# Fire Safety in Laboratories

- Fire Prevention is a vital aspect of laboratory safety.
- Requires knowledge and constant vigilance of lab workers.

# Major Features Of Fire Prevention At the Employee Level

**Employee Responsibilities**

Know fire evacuation plans
Follow safe work practices
Know the fire hazards of their work area
Report potential fire hazards to supervisor
Follow fire reporting procedures
Follow fire evacuation plan, if necessary
Ask Questions when not sure what to do

# Lab Fire Safety

1. Recognize Hazards
2. Evaluate the space before lab tests or chemical reactions have begun. This includes housekeeping and storage practices.
3. Protect yourself through the proper use of PPE (personal protective equipment) and emergency equipment.

# Personal Protection

- Long hair should be pinned back.
- Safety glasses and lab coats should always be worn.
- Closed toed shoes (preferably leather) and full-length pants are required.
- Other PPE, such as gloves, face shields, respirators, etc…should also be worn.

# Housekeeping

- Housekeeping is an essential component of fire safety in labs:
  - Lab area must be kept clean as work allows.
  - Unused combustible items, such as unused boxes and paper should be cleared from the lab workspace.


Stored items should not block access to the fire extinguishers or other safety equipment (eyewashes, safety showers), or block access to exits.

To identify whether or not a material is flammable,  utilize the Safety Data Sheet (SDS).  In a workplace, SDS sheets should be available for every chemical. SDS sheets give information on the proper handling, storage, dispensing, flammable limits, reactivity hazards, first aid and fire-fighting procedures.

# Electrical Safety in Labs

- All electrical equipment must be properly grounded.
- Electrical breaker boxes must be kept clear, including  a radius of 36’’ surrounding the breaker box.
- Equipment, appliances and extension cords must be in good condition and not frayed, damaged, or taped.
- Extension cords must never be used as a substitute for permanent wiring.
- Power strips should not be used.
- Multi-outlet plugs should not be used.
- Portable heaters should not be used in labs.

# Chemical Storage Safety

- Chemicals (especially liquids) should never be stored on the floor except in closed door cabinets that are suitable for the materials to be stored.
- Never store incompatible chemicals together (i.e. oxidizer and flammables; acids and bases). For more guidance on incompatible chemicals, please see the Safety Data Sheets.
- Do not store any flammable chemicals near an ignition source.
- All containers should be labeled to their contents.
- For guidance on the disposal of chemicals please contact the Safety Office at ext. 65416.

# Flammable Storage Cabinets

When using flammable storage cabinets:

- Store only compatible materials inside the cabinet.
- Do not store paper, cardboard, or other combustible packaging material in a flammable liquid cabinet.
- Do not exceed 60 gallons total volume of stored flammable liquids.

# Fume Hoods

- Only items necessary to perform the present experiment should be in the hood. The more equipment in the hood, the greater the air turbulence and the chance for gaseous escape into the lab.
- Keep sash at or below approved level.
- Keep chemicals within the fume hood closed.
- Ensure proper functioning of audible and visual alarms.

# Compressed Gases

- **Gas cylinders must always be secured to prevent tipping and should be stored in a well-ventilated area.**
- **Cylinders should be capped during transport.**
- **Do not store cylinders near open flames, areas where electrical sparks are generated or where other sources of ignition my be present.**

# Emergency Equipment in the Lab

- There should be access to a fire extinguisher.
- Know where the closest fire alarm pull station is located.
- A safety shower and eyewash station should be located within 10 seconds of the area in which you are working.

# What if You Catch on Fire

- If your clothes catch on fire, the best thing to do is to find a safety shower.
- If a safety shower is available, then immediately remove your lab coat and use the shower long enough to remove any contaminating material and to cool the skin.
- If there isn't a safety shower nearby, then stop where you are, drop and roll on the floor, covering your face with your hands and roll back and forth to extinguish the flames.

**In Case of Fire**

**Call 65500 and Pull Alarm**

**Then follow**

**R – Rescue Those in Danger**

**Patients * Staff * Visitors**

**A – Alert/Alarm**

**Code Alert = Fire**

**C – Contain/Confine**

**Close Door * Close Window**

**E – Extinguish/Evacuate**

# Fire Alarm Pull Box

To activate a fire alarm pull box, push in and then pull down on the pull handle.

Fire alarm will sound with a beeping followed by the audio (Code Alert) only in the building where the fire is, and Strobe Lights will only light on the floor or area where the fire is located.

# Evacuating from a Fire

- Pull the fire alarm.
- Leave immediately if the fire alarm sounds. Don't ever assume it is just a fire drill.
- Ensure you take any personal belongings.
- Close all doors and windows on the way out.
- Make sure everyone in your lab has been accounted for. Your lab area may want to designate an assembly area outside to meet in the event of an evacuation.
- Do not reenter the building unless authorized to do so.

# Emergency Egress

- Aisles need to remain clear so that there is a clear path of egress to emergency exits.
- Do not wedge or block doors in the event of a fire.
- Make sure you are familiar with your building's evacuation plan and know where exits are located and learn all of the escape routes from your lab area.

# Types of Evacuation

Evacuation – The process of leaving the area of a fire or other emergency in a rapid orderly manner: There are four types of evacuation. They are:

1. Horizontal Evacuation – Consists of moving from the area of the fire to another area on the same floor. This is usually sufficient for a small fire.

2. Vertical Evacuation – Consists of moving from the area of the fire to another area on a lower floor through the nearest stairwell. Before entering a stairwell, check the door for temperature and check the air for smoke contamination. If the stairway appears unsafe, go to the nearest stairway away from the fire. Elevators MUST NOT be used during a fire or other disaster unless clearance is obtained by the fire department or other appropriate management official.

3. Immediate Evacuation – This procedure is useful for a small fire. All personnel not directly fighting the fire must immediately leave the room. The doors must be closed when leaving a fire room.

4. Outside Evacuation – Refers to the evacuation of all non-firefighting personnel to the outside of the building.

# 3RD Floor, Building #21 and Building #2:

There are various evacuation routes from the Laboratory. The route taken will be determined by the group leader to be the safest and most expeditious. Also to be considered will be the location of the individuals to be evacuated. The group leader for the 3RD floor Laboratory is the Laboratory Manager and the assistant group leader is the Quality Manager and/or the Administrative Officer.

# From the main laboratory (Building #21):

1) Exit from the hallway at the back of the laboratory leading from building #21 to building #2, then the corridor leading to building #1 and down the stairway to the front of the building, exiting through the main doors.

a) Should the corridor be blocked continue around to the fire escape at the end of the hallway in building #2 through and out through the kitchen entrance on the first floor.

2) Exit through the hallway at the back of the laboratory, down stairway (#4) at the Northwest end of the hallway, once out the exit door proceed through the patio like area around the building and through the gate and away from the building.

3) Exit out the main laboratory door by the elevators, up the steps on your immediate right, out the access door, across the roof to the fire exit at the Northeast corner of the roof, take the exit to the ground floor, around the building and out to a safe distance.

# From Anatomic Pathology, Blood Bank, and Administrative offices (Building #2):

1) Exit to the hallway and proceed to exit through the corridor to Building #1 and down the stairway to the front of the building exiting the building through the main doors.

a) Should the corridor be blocked go to the fire exit at the end of the hallway in building #2 down the stairway and out through the kitchen entrance on the first floor.

2) Exit to the hallway at the back of the laboratory (Building #21), proceed down the hallway to the stairway (#4) at the Northwest end of the hallway, once out the exit door proceed through the patio like area around the building and through the gate and away from the building.

3) Exit to the hallway at the back of the laboratory (Building #21), enter the main laboratory and then exit out the main laboratory door by the elevators, up the steps on your immediate right, out the access door, across the roof to the fire exit at the Northeast corner of the roof, take the exit to the ground floor, around the building and out to a safe distance.

a) This means of exit should only be used if no other exit from the building is available.

b) All P&LMS personnel that work in these areas will locate the designated fire escape routes.

c) Following evacuation, all laboratory personnel will meet at a location designated by the laboratory safety officer for the purpose of determining that everyone has left the building safely and is accounted for.

# The Rendezvous point

The large tree in front of the Credit Union building on the Northwest corner of the campus when there is an evacuation called and staff are required to exit the building.

The Rendezvous point is the corridor leading to Building #1 just past the fire door when there is a horizontal evacuation. This will be the location for all P&LMS personnel to meet when there is a fire drill unless otherwise directed.

Individuals with disabilities will also be evacuated. These individuals will be moved to the stairways and the group leader or assistant group leader will notify the Directors Suite ext. 65050 or courier that stretchers and stretcher bearers are needed to evacuate these individuals; identify the specific location, the number of people to be evacuated as well as any other information which might be useful. Refer to Attachment A for information on how to move disabled individuals during an evacuation.

# 1ST Floor, Building #21(Phlebotomy Staff):

1) There are three main evacuation routes from the 1ST Floor Drawing Area. The route taken will be determined by the group leader (for this area the P&LMS group leader is identified as the Client Service Supervisor with assistant group leader being the Lead Phlebotomist) to be the safest and most expeditious.

a) Exit through the main doors to the clinical addition.

b) Exit phlebotomy through the back door to phlebotomy, go down the hallway and exit the building through the fire exit at the end of the hallway.

c) Exit phlebotomy through the door leading to radiology, go down the hallway and exit through the fire door at the bottom of stairs #4.

2) Following evacuation, all laboratory personnel from the first floor will meet at the Rendezvous point of the large tree in front of the Credit Union building on the Northwest corner of the campus when there is an evacuation called and staff are required to exit the building.

3) The Rendezvous point is the just inside the main entrance entering Building #21, unless otherwise noted by personnel on site when there is a horizontal evacuation

4) It is the responsibility of the Group Leader or assistant Group Leader to report to the Laboratory Manager, Quality Manager or Administrative Officer the accountability for all personnel working on the first floor.

# RALLY POINT AFTER EVACUATION


Northwest Arkansas Federal Credit Union - Bldg. 38

# HOW TO ASSIST A DISABLED INDIVIDUAL DURING AN EVACUATION

**The chair assist:** Use a chair with wheels. Push the person to the exit. If on the second floor Push the person to a stairway, wait until the stairs have cleared and then give physical assistance down the stairs. Assist the person to the stairs and stay with them far enough away so that no one can fall down the stairs. Wait until the way clears, then assist the disabled person down the stairs or up the stairs as the case may be. Do not try to use the stairs when others are going down (it blocks the way for people getting out and firemen entering) and may result in falling and getting trampled by people trying to exit. Along with another person, assist the person down the stairs. Assist by carrying, draping arms over shoulder or sitting on each step going down.

**The assisted walk:** Along with another person, drape the arms of the person being helped around the shoulders of the two helpers. Help the person walk to safety.

**The swing carry:** You and a co-worker carry the disabled person to safety by forming a cradle with both your arms behind the person's arms and knees. The person being assisted places their arms around the shoulders of the two people doing the carry.

**The blanket drag:** Place the disabled person on a blanket and drag them to safety.

Improvise if no blanket is available by making something that you could drag a person on- e.g. lab coats tied together.

**The two-man carry:** The front person takes the legs under the knees. The back person reaches under the disabled person's arms. The disabled person is then carried in a "sitting" position.

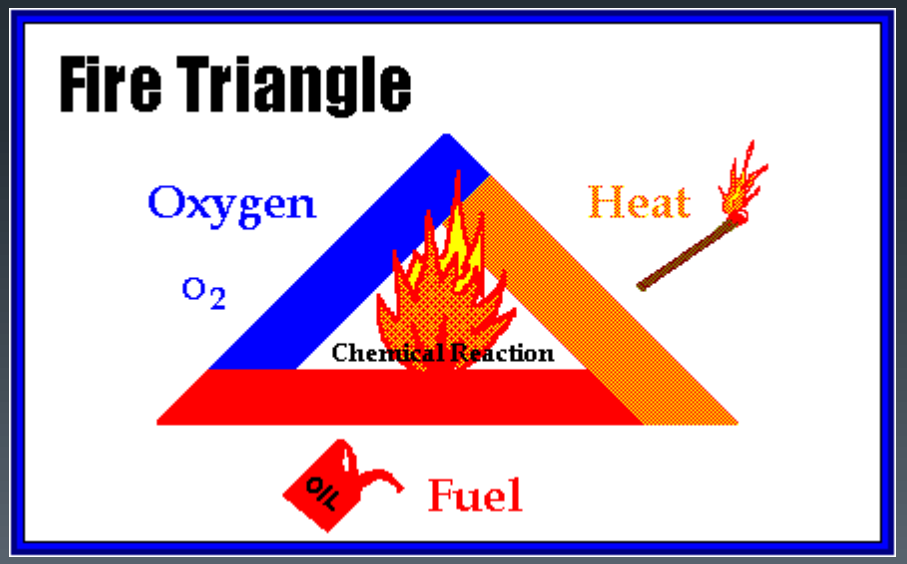
**The fireman's carry:** Place the disabled person across the shoulders. Grab their arm in one hand and the leg in the other.

**Remain with the disabled person:** Stay with the disabled person. Do not leave them unattended.

# Fire needs three things to burn
## Heat - Oxygen - Fuel  (Fire Triangle)

- To extinguisher a fire one must remove one of these 3 components.

- Cooling - absorbing a small portion of the total heat being evolved so that the fuel is cooled below the ignition temperature.
- Removing fuel - depriving the fire of any combustible material.
- Limiting Oxygen



# DANGER

Fires can be very dangerous, and you should always be certain that you will not endanger yourself or others when attempting to put out a fire.

1. **For this reason, when a fire is discovered…**Assist any person in immediate danger to safety, if it can be accomplished without risk to yourself.
2. Call 65500 or activate the building fire alarm. The fire alarm will notify the fire department and other building occupants and shut off the air handling system to prevent the spread of smoke.

3. If the fire is small (and Only after having done these 2 things), you may attempt to use an extinguisher to put it out.

**However . . . .**

# Fire Safety Guidelines

1. **Know what is burning.** If you don't know what's burning, you won't know what kind of extinguisher to use.
2. Even if you have an ABC fire extinguisher, there may be something in the fire that is going to explode or produce toxic fumes.
3. Chances are you *will* know what's burning, or at least have a pretty good idea, but if you don't, let the fire department handle it.

**. . . before deciding to fight the fire, keep these things in mind:**

# Fire Safety Guidelines

3. **Is the fire spreading** rapidly beyond the point where it started? The time to use an extinguisher is at the beginning stages of the fire.
4. If the fire is already spreading quickly, it is best to simply evacuate the building.
5. As you evacuate a building, close doors and windows behind you as you leave. This will help to slow the spread of smoke and fire.

# Do not fight the fire if:

- ✓ **You don't have adequate or appropriate equipment.** If you don't have the correct type or large enough extinguisher, it is best not to try fighting the fire.
- ✓ **You might inhale toxic smoke.** When synthetic materials such as the nylon in carpeting or foam padding in a sofa burn, they can produce hydrogen cyanide, acrolein, and ammonia in addition to carbon monoxide. These gases can be fatal in very small amounts.
- ✓ **Your instincts tell you not to.** If you are uncomfortable with the situation for any reason, just let the fire department do their job.

The **FINAL RULE** is to always position yourself with an exit or means of escape at your back before you attempt to use an extinguisher to put out a fire.

In case the extinguisher malfunctions, or something unexpected happens, you need to be able to get out quickly.  You don’t want to become trapped.

# Fuel Classifications

- Fires are classified according to the type of fuel that is burning.
- If you use the wrong type of fire extinguisher on the wrong class of fire, you might make matters worse.
- Its very important to understand the four different fire (fuel) classifications…

# 4 Classes of Fire


**Class A**

Ordinary combustibles or fibrous material, such as wood, paper, cloth, rubber, and some plastics.

**Class B**

Flammable or combustible liquids such as gasoline, kerosene, paint, paint thinners and propane.



**Class C**

Energized electrical equipment, such as appliances, switches, panel boxes and power tools.

**Class D**

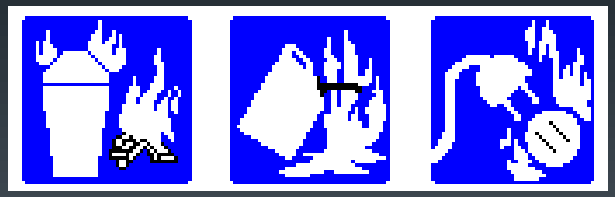
Certain combustible metals, such as magnesium, titanium, potassium, and sodium.

# Fire Extinguisher Training

- All lab personnel, including faculty staff and students, should be adequately trained in the use of fire extinguishers and know where the closest fire extinguishers are located.
- There should be at least one ABC extinguisher either inside the lab, or in close proximity.
- Extinguishers should not be blocked access or covered up.

**In the Fayetteville Laboratory, you will find ABC's in the hallways, microbiology, histology and the east and west ends of the main clinical laboratory. The 1st floor phlebotomy room has an ABC just down the hallway, around the corner.**

# Types of Fire Extinguishers



**DRY CHEMICAL**.
Work by cooling and smothering the fire.

These extinguishers should be inverted monthly to prevent the chemical agent from settling out and caking at the bottom of the canister.
**Multipurpose used on** Class A, B or C fires. This is an advantage because there is no need to decide which extinguisher to choose during an emergency.

Non-toxic and have a range of about 12 feet.

The primary disadvantage to dry chemical extinguishers is that they are messy. The chemicals can also be somewhat corrosive, especially when wet.

**WATER FIRE EXTINGUISHERS** are no longer commonly used but may still be found in some locations.

Water is only effective on ordinary combustible (Class A) fires.

Works by cooling the fuel below the ignition temperature.

Never use water on:

Flammable liquid (Class B) fires because it can spread the fire. This is due to the burning chemical floating on top of the water.

Electrical (Class C) fires because water can conduct electricity. A serious or fatal electrical shock may be received if water is used to extinguish Class C fires.

**Foam** extinguishers
Can be used on Class A or B fires.
Foam forms a layer over a burning material and prevents flammable vapors from escaping.

**Halon** extinguishers
Banned due to ozone depletion but are still found in computer rooms and airplanes. Halon is rated for Class B and C fires Works by displacing oxygen. Toxic and should not be inhaled for long.

**Carbon dioxide extinguishers** can be used on Class B and C fires

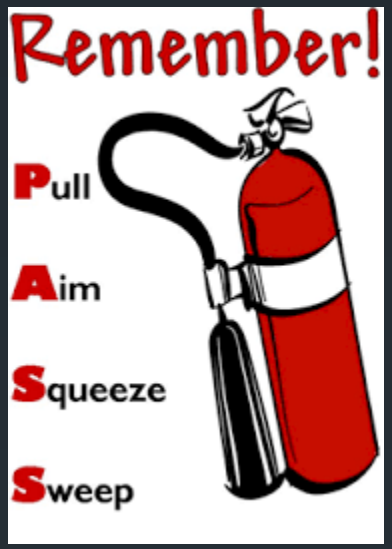
Work by reducing oxygen levels.

Do not use $CO_2$ not on Class A fires because $CO_2$ dissipates quickly, and hot material can re-ignite when oxygen returns.

$CO_2$'s primary disadvantage is that it has a range of only 3-6 feet.

# Use of Fire Extinguishers

- Use the PASS Method when using a fire extinguisher:
  - PULL THE PIN: This will allow you to discharge the extinguisher.
  - AIM AT THE BASE OF THE FIRE: If you aim at the flames (which is frequently the temptation), the extinguishing agent will fly right through and do no good. You want to hit the fuel.
  - SQUEEZE THE TOP HANDLE OR LEVER: This depresses a button that releases the pressurized extinguishing agent in the extinguisher.
  - SWEEP FROM SIDE TO SIDE: Start using the extinguisher from a safe distance away, then move forward. Once the fire is out, keep an eye on the area in case it re-ignites.


Remember!
Pull
Aim
Squeeze
Sweep

# REFERENCES:

College of American Pathologists' General Laboratory Checklist, September 17, 2019 GEN.73900.

MCM 00-18, Emergency Operations Plan, August 18, 2017.

MCM 00-17, Safety, Occupational Health and Fire Protection Rules and Procedures, February 27, 2020.