Western Carolina University | Safety and Risk Management

Visual Arts & Theatre Safety Manual

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Western Carolina University is committed to providing a safe and healthful environment for all persons associated with the institution, including employees, students, visitors, and the community. Cooperation of all parties involved is necessary to ensure that the University conducts research and teaching safely and in compliance with local, state, and federal regulations.

The visual arts can pose significant risks to the health and safety of artists. This guide provides an overview of some of the most common risks associated with painting, drawing, photography, ceramics, lithography, and sculpture, as well as hazards associated with theatrical set design and construction.

Section 1: Responsibilities

The effectiveness of the Visual Arts & Theatre Safety Program depends on cooperation and understanding among all parties involved. The general responsibilities for each of the key participants are summarized below:

Faculty and Staff

- Enforce safety rules for students and visitors.
- Ensure that proper safety equipment, such as eye protection, gloves, guards, and fire extinguishers are readily available, operable, and known to all people in the studio.
- Maintain ventilation for hazardous fumes/dusts as much as possible.
- Provide training on chemical hazard information, safety rules, and recommended safe work practices.
- Ensure that safety data sheets (SDS/MSDS) for hazardous chemicals stored and used in the studio are available.
- Prohibit eating, drinking, or smoking in the studios.

Students

- Follow the studio safety rules at all times.
- Report any unsafe conditions to the studio supervisor or instructor.
- Report accidents, even minor ones, to the studio supervisor or instructor.

Safety & Risk Management Office

- Update the Visual Arts & Theatre Safety Program manual.
- Conduct safety inspections of the studios and theatrical shops.
- Check safety equipment and maintain certification for the chemical fume hoods.
- Monitor hazardous material storage and waste disposal.
- Investigate accidents and hazardous material incidents.

Section 2: Studio Registration Program

Every studio and shop at WCU must be registered with the Safety and Risk Management Office. This process ensures that the Safety Office has a current list of responsible parties, a survey of the type of work being conducted, and an accurate list of emergency contacts.

The studio supervisor is required to submit a "Studio Registration Form" to initially register the space and at any time in the future if any of the following apply:

- You are relocating to a new space or become responsible for an additional space
- You are using a new hazardous chemical or starting new hazardous procedure

The Safety Office will use the information provided on the form to develop door signs for the studio. This provides a necessary reference in the event of an emergency.

Section 3: Studio Inspection Program

As required by state and federal law, the Safety and Risk Management Office will conduct inspections to determine individual compliance with relevant safety policies. These surveys are comprehensive and address record keeping, fire safety, egress, engineering controls, personal protective equipment, work practices, and where appropriate, chemical, biological, and radiation safety. At least one annual inspection will be announced to work directly with the supervisor to address specific items, such as inventories of particularly hazardous materials or processes and any other safety concerns that arise. Other inspections may be unannounced to provide a snapshot of safety and compliance and help to continually improve the safety program.

Inspection Reports

An inspection report identifying deficiencies and areas for corrective action will be directed to the studio supervisor. These items must be corrected within 30 days of receipt of the inspection report. If the items cannot be corrected in that timeframe, the supervisor must submit a written corrective action plan detailing the expected corrections and estimated date of completion within the same 30 days. Any inspection finding deemed an imminent danger (likely to cause a serious hazard, injury, disability, or death) must be corrected immediately.

Inspection Follow-up Process

If no response is received within 30 days of the initial report, then the Safety Office as a courtesy will contact the supervisor with a reminder. Additional department designees may also be notified.

If no response is received and/or corrective actions are not completed after 60 days from receipt of the initial inspection report, the studio will be deemed noncompliant and information will be forwarded to the Dean's Office.

Previous inspection reports are a good measure for addressing safety issues and eliminating risks. To help prepare for future inspections, please review the "Studio Inspection Checklist" report and perform self-inspections on a regular basis. The self-inspection process is an excellent learning tool for students and other personnel, and should be documented as part of the safety training requirement.

Section 4: Safety Training

General Safety Training: Each employee is required to take general safety courses covering fire safety and emergency preparedness, hazard communication, and any other courses applicable to their job duties. Employees working with hazardous chemicals and equipment are required to submit a "Hazard

Assessment Training Determination" form to the Safety Office when they begin employment and at any time in the future if new hazards are introduced.

Studio Specific Safety Training: The supervisor shall conduct specific hazard awareness training for each employee or student working in the space before that person begins work. Training must cover all items specified in the Visual Arts & Theatre Safety manual and any other studio specific concerns. This hazard awareness training must be documented and shall be reviewed and updated any time a new hazard is introduced. The training documentation must be available during a studio inspection.

Section 5: Chemical Safety

The requirement for chemical safety is one of the most critical components of an effective safety program.

Chemical Hazard Information

The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) is an international system for standardizing and harmonizing the classification and labeling of chemicals. It is a logical and comprehensive approach to:

- Defining health, physical, and environmental hazards of chemicals;
- Creating classification processes that use available data on chemicals for comparison with the defined hazard criteria; and
- Communicating hazard information, as well as protective measures, on labels and Safety Data Sheets (SDS).

Hazard Symbols and Labeling

Following GHS, new labeling requirements on chemical containers must include:

1. **The Product Identifier**: the name or number used to identify the chemical on the label and the SDS.
2. **Signal words**: The signal words "Danger" or "Warning" are used to emphasize hazards and indicate the relative level of severity of the hazard, assigned to a GHS hazard class and category. "Danger" indicates that the hazard associated with a chemical is *more severe,* while "Warning" signifies that the chemical is *less severe.*
3. **Hazard Statements**: Statements assigned to a hazard class and category that describe the nature of the hazard(s) of a chemical, including, where appropriate, the degree of the hazard.
4. **Precautionary Statement**: A phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical or improper storage or handling.
5. **Supplier Identification**: The name, address, and telephone number of the manufacturer, importer, distributor, or other responsible party.
6. **Hazard Pictograms**: Convey health, physical and environmental hazard information, assigned to a GHS hazard class and category.

New GHS labeling includes nine pictograms:

 Acute Toxicity (severe)	 Corrosives	 Environmental Toxicity
 Explosives Self-Reactive Organic Peroxides	 Flammables Self-Reactive Pyrophoric Self-Heating Emits Flammable Gas Organic Peroxides	 Gases Under Pressure

		
Carcinogen Reproductive Toxicity Target Organ Toxicity Mutagenicity Respiratory Sensitizer Aspiration Toxicity	Irritant Dermal Sensitizer Acute Toxicity (harmful) Narcotic Effects Respiratory Tract Irritation	Oxidizers

All chemicals arriving from the manufacturer or distributor will come with GHS compliant labels. Employees are expected to know how to read and understand these labels.

Secondary Container Labeling

If chemicals are transferred to any secondary container (spray bottles, buckets, bottles, vials, etc.) they will need to be labeled with a label that adequately depicts the chemical identification and associated hazards. An example of a compliant secondary label is depicted to the right. Include the following information on the secondary container label:

- Full chemical name (no abbreviations, formulas)
- Date of transfer or solution preparation
- Hazards, if applicable (flammable, corrosive, toxic, etc.)

If using small secondary containers (vials, tubes, etc.) where labeling requirements do not fit, it is acceptable to use a numbering system or abbreviations if there is a key detailing the contents clearly posted with the sample containers.

LABEL ALL CONTAINERS, INCLUDING WATER.

Safety Data Sheets (SDS)

Safety Data Sheets (formerly MSDS) are prepared in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200). They must be obtained or created by all chemical manufacturers and importers for every hazardous chemical they produce. The new SDS is now standardized in 16 sections and all manufacturers are required to use the same standardized 16-section format.

SDSs are available electronically from most major manufacturers. Smaller companies may distribute paper copies with the product. Supervisors must retain copies of any SDS that they receive, and ensure that employees are granted access to them. Electronic accessibility of these documents is an acceptable substitute to paper copies only if all personnel have demonstrated the ability to locate the necessary information and there is a backup means for obtaining an SDS in the case that the electronic system fails.

Occupational Exposure Limits (OELs) are airborne concentrations that have been set as safety limits for employees for a set period of time (usually an 8-hour working day). OSHA has published Permissible Exposure Limits (PELs) for many chemicals. The American Conference of Governmental Industrial Hygienists (ACGIH), a professional organization, has published Threshold Limit Values (TLVs). PELs and TLVs, as well as exposure limits published by other countries, may be specified in the SDS. Employees must be familiar with these terms and limits for the chemicals in use. If an employee suspects that their exposure may exceed the OEL they should contact the Safety and Risk Management Office immediately for exposure monitoring.

Chemical Storage

A major concern in many areas is the proper storage of chemicals. The best approach to this issue will vary depending on the chemical inventory and storage space available. To lessen the risk of exposure to hazardous chemicals, trained personnel should separate and store all chemicals according to hazard category and compatibility. In the event of an accident involving a broken container or spill, incompatible chemicals that are stored in close proximity can mix to produce fires, hazardous fumes, and explosions. Prudent chemical management involves the following processes:

- Store chemicals in the smallest quantities possible. Excessive purchases of hazardous chemicals invariably result in increased safety risks, compliance tasks, and costs for disposal.
- Ensure all chemical containers are properly labeled. Do not remove or deface manufacturer labels.
- Secondary containers must be labeled with the required information on the original container **OR** the product identifier (full chemical name, no abbreviations) AND words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemical and will provide employees with specific information regarding the hazards of the chemical. The date of transfer or solution preparation should also be included on the secondary container label.
- When storing chemicals on open shelves, always use sturdy shelves that are secured to the wall and contain ¾ inch lips.
- Do not store liquid chemicals higher than 5 feet, on the floor, in the aisles or areas of egress, or on the benchtop. Designate a storage location away from heat and light and return containers to that location after each use.
- Store chemicals in compatible cabinets. Acids will corrode metal cabinets, so use an approved acid cabinet. Store flammable materials in an approved flammable cabinet. Only explosion proof refrigerators should be used to store flammable chemicals that require cool storage. Domestic units should not be used to store chemicals as they possess ignition sources that can result in fires and explosions.

- Do not store chemicals in the fume hood. Excess storage interferes with the air flow and can become a source of hazardous materials discharge as well as a fire hazard.
- Use unbreakable secondary containers such as bins or bottle jackets for corrosive/hazardous liquids and other high hazard materials.
- Flammable materials in a quantity greater than 10 gallons must be stored in an approved flammable cabinet.
- Periodically inspect stored chemical containers for damage and label legibility. Damaged containers should be disposed of. Illegible labels should be replaced.
- Label the storage cabinets so areas of higher risk are easily identified (flammable, corrosive, toxic, oxidizer, water reactive, etc.)
- Store chemicals in compatible storage groups to prevent incompatible materials from reacting. Do not store chemicals in alphabetical order, except within the same storage group.
- Always review the SDS to determine compatibility and storage requirements of chemicals

Chemical Compatibility Storage Chart

Chemical Group	Properties	Common Examples	Incompatible groups to store away from	Storage Considerations
Flammable Liquids 	Flashpoint (FP) below 100°F Combustible liquids FP >100°F, <140°F FP is the lowest temperature at which a liquid gives off adequate vapor to ignite	Most Organic Liquids (alcohols, ethers, esters, aldehydes, ketones, etc.)	Oxidizers Acids Bases Volatile poisons	Approved flammable cabinet or explosion proof refrigerator. Avoid sources of ignition including outlet sparks, static electricity.
Peroxide Formers 	Highly flammable, low-power explosives, very sensitive to shock, sparks, light, strong oxidizers/reducers, friction, and high temperatures. High risk of explosion from distillation, evaporation, or on concentration	Diethyl ether, isopropyl ether, tetrahydrofuran (THF), acetal, potassium metal, sodium amide, dioxane, glyme, diglyme, furan, dicyclopentadiene, cyclohexene, acrylic acid, vinyl acetate, vinyl ethers	Oxidizers Acids Bases Volatile poisons	Approved flammable cabinet with other flammables. Date the containers when received and opened. Dispose of according to storage guidelines.
Volatile Poisons 	Poisons, toxics, select/suspected carcinogens, mutagens, and teratogens. Chronic exposure is a health hazard.	Carbon tetrachloride, Dimethylformamide, mercaptoethanol, methylene chloride, phenol, chloroform, formaldehyde	Can be stored with other flammables but do not store volatile poisons, flammables, and bases together	Approved flammable cabinet or explosion proof refrigerator. Store in a sealed & labeled secondary container, not out on an open shelf.

Chemical Group	Properties	Common Examples	Incompatible groups to store away from	Storage Considerations
Non-Volatile Liquid Poisons 	Highly toxic (LD_{50} less than 50mg/kg oral), carcinogens, mutagens	Acrylamide, ethidium bromide, triethanolamine	Oxidizing agents Acids	Store in a sealed & labeled secondary container, not out on an open shelf.
Oxidizing Acids 	Highly corrosive and reactive with each other and other substances	Sulfuric, Nitric, Perchloric, Phosphoric, Chromic acids	Flammables Organic/Mineral acids Bases Perchloric acid (>70%) reacts with wood/paper and may ignite. Do not store on wooden shelf.	Approved acid cabinet to prevent metal corrosion. Separate from other oxidizing acids using secondary containment.
Organic and Mineral Acids 	Highly corrosive	Inorganic/Mineral: Hydrochloric, phosphoric, hydrofluoric Organic: glacial acetic, acetic, butyric, formic, propionic, trifluoracetic acids	Oxidizing acids Bases Flammables Store separately from anhydrides as some can be very reactive with other acids. Store hydrofluoric acid separately.	Approved acid cabinet to prevent metal corrosion. Use secondary containment to prevent spills. Acid mists escape and build up inside unvented cabinets. Store in vented cabinet under fume hood if possible.
Liquid Bases 	Highly corrosive	Hydroxides (sodium, ammonium, calcium, etc.), glutaraldehyde, aqueous ammonia	Acids Flammables Volatile Poisons	Corrosion proof cabinet using secondary containment. Store prepared solutions in polyethylene containers.
Oxidizers 	Provide oxygen that feeds fire and makes fires difficult to extinguish	Persulfates, peroxides, nitrates, nitrites, perchlorates, superoxides	Flammables Combustibles Reducing Agents.	Store in secondary containment and store larger quantities (>3L) in separate compartment.

Chemical Group	Properties	Common Examples	Incompatible groups to store away from	Storage Considerations
Dry solids	All powders, hazardous and non-hazardous. Have different properties and various hazards, review the SDS.	Benzidine, cyanogens, bromide, oxalic acid, potassium hydroxide	Separate flammable solids from oxidizers, flammable liquids and corrosives.	Store above liquids and separate hazardous from non-hazardous.
Pyrophoric and Water Reactive 	Pyrophoric chemicals ignite spontaneously in air at temperatures below 130°F. Water reactive chemicals can react with moisture in the air to produce flammable gas. Metal hydrides react violently with water, and some with air.	Pyrophoric: alkyl/aryl metal/non-metals, metal carbonyls, diborane gas, organo-magnesium halides, metal/non-metal hydrides, metal powders, white phosphorous Water Reactive: aluminum chloride anhydrous, calcium carbide, acetyl chloride, alkali metals, calcium oxide, acid anhydrides.	Separate from other liquid chemicals and oxidizers. Store in air-tight, waterproof containers.	Store separately from flammable and combustible materials in a dry inert environment. These reactive chemicals require SOPs that cover storage practices and safe usage.
Compressed Gas Cylinders 	Flammable Gases	Methane, hydrogen, acetylene, propane	Separate from oxidizing gases	Secure cylinders upright with proper securing device. Store with cylinder caps in place. Separate flammable and oxidizing gases.

Gas Cylinder Safety Practices

Compressed gas cylinders can present a variety of hazards due to their pressure and contents. This section provides guidance for the storage, use, and handling of compressed gases on campus. In addition to the standard required work practices for inert gases, hazardous gases may require additional controls and work practices, including but not limited to the use of gas cabinets, gas monitors, emergency shutoffs, proper equipment design, leak testing procedures, and the use of air supplying respirators for certain highly toxic gases. Contact the Safety and Risk Management Office for further assistance with the safe design of equipment involving the use of hazardous gases.

Always wear appropriate Personal Protective Equipment (PPE) when transporting, connecting and disconnecting gas regulators and transfer lines. Minimum PPE should include approved safety glasses, closed-toed shoes, and gloves and clothing to protect skin from frostbite (cryogens), corrosives, or pinch points. A face shield should be used if face protection is necessary.

Always check the label on the cylinder. It should be legible and clearly indicate the contents with either the chemical or trade name of the gas. Never accept a cylinder that is not labeled correctly and do not rely on the color coding of the tanks/caps, this is not a reliable indicator of what is inside the tank.

If the labeling on the gas cylinder becomes unclear or defaced so that the contents cannot be identified, the cylinder should be marked "contents unknown" and the manufacturer must be contacted regarding appropriate procedures for removal.

Storing Compressed Gas Cylinders

All gas cylinders must be secured at all times with proper securing devices such as straps and clamps. Cylinders must be secured when full and when empty. The screw on cylinder caps must be in place at all times when the regulator is not connected to provide mechanical protection. Regulators must be removed and cylinder caps replaced prior to movement of compressed gas cylinders.

- Strap/chain the gas cylinder to a secure fixture at a height of 1/2 to 2/3 of the cylinder height.
- Secure fixtures include a properly secured wall mount, properly maintained and securely tightened bench mount, or secure floor support that doesn't present a tripping hazard.
- Strap each individual cylinder rather than strapping a group of cylinders together.
- Always store the cylinders upright with valve caps in place when not in use.
- Segregate full and empty cylinders.
- Separate flammable gases from oxidizing gases and other combustible materials (separation distance of 20 feet or a 5-foot-high fire-rated wall).
- Store cylinders in a cool, dry, well-ventilated, and secure area.
- Cylinder storage areas should be protected from extreme heat or cold, prevent temperatures from exceeding 125°F, and should have limited access to only authorized personnel.
- Store away from heavily traveled areas and emergency exits.
- Visually inspect storage areas on a routine basis for any indication of leakage or problems.
- Post signage in the storage area to indicate potential hazards (flammable gas, oxygen, etc.).

Handling Compressed Gas Cylinders

Compressed gas cylinders should be handled only by personnel who have been properly trained. Cylinders are heavy and awkward to move and improper handling can result in serious injury. Use the following precautions when handling compressed gas cylinders:

- Never drag, roll, or slide containers.
- Always leave the valve protection cap in place when transporting the cylinder and when securely stored until ready to be used.
- Always use a suitable cart to transport cylinders.
- Don't try to catch a falling cylinder.

- Don't allow grease or oil to come in contact with oxygen cylinder valves, regulators, gauges or fittings; an explosion or fire can result. Oxygen cylinders and apparatus must be handled with clean hands and tools.
- Refer to the SDS for the gas and use the proper precautions and PPE.
- Always use the regulator approved for the specific gas. Do not force cylinder valve connections that do not fit.
- Open the cylinder valve slowly, directed away from your face.
- Do not attempt to refill compressed gas cylinders; this can only be done by a qualified manufacturer of compressed gases.
- Only use non-sparking tools when working with flammable gases.
- When finished using the gas close the cylinder valve and release all pressure from the downstream equipment.
- Disconnect the cylinder anytime there is an extended non-use period and cap the cylinder.

Regulators, Tubing, and Piping Connections

Gases must be dispensed using systems that are cleaned and compatible with the gas in use. Use hard piping (copper, stainless steel) when possible, as opposed to flexible or plastic tubing. When flexible tubing is used, select compatible tubing and use it within line of sight (not under doors, through walls, ceilings). Replace old flexible tubing before it deteriorates. Secure tubing to keep it in place.

Don't use Teflon tape on cylinder connections. Use Teflon only on pipe threads where the seal is made at the threads. Always leak-check tubing or piping connections.

Regulators reduce the high-pressure gas to a lower usable level and provide additional safety measures. Only use a regulator for the gas for which it is intended and never force a connection.

Chemical Inventory Control

A system for maintaining an accurate chemical inventory on campus is essential for compliance with local and state regulations and any applicable building codes. Supervisors should maintain an up-to-date chemical inventory and a physical chemical inventory must be performed at least annually and submitted to the Safety and Risk Management Office. The benefits of performing an annual inventory include:

- Ensures chemicals are stored according to compatibility
- Checks expiration dates and eliminates unneeded or outdated chemicals
- Updates the hazard warning signage on the studio door
- Promotes more efficient use of the space and ensures integrity of shelving and cabinets
- Replaces illegible or missing labels

The chemical inventory should include the following information:

- Chemical name and Chemical Abstract Number (CAS)
- Manufacturer & product number (reorder #, catalog #, etc.)
- Quantity & location

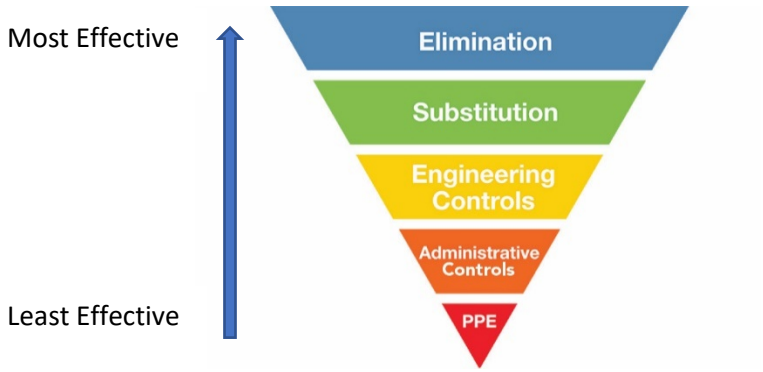
Section 6: Hazard Risk Reduction

Potential Hazards in Art Studios:

Activity	Materials	Potential Respiratory Hazard
Painting	Paint Pigments Solvents	Highly toxic metals, carcinogenic organic pigments. Common solvents include turpentine, mineral spirits, methyl and ethyl alcohols, toluene, xylene, petroleum distillates.
Spray painting	Pigments, solvents, varnish	Fine mist particles
Etching	Corrosives	Acid and base corrosives
Mixing dry clay	Dry clay, talk, bulk materials	Crystalline silica in clay dust, talk contaminated with asbestos-like fibers
Glazing	Glaze	Mixtures of silica, alumina, metal fluxes, and colorants may be highly toxic. Frits may contain toxic metals. Avoid materials that may contain lead, cadmium, chromium, uranium, and arsenic.
Firing kiln	Clay	Combustion products such as carbon monoxide, formaldehyde, sulfur oxides, chlorine, fluorine, metal fume, and nitrogen oxides.
Sculpture	Plaster, cement, clay dusts, wax, plastics	Respiratory irritants from dusts. Decomposition products from heating wax, toxic chlorinated waxes, toxic solvents used to dissolve the wax. Resins used to mold, cast, or form plastic sculptures emit volatile components. Urethane resin systems release extremely toxic isocyanates
Wood-working	Wood, preservatives, sawdust, glues, finishes	Irritant dusts. Toxic preservatives used to treat woods, glues, adhesives, and finishes.
Metal-working	Molds, melting metals, fluxes, welding rods	Silica sand used in molds, toxic resins, metal fumes, combustion products, welding fumes can contain toxic contaminants such as lead, zinc, chromium, cobalt, cadmium, nickel, beryllium.
Glass-making	Formers, flux, stabilizers, firing, melting, annealing	Formers include silica, toxic chemicals include lead compounds, arsenic oxide, antimony oxide, sodium cyanide.

Hierarchy of Controls to Minimize Hazardous Exposure

Use a hierarchy of controls that places emphasis on keeping hazards out of the workplace whenever possible. Below is the hierarchy, by order of effectiveness (with one being the most effective).



1. **Elimination:** The primary objective is to prevent atmospheric contamination by eliminating the hazard by removing the work process.
2. **Substitution:** Use less toxic materials in place of hazardous components.
3. **Engineering Controls:** Use enclosures or confinement for the operation with general and local ventilation to reduce exposure to contaminants.
4. **Administrative Controls:** Scheduling to reduce time of exposure, and following all safety policies in place to prevent unnecessary exposure (i.e. wet mopping).
5. **Personal Protective Equipment (PPE):** This should be the final step in the hierarchy of risk controls and includes items used to protect the health and safety of the employee such as, gloves, safety glasses, coveralls, safety shoes, dust masks, and respirators.

Best practices to reduce hazardous respiratory contaminants:

- Avoid materials containing toxic substances such as lead, arsenic, antimony, chromium, cobalt, cadmium, uranium, nickel, beryllium, cyanides.
- Purchase pre-mixed clays, glazes, and paints to avoid having to mix powders. If you do mix using powders always do so in a ventilation enclosure.
- Perform spray applications in a spray booth or other locally exhausted hood
- Use water-based products instead of solvent-based materials. If you must use solvents, purchase less toxic solvents.
- Regularly wet-mop, hose down, or HEPA vacuum the studio to remove potentially toxic dusts such as silica and heavy metals. Avoid dry-sweeping and any activity that could generate dust.
- Ensure that kilns are locally exhausted and vented to the outside.

Engineering Controls

When the hazard cannot be eliminated, engineering controls should be implemented to reduce exposure whenever possible.

Chemical fume hoods: The primary containment device used to control airborne contaminants generated by procedures. Use a chemical fume hood when working with:

- Powdered Particularly Hazardous Substances (PHS)
- Any volatile compounds
- Chemicals with a strong odor
- Other materials as indicated by the chemical Safety Data Sheet

Chemical fume hoods must be used properly to maximize their effectiveness. The following practices should therefore be observed when using fume hoods:

- Hood work areas should be clear of unnecessary equipment and materials, which can disrupt airflow and block vents.
- Hoods should not be used for storage of chemicals.
- Work should be carried out as far back in the hood as possible with a minimum distance of 6 inches from the front hood sash.
- Disruptive room air currents should be minimized by avoiding traffic near fume hoods and keeping doors closed while experiments are in progress.
- Keep the sash as low as possible.
- Use equipment with legs if possible to allow proper air flow inside the hood.
- Adjust the inside baffle at the back of the hood so the bottom slot is wide open and the one at the top is closed or partially closed. This will favor airflow across the workbench where heavier than air solvent vapors congregate.

Local exhaust: Local exhaust should be used to capture chemical vapors or particulates at the source. Examples of local exhaust include snorkel type exhaust and down draft sinks.

Isolation devices: Can be combined with local exhaust, these devices are often sealed plexiglass boxes, and offer a physical separation to a contaminant generating process.

Administrative Controls

Scheduling: By scheduling a variety of tasks, supervisors are able to reduce ergonomic risk factors from static postures or repetitive motion. Engineering controls and work practices should be used to control chemical exposures wherever possible, but when those means have been exhausted, task schedules and employee rotation can reduce exposures.

Limiting access to the studio: Work areas with hazardous chemicals should be secured when unattended, and visitors must be accompanied.

Work removal: In some instances, it may be necessary to remove an employee from a work area or restrict employees from performing specific tasks that may adversely affect their health (particularly in the case of sensitivity, allergens, or pregnancy).

Personal Protective Equipment (PPE)

Personal protective equipment is the last line of defense when all other efforts in the hierarchy of controls have failed to remove the hazard. It is important to understand the different types of personal protective equipment (PPE) available and to select the appropriate equipment for the circumstance. PPE must be available to assure a safe and healthful environment for all employees, students, and visitors.

The supervisor must evaluate the workspace and identify the type of personal protective equipment necessary to perform the job task. The supervisor is required to submit a "PPE Hazard Assessment" to document the evaluation. Forms are available on the Safety and Risk Management website under the Visual Arts and Theatre Safety page.

Eye Protection

Protective eye and face equipment shall be required where there is a reasonable probability of injury that can be prevented by such equipment, such as where machines or operations present the hazards of flying objects, glare, liquids, or a combination of these hazards.

Required for Students: University policy on eye and face protection for students is derived from legislation enacted by the North Carolina General Assembly entitled "Policy for Eye and Face Protection," and passed in 1969. This Act requires that eye protective devices be worn by students in shops and laboratories where work involves:

- Hot solids, liquids, or, molten metals
- Milling, sawing, turning, shaping, cutting, or stamping of any solid materials
- Heat treatment, tempering, or kiln firing of any metal or other materials
- Gas or electric arc welding
- Repair or servicing of any vehicle
- Caustic or explosive chemicals or materials

Eye protective devices are to be worn at all times while participating in any of the above programs.

Required for Visitors: This act also provides that visitors to such shops and studios be furnished with and required to wear eye safety devices while such programs are in progress.

Required for Employees: University policy on eye and face protection for employees is derived from the Occupational Safety and Health Act of North Carolina (OSHANC). The North Carolina legislation and OSHA NC specifies that eye and face protective devices, which include spectacles, goggles, and face shields, shall comply with American National Standards Institute (ANSI) Z87.1 1979 and later revisions thereof. All eye and face protective devices currently on State Contract meet ANSI standards.

Selection of Appropriate Devices Based on Hazard: The type of device required will depend on the nature of the hazard and the frequency with which it is encountered. There are three basic types of eye protection, which will meet the majority of University requirements. These are: safety spectacles (with or without side shields), dust goggles, and chemical goggles. Each of these meets the basic eye protection standards for frontal exposure to flying particles.

Safety Glasses: At a minimum, safety glasses are required and must be worn where chemicals are used or stored. Lenses and frames shall be marked with the manufacturer's symbol to indicate compliance with ANSI Z87.1. The use of approved lenses in unapproved frames is not acceptable. Tinted lenses in safety glasses for minimizing solar glare are permissible only when used outdoors during daylight hours unless approved by the Safety Office. Prescription safety glasses can be worn by personnel whose vision requires the use of corrective lenses.

Side Shields: Safety Glasses with side shields, or goggles, are required where flying particles are likely to enter at an angle, and are usually required where two or more people are working in close proximity. Safety glasses with permanently attached side shields, or impact goggles, will provide this protection. Clip on side shields do not meet ANSI standards.

Chemical Goggles: Chemical goggles shall be worn to protect against dust particles, liquids, splashes, mists, spray, and injurious radiation. They shall be designed to protect the eye sockets and the facial area around the eyes, thus protecting the wearer from side exposure. They can be worn over corrective eye glasses if they do not disturb the adjustment of the glasses, or corrective lenses can be incorporated into the goggle by mounting behind the protective lens. Chemical goggles must be worn when:

- Performing a chemical transfer/handling operation
- Performing any other operations that have any likelihood for chemical splash or spray
- When working with glassware under reduced or elevated pressures.
- When working with corrosive or hot liquids or fine particles capable of penetrating the ventilation holes in dust goggles.
- When contact lenses must be worn, chemical goggles should be used to prevent dissolved vapors and dust particles from creeping behind the lens. It is recommended that contact lenses are not worn where eye hazards exist when possible.

Face Shields

Face shields shall be worn to protect the face and front of the neck from flying particles and sprays or splashes of hazardous liquids. Face shields must be worn in conjunction with appropriate eye protection devices and do not represent sufficient protection as a standalone device.

Foot Protection

Closed-toed shoes should be worn at all times in areas where chemicals are used or stored. Perforated shoes, sandals, or cloth sneakers are not recommended to be worn in areas where mechanical work is being done. Shoes are also required to be slip resistant with a tread pattern designed to give better traction and with a heel less than 1 inch high. Rubber or neoprene overshoes are designed to protect against splashing liquids or chemicals and may be necessary where gross contamination may occur.

Safety shoes are used to protect the feet against injuries from heavy falling objects, against crushing by rolling objects, or against lacerations from sharp edges. Safety shoes are required for employees whose job duties frequently require the lifting, carrying, or moving, etc. of objects weighing more than fifteen pounds, which, if dropped, would likely result in a foot or toe injury. The state personal protective equipment policy as of February 1, 1985, stipulates that employees who are required to wear safety shoes

will be reimbursed up to a certain amount for one pair of shoes. For further information concerning employee eligibility for types of shoe protection, purchasing, etc., contact the Safety Office.

Hand Protection

Proper protective gloves should be worn when handling corrosive or toxic materials and materials of unknown toxicity, sharp edged objects, and very hot or very cold materials. Gloves should be selected on the basis of the material being handled, the particular hazard involved, and their suitability for the operation being conducted. Before each use, gloves should be inspected for discoloration, punctures, and tears. Always wash hands after removing gloves.

- **Disposable Gloves:** Disposable gloves are typically sufficient for incidental chemical contact. They are available in latex rubber, nitrile, polyethylene, PVC, neoprene, vinyl and other synthetic materials. Latex is gradually being replaced by other suitable alternatives because of the latex allergy concern and should be avoided whenever a suitable alternative exists. Disposable gloves must be replaced following contamination or if visible damage occurs.
- **Chemical Resistant Reusable Gloves:** The appropriate glove material must be selected that provides resistance to the specific chemical hazard that will be encountered, such as acids, alcohols, oils, corrosives, and solvents. Consult the chemical SDS as well as glove manufacturing guidelines when selecting chemical resistant gloves. Contact the Safety Office if further assistance is needed.
- **Cut-Resistant Gloves:** When working with sharps and glassware it is important to protect your hands from cuts and scratches because broken skin is more susceptible to chemical exposure. It is recommended that in these situations, employees wear cut-resistant gloves over their chemical gloves.
- **Electrical Gloves:** Rubber and leather insulating gloves, mittens, and sleeves are designed to protect the worker from electrical hazards such as fire ignition, electric shock, arc flash and blast. The proper gloves shall be chosen in accordance with the NFPA 70E (2009) Standard for Electrical Safety in the Workplace and tested to appropriate voltage meeting ASTM D120-09 Standard Specification for Rubber Insulating Gloves.

It is best not to use gloves made either entirely or partly of asbestos, which is regulated as a carcinogen under OSHA. If you have asbestos gloves call the Safety Officer so that they can be picked-up for disposal.

It is the responsibility of the studio supervisor to determine whether specialized hand protection is needed for any operation and to ensure that needed protection is available.

Respirators

Use of respirators requires medical clearance, annual training, and an annual fit test (in most cases). Contact the Safety Office if you believe you may need a respirator so that exposure monitoring may be considered. The decision to conduct exposure monitoring will be based on the presence of over exposure indicators (such as odors or symptoms of exposure), the type and effectiveness of control measures in place, the amount of chemical used, and the hazards associated with that chemical.

Guarding and Shielding for Safety

All mechanical equipment is to be equipped with guards that prevent access to electrical connections or moving parts, such as belts and pulleys of a vacuum pump. Each worker should inspect equipment before using it to ensure that the guards are in place and functioning. Careful design of guards is vital. An ineffective guard can be worse than none at all, because it may give a false sense of security. Emergency shutoff devices may be needed in addition to electrical and mechanical guarding.

Section 7: Hazard Waste Disposal

As a generator of hazardous waste the University is required to comply with Federal Standards promulgated under the Resource Conservation and Recovery Act (RCRA). These regulations cover the storage, handling, and documentation of the transfer of hazardous waste from the point of generation to the final disposal.

Visual art studios and theatrical production shops are required to follow the waste management policies detailed in WCU's **Laboratory Waste Management Plan (LWMP)**. The purpose of the Laboratory Waste Management Plan (LWMP) is to comply with the provisions of 40 CFR 262 (Subpart K – Alternative Requirements for Hazardous Waste Determination and Accumulation of Unwanted Material at Laboratories Owned by Colleges and Universities and Other Eligible Academic Entities Formally Affiliated with Colleges and Universities).

The LWMP guidelines are available on the Safety and Risk Management website under the Visual Arts and Theatre Safety page.

Hazardous Waste Training

All personnel are trained on chemical waste management procedures via an online training presentation and quiz available through Blackboard. This training is administered by the Safety and Risk Management Office.

Section 8: Safety Equipment

A variety of safety devices are provided in the workspace. It is important to identify the location of each piece of equipment and ensure that personnel working in the area know how to use the equipment properly.

Always maintain at least 3 feet of unobstructed access to safety equipment, including eyewash/shower stations, fire extinguishers, and electrical control panels.

Eyewashes and Safety Showers

OSHA (29 CFR 1910.151) requires that, "where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate use. Employee perceptions about causing property damage must not delay use of emergency equipment.

- All emergency eyewash and shower equipment shall conform to and be installed in accordance with the requirements listed in ANSI/ISEA Z358.1 (most recent revision), *American National*

Standard for Emergency Eyewash and Shower Equipment, developed with the International Safety Equipment Association (ISEA).

- Devices must deliver tepid water (60-100°F).
- Devices must be installed in a location and configuration so that they are protected from contamination and do not present additional hazard during use (location cannot expose the user to electrical hazards, sharp edges, etc.)
- Eyewash placement:
  - Nozzles must be installed at least 6 inches from the wall (or nearest obstruction)
  - Nozzles must be located 33-45 inches in height above the surface on which the user stands.
- Shower placement:
  - The valve actuator for showers shall be within 69 inches of the surface on which the user stands.
  - The top of the water column shall be between 82 and 96 inches from the floor with the center of the spray at least 16 inches from any obstruction.
- When large quantities (greater than 1 gallon) of corrosive or toxic materials are present, combination safety showers and eyewash stations are necessary and must be installed where they require no more than 10 seconds to reach.
- Personnel must be made aware of the location and operation of the eyewash and safety shower stations. Even the best emergency products won't be able to serve their purpose if employees are unaware of where they are or how to use them.

Eyewash and Shower Inspections

The studio personnel are responsible for ensuring that emergency eyewash facilities are operational and accessible. Eyewash stations that have a plumbed drain should be flushed weekly and documented on an attached sheet or tag. If, due to their configuration or location, eyewashes do not have an accessible plumbed drain, the eyewash must be checked at least monthly with a quick activation to flush out any debris and verify water pressure. The monthly check must be documented on an accessible sheet or an attached tag. For facilities that lack floor drains, secondary containment should be used to prevent discharge of water directly onto the floor. Safety showers will be flushed and maintained by the Safety and Risk Management Office. Report any problems to the Facilities Management department.

During the annual inspection of emergency safety showers, the Safety Office shall:

- Ensure the path to the equipment is not obstructed, is in a well-lit area, and is identified by a highly visible sign.
- Inspect components for corrosion and damage.
- Verify nozzle caps are in place and that nozzles, nozzle caps, and bowl/sink are clean and sanitary.
- Activate valve to full open position. Water must flow within 1 second.
- Verify nozzle caps come off when eyewash is activated.
- Verify the water flows continually hands-free until manually turned off.
- Flush until water is clear.
- Put nozzles back in place.

- Annually: Safety Office will perform a flow test. Flow must be at least 3 gallons per minute for eyewashes and 20 gallons per minute for showers. Ensure temperature is within the required range.

Fire Extinguishers

Since fire is a common hazard, it is important to be prepared and to know how to deal with a fire emergency. Fire extinguishers are a first line of defense, only if used properly, and under the right conditions. Fire extinguishers are appropriate for small, incipient stage fires, no bigger than a wastepaper basket. University policy states that individuals are not required to fight fires, but that those who choose to do so must have been trained in the proper use of fire extinguishers. Training is provided by the Safety Office to faculty and staff upon request. Students are discouraged from attempting to use fire extinguishers, and are not offered training on their use. Fires are classified based on the type of fuel that is burning, and fire extinguishers are classified based on the type of fire they are designed to extinguish.

- Class A – Wood, paper, cloth, trash, and plastic (solid combustible materials that are not metals)
- Class B – Flammable liquids
- Class C – Electrical equipment
- Class D – Combustible metals such as magnesium, potassium, and sodium, as well as organometallic reagents such as alkyl lithium compounds, and diethylzinc
- Class K – Cooking media such as vegetable oil and grease

Most areas have been provided with Class ABC Dry Chemical extinguishers. Areas using potentially flammable metals should contact the Safety Office to obtain an appropriate Class D extinguisher. Any time an extinguisher needs to be utilized, the Safety Office must be notified to collect information about the incident and provide a new extinguisher.

Fire-Rated Doors

A fire-rated door is made of fire resistant materials which when closed prevents the spread of fire and smoke through fire rated walls. Any time a doorway to a room, exit stairwell, or exit pathway is propped open by use of an unapproved device such as a wood or plastic wedge, or the latching door hardware is bypassed by taping, the fire-rated area is now compromised. To minimize the break in protection, fire doors, including the closer and latching hardware must not be modified by building occupants and must be kept closed.

Section 9: Emergency Preparedness and Response

The University provides non-emergency and initial emergency response services through Campus Police, the Safety and Risk Management Office, and Facilities Operations. Campus Police provides 24/7 coverage and will contact specific resources as needed. A list of contact numbers is provided in Appendix A and should be posted in a visible area of your work space. For non-emergency services during normal business hours, contact the appropriate department.

Where a response will be needed at the time of an emergency, a written plan describing the actions that are to be taken and an emergency contact list for employees must be documented by the studio supervisor.

Types of Incidents:

Each area should consider the types of incidents that could have a negative effect on people, property, the environment, and research efforts and participate in planning efforts to mitigate the impact of an emergency and the required response for each situation (i.e. backup power for critical equipment).

- For emergencies that may impact building integrity and/or harm people, evacuate the immediate area and call 911.
- For other incidents/accidents that do not pose immediate danger to people or the environment, call the Safety and Risk Management Office to report the incident and illicit assistance as needed.
- If maintenance support is required, contact Facilities Management.

Chemical Spill Response

In the event of a chemical spill, protection of personnel should be the primary concern, then protection of property. Many spills are of limited hazard potential and personnel can clean them up safely. Your area should be equipped to handle small low-hazard spills. Spill kits with appropriate instructions, PPE, and absorbents must be available so that employees may safely clean up minor chemical spills. It is the responsibility of the supervisor to ensure that it is stocked with needed supplies, and that all employees know where the kit is located and how to use it. Employees should be familiar with the hazards of the chemicals they work with and should have a sense of the need for spill clean-up assistance from the Safety Office.

Chemical Spill Kit: Every area where chemicals are stored or in use should have access to a chemical spill kit for minor spills. The spill kit should include the following:

- Absorbent material (vermiculite, absorbent pads, etc.)
- Neutralizers for corrosives or toxics
- Materials to limit the flow of a spill (absorbent sock/boom)
- PPE (gloves, safety goggles)
- Container/bags to collect the hazard spill contents
- Hazard waste tag/label to identify the contents

Minor Chemical Spills can be handled by staff without assistance following these general guidelines:

- Avoid breathing vapors from the spill
- Alert people in the immediate area of the spill
- If spilled material is flammable turn off ignition and heat sources
- Reference the SDS for appropriate PPE, spill response, and first aid measures
- Put on all appropriate PPE
- Confine spill to small area
- Use appropriate kit to neutralize and absorb acids and bases

- Use appropriate kit or spill pads for other chemicals
- Collect residue, place in appropriate container, label and dispose as chemical waste
- Clean spill area with water

Some spills may be more hazardous and personnel should not attempt cleanup. You should evacuate the room and call the Safety and Risk Management Office (828-227-7443) if a spill situation involves any of the following:

- a respiratory hazard
- a threat of fire or explosion
- more than 100 mL of an OSHA regulated chemical carcinogen or a highly toxic chemical
- more than 1 liter of a volatile or flammable solvent
- more than 1 liter of a corrosive (acid or base) liquid
- elemental (liquid) mercury spills

Major chemical spills

There may be little time to shut down procedures and secure activities and materials, so initial procedures should be to close containers and contain the spill if possible and initiate evacuation.

- Alert people in the area to evacuate
- If spilled material is flammable turn off ignition and heat sources
- Call 911 and notify the Safety and Risk Management Office (x7443)
- Attend to contaminated persons and remove them from exposure
- Have a person knowledgeable of the area assist the emergency personnel

Provide the following information when calling for assistance with a chemical spill:

- Caller's name and phone number
- Location of the incident
- Location to meet the caller in the event that they have to evacuate the premises
- Identity and quantity of the material spilled, if known, and any odors present
- Any injuries

The University is required to report any "reportable quantity" releases of hazardous chemicals to the environment, such as releases of compressed gases, outdoor spills, and discharges to the sewers. The Safety Office must be notified immediately of any release to the environment to ensure that the appropriate notifications are made.

Chemical Exposure

- Flood exposed area with running water for at least 15 minutes. If in eyes, rinse eyeball and inner surface of eyelid with water, forcibly holding eye open to effectively wash behind eyelids.
- Remove all contaminated clothing and shoes.

- If medical attention is needed, proceed to campus Health Services for medical care. Provide medical professionals with SDS sheets to ensure proper first aid and diagnosis. If immediate medical care is needed call 911.
- Report the incident to supervisor and complete a Report of Work-related Accident, Injury, or Illness.

Antidotes

Some chemicals have acute exposure effects that may be relieved or minimized by an antidote (i.e. calcium gluconate gel is to be used for first aid in the case of a hydrofluoric acid burn.) Using an antidote does not negate the need to seek medical attention immediately. Refer to SDS information to know if antidotes need to be stocked, or contact the Safety and Risk Management Office for guidance. Periodically check the expiration date for the antidotes to ensure that they will be effective if needed.

Reporting Accidents

The University has incident reporting procedures in place to comply with federal and state regulations. Incidents resulting in personal injuries to employees, students, and visitors while on University property, or during University employment or activity off campus, must be reported to the Safety and Risk Management Office within 24 hours.

Near miss incidents which do not result in an injury or illness but could have under slightly different circumstances should also be reported to the Safety and Risk Management Office. Reporting a near miss allows us to determine how and why it occurred and to take action to prevent a similar, or more serious, incident from happening in the future

Section 10: Ceramics Studio Safety

Ceramic art and pottery has a wide variety of hazards. The specific hazards and precautions may include working with clay, glazing and coloring, firing in a kiln, and potential leaching of finished ware.

Clay Hazards

Clays are minerals composed of hydrated aluminum silicates often containing large amounts of crystalline silica. The primary health hazard is from repeated breathing of clay dusts. Excessive dusts occur when dry clay is mixed without ventilation or allowed to accumulate on surfaces. Follow these safety guidelines to minimize exposure to clay dusts:

- Use premixed clay if possible to avoid exposure to large quantities of clay dust.
- Clay storage and mixing should take place in a separate, well-ventilated room.
- Always use the ventilation system during mixing to remove fine silica dust particles from the air.
- Clay mixers should be equipped with proper machine guards so that they cannot be opened to add clay or water while the mixer blades are turning.
- Always be alert to the potential for your hands or clothing to get caught in the plug mill, never put your hand in the hopper!
- Make sure the studio is cleaned daily by wet mopping and washing.
- Dry sweeping and vacuuming must be avoided unless a HEPA filter vacuum is used.

Glaze Hazards

Glazes contains a mixture of silica, fluxes and colorants. Fluxes and colorants can be highly toxic by inhalation. Highly toxic glaze constituents include:

- Antimony
- Lead
- Barium
- Lithium
- Cobalt
- Manganese
- Vanadium
- Arsenic
- Cadmium
- Beryllium
- Chromium
- Nickel

Follow these safety guidelines to minimize exposure to toxic glaze:

- Use lead-free glazes. If the glaze does not state "lead-free" or "leadless" on the label, assume it contains lead until proven otherwise.
- Avoid using colorants that are known or probable human carcinogens (arsenic, beryllium, cadmium, chromium VI, nickel, and uranium). There is no known safe level for carcinogens!
- Mix and weigh glazes in an exhaust hood. Wet glazes are not an inhalation hazard. Use a wet mop to clean spilled powders.
- Wear gloves when handling wet or dry glazes.
- Perform all glaze spraying in a ventilated booth.
- Wash hands thoroughly after each use.

Kiln Hazards

Electric kilns and fuel-fired kilns are used to heat the pottery to the desired firing temperature. Fuel-fired kilns are heated by burning gas (natural or propane), oil, wood, coke, charcoal or other materials. The fuels produce carbon monoxide and other combustion gases. Fuel-fired kilns are usually vented from the top through a chimney. Firing temperatures can vary from as low as 1382°F for raku and bisque wares, to as high as 2372 °F for stoneware, and 2642 °F for certain porcelains.

The early stage of bisque firing involves the oxidization of organic clay matter to carbon monoxide and other combustion gases. Sulfur breaks down later producing highly irritating sulfur oxides. Also, nitrates and nitrogen-containing organic matter break down to nitrogen oxides.

Galena, Cornish stone, crude feldspars, low grade fire clays, fluorspar, gypsum, lepidolite and cryolite can release toxic gases and fumes during glaze firings. Carbonates, chlorides, and fluorides are broken down to releasing carbon dioxide, chlorine, and fluorine gases.

At or above stoneware firing temperature, lead, antimony, cadmium, selenium and precious metals vaporize and the metal fumes can either escape from the kiln, or settle inside the kiln or on ceramic ware in the kiln. Nitrogen oxides and ozone can be generated from oxygen and nitrogen in air.

Salt glazing involves throwing wet salt into the heated kiln while the bisque ware is being fired. If sodium chloride salt is added, hydrogen chloride gas is formed which is highly toxic by inhalation. Hydrogen chloride and water vapor also form corrosive hydrochloric acid which can corrode metal fittings in the area. Substitute with sodium carbonate in place of sodium chloride to prevent hydrogen chloride generation. Sodium carbonate generates carbon dioxide gas.

Raku firing involves firing ware at a low temperature in a regular gas kiln and then removing the hot pieces and placing them in sawdust, leaves, or other organic materials for the reduction phase. The reduction phase releases large amounts of smoke and carbon monoxide and treated materials can also produce highly toxic compounds. Follow these safety guidelines to minimize exposure to kiln gases and hazardous products:

- Only personnel who have been instructed in firing procedures may operate the kilns. A complete understanding of firing procedures and safety components is essential to avoid personal injuries or damage to the kiln.
- Processes such as Raku Firing and Salt Glazing present unique safety hazards and should only be done outdoors away from air intakes or open windows of buildings. Close faculty or graduate assistant supervision is required at all times.

Section 11: Printmaking Studio Safety

Chemical Hazards

The primary hazard in printmaking and silkscreen printing is exposure to organic solvents during plate preparation and plate clean up. Repeated or prolonged exposure of the skin to organic solvent dries out the skin by defatting the tissue. Prolonged inhalation of solvent vapors in sufficient quantities can cause dizziness, nausea, loss of coordination and even unconsciousness. Accidental ingestion, either from poor hygiene or unlabeled containers can cause long-term toxic effects and can be fatal if significant quantities are ingested. Solvents are flammable and can easily be ignited!

Screen washing presents a moderate hazard of irritation to the lungs and skin and a severe hazard to the eyes. Bleach and some soaps used in the process are corrosive depending on the concentration used.

Acids used in etching are severely corrosive to the body and are reactive with many other chemicals. Nitric acid etching releases toxic nitrogen dioxide, which has poor odor warning properties. Mixing hydrochloric acid with potassium chlorate to make Dutch mordant produces toxic chlorine gas! Potassium chlorate is very reactive with organic compounds.

Resin and asphaltum dusts are combustible. Follow these safety guidelines to minimize exposure to hazardous chemicals:

- Learn the specific hazards of what you are working with by reading the label and reviewing the Safety Data Sheets (SDS/MSDS).
- Substitute less hazardous materials in place of more toxic hazardous chemicals.
- Gloves and goggles are necessary when using acids, solvents, or bleach, and in any situation when there is a splash hazard or risk of flying materials.
- Maintain good ventilation and use the chemical fume hoods.
- Be aware of the location of eye wash stations or other water source for drenching the skin and eyes.

- Store acids below eye level and use secondary containers to prevent spills. Segregate the storage of chemicals (do not store acids and bases together, and keep flammables separate from oxidizers/combustibles).
- Make sure all containers are properly labeled following GHS guidelines.
- When diluting acids always add the acid slowly into the water (not water into acid). Remember AA – Add Acid to the water slowly!

Section 12: Photography Studio Safety

Photo Processing Hazards

Photographic processing i.e. mixing, developing, stop bath, fixing, reducing, intensifying, etc. involves a wide variety of chemicals that are corrosive to the skin/eyes and in some cases, toxic by inhalation. Good chemical hygiene procedures are essential during all types of processing. Follow these safety guidelines to minimize exposure to hazardous photographic chemicals:

- Learn the specific hazards of what you are working with by reading the label and reviewing the Safety Data Sheets (SDS/MSDS).
- Substitute less hazardous materials in place of more toxic hazardous chemicals.
- Gloves and goggles are necessary when handling chemicals, and in any situation when there is a splash hazard or risk of flying materials.
- Maintain good ventilation and use the chemical fume hoods when necessary.
- Be aware of the location of eye wash stations or other water source for drenching the skin and eyes.
- Store corrosive chemicals below eye level and use secondary containers to prevent spills. Segregate the storage of chemicals (do not store acids and bases together, and keep flammables separate from oxidizers/combustibles).
- Make sure all containers are properly labeled following GHS guidelines.
- When diluting acids always add the acid slowly into the water (not water into acid). Remember AA – Add Acid to the water slowly!

Section 13: Sculpture Studio Safety

Sculpture hazards are generally those presented by welding, power machinery, and toxic dusts from sculpture materials. Follow these safety guidelines to minimize exposure to hazardous materials and equipment processes:

Welding Safety

- Remove all fire hazards (i.e. combustible materials, flammable solvents) from the area of welding.
- Wear goggles for torch soldering which does not require filter lenses.
- When arc welding is suspended and unattended, remove all electrodes and disconnect the machine. Shut off fuel cylinders.
- Use the exhaust ventilation system to remove fumes.
- Ensure the welding screen is in place.

- Store gas cylinders in the up-right position and securely mounted in place.

Machinery and Tools

- Never remove guards and shields provided with the equipment.
- Wear eye protection for machine and tool operations.
- Tie long hair back, don't wear ties, jewelry, or loose clothing that can get caught by machinery.
- Do not use damaged tools, including cords, and report to the studio supervisor immediately.

Plaster and Plaster Molds

Plaster can be carved, modeled, and casted. Varieties of plaster include: plaster of Paris, casting plaster, white art plaster, molding plaster, and Hydrocal. These are all varieties of calcined gypsum, composed of calcium sulfate. Mold releases used with plaster include Vaseline, tincture of green soap, auto paste wax-benzene, silicone-grease-benzene, and mineral oil-petroleum jelly. In waste molding, the plaster mold is chipped away.

Plaster dust is irritating to the eyes and respiratory system and in some situations, can cause more severe problems. Some dusts are toxic by ingestion, inhalation, and by absorption.

Follow chemical safety guidelines to minimize exposure to harmful plaster dusts and chemicals.

- Wear gloves and goggles when mixing acetic acid and burnt lime.
- Always carve or cut in a direction away from you, and keep hands behind the tool. If the tool falls, don't try to catch it!
- Wear safety goggles when chipping plaster.
- Wear gloves and goggles when pouring benzene and work in a well-ventilated area (preferably a fume hood). Store in safety containers and do not use near open flames. Benzene is a known human carcinogen, minimize exposure! If benzene is used, a Standard Operating Procedure (SOP) must be utilized to document training.
- Do not use plaster for body part casts. Instead, use a plaster-impregnated bandage (such as Pariscraft), along with Vaseline or similar mold release as protection.

Stones and Lapidary

Stone carving involves chipping, scraping, fracturing, flaking, crushing, and pulverizing with a wide variety of tools. Soft stones can be worked with manual tools whereas hard stones require crushing and pulverizing with electric and pneumatic tools. Lapidary involves cutting and carving semiprecious stones and has similar risks as hard stone carving. Stones can be finished by grinding, sanding, and polishing, by either hand or with machines. Various hazards exist when working with this art form, including:

- Sandstone, soapstone, and granite are highly toxic by inhalation because they contain large amounts of free silica. Limestone, containing small amounts of free silica, is less hazardous.
- Serpentine, soapstone, and greenstone may contain asbestos, which can cause asbestosis, lung cancer, mesothelioma, stomach and intestinal cancers.
- During chipping and other carving, flying chips and pieces of rock may cause eye injury. Grinding and sanding can release small pieces of stone and dust which are hazardous to the eyes.

- Lifting heavy pieces of stone may cause back injuries.
- Power tools create larger amounts of fine dust than hand tools. Pneumatic tools can create large amounts of fine silica dust.
- Vibration from pneumatic equipment can cause Raynaud's phenomenon, ("white fingers" or "dead fingers") a circulation disease. The hazard is greater with exposure to cold, (e.g. the air blast from pneumatic tools). This temporary condition can spread to the whole hand and cause permanent damage.
- Calcium oxide in Portland cement is highly corrosive to the eyes and respiratory tract, and is moderately corrosive to the skin. Allergic dermatitis can also occur due to chromium contaminants in the cement. The silica in the cement is also highly toxic by inhalation. Lung problems from inhalation of Portland cement include emphysema, bronchitis, and fibrosis. Acrylic resins are skin irritants and sensitizers.
- The dust from quartz gemstones such as agate, amethyst, onyx, and jasper is highly toxic due to silica content. Other gemstones such as turquoise and garnet may be contaminated with substantial amounts of free silica. Opal is made of amorphous silica, which is slightly toxic by inhalation.
- Grinding and sanding, especially with machines can create fine dust from the stone. There are also inhalation hazards from grinding wheel dust (especially sandstone wheels). Some polishing materials such as tripoli are highly toxic if inhaled in powder form.

Follow safety guidelines to minimize exposure to harmful dusts and physical hazards:

- Do not use stones which may contain asbestos. New York soapstone may contain asbestos, whereas Vermont soapstone is usually asbestos free. Alabaster is a substitute.
- Wear chipping goggles to protect against flying particles; wear protective shoes to protect against falling stones. Wear approved safety goggles when grinding, sanding, or polishing. For heavy grinding also wear a face shield.
- When using carving tools, keep your hands behind the tools, and carve or cut in a direction away from you.
- Don't try to catch falling tools!
- Use proper lifting techniques (bent knees) to prevent back injury.
- Protect against vibration damage from pneumatic tools by measures such as having comfortable hand grips, directing the air blast away from your hands, keeping hands warm, taking frequent work breaks, and using preventive medical measures such as massage and exercise.
- Tie long hair back, and don't wear ties, jewelry, or loose clothing which can get caught by machinery.

Wax Hazards

Many different types of waxes are used for modeling, carving, and casting. These include beeswax, ceresin, carnauba, tallow, paraffin, micro-crystalline, and synthetic chlorinated waxes. Solvents used to dissolve various waxes include alcohol, acetone, benzene, turpentine, ether, and carbon tetrachloride. Waxes are often softened for carving or modeling by heating in a double boiler or with a light bulb, by

sculpting with tools warmed over an alcohol lamp, or by the use of soldering irons, alcohol lamps, and blowpipes. Additives used with waxes include rosin, dyes, petroleum jelly, mineral oil, and many solvents. These processes and materials pose a multitude of hazards from the release of flammable and toxic vapors and the following guidelines should be followed to minimize exposure:

- Know the materials you are working with by reading the SDS/MSDS and following the handling and storage guidelines.
- Do not overheat waxes. Use a double boiler and a temperature-controlled hot plate, or a crock pot. Do not use an open flame to melt waxes.
- Use the least hazardous solvent to dissolve your wax. Do not use carbon tetrachloride under any circumstances. Store solvents safely, do not smoke or have open flames near solvents. Dispose of solvent-soaked rags in an approved waste disposal container.
- Do not use chlorinated synthetic waxes.

Wood working

Wood sculpture uses different types of hard and soft woods, including many exotic tropical woods. Many of these woods are hazardous themselves and may be treated with preservatives or pesticides posing a variety of hazards. In general, hardwoods come from deciduous trees and tend to be slower growing and denser. Examples of hardwoods include alder, balsa, beech, hickory, mahogany, maple, oak, teak, and walnut. Softwoods are generally from conifer trees (evergreens) which usually have needles and cones. Examples of softwoods include cedar, Douglas fir, juniper, pine, redwood, spruce, and yew.

- Saps present in many green woods, and lichens and liverworts present on the surface of freshly cut wood, can cause skin allergies and irritation from direct contact.
- Many hardwood dusts, especially those from exotic woods, are common sensitizers and can cause allergic skin reactions. Some hardwoods can cause allergic reactions in individuals working with or using finished hardwoods. Softwoods do not cause as high a frequency of skin and respiratory problems as do hardwoods.
- Contact with the dust of many hardwoods can cause conjunctivitis (eye inflammation), hay fever, asthma, coughing, and other respiratory diseases.
- Some hardwoods can cause hypersensitivity pneumonia (alveolitis), and frequent attacks can cause permanent lung scarring (fibrosis). Examples of these highly toxic woods include giant sequoia, cork oak, some maple woods, and redwood.
- Some hardwoods contain chemicals that are toxic, and can cause a variety of symptoms, including headaches, salivation, thirst, giddiness, nausea, irregular heartbeat, etc. A classic example is hemlock.
- Inhalation of hardwood dust is associated with a particular type of nasal and nasal sinus cancer (adenocarcinoma). This type of cancer has a latency period of 40-45 years, and occurs to the extent of about 7 in 10,000 among woodworkers who are heavily exposed. This rate is many times higher than the rate of nasal adenocarcinoma in the general population. Over half of all known cases of this type of cancer are found in woodworkers.

Plywood and Composition Board

Plywood is made by gluing thin sheets of wood together with either urea-formaldehyde glues (for indoor use) or phenol-formaldehyde glues (for outdoor use). Composition board, for example particle board, is made by gluing wood dust, chips, etc. together with urea-formaldehyde resins. The materials can emit unreacted formaldehyde for some years after manufacture, with composition board emitting more formaldehyde. In addition, heating these materials or machining them can cause decomposition of the glue to release formaldehyde.

Formaldehyde is highly toxic by inhalation, highly toxic by eye contact and ingestion, and moderately toxic by skin contact. It is an irritant and strong sensitizer. Formaldehyde is a known human carcinogen. Even trace amounts of free formaldehyde may cause allergic reactions in people who are already sensitized to it. Machining, sanding, or excessive heating of plywood or composition board can cause decomposition releasing formaldehyde, carbon monoxide, hydrogen cyanide (in the case of amino resins) and phenol (in the case of phenol-formaldehyde resins).

Use low-formaldehyde products whenever possible. There are particle boards that are made without formaldehyde, but these are very expensive. Do not store large amounts of plywood or composition board in the shop since it will emit formaldehyde. Instead store in a ventilated area where people do not work.

Wood Preservation and Other Treatments

Pesticides and preservatives are often applied to wood when it is being timbered, processed or shipped. Unfortunately, it is hard to find out what chemicals, if any, have been added. This is especially a problem with imported woods, since pesticides and wood preservatives banned in the United States and Canada are often used in other countries. Pentachlorophenol and its salts, creosote, and chromated copper arsenate (CCA) have been banned for sale in the United States as wood preservatives because of their extreme hazards. They can, however, still be found in older woods and chromated copper arsenate is still allowed as a commercial treatment (e.g. "green" lumber, playground equipment, and other outdoor uses). It is supposed to be labeled. A variety of other chemicals can be used in treating wood including fire retardants, bleaches, etc.

Wood Preservative Hazards

- Pentachlorophenol is highly toxic by all routes of entry. It can be absorbed through the skin, cause chloracne (a severe form of acne) and liver damage, and is a probable human carcinogen and reproductive toxin.
- Chromated copper arsenate is extremely toxic by inhalation and ingestion, and highly toxic by skin contact. It is a known human carcinogen and teratogen. Skin contact can cause skin irritation and allergies, skin thickening and loss of skin pigmentation, ulceration, and skin cancer. Inhalation can cause respiratory irritation, and skin, lung and liver cancer. Inhalation or ingestion may cause digestive disturbances, liver damage, peripheral nervous system damage, and kidney and blood damage. Acute ingestion may be fatal.

- Creosote has a tarry look, and is also used for outdoor wood. It is a strong skin and respiratory irritant, and is a probable human carcinogen and teratogen.
- Zinc and copper naphthenate are slight skin irritants; copper naphthenate is moderately toxic by ingestion. If suspended in solvents, the solvent would be the main hazard.

Follow these guidelines when handling wood working materials to minimize hazardous exposures:

- Obtain Safety Data Sheets on all chemicals being used in wood treatment. Treated wood itself does not have Safety Data Sheets, so you will have to find out about any treatments from the supplier. In the United States, CCA-treated wood is required to have a label and information on safe handling.
- Do not handle woods that have been treated with pentachlorophenol or creosote. Avoid scrap or old woods of unknown origin.
- If you add wood preservatives yourself, use zinc or copper naphthenates, if possible.
- Do not burn wood that has been treated with creosote, pentachlorophenol, or chromated copper arsenate.
- Whenever possible, use common hardwoods rather than rare tropical hardwoods.
- If you have a history of allergies, you should avoid common sensitizing woods.
- If you are handling woods that can cause skin irritation or allergies, wear gloves.

Section 14: Painting Studio Safety

Paints are pigments mixed with a binder. Poisoning can occur if toxic pigments are inhaled or ingested. Water based paints include water, color, acrylic, gauche, tempera and casein. The preservatives used in water-based paint may cause an allergic reaction in some people. Oil paints and brush cleaners include solvents. The solvents are toxic by inhalation, poisonous if ingested, and may cause skin contact dermatitis.

Follow these guidelines to minimize hazardous exposure to painting materials:

- Know the toxicity of the pigments you are using and use the least toxic paints available. Toxic paints include colors with lead, cadmium, mercury, arsenic and chromium.
- Avoid using turpentine. Use mineral spirits or vegetable oil to clean oil paint brushes instead of turpentine.
- Wear neoprene gloves when cleaning brushes in solvents and clean brushes under a fume hood.
- When transferring thinners and other chemicals from the original stock container, label the container with the contents and associated hazards (ie. turpentine, toxic & flammable).
- Do not use regular drinking/eating containers for chemicals or paintbrush holders.
- Keep chemical containers closed when not in use to avoid evaporation and inhaling vapors.
- Paint can be removed from your hands with baby oil and then soap and water.
- Practice good hygiene. Do not put the brush in your mouth. Do not eat while painting. Keep your hands out of your mouth. Wash your hands after painting.

Section 15: Theatrical Production Safety

The information in this section is applicable to all members of the theatre community including directors, performers, crew, stage managers, and front-of-house personnel and is designed to follow a production from planning stages to strike. It is divided into primary sections such as event planning, event registration, emergency procedures, set design & construction, lighting & sound, cast & crew, performance and strike.

Event Planning and Registration

Pyrotechnics and Fire Code Permits: When open flames or pyrotechnic devices (such as flash pots) are a planned part of the performance, contact the Safety and Risk Management Office (828-227-7443) a minimum of 4 weeks before the performance to obtain a fire code permit application. Fire Code permits from the local municipality are required for open flames and fireworks/pyrotechnics.

Special Effects: Certain special effects should be reviewed to ensure all necessary safeguards are in place. Contact the Safety Office at the earliest phase of production if the performance involves the use of:

- Knives, swords, guns or any prop weapons
- Items suspended over the audience
- Pits, trap doors or other changes in elevation
- Fog or smoke
- Strobe Lighting
- Lasers
- Rigging or flying performers

Set Design and Construction Hazards

Props and Decoration: Decorative materials such as curtains, draperies, streamers, fabrics, cotton batting, straw, hay, vines, leaves, stalks, tress and moss must be noncombustible or flame resistant or be rendered so with commercially available products. Certain types of decorative materials may be used only with the approval of the municipal fire official. Contact the Safety and Risk Management Office (828-227-7443) if you have any questions about the approved use of decorative materials.

Structural Issues for Set Design: Any set design which includes ladders, traps, scaffolds, rakes, rigging or other specialty devices must be approved and inspected by the production crew before each use. Some rigging guidelines include:

- Anything attached to a flybar must have a safety cable attached as well.
- Check that everything attached to a light, including barn doors, gel cases and safety cables, are secure before it is raised.
- Make sure the rope or cord is strong enough for what you are lifting and that the rope or cord is not frayed or damaged in any way.
- Warn people on the stage or grid before moving any rigged scenery or other objects.
- Maintain visual contact with a moving piece at all times.

Personal Protective Equipment (PPE): Personal protective equipment includes all types of equipment used to increase individual safety while performing potentially hazardous tasks. This may include eye and face protection, head protection, foot protection, hand protection, respiratory protection, or any equipment used to protect against injury or illness

Hand & Portable Power Tools: Crewmembers should use a power tool only after receiving proper training. Stage managers should review the operation of the equipment, making sure to point out safety features and guards. Crewmembers should be familiar with the owner's manual for the tool, and should know both the use and the limitations of all power tools. Only trained crewmembers are permitted to use power tools such as miter saws, table saws, and drill presses. This training must be documented.

Ladders: Ladders are one of the most common tools of the theatre trade. Misuse of portable ladders can result in serious injuries from falls or, in the case of metal ladders, electrical shock. Portable ladders must be maintained in good condition at all times, and inspected at regular, frequent intervals. Whenever possible, ladders should be hung horizontally on wall hooks in a dry place not subject to extremes of temperatures. Users can do minor maintenance, like lubricating hinges and tightening hardware; however, ladder repair is specialized work and should be completed by qualified persons or the manufacturer. If conditions exist that make a ladder unsafe for use, it should be removed from service immediately and marked with a warning such as "**Dangerous - Do Not Use"**. Personnel using ladders are required to take Ladder Safety training.

Chemical Hazards: Most chemical use in theatre is limited to paints and stains. However, if you are using any new or non-routine product, contact the Safety Office for assistance on proper use, PPE, spill and disposal procedures. For more information, please review the Chemical Safety section in this manual.

Housekeeping: Work areas can become congested while constructing the set and while rehearsals take place. Clutter makes it difficult to move around and can be a fire hazard. To prevent accumulation of materials, trash should be removed daily.

- Place trash in proper receptacles, preferably in metal containers.
- Clean up after each work session
- Avoid accumulating scrap lumber and materials
- Purchase materials as needed to avoid the need for additional storage
- Store tools in the proper areas when not in use

Storage of Materials: The proper storage of materials in theatre spaces is extremely important to the efficiency of the production and the safety of the cast, crew and audience. The NC Fire Code mandates certain storage requirements, such as:

- Flammable and combustible liquids must be stored in approved flammable storage cabinets.
- If the building has sprinklers, materials must be a minimum of 18 inches below sprinkler heads and a minimum of 24 inches below the ceiling in unsprinklered areas.
- Materials must never obstruct an exit from the building

- Stored materials must be a minimum of three feet in all directions from unit heaters, duct furnaces and flues
- Smoking is prohibited in all places of assembly and in spaces where combustible materials are stored or handled.

Lifting and Material Handling: Moving and transporting set pieces can be some of the most significant hazards during set construction. The following tips are recommended to avoid injury while moving and lifting objects:

- Ensure you have adequate help to lift heavy or awkward items.
- Plan your route before lifting. Ensure pieces will fit through doorways, openings on vehicles before attempting any lifting.
- Use hand trucks or carts whenever possible to reduce lifting.
- Strap or secure items that may fall during transport. "If it can fall down, lay it down."

Lighting and Sound Hazards

Electrical Hazards: Follow these guidelines when working with electrical devices.

- **Repairs:** No one should attempt electrical repairs without proper training. Equipment that malfunctions or causes shocks should be removed from service and repaired by a qualified individual.
- **Extension cords:** Extension cords are only designed for temporary use. Use of thin, light duty extension cords can increase the risk of fire and shock. Make sure extension cords have adequate current capacity for the equipment being used. Do not pull an electrical cord out of a socket by the cord. This breaks interior wires and can cause a short and, possibly, a fire. Inspect for frayed or split cords or plugs before use.
- **Electrical Cords:** Electrical cords can also be a tripping hazard. It is a good practice to route cords away from traffic areas to prevent trips and falls. Avoid stretching or pinching cords between objects. This can break interior wires, causing overheating which can result in a fire. Do not cover electrical cords with rugs; this can also result in a fire.
- **Circuit Protection Devices:** Circuit protection devices are designed to automatically limit or shut off the flow of electricity in the event of a ground-fault, overload, or short circuit in the wiring system. A ground-fault circuit interrupter, or GFCI, should be used in high-risk areas such as wet locations or outdoor sites. Portable GFCIs are available from any hardware store or safety supply catalog.
- **Training:** Training is essential in working with lighting circuitry, dimmers and instruments. Employees and students should be trained before being authorized to work the control areas. Document the training. Keep food and beverages out of the light control areas to prevent possible shocks and damage to the circuitry.

Overhead Lighting: Lighting dimmers have limits to the lamp loads they can handle. Overloading dimmers can cause a fire hazard. NOTE: The wattage of the bulbs MAY NOT exceed that of the dimmers they are plugged into.

Ladders & Catwalks: Lighting work sometimes requires working from ladders or elevated surfaces such as catwalks. Catwalks are designed with fall protection in the form of guardrails. Guardrails may not be removed, climbed or defeated in any way without additional fall protection practices in place. Ladder and guardrail safety training must be documented.

Safety Concerns for Cast and Crew

Cosmetics: Products approved for makeup use have been tested extensively for toxic hazards. Only these products should be used for stage productions. Old containers of makeup could contain bacteria and should be thrown away. Wash your face and hands before applying cosmetics. If you are using makeup from a "communal" make-up kit, use a clean brush or your clean fingers to apply. Shared makeup should not be applied directly to your face. These guidelines should be followed for shared makeup users:

- **Creme sticks:** slice these out with dental spatulas on to individual papers such as butter trays. Label and reuse them individually for touch-ups.
- **Lipsticks:** These too can be sliced and labeled.
- **Pancakes and powders:** Powdered products provide a less viable environment for infection, but try to individualize usage. Supply powders in the smallest containers available.
- **Mascara:** Use individual applicators/containers if possible.
- **Eyeliners and Eye makeup:** Use individual products if possible.
- **Brushes:** Use disposable brushes.
- **Sponges:** Use disposable sponges whenever possible. Reusable ones can be disinfected. Give out individual sponges at the beginning of a show, and maintain separate use.
- **Miscellaneous:** Any type of facial hair, skullcaps, sequins, or other face product should be disinfected before use by a new performer. Use an approved bactericide for disinfection. Carefully store these types of products in labeled individual plastic bags between performances.

Makeup artists should make a practice of washing their hands between actors. Sponges and brushes should be washed after use on each individual. When removing spirit gum or latex, avoid prolonged skin contact with solvents. Use moisturizers to replace lost skin oils and to guard against dermatitis.

Fatigue: Fatigue is a serious safety concern that should be considered during all stage productions. With performance dates approaching, most crewmembers can become severely overworked. Follow these simple guidelines to avoid fatigue:

- Get proper rest. The average person requires 7-8 hours of sleep per night.
- Limit drugs that might contribute to fatigue (tranquilizers and cold/allergy medications)
- Reduce caffeine, nicotine and alcohol which can also contribute to fatigue.
- Take frequent breaks while working. Repetitive or long work sessions can reduce one's ability to concentrate on the work at hand.
- Plan ahead. Having your building materials and equipment ahead of time can increase efficiency and reduce the work time required.

- Know when to quit. Recognize signs of fatigue – loss of concentration, slow reaction times, memory loss – and knock off for the day.

Heat Stress: Theatre spaces are often without air-conditioning and, even if they are air-conditioned, stage lighting can produce an incredibly hot glow. Add that to the stress and/or excitement of performing, and cast members are prime candidates for heat stress. Working in hot conditions may pose special hazards to safety and health.

Drink plenty of liquids during a performance to replace the fluids lost from sweating – as much as one quart per hour may be necessary. Water and/or sports drinks are recommended. Avoid caffeinated beverages such as cola, iced tea and coffee.

During the Performance

Crowd Control: Attendance for an event can be controlled through ticket sales, so overcrowding does not become an issue. The number of people involved and the nature of the event are the primary determining factors if security may be required.

Front-of-House Personnel: The house manager and all front-of-house personnel must assist the audience to evacuate the building safely in case of an emergency. A fire safety and evacuation plan must be prepared and all personnel should be trained in the duties they are to perform under the plan. Front-of-house personnel may wish to be instructed in the proper use of portable fire extinguishers. Fire extinguisher training is available through the Safety and Risk Management Office.

Exits (Means of Egress): The means of egress is the continuous and unobstructed path of travel from any point in a place of assembly to an exit or public way (e.g., sidewalk, street, etc.). All parts of the means of egress must be available for immediate, emergency use.

- Aisles and corridors must be unobstructed and kept free of flammable or combustible materials.
- Event organizers must inspect the means of egress immediately prior to any event and remove any obstructions immediately.
- Exit doors must be unlocked.
- Ensure that the exit discharge is also unobstructed (e.g., not blocked by dumpsters or vehicles, no materials stored against the exit door, all snow removed, etc.).
- All exit signs must be clearly illuminated and unobstructed at all times.
- The width of a means of egress cannot be blocked or reduced.
- Draperies or similar decorative hangings cannot obstruct the view or the access to an exit.
- Mirrors cannot be placed near an exit in any manner that may confuse those trying to exit.
- Exits cannot be used for any other purpose other than a means of egress. Spaces within a stairway enclosure are not to be used for storage of any materials.

Strike Hazards

Set Deconstruction & Material Disposal: Strike can be a chaotic, hazardous aspect of any production. Care must be taken to ensure that the stability of set pieces is not compromised as they are deconstructed, creating fall or crush hazards. Strikes should be organized with individuals assigned discrete tasks.

Chemical Waste Disposal: Most commonly used organic solvents (e.g., acetone, methanol, toluene, mineral spirits, turpentine) and paints are considered hazardous waste and cannot be disposed of with regular trash or poured down the drain. Review the Lab Waste Management Plan for waste disposal guidelines and Safety and Risk Management (828-227-7443) for assistance.

Appendix A: Emergency Contact List

In the event of an emergency affecting campus, the Campus Emergencies webpage is the official source for WCU emergency related information.

Emergency Telephone Numbers

	Normal Business Hours	**Evenings/Weekends**
EMERGENCY Fire/Police/Medical	828-227-8911 or 911	828-227-8911 or 911
University Police Department NON-EMERGENCY	828-227-7301	828-227-7301
Safety and Risk Management	828-227-7443	828-227-7443
Chemical Spill	828-227-7443	828-227-7443
Biological Spill	828-227-7443	828-227-7443
Radiation Exposure	828-227-7443	828-227-7443
Workers' Compensation	828-227-7443	828-227-7443
NC Poison Control Center	1-800-84 TOXIN (1-800-848-6946)	1-800-84 TOXIN (1-800-848-6946)
N.C. Radiation Protection Section	919-814-2250	800-858-0368 Emergency after hours
Jackson County Department of Public Health	828-586-8994	8:00am - 5:00pm Monday-Friday
Work Management Centers		
Facilities Management	828-227-7442	828-227-7224
WCU Health Services	828-227-7640	828-227-8911 EMS