but because of the associated high costs this practice may be limited, or the cost may be passed on to the generator's department.

Emergency Closure Procedures

Use this **general checklist for developing plans,** or shut down procedures for a temporary closure of lab with limited access by the Principle Investigator/Teaching Lab coordinator, or designated Safety Supervisor. **A Specific Long Term Closure with Prohibited Access**(below) should be developed for worst case scenarios.
Temporary Closure of Lab with Limited Access - Environmental and or external conditions prompt the temporary closure of labs for a period of hours to one day with access by the Principle Investigator/Teaching Lab coordinator, or designated Safety Supervisor limited.
Long Term Closure of Lab with Prohibited Access–Environmental and/or external conditions prompt the long term closure of labs for a period of days to weeks with prohibited access by the Principle Investigator/Teaching Lab coordinator, or designated Safety Supervisor.

General Checklist for Temporary Closure of Labs with Limited Access

1. Have all chemical reagents been returned to appropriate storage locations (e.g. Flammable liquid storage cabinets) to prevent spills and leaks. If containers or caps are not intact transfer contents into compatible containers, write full chemical name and include appropriate warnings from original label and properly dispose of old container.
2. Have all biological materials been returned to appropriate storage locations. Cultures in incubation chambers must be removed and terminated/stored as appropriate.
3. Has all biological waste been autoclaved and properly disposed.
4. Have all biosafety contaminants been decontaminated. If yes turn off fan and close sash.
5. Have radioisotopes, select agents, and controlled substances been properly secured in storage locations.
6. Are all chemical materials, stock solutions or samples that will remain in the lab in storage containers.
7. Have all on going chemical processes and reactions been terminated and stored correctly.
8. Are all heat producing equipment (ovens, hotplates, incubators) been shut off and unplugged.
9. Have all water faucets and supplies been cut off.
10. Have all compressed gas systems been shut off and pressure bled.
11. Have all unnecessary utility services been shut off.
12. Have all power sources from experimental apparatus been disconnected.
13. Have all computers been turned off.
14. Identify, label, and store appropriately all hazardous waste for removal by EHS.
15. Has a final walkthrough of the laboratory been conducted?

Temporary Closure of Labs with Limited Access - Plan A
PLAN A NOT ENTERED

Temporary Closure of Labs with Limited Access - Plan A file uploaded? ☑

Temporary Closure of Labs with Limited Access - Plan B (optional)
PLAN A NOT ENTERED

Any departmental temporary closure plans or Plan B file uploaded? ☑

Specific Long Term Closure with Prohibited Access

· The following are emergency contingencies designed to protect specific research "perishables" during long term university closure where access is prohibited.
· In case of such emergency, contact departmental faculty personnel immediately upon notification.
· One of the following **plans** should be executed based upon an anticipated power outage or research operations suspended.

- **Plan A** : university closure; no interruption in power supply
- **Plan B** : university closure; emergency power only
- **Plan C:** university closure; complete power outage
- **Plan D:** university closure; research operations suspended (other utility/manipulation required)

Specific Long Term Closure with Prohibited Access - Plan A
Please specify plans in the text box or attach a file with Plan A below
PLAN A NOT ENTERED

Specific Long Term Closure with Prohibited Access - Plan A file uploaded? ☑

Specific Long Term Closure with Prohibited Access - Plan B
Please specify plans in the text box or attach a file with Plan B below
PLAN B NOT ENTERED

Specific Long Term Closure with Prohibited Access - Plan B file uploaded? ☑

Specific Long Term Closure with Prohibited Access - Plan C
Please specify plans in the text box or attach a file with Plan C below
PLAN C NOT ENTERED

Specific Long Term Closure with Prohibited Access - Plan C file uploaded? ☑

Specific Long Term Closure with Prohibited Access - Plan D
Please specify plans in the text box or attach a file with Plan D below
PLAN D NOT ENTERED

Specific Long Term Closure with Prohibited Access - Plan D file uploaded? ☑

UNCG Regulated Chemical Identification Plan

Please Attach Current Chemical Inventories

The UNCG Regulated Chemical Identification Plan is meant to meet the requirements set forth by the Department of Homeland Security, and other regulating agencies requiring specific chemical identification and monitoring. The University is required to report chemicals that exceed quantities described by applicable regulations. This portion of the plan should be updated when new chemicals are purchased and or borrowed from other laboratories. This portion of the Lab Safety Plan should be updated at least annually to reflect approximate amounts of identified chemicals in your laboratory. Please see UNCG Regulated Chemicals and identify any chemicals from the list that are in your lab

(Chemistry department only - current inventory list)

You may also utilize the option of attaching a copy to your Lab Safety Plan of your current inventory in electronic (below) version or printed hard-copy format.

Inventory attached ☑

Appendix B. Additional Laboratory Operating Procedures

If you are working with any of the following materials or conducting any of the following operations you must complete a Laboratory Operating Procedure. Please check each procedure that is present in your laboratory. Completed laboratory operating procedures should be specific to your laboratory. Fill out the required sections, make necessary specific laboratory changes and attach to your lab safety plan notebook. If there is a hazard not listed under the operating procedure please contact the EH&S Dept. about the addition required.
You have the option of incorporating your own operating procedure subject to the approval of the EH&S Dept.
All applicable Laboratory Operating Procedures must be kept in the laboratory Lab Safety Plan notebook.

Laboratory Specific Operating Procedures

- ☑ Biological Materials Use Procedures (lab specific procedures attached)
- ☑ Radionuclide Use Procedures (lab specific procedures attached)
- ☑ Laser Use Procedures (lab specific procedures attached)
- ☑ Compressed Gas Use Procedures (lab specific procedures attached)
- ☑ Cryogenic Materials Use Procedures (lab specific procedures attached)
- ☑ Working Alone Procedures (Person working alone) (lab specific procedures attached)
- ☑ Unattended Operation Procedures (Work continuing with no person in lab) (lab specific procedures attached)
- ☑ Glassware (lab specific procedures attached)
- ☑ Fume Hood Procedures (lab specific procedures attached)
- ☑ Safe Lab Equipment Use Procedures (UNCG policy attached)