14-OSHA Fire and Electrical Safety

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SUPERSEDES: Procedure titled _____

Purpose:

The Occupational Safety and Health Administration (OSHA) requires employers to implement fire protection and prevention programs in the workplace. The regulations that apply to fire protection and prevention can be found mainly in Subpart F of the construction standards, though the requirement for a fire prevention program is first set out in Subpart C. The following sections of the

construction standards contain requirements for fire protection that are of significance to the lab:

1926.24 Subpart C, Fire protection and prevention programs 1926.150 Fire protection

1926.151 Fire prevention

1926.152 Flammable and combustible liquids

In the laboratory, workers may be exposed to electrical hazards including electric shock, arc blasts, electrocutions, fires and explosions. Potential exposures to electrical hazards can result from faulty electrical equipment/instrumentation or wiring, damaged receptacles and connectors, or unsafe work practices

Scope:

This SOP covers all laboratory personnel

Abbreviation

GFCI- Ground-Fault Circuit Interrupter

IDLH-immediately dangerous to life and health

MMCCCL- Meharry Medical College Clinical Consolidated Laboratory

OSHA- Occupational Safety and Health Administration's

SOP- Standard Operating Procedure

Policy:

MMCCCL will implement OHSA standards for Fire and Electrical Safety. Training will be conducted through MMCCCL and during Meharry medical college new employee orientation

Procedure:

Fire Protection

Fire is a chemical reaction that requires three elements to be present for the reaction to take place and continue. The three elements are:

● Heat, or an ignition source

● Fuel

● Oxygen

These three elements typically are referred to as the “fire triangle.” Fire is the result of the reaction between the fuel and oxygen in the air. Scientists developed the concept of a fire triangle to aid in understanding of the cause of fires and how they can be prevented and extinguished. Heat, fuel and oxygen must combine in a precise way for a fire to start and continue to burn. If one element of the fire triangle is not present or removed, fire will not start or, if already burning, will extinguish. Ignition sources can include any material, equipment or operation that emits a spark or flame——including obvious items, such as torches, as well as less

obvious items, such as static electricity and grinding operations. Equipment or components that radiate heat, such as kettles, catalytic converters and mufflers, also can be ignition sources.

Fuel sources include combustible materials, such as wood, paper, trash and clothing; flammable liquids, such as gasoline or solvents; and flammable gasses, such as propane or natural gas.

Oxygen in the fire triangle comes from the air in the atmosphere. Air contains approximately 79 percent nitrogen and 21 percent oxygen. OSHA describes a hazardous atmosphere as one which is oxygen-deficient because it has less than 19.5 percent oxygen, or oxygen enriched because it has greater than 23.5 percent oxygen. Either instance is regarded by OSHA as an atmosphere immediately dangerous to life and health (IDLH) for reasons unrelated to the presence of fire. Depending on the type of fuel involved, fires can occur with much lower volume of oxygen present than needed to support human respiration.

Fire Classifications

Fires are classified as A, B, C, D or K based on the type of substance that is the fuel for the fire, as follows:

Class A—fires involving ordinary combustibles, such as paper, trash, some plastics, wood and cloth. A rule of thumb is if it leaves an ash behind, it is a Class A fire.

Class B—fires involving flammable gasses or liquids, such as propane, oil and gasoline

Class C—fires involving energized electrical components

Class D—fires involving metal. A rule of thumb is if the name of the metal ends with the letters “um,” it is a Class D fire. Examples of this are aluminum, magnesium, beryllium and sodium.

Class K—fires involving vegetable or animal cooking oils or fats; common in commercial cooking operations using deep fat fryers

Fire Extinguishers

The following illustrates the types of extinguishers, fire classes for which each is used and the limitations of each extinguisher.

Fire Class of Extinguisher

Extinguisher Fire it Limitations/

Type Extinguishes Comments

Water A Good only for Class A fires

Carbon Dioxide B, C If used in confined areas, will create oxygen

deficiency; not effective in windy conditions; can cause frostbite during discharge;

OSHA requires a minimum-rated 10B fire extinguisher be provided within 50 feet of the point of job site use of more than 5 gallons of flammable or combustible liquids or 5 pounds of flammable gas. Examples of flammable and combustible liquids include gasoline, kerosene, acetone, Butanone, also known as methyl ethyl ketone (MEK), single ply adhesives, splice cleaners and asphalt cutback products. Fire extinguishers must be rated by a nationally recognized testing laboratory.

Extinguishers also must be inspected on a regular basis and maintained fully charged.

Using Fire Extinguishers

When using fire extinguishers, employees should employ the “PASS” system of early-stage firefighting.

P—Pull the pin on the extinguisher

A—Aim at the base of the fire

S—Squeeze the handle

S—-Sweep at the fire, moving from side to side

Employees should be instructed that if a fire cannot be extinguished using one full extinguisher, they should evacuate the site and let the fire department handle the situation as per RACE plane

R---Remove or Rescue

A---Alarm

C---Confine

E---Extinguish or Evacuate

Fire Prevention

Fire prevention requires segregating the three elements of the fire triangle. In practice, a method to achieve that goal is to post—and enforce—no smoking signs around flammable liquids and gasses and have fire watches on all work involving torch-applied materials of a minimum of two hours after the last torch is turned off.

Flammable and Combustible Liquids

Proper storage and handling of flammable and combustible liquids will help prevent fires from occurring; only approved, closed containers for storage of flammable or combustible liquids may be used under OSHA rules. Such containers include safety cans or containers approved by the U.S. Department of Transportation. A safety can is a container that has a self-closing lid, internal-pressure relief and flame arrestor with a capacity of not more than 5 gallons.

Flammable liquids that are extremely viscous, or difficult to pour, like single ply adhesive, can be left in their original shipping containers. Similarly, OSHA allows the use of original containers of flammable liquids that are in quantities of one gallon or less.

Static electricity may be generated when transferring liquids, gasses or solids through pipes or hoses. It is important to dissipate this electric charge when handling flammable and combustible materials. When transferring flammable or combustible liquids from one container to another, the two containers must be "bonded" together. The bonding process involves attaching a wire with alligator clips on each end to both containers. The clips must penetrate

the container coating and touch metal. You may need to score the paint with the alligator clips. To dissipate static, the container receiving the liquid must be in contact with the ground and not insulated from contact with the ground. For example, plastic or composite pickup truck bed liners prevent the flow of static electricity to ground because the liner does not conduct electricity. The receptacle container must have a clear path to ground, by direct contact or use of a grounding strap or wire, to effectively eliminate static.

To avoid Electrical Hazards, follow these best practices:

1. Always follow manufacturer's recommendations for using electrical equipment.

2. Do not use electrical equipment to perform a task for which it is not designed.

3. Most equipment includes either a 3-pronged plug or double insulation. Equipment with neither of these features is less safe but may meet electrical codes. You will not be protected from electric shock if a 3-pronged plug is not inserted into a 3-prong outlet.

4. If you plug more than two pieces of low demand equipment into a standard outlet, use a fused power strip that will shut off if too much power is used.

5. Make sure that any outlet near a sink or other water source is Ground-Fault Circuit Interrupter (GFCI) protected. If you have a GFCI, periodically test it by plugging something into it and pushing the "test" button. Once the equipment shuts off just turn it back on. Above all, do not disable any electrical safety feature. Before turning equipment on, check that all power cords are in good condition. Do not use extension cords as a substitute for permanent wiring.If you see a person being electrocuted, DO NOT TOUCH THEM! The electricity can go through you, too. If possible, turn off the power (pull the plug or trip the circuit breaker), or use an item made of non-conductive material (e.g., wooden broom handle) to pry him or her away from the contact. Call 911 immediately.

References

Meharry policy: GCN00016 - Emergency Preparedness Plan (458_0)

Subpart F of the construction standards, though the requirement for a fire prevention program is first set out in Subpart C