ELECTRICAL PROTECTION PROGRAM

A. Introduction:

1. Almost every workplace has a source of electrical power. If electrical energy is used improperly, electrical shock and injury may result. With the knowledge of a few basic guidelines, most people can avoid electrical hazards. This chapter is designed to protect those who may be exposed to electrical hazards from working on, near, or with any appliance or piece of equipment that uses electricity, either energized or de-energized.

B. Responsibilities:

1. Environmental Health and Safety:

a. Create policies and procedures pertaining to Electrical Safety.

b. Review policies and procedures annually or as needed and revise as necessary.

c. Provide training programs on Electrical Safety for employees.

d. Provide the necessary PPE for electrical work in hazardous conditions.

2. Employees

a. Become familiar with policies and procedures

b. Attend all mandatory training sessions

c. Adhere to all safety policies and procedures pertaining to Electrical Safety.

d. Report any problems or suggestions with policies and procedures to EHS.

e. Wear all personal protective equipment required for activities with exposure to electrical hazards.

C. Policies, Practices, and Procedures:

1. General Electrical Equipment Safety:

a. Do not raise or lower equipment using the cord or carry tools/equipment by the cord.

b. Do not damage the equipment's casing or the cord's insulation.

c. Check cord for defects prior to use.

d. Remove damaged or inoperative equipment from service immediately, attach a "do not use" or similar tag and notify your department head or supervisor.

e. Personally owned portable electrical equipment must be approved by Facilities Management prior to use.

f. Use of extension cords may only be utilized **temporarily** unless approved.

g. Maintain three foot (minimum) work space in the direction of the live parts around all breaker panels, distribution panels, motor control centers, motor starters and disconnects. The width of the work space should be 30 inches or the width of the equipment, whichever is greater.

h. Assume that all overhead wires are energized at lethal voltages. Never assume that a wire is safe to touch even if it is down or appears to be insulated.

i. Never touch a fallen overhead power line. Call the electric utility company to report fallen electrical lines.

j. Do not connect too many pieces of equipment to the same circuit or outlet as the circuit or outlet could become overloaded.

l. Power strips, such as those used on computers, should be *plugged directly into outlets and not into extension cords or other power strips.*

m. Grasp the plug to remove it from a socket, never pull the cord.

n. Keep all cords away from heat, oil, water and sharp edges.

o. Always unplug electrical appliances before attempting any repair or maintenance.

p. Keep cords out of the way of foot traffic so they don't become tripping hazards or become damaged by traffic. If this is unavoidable, tape the cord to floor in order to negate the tripping hazard.

q. Never use electrical equipment in wet areas or run cords across wet floors.

r. Always use ladders made of wood or other non-conductive materials when working with or near electricity or power lines.

2. Grounding Equipment: Use cords with 3 prong plugs. The continuity of the grounding conductor may not be disrupted by cutting off the third prong or by using adapters, attachment plugs, receptacles, etc.

3. Work Locations that contain Conductive Liquids:

   a. Employees must use ground fault interrupters, (GFI's either extension cords or receptacles) when working with portable electrical equipment in areas that are flooded or where contact with conductive liquids is likely (pools, basements, man-holes, labs).

   b. Any outlet that is serviced by a GFI circuit breaker will be marked as such.

4. Testing: The following tests will be performed on all 120 volt, single phase 15 and 20 ampere cord sets, receptacles which are not part of the permanent wiring of the building or structure, and cord and plug connected equipment required to be grounded:

a. All equipment grounding conductors will be tested for continuity and will be electrically continuous.

b. Each receptacle and attachment cap or plug will be tested for correct attachment of the equipment grounding conductor which will be connected to its proper terminal.

c. Cord sets and temporary receptacles will be tested for correct polarity.

d. All required tests will be performed:

i. Before first use.

ii. When equipment is repaired.

iii. When equipment is reasonably suspected to have been damaged.

5. Test Equipment: All receptacles, cord sets and cord and plug connected equipment, will be tested in the following manner:

a. If in service, tested with a circuit tester.

b. If not service, tested with continuity tester.

6. Test Verification: Tests will be documented and maintained for a minimum of three years.

7. Personal Protective Equipment: Faculty and Staff will be provided with and will wear all personal protective equipment that is appropriate for their work as defined by EHS. This may include but is not limited to: arc flash protecting hoods/face shields/overalls, insulated gloves/sleeves, leather gloves, arc flash protecting eyewear, etc.

a. Testing and Inspection. Gloves and sleeves must be electrically tested before being issued for use. They must also be visually inspected and gloves need to be air tested for any possible defects (for example, cuts, holes, tears, embedded objects, changes in texture) before each day's use and whenever there is a reason to believe they may have been damaged. Best practice is to inspect PPE and air test the gloves and sleeves before each use.

i. Insulating equipment may not be used if any of the following defects are present: holes, tears, punctures or cuts, ozone cutting or ozone checking, embedded foreign objects, texture changes, including swelling, softening, hardening, or becoming sticky or inelastic, and any other defect that damages the insulating properties.

ii. Insulating equipment failing to pass inspection must be removed from service and may not be used by workers. In addition, the gloves and sleeves must be electrically tested at regular intervals of not more than 6 months for gloves and 12 months for sleeves. When gloves and sleeves are used regularly, best practice is to test as frequently as monthly.

b. Protector Gloves and Storage. To ensure worker safety and the integrity of the gloves and sleeves, insulating gloves need to be worn along with protector gloves (such as leather),

and both insulating gloves and sleeves need to be stored properly when not in use. Proper storage means that gloves must not be folded and need to be kept out of excessive heat, sunlight, humidity, ozone, and any chemical or substance that could damage the rubber.

8. Using Tools: When working near exposed, energized parts, employees will only use insulated tools and handling equipment such as the following:

   a. Tools that are in good repair, double insulated, grounded.

   b. The insulating material must be protected from damage.

   c. Insulated, fuse handling equipment (when working with energized fuses).

   d. Nonconductive ropes and hand-lines (caution--wet ropes are conductive)

   e. Protective, insulated shields/barriers

   f. Wooden or Fiberglass ladders will be used if work requires the use of a ladder around electrical equipment. All metal ladders should be marked, CAUTION: DO NOT USE AROUND ELECTRICAL EQUIPMENT.

   g. Switch tools OFF before connecting them to a power supply.

   h. Disconnect power supply before making adjustments.

   i. Ensure tools are properly grounded or double-insulated. The grounded tool must have an approved 3-wire cord with a 3-prong plug.

   j. Test all tools for effective grounding with a continuity tester or a ground fault circuit interrupter (GFCI) before use.

   k .Do not bypass the switch and operate the tools by connecting and disconnecting the power cord.

   l. Do not use electrical tools in wet conditions or damp.

   m. Do not clean tools with flammable or toxic solvents.

   n. Do not operate tools in an area containing explosive vapors or gases, unless they are intrinsically safe and only if you follow the manufacturer's guidelines.

9. Alerting Techniques: Use the following to warn and protect everyone from electrical hazards:

   a. Signs and tags (refer to Chapter 8 Lock Out/Tag Out)

   b. Nonconductive barricades and signs to limit access.

   c. Guards, if the above will not provide adequate protection.

10. House Keeping: A neat, clean work space is essential where work on electrical equipment is to take place. Spaces behind and under consoles or power supplies should never be used for storage, and always be kept clear of rubbish or unnecessary equipment.

11. Electrical Panels:

    a. Access is restricted to authorized personnel only.

    b. Panels will have the function of each switch, circuit breaker, or fuse typed or printed clearly on the panel door interior.

    c. Panels will not be left unattended if opened for service.

    d. A three foot (minimum) work space around all breaker panels, distribution panels, motor control centers, motor starters and disconnect will be maintained. No equipment, machinery, or supplies are to be stored in front of electric panels.

    e. Ensure the appropriate signage is in place and all electrical panels are marked without being defaced or damaged in any way.

D. Training:

1. All new hires will be required to review the contents of this chapter.

2. Any Facilities employee whose job may change to include electrical work shall review the contents of this chapter and follow all rules/regulations within.