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**SAFETY MANUAL FOR THE  
EMPLOYEES  
OF**

**TEXAS A&M UNIVERSITY  
KINGSVILLE**



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## PRESIDENT'S STATEMENT

**W**elcome to Texas A&M University-Kingsville! Your skills, talents and knowledge are vital to the university's commitment of fulfilling our mission. A vital part of our mission is to provide a safe and healthy working environment for all employees. The Office of Environmental Health & Safety, under the Department of Occupational & Risk Management, has been charged with the oversight of the university's Environmental Health & Safety Programs. This office is also responsible for providing educational programs, technical assistance and on-site consultation services to the university's departments to ensure environmental and safety compliance.

This book is intended for all university employees; faculty, staff, full time, part time, student worker and all other TAMUK employment categories. It has been developed to provide you, the employee, with general safety information you should know about your workplace, answers to general questions you may have regarding your workplace and your rights and responsibilities pertaining to your work area.

There will always be some potential of a work related incident occurring in any position at the university, however, most work related incidences can be avoided through proper training, proper supervision, proper planning and proper work practices. It is very important that you and your supervisor discuss job-specific procedures and the training necessary to perform your specific job duties.

Each employee is ultimately responsible for his or her own personal safety, but by working together to understand and practice appropriate safety procedures, Texas A&M-Kingsville will become a safer place to work.

Dr. Steven H. Tallant  
President 2015

A handwritten signature in blue ink that reads "Steven H. Tallant".

**SECTION  
1****RESPONSIBILITIES FOR HEALTH & SAFETY AT TAMUK**

Prudent environmental health and safety practices are the responsibility of each and every employee. Each employee is expected to incorporate applicable safety measures and environmentally friendly practices into their daily job assignments. These two elements will assist in achieving and/or maintaining effective EHS requirements.

**1.1 EMPLOYEES**

Within your department, you are responsible for:

- Performing all jobs in the safest manner possible and in accordance to instructions, applicable policies and rules, and department procedures.
- Wearing or using the prescribed Personal Protective Equipment (PPE).
- Reporting workplace hazards to your supervisor.
- Immediately reporting work related injuries to your supervisor.
- Refraining from operating any equipment without first receiving the proper instructions, training, and authorization.

**1.2 SUPERVISORS**

Within their department, supervisors, are responsible for ensuring a working environment free from recognized hazards. The specific EHS requirements are as follows:

- Ensure new employees receive the proper training and instructions for their work assignments.
- Ensure that the required PPE is available, maintained, and used.
- Promoting Health and Safety Policies.
- Controlling or eliminating occupational hazards and taking prompt action when hazards are reported.
- Providing applicable safety training on a continuing basis.
- Reporting all work-related injuries promptly and initiate injury investigation.
- Ensuring that budget requests for necessary safety equipment or safety improvements have been submitted.

### 1.3 ENVIRONMENTAL HEALTH & SAFETY OFFICE

The Environmental Health & Safety Office is responsible for managing the university's Environmental Health and Safety (EHS) Programs. The goal of this office is to provide a safe campus environment to all employees, students, and visitors alike.

Services provided by the Environmental Health & Safety Office and its responsibilities for the EHS programs include but not limited to the following:

- Monitor and ensure safety regulation compliance .
- Manage university's hazardous waste program.
- Develop EHS procedures and/or protocols.
- Disseminate information to the university community regarding EHS programs and TAMUS policies.
- Collect information from various departments for required State reports.
- Assist departments in eliminating work-related hazards.
- Assist departments with safety training requirements.

### 1.4 UNIVERSITY ADMINISTRATION

Directors, chairs, deans, and university administrators have primary responsibility for:

- Providing the facilities, equipment and funding required for a safe work environment.
- Review and approve Health and Safety Policies and protocols.
- Ensuring the health and safety of their staff and students.
- Implementing approved Health and Safety Rules and protocols.
- Correcting safety deficiencies by establishing priorities and committing resources.
- Establishing methods for disseminating safety information and policies.
- Establishing criteria for implementing safety policies and protocols.
- Establishing a system for safety accountability.

**END OF SECTION**

## INCIDENT REPORTING PROCEDURES

### SECTION

# 2

An incident is an unplanned occurrence that resulted or **could have resulted** in injury to people; damage to property; equipment; or the environment. When incidents are reported promptly, injured persons receive timely medical care, and unsafe conditions receive prompt corrective action. The Environmental Health & Safety Office assists departments in investigating work related incidences to identify incident trends, effectiveness of current safety programs, and to prevent similar incidences from occurring.

### 2.1 EMPLOYEE RESPONSIBILITIES

Employees must report any work related injury or incident to their supervisor **immediately** upon occurrence. Depending upon the severity of the work related injury, employees may need to seek medical attention immediately. In cases such as this, the injured employee's supervisor must receive knowledge of the incident as soon as possible. For work related injuries not requiring immediate medical attention, the injured employee's supervisor must have knowledge of the incident prior to the employee leaving the premises.

### 2.2 SUPERVISOR'S RESPONSIBILITIES

Supervisors must report any work related injury or incident to the Office of Human Resources by means of a completed Incident Report, signed by the department head, within 24 hours of occurrence. The supervisor shall assist the EHS Manager in conducting an injury investigation.

### 2.3 OFFICE OF HUMAN RESOURCES' RESPONSIBILITIES

The Office of Human Resources is responsible for preparing all required paperwork and submitting it to the System's Risk Management and Safety Office. The Office of Human Resources will work with the injured employee to ensure they receive their Worker's Compensation benefits until they return to work. A copy of the Incident Report shall be sent to the Environmental Health & Safety Office.

### 2.4 ENVIRONMENTAL HEALTH & SAFETY MANAGER'S RESPONSIBILITIES

The EHS Manager is responsible for reviewing the Incident Report and collecting all necessary information causing the incident. The EHS Manager will work with the supervisor and the department to implement corrective measures to avoid similar incidents from occurring.

**END OF SECTION**

## SECTION

## 3

**OFFICE SAFETY PROCEDURES**

Much of the work at Texas A&M University Kingsville is clerical or office related; and, although you may work in an office, you are exposed to many hazards. Some common causes of office incidents include the following:

- Slip, trip, fall, hazards
- Improper lifting and handling procedures
- Improper electrical outlet usage
- Improper electrical cord placement
- Improper office furniture layout
- Improper housekeeping practices
- Cutting and pinching hazards
- Horseplay

**3.1 GENERAL OFFICE SAFETY PRACTICES**

A large percentage of work related injuries occur in office buildings. Prudent housekeeping in the office is a must. Like the shop employees, or laboratory employees, office employees must also use good judgment and preventive measures to ensure a safe and healthy work environment. Some common office practices that should be adhered to are as follows:

**Proper Housekeeping Practices**

- Keep your desk and cabinets clean and orderly.
- An open drawer of a desk or filing cabinet is a hazard which can cause you or others to trip and collide.
- Keep walk ways clear from electrical cords, phone cords, and other objects to prevent slip, trip, fall hazards.
- Clean spills and pick up debris immediately. Liquid spills and even a rubber band can cause a serious falling injury.
- Secure throw rugs and mats to prevent slipping hazards.
- Report tripping hazards such as defective tiles, carpet or boards.
- Store items in appropriate storage space. Do not stack boxes to high.

### 3.3 FILE CABINETS AND SHELVES

File cabinets and shelves usually support heavy loads and a work related injury could result if proper procedures are not followed. Follow these safety guidelines for file cabinets and shelves:

#### FILE CABINETS

- The standard four drawer filing cabinet can tip as a result of opening a heavily loaded top drawer which could result in serious injury. When lower drawers are empty or filled with light weight material, open only one drawer at a time.
- Fasten file cabinets to the wall or floor if possible.
- Store heavier items in the bottom drawers. This will help stabilize the cabinet.
- Close drawers when not in use.
- Use the handles when closing file drawers, desk drawers, and doors.
- Never climb on the cabinet - use a ladder.
- Do not block ventilation grills with cabinet.

#### BOOKCASES

- Fasten shelves to the wall or floor if possible.
- Store heavier items on the bottom shelves. This will help stabilize the entire structure.
- Do not store heavy or bulky objects on the top of the structure.
- Never climb on the shelves.
- Do not block ventilation grills with bookcase.

### 3.4 DESKS AND CHAIRS

Desks and chairs can be found in every office on campus. One would not think that these items could be hazardous, but if they are used improperly these items can cause serious injury. Follow these safety guidelines for office furniture:

#### DESKS

- Ensure that desks do not block thorough fairs.
- Keep desks in good condition and free from sharp edges, nails, etc.
- Keep desk drawers closed when not in use.
- Do not climb on desks - use a ladder.

#### CHAIRS

- Do not lean back in office chairs, particularly swivel chairs with rollers.
- Do not use defective chairs.
- Do not roll chairs over electrical cords.
- Do not climb on chairs - use a ladder.



### 3.5 OFFICE EQUIPMENT AND OFFICE MACHINES

Most office equipment and office machines have been designed with a high degree of safety factors, however the users of this equipment still need to be aware of the following safety guidelines:

- Use machines and equipment only after you know how to operate them. Ask your supervisor for instructions if you are unfamiliar with the proper usage of the equipment.
- Do not place machines or equipment near the edge of a table or desk.
- Ensure that all required guards are in place.
- Do not use any machine that smokes, sparks, or appears defective.
- Close hand-operated paper cutters after each use and activate the guard.
- Always unplug electrical equipment prior to conducting maintenance, repair or troubleshooting.
- Avoid wearing loose, hanging clothes, scarves, ties, jewelry, or loose hair around machinery with moving parts.

### 3.6 OFFICE ERGONOMICS

With the extensive use of computers and other automated desk equipment, employees must take special care to ensure proper work station layout and proper work practices. Office ergonomics encompasses the relationship of the employee's work station layout to their work practices. Proper office ergonomics customizes the employees work practices to their work station to obtain a safe and desirable outcome.

In recent years, computer screens or Video Display Terminals (VDT's) have received much attention concerning non-ionizing radiation levels. Tests prove, however, that VDT's do not cause adverse health effects due to harmful levels of radiation. However, improper work station arrangement combined with repetitive motion may contribute to visual and musculoskeletal injuries.

### 3.7 WORK BREAKS

Cumulative trauma disorders, such as carpal tunnel syndrome may result from the stress of repetitive motion. To reduce stress and minimize the risk of cumulative trauma disorders, employees are encouraged to take breaks throughout the day. Work breaks can be grouped into three categories: **micro-break**, **mini-break**, **macro-break**.

- **Micro-breaks** are when the employee looks away from the VDT and focuses on a distant object for 10 to 20 seconds.
- **Mini-breaks** are when the employee performs stretching exercises at their desk.
- **Macro-breaks** are when the employee leaves the work station and walks around for a few minutes and changes tasks every couple of hours.

### 3.8 STRETCHING EXERCISES

Along with taking a combination of breaks, employees are also encourage to conduct stretching exercises at their work stations, which include the following:

- **Head and Neck Stretch:** Slowly turn your head to the left, and hold for 3 seconds. Slowly turn your head to the right, and hold for 3 seconds. Drop your chin gently towards your chest, and then tilt it back as far as you can. Repeat all steps 5 to 10 times.
- **Shoulder Roll:** Roll your shoulders forward and then backward using a circular motion several times
- **Upper Back Stretch:** Grasp one arm above the elbow, **gently** twist your body while pulling towards the other shoulder. Hold this position for five seconds. Repeat with the other shoulder.
- **Wrist Wave:** With your arms extended in front of you, raise and lower your hands several times.
- **Finger Stretch:** Make fists with your hands and hold tight for one second, then spread your fingers wide for 5 seconds.

### 3.9 EMPLOYEE'S POSITION

Along with taking breaks and doing stretching exercises, your work area layout is just as important in reducing the risks of cumulative trauma disorders. To reduce the painful effects of repetitive motion, follow the guidelines when working with computers or typewriters:

- Always sit up straight. Make sure your chair is adjusted to provide adequate support for your back.
- Place your feet flat on the floor or on a footrest. Lower legs should be approximately vertical and thighs should be approximately horizontal. The majority of your weight should be on the buttocks.
- Ensure that there is at least 1 inch of clearance between the top of your thighs and the bottom of the table or desk.

### 3.9 EMPLOYEE'S POSITION (CONT.)

- Keep wrists in a natural position. They should not rest on the edge of the table or desk while typing.
- Wrist watches or jewelry should be loose enough to allow placement of one finger between the wrist and the watch or jewelry.
- Never twist your body when reaching for items such as books or folders; instead, move or rotate your chair.
- Arrange your work area to where the most frequently used items, such as books or folders are easily within reach .

### 3.10 WORK AREA LAYOUT

By properly arranging your equipment, you can also help reduce the harmful effects of repetitive motion. Follow these guidelines for arranging office equipment:

#### **Lighting:**

- Lighting around computer stations should illuminate the work area without obscuring the VDT or causing glare. Position VDT screen shades, blinds, and pictures to reduce the glare on the VDT. If possible the VDT should be at a 90° angle to the window.

#### **VDT Screen:**

- To place the VDT at the proper distance, conduct the following: While sitting in front of the VDT, place your palm flat on the VDT screen. Your arm should be straight and not bent.
- VDT images should be clear and well-defined. Adjust the screen's brightness, contrast and display size to meet your needs. If a screen flickers or jumps, have it repaired or replaced.

#### **Keyboards**

- Raise or lower the computer keyboard so that the angle between the forearm and upper arm is between 80 and 120°.

#### **Wrist Supports**

- The use of rolled up towels or padded wrist supports, is recommended. Your wrists should remain in the neutral position while you are typing.

#### **Document Holders**

- Keep documents at approximately the same height and distance from you as the VDT screen.

#### **Telephones**

- Telephones can literally become a "pain in the neck" by holding the phone with your shoulder for extended periods of time. A speaker phone or hands-free headset is recommended if you use the telephone for extended periods of time.

**3.11 ADDITIONAL SAFETY PRACTICES**

It is impossible to list and describe all safety hazards that could exist in the office. However, employees can ensure that their work area is as safe as possible by following these additional safety practices.

- Carry pencils, pens, scissors, etc., in such a way that a sharp end cannot cause puncture wounds to you or others.
- When using stairways, take your time, use handrails and do not carry more than you can safely handle.
- Do not stand and talk in front of a closed door that may be opened suddenly.
- Use a ladder and not makeshift boxes, cabinets, etc. for reaching higher objects.
- When walking in hallways, keep alert, and keep to the right especially at corners.

**END OF SECTION**

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**SECTION**  
**4**

**FIRE & LIFE SAFETY PROCEDURES**

Fire and life safety involves numerous safety issues including fire prevention, fire suppression, emergency response and emergency evacuation. Fire and life safety is everyone’s responsibility at Texas A&M University-Kingsville. It is everyone’s responsibility to become familiar with his or her work area; identify at least two exits and identify the locations of the emergency fire extinguishers.

**4.1 FIRE PREVENTION**

The best protection against property loss and injury from fire is prevention. If you are involved in an emergency fire situation on the campus of Texas A&M-Kingsville, implement the five-step FIR(E<sup>2</sup>) procedure.

<p><b>F</b> <b>(Find)</b></p>	<p>If you see or smell smoke, investigate. You should try to determine the extent of fire (wastebasket, or entire wing of building, etc.), the type of fire (paper, grease, electrical, etc.), and location of fire.</p>
<p><b>I</b> <b>(Initiate)</b></p>	<p>Alert the people in the vicinity of the danger as quickly as possible. Pull the fire alarm station and ask other people to assist in the evacuation of the building. <b>NEVER TRY TO CONTROL A FIRE BEFORE OTHER PEOPLE IN THE BUILDING AND UPD HAVE BEEN NOTIFIED.</b></p>
<p><b>R</b> <b>(Report)</b></p>	<p>Instruct someone to call UPD at extension 2611. If you are alone, call UPD prior to any attempt at extinguishing the fire. Dial 2611 and give UPD the following information:</p> <ul style="list-style-type: none"> <li>• Building Name</li> <li>• Floor</li> <li>• Room Number</li> <li>• Type of Emergency</li> </ul> <p>UPD will notify the Kingsville Fire Department</p>
<p><b>E</b> <b>(Extinguish)</b></p>	<p>Attempt to extinguish the fire only if it is small enough to be contained <b>AND</b> you have been trained to operate the extinguisher. Place yourself between the fire and an exit when using an extinguisher to prevent being trapped.</p>
<p><b>E</b> <b>(Evacuate)</b></p>	<p>If the fire can not be extinguished, <b>EVACUATE!</b> Use stairways to exit the building. Do not use elevators. As you exit the building, close as many doors as possible.</p> <p>Once outside, proceed to your evacuation assembly area; and contact your Building Emergency Manager for further information.</p>

## 4.2 EMERGENCY ACCESS AND EGRESS

Emergency access and egress are critical during an emergency situation. During a fire, timing and quick response are essential to save lives and property. Effective emergency access ensures that fire trucks can reach a building in time to extinguish the fire. Unobstructed emergency egress ensures that building occupants can exit a building to safety.

- **Emergency Access:**

Pertinent facilities and equipment remain available and unobstructed at all times to ensure effective fire detection, evacuation, suppression, and response.

- **Emergency Egress:**

A continuous and unobstructed way to travel from any point in a public building to a public way. A means of egress may include horizontal and vertical travel routes, including intervening rooms, doors, hallways, corridors, passageways, balconies, ramps, stairs, enclosures, lobbies, courts, and yards.

**Note:**

**Each location within a building must have a clear means of egress to the outside.**

## 4.3 CORRIDORS, STAIRWAYS AND EXITS

An exit corridor is the quickest, easiest, and most direct pathway for leaving a building. The corridor includes all doors, hallways and stairways leading to an outside exit. Because exit corridors are the primary means of egress during an emergency, building occupants must follow the safety guidelines outlined in this section.

- Keep all means of egress clean, clutter-free, and unobstructed.
- Do not block routes of egress.
- Do not use corridors or stairways for storage or office/laboratory operations. Corridors may not be used as an extension of the office or laboratory.
- Do not block stairway doors open. Stairway doors must be in a closed position unless equipped with an automatic releasing device.

**4.4 FIRE & LIFE SAFETY INSPECTIONS**

A critical component of an effective Fire & Life Safety Program is inspections. The Physical Plant Department conducts monthly and annual inspections and the Environmental Health & Safety Office conducts random inspections. The inspections conducted by the Physical Plant Department pertain mainly to the university's fire safety equipment ( i.e., fire alarms, fire extinguishers, stand pipes and sprinklers), whereas the EHS Office conducts departmental and residential inspections. Departmental and residential fire safety inspections are conducted to identify blocked exits and exit routes, prohibited appliances and other items and assesses the overall condition within university facilities.

Building occupants can conduct their own fire and life safety survey by reviewing the following survey categories and making an assessment of his or her work area.

<p><b>Electrical</b></p> <ul style="list-style-type: none"> <li>• <b>Improper use of extension cord</b> <i>Extension cords are only for temporary use and must not be used to power office machines or electronics. Please obtain an electrical power strip from the Store Room.</i></li> <li>• <b>Approved appliances or heaters</b> <i>"Homemade" electrical devices or portable electric strip heaters are not allowed. Portable heaters must be equipped with an auto shut-off switch and have an enclosed heating element.</i></li> <li>• <b>Electrical cover plates</b> <i>Ensure that cover plates are installed and in good condition</i></li> <li>• <b>Frayed electrical wiring</b> <i>Ensure all electrical equipment is in good condition.</i></li> <li>• <b>Use of non-approved outlet strips</b> <i>Electric outlet strips must have an on/off switch and be protected with a fuse. Multiple electric outlet strips must not be connected in series.</i></li> <li>• <b>Halogen Torchiere lamp</b> <i>If a halogen torchiere lamp is present in the work area, the lamp must not exceed 300 watts and the lamp must be covered with a protective shield.</i></li> <li>• <b>Access to electrical breaker panel</b> <i>Ensure unobstructed access to all breaker panels</i></li> </ul>	<p><b>Ignition Sources/Combustible Material</b></p> <ul style="list-style-type: none"> <li>• <b>Candles in work area</b> <i>Candles of any size, shape or form are prohibited in the work area by order of the State Fire Marshal.</i></li> <li>• <b>Flammable liquids</b> <i>Flammable liquids must be stored in an authorized flammable liquid cabinet</i></li> <li>• <b>Excessive fire load in room</b> <i>Ensure that there is not excessive papers, boxes, or clutter.</i></li> </ul> <p><b>Egress</b></p> <ul style="list-style-type: none"> <li>• <b>Evacuation Routes are accessible</b> <i>Ensure that evacuation routes are not blocked or cluttered</i></li> <li>• <b>Exit doors and stairways</b> <i>Ensure that exits are accessible and that doors are not locked.</i></li> </ul> <p><b>Miscellaneous</b></p> <ul style="list-style-type: none"> <li>• <b>Inadequate housekeeping</b> <i>Excessive clutter may hinder egress.</i></li> <li>• <b>Access to fire extinguisher</b> <i>Ensure that fire extinguishers are not blocked.</i></li> </ul>
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## 4.5 HOLIDAY DECORATIONS

Christmas trees and decorations can add to the enjoyment and beauty of the holidays - and to the hazards. Follow these guidelines to improve fire safety during the holidays:

- Do not use live Christmas trees in University buildings unless they are treated with fire retardant. Use an artificial tree that is fire resistant, be aware that even flame-resistant artificial trees can catch fire especially if they have years of dust buildup on them.
- When using artificial trees, follow the manufacturer's warnings regarding the use of electric lights. Lights on metal trees are not allowed.
- Candles, oil lamps, incense, or other flame producing items are strictly prohibited at any time of the year.
- Do not locate trees or other decorations in exit corridors, and never block emergency egress from any room.
- Securing decorations from fire sprinklers, smoke detectors or other fire equipment is prohibited.
- Do not block fire equipment.
- Unplug decorative lights at night and when the area is unoccupied. Only low-temperature mini-lights are permitted, and they must be UL approved.
- Use of extension cords is discouraged. If extension cords are used, they must bear the UL- approved label, and be of adequate wire gauge for the intended use. No frayed or broken cords may be used. Extension cords must be unplugged at night.
- Never connect more than two(2) extension cords, or more than one power strip and one extension cord, together in series. Never connect a power strip to another power strip for any reason.
- Electrical cords may not run beneath rugs or across work surfaces. Make certain they're located so they do not become trip hazards.
- Use ladders - not chairs, stepstools, or boxes - when installing decorations in high locations.
- Remove all decorations before leaving campus for the holidays.

**END OF SECTION**



**SECTION**  
**5**

**SHOP SAFETY PROCEDURES**

In the daily operation of the university, many trades and crafts are represented by our team members, some use many different tools and power equipment pursuant to their duties. Whether you work in a metal shop, wood shop, automotive shop, or any other shop areas located on campus, the potential hazards for personal injury are numerous.

It is impossible to detail **all** the risks involved with shop operations. However, it is possible to minimize the risk of many hazards by carefully planning each job; being properly trained for the job; and asking your supervisor for additional information pertaining to the procedures. The following table highlights some common shop hazards. Personnel should adhere to all of the safety guidelines listed in this section while conducting shop operations.

The following table highlights some common shop hazards.

POTENTIAL HAZARDS	HAZARD SOURCES
<p><b>Physical:</b></p> <ul style="list-style-type: none"> <li>Compressed air / gases</li> <li>Flying debris</li> <li>Noise</li> <li>Pinching, cutting, amputation</li> <li>Slip, trip, fall</li> <li>UV radiation</li> </ul>	<ul style="list-style-type: none"> <li>Oxygen, acetylene, air lines</li> <li>Grinders, saws, welders</li> <li>Any power tool</li> <li>Vises, power tools, hand tools</li> <li>Debris, cords, liquid spills</li> <li>Welding, sun light</li> </ul>
<p><b>Electrical:</b></p> <ul style="list-style-type: none"> <li>Overload</li> <li>Fire</li> <li>Shock</li> </ul>	<ul style="list-style-type: none"> <li>Too many cords per outlet</li> <li>Frayed, damaged cords</li> <li>Ungrounded tools, equipment</li> </ul>
<p><b>Fire:</b></p> <ul style="list-style-type: none"> <li>Flammable chemicals</li> <li>Sparks</li> <li>Static sparks</li> <li>Uncontrolled fire</li> </ul>	<ul style="list-style-type: none"> <li>Gasoline, degreasers, paints</li> <li>Welders, grinders</li> <li>Power tools, solvent containers</li> <li>Lack of fire extinguishers</li> </ul>
<p><b>Chemical:</b></p> <ul style="list-style-type: none"> <li>Hazardous materials</li> <li>Toxic fumes, gases, dusts</li> </ul>	<ul style="list-style-type: none"> <li>Cleaning solvents, paints</li> <li>Welding, exhaust, pesticides</li> </ul>

**5.1 GENERAL SAFETY GUIDELINES FOR SHOP OPERATIONS**

Prior to starting any shop procedure, you must be authorized and trained to perform the work and you must inspect your tools and equipment. If a procedure is potentially hazardous to others in the area, warn fellow workers accordingly. Use warning signs or barriers, as necessary.

Notify your supervisor if you notice any unsafe conditions such as the following:

- Defective tools or equipment; improperly guarded machines
- Oil, gas, or other leaks

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Inform other employees if you see an unsafe work practice; however, be careful not to distract a person who is working with power tools.

Follow these guidelines for general shop safety:

- **Do not** wear loose fitting clothing, neckties, or jewelry when working with power tools or equipment with moving parts
  - Know the hazards associated with your work. Be sure you are fully educated on the proper use and operation of any tool before beginning a job
  - Always wear appropriate safety gear and protective clothing.
  - Wear chemical resistant gloves when cleaning with degreasers or other cleaning agents
  - Ensure that there is adequate ventilation to prevent exposure from vapors of glues, lacquers, paints and from dust and fumes.
  - It is recommended that electrical cords pull down from an overhead pulley rather than lying on the floor.
  - Leave tool and equipment guards in place
  - Know where fire extinguishers are located and how to use them.
  - Make sure all tools and equipment are properly grounded and that cords are in good condition.
  - Double-insulated tools or those with three-wire cords are essential for safety.
  - Use extension cords that are large enough for the load requirements.
  - Secure all compressed gas cylinders. **Never** use compressed gas to clean clothing or skin.
  - Always use flashback arrestors on cutting/welding torches.
  - Take precautions against heat stroke and heat exhaustion.
  - Wear infrared safety goggles when appropriate.
  - Instructions for evacuation of a shop in an emergency will be posted in a conspicuous place where all personnel can see and read.
  - Specific safety rules must be posted at or near each hazardous machine or danger area.
  - All individuals will be prohibited from operating a machine in a shop or work area until such individuals have received appropriated training
  - Appropriate warning signs will be placed on any equipment which is under repair or otherwise inoperative.
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## 5.2 HOUSEKEEPING

Many of the hazards associated with shop areas can be eliminated through proper housekeeping practices. The following housekeeping guidelines should be followed in all shop areas:

- Horseplay or practical jokes of any kind are prohibited in shop or work area.
- All walkways (aisles) will be kept clear of materials, tools, and equipment.
- All liquid spills on the floor will be contained and cleaned up **immediately**.
- The cleanup of sawdust, shavings, metal cuttings, or other waste must be done on a daily basis.
- Accumulations of dust on overhead pipes, beams, and machines particularly from bearings and other heated surfaces, should be removed at regular intervals.
- Oily rags will be deposited in closed metal containers specifically provided for them.
- Only approved chemicals will be used for cleaning floors.
- Stairway access will be kept free of slip, trip and fall hazards.
- Floor areas under storage racks will be kept in an orderly manner and free from debris, refuse, scrap, and other foreign matter.
- Materials in supply bins will be maintained in an orderly manner with no materials projecting over the edge of the bins.
- Overhead storage areas for supplies, equipment or similar items must meet safety standards and be properly marked.

## 5.3 HAND TOOLS

Hand tools are non-powered tools. They include axes, wrenches, hammers, chisels, screwdrivers, and other hand operated tools. Even though hand tool injuries tend to be less severe than power tool injuries, hand tool injuries are more common. Because people take everyday hand tools for granted, they forget to follow simple precautions for safety. The most common hand tool injuries are caused by the following:

- Failure to use right tool for the job.
- Failure to use tool correctly.
- Failure to keep edged tools sharp.
- Failure to replace or repair a defective tool.
- Failure to store tools safely.

Along with following the general shop safety guidelines, follow these safety guidelines when working with hand tools:

- Wear safety glasses whenever hammering or cutting, especially when working with material that chips or splinters.
- Use the right tool for the job. Do not use a screwdriver as a chisel, or a knife as a screwdriver, etc. The tool could slip, causing a severe puncture wound.
- Do not carry screwdrivers, chisels, or other pointed tools in your pocket, use a tool belt.
- Replace loose, splintered, or cracked handles. Hammer heads, ax heads, or maul heads can fly off defective handles.
- Use the proper wrench to tighten or loosen nuts. An improper sized wrench or pliers can slip, causing you to smash your hand.
- When using a chisel, always chip or cut away from yourself. Use a soft-headed hammer or mallet to strike a wooden chisel handle. A metal hammer or mallet may cause the handle to split.
- Do not use a wrench if the jaws are sprung.
- Do not use impact tools, such as chisels, wedges, or drift pins, if their heads are mushroom shaped. The heads may shatter upon impact.
- Direct saw blades, knives, and other tools away from aisle areas and other employees.
- Keep knives and scissors sharp. Dull tools are more dangerous than sharp tools.
- Iron or steel hand tools may cause sparks and be hazardous around flammable substances. Use spark-resistant tools made from brass, plastic, aluminum, or wood when working around flammable hazards.

#### **5.4 HAND TOOL STORAGE**

Improper tool storage is responsible for many shop accidents. Follow these guidelines to ensure proper hand tool storage:

- Have a specific place for each tool.
- Do not place unguarded cutting tools in a drawer. Many hand injuries are caused by rummaging through drawers that contain a jumbled assortment of sharp-edged tools.
- Store knives or chisels in their scabbards.
- Hang saws with the blades away from someone's reach.
- Provide sturdy hooks to hang tools on.

## 5.5 POWER TOOLS AND EQUIPMENT

Power tools can be extremely dangerous if they are misused. Each year, thousands of people are injured or killed by power tool accidents. Common accidents associated with power tools include abrasions, cuts, lacerations, amputations, burns, electrocution, and broken bones.

These accidents are often caused by the following:

- Touching the cutting, drilling, or grinding components.
- Getting caught in moving parts.
- Suffering electrical shock due to improper grounding, equipment defects, or operator misuse.
- Being struck by particles that normally eject during operation.
- Touching hot tools or work pieces.
- Falling in the work area.
- Being struck by falling tools.

In addition to the general shop safety guidelines, follow these general power tool safety guidelines for working with power tools and equipment:

- Wear the appropriate personal protective equipment
- **Do not** wear loose clothing or loose jewelry while working with power equipment
- Identifiable markings indicating traffic or aisle ways should be applied to the floor around each hazardous equipment
- All large power machines will be fastened securely to the shop floor
- Use the correct tool for the job. Do not use a tool or attachment for something it was not designed for
- Select the correct bit, blade, cutter, or grinder wheel for the material
- Keep all machinery guards in place. Cover exposed belts, pulleys, gears, and shafts that could cause injury
- Always operate tools at the correct speed for the job at hand. Working too slowly can cause an accident just as easily as working too fast.
- Watch your work when operating power tools. Stop working if something distracts you.
- Do not rely on strength to perform an operation. The correct tool, blade, and method should not require excessive strength. If undue force is necessary, you may be using the wrong tool or have a dull blade.
- Before clearing jams or blockages on power tools, disconnect from power source. Do not use your hand to clear jams or blockages, use an appropriate tool.
- Never reach over equipment while it is running.

- Never disable or tamper with safety releases or other automatic switches
- When the chance for operator injury is great, use a push stick to move material through a machine.
- Disconnect power tools before performing maintenance or changing components.
- Keep a firm grip on portable power tools. These tools tend to "get away" from operators and can be difficult to control.
- Remove chuck keys or adjusting tools prior to operation.
- Keep bystanders away from moving machinery.
- Do not operate power tools when you are sick, fatigued, or taking strong medication.
- When possible, secure work pieces with a clamp or vise to free the hands and minimize the chance of injury. Use a jig for pieces that are unstable or do not lie flat
- Lubricating, cleaning, adjusting, or repairing of any machine tool while it is running is prohibited.
- Chips and debris will be cleaned from a machine with a brush or chip hook, not with a rag, the hand or compressed air.

## 5.6 INSPECTION OF POWER TOOLS

All power tools that are operated by Physical Plant personnel must receive a safety check on a quarterly basis. The types of power tools that must be inspected include, but are not limited to the following:

- Electrical Hand Tools (drills, saws, sanders).
- Fixed Electrical Tools (tables saws, grinders, welders).
- Vacuum Cleaners / Floor Polishers.
- Electrical Weed Trimmers / Hedge Trimmers.

The quarterly power tool safety check will involve the following:

- Inspecting the equipment for proper grounding and insulation
- Inspecting the integrity of the power cords and connections
- Placing a dated inspection tag on the piece of equipment
- Recording the inspection of the specific power tool in an inspection log

The responsible individual for conducting the quarterly safety check is the Superintendent of Utilities. The responsible individual for scheduling the safety check of the power tool is the user of the power tool. If it is discovered, through a safety walk through, that the power tool has not been inspected during the required time frame, the tool shall be "Red Tagged" and placed "Out of Service" until the power tool has been inspected.

## 5.7 SAFETY PROCEDURES FOR SPECIFIC POWER TOOLS AND EQUIPMENT

In addition to the general safety procedures for power tool and equipment usage, there are specific safety requirements for each type of power tool or equipment. These safety guidelines should be adhered to when using the following power tools and equipment:

- Drill press
- Lathe
- Planer
- Sander
- Grinder
- Nail / air gun
- Saw
  - \* Band
  - \* Circular
  - \* Radial arm
  - \* Table

## 5.8 DRILL PRESS SAFETY PROCEDURES

Follow these safety guidelines when using drill presses:

- Securely fasten work materials to prevent spinning. Never use your hands to secure work materials.
- Use a center punch to score the material before drilling.
- Run the drill at the correct speed. Forcing or feeding too fast can break drill bits.
- Never attempt to loosen the chuck unless the power is off.
- Lower the spindle before removing a chuck.
- Never use a regular auger bit in a drill press.
- Frequently back the drill out of deep cuts to clean and cool the bit.

## 5.9 GRINDER SAFETY PROCEDURES

Follow these safety guidelines when using a grinder:

- Ensure that no combustible or flammable materials are within 25 feet of job site. Sparks from the grinder wheel could ignite material.
- Ensure that a guard covers at least 270 degrees of the grinding wheel on bench-mounted machines.
- Place the grinder tool rest 1/8 inch from the wheel and slightly above the center line.
- Allow the grinder to reach full speed before stepping into the grinding position. Faulty wheels usually break at the start of an operation.
- Unless otherwise designed, grind on the face of the wheel.

- Use a vise-grip pliers or clamp to hold small pieces.
- Slowly move work pieces across the face of wheel in a uniform manner. This will keep the wheel sound.
- Do not grind non-ferrous materials.
- Periodically check grinder wheels for soundness. Suspend the wheel on a string and tap it. If the wheel rings, it is probably sound.
- Replace wheels that are badly worn or cracked.
- Never use a wheel that has been dropped or received a heavy blow, even if there is no apparent damage.
- Before using a new wheel, let it a run a few seconds at full speed to make sure it is balanced.

### 5.10 JOINTER AND SHAPER SAFETY PROCEDURES

Follow these safety guidelines when using jointers and shapers:

- Ensure that jointers are equipped with cylindrical cutting heads
- Use a push stick, as necessary
- Do not use single cutter knives in shaper heads
- Ensure that knives are balanced and correctly mounted
- Adjust cut depth before starting the machine
- Do not use the jointer for strips that are less that 1 inch wide

### 5.11 NAIL / AIR GUN SAFETY PROCEDURES

Nail guns and air guns are powered by compressed air. The main hazards associated with these tools is injury from one of the tool's attachments. Follow these safety guidelines when using pneumatic nail or air tools:

- **Never** point the tool at other people
- Ensure that pneumatic tools which shoot nails, rivets, or staples are equipped with a device that keeps fasteners from ejecting unless the muzzle is pressed against a firm surface.
- Keep your finger off the trigger until you are ready to begin work. Most pneumatic tools have a hair-trigger that requires little pressure to activate the gun.
- Treat air hoses with the same care as an electrical cord.
- Do not drive fasteners into hard, brittle surfaces or areas where the fastener may pass through the material and protrude on the other side.



## 5.12 LATHE SAFETY PROCEDURES

Follow these safety guidelines when using a lathe:

### Metal Lathes

- Make sure that all gear and belt guards are in place
- Never leave a chuck wrench in a chuck
- Keep hands off chuck rims when lathe is moving
- Steady rests should be properly adjusted to conform with the material being worked
- When filing work in a lathe, always face the head stock and the chuck
- Ensure that tail-stock, tool-holder, and work are properly clamped before turning on power
- Never attempt to adjust a tool while the lathe is running
- Never apply a wrench to revolving work or parts
- **Do not** use hands to remove chips, use a brush
- When possible, use pipe sleeves to cover work protruding from the end of the lathe.
- Before removing your work from the lathe, remove the tool bit.

### Wood Lathes

- Examine wood for knots and other defects before placing it in the lathe
- Ensure that glued materials are set before placing them in the lathe
- Before turning the lathe on, slowly turn rough materials a few times to ensure they will clear the tool rest
- Keep hands off the chuck rim when the lathe is moving
- Hold all wood cutting tools firmly with two hands
- Start all operations at the lowest speed. Ensure that materials are in a cylindrical form before advancing to higher speeds. **Never** turn a large diameter object at high speeds
- Firmly screw faceplate work to the faceplate. Take care to avoid cutting too deep and hitting the screws
- Do not cut too deep or scrape too long, use shallow cuts and short scrapes
- Remove the "T" rest when sanding or polishing
- Always use a brush to remove chips; never your hands.

### 5.13 PLANER SAFETY PROCEDURES

Follow these safety guidelines when working with planers:

- Examine wood for knots and other defects before placing it in the planer.
- Do not plane against the grain of the wood.
- Let go of the materials as the feeder rolls catch. Do not follow the work with your hands.
- Do not run boards that are more than 2 inches shorter than the distance between the in-feed and out-feed rolls.
- Use a push stick if a board stops with its end on the in-feed table.
- If a board sticks under the cutter head, turn off the machine to keep from burning the cutter knives.

### 5.14 SANDER SAFETY PROCEDURES

Follow these safety guidelines when working with circular and belt sanders:

- Ensure that sanding belts are not too tight or too loose. **Never** operate a sanding disk if the paper is loose.
- Use the correct grade of abrasive material.
- Ensure that the distance between a circular sander and the edge of the table is not greater than 1/4 inch.
- Do not push materials against sanders with excessive force.
- Sand only on the down stroke side of a disk sander.
- Do not hold small pieces by hand. Use a jig for pieces that are difficult to hold securely.

### 5.15 SAW SAFETY PROCEDURES

There are numerous types of power saws, such as band saws, circular saws, radial arm saws, and table saws. Regardless of the type of saw that is being used, adherence to these safety guidelines is crucial:

#### **Band Saws**

- Set the blade evenly with the proper amount of tension
- Keep your hands on either side of the cut line. Never reach across the cut line when the saw is in operation
- Do not stand to the right of the band saw
- Ensure the radius of the cutting area is large enough for the saw blade
- If you hear a rhythmic click, check the saw blade for cracks

**Radial Arm Saws**

- Push the saw blade against the stop before turning on the power
- Never place one piece of wood on top of another when using this saw
- This saw pulls itself into wooden materials. Ensure a tight grip to prevent uncontrolled acceleration
- Never leave the saw hanging over the end of the arm

**Table Saws**

- Circular table saws must have a hood over the portion of the saw blade above the table. The hood must automatically adjust to the thickness of, and remain in contact with, the material being cut
- Circular table saws must have a spreader aligned with the blade. The spreader must be spaced no more than 1/2 inch behind the largest blade mounted in the saw. Providing a spreader while grooving, dadoing, or rabbeting is not required.
- Circular table saws used for ripping must have non-kickback fingers or dogs.
- Feed rolls and blades of self-feed circular saws must be protected by a hood or guard to prevent the operator's hand from coming in contact with the in-running rolls.

**5.16 SAFETY PRECAUTIONS FOR FIRE AND EXPLOSION**

The following guidelines should be followed to minimize the risk to fire and explosion hazards in shop areas:

- Approved and appropriate fire extinguishers must be provided in all shop areas.
- Instruction in the proper use of fire extinguishers and other fire fighting equipment must be provided for personnel using a shop area.
- The location of fire fighting equipment must be marked with a large "fire red" square, arrow, bar or sign, high enough to be easily seen.
- **NO SMOKING** signs will be conspicuously posted in shop and storage areas.
- Flammable liquids must be stored in approved containers, and only in limited quantities.
- Flammable cleaning liquids will be used only in approved facilities and under strict supervision.
- The bulk storage of flammable liquids or hazardous chemicals is prohibited within the shop or work area, unless the containers are in an approved cabinet and the containers are bonded and grounded.
- An approved alarm system will be employed to command the attention of all shop personnel during an emergency situation.

- Electrical equipment and devices will be installed and maintained in accordance with the National Electrical Code and the National Electrical Safety Code.
- Only approved, UL explosion-proof equipment will be used in atmospheres containing flammable gases, vapors, or dust that may be ignited.

### 5.17 LADDER SAFETY PROCEDURES

Ladders can make many tasks easier, but they are also a continual safety hazard. Even the best ladder is not safe unless you are trained and proficient in using ladders. Each year, many people suffer serious injuries from accidents involving ladders. Before you use a ladder, take a moment to think about doing it safely.

A secure, well made ladder is necessary for safe ladder use. Ladders come in different styles, including step, straight, and extension. They also vary in construction and may consist of wood, aluminum, or fiberglass. Choose the correct type and size ladder for the job. All ladders sold within the U.S. are rated as follows:

#### **Type IA:**

- Heavy-duty industrial ladder rated to hold up to 300 pounds.

#### **Type II:**

- Medium-duty commercial ladder rated to hold up to 225 pounds.

#### **Type III:**

- Light-duty household ladder rated to hold up to 200 pounds.

#### **Follow these guidelines for safe ladder usage:**

- Always inspect a ladder before you climb it. Make sure the steps are sturdy and the locking mechanisms are in good working order.
- Carry ladders horizontally with the front end slightly higher than the back end.
- To open a stepladder, make sure the spreader is locked and the pail shelf is in position. To open an extension ladder, brace the bottom end and push the rungs or rails out.

#### **Place ladders on a solid, level surface to ensure safety:**

- Watch for overhead obstructions and power lines.
- To prevent ladders from sinking into soft ground, use a large board under the feet of the ladder.
- Position a straight or extension ladder so that the base of the ladder is **one foot away from the vertical support for every four feet of working ladder height**, 4 :1 ratio (e.g., if you are working with eight feet of ladder, place the base of the ladder two feet from the wall).
- Do not place the top of a ladder against a window or an uneven surface.
- When possible, tie the top of a straight or extension ladder to supports. Stake and tie the feet of the ladder.

- An extension ladder used for access to a roof must extend at least 3 feet beyond the support point.
- If you are working near electrical sources, you must use a ladder specifically designed and approved for electrical sources.
- Do not place a ladder in front of a door unless you lock and barricade the door and post a warning sign on the opposite side of the door.
- Use common sense when climbing or working on ladders:
- Wear shoes with slip-resistant soles and make sure they are dry before climbing.
- Never allow more than one person on a ladder.
- To climb or descend a ladder, face the ladder and firmly grip the rails, not the rungs, with both hands.
- Keep your body between the rails at all times. Do not shift your weight to one side.
- Conduct all work within one arms reach of the ladder.
- Have someone steady the ladder if it cannot be secured otherwise.
- Do not stand on the top four rungs of an extension ladder or the top two rungs of a step ladder.
- When working on a ladder, keep two feet and one hand on the ladder at all times.
- Do not stand on the bucket shelf of a ladder.
- When working on a ladder, carry small tools on a tool belt. Use a rope to raise and lower heavy items.
- Never leave a raised or open ladder unattended.
- Store ladders away from heat and moisture.
- Destroy damaged or unsafe ladders.

**END OF SECTION**

**LADDER SAFETY CHECKLIST**

The following checklist should be completed quarterly for each ladder used in the work area. All identified deficiencies must be corrected prior to using the ladder. If the deficiencies can not be repaired the ladder must be tagged out of service, and repaired or destroyed and discarded.

General (Applies to Both Step and Extension Ladders)	Condition		
	Acceptable	Needs Repairs	Date Repaired
Check for loose steps or rungs (considered loose if they can be moved at all with the hand)			
Check for loose nails, screws, bolts, or other metal parts			
Check for cracked, spilt, or broken uprights, braces, or rungs			
Check for splinters on uprights, rungs, or steps			
Check for damaged or worn non-slip bases			
<b>Step Ladders</b>			
Check for ladder wobble (movement from side to side)			
Check for loose or bent hinge spreaders			
Check the Stop on hinge spreaders			
Check for loose hinges			
Check for broken, split, or worn steps			
<b>Extension Ladders</b>			
Check for Loose, broken, or missing extension locks			
Check for defective locks that do not seat properly while extended			
Check for worn or rotted rope			

**Inspection Date:** \_\_\_\_\_

**Completed by:** \_\_\_\_\_

**Comments:** \_\_\_\_\_

**Overall Condition of Ladder**      **Acceptable** \_\_\_\_\_      **Needs Repairs** \_\_\_\_\_

**Submit Completed Inspection Report to your Supervisor.**

## LADDER SAFETY CHECKLIST

The following checklist should be completed quarterly for each ladder used in the work area. All identified deficiencies must be corrected prior to using the ladder. If the deficiencies can not be repaired the ladder must be tagged out of service, and repaired or destroyed and discarded.

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	Acceptable	Needs Repairs	Date Repaired
Check for loose steps or rungs (considered loose if they can be moved at all with the hand)			
Check for loose nails, screws, bolts, or other metal parts			
Check for cracked, spilt, or broken uprights, braces, or rungs			
Check for splinters on uprights, rungs, or steps			
Check for damaged or worn non-slip bases			
<b>Step Ladders</b>			
Check for ladder wobble (movement from side to side)			
Check for loose or bent hinge spreaders			
Check the Stop on hinge spreaders			
Check for loose hinges			
Check for broken, split, or worn steps			
<b>Extension Ladders</b>			
Check for Loose, broken, or missing extension locks			
Check for defective locks that do not seat properly while extended			
Check for worn or rotted rope			

**Inspection Date:** \_\_\_\_\_ **Completed by:** \_\_\_\_\_

**Comments:** \_\_\_\_\_  
 \_\_\_\_\_

**Overall Condition of Ladder**      **Acceptable** \_\_\_\_\_      **Needs Repairs** \_\_\_\_\_

**Submit Completed Inspection Report to your Supervisor.**

**SECTION 6**

**WELDING AND CUTTING TORCH PROCEDURES**

Welding and cutting are two forms of hot work that require special safety considerations. Unless they are done in a designated shop area, welding and cutting are strictly prohibited without proper authorization.

**6.1 INTRODUCTION**

The following table describes the most common hazards associated with welding and cutting operations:

POTENTIAL HAZARD	HAZARD SOURCE
Electrocution	<ul style="list-style-type: none"> <li>• Damp working conditions</li> <li>• Improper grounding</li> <li>• Improper insulation</li> <li>• Indirect work connection</li> </ul>
Hazardous Atmospheres	<ul style="list-style-type: none"> <li>• Confined space</li> <li>• Inadequate ventilation</li> <li>• Welding fumes</li> </ul>
Sparks, Fire, Explosion	<ul style="list-style-type: none"> <li>• Flammable materials in area</li> <li>• Containers having combustible material</li> </ul>
UV Radiation Burns	<ul style="list-style-type: none"> <li>• Gas arc</li> <li>• Reflective enclosures</li> <li>• Inadequate visor lens</li> <li>• Welding curtain not in use</li> </ul>
Confined Space	<ul style="list-style-type: none"> <li>• Atmosphere not monitored</li> <li>• No safety attendant present</li> </ul>
Gas Cylinders	<ul style="list-style-type: none"> <li>• Touching cylinder with electrode</li> <li>• Improper storage of cylinders</li> <li>• Improper use of cylinders</li> </ul>

**6.2 WELDING AND CUTTING GUIDELINES**

Before conducting welding or cutting operations, inspect your equipment for the following:

- Welding leads must be completely insulated and in good condition.
- Cutting tools must be leak-free and equipped with proper fittings, gauges, regulators, and flashback devices.
- Oxygen and acetylene tanks must be secured in a safe place.



In addition to the general shop safety guidelines, follow these guidelines for most welding and cutting procedures:

**Welding Guidelines**

- Wear proper protective clothing. Ensure that welding helmet lens is dark enough to provide the necessary protection. Wear welding gloves and welding apron.
- Ensure to utilize welding curtains when other people are in the area.
- Conduct welding operations in a designated area free from flammable materials.
- Ensure the welding area is free from combustible materials.
- Ensure adequate ventilation and exhaust.
- Ensure electrical cords are properly grounded, especially in damp conditions.
- When welding is necessary in an undesignated or hazardous area, have someone nearby act as a fire watch.
- Periodically check for combustible atmospheres.
- Take care to prevent sparks from starting a fire.
- Remove unused gas cylinders from the welding and cutting area.

**Cutting Guidelines**

- Conduct cutting operations in a designated area free from flammable materials.
- When cutting is necessary in an undesignated or hazardous area, have someone nearby act as a fire watch.
- Ensure that acetylene/oxygen systems are equipped with flame or flashback arrestors.
- Store cylinders in an upright, secured position.
- Keep cylinder and hose fittings free from oil and grease.
- Repair defective hoses by splicing, not with tape.
- Do not attempt to repair cylinders, valves, or regulators.
- Do not interchange regulators or pressure gauges with other gas cylinders.
- Carefully purge hoses and torches before connecting or disconnecting a cylinder.
- Set acetylene pressure at or below 15 psig. Always use the minimum acceptable flow rate.
- Never use a match to light a torch, use an approved striker.
- Periodically check for combustible atmospheres.
- Remove unused gas cylinders from the welding and cutting area.
- Keep hoses out of doorways and away from other people. A flattened hose can cause a flashback.
- Mark hot metal with a sign or other warning when cutting operations are complete.

## 6.3 HOT WORK GUIDELINES

These Hot Work Guidelines have been established to prevent unintended ignition of combustible and flammable materials.

### 6.3.1 Assignments

These guidelines apply to all university departments and vendors/contractors who perform welding and cutting on university properties. These procedures shall not apply to cutting and welding operations that are part of a routine and normal processes (ie., maintenance shops or welding booths having approved hot work areas).

The Supervisor of the Shop performing the welding/cutting tasks shall complete the [Hot Work Permit](#) and the appropriate Superintendent shall review hot work procedures for each Hot Work Permit submitted.

University Project Managers shall review welding/cutting work and locations proposed by vendors and contractors for applicability and shall be responsible for reviewing the Hot Work procedures for possible safety problems.

Each individual performing welding or cutting shall ensure precautions have been taken as prescribed in the Hot Work Permit Form prior to commencing any work. The Supervisor shall complete the Hot Work Permit Form at least **24 hours** prior to commencing any work in non-approved areas.

### 6.3.2 Definitions and Responsibilities

**Hot Work** is any activity that could produce flames, sparks, slag, or other hot fragments that might act as an ignition source to flammable materials in the area.

"Hot Work" also includes any activity that could generate sufficient smoke or heat to activate a fire alarm detection system. It includes, but is not limited to: welding, flame cutting, torch soldering, heat treating, pipe thawing, and grinding.

**Exempt Hot Work Area** - Areas that are not subject to a Hot Work Permit include:

- Work Shop with approved hot work area;
- Outdoor, open areas free of combustible material (i.e., dry brush, grass, leaves) providing that a fire extinguisher is present during the hot work.

**Confined Space** - As defined by OSHA is "any space having a limited means of egress, which is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere. Confined or enclosed spaces include, but are not limited to, storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, tunnels, pipelines, and open top spaces more than 4 feet deep such as pits, tubs, vaults, and vessels." OSHA 1926 is the construction industry standard.

**Hot work will NOT be performed in a Confined Space until the EHS Office has tested the atmosphere and a Confined Space Permit has been completed.**

**Permit Required Hot Work Areas** - Areas subject to a Hot Work Permit

Individuals performing hot work in areas other than Exempt Hot Work Areas shall ensure precautions have been taken as prescribed in the Hot Work Permit Form prior to commencing **any** work.

The Supervisor shall complete the Hot Work Permit Form prior to commencing hot work in any Permit Required Hot Work area. The Supervisor shall take the following precautions while

- Assigning the appropriate number of Fire Watch personnel.
- Ensuring that fire extinguishers are available.
- Ensuring adequate ventilation is provided.
- Segregating combustible material at least 35 feet from work area.
- Provide adequate shielding and covering if combustibles cannot be removed or segregated.
- Removing combustibles from common surfaces when welding on metal walls, partitions, or ceilings.
- Special attention to welding or cutting pipes in contact with walls made with combustible materials.
- Posting a fire watch in areas where combustibles cannot be safely segregated from work, where sparks may impact lower levels in cases of elevated work, or where a fire alarm has been partly or completely disabled in order to perform the work.
- If the fire alarm has been disabled, the Supervisor will contact the building's occupants and inform them that the fire alarm has been disabled. The Supervisor will utilize an alternative alarm method (ie., air horn) in the event that the building needs to be evacuated while the fire alarm is disabled.

**Fire Watch** is where one or more responsible persons visually check all areas when:

- there is any potential for the hot work to start a fire, or;
- where building spaces that are normally protected by an automatic fire alarm system are unprotected, because the alarm has been partially or completely deactivated in order to perform the work.

In areas where there is risk of ignition from the work, fire checks must be made frequently enough so that any fire discovered could be put out with a single fire extinguisher (probably every 5 minutes or less, depending on the nature and amount of flammable materials present). If any smoldering or burning material is discovered, Fire Watch personnel should attempt to put the fire out with a fire extinguisher and if necessary, call 911 to request the Kingsville Fire Department and take all necessary steps to assure evacuation of building occupants.

An individual performing a fire watch may not leave the area until all other fire watch personnel have been notified and appropriate steps have been taken to ensure adequate fire watch protection. A fire watch shall be maintained for at least 30 minutes after completion of operations.

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**6.3.3 PRECAUTIONS**

The following general safety precautions shall be observed regardless of welding locations:

- Valves, regulators, hoses, and torches shall be checked regularly;
- welding or cutting on vessels (empty drums, tanks, etc.) that contained combustible or flammable material is prohibited unless completely purged and residue removed and the atmosphere inside the vessel has been tested and is safe;
- gas cutting and welding equipment shall be secured to avoid damage and disturbance;
- Personnel performing hot work shall ensure that the atmosphere is free of flammable or combustible vapor. Should doubt arise, consult with EHS to determine if work should continue.

**6.3.4 CONTRACTORS**

The university's Construction Project Manager shall evaluate hot work activities to be conducted by contractors or vendors for adherence to the Hot Work policy prior to the start of work. Contractors and Vendors are required to complete the Hot Work Permit Form at least 24 hours prior to the start of work unless precluded by an emergency situation.

**END OF SECTION**

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# TEXAS A&M UNIVERSITY-KINGSVILLE HOT WORK PERMIT

This Hot Work Permit is to be completed by the Competent Person performing the hot work procedure. This Hot Work Permit shall be reviewed and approved by the Physical Plant Superintendent responsible for the Shop performing the work and also the Manager of Environmental Health & Safety prior to starting the hot work procedures.

If the hot work procedures are being performed by a contractor, their completed Hot Work Permit shall be reviewed by the University's Project Manager and the Environmental Health & Safety Office prior to starting the hot work procedures. No indoor Hot Work will be permitted after normal working hours.

**DATE AND TIME ISSUED:** \_\_\_\_\_ **VALID UNTIL:** \_\_\_\_\_

**BUILDING AND WORK AREA:** \_\_\_\_\_ **PROJECT NO:** \_\_\_\_\_

**NAME OF COMPETENT PERSON PERFORMING THE HOT WORK:** \_\_\_\_\_

### FIRE SAFETY PRECAUTIONS

**BEFORE THE WORK - All** of the following precautions apply. Each bullet must be initialed by the Competent Person.

- \_\_\_\_\_ Cutting and/or welding equipment must be thoroughly inspected and found to be in good repair, free of damage or defects.
- \_\_\_\_\_ A multi-purpose dry chemical, portable fire extinguisher must be located such that it is immediately available to the work and is fully charged and ready for use.
- \_\_\_\_\_ At least one fire alarm pull station or means of contacting the fire department (i.e. site telephone) must be available and accessible to person(s) conducting the cutting/welding operation.
- \_\_\_\_\_ Floor areas under and at least 35 feet around the cutting/welding operation must be swept clean of combustible and flammable materials.
- \_\_\_\_\_ All construction equipment fueling activities and fuel storage must be relocated at least 35 feet away from the cutting/ welding operation.

**Where applicable**, the following precautions will also be taken before the work begins:

- \_\_\_\_\_ Fire resistant shields (fire retardant plywood, flameproof tarpaulin, metal, etc.), must cover combustible floors.
- \_\_\_\_\_ Spark/slag catchers (fire retardant plywood, flameproof tarpaulins, metal, etc.) must be suspended below any elevated cutting/welding operation.
- \_\_\_\_\_ All floor and wall openings must be covered to prevent sparks/slag from traveling to other, unprotected areas.
- \_\_\_\_\_ Containers in or on which cutting/welding will take place must be purged of flammable vapors.

**DURING / AFTER THE WORK** - The following precautions will be taken:

- \_\_\_\_\_ Person(s) must be assigned to a fire watch during and for at least 30 minutes after all cutting/welding ceases.
- \_\_\_\_\_ Fire watch person(s) are to be supplied with multipurpose dry chemical, portable fire extinguisher and trained in its use.
- \_\_\_\_\_ A fire alarm pull station or means of contacting the fire department (i.e. site telephone) available and accessible to fire watch person(s).

### ACKNOWLEDGEMENT:

**Pre-Inspection of Hot Work Area / Date/Time**

**Post Inspection of Hot Work Area / Date/Time**

\_\_\_\_\_  
EHS Manager

\_\_\_\_\_  
EHS Manager

\_\_\_\_\_  
Physical Plant Superintendent

\_\_\_\_\_  
Physical Plant Superintendent

\_\_\_\_\_  
Competent Person Performing the Hot Work

\_\_\_\_\_  
Competent Person Performing the Hot Work

\_\_\_\_\_  
Fire Watch

\_\_\_\_\_  
Fire Watch

**SECTION****7****ELECTRICAL SAFETY PROCEDURES**

The following sections provide general safety guidelines and procedures for electrical safety. This chapter covers the following:

- **General Electrical Safety**
- **High-Voltage Procedures**

**7.1 INTRODUCTION**

The danger of injury through electrical shock is possible whenever electrical power is present. When a person's body completes a circuit and thus connects a power source with the ground, an electrical burn or injury is imminent. Most fatal injuries result from high-voltage exposure; however, people can sustain severe injuries from low voltage power if it has a high current flow.

Electrical safety is important in every work environment. The following sections cover circuit breaker loads, electrical grounding, electrical safety guidelines, and electrical emergency response.

The following definitions help clarify general electrical safety:

**Amps:**

- The standard unit for measuring electrical current.

**Watt:**

- A unit of electrical power, equal to the power developed in a circuit by a current of amp flowing through a potential difference of one volt.

**Voltage:**

- Electromotive force expressed in volts.

**Circuit Breaker:**

- A device that automatically interrupts the flow of an electrical current.

**Breaker Box:**

- An insulated box on which interconnected circuits are mounted.

**Electrical Panel:**

- An insulated panel on which electrical wires are mounted.

**Current Flow:**

- The rate of flow of an electrical charge, generally expressed in amps.

**Electrical Load:**

- The amount of power delivered by a generator or carried by a circuit. A device to which the power is delivered.

**Ground-Fault Circuit Interrupter (GFCI):**

- A GFCI detects grounding problems and shuts electricity off to prevent a possible accident.

**High Voltage:**

- The term high voltage applies to electrical equipment that operates at more than 600 Volts (for terminal to terminal operation) or more than 300 Volts (for terminal to ground operation). Low voltage, high current AC or DC power supplies are also considered to be high voltage.

**Hazardous Energy Sources:**

- This term applies to stored or residual energy such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure.

**Lockout:**

- The placement of a lock on an energy-isolating device. This act prevents workers from operating a piece of equipment until the lock is removed.

**Tagout:**

- The placement of a tag on an energy-isolating device. A tagout device is a prominent warning device or a lockout.

**Energy-Isolating Device:**

- A mechanical device that prevents the transmission or release of energy. Examples include the following:
  - Manually operated circuit breakers
  - Disconnect switches
  - Line or block valves

**NOTE**

- **Pushbuttons, selector switches, and other control circuit devices do not isolate energy.**
- **Energy-isolating devices should be lockable by means of a hasp or other type of attachment. It should not be necessary to dismantle or reassemble a device to lock it.**

**Authorized Employee:**

- A person who locks out or tags out equipment for service or maintenance. Authorized employees have been formally trained in proper lockout/tagout procedures

## 7.2 CIRCUIT BREAKER LOADS

Most office and laboratory locations have 20 amp circuit breakers that serve two or more outlets. These breakers can handle most office equipment; however, the widespread use of personal computers and associated hardware can create an electrical overload. To determine your current electrical load, follow these steps:

- Check office/laboratory equipment for a manufacturer's rating label that indicates total watts or amps. Take special care to check appliances that use electricity to generate heat.
- Convert the watts rating to amps:  
$$\text{Amps} = \text{Watts} / 120 \text{ Volts}$$
- Total the amps for each circuit.
- If the total equals more than 15 amps per 20 amp circuit, you may be overloading the circuit. Move enough equipment to a different circuit to reduce the circuit load; otherwise, have the Physical Plant inspect the circuit wiring.

## 7.3 ELECTRICAL GROUNDING

Proper electrical grounding can help prevent electrical injury. Most electrical equipment is grounded with either a three-prong plug or a two-prong plug and insulation. Because a grounding system may be defective without your knowledge, use a GFCI to ensure electrical safety. GFCIs are required in moist or potentially damp environments.

## 7.4 ELECTRICAL PANELS

Electrical panels or breaker boxes require special safety considerations including the following:

- Know where your panel box is located.
- Do not tape circuit switches to keep a breaker from tripping.
- Ensure that breaker circuits are accurately labeled within panel boxes.
- Ensure that panel box doors are securely attached.
- Do not block panel boxes. There should be at least 30 inches of clear space in front of a panel box.
- Report tripped breakers and refer any electrical questions to the Physical Plant.



**7.5 ELECTRICAL SAFETY GUIDELINES**

Follow these guidelines for general electrical safety:

- Be familiar with the electrical hazards associated with your workplace.
- All motors, fuse boxes, switch boxes and other electrical equipment must be provided with an approved ground.
- All equipment control switches must be easily accessible to the operator.
- Unplug electrical equipment before repairing or servicing it.
- Only authorized personnel will repair and/or install electrical equipment
- Until properly grounded or locked out, electrical circuits shall always be treated as live circuits.
- Temporary wiring will be installed only by authorized personnel. Such wiring must be replaced with permanent installations or removed within a reasonable period of time.
- All electrical cabinets and enclosures must be kept clear of tools, clothing, rags and other materials, i.e. unobstructed at all times.
- If a prong breaks off inside an outlet, do not attempt to remove it yourself. Call the Physical Plant for assistance.
- Ensure that outlets are firmly mounted. Report loose outlets to the Physical Plant.
- Report all electrical problems, including tripped breakers, broken switches, and flickering lights, to the Physical Plant.
- All appliances used in TAMUK buildings must be UL or FM (Factory Mutual) labeled.
- Do not use an appliance that sparks, smokes, or becomes excessively hot, unless the appliance is specifically designed to exhibit these characteristics.
- Portable electrical heaters must be equipped with automatic shut-off switches and must be designed in a manner that prevents any item from contacting the heating elements.
- Portable electrical heaters must be placed as to avoid causing a trip hazard and must be kept away from combustible material.
- Never leave a portable heater unattended. Unplug the heater at the end of the day or when not in use.
- Keep electrical equipment away from water, unless the appliance is specifically designed for use around water, such as a wet-dry shop vacuum.
- Use GFCIs whenever possible.
- Be aware of overhead power lines when working with tall equipment (e.g., grain augers, cranes, sailboats, etc.).
- Follow lockout/tagout procedures, as appropriate.

- It is recognized that the testing of voltages, or the checking or calibrating of circuits may require that the equipment be electrically energized. Under these conditions, precautions adequate to overcome the additional hazard must be taken, and only then to be performed by authorized personnel.
- Before handling, connecting or testing capacitors, it should be recognized that such devices may contain stored charge. Such equipment should therefore be discharged and checked for charge through the use of a suitable insulated short circuit jumper or shorting bar with such device being sufficiently insulated to exceed the capacitor voltage rating. This is only to be done by trained, experienced personnel.
- Approved fuse "pullers" must be used to remove cartridge type fuses .

**Follow these guidelines for electrical plug and cord safety:**

- Use extension cords only when necessary and only on a **temporary basis**. Do not use extension cords in place of permanent wiring. Obtain a multiple electrical strip from the store room or request new outlets if your work requires equipment in an area without an outlet.
- Use extension cords that are the correct size or rating for the equipment in use. The diameter of the extension cord should be the same or greater than the cord of the equipment in use.
- Do not remove the prongs of an electrical plug. If plug prongs are missing, loose, or bent, replace the entire plug.
- The makeup or use of an extension cord with a male connector at each end is prohibited.
- Do not use an adapter or extension cord to defeat a standard grounding device. Only place three-prong plugs in three-prong outlets; do not alter them to fit in a two-prong outlet.
- Do not run electrical cords above ceiling tiles or through walls.
- Keep electrical cords away from areas where they may be pinched and areas where they may pose a tripping or fire hazard (e.g., doorways, walkways, under carpet etc.)
- Avoid plugging more than one appliance in each outlet. If multiple appliances are necessary, use an approved power strip with surge protector and circuit breaker. Do not overload the circuit breaker
- Discard damaged cords, cords that become hot, or cords with exposed wiring.
- Never unplug an appliance by pulling on the cord; pull on the plug. Pulling on the cord may damage the grounding prong, resulting in the cord not being properly grounded.

## 7.6 ELECTRICAL EMERGENCY RESPONSE

The following instructions provide guidelines for handling three types of electrical emergencies:

### 1. Electric Shock:

- When someone suffers serious electrical shock, he or she may be knocked unconscious. If the victim is still in contact with the electrical current, immediately turn off the electrical power source. If you cannot disconnect the power source, try to separate the victim from the power source with a nonconductive object, such as a wood-handled broom.

#### **IMPORTANT:**

Do not touch a victim that is still in contact with a power source, you could electrocute yourself. Have someone call for emergency medical assistance immediately. Administer first-aid, as appropriate.

### 2. Electrical Fire:

- If an electrical fire occurs, try to disconnect the electrical power source, if possible. If the fire is small, and you are not in immediate danger, **and** you have been trained in the proper use of a fire extinguisher, use any type of fire extinguisher except water to extinguish the fire. Follow the university's FIR(E<sup>2</sup>) procedures in Chapter 4.

#### **IMPORTANT:**

- Do not use water on an electrical fire.

### 3. Power Lines:

- Stay away from live power lines and downed power lines. Be particularly careful if a live power line is touching a body of water. The water could conduct electricity.

#### **IMPORTANT:**

- If a power line falls on your car while you are inside, remain in the vehicle until help arrives.

## 7.7 HIGH VOLTAGE PROCEDURES

In addition to the guidelines associated with general electrical safety and lockout/tagout procedures, there are more stringent safety requirements for high voltage procedures.

The following list provides high-voltage safety tips. For more information, please refer to Title 29 Section 1910.269 of the Code of Federal Regulations or NFPA 70 (National Electric Code).

- Ensure that only authorized employees work around high voltage equipment.
- Label entrances with a High Voltage Sign.
- Ensure that terminal voltage ratings can withstand surges caused by electrical faults or switching transients.
- Be careful around output circuits even when the input power is off. Parallel power sources and energy storage devices can still be dangerous.
- Be careful when working with power supplies that serve more than one area.

- Before working in a high voltage area, inspect the power supply and check all protective devices.
- Do not work alone near high voltage.
- Label equipment to identify power sources label input power sources to identify connected power supply loads.
- Attach emergency shutdown instructions and phone numbers to equipment that is remotely controlled or unattended while energized.
- Before entering a power supply or associated equipment enclosure to work on hazardous energy sources, complete the following:
  - ✓ De-energize the equipment.
  - ✓ Open and lockout the main input power circuit breaker.
  - ✓ Check for auxiliary power circuits that could still be energized.
  - ✓ Inspect automatic shorting devices for proper operation.
  - ✓ Short the power supply with grounding hooks.

### 7.10 MINIMUM CLEARANCE OF WORKING SPACE

The following table from the National Electric Code provides minimum depth of clear working space in front of electrical equipment:

Nominal Voltage to Ground	Condition i	Condition ii	Condition iii
601 - 2,500 V	3 feet	4 feet	5 feet
2,501 - 9,000 V	4 feet	5 feet	6 feet
9,001 - 25,000 V	5 feet	6 feet	9 feet
25,001 - 75,000 V	6 feet	8 feet	10 feet
Above 75,000 V	8 feet	10 feet	12 feet

Where conditions (i), (ii), and (iii) are as follows:

( i ) Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by suitable wood or other insulating materials. Insulated wire or insulated bus bars operating at not over 300 volts shall not be considered live parts.

( ii ) Exposed live parts on one side and grounded parts on the other side. Concrete, brick, or tile walls will be considered as grounded surfaces.

( iii ) Exposed live parts on both sides of the workspace [not guarded as provided in condition (i)] with the operator between.

## SECTION

## 8

**LOCKOUT / TAGOUT PROCEDURES**

Lockout/tagout, commonly known as LOTO, is also referred to as “control of hazardous energy”. These procedures protect employees by making sure that machines and equipment are properly shut down during any service or maintenance. Servicing of equipment for which these procedures apply include:

- ✓ Repair and replacement work
- ✓ Renovation work
- ✓ Modifications
- ✓ Adjustments to power equipment

**8.1 INTRODUCTION**

When service or maintenance work is required, lockout and tagout devices help ensure personal safety from possible energy releases. All employees whose work involves hazardous energy sources must be trained in lockout/tagout procedures. Hazardous energy sources covered by the LOTO procedures include but are not limited to the following:

- |              |                   |
|--------------|-------------------|
| ✓ Electrical | ✓ Thermal         |
| ✓ Mechanical | ✓ Fluid and gases |
| ✓ Pneumatic  | ✓ Hydraulic       |

There are exceptions to the LOTO procedures if the following conditions apply:

- Servicing and maintenance of cord and plug-connected electric equipment in which the operator has exclusive control over the equipment by merely unplugging it.
- During hot tap operations on pressurized pipelines, providing that:
  - ✓ continuity of service is essential;
  - ✓ system shutdown is impractical;
  - ✓ documented procedures are used; and
  - ✓ employees receive equally effective alternate protection.
- Minor servicing for routine tasks, providing that the service:
  - ✓ is routine, repetitive, and an integral part of the production equipment;
  - ✓ occurs during normal production operations; and
  - ✓ does not require the operator to disable or by-pass a safety device.

## 8.2 LOCKOUT / TAGOUT MISCONCEPTIONS

The following are common misconceptions about LOTO procedures and related hazards:

- **Tags are as effective as locks in protecting employees.**  
This is FALSE. Locks are vastly superior to tags and must be used in conjunction with tags. Only under very limited circumstances are tags to be used without locks.
- **LOTO mainly affects workers who will be performing the service work.**  
This is FALSE. Lockout/tagout procedures require training for those employees who will also be in the area while the LOTO work is being conducted. These employees need to know that the LOTO work is being performed and not to attempt to start the equipment.
- **LOTO applies only during service or maintenance, not during “production”.**  
This is FALSE. If any activity exposes an employee to hazards associated with the unexpected activation or machinery or equipment (automatic start-up), or the release of stored energy, then proper lockout/tagout procedures apply.
- **A single “generic” approach for servicing different pieces of equipment will apply for all equipment.**  
This is FALSE. The concept of lockout/tagout will remain the same, however each piece of equipment will require specific shut-down and LOTO procedures.

## 8.3 BASIC PRINCIPLES OF LOCKOUT / TAGOUT

Lockout/tagout protects employees by blocking the release of energy from a power source to a piece of equipment. A pad lock or another form of lock is placed on the equipment’s energy source to prevent the equipment from operating. A tag is placed on the lock to identify the employee who is working on the piece of equipment and also to inform other employees that the equipment is being serviced.

### Energy-Isolating Devices

An energy-isolating device is any mechanical device that physically prevents the transmission or release of energy. The following are examples of energy-isolating devices:

- lockable plastic cap placed over an electric plug;
- lockable plastic cap placed over an electrical switch;
- lockable hasp placed on a breaker panel;
- lockable valve cap placed over a hand wheel valve;
- chain placed through a pulley system.

### 8.3 BASIC PRINCIPLES OF LOCKOUT / TAGOUT (CONT.)

#### Tagout Devices

Tagout involves placing a tag on the lockout device. This tag acts as a warning not to use the equipment. A tag must be used in conjunction with a lock because a tag alone does not restrain operation and is therefore less secure. Tags must clearly state the danger of operating the equipment such as DO NOT OPERATE and must be applied by the employee conducting the work.

- **Durability**  
Tags must be able to withstand environmental exposures and must not deteriorate in wet or corrosive environments.
- **Standardization**  
Tags must be the same size, shape, color and have the same print and format.
- **Substantial**  
Tags must be strong enough to avoid accidental removal.
- **Identifiable**  
Tags must identify the danger and also the employee who placed the tag.

### 8.4 LOCKOUT / TAGOUT PROCEDURES

The university's LOTO program requires that specific procedures be conducted to shut down and isolate equipment prior to performing maintenance. Each different type of equipment will have different shut down procedures. The shop supervisor is responsible for defining the specific shut down procedures and ensuring that all employees who will be working on the equipment are aware of the specific shut down procedures.

#### STEP 1 – PREPARATION

- **Supervisor** must notify all affected employees of the lock-out procedure.
- **Supervisor** must locate all energy sources powering the equipment.
  - Some machines may have more than one power source
- **Supervisor** must inform all affected employees of all power sources.

#### STEP 2 – SHUTTING DOWN THE EQUIPMENT

- Shutdown procedures should be posted at equipment.
- Turn off the energy at the main power source and all alternate sources.
- Attempt to restart the machine to guarantee the machine will not start.

Continued 

**STEP 3 – DISCHARGE STORED ENERGY**

- Equipment must be at “Zero Energy State” before servicing or maintenance:
  - ✓ Drain all valves
  - ✓ Bleed air from system
  - ✓ Eliminate stored hydraulic pressure
  - ✓ Eliminate stored mechanical energy
- Test the machine to make sure all energy sources were disconnected or discharged.

**STEP 4 – ELIMINATE THE ENERGY SOURCE**

- Use the appropriate method to physically prevent the transmission or release of energy:
  - ✓ Open Electrical circuit breaker
  - ✓ Disconnect switch
  - ✓ Shut Valve
  - ✓ Insert Line blank
  - ✓ Insert blocks

**STEP 5 – APPLY LOTO DEVICE**

- Apply the appropriate LOTO device and padlock to the energy source:
  - ✓ Test the equipment to make sure that it can not be energized
  - ✓ Attach a tag to identify the person who is locking out the equipment, the date, and the reason for lockout.

**MULTIPLE LOTO DEVICES**

- ✓ Each employee working on the equipment must apply his or her own lock & tag
- ✓ A LOTO device that can accommodate several locks must be used
- ✓ Never use another employee’s lock and never lend your lock

**STEP 6 – RESTORING POWER**

- Remove all tools from the area
- Replace all machine guards
- Each employee must remove their own tags, locks and lockout/tagout devices
- Reenergize all sources of energy and start equipment



## 8.5 EMPLOYEE TRAINING AND RESPONSIBILITIES

The university's LOTO program consists of providing training to employees as identified by the following employee categories:

- Authorized Employees are responsible for the LOTO program because they:
  - ✓ Repair or service equipment.
  - ✓ Must be able to identify energy sources.
  - ✓ Must be able to isolate and control energy sources.
- Affected Employees are responsible for the LOTO program because they:
  - ✓ Must be able to recognize a lockout/tagout procedure.
  - ✓ Must understand the purpose and not attempt to operate the equipment during LOTO.
- Other Employees:
  - ✓ Must be made aware that a LOTO procedure is occurring within their work area and they must know to leave the equipment alone during the LOTO procedure.

Each Affected employee or Authorized employee or Supervisor has the following responsibilities pertaining to the LOTO program:

- Affected Employee Responsibilities:
  - ✓ Notify maintenance, etc., when equipment needs repair or adjustment.
  - ✓ Leave all LOTO devices in place.
  - ✓ Verify equipment is safe to operate following LOTO.
  - ✓ Follow all safety rules while operating the equipment.
- Authorized Employee Responsibilities:
  - ✓ Repair or service equipment as needed using proper procedures.
  - ✓ Ensure that all energy sources are locked out.
  - ✓ Test equipment to verify residual energy is dissipated.
  - ✓ Use proper LOTO devices.
  - ✓ Remove LOTO devices after work is completed.
- Supervisor Responsibilities:
  - ✓ Ensure that all employees have been trained in LOTO procedures.
  - ✓ Ensure that employees have proper LOTO devices.
  - ✓ Ensure that proper shut-down procedures are posted.

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The university's LOTO program identifies training requirements for Affected employees and Authorized employees as follows:

- Authorized employees:
  - ✓ initially and at least annually.
- Affected employees:
  - ✓ at least initially.
- Authorized and Affected
  - ✓ whenever changes are made to jobs or procedures and when program deficiencies are noted.

**END OF SECTION**

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## SECTION

## 9

**PERSONAL PROTECTIVE EQUIPMENT**

The following sections provide general guidelines and requirements for using personal protective equipment. This chapter covers the following topics:

- ✓ Personal Protective Equipment Defined
- ✓ Arm and Hand Protection
- ✓ Body Protection
- ✓ Ear and Hearing Protection
- ✓ Eye and Face Protection
- ✓ Eye Wash Stations
- ✓ Foot Protection
- ✓ Head Protection
- ✓ Respiratory Protection Program
- ✓ Showers

**9.1 DEFINITION**

Personal Protective Equipment (PPE) includes all clothing and work accessories designed to protect employees from workplace hazards. Protective equipment should not replace engineering, administrative, or procedural controls for safety--it should be used in conjunction with these controls. Employees must wear personal protective equipment as required and when instructed by a supervisor.

**IMPORTANT:**

Always remove protective clothing before leaving the work area. Do not wear PPE in public elevators, classrooms, restrooms, break-rooms, etc.

**9.2 ARM AND HAND PROTECTION**

Arms and hands are vulnerable to cuts, burns, bruises, electrical shock, chemical spills, and amputation. The following are examples of hand protection that employees may be required to use:

- Disposable exam gloves
- Rubber gloves
- Nitrile gloves
- Neoprene gloves
- Leather gloves
- Non-asbestos heat-resistant gloves
- Metal-mesh gloves for meat cutters
- Cotton gloves

Always wear the appropriate hand and arm protection. The correct size glove must be worn to ensure proper protection. Wearing multiple layers of gloves may increase protection but decrease tactile response, layer gloves only when necessary. For arm protection, wear a long-sleeved shirt, a laboratory coat, chemical-resistant sleeves, or gauntlet-length gloves.

Follow these guidelines to ensure adequate arm and hand protection:

- Inspect and test new gloves for defects.
- Always wash your hands before and after using gloves. Wash chemical-protective gloves with soap and water before removing them.
- Do not wear gloves near moving machinery, the gloves may become caught.
- Do not wear gloves with metal parts near electrical equipment.

**IMPORTANT:**

- Gloves are easily contaminated. Avoid touching surfaces such as telephones, door knobs, etc. when wearing gloves.

### 9.3 BODY PROTECTION

Hazards that threaten the torso tend to threaten the entire body. A variety of protective clothing, including laboratory coats, long pants, rubber aprons, coveralls, and disposable body suits are available for specific work conditions.

- Rubber, neoprene, and plastic clothing protect employees from most acids and chemical splashes.
- Laboratory coats, coveralls, and disposable body suits protect employees and everyday clothing from contamination.
- Welding aprons provide protection from sparks.

**IMPORTANT:**

- Launder reusable protective clothing separate from other clothing.

### 9.4 HEARING PROTECTION PROCEDURES

Excessive noise levels may permanently or temporarily damage a person's hearing. Whenever possible, employees should reduce noise levels to an acceptable level. The following OSHA limits are to be used as guidelines for acceptable noise exposure levels for operations conducted at university facilities:

**SOUND LEVEL EXPOSURE LIMITS:**

DURATION / DAY	SOUND LEVEL
8	84
6	86
4	89
3	91
2	94
1.5	96
1	99
0.5	104*
0.25 or less	109*

\*Requires double hearing protection

Before using hearing protection to reduce noise exposure, try to reduce noise exposure either through engineering or administrative controls. A description of ways to reduce sound level exposures include the following:

**Engineering Controls**

- Installing insulating panels.
- Replacing worn or loose machine parts.
- Lubricating equipment to eliminate squeaks
- Use of large, low speed fans
- Placing heavy equipment on rubber mountings

**Administrative Controls**

- performing high noise operations during hours when people will be less affected.
- changing work procedures.
- Placing noisy machinery or operations in a separate area or room
- Considering the noise level of new equipment or processes before purchasing or implementing.

If you work in a high noise area in which the sound level exposures can not be reduced through engineering or administrative controls, then you wear hearing protection. Most hearing protection devices have an assigned rating that indicates the amount of protection provided. Depending on your level of exposure, you may choose from the following devices:

- ✓ Disposable earplugs
- ✓ Reusable earplugs
- ✓ Headband plugs
- ✓ Sealed earmuffs

Earplugs may be better in hot, humid, or confined work areas. They may also be better for employees who wear other PPE, such as safety glasses or hats. Earmuffs, on the other hand, may be better for employees who move in and out of noisy areas, because the muffs are easier to remove. Earmuffs and plugs are required when sound levels are  $\geq 104$  Db

To avoid contamination, follow these guidelines when using earplugs:

- ✓ Wash your hands before inserting earplugs.
- ✓ Replace disposable earplugs after each use.
- ✓ Clean reusable earplugs after each use.

### 9.5 EYE AND FACE PROTECTION

Employees must wear protection if hazards exist that could cause eye or face injury. Eye and face protection should be used in conjunction with equipment guards, engineering and administrative controls and general, safe working practices. Approved safety glasses and goggles must have "ANSI Z87.1" stamped somewhere on the eye protection.

Always wear the required eye and face protection when performing tasks such as grinding, buffing, welding, chipping, cutting, or pouring chemicals. Safety glasses with side shields provide protection against impact and splashes, but safety goggles provide protection against impact, splashes, and hazardous atmospheres.

#### **IMPORTANT:**

For personnel involved in laboratory work, refer to the Laboratory Chemical Hygiene Plan for the required eye and face protective equipment.

- If you wear prescription glasses, wear goggles or other safety protection over the glasses.
- Safety glasses with side-shields provide primary protection to eyes and are four times as resistant as prescription glasses to impact injuries.
- Goggles protect against impacts, sparks, chemical splashes, dust, and irritating mist. Wear full goggles, not just safety glasses, when working with chemicals.
- Eyecup welding goggles with filter lenses give protection from glare and sparks.
- A welding helmet protects from flash-burn due to welding, soldering, or brazing, but does not provide primary eye protection; safety glasses or goggles should be worn with the helmet.
- A face shield is designed to protect the face from some splashes or projectiles, but does not eliminate exposure to vapors. A face shield should be worn with goggles or safety glasses.
- Sunglasses are useful to prevent eyestrain from glare and to minimize ultraviolet light exposure but do not provide adequate impact protection.

## 9.6 EYE WASH / EMERGENCY SHOWER

Eye wash stations / emergency showers provide first response treatment for chemical contamination. The following is a discussion on the common types of emergency wash stations:

### Shower Station:

Emergency safety showers provide emergency treatment for people exposed to harmful materials. If a person is contaminated with harmful chemicals, the emergency shower provides an instant deluge to protect the person from further exposure. The following guidelines are for shower locations, travel distance, function and testing.

- Emergency showers must be located to ensure accessibility within 10 seconds.
- Travel distance between a shower and potential hazards may not exceed 100 feet.
- The shower must operate in a hands-free manner that once the valve is activated the water will continue to flow until the valve is manually closed.
- Departments having emergency showers will test the showers on a monthly basis. The test will consist of opening the valve for 3 to 5 minutes in order to flush the lines and to observe the water flow and pattern. A shower test curtain and bucket are required.

### IMPORTANT:

Emergency showers are for emergencies only. If a chemical spill occurs involving personal exposure, pull the cord and remove affected clothing immediately. Stay in the shower for at least 20 minutes or until medical assistance is provided.

### Eye Wash Stations:

- These stations are usually attached to emergency showers. They provide a continuous water flow and are required for laboratories and other locations with hazardous materials.
- Another type of eye wash station is one which attaches to a sink faucet. This style of eye wash has a by-pass valve which when pressed, diverts water from the faucet into the eye wash system. This style of eye wash is a hands-free operation once the by-pass valve is pressed and is easily connected to an existing sink.
- Departments having eye wash stations will test the stations on a monthly basis. The test will consist of opening the valve for 3 to 5 minutes in order to flush the lines and to observe the water flow and pattern. A shower test curtain and bucket are required.

**Drench Hoses at Sinks:**

- These stations provide a continuous water flow, however they are easily contaminated with sediment, and normally they do not have the required hands-free operation. Drench hoses are not ANSI approved, and are not preferred for laboratory usage. If you have a drench hose in your work area, flush the hose regularly to remove any sediment.

**Plastic Eye Wash Bottles:**

- These stations do not provide a continuous water flow, and they do not allow free use of both hands. They are **not** approved in laboratories or other hazardous areas. Plastic eye wash bottles are ideal, however, for portable eye wash needs and short-term operations where continuous flowing water is not immediately available. If you have a plastic eye wash bottle in your work area, make sure it is filled with sterile water or changed weekly.

**9.7 FOOT PROTECTION**

To protect feet and legs from falling objects, moving machinery, sharp objects, hot materials, chemicals, or slippery surfaces, employees should wear closed-toed shoes, boots, foot-guards, leggings, or safety shoes as appropriate. Safety shoes are designed to protect people from the most common causes of foot injuries - impact, compression, and puncture. Special foot protection is also available for protection against static electricity, sparks, live electricity, corrosive materials, and slipping.

**NOTE:**

Foot protection is particularly important in laboratory, agricultural, and construction work. Do not wear sandals or open-toed shoes in laboratories, shops, or other potentially hazardous areas.

**9.8 HEAD PROTECTION**

Accidents that cause head injuries are difficult to anticipate or control. If hazards exist that could cause head injury, employees should try to eliminate the hazards, but they should also wear head protection.

Safety hats protect the head from impact, penetration, and electrical shock. Head protection is necessary if you work where there is a risk of injury from moving, falling, or flying objects or if you work near high-voltage equipment.

Hard hats should be water resistant, flame resistant, and adjustable. Wear one of the following hard hats as appropriate for your work situation:

- ✓ Class A - General service, limited voltage protection
- ✓ Class B - Utility service, high-voltage protection
- ✓ Class C - Special service, no voltage protection



Follow these guidelines for head safety:

- Check the shell and suspension of your head-ware for damage before each use. Look for cracks, dents, gouges, chalky appearance, and torn or broken suspension threads. Discard damaged hats or replace broken parts with replacements from the original manufacturer.
- Discard any hat that has been struck or dropped from a great height, even if there is no apparent damage.
- Do not wear a hard hat backwards, unless this is necessary to accommodate other protective equipment (e.g., welders face shield).
- Do not paint the plastic shell of a hard hat or alter it in any way.

**END OF SECTION**

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**SECTION****10****RESPIRATORY PROTECTION PROGRAM**

It is the policy of Texas A&M University-Kingsville to provide employees with a safe and healthful working environment. The University uses engineering, administrative, and procedural controls to protect people from dangerous atmospheres, including harmful mists, smoke, vapors, and oxygen-deficient atmospheres. When these controls cannot provide adequate protection against harmful atmospheres, respiratory protection is necessary.

**10.1 INTRODUCTION**

The basic purpose of any respirator is to protect the respiratory system from inhalation of hazardous atmospheres. Respirators provide protection either by removing contaminants from the air before it is inhaled or by supplying an independent source of breathing air.

Contractors are responsible for providing their own respiratory protection programs and respiratory protective equipment.

**10.2 RESPONSIBILITIES****10.2.1 Environmental Health and Safety Office**

The Environmental Health & Safety (EHS) Office is responsible for establishing and maintaining a respiratory protection program consistent with the goal of protecting TAMUK personnel. The EHS Office will implement a Respiratory Protection Program which is designed and organized to ensure respirators are properly selected, used, and maintained by university personnel, and to meet federal regulatory standards (29 CFR 1910.134) and industry accepted standards (ANSI).

The EHS Office is also responsible for:

- assisting university departments in evaluating those tasks for which respiratory protection is thought to be necessary;
- determining the degree of hazard posed by the potential exposure;
- determine whether engineering or administrative controls are feasible;
- and specifying which respiratory protection device is to be used at each task.

In addition, the EHS Office will train personnel in the selection and use of respiratory protective devices and conduct qualitative fit-testing.

**10.2.2 Supervisor**

Supervisors will ensure each employee under his or her supervision using a respirator has received appropriate training in its use. Supervisors will ensure annual medical evaluations are scheduled, provide appropriate respirators and accessories, ensure adequate storage facilities, and proper respirator equipment maintenance is conducted.

Supervisors must identify the tasks which may require the use of respiratory protection, and communicate these tasks to the EHS Office. Supervisors shall ensure that all employees engaging in such work use the appropriate respirators at all times.

### **10.2.3 Respirator Wearers**

It is the responsibility of each employee to wear his/her respirator when and where required and in the manner in which they were trained. Respirator wearers must report any malfunctions of the respirator to his/her supervisor immediately. The respirator wearer must also guard against mechanical damage to the respirator, clean the respirator as instructed, and store the respirator in a clean, sanitary location.

### **10.2.4 Contractors**

Contractors are required to develop and implement a respiratory protection program for their employees who must enter into or work in areas where exposure to hazardous materials can not be controlled or avoided. This program must meet OSHA regulations and include issuance of respirators, medical evaluations, fit testing and training.

## **10.3 MEDICAL EVALUATION**

Employees who are required to wear respiratory protection because of federal or state standards, must undergo an initial medical evaluation and annually thereafter. During the medical evaluation the Occupational Physician makes a determination as to whether or not an employee can wear the required respirator without physical or psychological risk. Based on the overall health of the individual and special medical tests (pulmonary function studies, EKG, etc.) as appropriate, the examining physician determines whether or not the individual will be restricted from wearing respiratory protective equipment.

Specific medical tests and procedures will be determined by the Occupational Health Physician and will be in accordance with OSHA medical surveillance requirements and/or NIOSH recommendations.

## **10.4 USAGE, TYPE AND SELECTION OF RESPIRATORY PROTECTION DEVICES**

### **10.4.1 Respirator Use**

Respiratory protection is authorized and issued for the following personnel:

- Workers in areas known to have contaminant levels requiring the use of respiratory protection or in which contaminant levels requiring the use of respiratory protection may be created without warning (e.g., emergency purposes such as hazardous material spill responses).
- Workers performing operations documented to be health hazardous and those unavoidably required to be in the immediate vicinity where similar levels of contaminants are generated.
- Workers in suspect areas or performing operations suspected of being health hazardous but for which adequate sampling data has not been obtained.

### **10.4.2 Use of Respirators When Not Required Under the Standard**

In accordance to Appendix D of the 29CFR 1910.134, Texas A&M University-Kingsville is providing the following information to employees who wear respirators when respirators are not required under the standard.

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Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker.

On occasions, employees may be required to wear respirators or dust masks to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If the university provides respirators or dust filters to employees who will not be exposed to hazardous substances in excess of the permissible exposure limit (PEL), the following guidelines will be followed to ensure that the respirator itself does not present a hazard. These guidelines must also be followed for those employees that provide his or her own respirator to be worn in areas that do not exceed the PEL.

1. Medical evaluations are not required.
2. The EHS Office will provide approved respirators certified for use to protect against the contaminant of concern.
3. The EHS Office will provide annual training on respiratory protection. This training will consist of providing information on use and warnings regarding the respirators limitations, maintenance of the respirator, and cleaning and care of the respirator.
4. The EHS Office will conduct a Qualitative Fit Test to assure a proper fitting respirator.

### 10.4.3 Types of Respirators

#### A. Air-Purifying Respirators

These respirators remove air contaminants by filtering, absorbing, or by chemically reacting with the contaminants as they pass through the respirator canister or cartridge. The Air-Purifying Respirator is to be used only where adequate oxygen (19.5 to 23.5 percent by volume) is available. Air-purifying respirators can be classified as follows:

1. Particulate removing respirators filter out dusts, fibers, fumes and mists. These respirators may be single-use disposable respirators or respirators with replaceable filters.
2. Gas/vapor-removing respirators, which remove specific individual contaminants or a combination of contaminants by absorption, adsorption or by chemical reaction. Gas masks and chemical-cartridge respirators are examples of gas- and vapor-removing respirators.
3. Combination particulate and gas/vapor-removing respirators, which combine the respirator characteristics of both kinds of air-purifying respirators.

## Function and Limitations of Air-Purifying Respirators:

Ambient air, prior to being inhaled, is passed through a filter, cartridge, or canister, which removes contaminants. Different filters are required to remove different contaminants. Contact the EHS Office for assistance in determining the correct filter or cartridge.

### 1. Non-powered Air-Purifying Respirator

The breathing action of the wearer operates the non-powered type of respirator. Equipped with a tight-fitting facepiece and cartridge(s), the respirator is secured to the face by means of a strap or harness. The wearer pulls air through the cartridge(s) during inhalation.

- Air purifying respirators use ambient air and **cannot** be used in oxygen deficient atmospheres (must be at least 19.5% oxygen); Immediately Dangerous to Life or Health (IDLH) atmospheres; or areas where the identity or concentration of a contaminant is unknown.
- The respirator's cartridge(s) must be specifically selected according to the contaminant. Using the wrong cartridge(s) could cause injury to the user.
- The cartridge(s) must be replaced if the user notices an odor, taste, throat irritation or breathing becomes difficult. Wet, damaged, and grossly contaminated cartridge(s) must also be replaced.

#### Mask Types:

- ✓ Full-face mask - covers the face from the hairline to below the chin. This type of mask provides eye protection.
- ✓ Half-mask - covers the face from above the nose to below the chin.

### 2. Powered Air-Purifying Respirator

Powered air-purifying respirators filter the ambient air using a small pump and provides the filtered air to the user in a positive-pressure continuous flow mode. The user wears a small pump with air filters around the waist and a helmet & face shield unit. The air is pumped through the cartridge(s) and delivered to the helmet through a small flexible hose.

- Powered air-purifying respirators must also not be used in an oxygen deficient atmosphere; Immediately Dangerous to Life or Health (IDLH) atmospheres; or areas where the identity or concentration of a contaminant is unknown.
- Powered air-purifying respirator's cartridge(s) must be specifically selected according to the contaminant and the cartridge(s) must be replaced if the user notices an odor, taste, throat irritation or breathing becomes difficult. Wet, damaged, and grossly contaminated cartridge, canister or filter must also be replaced.

3. Disposable or single-use respirators are made of cloth or paper and are primarily used for nuisance dusts.

**B. Supplied-Air Respirators**

These respirators provide breathing air independent of the environment. Such respirators are to be used when the contaminant has insufficient odor, taste or irritating warning properties, or when the contaminant is of such high concentration or toxicity that an air-purifying respirator is inadequate. Supplied- air respirators, also called air-line respirators, are classified as follows:

**1. Demand**

This respirator supplies air to the user on demand (inhalation) which creates a negative pressure within the facepiece. Leakage into the facepiece may occur if there is a poor seal between the respirator and the user's face.

**2. Pressure-Demand**

This respirator maintains a continuous positive pressure within the facepiece, thus preventing leakage into the facepiece.

**3. Continuous Flow**

This respirator maintains a continuous flow of air through the facepiece and prevents leakage into the facepiece.

**C. Self-Contained Breathing Apparatus (SCBA)**

This type of respirator allows the user complete independence from a fixed source of air and offers the greatest degree of protection but is also the most complex. Training and practice in its use and maintenance is essential. SCBAs will only be used at the university in emergency situations.

The following table is a brief overview of limitations of the various types of respiratory protection devices available to university employees.

<b>RESPIRATOR TYPE</b>	<b>PROTECTION FROM</b>	<b>NO PROTECTION FROM</b>
Dust Mask	<ul style="list-style-type: none"> <li>✓ Dust</li> <li>✓ Grass and weeds</li> </ul>	<ul style="list-style-type: none"> <li>× Chemical vapors or gases</li> <li>× Oxygen deficiency</li> </ul>
Respirator with HEPA cartridge	<ul style="list-style-type: none"> <li>✓ Dust</li> <li>✓ Fumes</li> <li>✓ Smoke</li> <li>✓ Mist</li> <li>✓ Microorganisms</li> <li>✓ Asbestos</li> </ul>	<ul style="list-style-type: none"> <li>× Chemical vapors or gases</li> <li>× Oxygen deficiency</li> </ul>
Chemical cartridge or canister respirator	<ul style="list-style-type: none"> <li>✓ Specific gases up to a particular concentration</li> </ul>	<ul style="list-style-type: none"> <li>× Oxygen deficiency</li> <li>× Particulate matter</li> </ul>
Air supplied respirator/SCBA	<ul style="list-style-type: none"> <li>✓ Particulates</li> <li>✓ Chemical Vapors and gases</li> <li>✓ Oxygen Deficiency</li> </ul>	

#### 10.4.4 Respirator Selection

Selection of the proper respirator(s) to be used in any work area or operation at Texas A&M University-Kingsville is made only after a determination has been made as to the real and/or potential exposure of employees to harmful concentrations of contaminants in the workplace atmosphere. This evaluation will be performed prior to the start of any routine or non-routine tasks requiring respirators. Respiratory protective devices will be selected using ANSI Z88.2, NIOSH Certified Equipment List, and/or the NIOSH Respirator Selection Decision Logic as a guide. The following items will be considered in the selection of respirators:

- Identity and concentration of contaminant;
- Hazards of contaminant;
- General environment (open shop or confined space, etc.);
- Known limitations of the respiratory protective device;
- Comfort, fit, and worker acceptance; and
- Other contaminants in the environment or potential for oxygen deficiency.

Follow these guidelines for selecting the correct respirator:

##### **Use a Dust Mask:**

- For procedures that produce only nuisance dust and not toxic particles. Examples: Sanding wood, sweeping sawdust, mowing grass, etc.

##### **Use a Respirator with HEPA Filters:**

- If the contaminate contains toxic particles or is a biological hazard. Examples: Scraping lead based paint; welding fumes; asbestos cleanup; handling animal carcasses.
- HEPA Filters are only intended to provide protection against particles and fibers and **not** chemical vapors.

##### **Use a Respirator with Chemical Filters:**

- For operations dealing with organic or inorganic chemicals. Examples: Painting operations; pesticide applications; operations involving acids.
- Wear a respirator with chemical filters only when you know what chemical is present and its concentration.
- Wear a respirator with chemical filters only when there is adequate oxygen  $\geq 19.5\%$ .

##### **Use a Supplied Air Respirator (Air Line):**

- If the identity and/or concentration of the contaminant is not known.
- If an oxygen deficient atmosphere is known or suspected.
- If an IDLH condition exists.
- It is unlikely that any work with Supplied Air Respirators will be required by university employees.

##### **Use a SCBA instead of an airline respirator:**

- SCBAs will only be utilized in emergency situations.

### 10.4.5 Identification of Respirator Cartridges

Respirator cartridges and canisters are designed to protect against individual or a combination of potentially hazardous atmospheric contaminants, and are specifically labeled and color coded to indicate the type and nature of protection they provide. Respirator cartridges and respirators are manufacturer specific. Respirator cartridges from one manufacturer can not be used with another manufacturer's respirator.

It is a common industry practice to color code respirator cartridges as to the type of contaminant the cartridge protects against. Most manufactures follow the similar color code, however, prior to wearing a respirator always ensure that the correct cartridge has been selected and do not identify the cartridge simply by its color.

The following chart identifies the most common types of cartridges along with their identifying color:

Cartridge Color	Description	Approved for Type of Contaminants
Olive Green	Multi-Contaminant Cartridge	Organic vapors, chlorine, hydrogen chloride, chlorine dioxide, sulfur dioxide, ammonia, methylamine, formaldehyde, hydrogen fluoride, hydrogen sulfide (escape only)
Black	Organic Vapor Cartridge	Organic vapors (i.e., paint, paint thinner, acetone, hexane, etc.)
Yellow	Organic Vapors/ Acid Gas Cartridge	Organic vapors, chlorine, hydrogen chloride, sulfur dioxide, hydrogen fluoride, hydrogen sulfide (escape only)
White	Acid Gas Cartridge	Chlorine, hydrogen chloride, sulfur dioxide, formaldehyde
Green	Ammonia/Methylamine Cartridge	Ammonia, methylamine
Magenta (hot pink)	P100 (HEPA) Cartridge	At least 99.97% efficient against all types of particulate aerosols (i.e., lead dust, asbestos, etc). Will not protect against vapors



### 10.4.6 Warning Signs of Respirator Failure

All respirator cartridges have a range of effective use or a “life-span”. When the cartridge has been exposed to large amount of contamination or moisture the cartridge becomes breached and is no longer effective. The following are methods in which the respirator user can determine if his or her respirator cartridge has become ineffective.

- Particulate Air-Purifying

When breathing difficulty is encountered with a filter respirator (due to partial clogging with increased resistance), the filter(s) must be replaced. Disposable filter respirators must be discarded.

- Gas or Vapor Air-Purifying

If, when using a gas or vapor respirator (chemical cartridge or canister), any of the warning properties (e.g., odor, taste, eye irritation, or respiratory irritation) occur, promptly leave the area and check the following:

- ✓ Proper face seal
- ✓ Damaged or missing respirator parts
- ✓ Saturated or inappropriate cartridge or canister

If no discrepancies are observed, replace the cartridge or canister. If any of the warning properties appear again, the maximum use concentration (MUC) of the contaminants may have exceeded the cartridge or canister design specification. When this occurs an airline respirator or SCBA is required.

## 10.5 RESPIRATOR TRAINING

University employees who may be required to wear a respirator shall receive ANSI/AIHA Z288.10-2001 training, as well as the contents of Texas A&M University-Kingsville’s Respiratory Protection Program and his or her responsibilities under it. Employees will be trained on the proper selection and use, as well as the limitations of the respirator. Training also covers how to ensure a proper fit before use and how to determine when a respirator is no longer providing the protection intended.

The EHS Office will provide respirator training consisting of the following:

- Nature and degree of respiratory hazard
- Respirator selection, based on the hazard and respirator capabilities and limitations
- Donning procedures and fit tests including hand's-on practice
- Care of the respirator, e.g., need for cleaning, maintenance, storage, and/or replacement
- Use and limitations of respirator

Respirator training is required initially and annually thereafter and only upon successful completion of the medical questionnaire, examination, and fitness test performed by a physician or other licensed health care professional (PLHCP).

Respirator training will be properly documented (29 CFR 1910.134 Appendix A) and will include the type and model of respirator for which the individual has been trained and fit-tested.

## 10.6 RESPIRATOR FIT TESTING

A fit test shall be used to determine the ability of each individual respirator wearer to obtain a satisfactory fit with any air-purifying respirator. A qualitative fit tests (QLFT) will be performed. Personnel must successfully pass the fit test before being issued an air-purifying respirator.

No university employee is permitted to wear a negative-pressure respirator in a work situation until he or she has demonstrated that an acceptable fit-factor of 100 or less can be obtained. Respirator fitting is conducted initially upon assignment to a task requiring use of a respirator. Refitting is conducted annually thereafter upon successful completion of the respirator training.

Fit testing will be conducted by the EHS Office and the test results will be the determining factor in selecting the type, model, and size of negative-pressure respirator for use by each individual respirator wearer.

### 10.6.1 Qualitative Fit Testing

Federal regulations (29 CFR 1910.134) require qualitative fit tests (QLFT) of respirators and describe step-by-step procedures. This test checks the subject's response to a chemical introduced outside the respirator face-piece. This response is either voluntary or involuntary depending on the chemical used. Several methods may be used. The ESH Office will utilize the irritant smoke method while conducting the QLFT.

#### Irritant Smoke Test

The irritant smoke test is an involuntary response test. Air purifying respirators must be equipped with a high efficiency particulate air (HEPA) filter for this test. An irritant smoke, usually either stannic chloride or titanium tetrachloride, is directed from a smoke tube toward the respirator. If the test subject does not respond to the irritant smoke, a satisfactory fit is assumed to be achieved. Any response to the smoke indicates an unsatisfactory fit.

The irritant smoke is an irritant to the eyes, skin, and mucous membranes. It should not be introduced directly onto the skin. The test subject must keep his or her eyes closed during the testing if a full face-piece mask is not used.

### 10.6.2 Fit Checking

Each time a respirator is donned (worn), the user must perform positive and negative pressure fit checks. These checks are not a substitute for fit testing. Respirator users must be properly trained in the performance of these checks and understand their limitations.

- Negative Pressure Check Applicability and Limitations:

This test cannot be carried out on all respirators; however, it can be used on face-pieces of air purifying respirators equipped with tight-fitting respirator inlet covers and on atmosphere supplying respirators equipped with breathing tubes which can be squeezed or blocked at the inlet to prevent the passage of air.

- Negative Pressure Check Procedure:

Cover the inlet opening of the respirator's cartridge(s) with the palm of the hand so that it will not allow the passage of air. Inhale gently and hold for at least 10 seconds. If the face-piece collapses inward slightly and no inward leakage of air into the face-piece is detected, it can be reasonably assumed that the respirator has been properly positioned and the exhalation valve and face-piece are not leaking.

- Positive Pressure Check Applicability and Limitations:

This test cannot be carried out on all respirators; however, respirators equipped with exhalation valves can be tested.

- Positive Pressure Check Procedure:

Close off the exhalation valve with the palm of the hand. Exhale gently. If the face-piece lifts off of the face slightly and no outward leakage of air is detected, it can be reasonably assumed that the respirator has been properly fitted to the face.

### 10.6.3 Special Problems

There are certain conditions that must be met prior to wearing a respirator. The two most common conditions which interfere with a respirator's performance are as follows:

- Facial Hair

No attempt will be made to fit a respirator on an employee who has facial hair which comes between the sealing periphery of the face-piece and the face, or if facial hair interferes with normal functioning of the exhalation valve of the respirator.

- Glasses and Eye/Face Protective Devices

Proper fitting of a respiratory protective device face-piece for individuals wearing corrective eyeglasses or goggles, may not be established if temple bars or straps extend through the sealing edge of the face-piece. If eyeglasses, goggles, face shield or welding helmet must be worn with a respirator, they must be worn so as not to adversely affect the seal of the face-piece. If a full-face-piece respirator is used, special prescription glasses inserts are available if needed.

### 10.6.4 Respirator User Cards

The EHS Office will issue each respirator user a card stating that the employee has been trained, fitted, and medically evaluated to use respirators. A Respirator User Card will include:

1. Name and identification number of the worker.
  2. The statement: " (name) has been trained, fitted and medically evaluated to use the respirator(s) indicated."
  3. The type(s), model(s), and size(s) of respirator(s) that the cardholder was issued.
  4. Expiration date of card.
-

### **10.6.5 Recordkeeping**

The EHS and Physical Plant Offices shall maintain employee fit test records. The documentation shall include the type of respirator, brand name and model, method of test and test results, test date and the name of the instructor/tester (See 29 CFR 110.134(m)).

## **10.7 ISSUANCE AND MAINTENANCE OF RESPIRATORS**

### **10.7.1 Issuance of Respirators**

The EHS Office will assist departments in the selection of respirators and cartridges. Each respirator user will be issued his or her own respirator. Respirators are not to be shared between employees.

Respiratory protective equipment shall not be ordered, purchased, or issued to personnel unless the respirator wearer has received a medical evaluation, respirator training and a fit test. New employees who require respiratory protective equipment, must be placed into the respirator program before being issued equipment.

### **10.7.2 Maintenance**

Even though most respirators are basically maintenance-free, there are requirements that each wearer must complete before and after wearing a respirator.

The maintenance of respiratory protective devices involves a thorough visual inspection for cleanliness and defects (i.e., cracking rubber, deterioration of straps, defective exhalation and inhalation valves, broken or cracked lenses, etc.). Worn or deteriorated parts must be replaced prior to using. No attempt must be made to replace components, make adjustments or make repairs on any respirator beyond those recommended by the manufacturer. Under no circumstances will parts be substituted as such substitutions will invalidate the approval of the respirator.

### **10.7.3 Cleaning of Respirators**

Employees shall clean and sanitize their respirator after each use. Cleaning and disinfection of respirators must be done frequently to ensure that contaminants are removed from the surface of the respirator. The following procedure is recommended for cleaning and disinfecting respirators:

1. Remove and discard all used filters, cartridges, or canisters.
2. Wash face-piece in a mild soap and water solution.
3. Rinse completely in clean, warm water.
4. Air dry in a clean area in such a way as to prevent distortion.
5. Clean other respirator parts as recommended by the manufacturer.
6. Inspect valves, head straps, and other parts to ensure proper working condition.
7. Reassemble respirator and replace any defective parts.
8. Wipe the respirator with an alcohol pad.
9. Place in a clean, dry plastic bag or other suitable container for storage after each cleaning and disinfection.

### 10.7.4 Storage

After inspection, cleaning, and any necessary minor repairs, store respirators to protect against sunlight, heat, extreme cold, excessive moisture, damaging chemicals or other contaminants.

Respirators shall always be placed in sealable plastic bags when not in use. Respirators may be stored in such places as lockers or tool boxes only if they are first placed in carrying cases or cartons. Respirators shall be packed or stored so that the facepiece and exhalation valves will rest in a normal position and not be crushed.

### 10.8 PROGRAM SURVEILLANCE

The evaluation of the Respirator Program will include investigating wearer acceptance of respirators, inspecting respirator program operation, and appraising protection provided by the respirator. Evidence of excessive exposure of respirator wearers to respiratory hazards will be followed up by investigation to determine why inadequate respiratory protection was provided. The findings of the respirator program evaluation will be documented, and this documentation will list plans to correct faults in the program and set target dates for the implementation of the plans. These evaluations will be conducted at least annually.

### 10.9 RECORD KEEPING

The following records shall be developed and maintained for the University's Respiratory Protection Program:

Record	Location
Medical Evaluations	Human Resources Office College Hall Rm 210
Training Records	Human Resources Office College Hall Rm 210
Fit Test Records	EHS Office Lewis Hall Rm133
Respiratory Protection Program Manual	EHS Office Lewis Hall Rm133
Hazard Evaluations (Air sampling results, surveys, respirator selection records)	EHS Office Lewis Hall Rm133
Program Evaluations	EHS Office Lewis Hall Rm133

**END OF SECTION**

## SECTION

## 11

**AGRICULTURAL SAFETY PROCEDURES**

The following sections provide agriculture safety guidelines and procedures. This chapter covers the following topics:

- |                              |                    |
|------------------------------|--------------------|
| ✓ Pesticide Chemical Safety  | ✓ Grain Storage    |
| ✓ Fertilizer Chemical Safety | ✓ Livestock Safety |
| ✓ Farm Equipment Safety      | ✓ Manure Pits      |
| ✓ Fuel Storage               | ✓ Towing Safety    |

**11.1 Introduction**

This section discusses agricultural chemical safety for pesticides, including rodenticides, insecticides, herbicides, etc. Pesticides are chemicals that protect crops and livestock from rodents, insects, disease, or weeds. They also control pests that endanger human health. Because pesticides are poisonous, they can be extremely dangerous to humans. Before applying commercial pesticides, always ensure environment safety, your safety, and the safety of others.

Here are several government agencies that govern the use of commercial pesticides. For more information on pesticide usage, contact one or more of the following groups: Texas Department of Agriculture, Texas Department of Health, Structural Pest Control Board, Texas Commission on Environmental Quality (TCEQ), Environmental Protection Agency (EPA).

**11.2 General Pesticide Safety**

The following sections provide general or specific guidelines for handling pesticides. To help reduce the hazards associated with pesticides

- Do not transport, mix, or use agricultural chemicals unless you can summon help, if needed.
- Keep an ample supply of water nearby to flush exposed areas, if a spill occurs.
- Check all pesticides equipment before you use it to ensure proper working condition.
- Read pesticide labels carefully. Follow the label directions when mixing, applying, storing, or disposing of pesticides.
- Wear personal protective equipment to prevent dermal, inhalation, and mucous membrane exposure.
- Do not eat, drink or smoke when handling pesticides.

Continued

- Launder clothing and bath after working with pesticides to ensure that all chemicals are removed from clothing and skin.
- Do not use agricultural pesticides around the home or office.
- Observe assigned reentry intervals. Always wear the appropriate clothing when entering fields before the reentry date.
- Always handle pesticides downhill from wells, cisterns, sink holes, ditches, or standing water.
- Do not apply pesticides when rain is imminent or if wind could affect the spraying area.
- Triple-rinse spray equipment and empty containers. Apply the rinse water to the treated field.
- Properly dispose of empty containers.

### 11.3 Pesticide Preparation

Preparation is essential for chemical safety. Follow these steps to properly prepare for pesticide application:

#### **Plan Ahead**

- Always read chemical labels before attempting to work with pesticides. Prepare for a possible emergency by maintaining a personal decontamination site, a chemical spill kit, and by knowing the proper first aid procedures associated with your pesticide.

#### **Move Pesticides Safely**

- Careless chemical transportation can cause spills and contamination. Do not carry pesticides in an enclosed area, such as a car. Be sure to secure the pesticides to prevent shifting or bouncing. In addition, never leave your vehicle unattended when transporting chemicals.

#### **Select Appropriate Personal Protective Equipment**

- Regardless of the pesticide's toxicity, always wear a long-sleeve shirt and pants when working with pesticides. Wear additional protective equipment, as necessary.

#### **Select Application Equipment**

- Choose suitable equipment to properly apply pesticides. Before using the equipment, inspect it for good working order.

#### **Provide Prior Notification**

- Before applying pesticides, inform all people in or around the application area. Notification allows people to protect themselves from harmful chemicals.

## 11.4 Mixing Pesticides

Always read and carefully follow label directions when mixing pesticides. Even if you are familiar with a particular chemical, reread the label to ensure that you have the latest safety information. In addition, follow these guidelines for mixing pesticides:

### **Wear Personal Protective Equipment**

- Always wear protective gear when handling hazardous chemicals such as pesticides.

### **Work in a Safe Area**

- The pesticide mixing and loading should be well ventilated, well lighted, and downhill from any water sources. Concrete slabs are ideal for mixing chemicals since they allow for easy cleanup.

### **Measure Chemicals Correctly**

- Measure and mix pesticides carefully. Never mix different pesticides except as directed by the label or chemical manufacturer. Do not use more chemical than prescribed by the pesticide label. The overuse of pesticides is illegal, and may result in the following:
  - ✓ Higher pest control costs.
  - ✓ Pesticide residue in food.
  - ✓ Groundwater pollution.
  - ✓ Pesticide resistance.

### **Pour Pesticides Carefully**

- Always wear a face shield and take care not to splash chemicals when pouring pesticides. Never use your mouth to siphon pesticides.

## 11.5 Applying Pesticides

When you apply pesticides, you are responsible for protecting yourself, other people, and the environment. Follow these guidelines when applying pesticides:

### **Minimize Exposure**

- Even mildly toxic chemicals can harm you if you use them daily. Take care to minimize your exposure to any chemical. Avoid working in pesticide spray, mist, or runoff. Always work with another person when working with hazardous chemicals.

### **Avoid Applying Pesticides in Sensitive Area**

- Avoid spraying pesticides near beehives or areas that humans normally occupy (i.e., schools, playgrounds, hospitals, etc.). If you must apply pesticides in sensitive areas, do so when the weather is calm and when people are not around.





**Avoid Pesticide Drift, Runoff, and Spills**

- Pesticides that fall outside the targeted application area can be very hazardous. Choose weather conditions, equipment, and chemicals that do not lend themselves to these hazards.

**Avoid Equipment Accidents**

- Equipment accidents are often caused by poor maintenance and improper work habits. Avoid equipment accidents by following all operating instructions.

**11.6 Pesticide Storage and Disposal Procedures**

Always try to use all the pesticide in your application tank. If pesticide remains, discharge remainder on other target locations. After emptying the tank, clean and store equipment.

The following summary of EPA storage criteria should be followed for pesticides labeled with the signal words DANGER, POISON, or WARNING, or the skull and crossbones symbol. These procedures and criteria are not necessary for the storage of pesticides classed as less toxic (CAUTION word on the label) or for those registered for use in the home or garden.

**Site Storage:**

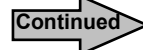
- Locate where flooding is unlikely.
- Locate where runoff will not contaminate any water system.

**Storage Facility:**

- Dry, well ventilated, separate room, building, or covered area with fire protection (i.e., dry chemical fire extinguisher).
- Secured by fence and/or locked doors.
- Signs on rooms/buildings to provide hazard warning (i.e., DANGER, POISON, PESTICIDE STORAGE).
- Movable pesticide equipment is labeled as contaminated and not removed from the site until decontaminated.
- Provisions are available for the decontamination of personnel and equipment; contaminated water disposed of as excess pesticide; contaminated runoff collected and treated as excess pesticide.

**Fire Control:**

- Where large quantities are stored; inform the fire department.
- Furnish the fire chief with home telephone numbers of responsible persons.

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**Operational Procedures:**

- Store pesticide containers in rows with labels plainly visible.
- Place contents from damaged containers in sound containers.
- If relevant, segregate pesticides by formulation.
- Store rigid, containers in an upright position, with tight lids/bungs. Off the ground, in a manner to permit access and inspection.
- Maintain a complete inventory indicating the number and identity of containers.
- Check containers regularly for corrosion and leaks.
- Keep suitable absorbent on hand in case of spills. Contact the EHS Office if absorbent material is needed.

**Safety Precautions:**

- Inspect pesticide containers for leaks before handling them.
- Do not allow unauthorized personnel in the storage area.
- Do not store pesticides next to items intended for consumption by animals or humans.
- Do not eat, drink, smoke, or chew tobacco where pesticides are present.
- Do not store beverages, food, eating utensils, or smoking material in the storage or loading areas.
- Wear appropriate protective gloves while handling containers of pesticides.
- Wash hands immediately after handling pesticides. Remove contaminated protective clothing immediately; extra sets of clean clothing should be nearby.

**Disposal:**

Unused or outdated pesticides must be disposed of as hazardous chemicals. Occasionally throughout the year, the Agriculture Extension Office of Kleberg County and the surrounding counties provide a pesticide disposal service. Contact the EHS Office if your department has pesticide that has exceeded its shelf life.

The City of Kingsville will allow a small volume of empty pesticide containers to be disposed of as municipal waste (ordinary trash) **if:**

- ✓ the containers are triple rinsed with water and the rinsate is collected and applied to the field;
- ✓ container labels are removed or defaced and;
- ✓ the containers are punctured

**Important:**

Never leave pesticide containers at a field site. Be sure to account for every container used, and safely dispose of empty containers.

**Note:**

Store herbicides separately from other pesticides. Some herbicides may volatilize and contaminate the pesticide.

### 11.7 Pesticide Cleanup

Always thoroughly clean all pesticide equipment as soon as you are through with it. Leaving pesticide residue in mixing, loading, or application equipment can result in accidental injury or death to livestock or people or unwanted contamination to plants or soil.

Clean the inside and outside of pesticide equipment, including nozzles. Dispose of contaminated rinsate as directed on the chemical label.

#### **IMPORTANT:**

Do not allow pesticide rinsate to contaminate water supplies.

### 11.8 Pesticide Exposure

Time is of the essence when pesticide overexposure occurs. However using an antidote kit may not be the best course of action. Unless a physician has stated that an antidote is needed, it should not be administered. Some antidotes such as atropine can be poisonous if misused. A prescription may even be necessary to acquire the antidote.

If medical assistance is available locally through a hospital, physician, or ambulance service, you should call 911 (or 9-911, from a campus phone) or take the individual directly to the nearest emergency treatment center instead of maintaining an antidote kit on site.

### 11.9 Fertilizer Chemical Safety

Ammonia fertilizers are widely used because of their effectiveness in getting large amounts of nitrogen into the soil. Anhydrous ammonia fertilizer is essentially dry ammonia gas compressed into liquid form. This material is very harmful if accidentally spilled or sprayed onto body surfaces. It can cause blindness if it gets into the eyes. Also, high concentrations of ammonia gas in the air are very irritating to the lungs. Always use appropriate personal protective equipment and exercise rigorous care when handling, applying, and storing such toxic or irritating materials.

### 11.10 fertilizer Safety Precautions

Most ammonia fertilizer accidents occur when the material is being transferred from one tank to another. One of the major causes of accidents are hoses coming loose or bursting.

Exercise care in handling and use of ammonia fertilizer by doing the following:

- Always wear chemical goggles and adequate skin cover.
- Inspect equipment before each day's work and correct any abnormal conditions.
- Water is the first aid treatment of choice when ammonia gets into the eyes or on the skin. In case of contamination, flush affected areas for 15 minutes and get medical help as soon as possible.

Continued 

- Make sure all valves, lines, and connections are secure in order to reduce the chance of either leaks or being doused during transfer

**Observe these precautions when working with anhydrous ammonia:**

- Use good equipment specially designed for handling anhydrous ammonia.
- Keep your equipment in good repair. Worn hoses, loose connections, and other defects can cause accidents.
- Follow the prescribed sequence of operations for connecting to, filling, and disconnecting from the applicator tank.
- Never leave the equipment during the transfer operation.
- After filling the applicator tank, close all valves.

### **11.11 Ammonia Nitrate Storage**

The guidelines listed below must be followed when storing ammonium nitrate fertilizer:

- Not more than 60 tons of ammonium nitrate shall be stored.
- Storage buildings shall have adequate ventilation.
- All flooring in storage and handling areas shall be of noncombustible material, without open drains or traps.
- Buildings and structures shall prevent direct sunlight contact and be dry and free from water seepage through the roof, walls, and floors.
- Bags of ammonium nitrate shall be stored no closer than 30 inches of the storage building walls and partitions.
- The height of piles shall not exceed 20 feet. The width of piles shall not exceed 20 feet nor the length 50 feet.
- Aisles shall be provided to separate piles by a clear space of not less than 3 feet in width.
- Ammonium nitrate shall be stored separately from other flammable or combustible materials (i.e. paper, rags, hay, oils).
- Broken bags, spilled material, and discarded containers shall be promptly gathered and disposed.
- Smoking is **prohibited** in ammonium nitrate storage areas.
- Fire control devices such as a water hose or portable fire extinguishers must be available in the storage area.

### 11.12 Farm Equipment Safety

New farm equipment is specifically designed for safe handling and operation. Older farm equipment is outdated and not equipped with the latest standard safety features.

The following sections discuss general guidelines for farm equipment safety, including farmstead equipment, farm field equipment, guards, shields, and power take-off equipment (PTOs).

Keeping equipment in good working condition is half the formula for being safe. The other half is ability and awareness of the person operating the equipment.

**Safety = Good Working Equipment + Able and Aware Operators**

Equipment failure causes some farm accidents; however, most farm accidents are caused by tired, stressed, rushed, distracted, or incompetent operators.

In addition to the specific safe handling rules for each type of farm equipment, there are ten basic guidelines for equipment safety:

- Read and comply with the operator's safety manual for each piece of farm equipment.
- Prepare for safety by wearing appropriate clothing, having enough rest, not drinking alcohol, and ensuring that all workers have been trained and are capable for safely using the farm equipment.
- Keep all guards, shields, and access doors in place when the equipment is in operation.
- Be aware of what you are doing and where you are going.
- Adjust equipment speed to fit operating conditions.
- Keep children and other people away from the working area.
- Take scheduled breaks from work, in order to remain alert and awake.
- Always stop the engine, disconnect the power source, and wait for all moving parts to stop, before servicing, adjusting, cleaning, or unclogging equipment.
- Display the slow moving vehicle emblem on equipment driven on public roadways.
- Allow the engine to cool before refueling.

### 11.13 Farmstead Equipment Safety

Farmstead equipment is agricultural machinery that is normally stationary. This includes materials handling equipment and accessories for such equipment whether or not the equipment is an integral part of a building. Examples of farmstead equipment include cotton gins, grain augers, crushers, sorters, and miscellaneous belt-driven equipment.

Farmstead equipment should have an audible warning device to indicate that the machine is about to be started. Refer to Electrical Lockout/Tagout procedures to safely perform repairs or maintenance on electrical equipment. Farmstead equipment that is not properly guarded and shielded may pinch, crush, electrocute, or otherwise harm humans. Refer to the operator's manual for specific safety instructions for each piece of equipment.

### 11.14 Farm Field Equipment Safety

Farm field equipment is agricultural machinery that is normally mobile. Examples of farm field equipment include combines, tractors, and their implements, including self-propelled implements. Because tractor accidents account for 500 to 600 fatalities each year, this section will focus primarily on tractor safety.

Tractor accidents are the leading cause of fatalities and accidents on Texas farms and ranches. Approximately 42% of these accidents are the result of operators being run over by tractors, 36% are due to tractor rollovers, and 5% involve riders who fall off the tractor and are run over by the attached trailing equipment.

The following guidelines offer general safety tips for operating tractors:

- Know your tractor and how to use it safely. Regularly review the safety precautions in your operator's manual.
- Prepare for tractor work by inspecting the vehicle and wearing appropriate clothing.
- Ensure that new and inexperienced workers are properly trained in tractor operation.
- Never allow riders. A tractor should have only one person on board.
- Install an approved roll-over protective structure (ROPS) and seat belt on any tractor that is not equipped with these features.
- ROPS prevent tractor turnover injuries, but only if the seat belt is worn.
- Always wear a seat belt, when driving a tractor equipped with a ROPS.
- Disengage drives and turn the engine off before leaving the tractor unattended.
- Keep yourself and others away from moving parts.
- Hitch loads only to the draw-bar. When using three-point rear hitches, add front end weights to maintain stability and controlled steering.
- Never bypass start the engine.

### 11.15 Tractor Driving Safety

The following guidelines provide tips for tractor driving safety:

- Watch where you are going at all times. Be sure everyone is out of the way before moving.
- Watch for and avoid obstacles, ditches, embankments, and holes.
- Slow down when turning, crossing slopes, or driving on rough, slick, or muddy surfaces.
- It is safer to back up an incline.
- Apply power slowly when pulling a heavy load.
- Lock the brake pedals together for single action braking.

Continued 

**Tractor operators can help prevent back roll-overs as follows:**

- Only hitch loads to the draw-bar.
- Limit the height of three-point hitches.
- Use front-end weights to stabilize heavy hauling loads.
- Start slowly.
- Change gears carefully.

**Tractor operators can help prevent side roll-overs as follows:**

- Increase tractor width, if possible.
- Lock brakes together for road travel.
- Operate tractors only as recommended.
- Avoid steep slopes and ditches.
- Be careful when pulling heavy loads or working with a front-end loader.
- Turn corners slowly.

**11.16 Roll-over Protective Structures (ROPS)**

ROPS consist of cabs or frames that protect tractor operators. They are designed to prevent tractor roll-over injuries. All tractors manufactured after October 25, 1976 must have ROPS. Older tractors may be retrofitted with a ROPS obtained from the tractor manufacturer. Installing a makeshift metal bar is not sufficient to protect people from the dangers of a tractor roll-over. An OSHA-approved ROPS that meets durability tests is the only real protection against roll-over injuries.

**NOTE:**

The only types of tractors that do not require ROPS include the following:

- Low profile tractors used for work that would interfere with a ROPS (i.e. picking orchards, vineyards, hop-yards, etc.).
- Tractors with mounted equipment that is incompatible with a ROPS (i.e., corn-pickers, cotton-strippers, fruit harvesters. etc.).

**11.17 Bypass Starting**

Bypass starting occurs when an operator “bypasses” normal safety procedures and the normal starting system. A typical bypass occurs when someone standing on the ground touches a screwdriver or other metal object to the starter contacts and activates the engine. This action avoids standard safety devices that keep the engine from starting without someone in the driver’s seat. Another method of bypass starting occurs when someone uses the starting button to start a tractor from the ground.

**IMPORTANT:**

Any method of bypass starting is extremely dangerous. If the tractor is in gear when the bypass occurs, the machine will start and can injure or kill anyone in its path. This situation is even more serious if the tractor is equipped with a hydraulic clutch. If a tractor with a hydraulic clutch is bypass started it will not move immediately, but it will lurch suddenly with the buildup of hydraulic pressure.

**All tractor operators should follow these safe starting rules:**

- Never start a tractor by shorting across the starter terminals.
- Keep tractors in good working order so they will start normally.
- If a tractor has a neutral start switch, but it starts in gear with the key or starter button, something is wrong. Fix the tractor immediately.
- Never by pass or disable the neutral start switch.
- Always place a tractor in neutral or park before starting it.
- Never start a tractor from the ground.

**11.18 Grain Augers**

A grain auger is a piece of farm equipment that helps transfer grain from one location to another. Tractor operators that move grain augers should take special precautions when working with this equipment.

**IMPORTANT:**

Moving grain augers in their elevated position may result in electrocution if the equipment contacts overhead power lines.

Farm owners, managers, and operators should ensure that augers are in the lowered position before moving them. In addition, all augers should have warning signs that indicate the potential electrical hazards associated with moving the auger upright. Functional components of augers must be guarded to the fullest extent possible.

**11.19 Hydraulic Equipment Safety**

Farm equipment operators must be extremely careful when working around hydraulic equipment. Hydraulic pressure is often strong enough to knock a person out if a leak or explosion occurs.





Follow these guidelines when working with hydraulic equipment:

- Inspect hydraulic equipment regularly for leaks. Report and fix any leaks immediately.
- Ensure that all couplings are properly installed and in good working condition.
- Ensure that all lines and fittings are in good condition. Repair or replace any equipment that is not in good condition.
- Lock transport wheels and support jacks on implements in place before disconnecting hydraulic cylinders. This action will prevent sudden shocks to the machine or personal injury.
- Keep couplings and hoses in good repair so that the hydraulic system can safely sustain maximum pressure.

### 11.20 Guards, Shields, and PTOs

Guards and shields are extremely important because they keep operators from inadvertently contacting, or being caught, by moving machinery parts. Ensure that moving parts are guarded or shielded whenever possible. In addition, to prevent burns or fires, shield heat-producing components (e.g. exhaust pipes).

Since all moving parts cannot be guarded due to their friction, stay clear of these machines when they are in operation. In addition, turn these machines off if they need service, maintenance, or repair.

#### **IMPORTANT:**

If you take guards or shields off, put them back on the machine. Replace them if they are lost or damaged.

Guards and shields are absolutely essential for PTO farm equipment. Leave the master shield in place when the implement is unhitched. Replace missing or damaged shields immediately.

### 11.21 Fuel Storage

Fuel storage is an important safety concern in agriculture. The following sections discuss general safety guidelines for stationary fuel storage tanks, portable fuel tanks, and liquefied petroleum gas.

Petroleum products for agriculture use, including gasoline and diesel fuel are stored in Above-ground Storage Tanks (AST) or Underground Storage Tanks (UST). The TCEQ regulates ASTs and USTs. Fuel tanks with volumes less than or equal to 1100 gallons are exempt from TCEQ requirements. Fuel tanks with volumes greater than 1100 gallons must meet these requirements:

- ✓ Notification
- ✓ Registration
- ✓ Annual fees
- ✓ Record keeping

Even small quantities of fuel, such as gasoline, kerosene, or diesel fuel must be properly labeled and stored. Always use DOT approved metal tanks or UL or FM labeled containers too store small amounts of fuel. Store small portable fuel tanks in well-ventilated areas, away from other flammable materials or ignition sources. Do not use containers such as empty plastic milk jugs to store fuels.

**IMPORTANT:**  
Clearly label fuel containers to indicate contents.

**11.22 Liquefied Petroleum Gas (LPG)**

The Texas Railroad Commission regulates the sale and use of Liquefied Petroleum Gas (LPG). There are several safety considerations associated with LPG. All LPG tanks must comply with Department of Transportation (DOT) standards for storage and use.

Paint LPG tanks either white or aluminum. Locate LPG tanks away from flammable materials and possible ignition sources. In addition, ensure that ASTs have noncombustible structural supports and a firm masonry foundation so that the bottom of the tank does not touch the ground.

- ✓ LPG tanks cannot be downhill from flammable liquid tanks such as gasoline or diesel.
- ✓ Stationary LPG tanks cannot be placed in any area beneath an electric transmission or distribution line.
- ✓ LPG tanks must be equipped with hydrostatic relief valves, excess flow valves, etc., as required by the Texas Railroad Commission.

**IMPORTANT:**  
Portable LPG containers may be used within a building; however, they must be stored in a separate location outside of the building.

The following table provides minimum safe distance requirements for the location of stationary LPG containers:

Location Description	0-500 Gal.	501-2000 Gal.	2001-4000 Gal
<b>MINIMUM SAFE DISTANCE</b>			
Ignition Source/Combustible Materials	10 Feet	15 Feet	25 Feet
Flammable Liquid Container	20 Feet	20 Feet	20 Feet
Building	10 Feet	15 Feet	25 Feet
Adjoining Property Line	10 Feet	15 Feet	25 Feet
Roadway, Railway, Utility Line, or Pipe Line	10 Feet	15 Feet	25 Feet

### 11.23 Grain Storage

Grain storage bins and hoppers pose severe hazards, including entrapment and suffocation. Each year, numerous people suffocate and die while working on or under unstable materials contained in grain silos. Grain materials are unpredictable and move quickly—entrapment, burial, and suffocation can occur within seconds.

In some cases, the surface material in a grain bin acts like quicksand. When a storage bin is emptied from the bottom, the grain material forms a funnel. The flow rate of this funnel can be strong enough to trap a worker and make rescue virtually impossible.

In other cases, a condition known as bridging can create serious hazards. A bridge occurs when grain or other loose material sticks to the side of a bin that is being emptied from below. The bridge is highly unstable and dangerous. If it collapses, it can trap any worker either on or below it.

Follow these guidelines to reduce the risks associated with grain storage:

- Assume that all stored materials are bridges and that the potential for entrapment and suffocation is constant.
- Do not enter a storage area from the bottom if material is adhering to the sides.
- If you must enter a storage area, use a safety belt or harness with a lifeline. Always stay above the highest level of material.
- Never stand on top of stored material.
- Lock out supply and discharge equipment whenever a worker enters the storage area.
- Post signs that indicate the hazardous of working with stored materials.
- Ensure that storage areas are equipped with mechanical devices so that workers are not required to enter the area.

### 11.21 Livestock Safety

Farm animals are responsible for many disabling injuries. Although animal-related injuries are generally less severe than injuries caused by farm machinery, such accidents cost time, money, and productivity.

The following guidelines offer general safety instructions for working with any animals:

- Take good care of animals and treat them kindly.
- Use adequate restraining and handling facilities when working with animals.
- Always leave yourself an escape when working with animals (i.e. do not work in small, confined areas or back yourself into a corner).
- Do not put your hands, legs, or feet in gate or chute closures where you may become pinned or crushed by a large animal.

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- Reduce the chance for slips and falls by keeping handling areas free from debris. Attach “no slip” safety strips to slick areas.
- Stay away from frightened, sick, or hurt animals whenever possible. Take care around animals with young offspring.
- Wear protective clothing around animals, as appropriate.
- Do not handle livestock when you are alone.

The following sections provide specific instructions for working with certain animals.

### **BEEF CATTLE**

- Ordinary beef cattle generally have a calm disposition; however, they are easily spooked. Because cattle can see almost 360 degrees without moving their heads, a quick movement from behind can scare them just as easily as a sudden movement from the front. Loud, sudden noises, and small dogs tend to upset cattle.
- Although cattle are not likely to attack humans, their size and weight can make them dangerous. Always leave yourself an escape route when working with cattle. Keep small children and strangers away from cattle.
- Remember, cattle tend to kick forward and then backward with their back legs. If you are working near the udder or flank area of a cow, consider pulling the back leg forward to prevent a kick.

### **DAIRY CATTLE**

- Dairy cattle tend to be more nervous than other domestic animals. Always announce your presence to a cow by speaking calmly or touching the animal gently. When moving cows into a constraining place, such as a milk parlor, always give them time to adjust before beginning work. If a dairy cow tends to kick, consider using a hobble.

### **SWINE**

- Hogs can be dangerous because they can bite with enough force to cause serious injury. Likewise, a hog’s size and weight can easily harm a person if the animal steps on, lays on, or charges a person. Guiding hogs for sorting or movement to a new pen requires lots of patience and adequate facilities. An easy way to guide a hog backwards is to place a box or basket over the hog’s head. The hog will then back away to avoid the box. As with cattle, you should announce your presence to a hog by speaking calmly.

### **HORSES**

- Take care not to spook horses with loud noise. If you intend to work with a horse, you should know how to ride properly, saddle, and handle a horse. Ride with extra care around trees, water, or rough terrain.

**SHEEP**

- Take care when working around sheep to avoid being butted by a ram. To safely immobilize a sheep for handling, place the animal on his rump and tilt him far enough back to keep the rear hooves off the ground.

**POULTRY**

- Chickens are fairly harmless, although geese, gobblers, and roosters can harm children and the elderly. Most hazards associated with poultry concern improper equipment usage, dust, and slippery surfaces within poultry facilities.

**11.25 Manure Pits**

Manure pit systems are often used to store large amounts of raw manure under animal confinement buildings. Manure pits make cleanup easier for farm employees; however, these pits may contain hazardous atmospheres. Due to the nature of these pits, workers should always treat manure pits as confined spaces.

Manure pits may contain one or more of the following gases in dangerous concentrations:

- ✓ Methane
- ✓ Hydrogen sulfide
- ✓ Carbon dioxide
- ✓ Ammonia

Within the confined space of a manure pit, these gases can create an oxygen deficient, toxic, and/or explosive atmosphere.

Treat manure pits like any other type of confined space. For example:

- Ensure that manure pits are properly ventilated.
- Test the pit atmosphere before entering the pit.
- Have a safety attendant ready to lift workers within the manure pit to safety, if necessary.
- Always wear a safety belt or harness with a lifeline when working within a manure pit.

**END OF SECTION**

## SECTION

## 12

**VEHICLE SAFETY PROCEDURES**

Motor vehicle accidents are a leading cause of death and crippling injury in the United States. Traffic safety laws are important components of vehicle safety, but the most important aspect of vehicle safety is the driver. Texas A&M Kingsville employees should adhere to the following sections to ensure driving safety while operating university vehicles.

**IMPORTANT:**

All TAMUK employees who operate a motor vehicle for company business, whether a company vehicle, rental vehicle, or personal vehicle must possess a valid state driver's license for their vehicle's class.

**12.1 Introduction**

The following general requirements must be adhered to at all times with operating a motor vehicle while conduction university related business.

- The University Police Department is responsible for regulating moving vehicles and bicycles on university property.
- Only authorized personnel shall operate or ride in a vehicle used for university business.
- NEVER drink and drive. Driving while under the influence of alcohol or drugs is strictly prohibited.
- All occupants of the vehicle shall where safety belts.
- Obey all traffic laws, signs, and signals.
- Respond to dangerous driving conditions as appropriate.
- Maintain a safe driving distance between your car and any car in front of you. Allow at least one car length for each 10 MPH (e.g., three car lengths if you are driving 30 MPH).
- Keep your eyes moving to avoid fatigue, especially if you plan on driving for a long period.
- Always use your turn signal to indicate your intended action.
- Employees shall not ride on the running boards, fenders, or tailgate of a vehicle when in motion.
- Employees may ride in the back of pick-up trucks only when necessary and only under slow speeds and employees must sit within the sides of the bed and not on the tailgate or the sides of the pick-up bed.
- Employees shall not jump off or on vehicles in motion.

## 12.2 General Vehicle Condition

The following vehicles conditions are guidelines in which personnel who operate university vehicles should adhere to:

- Prior to operating a vehicle, the driver shall conduct a pre-trip inspection. Not limited to, but including the following inspections:
  - ✓ Oil
  - ✓ Tires
  - ✓ Brakes
  - ✓ Lights/Blinkers
  - ✓ Horn
- The employee shall report all deficiencies to their supervisor and a work order must be submitted for all necessary repairs.
- Windshields and windows shall be kept clear of anything that may obstruct the vision of the driver, i.e., dirt, insects, cracks.
- Remove all small debris that could blow out of a pick-up bed or flat bed prior to driving the vehicle.

## 12.3 General University Travel Guidelines

Off-campus travel is often required of university employees, whether it is to attend a business meeting or taking students to a competition. Depending on the nature of the trip, the university has specific travel guidelines which must be adhered. Follow these general travel guidelines when you are traveling on university business.

### 12.3.1 15-Passenger Van Guidelines

Fifteen-passenger vans typically have seating positions for a driver and 14 passengers. The vans are widely used by university departments and organizations to take members on short trips and outings. Fifteen-passenger vans have been involved in several fatal roll-over accidents, as a result of these accidents the National Highway Traffic Safety Administration (NHTSA) and the A&M System has placed restrictions on the use of the fifteen-passenger vans.

If your department utilizes fifteen-passenger vans, you must adhere to the university's Student Travel Policy. This policy states that only employees will be allowed to drive the van and each driver must be evaluated by the Physical Plant Department prior to driving a fifteen-passenger van.

### 12.3.2 Vehicle Emergency Kits

The Physical Plant Department manages the University's rental fleet. When employees are issued a vehicle, the Physical Plant Department provides the driver with a vehicle emergency kit which includes the following items:

- ✓ First Aid Kit
- ✓ Fire Extinguisher
- ✓ Flashlight
- ✓ Biohazard Kit for body fluids
- ✓ Reflective Roadside Triangles

### 12.3.3 Emergency Cellular Phones

The university's Procurement Office provides rental cell phones to employees who are on travel. In order to obtain a rental cell phone, the department needs to submit a requisition. All charges on the cell phone will be billed back to the department. It is not advised to use the rental cell phone to place business calls, however the cell phone would be available for emergency purposes.

### 12.4 Guidelines for Fueling Vehicles

Filling your vehicle with gasoline seems like a simple, safe procedure. However, in recent years several individuals have either been severely burnt or have been killed as a result of a gasoline fire occurring while fueling their vehicles.

According to the American Petroleum Institute and the Petroleum Equipment Institute, preventing static electricity discharge is the main safety concern when fueling gasoline vehicles. Static electricity may build up when a motorist re-enters the vehicle during fueling. When the motorist then returns to the vehicle fill pipe during or at the end of refueling, the static may discharge at the fill point, potentially causing a flash fire or a small sustained fire with gasoline refueling vapors.

The primary way motorists can avoid static electricity problems at the gas pump is to stay outside the vehicle while refueling. It may be a temptation to get back in the car when it's cold, or for any number of reasons. But the average fill-up takes only two minutes, and staying outside the vehicle will greatly minimize the likelihood of any build-up of static electricity that could be discharged at the nozzle.

In the rare event a motorist experiences a fire when refueling, leave the nozzle in the fill pipe of your vehicle and back away from the vehicle. Notify the station attendant immediately to shut off all dispensing devices and pumps with emergency controls. If the facility is unattended, use the emergency shutdown button to shut off the pump and use the emergency intercom to summon help. Leaving the pump nozzle in the vehicle will prevent any fire from becoming much more dangerous.

Motorists who cannot avoid getting back into the vehicle during refueling should discharge any static away from the fill point upon exiting the car before going back to the pump nozzle. Static may safely be discharged by touching a metal part of the vehicle, such as the vehicle door, or some other metal surface, with a bare hand prior to touching the pump nozzle.

#### 12.4.1 Safe Refueling and Fuel Handling Guidelines for Consumers

Here are consumer refueling and fuel safety guidelines that will help keep you and your family safe when refueling your vehicle or filling up gasoline storage containers:

- Turn off your vehicle engine while refueling. Put your vehicle in park and/or set the emergency brake. Disable or turn off any auxiliary sources of ignition such as a camper or trailer heater, cooking units, or pilot lights.
- Do not smoke, light matches or lighters while refueling at the pump or when using gasoline anywhere else.

Continued 



- Use only the refueling latch provided on the gasoline dispenser nozzle, – never jam the refueling latch on the nozzle open.
- Do not re-enter your vehicle during refueling.
- In the unlikely event a static-caused fire occurs when refueling, leave the nozzle in the fill pipe and back away from the vehicle. Notify the station attendant immediately.
- Do not over-fill or top-off your vehicle tank, which can cause gasoline spillage.
- Avoid prolonged breathing of gasoline vapors. Use gasoline only in open areas that get plenty of fresh air. Keep your face away from the nozzle or container opening.
- When dispensing gasoline into a container, use only an approved portable container and place it on the ground when refueling to avoid a possible static electricity ignition of fuel vapors. Containers should never be filled while inside a vehicle or its trunk, the bed of a pickup truck or the floor of a trailer.
- Only store gasoline in approved containers as required by federal or state authorities. Never store gasoline in glass or any other unapproved containers.
- When filling a portable container, manually control the nozzle valve throughout the filling process. Fill a portable container slowly to decrease the chance of static electricity buildup and minimize spilling or splattering.
- Fill container no more than 95 percent full to allow for expansion.
- Place cap tightly on the container after filling - do not use containers that do not seal properly.
- If gasoline spills on the container, make sure that it has evaporated before you place the container in your vehicle. Report spills to the attendant.
- When transporting gasoline in a portable container make sure it is secured against tipping and sliding, and never leave it in direct sunlight or in the trunk of a car.
- Never siphon gasoline by mouth nor put gasoline in your mouth for any reason. Gasoline can be harmful or fatal if swallowed. If someone swallows gasoline, do not induce vomiting. Contact a doctor immediately.
- Keep gasoline away from your eyes and skin; it may cause irritation. Remove gasoline-soaked clothing immediately.
- Use gasoline as a motor fuel only. Never use gasoline for an open fire ignition source, to wash your hands, or as a cleaning solvent.

## 12.5 Basic Defense Driving Techniques

By taking defensive driving courses, employees can promote driving safety and lower their insurance rates. The principles of defensive driving include the following:

### Knowledge:

- Know your vehicle and know the law.



**Control:**

- Always maintain control of your vehicle. To improve your control, perform routine vehicle maintenance and respond to road conditions as appropriate.

**Attitude:**

- Be willing to obey all laws and be willing to yield to all other vehicles and pedestrians.

**Reaction:**

- Respond to driving conditions appropriately. Do not impede your reaction time by driving when tired or under the influence of alcohol or drugs.

**Observation:**

- Be aware of potential accidents and take preventive measures. Always try to anticipate the reactions of other drivers.

**Common Sense:**

- Do not risk your safety to save time. Do not respond to rude or obnoxious drivers by violating traffic laws. Leave yourself an “out” by either driving in the lane with a shoulder, driving in the middle lane of a multi-lane road, or following other vehicles at a safe distance.

**12.6 Driver Distractions**

Recent studies have proven that driver inattention is a major contributor to highway crashes. The National Highway Traffic Safety Administration (NHTSA) estimates that at least 25% of police-reported crashes involve some form of driver inattention. Driver distraction is one form of inattention, and is a factor in over half of these crashes.

The following table identifies specific causes of distractions identified by vehicle accident victims:

SPECIFIC DISTRACTION	% of Distracted Drivers
Outside person, object or event	29.4%
Adjusting radio system	11.4%
Other occupant in vehicle	10.9%
Moving object in vehicle	4.3%
Other device/object brought into vehicle	2.9%
Adjusting vehicle/climate controls	2.8%
Eating or drinking	1.7%
Using/dialing cell phone	1.5%
Smoking related	0.9%
Other distractions	25.6%
Unknown distraction	8.6%
TOTAL	100.0 %
Source: Jane C. Stutts, Ph.D., Manager, Epidemiological Studies, University of North Carolina Highway Safety Research Center , Chapel Hill, NC., 2001.	

Drivers can become distracted in many different ways from talking on a cell phone, adjusting the radio or drinking a beverage. The following guidelines listed below are simple steps to take to minimize the distraction hazards:

- Before entering your vehicle, prepare for the drive by learning your vehicle. Locate switches and controls before you need them (i.e. windshield wipers, head lights) to keep from being distracted while driving.
- Before driving away in the vehicle, look for people and hazards in the area.
- Shift your eyes every two seconds and check the rear-view mirror every five to eight seconds. This keeps your eyes ahead of the vehicle and your brain focused on driving.
- When approaching construction zones, be extra attentive, slow down and watch for workers, changing road surfaces and traffic patterns.
- Drive defensively. Expect the unexpected and always leave yourself an out.
- Signal you intentions early enough to give others more time to prepare for your next move.
- Being aware of others is only half of being attentive. Make sure they are aware of you, too!

#### 12.6.1 Cell Phone Distractions:

Texas A&M University Kingsville does not recommend the use of cell phones while driving.

Several states, including Texas, have passed laws restricting the use of cellular telephones while operating a motor vehicle. The following guidelines listed below are simple steps to take to minimize the hazards associated with driving and cell phone usage:

- Avoid talking on a cell phone while driving, find a safe place to pull off of the road.
- Use a hands-free cell phone device such as an earpiece or cradle.
- Avoid Texting while driving.
- Place calls when you are not moving or before pulling into traffic.
- Keep conversations short; don't use the phone for social visiting while you drive.
- Suspend the call in heavy traffic, hazardous weather, or stressful conditions.

#### **Important**

**If you need to use your phone while you are driving, you are asked to pull off the road to use it. You still have the convenience of making calls from your vehicle. You're just not endangering yourself or other motorists by using the phone in traffic.**

## 12.6.2 Drowsy Driving

Not only is distracted driving a leading cause for motor vehicle accidents, but NHTSA data indicates that in recent years there have been about 56,000 crashes annually in which driver drowsiness/fatigue was cited by police.

**Characteristics of Drowsy-Driving Crashes**— a typical crash related to sleepiness has the following characteristics:

- The problem occurs during late night/early morning or late afternoon.
- The crash is likely to be serious
- The crash involves a single vehicle leaving the roadway.
- The crash occurs on a high-speed road.
- The driver does not attempt to avoid the crash.
- The driver is alone in the vehicle.

Through numerous motor vehicle accident investigations, NHTSA has been able to identify common factors that have increased the risk of a having a motor vehicle accident:

### Risk Factors for Drowsy-Driving Crashes

- Sleep loss.
- Driving patterns
  - ✓ including driving between midnight and 6 a.m.;
  - ✓ driving a substantial number of miles each year and/or a substantial number of hours each day;
  - ✓ driving in the late afternoon hours (especially for elderly persons);
  - ✓ and driving for longer times without taking a break.
- Use of sedating medications, especially prescribed anxiolytic hypnotics, tricyclic antidepressants, and some antihistamines.
- Untreated or unrecognized sleep disorders, especially sleep apnea syndrome (SAS) and narcolepsy.
- Consumption of alcohol, which interacts with and adds to drowsiness.

These factors have cumulative effects; a combination of them substantially increases crash risk.

### Tips to Avoid Distracted/Drowsy Driving

- Drive only when rested. Don't take the wheel if you feel fatigued, no matter when or where you are driving. Have some sleep or exercise first, avoid or delay the trip, or let a rested person drive.

Continued 

- Keep your mind alert. Listen to talk shows or up-tempo music. Try to have company on long trips. Change position frequently, keeping your head up and shoulders back. Chew gum. Actively watch road signs and traffic.
- Find a safe place to stop. On a long trip, every couple of hours or if you start to feel sleepy, pull off the road for a break, exercise and fresh air. When possible, spend the night at a hotel or stop in a safe place to take a nap. Don't rely on coffee!
- Be careful about what you eat and drink. Coffee, sugar or other stimulants may wake you up physically but they do not ensure mental alertness. Drink water, juice or soft drinks low in sugar and caffeine. Choose high-protein snacks over heavy or fatty foods such as fries. Avoid alcohol and medications (including cold remedies). If you require medication, consult with your doctor to minimize effects on driving.
- Drive defensively. Be prepared to prevent collisions in spite of the actions of others -including drivers around you who may be drowsy.

### 12.7 Use of Maintenance/Delivery Vehicles on Campus

The majority of the maintenance vehicles that are used on campus are those vehicles belonging to the Physical Plant Department. Other departments however also utilize maintenance or delivery vehicles, and these guidelines apply to all university departments having maintenance/delivery vehicles or utility carts that are driven on the university campus.

- When possible park the vehicle in a designated parking space.
- Avoid parking the vehicle in a reserved space, a fire lane, handicap parking space, next to an ADA accessible sidewalk, or on a pedestrian cross-walk.
- All maintenance/delivery vehicles or utility carts shall have two orange traffic cones. These cones will be placed at the front and at the rear of the vehicle on the traffic side when the vehicle is parked parallel to a designated yellow or red curb.
- Turn the engine off and remove the key from the ignition switch.
- Apply the vehicle's parking brake.
- Secure the vehicle and any exposed equipment, tools or other materials.

### 12.6 Techniques For Backing Vehicles

Backing a vehicle, especially large vehicle can be difficult. You are at greater risk of having an accident when you are backing a vehicle. Plan ahead when driving into an area with limited turning radius to avoid the need for backing. If you must back a vehicle, follow these guidelines:

- Get out of the vehicle and inspect the area prior to backing the vehicle.
- If possible, have someone outside help guide your vehicle into position.



- If your vehicle does not automatically sound a horn when in reverse, sound the horn once before moving backwards.
- Back slowly and check your mirrors often.
- When backing a trailer, it is helpful to have another person behind the trailer to guide you. Put your hand on the bottom section of the steering wheel and turn the wheel in the direction that you want the trailer to move.

### **12.8 Equipment Towing Safety**

When towing a trailer or farm equipment, follow these guidelines to ensure driving safety:

- Ensure that the trailer and hitching attachments meet local and state requirements. The trailer must have a current tag and registration.
- Inspect the trailer's wheels and the towing vehicle's wheels to ensure they are in good working order.
- Ensure that the trailer hitch is sufficiently strong and properly mounted.
- Make sure that the towing ball is the correct size for the trailer hitch.
- Always secure a safety chain between the trailer and the towing vehicle.
- Inspect all indicator lights to ensure they are working.
- Adjust mirrors as necessary to view the roadway behind the trailer.
- Adjust your speed and apply brakes evenly to allow for increased stopping distances.
- When backing a trailer, it is helpful to have another person behind the trailer to guide you. Put your hand on the bottom section of the steering wheel and turn the wheel in the direction that you want the trailer to move.

### **12.8 Material Hauling**

The following guidelines apply when university vehicles are involved in material hauling operations:

- Materials and equipment shall be loaded and securely fastened in a manner that prevents shifting during transfer.
- Red flags during the day and red lights shall be attached to equipment or material which extends more than four feet beyond the back of the vehicle. Red flags or approved clearance lights shall be attached to loads that extend more than two feet beyond the front of the vehicle.

## 12.9 Vehicle Back-up Alarms

The following vehicle back-up alarm guidelines apply to university vehicles meeting the following criteria:

- Back-up alarms will be installed and maintained in operating order on the following types of vehicles:
  - ✓ Fork Trucks / Personnel Lifts.
  - ✓ Loader / Backhoes.
  - ✓ Tractors having limited rear visibility.
  - ✓ Vehicles having limited rear visibility, i.e., trucks with utility beds, flat-beds, or box vans.

## 12.10 Vehicle Battery Maintenance

Car, boat, and tractor batteries (sometimes referred to as wet cell batteries) contain lead and sulfuric acid. Sulfuric acid is extremely caustic and can burn the skin. Lead is poisonous and accumulates in our bodies and in the environment. The sulfuric acid in wet cell batteries is usually contained in 6 cells that are unsealed in regular batteries or sealed in the maintenance free batteries. Lead is found in the battery terminals.

Improper handling and disposal of motor vehicle batteries can be harmful to humans and the environment. Follow the following precautions when using, storing and disposing of wet cell batteries.

### Usage:

Wear protective gloves when handling them. If you get battery acid on your hands or body wash immediately. Put baking soda on clothes where battery acid has splashed. Never stand near an uncapped battery while a motor vehicle is running and keep all sources of fire, including cigarettes away from batteries. Batteries produce explosive gases that burn easily.

### Storage:

Store in a covered area away from sources of sparks and flame.

### Disposal:

Used batteries can be recycled. The Physical Plant Department recycles used lead acid batteries. Contact the Auto Shop for more information if your department uses lead acid batteries.

### 12.10.1 Recharging Lead Acid Batteries

A lead-acid battery cannot absorb all the energy from the charging source when the battery is nearing the completion of the charge. This excess energy dissipates in water by way of electrolysis into hydrogen and oxygen. Oxygen is produced by the positive plate, and hydrogen is produced by the negative plate. This process is known as gassing.

Gassing is first noticed when cell voltage reaches 2.30-2.35 volts per cell and increases as the charge progresses. At full charge, the amount of hydrogen produced is about one cubic foot per cell for each 63 ampere-hours input. If gassing occurs and the gases are allowed to collect, an explosive mixture of hydrogen and oxygen can be readily produced. It is necessary, therefore, to ensure that the area is well ventilated and that it remains free of any open flames or spark producing equipment.

As long as battery voltage is greater than 2.30 volts per cell, gassing will occur and cannot be prevented entirely. To reduce the amount of gassing, charging voltages above 2.30 volts per cell should be minimized (e.g., 13.8 volts for a 12 volt battery).

The following safety guidelines apply when charging lead acid batteries:

#### **Battery Charging:**

- Safety glasses must be worn when recharging lead acid batteries.
- Battery charging operations shall only be conducted in areas designed for this purpose.
- When charging batteries, the vent caps shall be kept in place to avoid electrolyte spray.
- Emergency eye wash and shower stations shall be available at all battery charging stations.
- **Smoking is not permitted** in the battery charging area

### 12.10.2 Jump Starting Lead Acid Batteries

It is a fact that all vehicle batteries contain sulfuric acid and produce explosive hydrogen and oxygen gases. If improper procedures are performed while jump-starting a dead battery, the battery can become a lethal bomb. According to the information obtained from Prevent Blindness America, thousands of serious eye injuries occur each year from jump starting vehicles.

#### **How do I jump start my battery?**

First, be sure to follow these important safety tips:

- Put on protective eye wear and clothing and remove all jewelry. **NOTE:** Rings and bracelets can make contact with the battery terminals, causing the battery to arc and possibly explode.





- Don't allow smoking, open flames or sparks near the battery.
- Don't attempt to jump start a car if gasoline fumes are present around either the source vehicle (good battery) or the dead vehicle.
- Check the water level in the dead vehicle's battery and fill if needed.
- Use extreme caution with jumper cables!
- Avoid connecting cables in reverse polarity.
- Place the source vehicle close enough to the dead vehicle so that the jumper cables reach between the batteries without stretching.
- Do not let the vehicle bumpers touch.
- Turn the source vehicle off before making any jumper cable connections between the two batteries.
- Clean the battery terminal surfaces of corrosion to ensure clean and quick connections.

#### **Attaching the Jumper Cables**

- Only use jumper cables on batteries of the same voltage (6 volt or 12 volt) do not jump batteries having different voltages
- Connect the ends of the positive cable (usually the red clamps) to the positive **(+)** terminals of the good battery and the dead battery.
- Connect one end of the negative cable (usually the black clamp) to the negative **(-)** terminal of the good battery.
- Connect the other end of the negative cable to the engine block of the car with the dead battery.
- Start the source vehicle and allow two to five minutes for the dead battery to begin to charge.
- Start the dead vehicle and remove the cables in reverse order.
- When attempting to start the vehicle, personnel must stay clear of both batteries in case of an explosion

### 12.11 Vehicle Jack Procedures

The following procedures apply to the correct vehicle jack maintenance and procedures:

- The rated load shall be legibly and permanently marked in a conspicuous location on the jack.
- Jacks shall be designed so that their minimum safe extension cannot be exceeded.
- If there is not a firm foundation, the base of the jack shall be blocked. If there is a possibility of slippage of the jack cap, a block shall be placed between the jack cap and the load.
- Personnel shall not enter the zone beneath a jack-supported load unless the load has been effectively blocked with jack stands or other acceptable methods.
- Screw jacks shall be cleaned and lubricated on a regular basis and hydraulic jacks shall be maintained with the proper fluid level.

### 12.12 Vehicle Tire Maintenance

The following safety guidelines apply to tire maintenance and repair operations:

- A tire restraining device, such as a cage, rack or other effective methods shall be used while inflating tires mounted on split rims.
- Tire inflation control valves shall automatically shut off the air flow when the valve is released by the operator or be of the present regulator type.

### 12.13 Vehicle Accidents

If you are involved in an accident involving a university vehicle, follow these guidelines:

#### **Accidents Occurring on University Property:**

1. Check for injuries. If anyone is injured, immediately call UPD at Ext. 2611 or EMS (911 or 9-911 from any University telephone).
2. If there are no injuries and you are blocking traffic, move your vehicle to a safe location nearby. Call UPD at Ext. 2611 and report the accident.
3. Notify your supervisor so that an Incident Report can be completed.
4. Notify the Physical Plant Department at Ext 3312.

**Accidents Occurring off University Property:**

1. Check for injuries. If anyone is injured, immediately call EMS at 911.
2. If there are no injuries and you are blocking traffic, move your vehicle to a safe location nearby. Call 911 and report the accident. (If the accident occurs on a freeway lane, ramp, shoulder, median, or busy metropolitan street, you must move your car if it is safe and possible to do so).
3. If you cannot move your car, try to warn oncoming traffic to prevent other accidents:
  - ✓ Raise your hood
  - ✓ Turn on your hazard lights
  - ✓ Light flares
4. It is a priority that the police investigate the accident, however, if the police can not be contacted, you must obtain the following information:
  - ✓ Name, Address and Phone Number of other person
  - ✓ Vehicle identification number, license number, and description
  - ✓ Insurance Information
  - ✓ Driver's license number
5. Notify the Physical Plant Department at 593-3312.

**12.13 Railroad Crossing Safety**

Compared with other types of collisions, train/motor vehicle crashes are 11 times more likely to result in a fatal injury. On the average, there are more train-car fatalities each year than airplane crashes. Unfortunately, driver error is the principal cause of most grade crossing accidents. Many drivers ignore the familiar tracks they cross each day, and some drivers disregard train warning signals and gates.

All public highway-rail grade crossings are marked with one or more of the following warning devices:

**Advance Warning Signs:**

- Advance warning signs indicate that a railroad crossing is ahead. These signs are positioned to allow enough room to stop before the train tracks.

**Pavement Markings:**

- Pavement markings may be painted on the pavement in front of a crossing. Always stay behind the stop line when waiting for a passing train.

**Cross-buck Sign:**

- Railroad cross-buck signs are found at most public crossings. Treat these signs as a yield sign. If there is more than one track, a sign below the cross-buck will indicate the number of tracks at the crossing.

**Flashing Lights and Gates:**

- Flashing lights are commonly used with cross-bucks and gates. Stop when the lights begin to flash and the gate starts to lower across your lane. Do not attempt to cross the tracks until the gate is raised and the lights stop flashing.

Motorists must stop at least 15 feet from a train track when:

- Warning lights flash.
- A crossing gate or flag person signals an approaching train.
- A train is within 1500 feet of the crossing.
- An approaching train is plainly visible and in hazardous proximity.

Follow these guidelines when you encounter a railroad crossing:

- Always expect a train.
- When approaching a crossing, LOOK, LISTEN, and LIVE.
- Be sure all tracks are clear before you proceed. Remember, due to their large size, it is easy to misjudge the speed and distance of an oncoming train. If you have any doubts, stop and wait for the train to pass.
- Watch for vehicles, such as school buses, that must stop before train tracks.
- Never race a train to a crossing.
- Always stop for flashing lights, bells, and gates. **Never drive around a gate.**
- Do not allow yourself to be boxed in on a track with cars in front and behind you.
- Never stop on train tracks. If your car stalls on train tracks, call 911 immediately. If a train approaches, abandon the car and run away from the tracks.
- When driving at night, look low to the ground for moving trains. One third of all train-car collisions occur at night when cars run into moving trains.

**END OF SECTION**

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## SECTION

## 13

**GROUND MAINTENANCE SAFETY PROCEDURES**

The university spends a considerable amount of time, effort, and money on grounds maintenance. From flower care, to lawn care, tree trimming, and leaf blowing, TAMUK employees are responsible for safely maintaining the grounds on campus. Gardening tools and mechanical lawn care devices, such as lawn mowers, power blowers, and chain saws, present special safety concerns for grounds maintenance personnel.

**13.1 Introduction**

The following sections provide general safety guidelines and requirements for employees involved in grounds maintenance activities. Common landscaping accidents include the following:

- ✓ Cuts, lacerations, or amputations from whirling mower blades.
- ✓ Bruises or broken bones from flying projectiles.
- ✓ Burns from hot equipment parts.
- ✓ Electrical shock from faulty grounding or defective electrical cords.
- ✓ Back strain from improper equipment usage.
- ✓ Slips, trips, and falls.

Regardless of the type of landscape equipment you use, follow these basic guidelines to ensure optimum safety:

**Read the equipment owner's manual:**

- Use the right equipment for the job at hand.
- Inspect the equipment before each use.
- Know how to control and stop the equipment quickly.

**Wear personal protection equipment, as necessary:**

- Eye protection.
- Hearing protection.
- Long pants.
- Sturdy shoes.
- Work gloves

**Apply sunscreen to exposed areas of skin**

- Be careful to avoid fatigue and heat stress.
- Drink plenty of water.
- Take breaks.

Continued

**General Lawn Safety Procedures**

- Operate the equipment only after you are familiar with the correct operating procedures.
- Do not operate powered equipment if you are tired, sick, or taking medication.
- Take special precautions when working with electrical equipment. If you are using an extension cord, take care not to accidentally cut it.
- Do not smoke around gas powered equipment. Allow hot equipment to cool before refueling.
- Make sure that all guards are in place and in good condition.
- Keep pedestrians and bystanders at least 30 feet away when using powered equipment.

Although garden hand tools tend to be safer than powered equipment, common gardening tools, such as rakes, shovels, and hoes cause thousands of injuries each year. Follow these guidelines for using garden hand tools.

- Keep hand tools in good condition. Replace split or rotten handles. Keep blades sharp.
- Buy quality tools that fit your needs and your build. For example, if you are tall, choose tools with handles that are long enough to prevent you from stooping over your work.
- Never leave a rake, shovel, or hoe on the ground facing up. Foot injuries from exposed metal and head injuries from handles that pop up unexpectedly are the main hazards associated with these tools.

**13.2 General Mower Safety**

Mowers are the most common type of lawn care equipment. To avoid injury with power mower equipment, you must pay close attention to you surroundings. Whether you use a riding mower or a walk-behind mower, follow these guidelines for lawn mower safety:

- Safety glasses with side shields must be worn while operating riding mowers or walk-behind mowers.
- Conduct a pre-mowing inspection of the lawn and remove any debris, rocks, limbs, or other items that could become a projectile. Look for concealed hazards such as holes.
- Keep hands and feet away from moving blades.
- Fill the tank with gas before beginning work. Never fill the gas tank when the engine is hot. Allow the engine to cool.
- Replace loud or faulty mufflers.
- Shut off the engine before unclogging, servicing, or adjusting the mower and before removing the grass-bag. For added protection, remove the ignition wire before working on the machine.

### 13.3 Riding Mower Safety

In addition to the general guidelines for mower safety, follow these guidelines for riding lawn mower safety:

- Before starting the engine, make sure the transmission is out of gear and the mower blade clutch is disengaged.
- Never allow extra riders on the lawn mower.
- Slow down when turning and when working on slopes. Mow up and down slopes rather than across them.
- Always look behind you before backing.
- If you hit a large rock or stump, stop the mower and inspect the blades and shaft. Replace damaged blades.
- Never leave a running lawn mower unattended. Before leaving the seat, park the mower on a flat area, disengage the mower blades, and remove the ignition key.

### 13.4 Walk-Behind Mower Safety

In addition to the general safety guidelines for mower safety follow these guidelines for walk-behind mower safety:

- Wear sturdy shoes with good traction. Never wear sandals while operating mowers.
- Do not bypass the safety device that stops the blade when the operator releases the handle.
- Mow across slopes rather than up and down slopes.
- Work slowly and patiently when mowing tall grass or tough weeds. Forcing the mower may cause repeated clogs and engine stalls.
- Never leave a running mower unattended. If you stop momentarily, cut the throttle to idle and make sure the mower will not roll away.

### 13.5 Chain Saw Safety

Chain saws are ideal for trimming trees and cutting fallen limbs into smaller pieces. Unfortunately, chain saws are associated with many serious injuries each year. Common chain saw hazards include the following:

- ✓ Chain cuts
- ✓ Falling trees and limbs
- ✓ Strains and sprains
- ✓ Burns

To avoid injury, you must respect chain saw hazards and handle chain saws skillfully. In addition to general lawn safety guidelines, follow these safety instructions when using chain saws.

- Safety glasses with side shields must be worn while operating chain saws.
- Stay alert while sawing. Most injuries occur below the waist when the operator is not paying attention.
- Do not use a chain saw alone. Have someone else stand nearby in case of an emergency.
- Use the correct size chain saw for the job at hand.
- Ensure that the chain is sharp and tension is taut.
- Ensure that smaller chain saws have a safety tip to prevent kickbacks. (Kickbacks cause 1/3 of all chain saw injuries).
- Limbs that are at shoulder height or higher present a special safety problem. Use a ladder so that the saw is at a lower and safer position relative to your body.
- Wear a hard hat to protect you from falling limbs.
- Always operate a chain saw with two hands.
- Never allow the tip of a running chain saw to touch the ground. This could cause a serious kickback injury.
- To avoid kickback injuries, stand to the side of a running chain saw. Do not stand directly behind it.
  - ✓ Move brush and limbs as you work to maintain a clear operating area.
  - ✓ Never force a chain saw through a limb.
  - ✓ Never stand on a log or limb while cutting it.

### **13.6 Power Blower Safety**

Because power leaf blowers may produce air gusts up to 200 MPH, you must follow all manufacturer's safety precautions. Always walk towards your work when using a power leaf blower. Do not back away from your work. Never point the blower end directly towards another person, this may cause serious injury.

### **13.7 Trimming Safety**

Follow these safety guidelines for trimming equipment such as hedge trimmers, string trimmers, grass shears, and edgers:

- Avoid hitting rocks, debris and gravel with trimming equipment. These items could become airborne and cause serious injury to the operator or by-standers.
- Ensure that all screws and chains are tight. Vibrating equipment can cause screws to loosen.
- Walk towards your work. Do not back away from your work when using a trimmer.

#### **IMPORTANT:**

Safety glasses with side shields must be worn while operating power blowers and trimmers.



## SECTION

## 14

**HEAT STRESS SAFETY PROCEDURES**

More than 5,000 people die each year from heat stroke, while the majority of these deaths occur among people older than 50, younger people are vulnerable to heat-related illness under the right conditions.

Individuals may suffer from heat stress during hot, humid conditions. Due to the fact that climate at TAMUK is conducive to heat stress, employees must take preventative measures to reduce their risk. The following sections discuss the body's internal cooling system; descriptions of heat stress related symptoms; and procedures to protect against heat stress illness.

**14.1 Generation of Body Heat**

To understand how heat stress affects the body, it is important to know how the body generates heat. The body generates heat through the digestion of food and exercise which is termed "metabolic heat". We all know that we get warmer when we perform strenuous work or exercise.

The environment is another source of heat because the body absorbs heat from the surrounding environment.

**14.2 Body's Cooling Mechanisms**

The principal mechanisms by which the body exchanges heat with the environment are convection, radiation, and evaporation.

**CONVECTION-**

- Is the transfer of heat through the circulation of air. If the air temperature is cooler than our skin temperature, we give off heat. If the air temperature is warmer than our skin temperature, we absorb heat from the environment.

**RADIATION-**

- The natural emission of heat from the body surface not requiring a medium of movement.

**EVAPORATION-**

- Process that occurs when a liquid changes into vapor. Our most potent weapon in the fight against heat is sweating, where the evaporation of fluid from our skin helps to cool us.

### 14.3 Conditions Affecting the Cooling System

Everyone has heard the old saying, "It's not the heat, it's the humidity," this is partially correct. Both the heat and humidity conditions affect our body's cooling system along with several other factors. Our acclimation to the environment, the work load, wind speed and our clothing must also be considered.

#### Acclimation-

- Is the biological process through which our bodies adapt to the environment, allowing us to either retain or lose heat. In hot conditions, this process, which usually takes seven to ten days, adjusts the body's temperature and pulse downward, while increasing the ability to sweat by as much as 250%.

#### Air Temperature-

- Heat always flows from warmer to cooler objects. When the air temperature is lower than the skin temperature, we lose heat. When the air temperature is higher, we gain heat.

#### Air Movement-

- Air movement is a major factor in cooling our bodies. The reason a breeze feels cool is that it speeds up the evaporation of sweat.

#### Humidity-

- Humidity is the measurement of water vapor in the air. Since humid air contains a lot of water vapor, it is more difficult for sweat to evaporate. That's why 100 degrees in South Texas feels differently than 100 degrees would feel in the Sahara Desert.

#### Clothing-

- Clothing does not affect environmental heat, however, it does affect the way we respond to it. Light colored, loose fitting fabrics reflect the sunlight and allow our skin to breathe. Dark, tight fitting clothing absorbs sunlight and traps the skin's heat and moisture. Hats should also be worn when working outdoors. The scalp is extremely vascular and the blood vessels absorb a large amount of heat.

### 14.4 Heat-Related Health Problems

Heat-related health disorders range from the discomfort of heat rash to the life-threatening condition known as heat stroke. The following is a discussion on heat-related illnesses:

#### Heat Rash-

Also known as Prickly Heat. Occurs in hot, humid environments where sweat can't easily evaporate from the skin. When this occurs, sweat ducts become infected and a rash can develop that in some cases causes severe pain. This condition can be prevented with frequent rests in cool places and regularly bathing and drying the skin.

**First Aid:** Cleanse the affected area thoroughly and dry completely. Calamine or other soothing lotion may help relieve the discomfort.

**Heat Cramps-**

- Painful muscle spasms that result from the loss of salt that occurs from sweating.

**First Aid:** Rest, drink plenty of water or electrolyte drink.

**Heat Exhaustion-**

- Is a state brought on by not replenishing the fluids lost during sweating. Individuals with heat exhaustion still sweat, but they experience extreme weakness or will even collapse, they experience nausea and headache. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or slightly higher.

**First Aid:** Rest in the shade or cool place. Drink plenty of water or electrolyte drink.

**Heat Stroke-**

- Is a severe medical emergency. Heat stroke results when the body's internal temperature-regulating mechanism shuts down. The skin is hot and dry, the pulse is rapid, the blood pressure falls, the person stops sweating and may have irrational behavior and in a state of confusion or become comatose. The body core temperature may exceed 104 degrees. If not treated promptly, the core temperature continue to rise and death will follow. The victim must be cooled immediately with water and fanned to promote evaporation. Immediate medical attention must be provided.

**First Aid:** Douse the body continuously with a cool liquid and summon medical aid immediately.

**14.5 Preventing Heat-Related Health Problems**

Heat disorders can be fatal, but there are ways to protect yourself from the heat. Ranging in severity, heat disorders share one common feature: The individual has been under physical stress too long in the heat for his or her age and physical condition. The severity of heat disorders tend to increase with age - - heat cramps in a 17-year-old may be heat exhaustion in someone 40, and even heat stroke in a person over 50.

Heat-related health problems are serious and individuals showing signs of heat stress should have medical attention administered immediately to prevent the on-set of heat stroke, the most dangerous stage of heat stress. The following procedures are guidelines to assist employees in their prevention of heat-related health problems:

**Acclimation-**

- Individuals must be accustomed to the weather prior to long durations of physical activity. Supervisors must ensure that employees have been properly acclimatized prior to assigning them strenuous tasks.
- In a heat-stressful situation, acclimatized individuals have lower heart rates, lower body temperatures, and higher sweat rates that consist of a more dilute sweat (with less salt) than persons who are not acclimatized. Maximum sweat rates vary from 0.6 liters per hour in the un-acclimatized person to more than 1.5 liters per hour for a fully acclimatized person.

**Maintain Body Fluids-**

- Fluid intake must be maintained throughout the course of physical activity. The body can lose as much as 1.5 liters of water per hour under heavy activity in high temperatures. A standard rule of thumb is to drink 4 to 8 ounces every 15 to 20 minutes. Thirst is not a good indicator of dehydration because the body loses water faster than a person is aware.

Water is an adequate fluid replacement beverage for low-intensity and short-duration activity. During prolonged heat exposure or a high-intensity workload, a beverage containing a carbohydrate / electrolyte mixture is preferred. Alcohol should be avoided because it is a diuretic which increases dehydration and can interfere with heat loss.

**Proper Diet-**

- Eat light and stay away from heavy foods. They increase metabolic heat production and also increase water loss. Eat smaller, well-balanced meals more often.

**Dress Light -**

- Lightweight, light-colored clothing reflects heat and sunlight and helps your body maintain normal temperatures. Wear loose-fitting clothes such as cotton which lets air move over your body. Wide brimmed hats should also be worn.

**Rest Periods-**

- Pace your work activities at a slower rate during high temperatures and take frequent rest periods in a shaded area and drink plenty of fluids.

**Schedule Modifications-**

- Schedule changes are one way in which administrative personnel can minimize the employees' chances of heat stress. Activities requiring strenuous physical labor may possibly be scheduled during the cooler hours of the day (in the early morning

**14.6 Heat Index Chart**

		RELATIVE HUMIDITY								
		10 %	20%	30%	40%	50%	60%	70%	80%	90%
TEMPERATURE F°	104°	98	104	110	120	>130	>130	>130	>130	>130
	102°	97	101	108	117	125	>130	>130	>130	>130
	100°	95	99	105	110	120	>130	>130	>130	>130
	98°	93	97	101	106	110	125	>130	>130	>130
	96°	91	95	98	104	108	120	128	>130	>130
	94°	89	93	95	100	105	111	122	128	>130
	92°	87	90	92	96	100	106	115	122	128
	90°	85	88	90	92	96	100	106	114	122
	88°	82	86	87	89	93	95	100	106	115
	86°	80	84	85	87	90	92	96	100	109
	84°	78	81	83	85	86	89	91	95	99
	82°	77	79	80	81	84	86	89	91	95
	80°	75	77	78	79	81	83	85	86	89
	78°	72	75	77	78	79	80	81	83	85
	76°	70	72	75	76	77	77	77	78	79
	74°	68	70	73	74	75	75	75	76	77

Directions: Locate the current temperature on the left column and then locate the relative humidity on the top row. Follow the temperature across and the humidity down until they meet; this measurement is the heat index. The heat index will increase 15 degrees in direct sunlight.

**14.7 University Procedures for Severe Heat Conditions**

DANGER CATEGORY	HEAT SYNDROME	TAMUK PROCEDURES
<b>EXTREME DANGER</b>	Heatstroke Imminent	When the Heat Index is in this zone, the President will dismiss the personnel in the affected areas.
<b>DANGER</b>	Heat cramps , or heat exhaustion likely. Heat-stroke possible with prolonged exposure and activity.	When the Heat Index is in this zone, the appropriate A.V.P. will discuss the condition with departmental supervisors and make schedule adjustments or temporarily relocate the affected employees. The appropriate Vice President must approve personnel working under a Danger condition.
<b>EXTREME CAUTION</b>		
<b>CAUTION</b>	Heat cramps , or heat exhaustion possible with prolonged exposure and activity.	When the Heat Index is in this zone, the departmental supervisor will discuss the condition with departmental personnel and make schedule adjustments to accommodate for the heat . The Dean or appropriate A.V.P. must approve personnel working under an Extreme Caution condition.
	Fatigue possible.	
		Normal work day. No alerts posted

# 15 General Sanitation

## 15.1 Purpose

Provides guidelines to establish environmental conditions favorable to health. This procedure covers drinking water and wastewater, solid waste disposal, vermin control, and general cleanliness of facilities as defined in the Texas Health and Safety Code, Title 5, subtitle A, chapter 341.

## 15.2 Scope

This procedure applies to all TAMUK staff, faculty, students, and visitors. All facilities on the TAMUK campus or any of its constituents are governed by this procedure.

## 15.3 Responsibilities

It is the responsibility of all TAMUK staff, faculty, students, and visitors to follow these guidelines. The guidelines are provided to ensure proper sanitation is maintained for all living and working conditions at the TAMUK campus and all of its constituents.

### I. Housekeeping

All buildings and grounds occupied by faculty, students, employees, or visitors will be kept clean to the extent that the nature of the work or research allows. Excess clutter shall be eliminated by proper storage, surplus material transfer, or proper disposal.

### II. Waste Disposal

Any containers used for putrescible solid or liquid waste or refuse shall be constructed to prevent leakage and must be cleaned and maintained in a sanitary condition. Such containers shall be fitted with a solid tight fitting cover unless a sanitary condition can be maintained by alternative means.

#### a. Vermin Control

Every enclosed building shall be reasonably constructed, maintained, and equipped to prevent the entrance or harborage of rodents, insects, birds, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected.

#### b. Potable Water

Potable water means water which meets the quality standards prescribed in the U.S. Public Health Service Drinking Water Standards, published in 42 CFR Part 72, or water which is approved for drinking purposes by the State of Texas or local authority having jurisdiction.

Every system member shall assure potable water is provided for cooking, drinking, hand washing, bathing, washing of cooking or eating utensils, food preparation, and personal service rooms. Potable water systems shall be designed to prevent backflow or back-siphonage of non-potable water or contaminants from occurring.

Potable drinking water dispensers shall be constructed and serviced to maintain a sanitary condition. Open containers from which drinking water may be dipped or poured are prohibited.

Outlets for non-potable water, such as that water used for firefighting purposes, shall be posted or otherwise marked in a manner that clearly states the water is not safe for human consumption.

Construction of non-potable water systems or other systems carrying non-potable substances shall be constructed to prevent backflow or back-siphonage into a potable water system.

#### c. Toilet Facilities

Toilet facilities shall be maintained in a sanitary condition.

#### d. Sewage Disposal

Sewage shall be disposed in a manner that prevents contamination of the environment or facilities and does not endanger faculty, students, employees, or visitors. All applicable regulations of the U.S. Environmental Protection Agency, the State of Texas, or the local authority having jurisdiction shall be complied with.

e. Solid Waste Disposal

All solid waste shall be stored and disposed of in a manner to assure sanitary conditions are maintained and that applicable Federal and State regulations are complied with.

f. Food Handling

All campus food service facilities and operations shall be carried out in accordance with sound hygienic principles. Food dispensed shall be from a reputable source approved by the state or local organization having jurisdiction and handled in a manner to prevent spoilage or contamination.

g. Swimming Pools and Hot Tubs

Swimming pools and hot tubs shall be designed, constructed, and maintained in a sanitary condition as outlined in the Texas Health and Safety code.

h. Special Events

Events involving either temporary food services, refuse handling, or temporary restroom facilities for the general public, students, or employees will be designed to assure adequate and proper sanitation are provided.