Reed College Theater Safety Manual

July 2023

Emergency and Reference Contacts

Emergency	911
Community Safety	503-517-5355
EHS	503-777-7788
Departmental Contact Names: _____ _____ _____	Departmental Phone Numbers: _____ _____ _____

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1.0 Purpose and Scope

The purpose of this manual is to help minimize risks and establish good practices under Reed college. The goal is to also help familiarize participants with the basic procedures. Operations of the scene shop and costume shop involve risks that need to be addressed prior to operation.

This manual will set the basic guidelines to follow within the theater department within its contents:

- Policies and Procedures relating to Reed costume shop and scene shop operations.
- Administrative Procedures for Reed costume shop and scene shop operations.
- Operational Procedures.

All equipment that is operated by Reed must comply with this manual, state, and local requirements. Equipment used under Reed auspices includes:

- Scene shop and/or costume shop equipment owned, supported, or administered by Reed.
- Equipment used by Reed for research or educational purposes.

2.0 Responsibilities of Positions

2.1 Environmental Health and Safety Department (EHS)

EHS will administer, oversee, and maintain Reed's theater safety manual and policies. EHS is thereby responsible for changes made to the Theater Safety Manual. EHS will also review workplace accidents involving injury and loss/damage to equipment.

2.2 Department Owner or Operator

This person will ensure that all federal, state, local, and Reed's own safety policies will be fulfilled in regards to user safety and scene shop and/or costume shop safety. Detailed responsibilities include:

1. Assigns personnel to maintain the safety of operations, people, and the equipment itself.
2. Supplies resources to assigned personnel for their work.
3. Verified personnel are trained and competent within their work.
4. Authorizes all of the scene shop and/or costume shop equipment operation under the department.
5. Swiftly takes action to suspend unsafe operations.

2.3 Students in the scene shop and/or costume shop

Students must follow instructions from faculty and staff within the theater department and also follow all safety requirements. They should also report any potentially unsafe conditions.

3.0 Administrative Procedures

3.1 Theater Equipment

Any Reed department that utilizes equipment, such as sewing machines or saws, must comply with the following in order to ensure the safety of the equipment and the personnel:

1. Operators and students have appropriate training.
2. Each operator and student is safety trained and oriented on emergency procedures.
3. All operators and students are informed of the locations of emergency equipment.
4. The owner or operator has performed start-up safety checks of all theater equipment before use.

3.2 Accident and Incident Reporting

All accidents and incidents should be reported to ehs@reed.edu, hr@reed.edu, the department, and the equipment owner as soon as possible. Accidents can be defined as events that result in a serious injury that goes beyond basic first aid and serious damage to theater equipment that goes beyond cosmetic issues. Incidents are events that only result in minor injuries (cuts and scrapes) and cosmetic damage to equipment (damage that does not affect the operation of the equipment). Near misses of accidents or incidents should also be reported as an incident.

Accident/Incidents should be reported within 24 hours by emailing hr@reed.edu. Accidents/Incidents dealing with equipment damage should be reported to ehs@reed.edu and accidents/incidents dealing with injury reported to hr@reed.edu.

In addition, HR requires an Accident/Incident Report form within 3 days of the accident/incident which can be found here: https://www.reed.edu/human_resources/assets/downloads/AccidentIncidentForm2015.pdf

4.0 Use of Production Facilities

4.1 Responsibilities of Key Access

Every student granted access should be aware of the following:

- **No one** should operate any machinery unless the technical director or costume designer has granted permission. This is for your own safety.
- The facilities are to be respected and left in a tidy fashion when activities are complete.

Anyone that is found in violation of any of these rules is in danger of losing their access to all theater facilities.

4.2 Emergency Procedures

In case of fire:

- Leave the immediate area, closing all doors and windows behind you.
- Sound alarm by pulling on the handle of the fire alarm.
- Use a portable fire extinguisher only if you have been trained to use one and the fire is small. Sound the fire alarm before using an extinguisher.

In case of injury:

- Get first aid immediately, if needed. If chemicals are on skin or in eyes, flush the affected area with water.
- If possible, remove the victim from the immediate cause of injury. Report injury to instructor. If an instructor is not available, call Community Safety (503-788-6666).

In case of a spill or leak:

- Turn off all ignition sources and open all outside doors/windows to let any flammable or toxic vapors to escape.
- Inform your instructor of the issue.
- Call Community Safety (503-788 6666).
- If a spill or leak produces hazardous vapors, evacuate the area immediately.
- Use a spill kit, if applicable, to contain spill/leak so it will not spread further. Wear appropriate protective equipment.

When reporting an emergency:

- Give exact location of emergency (building, room, etc.).
- Give your name and the phone number of the location.
- Describe the nature of emergency (fire, leak, spill, injury, etc.).
- Stay near the phone, if possible, for additional instructions.

4.3 First Aid Kits

First-Aid kits are available in the theater, scene shop, costume shop, and make-up room. Eye wash stations are attached to the paint sinks in the scene shop and backstage. An emergency shower is located in the scene shop. Spill kits are located near all paint sinks. If supplies seem to be running low, please inform the Technical Director .

5.0 Hierarchy of Hazard Control

Hierarchy of controls is a system used in industry to minimize or eliminate exposure to hazards. Reed College is committed to controlling workplace hazards that could cause injury or illness to our employees and students. All work processes will meet the requirements of state and federal safety standards where they have specific rules about hazards or potential hazards in the workplace.

The hazard controls in the hierarchy are, in order of decreasing effectiveness:

- Engineering Controls
- Administrative Controls
- Personal Protective Equipment

5.1 Engineering Controls

Whenever possible facilities and equipment will be designed or modified to eliminate employee exposure to hazards.

5.2 Administrative Controls

Where engineering controls are not possible, work practice controls will be instituted to effectively prevent employee exposure to the hazard. Work practice controls include not working alone, standard operating procedures for equipment, building use policies, and more.

5.3 Personal Protective Equipment

The Occupational Safety and Health Administration (OSHA) requires employers to protect their employees from workplace hazards. One primary method for achieving this requirement is to develop workplace procedures and practices – such as those within the manual – to remove and/or minimize hazards. In theater arts, it is not always possible to eliminate a hazard through engineering or administrative controls – and therefore Personal Protective Equipment becomes the means for satisfying this requirement and successfully establishing a safe work environment.

When exposure to hazards cannot be engineered out of normal operations, and when safe work practices and other forms of administrative controls cannot provide sufficient additional protection, a supplementary method of control is the use of protective clothing or equipment. Your professor or a theater staff member will inform you if you are affected by one or more of the following Safety Programs, and provide you with access to the program. Affected employees will be required to complete safety training and utilize the exposure control methods in the next section, in accordance with the following Reed College Safety Plans:

- **Personal Protective Equipment Plan:** All employees and students who wear personal protective equipment are required to comply with this plan.
- **Hearing Conservation Plan:** All employees and students with noise exposures equal to or exceeding an 8-hour time weighted average (TWA) of 85dBA must comply with this plan.
- **Respiratory Protection Plan:** All employees and students who wear respiratory protection are required to comply with this plan.
- **Fall Prevention Plan:** All employees and students performing work with a fall potential greater than four feet must comply with this plan. This includes but is not limited to personnel using aerial lifts, theater grid system, ladders, scaffolds, and those working at elevated heights on roofs.

- **Hazard Communication Plan:** All employees and students who work with hazardous materials are required to comply with this plan.
- **Fleet Policy:** All employees and students who use a college owned, leased, or rented vehicle for college business will be required to comply with this plan.

5.4 Personal Safety Devices

The theater provides all protective devices for the department (safety goggles, face shields, respirators/particle masks, gloves and ear plugs). Take the time to make sure you have selected the proper device for the job and that it fits properly. If the device is defective or seems insufficient for the assigned job, please bring it to the attention of your supervisors/professor.

Eye Protection

There are several types of eye protective devices provided. The appropriate type to use will depend on the project at hand. You must wear eye protection whenever you are near power tools or chemicals in use, even if you are not the person actively involved.

- **Safety Goggles/Glasses** - These goggles/glasses are used in all woodcutting and sanding operations. They protect the eyes against foreign particles and dust.
- **Face Shields -** These can be used for any woodworking project and are used for all grinding of metals. They protect the eyes and the face from foreign particles. They are also often the most comfortable eye protection for students who wear eyeglasses.

NOTE: If you wear contacts, it is necessary that you use extreme caution in the shop. Most contacts allow chemicals to pass through, and cause eye irritation. Some chemicals, if they get into your eyes, will move behind your contacts and cause severe damage. Dust also causes eye irritation to contact wearers. Eyeglasses are suggested for use while working in the scene shop.

Particle/Respirator Masks

All filtering facepiece respirators (N95s, cartridge, etc) must be properly fitted to provide adequate protection. In order to use a respirator at Reed College you must enroll in our respiratory protection program. Contact EHS for assistance.

Gloves

- **Fabric Work Gloves** - These are provided to prevent hands from being injured while moving lumber or working with hot lighting units. Never wear gloves when using power tools, they can get caught in the mechanics and cause severe injury.
- **Nitrile Gloves** - These are available for any one using stains, dyes, varnishes or paint. Nitrile gloves or other non-latex gloves are for those with a latex allergy and should be used when working with latex paints.

Ear Protection

Ear protection is provided and needs to be used whenever excessive noise exists in the shop. This includes sanding, grinding, and power cutting tools.

5.5 Hazards and Appropriate PPE

The following summary has been provided to you as a means of identifying hazards involving certain work tasks, locations, and job titles and the exposure controls required to reduce those hazards. Please note that this is not a comprehensive list. If you are confused, please speak to a theater faculty or staff member about your situation.

Welding/brazing/cutting with torch

When you are welding/brazing/cutting with torch, you must be wearing the following PPE:

- Goggles with proper tinted lenses,
- Welding helmet and Leather gloves,
- Ankle-length pants, Leather boots, and Apron (as needed),
- Respiratory Protection (as needed),
- Local exhaust ventilation is required.

Soldering

When you are soldering, you must be wearing the following PPE:

- Safety glasses,
- Ankle-length pants.

Working with Hazardous Chemicals

When you are working with hazardous chemicals:

- Follow manufacturer's recommendations or contact the Environmental Health & Safety Department for guidance.

Cleaning up Glass

When you are cleaning up glass, you must be wearing the following PPE:

- Safety Glasses,
- Leather Gloves.

Spraying Chemicals Above Your Head

When you are spraying chemicals above your head, you must be wearing the following PPE:

- Chemical Splash Goggles,
- Chemically Resistant Gloves.

Scraping Wood

When you are scraping wood, you must be wearing the following PPE:

- Safety Glasses,
- Leather gloves (or cut resistant fabric or synthetic gloves).

Carrying Wood

When you are carrying wood, you must be wearing the following PPE:

- Leather gloves (or cut resistant fabric or synthetic gloves).

Working Inside the Spray Paint Booth
When you are working inside the spray paint booth (not glove box), you must be wearing the following PPE:
- Safety Goggles.

Relocating Items
When you are relocating items, you must be wearing the following PPE:
- Leather Gloves (or cut resistant fabric or synthetic gloves).
- Heavy load carts must be used when transporting large and/or heavy items.

Operating Hand and/or Portable Power Tools
When you are operating hand and/or portable powered tools, you must be wearing the following PPE:
- Safety Glasses,
- Hearing Protection (if needed),
- GFCI extension cords must be used where needed ,
- All guards must be in place,
- Shoes that completely cover the foot,
- Hair or loss clothing tied back.

Cleaning Lights and/or Lens Above Your Head
When you are cleaning lights and/or lens above your head, you must be wearing the following PPE:
- Safety Glasses.

Focusing Lights
When you are focusing a light, you must be wearing the following PPE:
- Leather Gloves (or cut resistant fabric or synthetic gloves),
- Heat Gloves (if needed).

Changing a Light Bulb Overhead
When you are changing a light bulb overhead, you must be wearing the following PPE:
- Safety Glasses,
- Leather Gloves (or cut resistant fabric or synthetic gloves),
- Heat Gloves (if needed),
- Lock out tag out devices (if needed),
- De-energize electricity.

Exposed to Noise Exceeding an 8-hour Average of 85 dBA
When you are exposed to noise exceeding an 8-hour average of 85 dBA, you must be wearing the following PPE:

- Hearing Protection.

Operating a Travel Spotlight
When you are operating a travel spotlight, the following PPE is strongly recommended:
- Long-sleeved shirt,
- Leather gloves (or synthetic gloves).

Operating a Forklift
When you are operating the forklift, you must be wearing the following PPE:
- Seat Belt,
- Only personnel trained by Reed College in fork truck operation may operate this vehicle.

Operating an Aerial Lift
When you are operating the aerial lift, you must be wearing the following PPE:
- Personal Fall Arrest System (this includes the scissors lift if a PFAS is required per manufacturer's guidelines),
- Only personnel trained by Reed College in aerial lift operation may operate this vehicle.

5.6 Other Safety Precautions

Smoking and Open Flame Policy
No smoking or open flame of any kind is allowed in any Theater Department Space at any time.

Lifting/Carrying Heavy Objects
- Size up the load. Do not lift a load that exceeds your strength capacity.
- Lift correctly: bend your knees and lift with your legs.
- Keep back straight.
- Face the item you are lifting.
- Keep the item close to the body.
- Communicate with others.
- Look where you are going, especially through doors and around corners.
- Be aware of the back end and what is behind you.
- Store objects 30 inches off the floor; avoid lifting from the floor. Do not store heavy objects above your total height.
- When carrying tall objects like a flat or ladder, lift with one hand high and one hand low. That is, one hand carrying the weight and the other hand extended to help balance the object.
- If you are losing your grip, you are fatigued, you are tired from not enough sleep, or if something is too heavy; you should speak up, ask for help, say no, take a rest, and/or get a better grip. This is much better than dropping it and having someone suddenly bear the entire weight at once, or injuring yourself.

6.0 Costume Shop Safety

6.1 Costume Shop Guidelines

Please remember this is a shared space and the following guidelines are intended to ensure your safety and continuation of a positive workspace.

- If you are unable to work due to medical or other personal reasons, please call the supervisor to make other arrangements for work.
- Remember to gain the permission form from the Costume Director if you need to use the shop after hours.
- No tools are to be removed from theater property without permission from the Costume Director.
- If a machine/serger requires repair speak with the Costume Director before making any repair.
- Please strip bobbins before winding another color thread.
- When finished with a project:
    - Always remember to return tools, fabric, bobbins and costumes to where they belong.
    - Begin cleaning and organizing the shop 10 minutes before leaving.
    - Fold/hang up sewing projects in their proper bin/space.

7.0 Scene Shop Safety

7.1 General Safety Rules for the Scene Shop

The following should be considered guidelines for working in the shop areas, and should be followed at all times. Any questions regarding the safe operation of any equipment, tools, or methods of construction should be addressed to the Technical Director or other faculty.

- No one may use this facility if:
    - They have not read the safety guide.
    - They are intoxicated, extremely tired, sick or upset.
    - They are not dressed in proper shop attire.
- Hard-toed shoes should be worn if possible, as gym shoes do not provide sufficient sole and toe protection. No open toed shoes. Pants are required. Long hair should be tied back, as it can become entangled in machinery. Dangly jewelry, and loose scarves and sleeves should also be avoided, as they are also at risk of entanglement.
- The scene shop is an eye and ear protection area and thus, when operating any power tool, or near someone who is, safety glasses and ear protection should be worn.
- Protective gloves are required while working with solvents or any non-water based chemicals. Extended exposure to water based chemicals (such as paint) shall also require the use of protective gloves. Refer to the SDS for guidelines as to appropriate safety gear.

- No tools are to be removed from theater property without permission from the Technical Director.
- Make certain you know how to operate a tool before using it.
- If a tool requires repair, speak with the Technical Director BEFORE making any repair.
- Never distract someone while they are using a tool. Wait until they have finished and then get their attention.
- Turn on the dust collection system before using the stationary woodworking tools.
- Never work alone and be mindful of the needs of your fellow workers. If someone is having difficulty with something, offer to help them.
- While participating in abrasive sanding and spray-painting, the spray booth/vent hood should be used in addition to safety goggles. The vent hood and or paint booth should be turned on.
- CLEAN UP AFTER YOURSELF.
- Keep work areas neat and organized. This entails sweeping or vacuuming periodically and returning tools to their designated spaces when finished with them.
- Smoking, food, and beverages (other than water in a closed container) are not permitted in the shop. NOTE: Smoking is not permitted in any building on the Reed College campus.
- No person shall work in the shops while under the influence of drugs, alcohol, or prescribed drugs which cause drowsiness, lightheadedness, or disorientation. Should a worker need to take medications with the aforementioned effects, staff should be notified. Any person removed from the shops for this reason, shall not be allowed to return without faculty approval.

7.2 Scenery

When scenery construction is permitted, it must:

- Ensure safety to the cast, crew, and audience, and be adequately secured;
- Be pre-approved by following the submission of a suitable plan that details construction methods, labor skills available, and materials to be used. Resources and skills must be compatible with the scale of the planned work;
- Occur only in an authorized work area with prior approval and appropriate supervision. Construction is prohibited in all other locations;
- Occur with students wearing all appropriate personal protective equipment (e.g., hard hats, safety goggles) as required by the work
- Be constructed in a safe manner.
- No live water effects such as rain, sinks, or showers are allowed in productions.
- No open flames are allowed without prior approval from EHS.

7.3 Painting

- Scenic painting may only occur in authorized work areas with appropriate supervision.

- Only water-based paints, stains and coatings may be used for flats, platforms, backdrops, and props, and painting, sets, etc.
- Painting must be done only in well-ventilated areas, with adequate protection against splashes and spills. Drips and spills must be cleaned up immediately.
- Used or unwanted paints must be disposed of promptly and properly. For water-based paints, cans should be opened and the paint allowed to evaporate to dryness, and then discarded as trash. No other materials may be discarded down the drain or put into the trash. Instead, contact EHS regarding disposal of waste.

If you don't know- ask! Avoid hazardous mistakes by asking questions.

7.4 Proper Scene Shop Attire

It is necessary that you follow the guidelines outlined in this section. If you fail to dress appropriately, you may be asked to leave your work assignment, and receive no credit or pay for that scheduled work period.

- Wear clothes that can be soiled with paints and glues. Slacks and pants (including jeans) are fine. Dresses, skirts, and shorts are NOT acceptable for work in the shop.
- Make sure all loose articles of clothing are properly buttoned or tied before using any power equipment. This includes shirtsleeves, loosely tied sweaters, and decorative accessories.
- Shoes with leather or hard rubber soles are most appropriate. High heels, sandals, and any open toed shoes are not permitted in the shop.
- No loose-fitting jewelry is permitted in the shop. All rings should be removed before you begin work. Long hair is a potential danger when using power tools. If you have long hair, it is required you either gather or tie it up so that a possible accident may be avoided.

7.5 Ventilation Systems

The Scene Shop is equipped with certain ventilations systems, which shall be used at all appropriate times. These should be switched on during dusty operations. There is a dust collection system connected to all stationary power tools, which should be utilized while using these tools.

7.6 Power Tool Guidelines

Before students and staff are allowed to use potentially hazardous tools, they must be trained and approved by a supervisor. These tools include, but are not limited to, saws, the drill press, grinders, pneumatic tools, rigging and fly systems, lighting control boards, sound control boards, and the lift. At no time should an attempt be made to operate any of these tools by anyone who has not been instructed and directed by the Technical Director or a supervisor.

Inspect tools before use for any defects such as frayed wire, or damaged hand tools. Remove defective tools from service until they are repaired or replaced.

Only use power tools that are properly grounded and double insulated with a three- pronged plug. If a power tool has a damaged or missing grounding prong, immediately report it to a supervisor who will then remove it from use.

Never carry a power tool by its cord. Avoid wrapping cords too tightly around tools for storage to prevent damage to strain relief grommets.

Unplug power tools before loading them, changing bits or blades, making adjustments, or cleaning them. Follow all manufacturer's instructions for handling and adjusting.
Defective, damaged or unsafe equipment must be removed immediately from service.

- Dull tools are unsafe and can damage operators or work. Maintain your tools and always use sharp cutting blades.
- Bring any problems with tools or machines to the attention of the staff for assistance. Never attempt to repair or adjust machines. Please do not try to hide or cover up any damages.
- Before operating any power tools, make sure all allen wrenches, chuck keys, or other foreign materials are clear of the machine's work area.
- Always make sure that all power tools are turned off and the electrical power disconnected before leaving the machine. Never leave an unattended machine running, even if for "one second".
- Never alter or remove any machine or blade guards or disable any safety feature.

Wood-working Tools

Table Saw - This saw has a circular blade that is used to rip-cut (cut with the grain) boards and plywood. Safety precautions for this tool:

- Use proper attire.
- Use eye & ear protection.
- Do not remove any device or guard.
- Always turn off the saw when making adjustments (height or angle of blade).
- Set the blade height to no more than ¼” above the thickness of the material to be cut.
- Make sure the dust collection system is on and the vent is open.
- Use a “push-stick” to guide the wood through, and always use assistance when cutting long or very thin stock.
- Pay close attention to your work. DO NOT BECOME DISTRACTED.
- You will often have a partner when using this tool. It is important that ONLY the partner at the leading (front) edge of the saw puts any pressure on the piece that causes it to move through the saw. The other must only support the piece on the back end, and ensure that it does not catch or bind on anything.
- Make certain that the floor space surrounding this tool is clear to reduce any trip hazard.

- When your task is complete make sure the tool is fully turned off and the blade is lowered.

Band Saw - This saw is a cutting device, which has a continuous loop blade that is generally used to cut curves. Safety precautions for this tool:

- Use eye & ear protection.
- Make sure the saw is unplugged before making any adjustments, or opening the blade doors for servicing.
- Always adjust the blade guard so that it is no more than 1/8" above the thickness of the material to be cut.
- NEVER ADJUST THE TENSION AND FLYWHEEL HANDLES ON THE BACK OF THE MACHINE.
- Keep the upper and lower doors that cover the blade closed at all times while the tool is in operation.
- Use the "push-stick" for cuts that require manipulation near the saw blade.
- Make certain that the floor space surrounding this tool is clear to reduce any trip hazard.
- Make sure the dust collection system is on and the vent is open.
- Lower the guard when finished.

Miter Saw - This has a circular blade used to crosscut 1" dimensional and 2" structural lumber. In addition, it is very useful for cutting precise angles.
Safety precautions for this tool:

- Use eye & ear protection.
- Always hold work against the fence.
- Never pin up the guard; keep the guard in place.
- Allow the motor to come to full speed before you start cutting.
- Be sure the blade has come to a complete stop before you try to pick up the piece of wood or adjust the machine to another angle.
- Make sure the dust collection system is on and the vent is open.
- Make certain that the floor space surrounding this tool is clear to reduce any trip hazard.

Panel Saw - This has a circular blade and is used to crosscut or rip sheet stock material.
Safety precautions for this tool:

- Use eye & ear protection.
- Always hold work against the support frame.
- Allow the motor to come to full speed before you start cutting.
- Be sure the blade has come to a full stop before you try to pick up the piece of wood or adjust the machine to another cut distance.
- Make sure that you feed the material in the direction of the blade rotation.
- Make certain that the floor space surrounding this tool is clear to reduce any trip hazard.
- Make sure the dust collection system is on and the vent is open.

Drill Press - This is used to bore holes or for precision drilling in both wood and metal. Safety precautions for this tool:

- Use eye & ear protection.
- Make sure the drill press is unplugged before making all necessary adjustments.
- Use only twist and spade bits in the drill press. If you are drilling metal, make sure the bit you are using is for metal work and use 3in1 oil to reduce friction. Friction heats the tip of the bit, which dulls it.
- Position and tighten the drill bit with the chuck key attached to the machine. BE SURE the drill bit is securely tightened before turning on the machine.
- Use the table and depth stop to avoid drilling into the metal support table.
- Use the proper speed for the materials you are machining.
- Always clamp your work down.

Bench Sander - This is used to sand and shape edges of wood. Safety precautions for this tool:

- Use eye & ear protection.
- Make sure the dust collection system is on, the vent is open, and the system is picking up the dust.
- Make sure the bench sander is unplugged before making all necessary adjustments.
- Make certain that the floor space surrounding this tool is clear to reduce any trip hazard.

Hand Circular Saw - This tool has a circular blade that is used for cutting plywood, Masonite, and occasionally 2" structural stock. Of all the power tools you will encounter in the shop, this has the potential to be the most dangerous. Safety precautions for this tool:

- Use eye & ear protection.
- Always unplug the saw before making adjustments or changing the blade.
- Keep guard in place.
- Always make sure there is both stable and sufficient support under the material being cut.
- NEVER stand on or put your weight on the material being cut.
- Set the depth of the cut so that it is no more than ¼" below the thickness of the material being cut.
- Make sure that your pieces will not put pressure on the blade while cutting – this can cause kickback. In other words, make sure all parts of the material being cut remain level.
- Use clamps and guides to assist the cutting process.
- Always check to make sure the blade is sharp before you use the tool. Pitch build-up will slow the blade, which can lead to kickback.

Saber (Jig) Saw - This is generally used to cut curves. It can be used to cut both steel and wood. The blade moves in a reciprocating motion.
Safety precautions for this tool:

- Use eye & ear protection.
- Make sure that there is both stable and sufficient support under the material being cut.
- Always check that the blade is correct for the material.

- Clamp or secure work in place when possible.

Portable Hand Drill - This drill (either corded or cordless) is used for boring holes and driving screws into wood, plastic and metal. Safety precautions for this tool:

- Use eye protection.
- All of our cordless drills use a keyless chuck and most of our corded drills have a keyed chuck. Make sure you understand how each chuck functions before use. Be sure the drill bit or screw bit is securely tightened before using the drill.
- For corded drills, unplug/disconnect the drill when changing the bit.
- A slower speed makes for more accurate work.
- Ensure the drill is operating in the necessary direction.
- Check the drill's clutch and speed position prior to work.
- Clamp or secure work in place when possible.

Router - This is used for shaping wood. Depending on the need, and the bit selected, it can make either straight cuts or decorative edge work. Safety precautions for this tool:

- Use eye & ear protection.
- Be sure the bit is secure before turning on the router.
- Ensure that you have the proper cutting depth set.
- Cut with the spin of the bit.
- Clamp or secure work in place when possible.

NOTE: All wood working tools including those listed in this section require individual training from the technical director.

Metal-working Tools

Metal Band Saw - This is a hand-held tool used to cut metal. It uses a thin, flexible blade. Safety precautions for this tool:

- Use a face shield & ear protection.
- Always clamp the work tightly to the machine.
- Always use the correct speed for work.
- Ensure that the coolant tank is filled before use.
- Always unplug the tool before making any adjustments.

Handheld Grinder - This tool is used to remove material from metal. It turns in a circular motion and can be equipped with either a grinding wheel or wire brush. Safety precautions for this tool:

- Use a face shield & ear protection.
- Use hearing protection.
- Clamp work in place when possible.
- Avoid sparks to other workspaces.

Arc Welder/Oxy-Acetylene Torch - These tools are used to join metals together or heat bend/treat metal materials. Safety precautions for this tool:

- Specific information regarding the safe and correct operation of these tools can only come from the Technical Director.
- These tools require specialized garments and eye/face protection.
- The arc and flame produced by the welding process is extremely harmful to the eyes. Prolonged exposure can lead to possible eye damage and severe headaches.
- The use of the welding equipment is restricted ONLY to students (regardless of previous experience) who have been thoroughly checked out on the machine.
- When working around the welding area, always be on the lookout for smoldering debris or stray sparks that could possibly result in a fire, and welding vapors. Have a fire extinguisher handy
- When working on other projects while welding is in process, work as far away from the welding area as possible. Try to shield your eyes from the direct and indirect exposure to the welding light or arc.

NOTE: All metal working tools including those in this section require individual training from the Technical Director.

7.7 Clean, Organized, and Safe Work Environment

Every work area in the shop should be free of loosely lying tools, hardware, scrap, cords, or airlines that might cause a safety problem. Make sure that the floor space is completely clear of all trip hazards, especially when using cutting tools. All tools should be returned to the tool room when not in use.

Our shop and theater are busy places—others use them from early morning to late at night. It is therefore imperative that we leave our workspaces as clean, if not cleaner, than they were when work began. Make certain you have time at the end of your work session to fully clean your work area.

Never leave extension cords plugged in overnight. Extension cords are for temporary purposes only. They can potentially cause a fire if left unattended.

8.0 Paint Safety

The following are general safety guidelines for using paint:

- The Theater uses primarily latex and vinyl-acrylic paints. These are both water soluble. Due to this fact, brushes, rollers and paint containers can be cleaned in any of the three paint sinks.
- If you have a latex sensitivity or allergy, make sure you wear clothing that covers as much skin as possible. You will also need to wear non-latex gloves to protect your hands.

- If you accidentally ingest paint, contact poison control at #-1-800-222-1222 immediately and follow their instructions.
- If you accidentally get paint in your eye, go directly to one of the eye wash units and flush your eyes with water.
- Any paint, varnish or dye that is not latex or vinyl-acrylic should be used in a well-ventilated area.
- If a spill occurs, isolate areas where paint was spilled until clean up is complete and the affected area is dry. Use the spill fit under the nearest paint sink to clean up the spill.
- Place all empty paint cans in the waste bin only after they have dried.
- Replace and secure lid on any can that still has wet paint inside it.
- Wipe excess paint from the can lid and can rim after opening.
- Cover cans of paint with a rag when closing a lid to prevent paint splattering.
- Clearly identify/label cans that have leftover paints.
- Do not leave or store paint solvents in paint cans. Return them to the flammable cabinet for storage.
- Ensure all drop sheets are flat on the floor while working to prevent tripping or other accidents.
- Never carry solvent soiled rags in pockets or leave bunched up or in an unventilated area.
- Read safety tips on manufacturer paint cans.
- Use ladders to reach high areas, not empty paint cans or chairs.
- Do not over-extend your reach when on a ladder. Move the ladder instead.
- Use proper extensions when reaching high areas.
- In order to lessen the strain on your back, use a bamboo stick or extension when painting floors.
- All paint should have flame-retardant added before any combustible scenery (wood/fabric) is painted.

9.0 Theater Stage Safety Procedures

9.1 Hours and Use of Production Facilities

- A technical supervisor must be present when lights are being rigged and struck.
- The technical director or a qualified member of the staff must be present when scenery is being built, rigged, moved, struck, or weights are being changed on any of the counterweight systems.
- The technical director or a qualified technical supervisor must be present for all technical rehearsals.
- All staff and students operating power or hand tools must have completed a safety orientation administered by a designated shop supervisor. The technical director must maintain records verifying completion of this training.

- All staff and students participating in crew must be given a theater safety orientation prior to the start of technical rehearsals. The technical director coordinates all safety training and maintains all associated records.
- Any injury requiring first aid or other medical treatment must be reported to the technical director immediately.
- Smoking is prohibited in all buildings on Reed College campus.
- Food and drink are prohibited in all theater and control booths.
- Report all unsafe conditions to a supervisor and to Environmental Health and Safety.

9.2 Ladder, Scaffold, & Lift Protocols

Ladders should be inspected frequently and maintained in good condition. They should be free from slippery materials. Defective ladders should be removed from service until they are repaired or replaced. When using ladders, provide as much light as possible in the working space. Treat both portable and permanent ladders in the same manner! NEVER WORK ALONE.

- Follow all safety rules as posted on the ladder (e.g.—if it cautions against using the top rung of a ladder, do not use it!).
- Never exceed the weight limit posted on the ladder.
- Be sure all ladders and lifts are properly stabilized before climbing. A-frame ladders should have all four legs securely resting on the floor and extension ladders must be tied to the surface on which they are leaning. All wheels of the scaffold should be locked when work is being done on them and no one should be standing on the top platform when it is being moved. Extension ladders must extend 3 ft. above the landing area and must be tied off.
- Always place ladders on stable bases – use a spotter if necessary.
- Make sure all locks on the ladder are secure before attempting to climb it.
- Always face the ladder when climbing up or down.
- Do not rush up and down a ladder – be sure of each step.
- Do not use a ladder as a brace, a workbench or for any purpose except for climbing.
- Always maintain three points of contact when climbing a ladder. (e.g.- two hands and one foot).
- Only one person is allowed on a ladder at a time.
- Do not have any unsecured tools or loose items on your person when in the air.
- Keep your center of gravity on the ladder/scaffold/lift. Do not take risks by leaning out too far into the air or by standing on the top step or on the guardrails.
- When painting from a ladder, do not over-extend your reach. Move the ladder instead.
- Have other workers warn you before they cause loud noises (routers, saws, etc.) The proper way for them to do this is to call “NOISE” before using a tool.
- If you drop something from above, yell “HEADS!” as loud as possible. If you are on the ground, and hear this call, run offstage while ducking and covering your head. DO NOT LOOK UP!

- Make sure everyone on the crew knows if you are in the air above him or her. Whenever possible, crews in the air and on the ground should not occupy the same two-dimensional space.
- If you use a ladder to get to a roof or platform, the ladder must extend 3 feet above the landing.
- Set a single or extension ladder with the base one-quarter of the working ladder height away from the support.
- Never use boxes or barrels to extend the reach of a ladder.
- Do not leave tools on a ladder.
- Never drop or throw tools to another worker.
- Do not carry heavy loads up a ladder.
- Tools must be secured to the worker or equipment with a safety line.
- Never leave paint or other materials on a ladder.
- Make sure all ladders are properly stored and secured when work is completed.

Lifts, Hazards, and Safe Working Practices

Any personnel lift equipment can be dangerous without proper training on its use. Use *Extreme Caution* before operating this system as damage to self and others, as well as property can occur. Visually inspect the personnel lift before use and alert the Technical Director of potential problems. Personnel lifts are professionally inspected annually.

All users must first be trained by the technical director or other appropriate supervisor. This supervisor is also responsible for maintaining record of this training.

- The unit must be used on a flat and level surface.
- All stabilizers (outriggers) must be properly extended and locked before entering the basket.
- Do not exceed the maximum load rating. This includes the operator and all equipment in the basket.
- Only one person is allowed in the basket.
- Do not operate the lift on an elevated platform, scaffold, truck bed, or extended platform.
- Do not climb, stand, or sit on the basket railings.
- Do not lean ladders against the lift. Never apply a side load force to the unit by pushing or pulling from the basket or by hanging heavy wires or cables over the side.
- Do not move the lift when the basket is raised.
- Do not operate near overhead electrical lines or obstructions.
- Do not stand under or near the loaded basket.
- Never attempt to use the lift without someone else present in the area.
- After use, coil the power cable and put it in the basket. Return the lift to its storage area.
- The use of fall protection is mandatory whenever working over 4 ft up on a lift truck or in the bucket of a lift truck.

Structural Platforms, Railings, Risers, Stages, Stairs, and Other Elevated Stage Equipment

- Where platforms, risers, or stages are permitted, they must be constructed in a secure and stable manner that allows no movement, and designed to support an anticipated load of at least 100 pounds per square foot.
- Acting platforms and stages higher than 36 inches must have a railing on all exposed sides.
- Safety railing systems must be constructed in a secure and stable manner that allows no movement. Railings must be designed at least 42 inches high above the platform or tread and capable of supporting an anticipated force of 200 pounds applied at any point, in any direction; cable or other non-rigid railings may show no more than 2” deflection under these test conditions. Railing systems must also have an upright support at least every 4 feet, a mid and top rail secured to the insides of the uprights, and the top rail surface must be smooth.
- Acting area stairs higher than 24 inches must have a safety hand railing on at least one side. Acting area stairs must be constructed in a secure and stable manner that allows no movement and capable of supporting an anticipated load of 200 pounds per tread.
- The edges of all stages, steps, and openings must be marked throughout the space.
- Scaffold type platforms, railings, risers, stages, and stairs must be constructed entirely from commercially available products.

9.3 Audio/Visual Equipment and Safe Working Practices

The use of audio/visual equipment in the theater is accompanied by the risk of electric shock, burns, and physical injury from contact with the hot metal, glass, electrical connectors and cables, both hanging and on the floor. Do not use or handle any audio/visual equipment without proper training and authorization.

- The rigging of audio/visual equipment is to be done only under staff supervision.
- All electrical, floor, hand tool, ladder, lift, lighting, low light level, noise level, obstruction, orchestra pit, overhead work area, and rigging rules apply while working with audio/visual equipment.
- All electrical repair work is only to be performed by trained and qualified staff employees.
- All audio/visual cables in working and walking areas are to be properly dressed and taped down.
- Return unused equipment, cable, and accessories to proper storage areas when work is complete.
- Clean up electrical equipment and accessories from stage and sound rooms at the end of any call or working period.
- Store equipment in appropriate cabinets and rooms designated for audio/visual equipment.
- Report any damaged equipment to the supervisor; tag and remove all damaged equipment from circulation.
- Report any hazards to the supervisor immediately.
- Safety cables are required on all hanging audio/visual equipment.

9.4 Electricity and Lighting Equipment

Electricity is present everywhere in the shop and stage areas. The risk of electric shock is present at all times due to the constant changes in work areas, lighting positions, and heavy use of electrical equipment and accessories.

Electricity Hazards and Safe Working Practices

- Only trained and qualified staff employees will perform electrical work.
- Only trained and qualified staff employees will perform electrical repair work.
- Only trained lighting crewmembers will perform electrical rigging.
- All electricity must be de-energized and locked out before work is performed.
- Only properly grounded tools, cords, and equipment may be used.
- Check all equipment and cords for damage before use.
- Remove damaged equipment from use and notify the supervisor.
- Be alert for extension cords on the floor and in work areas.
- Do not overload extension cords; use one tool per cord.
- Be aware of overhead and floor mounted lighting fixtures and power cables in stage areas.
- All shop, stage, ladder, lift, and rigging rules apply to electrical safety.
- Heat resistant, insulated gloves should be worn when focusing lighting equipment or changing lamps.
- Safety lines should be attached to wrenches and tools when working overhead.
- Hard hats must be worn when persons are working overhead.
- Exposed asbestos wires are not allowed in any theater on campus.
- Rings, jewelry, watches, etc. should not be worn when working with lighting equipment. Do not use cell phones or portable music players during this process.
- Do not overload theater circuits; see technical director for questions on proper amperage levels.
- In lighting installations, ask the supervisor first to ensure that the proper wire and cable sizes and types are always used.
- Use the shortest extension cable possible.
- Never coil or wrap cable around pipes, raceways, or drop boxes.
- Do not use fiberglass sheathed in floor positions.
- All lighting equipment must have a safety cable. Attach first, disconnect last.
- Top hats and barn doors must be attached to the lighting equipment's safety cable.
- Dry your hands completely before touching electrical switches, plugs, or receptacles.
- **Notify your supervisor immediately of any hazardous electrical condition.**

Lighting and Electrical Devices

- Lighting and electrical devices must be commercially available, plug-based products that require no field wiring. All electrical devices must be Underwriter's Laboratory (UL) approved and tagged. A licensed electrician must perform any actual wiring.

- All electrical extension cords must be fully insulated, with three prong grounded connectors. Lightweight “zip cords” and flat wire cords are not allowed.
- Lighting, sound equipment, and rigging may not be affixed to fire sprinkler pipes, nor may cables or equipment be run through or across aisles or exit ways.
- Any floor-run temporary wire or cable runs must be securely taped to the floors or walls.
- Theatrical lighting and sound equipment must have safety cables through the equipment and secured around a yoke to the supporting structure.
- Light fixtures without lenses must have a safety screen or gel securely fastened to the lighting fixture to protect the exposed lamp.
- Lighting equipment and all other rigging over the audience seating area is highly discouraged. Where used, lighting towers must be secured at the top, bolted to the floor, and secured or sufficiently weighted at the bottom to prevent falling. Strobe lights may only be used in a production if their use is described on all posters, programs, and publicity announcements and also directly to the audience during the pre-show public announcement. This is to ensure that audience members with certain pre-existing ocular or neurological conditions will be aware of pending strobic light.

Lighting Positions

- Check all equipment and cords for damage before use.
- Do not overload dimmers or extension cords.
- Only 12-3 wire and cable may be used in theatrical lighting installation.
- Use the shortest extension cable possible.
- Gloves should be worn when focusing lighting equipment or changing a lamp.
- Theater circuits are rated at 20 amps - DO NOT OVERLOAD.
- All lighting and electrical equipment must have a functioning safety cable attached.
- Top-hats and Barn-doors must be attached to the lighting equipment with safety cables.
- Lighting gels, filters, patterns, and gobos must be properly installed in a holder and be made out of appropriate materials made for lighting usage. Other materials may overheat and may be a fire hazard.
- Return unused gel, cable, lights, and accessories to proper storage areas when work is finished.
- Unplug lighting instruments before changing lamps.
- Use test lamps when checking light plugs.
- When using strobe lighting in a performance, warnings should either be posted in the program or on the entrance door, or should be announced prior to the beginning of the show.
- Employees must be trained before being authorized to work with lighting circuitry, dimmers, and instruments.

Low Light Level Hazards and Safe Working Practices

Low light levels are present when lighting equipment is being focused during rehearsals, as well as performances. Extreme caution should be used in these conditions as vision is greatly impaired. Blackouts may occur at any time.

- Use caution in low light level situations.
- Sound off when stage lights are going to black.
- Know where flashlights are kept and use them when necessary.
- Stop all hazardous activity during low light levels.
- If a blackout occurs and nothing is visible, stop immediately. Sound off and wait in place for assistance.
- Provide running lights for major pathways whenever possible, being careful not to run cords across any walkways.

Noise Level Hazards and Safe Working Practices

Loud noise levels are present both in the shop and on stage. These noises come from machine tools as well as theater sound systems. Prolonged exposure to loud and continuous levels of noise can severely damage or impair one's hearing.

- Wear ear protection when operating or in the vicinity of loud machinery and tools.
- Wear ear protection when exposed to loud and prolonged sound from theater audio systems. Ear muffs and plugs will be made available by the technical director or other appropriate supervisor.

Obstructions, Hazards and Safe Working Practices

Many obstructions are present in the shop and theater work areas. These hazards include, but are not limited to, overhead wires, cables and scenery, flexible work areas, temporary storage of scenery, materials and settings, and various floor obstructions as stated above. Extreme caution should be used in all work areas.

- Be aware of changes in working areas.
- Use caution when moving objects in, around, and out of the stage and shop areas.
- Clean up and properly store all tools, materials, and scenery when finished with a project.
- Mark off and alert others of temporary obstructions.
- Do not block aisles, hallways, fire exits, doorways, fire doors, fire equipment, or electrical panels.
- Notify the shop supervisor of any unsafe conditions immediately.

Overhead Work Areas, Hazards and Safe Working Practices

There are many overhead work areas in the theater environment including areas in and around the shop, on stage, and in the auditorium. These areas include: ladders, lifts, platforms, grids, and catwalks. There is always a chance that something or someone may fall from an overhead work area. Be cautious when working overhead as well as below.

- Sound off when working overhead.
- Hard hats are required below when overhead work is in progress.
- A minimum of two people will always be present when the catwalks are occupied.
- No span of catwalk will have more than three people on it at any one time.

- OSHA compliant ladders or lifts will be provided to the persons accessing the underside of the catwalk hanging positions. Lighting hanging on these positions can not be focused or hung from the catwalk walking surface.
- All tools and equipment in use on the catwalks to be attached to the person working with them by a suitable lanyard.
- All pockets to be cleared of loose objects before going out on the catwalks.
- Stay inside catwalks and railings when working overhead.
- Sound off if something is dropped when working overhead.
- If one does not feel safe working at heights, the supervisor should be informed.
- Do not drop objects from any height over four feet; lower them down with a rope.
- Empty unsecured objects from pockets before climbing onto the grid or catwalks.
- Do not look up if someone sounds off. A hard hat will not protect one's face or teeth.
- Use safety lines at all times when working in unprotected areas.
- Do not leave unsecured tools or materials unattended in overhead work areas.

Hanging and Focusing Lighting Equipment

- Catwalks are equipped with railings built to regulations to protect from falls. Catwalk railings should never be removed unless alternative fall protection is employed. It is the responsibility of the Technical Director to ensure the safety of the catwalk.
- Catwalks often hold other dangers including low light levels, trip hazards, and low-hanging beams/ducts. Always use extreme caution. Hard hats are available for use when working on the catwalk.
- Scaffolding is sometimes used for theatrical work, specifically for hanging and focusing lighting equipment. OSHA standard 29 CFR 1910.28 applies strict requirements for the use of scaffolding. It is the responsibility of the Technical Director to ensure work on scaffolding is done safely and correctly and scaffolding must be inspected before use.
- When working in the lighting grid, personal fall arrest systems should be used.
- When hanging and focusing lighting equipment, all pockets should be emptied before work is done. Tools should be secured to the worker or lift with safety lines.
- Tighten all bolts before taking your hands off a lighting instrument. However, do not over tighten. This could possibly bend the bolts and lessen their strength.
- NEVER put a lighting instrument up without a safety cable.
- Hang instruments properly, so that gel-frames and other accessories may be safely used. (Know which way is up).
- Do not play with live wires or cables. Always disconnect power before working on any sort of line or fixture that uses electricity. UNPLUG THE FIXTURE BEFORE UNHANGING IT AND/OR CHANGING ITS LAMP. If you are unsure if a cable is live, trace it back to its other end and ensure it is unplugged.
- If an instrument needs repair, speak to the Technical Director before repairing it.

Chemicals, Hazards and Safe Working Practices

- Many solvents, adhesives, enamel, spray paints, and styrofoam are used in the scene shop and stage areas. Many of these chemicals produce toxic vapors and gasses and

are extremely flammable. Consult the safety data sheet (SDS) for proper handling and hazards of each specific chemical.

- Know what you are working with. Read the SDS on each chemical before using it.
- Make sure local exhaust ventilation is turned on.
- Wear the proper protective clothing and equipment for the job.
- Prevent ingestion of chemicals. Wash hands frequently. Do not eat, drink, smoke, or apply lip balm around chemicals.
- Keep the workplace clean and free of debris.
- Solvents such as paint thinner, lacquer thinner, alcohol, and acetone must be used in conjunction with a respirator and the spray hood.
- Spray paints must be used in conjunction with a respirator and the spray hood. See shop supervisor for disposal of empty spray cans.
- Protective gloves must be worn when handling chemicals, including dry ice. If gloves or any other personal protective equipment, including respirators, do not fit properly, or become damaged, contact supervisor, immediately discard the damaged equipment and replace it with new, clean equipment. Damaged PPE should never be reused for any reason.
- Eye protection must be worn when handling chemicals, including dry ice.
- Smoking or an open flame is not permitted when working with chemicals.
- In case of a chemical spill, notify the shop supervisor, Community Safety and Environmental Health and Safety.
- Waste chemicals must be disposed of properly. See the shop supervisor or the Environmental Health and Safety for questions on proper disposal.
- Flammable chemicals are to be stored in safety cans and in properly labeled flammable storage cabinets.

Floors, Hazards and Safe Working Practices

Floors in the shop and stage areas are often covered with many hazards and obstructions due to flexible work areas in the building. Some of the floor hazards associated with the floor include, but are not limited to: open traps in stage floor, wet floors due to painting and spills, obstructions including tools, power cords, air hoses, materials, and scenery.

- Stay alert to changes in work conditions.
- Clean up spills as they occur.
- Do not leave open traps unattended. Install railings and mark with “Caution” or “Danger” signs and/or tape.
- Clean up tools, materials, and obstructions when finished with a project or when leaving it for an extended period of time.
- Mark and block off entrances to wet painted floor areas.
- Put away cords and hoses when the job is complete.
- Do not block aisles, hallways, fire exits, doorways, fire doors, fire equipment, first aid kits, or electrical panels.
- Notify the shop supervisor of any unsafe condition immediately.

Appendix 1: Glossary of Terms

Acute: Acute exposures and effects involve short-term high concentrations and immediate results of some kind (illness, irritation, or death). The effect of a chemical is considered acute when it appears with little time lag, such as within minutes or hours.

Dust: Airborne particles with weight and mass that are generally larger in size than the particles in fumes. Dust particles within a respirable size (1-10 microns) represent a health problem via inhalation. Dust cannot be seen by the naked eye, but may be visible when viewed through rays of light. Dust can be generated by handling, crushing, grinding, rapid impact, detonation, and breakdown of certain organic or inorganic materials (especially rocks, metal, wood and fibers). Dust is different from vapors and mists—it is composed of solid particles, each of which consists of a large number of atoms or molecules of a material that is not normally volatile.

Ergonomic Hazards: Workplace conditions that place workers at increased risk of developing a musculoskeletal injury or which otherwise increase the likelihood of other work performance problems. Some examples of ergonomic hazards are lifting or extended work in one position (drawing, computer work, etc.)

Flash Point: Lowest temperature at which the vapor of a liquid or solid ignites when in contact with sparks, flames, or other ignition source.

Hazard: A situation or chemical that may present the potential for harm.

Health Hazard: Pertains to a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.

Hazardous Substances: Any substance which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any person will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions or physiological deformations in such persons or their offspring. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive.

Health Risk Assessment: A document that identifies the risks and quantities of possible adverse health effects that may result from exposure to emissions of toxic air contaminants. A health risk assessment cannot predict specific health effects; it only describes the increased possibility of adverse health effects based on the best scientific information available.

Safety Data Sheets (SDS): A SDS contains information on the hazards associated with a chemical or product, and gives information on its safe use. SDS are available and should be read before use of any new materials. Previously these were called **Material Safety Data Sheets (MSDS)**.

National Institute of Occupational Safety and Health (NIOSH): The federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH is part of the Centers for Disease Control and Prevention (CDC) in the Department of Health and Human Services.

PPE: (Personal Protective Equipment) refers to whatever protective equipment may be used to insulate an individual from the chemical, thermal, explosive or other hazards presented by the environment in which he or she is working, i.e. safety glasses, laboratory coat, protective shoes, chemical-resistant gloves, etc.

Risk: Is the probability or chance that the hazard posed by the chemical or situation will lead to injury.

Risk Assessment: A process that estimates the likelihood that exposed people may have health effects.

- Hazard Identification: Can this substance damage health?
- Dose-response Assessment: What dose causes what effect?
- Exposure Assessment: How and how often do people contact the substance?

Risk Factors: something that puts an individual at a greater risk, specifically for diseases or infections. Below are some of the most common risk factors:

- Amount of exposure
- Length of exposure
- Multiple exposures
- Exposure conditions
- Toxicity
- Total body burden
- High-risk groups:
    - Smokers
    - People taking medications
    - People with allergies
    - People who have pre-existing medical conditions
    - Pregnant women

Appendix 2: Communicating Chemical Hazards

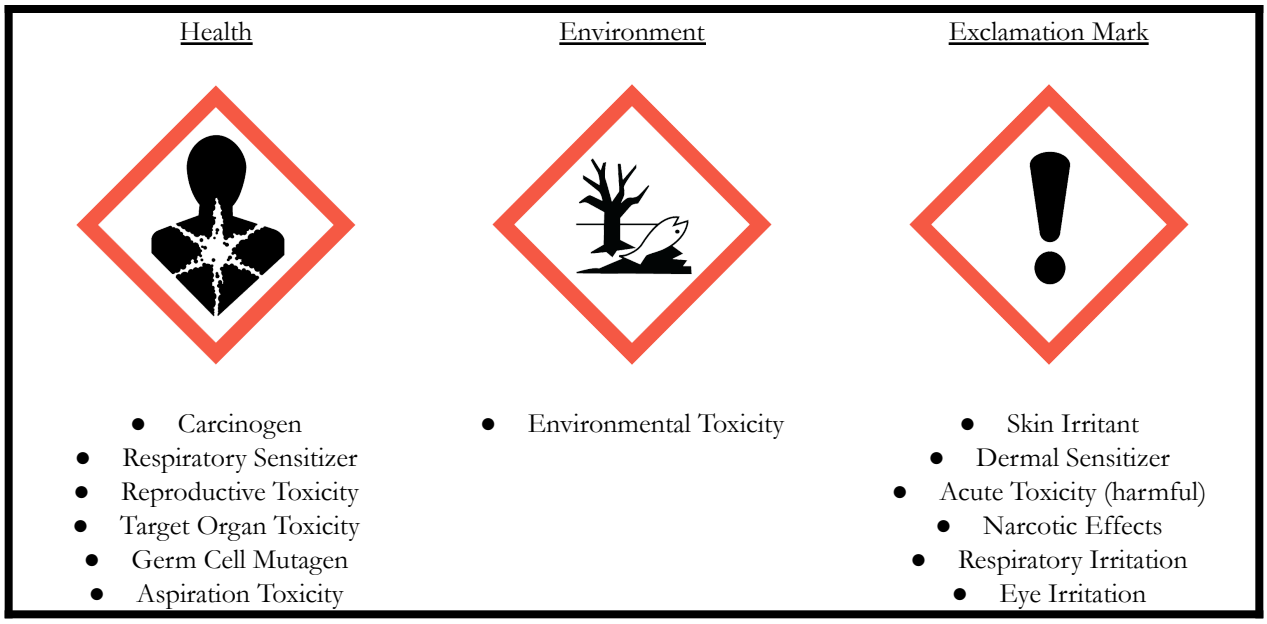
In 2012, the Occupational Safety and Health Administration (OSHA) updated the Hazard Communication Rule, 29 CFR 1910.1200. The changes standardize the content of safety data sheets (SDSs) and require the use of pictograms, signal words, and statements that identify hazards and precautions.

The SDS 16-Section: Format

- Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.
- Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.
- Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.
- Section 4, First-aid measures includes important symptoms/effects, acute, delayed; required treatment.
- Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.
- Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.
- Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities
- Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).
- Section 9, Physical and chemical properties lists the chemical's characteristics.
- Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.
- Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.
- Section 12, Ecological information
- Section 13, Disposal considerations
- Section 14, Transport information
- Section 15, Regulatory information
- Section 16, Other information, includes the date of preparation or last revision preparation or last revision.

Pictograms and Hazard Classes

Flame Over Circle	Flame	Exploding Bomb
		
• Oxidizers	• Flammables • Self Reactives • Pyrophorics • Self-Heating • Emits Flammable Gas • Organic Peroxides	• Explosives • Self Reactives • Organic Peroxides
Skull and Crossbones	**Corrosion**	**Gas Cylinder**
		
• Acute toxicity (severe)	• Corrosive to Metal • Skin Corrosion • Serious Eye Damage	• Gases Under Pressure • Liquefied Gas



Labels

All labels from manufacturers must have the following information:

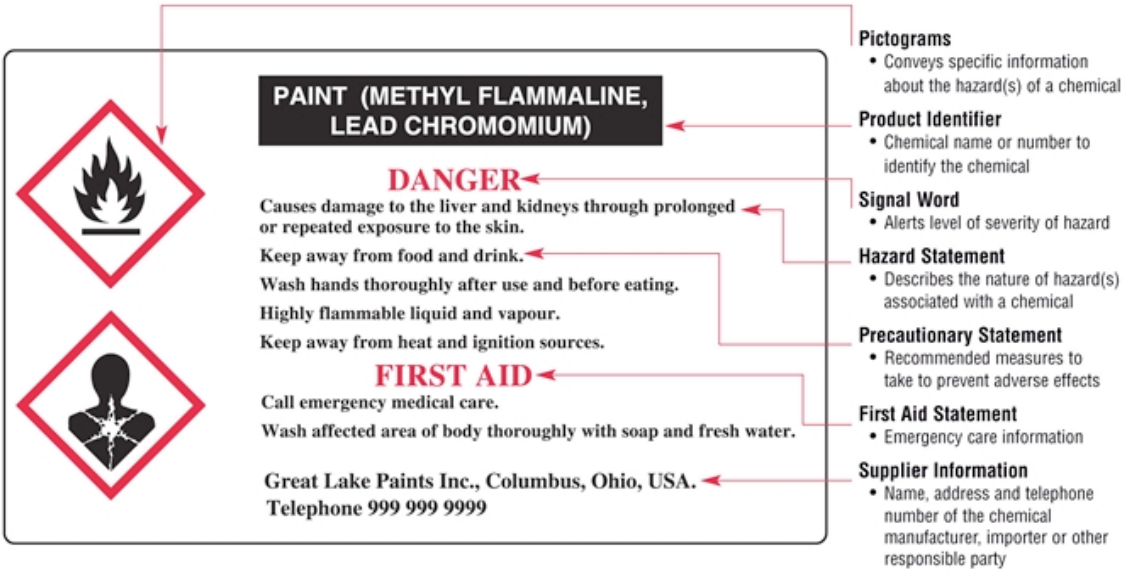
- pictograms,
- a signal word: either “danger” or “warning”
- hazard statements that describe the physical, health, and/or environmental hazards.
- precautionary statements that describe measures to minimize or prevent adverse effects.

There are four types:
Prevention - “Wash thoroughly after handling. Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Do not eat, drink, or smoke when using this product.”
Response - “If swallowed: Immediately call a poison center/doctor Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Specific treatment (see on this label) Reference to supplemental first aid instruction. - if immediate administration of antidote is required. Rinse mouth.”
Storage - “Store locked up.”
Disposal - “Dispose of contents or container to… in accordance with local, regional, national, international regulations (to be specified).”

For example, for a product identified as acutely toxic – oral, we would see the following:

- the product identifier
- supplier identification.

A sample label, identifying the required label elements, is shown below. Supplemental information can also be provided on the label as needed.


PAINT (METHYL FLAMMALINE, LEAD CHROMOMIUM)
DANGER
Causes damage to the liver and kidneys through prolonged or repeated exposure to the skin.
Keep away from food and drink.
Wash hands thoroughly after use and before eating.
Highly flammable liquid and vapour.
Keep away from heat and ignition sources.
FIRST AID
Call emergency medical care.
Wash affected area of body thoroughly with soap and fresh water.
Great Lake Paints Inc., Columbus, Ohio, USA.
Telephone 999 999 9999
Pictograms
• Conveys specific information about the hazard(s) of a chemical
Product Identifier
• Chemical name or number to identify the chemical
Signal Word
• Alerts level of severity of hazard
Hazard Statement
• Describes the nature of hazard(s) associated with a chemical
Precautionary Statement
• Recommended measures to take to prevent adverse effects
First Aid Statement
• Emergency care information
Supplier Information
• Name, address and telephone number of the chemical manufacturer, importer or other responsible party