SAFETY REGULATIONS AND PROCEDURES

FOR

PHYSICAL PLANT TRADES
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ACCIDENT REPORTING PROCEDURE

NOTICE TO ALL EMPLOYEES

1. All accidents resulting in personal injury shall be reported within twenty-four hours to the supervisor in charge. The supervisor will then notify the department head immediately regardless of the nature or severity of the injury.

2. All accidents will be reported to Human Resources on the TAMUS-RM 1 Form, Employer’s First Report of Injury or Illness. The report will be filed by the injured persons’ supervisor within 24 hours of his/her knowledge of the injury.
GENERAL SAFETY RULES

General

- University employees or students shall not turn on, use, repair, or operate any machine, tool, vehicle, crane, electricity, gas, steam, air, acid, caustic or other dangerous material or equipment unless authorized by a supervisor.

- Safety guards and devices furnished by the University or department shall be used. Removal or non-use may be authorized only by the supervisor and approved by the department.

- Approved personnel protective equipment shall be worn when the exposure indicates the need for it, i.e., head and ear protection, face and eye protection, respiratory equipment, safety belts, protective footwear, etc. (See “Personnel Protective Equipment” for more details).

- Only a tool, equipment, machinery, etc. that is properly maintained and adjusted may be used.

- University-provided tools, may not be modified, unless authorized by a supervisor.

- Floors must be kept free of paper clips, pencils, rubber bands, trash, coffee, food, and other material or substance that might constitute a tripping or slipping hazard. Employees responsible for any such material or substance spilled shall clean it up immediately.

- Horseplay, running and practical jokes are prohibited in buildings because of potential slipping, tripping and collision hazards.

Clothing and Safe Dress

- Employees will wear clothing appropriate to their work assignments. Clothing will be in reasonably, good condition and clean.

- Supervisors are responsible for ensuring, that employees are informed as to the requirements for wearing apparel that is suitable for the type of work performed and the hazards involved.

- For those working with machinery or in other hazardous operations, shirts, blouses, trousers, slacks, coveralls, etc. should be well fitted, with no lose or flowing appendages. Sleeves, if full length, should be buttoned at the wrist. The practice of working without a shirt is prohibited.
• Shoes should be well fitted with good soles and heels and of a style that completely covers the foot. Open-toe shoes, or lightweight shoes of the canvas “sneaker” type may not be safe. Safety shoes or safety toecaps are mandatory in foot-hazardous work. Working without shoes is prohibited.

• Employees with long hair who work around moving machinery must wear adequate hair covering to preclude the possibility of entanglement.

• Jewelry such as rings, pendants, necklaces, earrings, watches (other than those with breakaway bands), etc., shall not be worn when they constitute a hazard, i.e. working around moving machinery, electrical or electronics equipment, etc.

  **Flexible Electric Cords**

• Flexible cords shall be maintained in good repair and must bear the Underwriters Laboratory label (UL) or meet standards of the NFPA 70. Do not use cords that are frayed or damaged.

• Flexible cords should be short (6-8 feet in length), limited to temporary use, and never cross traveled pathways unless suitably protected to avoid damage and the creation of tripping hazards.

• Two-wire flexible cords and adapter plugs are not permitted on campus, since equipment is not grounded when connected to them.

• Under no circumstances shall any flexible cord or electrical cord be spliced, except by University electricians.

• Do not tack cords to walls, baseboards, etc. Cords should be kept away from pinch points as well as hot and/or wet surfaces. Do not string cords across the ceiling, over pipes, or near sinks. Cords should not be placed under physical stress or tension.

  **Washing With Solvents**

Flammable liquids shall not be used to clean floors, workbenches, or other large surface areas.
PERSONAL PROTECTIVE EQUIPMENT

General

- Protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective barriers shall be provided and used wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.

- If employees provide their own protective equipment, the department shall be responsible to assure its adequacy, including proper maintenance, and sanitation of such equipment.

- Protectors shall meet the following minimum requirements:
  - They shall provide adequate protection against the particular hazards for which they are designed.
  - They shall be reasonably comfortable when worn under the designated conditions.
  - They shall fit snugly and shall not unduly interfere with the movement of the wearer.
  - They shall be durable.
  - They shall be capable of being disinfected.
  - They shall be easily cleaned.

- Personal protective equipment shall comply with the standards of The American National Standards Institute, Bureau of Standards, or other recognized authorities.

- Protectors shall be maintained in a sanitary and reliable condition at all times. Safety devices, including protective clothing worn by the employee, shall not be interchanged among the employees until properly cleaned. Where it has been determined that ordinary cleaning will not remove risk of infection, additional precautionary measures may be required.

Body

- Body protection may be required for employees whose work exposes parts of their bodies to hazardous substances or objects not otherwise protected, as required by other sections.

- Protective clothing appropriate for the work being done shall be worn at all times. This may include laboratory coats, raincoats, aprons, full jump suits, bright reflective vests, etc.

- Clothing saturated or impregnated with flammable liquids, corrosive substances, irritants or oxidizing agents shall be removed and shall not be worn until properly cleaned.
Ear

- If it is not feasible to reduce the noise levels or duration of exposures to those specified under the Noise Control Procedure 1-16, ear protection devices shall be provided by the University and used by the employees.

- Supervisors whose employees are engaged in noise hazardous operations, or who work in noise hazardous areas, shall be responsible for ensuring the use of approved hearing protective devices.

- Each employee must wear an appropriate hearing protective device when exposed to hazardous noise. Hazardous noise is determined to exist when it is difficult to hear a loud spoken voice at assistance of one foot. The wearing of a hearing protective device when required is a condition of employment.

- Full earmuff-type hearing protection devices are generally recommended.

- Ear protective devices inserted directly into the ear shall be fitted or determined individually by competent persons.

- Plain cotton is not an acceptable protective device.

- Ear protectors should be washed with mild soap and water after use. Dirty equipment may cause the ear to become sore or inflamed.

Eye and Face

- Employees or students working in locations where eye hazards exist shall wear face and/or eye protection. Suitable screens or shields isolating the hazardous exposure may be considered adequate safeguarding for nearby employees.

- The employer shall provide, and the employee shall use, protection suitable for the exposure. Students shall be required to provide their own eye protection devices unless special requirements are necessary.

- All visitors to campus who are exposed to eye-hazardous areas shall be provided with protective eyewear, by the University on a temporary basis.

- Face and eye protection equipment shall be kept clean and in good repair. The use of this type of equipment with structural or optical defects shall be prohibited.

- Safety eye wear or face wear shall meet the American National Standards Institute (ANSI-Z87) Standard. Personal “street wear” which has the new FDA approved impact-resistant lenses cannot be substituted for industrial type equipment. The latter offers a far greater degree of protection.
To protect against radiant energy when welding, burring or cutting, the use of the welding type filter lenses shall conform to the following shade specifications.

- Arc weld over 400 amps Shade 14
- Arc weld 200-400 amps Shade 12
- Arc weld 75-200 amps Shade 10
- Arc weld 30-75 amps Shade 8
- Heavy gas weld and cutting Shade 8
- Arc weld up to, 30 amps Shade 6
- Medium gas weld and cutting Shade 6
- Light gas weld, cutting and brazing Shade 5

Full face shields, chemical splash goggles or hoods with shields, as appropriate, shall be worn when exposed to or handling caustics, acids, or cryogenic liquids.

In laboratories it may at times be necessary to perform demonstrations involving potentially hazardous operations so that students can observe certain reactions. Transparent shields or barricades may be used for this purpose. However, even if a shield or barricade is utilized, the demonstrator and students are at increased risk and must therefore wear adequate personal eye protection.

Persons who wear contact lenses face additional eye dangers. In eye hazard areas they are required to wear full goggles instead of safety glasses.

**Foot**

Appropriate foot protection shall be required for employees who are exposed to foot injuries from hot, corrosive, poisonous substances, falling objects, crushing or penetrating actions, which may cause injuries, or who are required to work in abnormally wet locations.

Foot wear which is defective or inappropriate to the extent that its ordinary use creates the possibility of foot injury shall not be worn.

Safety footwear shall meet the requirements of the applicable ANSI Standard.

Full coverage type safety, work, or dress shoes shall be worn in all shops, laboratories, and other foot hazard areas. Open type, high heel, or canvas shoes shall not be worn in these areas.

**Hand**

Protection for the hands may be required for employees and students whose work involves unusual and excessive exposure to cuts, burns, or to corrosive, irritating, allergenic, or other harmful substances. All such required hand protection shall be provided by the University.
• The department shall exercise great care in the supervision of employees relative to the wearing of gloves when working around machinery. The wearing of gloves by a machine operator is not advisable, and the wearing of gauntlet-type or loose cuff-type gloves around any moving machinery should not be permitted.

• Employees performing industrial work should equip themselves with general-purpose gloves for hand protection against various hazards. Cotton or fabric gloves are suitable for protection against dirt, slivers, chafing, or abrasions. Leather gloves are more effective in resisting moderate heat, chips, and rough objects. Special purpose gloves such as chrome-tanned leather gloves for welders, rubber gloves, chemical-resistant gloves, etc., should also be considered.

• Generally, the recommended types of gloves for chemical handling are: vinyl plastic, natural latex and neoprene. Consult the manufacturer’s specifications as each is not satisfactory for all types of chemicals.

**Lifelines, Safety Belts and Nets**

• Approved safety belts and lifelines shall be worn by those employees whose work exposes them to falling in excess of 5 feet from the perimeter of a structure or through openings not otherwise adequately protected. The anchor end of the lifeline shall be secured at a level not lower than the workman’s waist, and at a horizontal distance not to exceed six feet except where the waist level connection is not possible, connections at feet level may be permitted provided that adequate risk control procedures are followed. Lifelines shall be secured to a substantial member of the structure or to securely rig lines, using a positive-descent control device.

• If a worker’s duties require horizontal movement, rigging shall be provided so that the attached lifeline will slide along with him.

• Lifelines and safety belts shall be used only for employee safeguarding. Any lifeline or safety belt actually subjected to in service loading, as distinguished from static load testing, shall be immediately removed from service and shall not be used again for employee safeguarding.

• Lifelines shall be capable of supporting a minimum dead weight of 5400 pounds.

• Lifelines subject to excessive fraying or rock damage shall be protected and shall have a wire rope center.

• All safety belt and lifeline hardware shall be drop forged steel, or equivalent.

• Where the elevation is 25 feet or more above the ground, floor level below, and when the use of safety belts and lifelines is clearly impractical, the exterior and/or interior perimeter of the structure shall be provided with an approved-type safety net, or equivalent protection.
Respiratory Protection

- When it is clearly impracticable to remove harmful dusts, fumes, mists, vapors, or gases at their source, or where emergency protection against an occasional and/or relatively brief exposure is needed, the employee exposed to such hazard shall use approved respiratory equipment.

- When respirators are required to be used to control harmful exposures, only respiratory equipment approved for that purpose shall be used and such equipment shall be approved by U.S. Bureau of Mines, or the National Institute for Occupational Safety and Health.

- Employees shall be instructed and trained in the need, use, sanitary care and limitations of such respiratory equipment as any employee may have the occasion to use. Respirators shall be inspected before each use and shall not be worn when conditions prevent a good gas-tight face seal. Every respirator wearer shall be instructed in how to properly fit and test respiratory equipment and how to check the face piece fit and shall be provided the opportunity to wear respiratory equipment in normal air for an adequate familiarity period, and to wear it in a test atmosphere, such as generated by smoke tubes.

- The University shall provide, repair, or replace respiratory protective equipment as may be required due to wear and deterioration, maintain same in effective and sanitary condition. Respirator maintained for emergency use shall be inspected and sanitized after each use and inspected at least monthly.

- Respiratory equipment shall not be passed on from one person to another until it has been cleaned and sanitized. When not in use, respirators shall be stored to protect against dust, sunlight, extreme temperatures, excessive moisture, or damaging chemicals. Cylinders shall be tested and maintained.

- SCBA shall be inspected on a monthly basis.

- Compressed air used for respiration shall be high purity minimum grade D. Breathing air shall also be free from harmful dusts, fumes, mists, vapors, or gases and may be supplied from cylinders or air compressors certified by CGA.

- An employee required to wear a respirator must first undergo a Medical evaluation, offered annually thereafter, by a Medical Doctor or a Licensed Health Care Professional. A medical examination will follow to ensure the employee is physically qualified to wear a respirator.
### ELECTRICAL SAFETY

#### General

The following table will show that a very small amount of electrical current is hazardous.

<table>
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<tr>
<th>Current in Milliamperes</th>
<th>Effect</th>
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<tr>
<td>2ma-10ma AC or DC</td>
<td>Threshold of sensation: a strong tingling</td>
</tr>
<tr>
<td>10ma-60ma AC or DC</td>
<td>No let go current, above which one freezes due to muscular contraction</td>
</tr>
<tr>
<td>100ma-500ma AC or DC</td>
<td>Death due to heart fibrillation and paralysis of breathing</td>
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</tbody>
</table>

The current passing through the body is the key factor in any shock accident. Most of the over 1000 electric shock fatalities which occur in the U.S. every year are due to voltages of less than 440 volts. It is imperative that respect is given all electric equipment and circuits and that adequate precautions be taken regardless of voltage.

- Listed below are some electrical safety precautions. Typical body resistances are on the order of 1000 ohms. Keep your resistance high by keeping hands and feet dry. Shoes must be worn at work (rubber soled shoes are preferable). The removal of rings and watches is recommended. Persons should never hold an energized electric appliance with wet hands, or when wearing wet shoes. Do not touch electrical appliances when working at a sink. Know the location of all power plugs and off-switches on all equipment. Assume all electrical gear is potentially lethal.

- Report all shocks and defective equipment. A shock means something is wrong! The slightest shock when operating an electrical appliance in one location might, in another situation, result in instant death if part of the body made only slightly better contact with the ground or a grounded metallic object.

- Rely on qualified electricians to do electrical repairs and installation. Consult Physical Plant for advice and work scheduling.

- In case of an electrical accident:
  - Break connections to victim by turning off the power or use a non-conducting object to separate victim and source.
  - If necessary, begin artificial respiration (CPR) as quickly as possible. External cardiac massage may also be needed.
- Obtain emergency assistance quickly by calling 4444.
- When an electrical fire occurs use CO2 or all-purpose dry chemical extinguisher only. (DO NOT USE WATER EXTINGUISHER ON ELECTRICAL FIRES).

**Disconnecting**

- All switches, circuit breakers, fuses and other control and protective devices shall be so located or arranged that they may be safety operated, removed or repaired.

- Each disconnecting means for motors and appliances, and each service feeder, or branch circuit at the point where it originates shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. The marking shall be of sufficient durability to withstand the environment involved.

- Devices intended to break current shall have an interrupting capacity sufficient for the voltage employed and for the current that must be interrupted.

- Disconnect electric service (and any control power) before servicing or opening any electrically powered case, equipment or appliance.

**Flexible Cords**

- Flexible Cords shall be used only for: pendants, wiring of fixtures, connection of portable lamps or appliances, elevator cables, wiring of cranes and hoists, connecting of stationary equipment to facilitate their frequent interchange, prevention of the transmission of noise or vibration, fixed or stationary appliances where the fastening means and mechanical connections are designed to permit removal for maintenance and repair, and data processing cables.

- Flexible Cords shall not be used: as a substitute for the fixed wiring of a structure, where run through holes in walls, ceilings or floors, where run through doorways, windows or similar openings; where attached to building surfaces, and where concealed behind building walls, ceilings or floors.

- Flexible cords shall be used only in continuous lengths without splice or tape when initially installed. The repair of hard-service flexible cords No. 12 and larger shall be permitted if the completed splice retains the insulation, outer sheath properties, flexibility, and usage characteristics of the cord being spliced.

- Flexible cords shall be so connected to devices and to fittings that tension will not be transmitted to joints or terminal screws. This shall be accomplished by a knot in the cord, winding with tape, by a special fitting designed for that purpose, or by other approved means which will prevent a pull on the cord from being directly transmitted to joints or terminal screws.

- Unplug flexible cord before servicing or opening any electrically operated tool, equipment or appliance.
Ground-Fault Circuits

- To protect employees and students using portable electrical equipment outdoors, in wet, or other hazardous locations, ground-fault circuit interrupters (GFCI) shall be used in all times when these conditions exist.

- All general-purpose 120-volt, AC single phase, 15-and 20-ampere receptacle outlets outdoors, in wet, or other hazardous locations, should have approved ground-fault circuit interrupters.

Equipment Connected By Cord and Plug

- Under any of the conditions described in (1) through (5) below, exposed non-current-carrying metal parts of a cord and plug-connected equipment likely to become energized, shall be grounded.

  1) In hazardous locations (flammable liquids and gases present).
  2) Where operated at over 150 volts to ground.
     - Exception No. 1
       Motors, where guarded
     - Exception No. 2
       Metal frames of electrically heated appliances.
  3) Potentially hazardous portable, hand-held motor-operated tools and appliances such as drills, wet scrubbers, sanders and saws.
  4) Cord and plug-connected appliances used in damp or wet locations or by persons standing on ground or on metal floors or working inside of metal tanks or boilers.
  5) Portable tools likely to be used in wet and conductive locations.
     - Exception No. 1
       Portable tools are likely to be used in wet and conductive locations shall not be required to be grounded where supplied through an isolating transformer with an underground secondary of not over 150 volts.
     - Exception No. 2
       Listed portable tools and appliances protected by an approved system of double insulation, or its equivalent, shall not be required to be grounded. Where such a system is employed, the equipment shall be distinctively marked.

- Never break a grounding pin, or use a tool or cord that has a broken pin or other parts intended to provide equipment bond.
Grounded Fixed Equipment

- Exposed non-current-carrying metal parts of fixed equipment likely to become energized under abnormal conditions shall be grounded under any of the conditions specified in (1) through (6) below.

1) Where within 8 feet vertically or 5 feet horizontally of ground or grounded metal objects and subject to contact by persons.
2) Where located in a wet or damp location and not isolated.
3) Where in electrical contact with metal.
4) Where in a hazardous location.
5) Where supplied by metal-clad, metal-sheathed, or metal-raceway wiring method.
6) Where equipment operated with any terminal at over 150 volts to ground.
   - Exception No. 1
     Enclosure for switched or circuit breakers used for other than service equipment and accessible to qualified persons only.
   - Exception No. 2
     Metal frames of electrically heated devices, exempt by special permission, in which case in frames shall be permanently and effectively insulated from ground.

- Exposed, non-current-carrying metal parts of the kinds of equipment described in (1) through (5) below, regardless of voltage, shall be grounded.

1) Switchboard frames and structures supporting switching equipment.
   - Exception:
     Frames of DC, single-polarity switchboards where effectively insulated.
2) Generator and motor frames in an electrically operated organ.
   - Exception:
     Where the generator is effectively insulated from ground and from the motor driving it.
3) Motor frames.
4) Enclosures for motor controllers.
   Exception:
   Lined covers of snap switches.
5) Electric equipment for elevators and cranes.

Grounding of Live Parts

- Live parts of electric equipment operating at 50 volts or more shall be guarded against accidental contact by approved cabinets or other forms of approved enclosures or by any of the following means.

- By location in a room, vault, or similar enclosure that is accessible only to qualified persons.
• Entrances to rooms and other guarded locations containing exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter.

Methods of Grounding

• The grounding connection for metal non-current carrying equipment shall be made on the supply side of the service disconnecting means.

• The path to ground from circuits, equipment, and conductor enclosures shall:
  - Be permanent and continuous
  - Have ample carrying capacity to safely conduct any current liable to be imposed on it.
  - Have impedance sufficiently to limit the potential above ground and to facilitate the operation of the over current devices in the circuit.

• Metal non-current-carrying fixed equipment where required to be grounded shall be grounded by one of the methods indicated in (1) below.

  1) By an equipment grounding conductor contained within the same raceway, cable, or cord or otherwise run with the circuit conductors. The conductor cover shall have a continuous outer finish that is either green, or green with one or more yellow strips.
     - Exception:
     An insulated grounding conductor larger than No. 6 shall, at the time of insulation, be permitted to be suitably identified as a grounding conductor at each end and at every point where the conductor is accessible.

• Non-current-carrying metal parts of cord and plug connected equipment, where required to be grounded, shall be grounded by one of the methods indicated in (1), (2), or (3) below.

  1) By means of the metal enclosure of the conductors supplying such equipment if grounding type attachment plug with one fixed grounding contact is used for grounding the metal enclosure, and if the metal enclosure of the conductors is secured to the attachment plug and to equipment by connectors approved for the purpose.
  2) By means of a grounding conductor run with the power supply conductors in a cable assembly or flexible cord properly terminated in grounding-type attachment plug with one fixed grounding contact. The covering shall have a continuous outer finish that is either green or green with one or more yellow stripes.
  3) By means of a separate flexible wire or strap, insulated or bare, protected as well as practicable against physical damage.
Outdoor Conductor – Clearances

- For outside wiring, conductors shall comply with clearances specified below:

  Minimum Clearance  
  Low-voltage Q-750 volts

  Above and along thoroughfares  
  20 feet

  Above areas where it is possible to drive vehicles  
  16 feet

  Above areas accessible to pedestrians only  
  12 feet

  Above structures  
  8 feet

  Distance away from windows, doors, scaffolds, or similar locations shall be maintained not less than  
  3 feet

Work Procedures

- Only qualified persons shall work on energized equipment and/or wiring.

- No employee shall work in such proximity to any part of an electric power circuit unless the employee is protected against electric shock by de-energizing the circuit and grounding it or by guarding it by effective insulation or other means.

- Suitable protective equipment or devices shall be provided and used on or near energized equipment for the protection of employees where there is recognized hazard of electrical shock or burns. In lieu of protective equipment, barricades may be used to provide protection from exposed energized equipment.

- Equipment or circuits that are de-energized shall be rendered inoperative and have tags attached at all points where such equipment or circuits can be energized.

- All reasonable means shall be provided to bar unauthorized persons and/or equipment from the immediate vicinity of the work in progress.
Working Space About Electric Equipment

- Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment.

- The dimension of the working space in the direction of access to live parts operating at 600 volts or less which require examination, adjustment, servicing, or maintenance while alive, shall not be less than indicated in Table 1 below. In addition to the dimensions shown, the workspace shall not be less than 30 inches wide in front of the electric equipment. Distances shall be measured from the live parts if such are exposed, or from the enclosure front or opening if such are enclosed. Concrete, brick, or tile walls shall be considered as grounded.

WORKING CLEARANCES

<table>
<thead>
<tr>
<th>Voltage to Ground</th>
<th>Minimum Clear Ground Distance (feet)</th>
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<tr>
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<td>*(Conditions (1) (2) (3))</td>
</tr>
<tr>
<td>0 – 150</td>
<td>2 ½  2 ½  3</td>
</tr>
<tr>
<td>151 – 600</td>
<td>2 ½  3 ½  4</td>
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*Conditions

(1) Exposed live parts on one side and no live or grounded parts on the other side of the working space.
(2) Exposed live parts on one side and grounded parts on the other side.
(3) Exposed live parts on both sides of the workspace.
- Working space required by this Section shall not be used for storage.
- At least one entrance of sufficient area shall be provided to give access to the working space about electric equipment.
- Adequate illumination shall be provided for all working spaces about electrical equipment. The light outlets shall be so arranged that persons changing lamps or making repairs on the lighting system will not be endangered by live parts or other equipment.
(4) The minimum headroom of working spaces about switchboards, panel boards and control centers which require manual operation or where there are live parts exposed at any time shall be 6 ¼ feet.
GROUND SAFETY

Pest Control

- With few exceptions, pesticides are potentially toxic to human beings and in some cases are flammable or explosive. All persons who mix, store or apply pesticides should have full knowledge of the characteristics, effects, and precautions applicable to the material being used.

- All University employees engaged in pesticide application work are to be licensed by the State of Texas or under the supervision of a licensed person. Products sold over the counter for immediate use from the container may be used with care by any licensed personnel.

- Private contractors who apply pesticides on campus must also be licensed by the State of Texas.

- Pesticides and other chemicals used in pest control must be used in accordance with instructions on the container label.

- Do not spray liquid pesticides on electrical outlets or equipment, use dust or powder.

- Chemicals consisting of high vapor toxicity must not be applied in large quantities in unventilated areas.

- Surplus pesticides must be disposed of in a manner, which will not permit harm to people, animals or the environment. Contact the Environmental Health & Safety Office for proper disposal procedures.

- The spray equipment tanks should be equipped with a leak-proof latch. The mixing system should be so designed that it eliminates spills during transfer and mixing.

- Do not apply pesticides in laboratories, office areas or any occupied areas without authorization from the individual responsible for that area.

- Persons requesting pesticide application must contact/notify all personnel in the affected area.

- All necessary safety equipment must be available during application of pesticides, such as respirators, gloves, face shields or goggles and aprons if the job warrants their use.
Tree Trimming

- Wear chainsaw chaps.

- Employees engaged in pruning, trimming, removing, or clearing trees shall be required to consider all overhead and underground electrical power conductors with potentially fatal voltages.

- The Grounds Supervisor shall ensure that a thorough inspection is made before climbing, entering, or working around any tree, to determine whether an electrical power conductor passes through the tree, or passes within reaching distance of an employee working in the trees. If any of these conditions exist either directly or indirectly, an electrical hazard shall be considered to exist unless the hazard can be removed by de-energizing the lines, or installing protective equipment.

- Only qualified line clearance tree trimmers familiar with the special techniques and hazards involved in line clearance, shall be permitted to perform the work if it is found that an electrical hazard exists.

- During all tree working operations aloft where an electrical hazard of more than 600 volts exists, there shall be a second employee qualified in line clearance tree trimming within normal voice communication.

Excavation

- Employees shall not work in or adjacent to any excavation until a reasonable examination has been made to determine that no conditions exist exposing them to injury from moving ground.

- Prior to opening an excavation, effort shall be made to determine whether underground installations, i.e. sewer, electrical lines, etc., will be encountered.

- The walls and faces of all excavations 5 feet or more in depth which employees will enter shall be effectively guarded by a shoring system, sloping of the ground, or other equivalent means.

- Where a shoring system is used it shall consist of wood timbers or equivalent, with sheathing as needed, properly designed and installed to sustain all existing and expected loads. Wood sheathing or uprights shall not be less than 2 inches in nominal thickness, except that ¾ inch thick plywood panels may be used in addition to the 2-inch material, as an aid in holding loose material. In lieu of the above shoring system the use of properly maintained hydraulic metal jack shoring units with equivalent strength is acceptable.
• In lieu of a shoring system, the sides or walls of an excavation may be sloped, provided equivalent protection is thus afforded. Where sloping is a substitute for shoring that would otherwise be needed, it shall be \( \frac{3}{4} \) horizontal to 1 vertical except where the instability of a material requires a slope greater than \( \frac{3}{4} \) to 1.

• Excavation work shall at all times be under the immediate supervision of someone with authority and qualifications to notify the shoring system or work methods, as necessary, to provide greater safety. This person shall examine the material under excavation and improve the shoring or methods beyond the minimum requirements, as necessary, to ensure protection of workmen from moving ground.

• Excavation material shall be prevented from falling back into the area where individuals are working. In no case shall the excavation material be placed closer than 2 feet from the edge of the excavations 5 feet or more in depth. Maintain at least 1-foot clearance for lesser depths.

• Convenient and safe means shall be provided for workers to enter and leave the excavation area. This shall consist of a standard stairway, ladder, or ramp securely fastened in place at suitably guarded or protected locations so as to require no more than 25 feet of lateral travel.

• No excavation shall take place below the level of the base of an adjacent foundation, retaining wall, or other structure until it has been determined that such excavation will in no way create a hazard or until adequate safety measures have been taken. If sidewalks are to be undermined they shall be supported to carry a maximum live load of 125 pounds per square foot.

Adequate barrier physical protection shall be provided at all excavations. All wells, pits, shafts, etc. shall be barricaded or covered upon completion of exploration and similar operations. Temporary walls, pits, shafts, etc., shall be backfilled.
STORAGE AND HOUSEKEEPING

**Housekeeping**

- Safety starts with housekeeping, a clean, neat and orderly work area is an important reflection of safe work habits and attitudes. Therefore, the following housekeeping rules will apply.
  - Places of employment and study shall be kept clean and orderly and in a sanitary condition. The floor of each area shall be maintained in a clean, and, so far as possible, a dry condition.
  - Material spilled on the floor which could cause an accident must be cleaned up immediately.
  - During the course of work, debris shall be kept reasonably cleared from work areas, and waste shall be disposed of at intervals determined by the rate of the accumulation and the capacity of the container. Always use containers supplied for this purpose.

**General Storage Rules**

- Material, whenever stored, shall not create a hazard. It shall be limited in height and shall be piled, stacked, or racked in a manner designed to prevent it from tipping, falling, collapsing, rolling, or spreading. Racks, bins, planks, blocks, sheets, shall be used where necessary to make the piles stable.

- Heavy or awkward items should always be stored near the bottom of shelves or cabinets as falling heavy items are a hazard to personnel.

- Do not allow equipment or storage to encroach within 42 inches of electrical panels. These panels contain the emergency switches for equipment and sometimes must be reached quickly.

- Have Physical Plant secure storage shelving, cabinets, and other items, which may accidentally tip over or are subject to movement.

- Storage of combustible equipment or materials shall not be allowed in boiler rooms, mechanical rooms and electrical panel rooms.

**Indoor Storage**

- Storage shall not obstruct or adversely affect means of exit.

- State fire codes do not allow the storage of materials, which may generate heat or emit smoke in corridors and halls. For this reason, it is University policy that there be no lockers, cabinets, refrigerators, storage materials, or extension of offices or laboratory facilities or functions into any corridor space of University buildings.
- Materials shall be stored, handled, and piled with due regard to their fire characteristics. Non-compatible materials, which may create a fire hazard, shall be segregated by a barrier having a fire resistance of at least one hour. Arrangement should permit convenient access for fire fighting.

- Clearance shall be maintained around lights and heating units to prevent ignition of combustible materials.

- Stacked materials shall have minimum clearance of 36 inches between the top of the stack and the sprinkler system piping and deflectors.

- Material stack height shall not exceed 15 feet in non-sprinklered buildings.

- Stacks shall have a maximum of 36 inches clearance between the top of the stacks and joists, rafter, or roof trusses.

- The maximum weight of materials stored on building floors or load carrying platforms, except those built directly on the ground, shall not exceed their safe carrying capacity.

- In warehouse-type storage areas, the following rules apply:
  - Aisles and passageways for one-way fork lift traffic shall be not less than the width of the widest vehicle or load plus three feet. For two-way fork lift traffic the minimum width of aisles shall be not less than twice the width of the widest vehicles or loads plus three feet.
  - Lanes for aisles and passageways shall be painted on the floor, or a similar method employed to mark such areas.
  - Black, white or combination of these two shall be the basic colors of the designation of traffic and housekeeping markings.

- Combustible rubbish, oily rags, or waste material, when kept within the building or adjacent to a building, shall be securely stored in metal or metal-lined receptacles equipped with tight fitting covers or in rooms or vaults constructed of non-combustible materials.

- Combustible storage shall not be allowed in attic or similar spaces.
**Loose Material Storage**

- Materials dumped against walls or partitions shall not be stored to a height that will endanger the stability of such walls and partitions.

- Employees shall not be permitted to work on or over loose material, until they have been instructed in the hazards involved and the precautions that must be taken to prevent employees being caught in caved-in material.

- In withdrawing materials, no over handling shall be permitted to exist at any time.

**Outdoor Storage**

- Combustible materials shall be piled with due regard to the stability of piles and in no case higher than 20 feet.

- Driveways between and around combustible storage piles shall be at least 15 feet wide, and maintained free from accumulation of rubbish, equipment or other materials.

- The entire storage site shall be kept free from accumulation of unnecessary combustible materials. Weeds and grass shall be kept down and a regular procedure provided for the periodic cleanup of the entire area.

- Storage shall be in orderly and regular piles. Combustible material shall not be stored outdoors within 10 feet of a building or structure.

- Portable fire extinguishing equipment, suitable for the fire hazard involved, shall be provided at convenient, conspicuously accessible locations in the yard area.
SHOP SAFETY

Shop Safety Rules

- Personnel shall not be permitted to operate any machinery until they have been instructed as to the hazards and the proper operation of such equipment and the use of protective devices.

- Floors shall be kept in good repair and shall be free from protruding nails, splinters, holes, unevenness, and loose boards. Effective means shall be provided to prevent slipping.

- Aisles shall be of sufficient width to permit the uncrowded and safe passing of personnel, trucks, or material. Where practicable, lines shall be painted on the floor or some similar method shall be employed to mark aisles.

- During working periods each working area, operation, or process shall be adequately lighted and harmful glare minimized.

- Tools, machines, devices, or other equipment that are hazardous because of defects or other conditions shall not be used until suitably repaired.

- Areas around machines should be kept clear of obstructions and in non-slippery condition. Spilled oil or grease shall be cleaned up immediately.

- Do not clean chips from the surface of machines with compressed air or with hands; a brush or hook should be used. When general cleaning of machines and equipment by compressed air is considered necessary, the outlet pressure should be reduced to not more than 10 psi by means of a regulator or pressure reducing control nozzle designed for this purpose.

- Cleaning of one’s clothes with compressed air is prohibited.

- When using portable electrical equipment around machine tools, keep electrical cords clear of moving parts.

- Do not place hand tools on machines. Keep them in their assigned location.

- Loose flowing or torn clothing, gloves, neckties, long sleeves, rings or bracelets shall not be worn around machinery such as band and circular saws, drill presses, grinders, joiners and planers, lathes, and sanders. Snug-fitting clothing shall be worn.

- Goggles or face shields shall be worn when grinding or when there is danger of flying particles.
- Gloves are not to be worn around rotating machinery unless sharp or rough materials are being handled. If gloves are worn great care should be exercised to prevent their being caught in the machinery.

- Gear and belt guards must be in place before machine is operated. Guards on machines are to be properly adjusted and in working order before starting the machine. Machine guards must be kept in position at all times unless removal is authorized for repairs or cleaning.

- Be sure all is clear before starting any machine.

- Unless conditions make it impractical, no employee should be permitted to operate electric or mechanical equipment or machines in a building or room when alone.

- Dull, badly set, improperly filed or improperly tensioned saws, shall be removed from service immediately as soon as they begin to cause the material to stick, jam, or kick back when it is fed to the saw at normal speed. A saw to which gum has adhered shall be cleaned immediately.

- A push stick made of a narrow strip of wood or similar material, with a notch in one end and shaped on the other end to provide a good hand grip, shall be used to push material through saws where there is possibility of the operator’s fingers coming in contact with blades. A jig or fixture shall be used when cutting or forming irregular pieces or oblique angles.

- Projecting keys, set screws, and other projections in revolving parts shall be made flush or as guarded as practicable by a substantial metal cover as practicable.

- Power saws shall be guarded underneath and behind the table to prevent possible personal contact. A mechanical or electrical power control shall be provided on each machine which will make it possible for the operator to cut off the power from the machine without leaving his position at the point of operation.

- Each activity whose activities create dust, shavings, chips, or slivers, shall be equipped with an exhaust system either continuous or automatic in action, of sufficient strength and capacity to remove such refuse from the points of operation and immediate vicinities, of machine and work place.

- Do not repair, oil, or clean machinery while it is in motion. Lubrication while machinery is in motion shall be done by remote control lubricating system.

- Do not use electrical equipment or machines with frayed or otherwise deteriorated insulation. Electrically driven portable machinery as well as fixed electrical equipment shall have the frame grounded.
• Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

• Safety shoes should be considered for foot protection where there is reasonable possibility of dropping heavy objects. Footwear which is defective or inappropriate to the extent that ordinary use creates possibility of foot injury (open toed sandals or tennis shoes) shall not be worn in shop areas.

• Do not attempt to remove foreign objects from the eye or body; obtain proper medical treatment.

• Report ALL injuries to your supervisor.

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**Band Saw Safety Procedures**

• Adjustable guards should be kept as close over the point of operation as the work permits.

• When a band breaks - shut off the machine and stand clear until the machine has stopped.

• Never stop a machine by pushing material against the band.

• Cracked saw blades should not be used. A “click” as the blade passes through the work denotes a cracked blade.

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**Drill Press Safety Procedures**

• When drilling, tapping, or reaming material, see that it is securely fastened by discs or clamps, so that it cannot spin. In no case should the operator rely on his hand to secure the material from turning.

• When tightening drill or chuck of drill press be sure to remove release key before starting the machine.

• Run the drill only at the correct speed. Forcing or feeding too fast may cause broken drills and result in serious injury.

• An operator should never attempt to loosen the chuck of a tapered shank drill unless the power is turned off.

• When chucks are being removed from the spindle, the spindle should be lowered close to the table so the chuck will not fall.

• Never use the hands to remove drilling from the work.
**Circular Saw Safety Procedures**

- Stand to one side. Do not stand directly in line with work being fed through saw.

- A ripsaw shall not be used for cross cutting nor shall a crosscut saw be used for ripping.

- See that saw blade is in good condition before using. This means sharp, unbroken, free from cracks, and the proper size.

- Never reach over the saw to obtain material.

- Never oil the saw or change the gauge while the machine is running.

- When shutting off power, never stop the saw quickly by thrusting a piece of wood against it. Be sure the saw has stopped before leaving the table.

- A pusher stick shall be used when the size or shape of the piece requires the hands to be near the blade of the saw.

- The appropriate guards must be kept in place at all times.

- Speed of Saw: The peripheral speed of circular saws shall not exceed 12,000 feet per minute unless the saw has been manufactured for a higher speed and is so marked.

**Jointer and Planer Safety Procedures**

- Stand to one side. Do not stand directly in line with work being fed through the machine.

- When pieces shorter than 18 inches are machined, a safety pusher stick of suitable design shall be used.

- Do not take too heavy a cut as this will cause a kickback.

**Grinding Safety Procedures**

- Abrasive-wheel machinery shall be equipped with protection hoods, which shall be designed and constructed to effectively protect the user from flying fragments of a bursting wheel insofar as the operation will permit.

- Wear a face shield, safety goggles, or cover goggles when grinding.

- Grinding wheels shall be equipped with tool rests, which are set not more than one-eighth inch from the wheel.
• The side of an emery wheel shall not be used for grinding unless it is a special type wheel for that PURPOSE.

• Stand to one side when starting up a machine and not exert great pressure on the wheel until it is wound up.

• Report to your supervisor immediately any broken, cracked, or other wheel defects.

• Mounting a new wheel should be done only by an experienced person.

• Never use a wheel that has been dropped or has received a heavy blow, even though there is no apparent damage. The wheel may be weakened to a point where it may fly apart when used.

• An abrasive wheel shall not be operated at a speed in excess of that recommended by the manufacturer of the wheel.

**Lathe Safety Procedures**

• A chuck or faceplate should never be put on a lathe by power operation.

• Make sure that all gear and belt guards are in place.

• Keep hands off chuck rim when lathe is in motion.

• Do not attempt to adjust a tool while the lathe is running.

• Never apply a wrench to revolving work or parts.

• Always use a brush to remove chips – never the hands.

• After adjusting the chuck remove the chuck wrench immediately.

**Sander Safety Procedures**

• Belt sanders shall have both pulleys and the unused run of the sanding belt enclosed. Rim guards will be acceptable for pulleys with smooth disc wheels provided that on-running nip points are guarded. Guards may be hinged to permit sanding on the pulley.

• Disc sanders shall have the periphery and back of revolving disc guarded, and the space between revolving disc and edge of table shall not be greater than one-quarter inch.
- Do not push the work against the sander surface with excessive force as this may cause it to be thrown. Always wear eye protection.

**Kiln Safety Procedures**

- Metal pouring is a particularly hazardous operation due to the possible presence of impurities in the molds, ladles, pouring troughs, or the metal itself, which could cause “spluttering.”

- Ceramic kiln brick and other ceramic objects hold heat for a long time without visual effect. Always wear gloves when handling them.

- Individuals operating metal melting furnaces or kilns must be provided with and required to wear approved eye shield, protective gloves and aprons. Bare flesh should not be exposed during the pouring or removal of heated items.

- The appropriate class fire extinguisher shall be immediately available in the kiln area in the event of fire.

**Tools, Hand and Portable Powered**

**Hand Tools**

- Hand tools shall be maintained in a safe condition free of worn or defective parts.

- Tools shall be restricted to the use for which they are intended, and should be used only by employees.

- Tools having mushroomed heads, split or defective handles, worn parts, or other defects that impair their strength or render them unsafe for use shall be removed from service and shall not be reissued until the necessary repairs have been made.

- Goggles shall be worn by persons using hand tools when there is a possibility of flying chips or other materials.

- Listed below are some condition requirements for specific hand tools:

  - Files or rasps shall be equipped with a secure fitted, substantial handle.
  - The head of a hammer shall be wedged securely and squarely on the handle and neither the head nor the handler shall be chipped or broken.
  - Care shall be taken to select a screwdriver of the proper size to fit the screw. Screwdrivers with a split or splintered handle shall not be used. The point shall be kept in proper shape with a file or grinding wheel, and the screwdriver shall not be used as a substitute punch, chisel, nail putter, etc.
- Only wrenches in good condition shall be used: a bent wrench, if straightened, has been weakened and shall not be used. Also watch for sprung jaws on adjustable wrenches. Always pull toward you, never push, since it is easier to brace against a sudden lunge forward should the tool snap or break.
- Pliers shall be kept free from grease and oil and the teeth or cutting edges shall be kept clean and sharp. The fulcrum pin, rivet or bolt shall be snug but not tight.
- Only saws that are sharp and properly set shall be used. A crosscut saw shall be used for cutting across the grain; a ripsaw for cutting with the grain.
- Hacksaws should be adjusted in the frame snug and tight enough to prevent buckling. The number of teeth per inch should be selected for the work. Pressure should be on the down stroke only.
- Wrecking bars and crowbars shall be kept sharpened and free from burrs.
- Shovels shall be inspected by the worker before use to ensure that they have a strong, smooth handle and grip free from splinters, and that the blades are smooth and sharp.

**Powered Tools**

- Portable power tools shall be kept cleaned, oiled and repaired. They shall be carefully inspected before use. The switches must operate properly and the cords should be clean and free from defects. The plug shall be clean and sound.

- Portable powered tools capable of receiving guards and/or designed to accommodate guards shall be equipped with guards to prevent the operator from having any part of his body in the danger zone during the operating cycle.

- Electric powered portable tools with exposed conducting parts shall be grounded. Portable 1 projected by an approved system, of double insulation, or its equivalent, not be grounded. Where such an approved system is employed the equipment shall be distinctly marked.

- Hand-held powered tools of a hazardous nature such as circular saws having a blade diameter greater than two inches, chain saws, percussion tools, drills, topers, fasteners, drivers, grinders with wheels greater than two inches in diameter, disc sanders, belt sanders, reciprocating saws, saber scroll, and jig saws with blade shanks greater than one-fourth inch, and other similarly operating powered tools shall be equipped with a constant pressure switch or control that will shut off the power when the pressure is released. Other than circular saws, chain saws, and percussion tools, these tools may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on. All other less hazardous hand-held powered tools, such as routers, may be equipped with a positive “on-off” control.
Portable circular saws having a blade diameter over two inches, shall be equipped with guards or hoods which will automatically adjust themselves to the work when the saw is in use, so that none of the teeth are exposed to contact above the work; and when withdrawn from the work, the guard shall completely cover the saw to at least the depth of the teeth. The saw should not be used without a shoe or guide.

Pneumatic powered portable tools shall be equipped with automatic air shut-off valve that stops the tool when the operator’s hand is removed. Safety clips or retainers shall be installed on pneumatic tools to prevent tools from being accidentally expelled from the barrel; or other effective means to prevent accidents from this source shall be used.

Abrasive wheels with a diameter over 2 inches shall be used only on machines provided with safety guards. The guard shall cover the spindle end, nut and flange projections. Guards on operations where the work provides a suitable measure of protection to the operator may be so constructed that the spindle end, nut and other flange are exposed.

Explosive-actuated fastening tools muzzle ends shall have a protective shield or guard designed to confine any flying fragments or particles. The tool shall be so designed that it cannot be fired unless it is equipped with a protective shield or guard. A department shall not permit an employee to use a power-actuated tool until he has received training as prescribed by the manufacturer.

**Power Mowers**

**General Requirements**

- Power mowers shall bear a label certifying that they have been constructed in accordance with the provisions of ANSI B71.1-1972.

- Power mowers shall be maintained in safe operating condition in accordance with the owner’s manual.

- An indicator of blade rotation shall be provided on mowers that operate quietly.

- The controls used for stopping, starting, speed control, and attachment engagement shall be clearly identified by a durable label.

- The mower blade shall be enclosed except on the bottom, and the enclosure shall extend 1/8-inch minimum below the lowest cutting point of the blade.

- The discharge opening(s) shall be so placed or guarded that grass or debris will not discharge directly into the operator zone. Do not chain up safety guards.

- The word “CAUTION” OR “DANGER” shall be placed on the mower at or near discharge opening.
• The blade(s) shall stop rotating within seven seconds after either declutching or shutting off drive power.

• Gasoline mowers shall not be parked, stored or repaired in any public use building, office, exit way or location that would create a fire or life hazard.

Operating Requirements:

• Area to be cut should be examined for loose objects such as tin cans, pieces of wire, or other objects. Serious injury can result from objects thrown by rotating blade.

• The engine will be cut off when filling the gas tank. No smoking when filling.

• Avoid slopes that are too steep for machines, whether a push mower or riding mower.

• Suitable foot, eye, and head protection should be worn when operating power mowers.

Walk-Behind Mowers:

• The mower handle shall be fastened to the mower so as to prevent unintentional uncoupling with in operation.

• A mower with a rope starter shall have a labeled, designated area for stabilizing the mower when starting the engine.

• A shutoff control device shall be provided to stop operation of the engine. This device shall require manual and intentional activation in order to restart the engine.

Riding Rotary Mowers:

• A disconnect device shall be provided between the engine (motor) or power source and the blade(s).

• A means shall be provided to prevent the starting of the engine when the wheel drive control is in the engaged position. Such means shall not be required on units equipped with dead-man controls.

• A slip-resistant surface or other means shall be provided to minimize the possibility of an operator’s foot slipping off the foot support or platform.

• A brake pedal shall be provided. It shall be foot-actuated, and the direction of motion shall be forward or downward, or both, for stopping.

• Towed rotary mower attachments shall have no front opening in the blade enclosure.
MISCELLANEOUS OPERATIONS

Confined Spaces

- These safety procedures apply to all employees performing work within a confined space.

- Confined spaces are defined as the interior of signal manholes, electrical manholes, vaults, sewers, tunnels, or other structures which are similarly surrounded by confining surfaces so as to permit the accumulation of dangerous gases or vapors, or the exclusion of oxygen.

- Many flammable gases are heavier than air and will remain in a confined space thus presenting a serious fire and explosion hazard. Toxic gases that in minute quantities can kill instantaneously may also be present. Some are colorless, odorless, and tasteless. Examples of gases and materials that give off vapors that may be present are: natural gas, propane petroleum gas, kerosene, gasoline, fuel oils, benzol, carbon monoxide, hydrogen sulfide, chlorine, solvents, acids, etc.

- Confined spaces that contain or that have contained combustible gases or dangerous gases shall be thoroughly purged of said substances before they are entered.

- Confined spaces that have contained dangerous gases shall be tested with the instrument after the confined spaces have been cleared of these gases and before being entered without wearing approved respirator equipment.

- When a test instrument sounds an alarm while employees are in a confined space, the employees shall immediately evacuate the space and begin purging operations.

- Employees shall not be permitted to enter or remain within a confined space until it is free of harmful concentrations of dangerous gases unless they wear the approved respiratory equipment.

- Employees assigned to work in or inspect a confined space that is or may become hazardous, shall be informed of the potential hazard and shall be trained in the use of all required safety equipment.

- Provisions shall be made for ready entry – and exit before working in a confined space.

- An approved safety belt with a life line attached shall be used by employees equipped with respiratory equipment as required within confined spaces: such safety belt and life line shall also be required when employees are not equipped with respiratory equipment, if the possibility exists that the confined space may become hazardous.
• In all situations while employees are inside a confined space, at least one employee shall stand by on the outside ready to give assistance in case of an emergency.

• If entry is through a top opening, the safety belt shall be of the harness type that suspends a person in an upright position, and it shall have a safety line attached. The other end of the line shall be secured outside the entry opening. In addition, if entry is through the top, at least two employees shall stand by on the outside ready to give assistance in case of an emergency while employees are inside.

• Employees assigned to operate blowers (portable ventilation or exhaust) shall have no other duties while performing their function. (NOTE: such blower should have at least 750 CFM output).

• When respiratory equipment is required, there shall be at least two workers on the job equipped with approved respiratory equipment.

• While it is open, the opening to a confined space shall always be identified or guarded by a worker.

• Lines which may convey hazardous materials to the confined space in question shall be disconnected or blocked and blinded to prevent such material from entering the confined space while the work is in progress.

• While work is being performed inside a confined space, at least one person shall be immediately available to administer artificial respiration (CPR).

• Only wood or fiberglass extension ladders of at least six feet in length shall be used in confined spaces.

• In confined spaces subject to contamination by flammable or explosive liquids or gases, only permissible lighting or electrical equipment shall be used.

• When atmospheric conditions are nauseating, or where prolonged exposure would be harmful, all work in confined spaces shall be arranged in short periods.

• Except in extreme emergencies involving imminent peril to life, employees shall not be permitted to work without respiratory equipment where the oxygen content of the air is less than 19-1/2 percent by volume.

• Non-University personnel shall not be permitted in a confined space unless their entrance has been authorized by the University Physical Plant.
Heat Stress

People may suffer from heat stress during hot, humid conditions. Because the climate at TAMU-CC is conducive to heat stress, people must take preventive measures to reduce their risk. To prevent heat stress, employees should limit strenuous physical activity during the hottest portion of the day, wear a brimmed hat when in the sun, take frequent breaks, and drink plenty of fluids. Heat stress occurs in two forms: Heat Exhaustion and Heat Stroke.

Heat Exhaustion

Heat exhaustion is usually caused by strenuous physical activity and hot, humid conditions. Because heat exhaustion is the body’s response to insufficient water and salt it, should be treated as quickly as possible.

The signs and symptoms of heat exhaustion include the following:

- Exhaustion and restlessness
- Headache, Dizziness
- Nausea
- Cold, clammy, moist skin
- Pale face
- Cramps in abdomen and lower limbs
- Fast, shallow breathing
- Rapid, weak pulse
- Falling body temperature
- Fainting

Take the following steps to administer first aid for heat exhaustion:

1. Have the victim lie down in a cool or shaded place.
2. If the victim is conscious, have him/her slowly sip cool water.

If the victim is unconscious or is conscious but does not improve, seek medical aid as soon as possible.

3. If the victim is sweating profusely, have him or her sip cool water that contains one teaspoon of table salt per pint of water.
Heat Stroke

Heat stroke is usually caused by exposure to extreme heat and humidity and/or a feverish illness. Heat stroke occurs when the body can no longer control its temperature by sweating. Heat stroke is extremely dangerous and may be fatal if not treated immediately.

The signs and symptoms of heat stroke include the following:

- Hot, dry skin
- Headache, Dizziness
- High temperature
- Strong pulse
- Noisy breathing
- Unconsciousness

Immediately take the following steps to administer first aid for heat stroke:

1. If possible, move the victim to a cool place.
2. Seek medical attention as soon as possible.
3. Remove the victim’s clothing.
4. If the victim is conscious, place him in a half-sitting position and support the head and shoulders.

If the victim is unconscious, place him on the side with the head facing sideways.

5. Fan the victim and sponge the body with cool water.

Spray Painting

- Spray painting operations using flammable or combustible liquids shall be separated from other areas by either construction having a fire resistance of at least two hours or by being in a separate building. Spray painting should be confined to properly constructed spray booths or rooms.

- Spray booths shall be substantially constructed of steel, or masonry with interior surfaces smooth and continuous without edges and otherwise designed to prevent pocketing of residues and facilitate cleaning. Space within a spray booth having a frontal area greater than nine square feet should be protected with automatic sprinklers or have a fire curtain or metal door at the outer edge of the booth opening.

- Electrical equipment located within 20 feet of a spraying area shall be installed and maintained in accordance with Chapter 5 of the National Electrical Code.
Spraying areas shall be kept free from the accumulations of deposits of combustible residues. If there are excessive accumulations of residue in booths, ducts, duct discharge points, or other spraying areas, then all spraying operations should be discontinued until conditions are corrected.

Spraying areas shall be provided with mechanical ventilation adequate to dilute flammable vapors to less than 20 percent of their lower explosive limit.

Welding, Cutting and Brazing

Welding and cutting are done on an ever increasing variety of metals and metal coatings. Four primary hazards are associated with welding operations: ultraviolet and infrared light, oxides of nitrogen, ozone, and metal fumes.

Before cutting or welding is permitted the area shall be inspected by the individual responsible for authorizing cutting and welding operations. Cutting or welding shall be permitted only in areas that are, or have been made, fire safe. Where objects to be welded or cut are not readily movable, all movable fire hazards in the vicinity shall be taken to a safe distance.

Where objects to be welded or cut are not movable and where fire hazards cannot be removed, then guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards and nearby personnel.

Suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for instant use. It may be necessary to assign additional personnel to guard against fire while the actual welding is being performed, and for a sufficient period of time after completion of the work to ensure that no possibility of fire exists.

No welding, cutting or other hot work shall be performed on used drums, barrels, tanks or other containers until they have been cleaned so thoroughly as to make absolutely certain that there are no flammable materials present which, when subjected to heat, might produce flammable or toxic vapors.

Goggles or other suitable eye protection shall be used during all gas welding or cutting operations. Eye protection shall be provided where needed for brazing operations.

Welders should wear flameproof gauntlet gloves. Flameproof aprons may be desirable as protection against radiated heat and sparks. Cotton clothing, if used, should be chemically treated to reduce its combustibility. All clothing should be reasonably free from oil or grease.
- Local exhaust systems providing a minimum air velocity of 100 lineal feet per minute in the welding zone shall be used except where not feasible. Mechanical dilution ventilation sufficient to prevent exposures to concentrations of airborne contaminates from exceeding mandatory limits of Title 29 CFR, Part 1910.1000, PEL air contaminates.

- Respiratory protective equipment shall be used when ventilation is not feasible.

- If work place monitoring records clearly demonstrate that exposure levels are not exceeded, neither mechanical ventilation nor respiratory protective equipment is required.

- Local exhaust ventilation shall be used when potentially hazardous materials are employed as base metals, fluxes, coatings, platings, or filler metals. These include, but are not limited to, the following materials:

  - Beryllium
  - Lead
  - Cadmium
  - Mercury
  - Chromium
  - Zinc
  - Inert-gas metal-arc welding or oxygen cutting of stainless steel

- Where the work permits, the welder shall be enclosed with noncombustible screens having a low reflective finish. Booths and screens shall permit circulation of air at floor level. Workers or other persons adjacent to the welding areas shall be protected from the rays by non-combustible or flameproof screens or shields or shall be required to wear appropriate eye protection.

- When operations are suspended for any substantial period of time, such as during lunch or overnight, welding equipment shall be cut off.

- The frames of arc welding and cutting machines shall be grounded either through a third wire in the cable containing the circuit conductor or through a separate wire which is grounded at the source of the current.

- Arc welding and cutting cables shall be of the completely insulated, flexible type, capable of handling the maximum current requirements of the work in progress.

- Mixtures of combustible gases and air are very explosive and shall be carefully guarded against. No device or attachment facilitating or permitting mixture of air or oxygen with combustible gases prior to consumption, except at the burner or in a standard torch or blow pipe, shall be allowed unless approved for that purpose.
- Acetylene and liquified fuel-gas cylinders shall be placed with valve-end up whenever they are used. If a leak develops at the fusible plug or elsewhere on a cylinder, the cylinder shall be removed well away from any source of ignition, the cylinder valve slightly opened with the fuel gas allowed to escape slowly. A warning shall be placed near this cylinder not to approach it with a lighted cigarette or other source of ignition. Such a cylinder shall be plainly tagged as defective or in need of repair before refilling.

- The primary hazard associated with silver soldering is the inhalation of cadmium fumes. Silver solder generally contains 18% to 20% cadmium which is emitted as a fume when silver solder is heated. Silver soldering operations always should be conducted where local exhaust ventilation is available to remove the cadmium fumes, and also fluoride fumes, which may be emitted from the flux. Sometimes, if it is impractical or nearly impossible to provide exhaust ventilation, the worker should wear an approved respirator with a high efficiency particulate filter.

**Window Cleaning**

- Employees shall not be required nor permitted to clean any window in any building from the outside or inside unless means are provided to enable such work to be done in a safe manner.

- Window cleaning employees shall be provided with safety equipment and devices, such as elevating platforms, rolling scaffolds, suspended scaffolds or extension ladders.

- Window cleaning employees shall be instructed in the proper use of equipment provided them, and shall be supervised during the use of the equipment and safety devices to ensure that safe working practices are observed.

- Employees required to clean windows shall use safety devices as required herein.
VEHICLE OPERATION

General

- Operators of University equipment and vehicles are considered as representatives of the University and should extend every courtesy to both traffic and pedestrians.

- Those employees specifically authorized and who possess a valid Texas driver’s license may operate University owned vehicles on official business.

- The following rules apply to the operation of University vehicles:
  - Drivers shall be familiar with and obey state motor vehicle laws that apply to them.
  - A driver shall not permit unauthorized persons to drive, operate or ride in or on a University vehicle.
  - Driver and front seat passengers shall use seat belts at all times.
  - Employees shall not permit anyone to ride on the running boards, fenders, or any part of any motorized equipment except on the seats or inside the body walls.
  - Employees shall not ride on loose materials or equipment carried on trucks, nor shall they ride on trailers or towed equipment, except when performing a job function.
  - Employees shall not jump on or off vehicles in motion.
  - Drivers shall keep a sharp lookout for persons and cyclists on campus and be prepared for an immediate stop.

- The following rules apply to the condition of university vehicles:
  - Windshields and windows shall be kept clear of anything that may obstruct the vision of the driver.
  - Brakes shall be tested by the driver at the start of each day. The driver shall report all defects and they shall be adjusted or repaired before the vehicle is put in operation.
  - Lights and other signaling devices shall be inspected daily. If found defective, they shall be repaired before the vehicle is placed in operation. NO vehicle shall be operated at night unless equipped with properly working headlights, taillights and other necessary safety devices as required by law.

- The following rules apply to University haulage vehicles:
  - Materials and equipment shall be loaded so they will not cause a hazard by shifting. Heavy equipment and materials shall be securely fastened.
  - Red flags during the day and red lights at night shall be attached to equipment or material that extends more than four feet beyond the back of the vehicle. Red flags or approved clearance lights shall be attached to loads extending more than two feet beyond the front of the vehicle.
  - Tools, materials, or equipment shall not be permitted to extend beyond the permanent fixtures provided in the sides of the truck.
  - Trailers or equipment, while being towed, shall be securely coupled to the truck, and the towing ball and towing hitch shall be compatible. A vehicle with a 1 7/8” ball shall not tow a trailer with a 2” connector. At a minimum safety chains shall be 3/8” galvanized and wither shackled or securely hooked to the towing vehicles bumper.
-Trucks shall not be operated with tailgate hanging or dangling.
- Vehicles will not be operated unless back-up signals are in operating order.

- In case of vehicle accident:
  - Obtain medical aid for the injured (if necessary).
  - Call the University Police (4444) for an investigation of the accident.
  - Submit accident investigation results to your supervisor.

- Parking, storing, or repairing gasoline-fueled vehicles, motorcycles, mopeds or other similar devices shall not be allowed in any dwelling unit, office, exit way or location that would create a fire or life hazard.

**Bicycles and Mopeds**

- The following regulations are incorporated into this manual because bicycles and mopeds are regularly operated on campus, and accidents with pedestrians are quite possible.

- Persons operating a bicycle on campus are subject to both the Texas Vehicle Code and the University’s Traffic and Parking regulations.

- All laws and regulations are enforced by the University Police.

- Motorized bicycles shall not be operated under power on walkways.

- Bicycle operators shall not exceed the posted speed limit of 15 mph on campus, nor exceed a speed, which is unsafe for campus conditions, nor shall they operate their bicycles in a manner, which endangers the safety of either persons or property.

- Bicycle operators shall yield the right-of-way to pedestrians on campus.

- Bicycles shall be parked in racks provided for that purpose.

- Bicycles are not permitted in University buildings.

**Garage Safety**

- The following rules apply to the use and repair of vehicle batteries.
  - Battery charging installations shall be located in areas designated for this purpose.
  - When charging batteries, the vent caps shall be kept in place to avoid electrolyte spray.
  - Facilities for quick drenching of the eyes and body shall be provided within 250 feet of the battery area for emergency use.
• When using jumper cables to start a second vehicle, follow these procedures to avoid either equipment damage or an explosion:
  - It must be initially determined whether, both vehicles are negatively grounded, (the negative terminal is connected to the engine block or frame), or positively grounded. It must also be determined that both batteries have the same nominal voltage (6 or 12 volts). Do not mix these systems in any way as damage will occur.

• When both vehicles are negatively grounded (which most often is the case), connect the ends of one cable to the positive terminal of each battery. Then connect one end of the other cable to the engine block of the car being started. Do not make this final connection to the negative terminal of the weak battery. Disconnecting the batteries should be done by reversing this procedure.

• The following rules apply to the fueling of vehicles and equipment:
  - No internal combustion engine fuel tank shall be refilled with a flammable liquid while the motor is running. Filling shall be done in such a manner that likelihood of spillage is minimal. If a spill occurs it shall be washed away completely, or equivalent action taken to control vapors before restarting the engine. Fuel tank caps shall be replaced before starting the engine.
  - A gasoline pump shall be provided to service the fuel tanks of gasoline engine driven equipment. A good metal-to-metal contact should be kept between fuel supply tank or nozzle of supply hose and the fuel tank.
  - Open lights, open flames, or sparking or arching equipment except that which is an integral part of automotive equipment, shall not be used near fuel storage tanks or internal combustion engine equipment while being fueled with flammable liquids.
  - Smoking shall not be permitted at or near the equipment being fueled.
    Post a conspicuous sign in each fueling area stating: “NO SMOKING”.
  - A dry chemical or carbon dioxide fire extinguisher rate 6:BC or larger shall be in a location accessible to the fueling area.

• The following apply to jacks and their use:
  - The rated load shall be legibly and permanently marked on a prominent location on the jack by casting, stamping or other suitable means.
  - Jacks shall be designed so that their maximum safe extension cannot be exceeded.
  - In the absence of a firm foundation, the base of the jack shall be blocked. If there is a possibility of slippage of the cap, a block shall be placed between the cap and the load.
  - Employees shall not enter the zone beneath a jack-supported load unless it has been effectively blocked or cribbed.
  - Jacks requiring cleaning and lubrication, such as screw jacks, shall be properly cleaned and lubricated at regular intervals. The lubricating instructions of the manufacturer should be followed, and only recommended lubricants should be used.
The following rules apply to tire inflation:
- Tire inflation shall be accomplished by means of a clip-on chuck with a minimum 24-inch length hose to an in-line foot or hand valve, and gauge. A clip-on chuck an in-line regulator (factory preset at 40 psi maximum) or a restraining device may be used as an equivalent.
- Tire inflation control valves shall automatically shut off the air flow when the valve is released by the operator or be of the preset regulator type.
- A tire restraining device, such as a cage, rack or other effective method shall be used while inflating tires mounted on split rims or having retaining rings.
EXCEPTION: While the wheel assembly is mounted on a vehicle, tire may be inflated without a restraining device, provided the remote control inflation equipment is used and all persons stay out of the danger area.

Transporting Employees and Students

- Trucks, buses and other vehicles used regularly for the transportation of employees and students shall be constructed or accommodated for that purpose, and shall be equipped with adequate seats properly secured in place, and shall be protected on sides and ends to a height of 46 inches to prevent falls from the vehicle.
- Motor vehicles used to transport employees shall be kept in good repair; this includes: lights, brakes, horn, mirrors, windshields, turn signals and any other equipment affecting passenger safety.
- The number of employees or students transported on vehicles covered by this section shall be limited to prevent crowding, and shall never exceed a number, which may endanger the safe handling of the vehicle or the safety of the passengers. The passengers carrying capacity of trucks and buses regularly used to transport employees shall be conspicuously marked on the outside of the vehicle near the door or entrance.
- Every bus, conventional type or truck type, used for the transportation of employees or students, every compartment with an enclosed seating capacity of seven or more shall be provided with an emergency exit remotely located from the normal means of entrance.