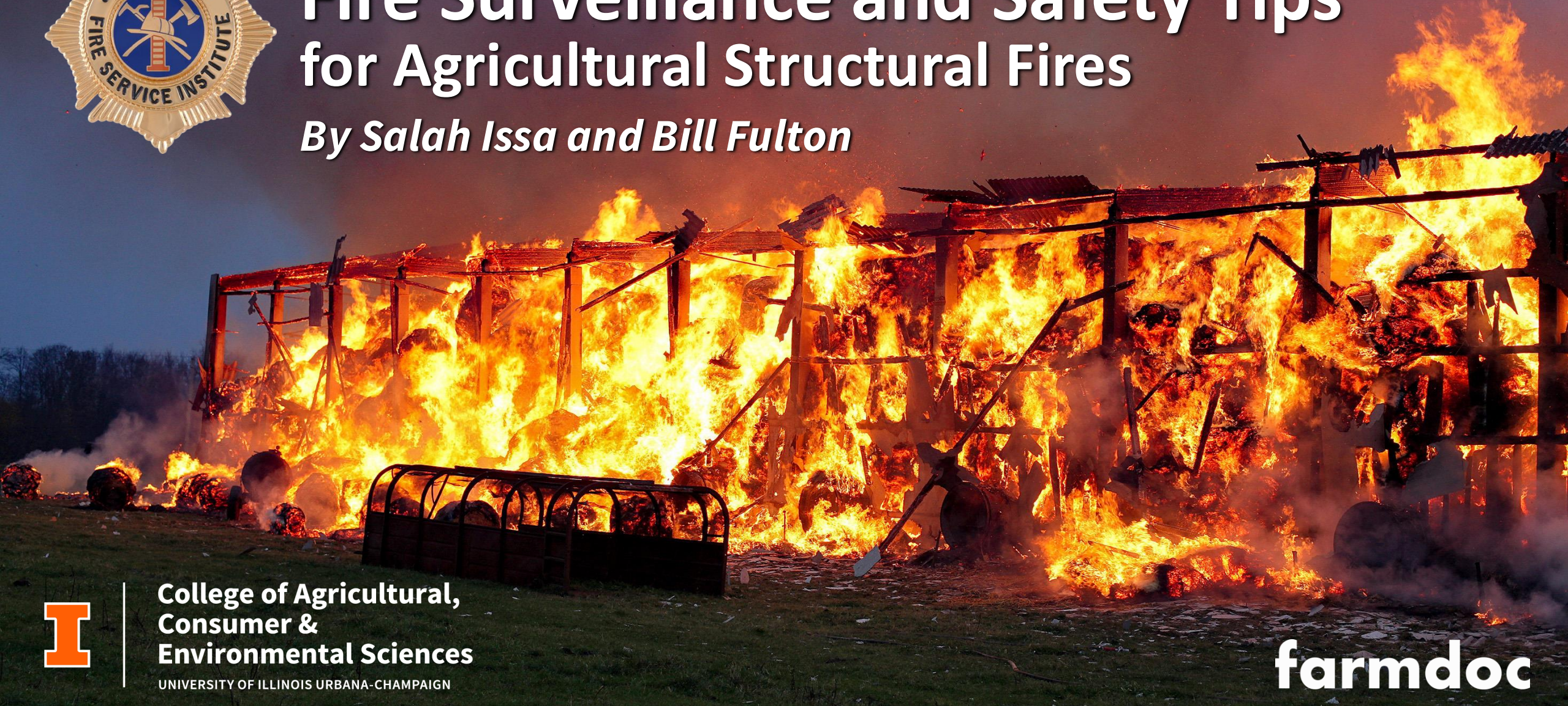




Eyes on the Blaze

Fire Surveillance and Safety Tips for Agricultural Structural Fires

By Salah Issa and Bill Fulton



College of Agricultural,
Consumer &
Environmental Sciences

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

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Introduction



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ILLINOIS

Agricultural Safety & Health



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Objectives

- Describe fire surveillance data for Illinois for agricultural operations
- Fire prevention and safety tips for agricultural operations
- Preparing for a Fire
 - Emergency Action Plans
 - Using a fire extinguisher
 - Know your firefighters

2025 Fire Incidents Summary

No less than 51 fire incidents occurred in agricultural operations in Illinois

24

Barn Fires

- Many chickens
- 8 goats
- 6 horses
- 5 pigs
- 1 dog
- Lots of Hay

4

Machine Shed/Shop

- 1 Tractor
- 2 Mowers
- Other vehicles
- Other equipment

10

Field Fires

- 420+ acres burned
- Brush, Corn, Wheat
- A Jeep

3

Grain Facilities

- 2 Grain Bins
- 1 Conveyor Belt

10

Vehicle Incidents

- 9 Combines
- 2 Tractor
- 1 Grain Cart
- 50+ acres farmland

Barn Fires

- In 2024,
Fire burnt 4 barns
housing 1.2 million
chickens
- Chickens & Pigs
most common animal
impacted



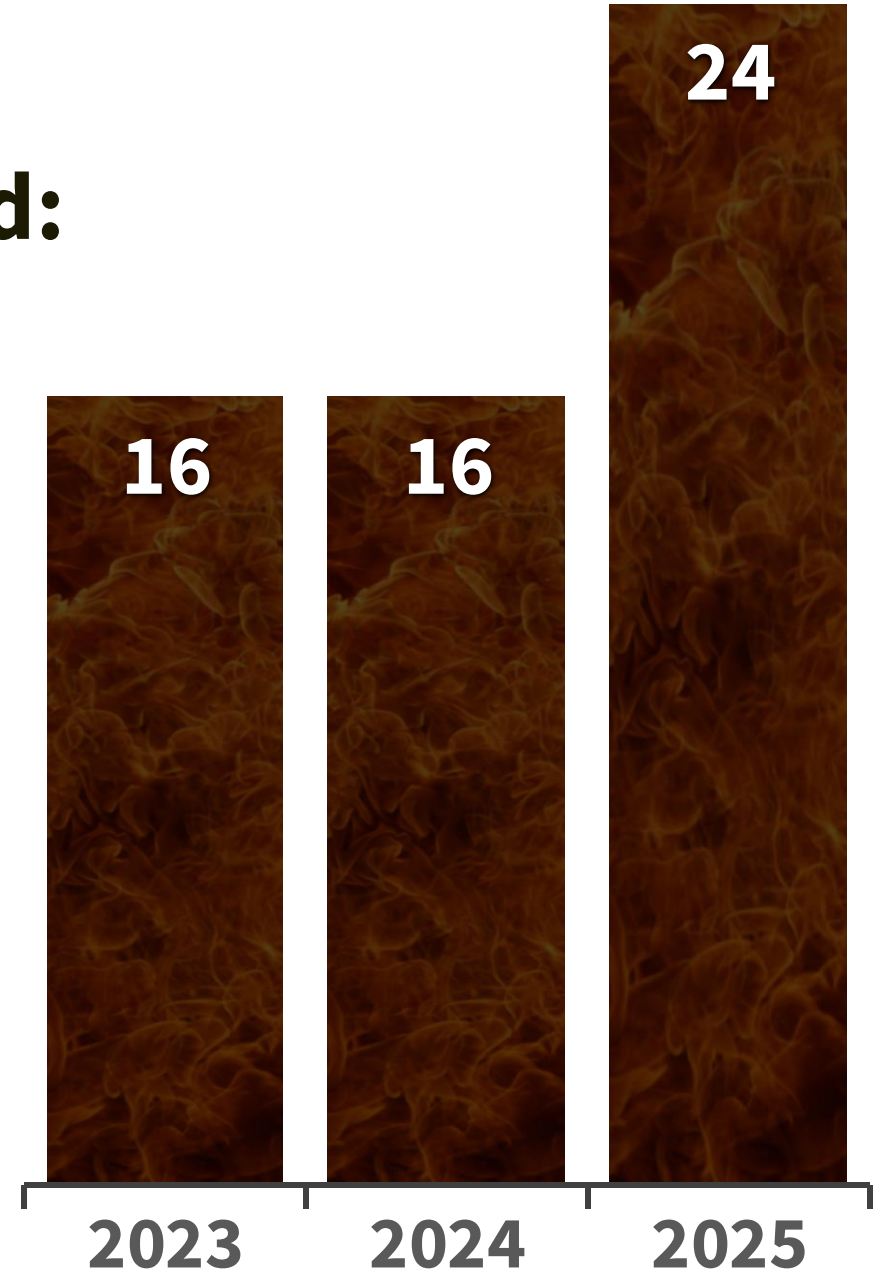
Credit: Dash Jarhaus

<https://www.kvue.com/article/news/local/chicken-farm-fire-marion-county/63-ba50a1a3-2e70-436d-aa90-e58ea0fcbe2d>

Barn Fires

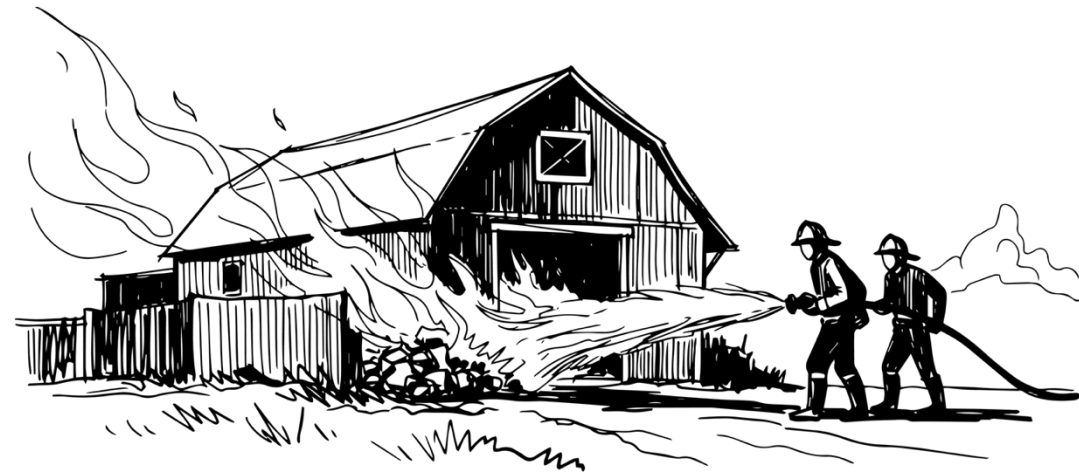
Over last three years, causes included:

- 4 Electrical
- 2 Heat Lamps
- 2 Hay Combustion
- Lightning Strike
- Propane tank explosion
- 5 External (bonfire/brush)
- 3 Arson (?)



Barn Fires

- Inspect all heating equipment well in advance of needing it
- Use dedicated outlets for heat lamps, tank deicers, and other equipment of this type
- Use protective guards to keep livestock from having direct access with heating equipment



Barn Fires

Use “Thermo Cubes” to reduce heat equipment exposure time (On at 35°F off at 45°F)

In the summer, if fans are used for cooling, keep them clean and free of obstructions



Machine Shed / Shop Fires

In 2023, an owner was working on a Utility Terrain Vehicle (UTV) when it malfunctioned and its tank exploded.

Pole barn and its contents burned down including:

- Two new tractors
- Several Antiques
- Skid Steer



Machine Shed / Shop Fires

Very rarely is cause mentioned

Over last three years,
causes included:

- Fuel tank
- Charging battery
- Lightning Strike
- Arson



Machine Shed / Shop Fires

- Always make sure grinders and/or torches are used in an area free of combustibles
- Make sure all breakers are clearly marked in the breaker box
- Have the proper fire extinguishers readily available and know how to use them



Machine Shed / Shop Fires

- Keep all flammables such as fuels, oils, paints, and cleaners in a central protected area
- Always make sure any heating systems has the proper safety devices or are turned off when no one is present



Grain Facility Fires

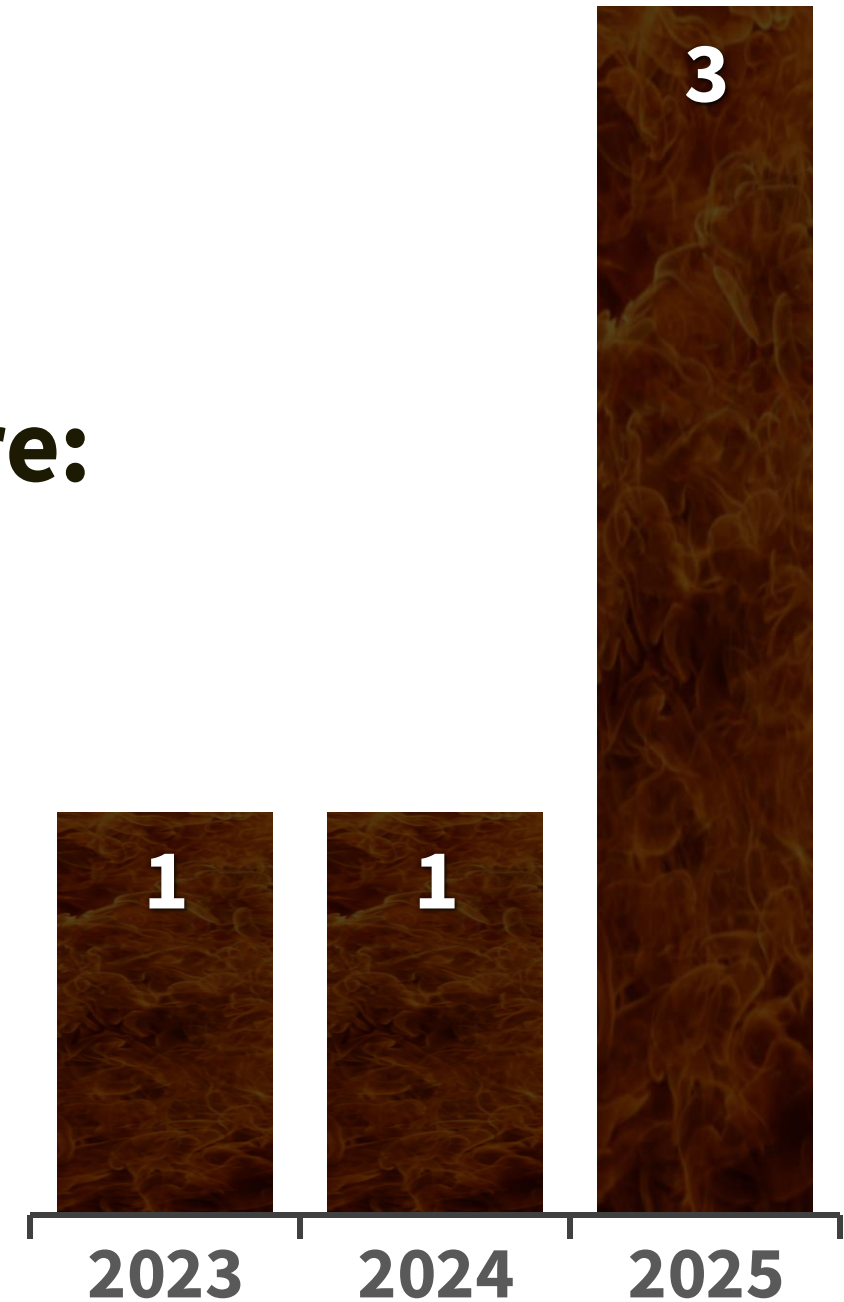
An employee noticed smoke coming from a grain bin. Firefighters located the smoldering area, and it was near an access panel about 60 feet up and were able to knock down the fire using a hand line.

Water was flooded into the bin using a ladder truck.



Grain Facility Fires

- Usually rare event
- Over last three years, causes were:
 - 3 Smoldering grain in bin
 - Conveyor Belt
 - Grain Dryer



Grain Facility Fires

- Have a qualified technician check over drying equipment before harvest.
- Keep a watch on stored grain. Have a schedule to check it weekly for issues.
- Never run burned or burning grain through the grain handling system.



Grain Facility Fires

- There are procedures to safely extinguish burning grain and they should be followed for everyone's safety.
- This is another place that it is extremely important to have breakers properly labeled.



Preparing for a Fire

Preparing for a Fire

- Emergency/Fire Plans
- Using a fire extinguisher
- Know your firefighters



Emergency Action Plans (EAP)

Document that describes actions to be taken to ensure employee safety during an emergency.

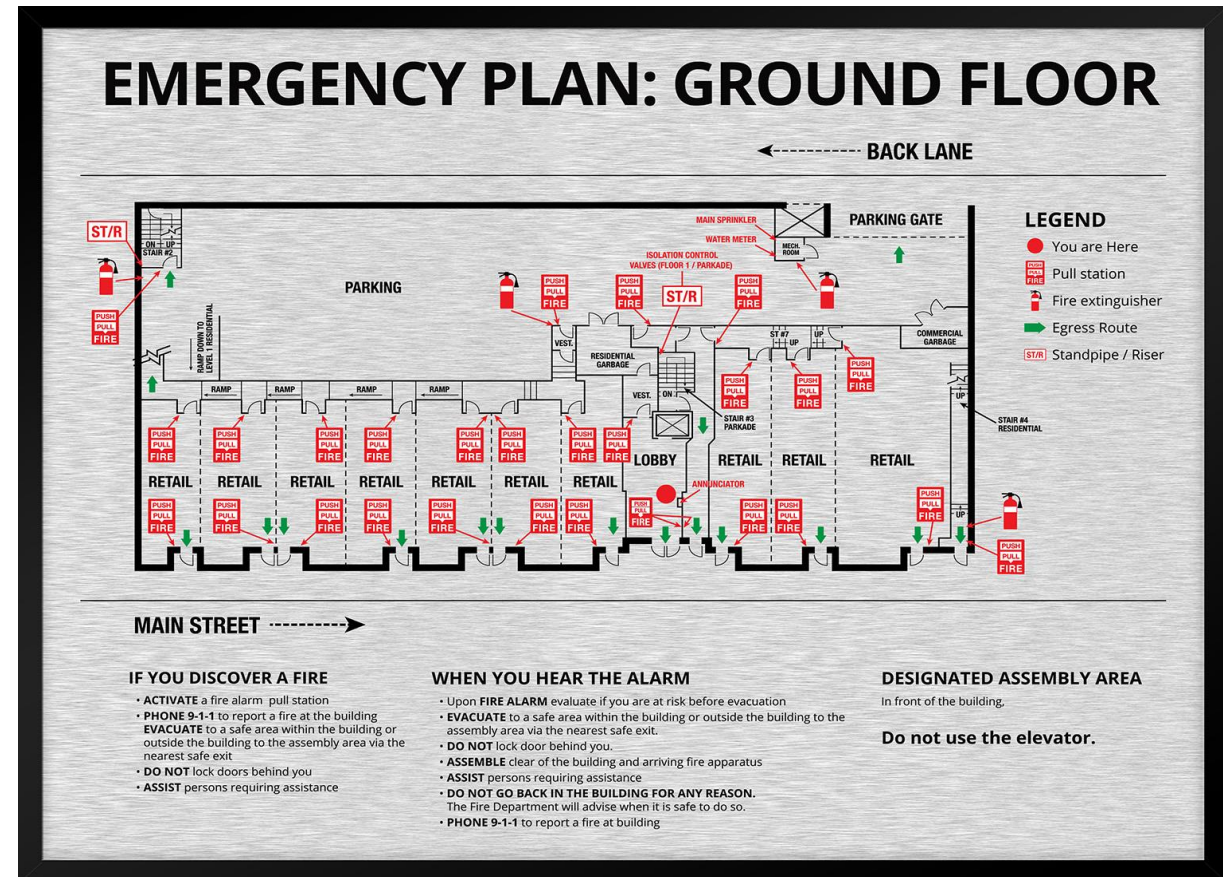
Facilitate communication between worker & employer

Benefits:

- Fewer and less severe injuries
- Less structural damage
- Reduce confusion

Emergency Action Plans Elements

- Evacuation procedures and emergency escape plans
- Accounting for employees
- Rescue/Medical duties
- Contact persons
- Means of reporting



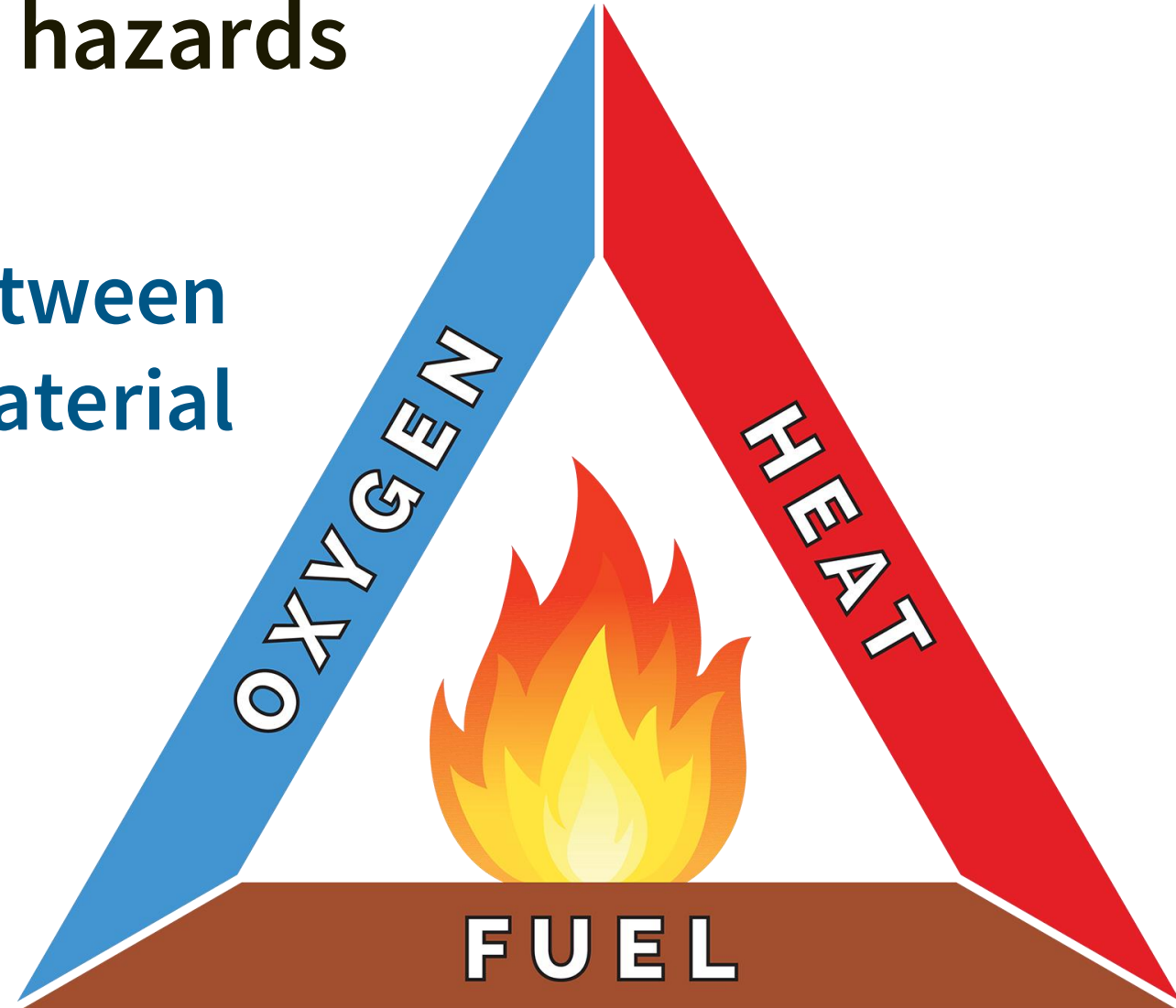
Fire Prevention Plans (FPP)

- Inform employees of fire hazards
- Explain how fires occur

Rapid chemical reaction between oxygen and combustible material

Requires

- Oxygen
- Ignition source (heat)
- Fuel
- Chemical reaction



Fire Prevention Plans (FPP)

Must consider all open sources

- Open flames
- Embers
- Hot work
- Hot surfaces
- Electrical & mechanical sparks
- Lightning



Fire Prevention Plans

Tasks that require fire protection and examples of hazards

- **Hot work**
30-minute fire watch
- **Brush burning**
Stay at site till end



Fire Prevention Plans

Handling of flammable hazards

- Only use approved metal safety containers or original manufacturer's containers for storage
- Practice good housekeeping
- Store away from exits or passageways

Keep away from ignition sources



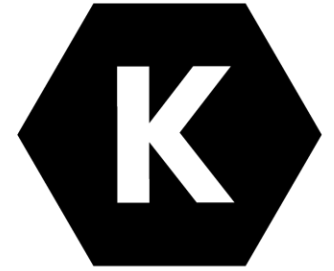
Fire Prevention Plans

Fire protection equipment

- Personal Protective Equipment (PPE)
- Fire Suppression
 - Portable fire extinguishers
 - Fixed systems



Classes of Fires



**Common
Combustibles**

**Wood, Paper,
Fabric, Cloth,
& Plastic**

**Flammable
Liquids, Gases**

**Gasoline, Oil,
Grease,
Propane,
Solvents**

**Energized
Electrical**

**Wiring Panels,
Appliances,
Electronics**


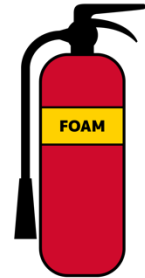
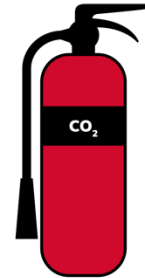






**Combustible
Metals**

**Magnesium,
Titanium,
Sodium, Zinc**

**Commercial
Cooking Equipment**

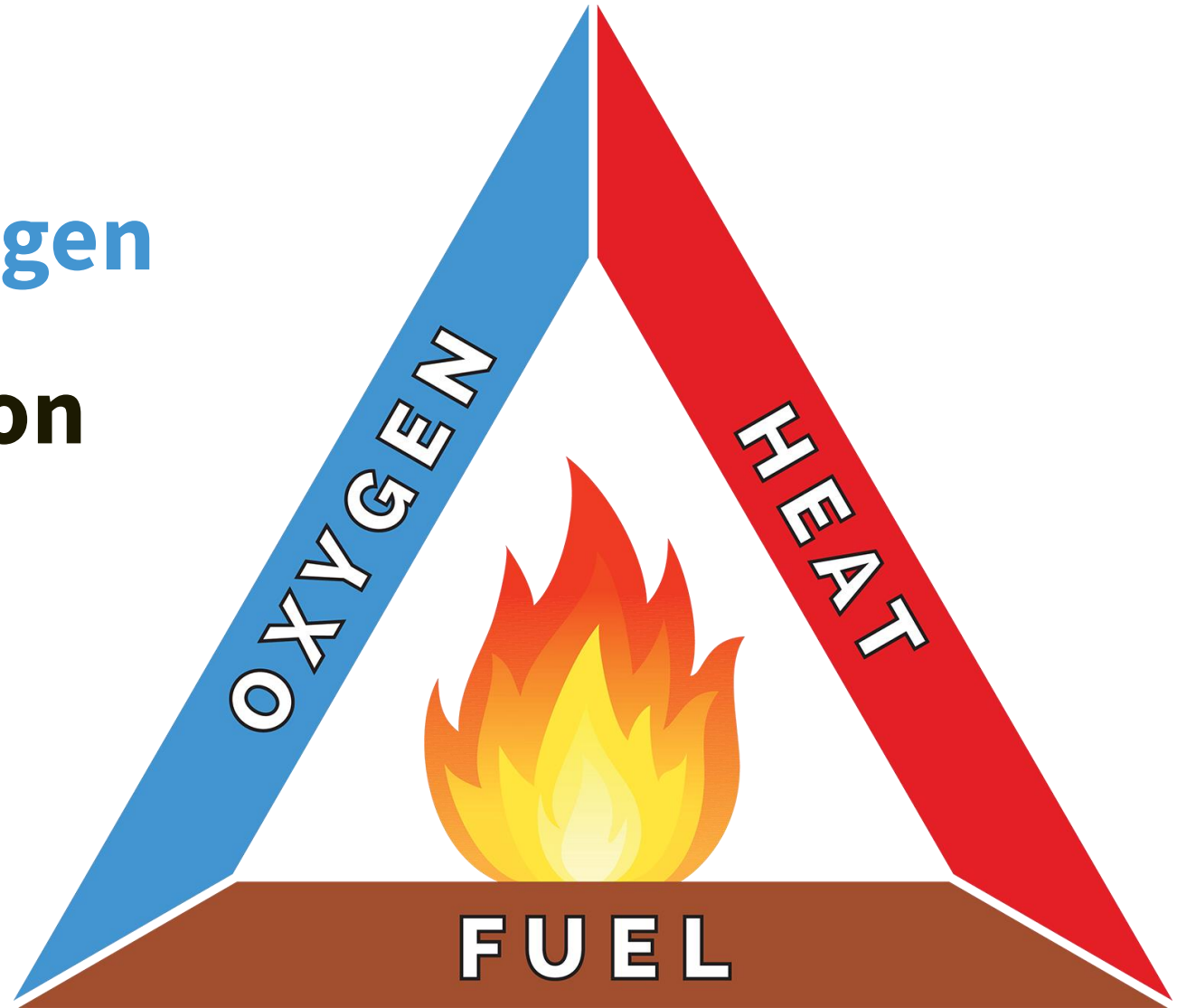
**Cooking Oils,
Fats, Grease,
Animal Fats,
Vegetable Oils**

Fire Extinguishers

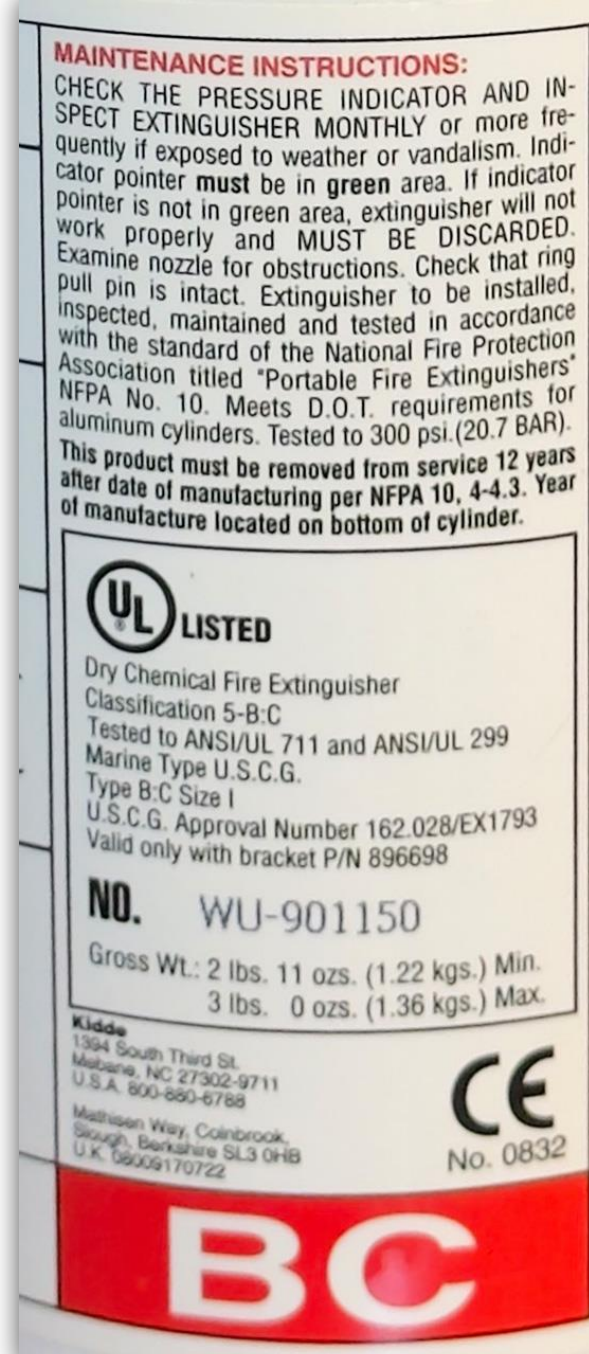
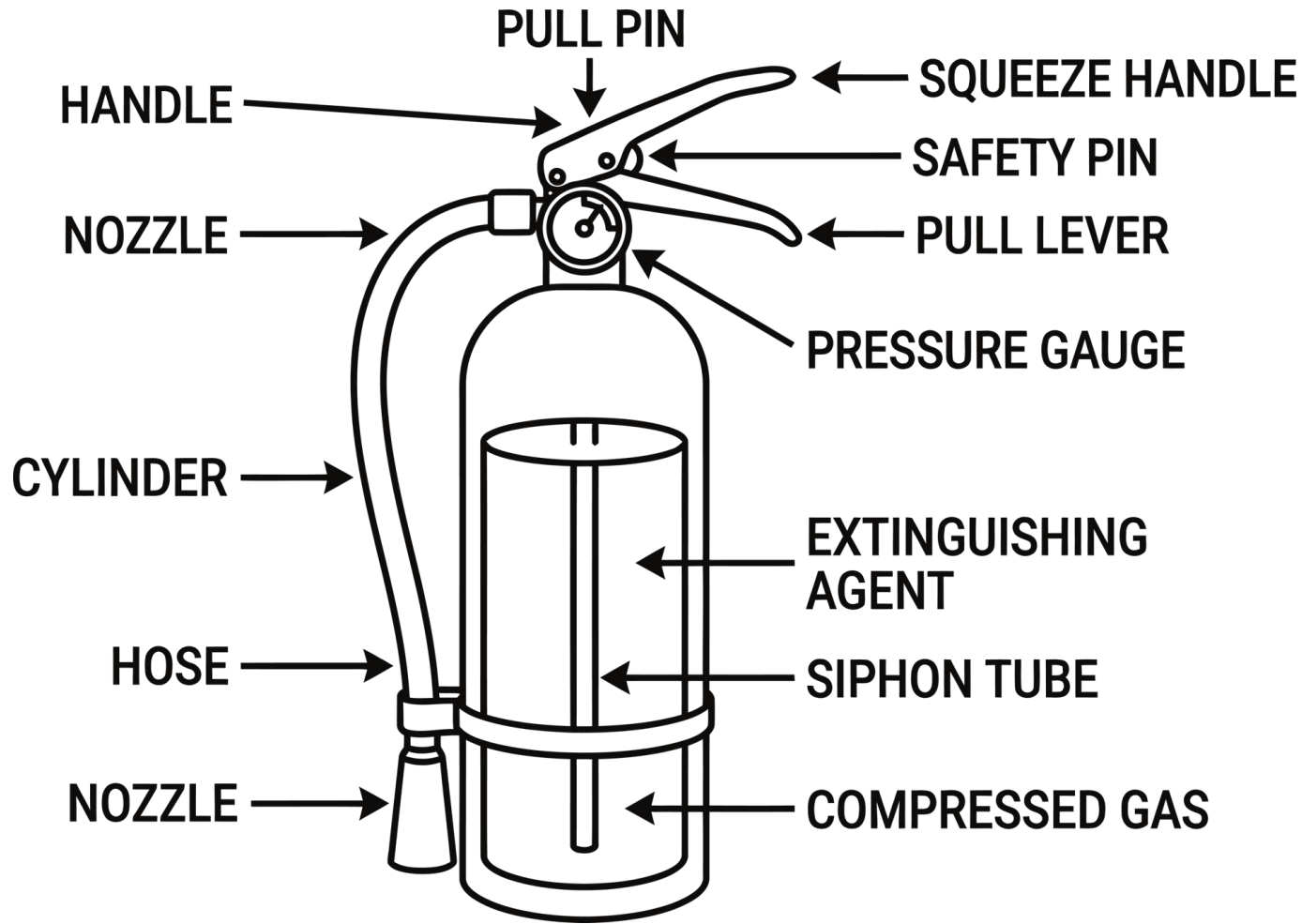
FIRE RISK TYPE ↓				
	WATER	FOAM	CO ₂	POWDER
 A PAPER, WOOD, TEXTILE	✓ YES	✓ NOT VERY EFFECTIVE	✓ NOT VERY EFFECTIVE	✓ NOT VERY EFFECTIVE
 B FLAMMABLE LIQUIDS	✗ NO	✓ YES	✓ YES	✓ YES
 C FLAMMABLE GASES	✗ NO	✗ NO	✓ YES	✓ YES
 ELECTRICAL HAZARD	✗ NO	✗ NO	✓ YES	✓ YES
 VEHICLE PROTECTION	✗ NO	✓ YES	✗ NO	✓ YES

How fire extinguishers work

- **Remove heat**
- **Displace/remove oxygen**
- **Stop chemical reaction**



Parts of a Fire Extinguisher



Types of Fire Extinguishers





WATER



Safe for:
Wood, paper
and textiles.



Not for:
Live electrical
equipment.



Not for:
Flammable
liquids.



Not for:
Flammable
metal fires.



CO₂



Safe for:
Flammable
liquids.



Safe for:
Live electrical
equipment.



Not for:
Wood, paper
and textiles.



Not for:
Flammable
metal fires.



POWDER



Safe for:
Wood, paper
and textiles.



Safe for:
Flammable
liquids.



Safe for:
Gaseous
fires.



Safe for:
Live electrical
equipment.



WET CHEMICAL



Safe for:
Wood, paper
and textiles.



Safe for:
Cooking oils &
deep fat fires.



Not for:
Flammable
liquids.



Not for:
Flammable
gases.



Not for:
Live electrical
equipment.



FOAM



Safe for:
Wood, paper
and textiles.



Safe for:
Flammable
liquids.



Not for:
Live electrical
equipment.



Not for:
Flammable
metal fires.

Water or Air-pressurized Water (APW) Fire Extinguishers

Designed for Class A fires only

- Large silver container, 2 to 3 ft. tall, weighing about 25 lbs. when full
- Filled 2/3 with ordinary water, then pressurized with air
- Cool the surface to remove the heat
- Never use to extinguish flammable liquid fires or electrical fires



Carbon Dioxide (CO₂) Extinguishers

Designed for Class B and Class C fires only

- Red cylinders, ranging from 5 to 100 lbs. or larger, with a hard horn and no pressure gauge
- Filled with Carbon Dioxide (CO₂), under extreme pressure
- Never use in confined space without respiratory protection



Dry Chemical extinguishers (Multi-purpose)

May be used on Class A, Class B,
and/or Class C fires (check label)

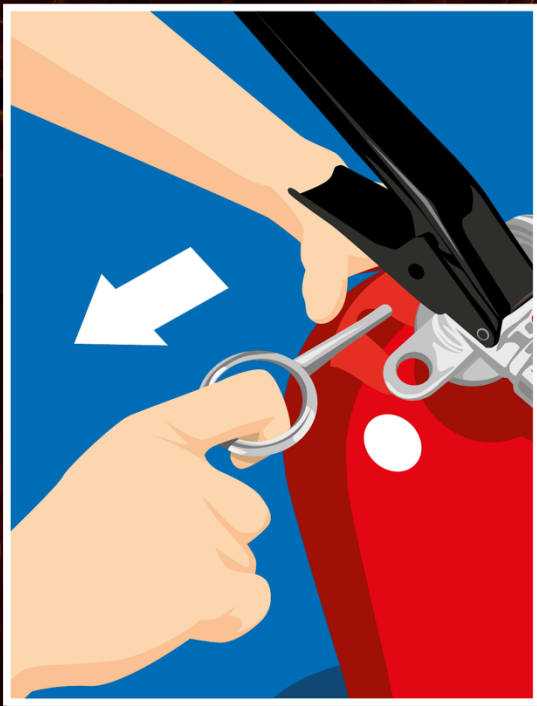
- Red cylinders, ranging in size from 5 to 20 lbs
- Fire-retardant powder is the extinguishing agent and is propelled by a compressed, non-flammable gas
- Separates fuel from oxygen; powder also interrupts chemical reaction





How to Use Fire Extinguisher

PASS Method



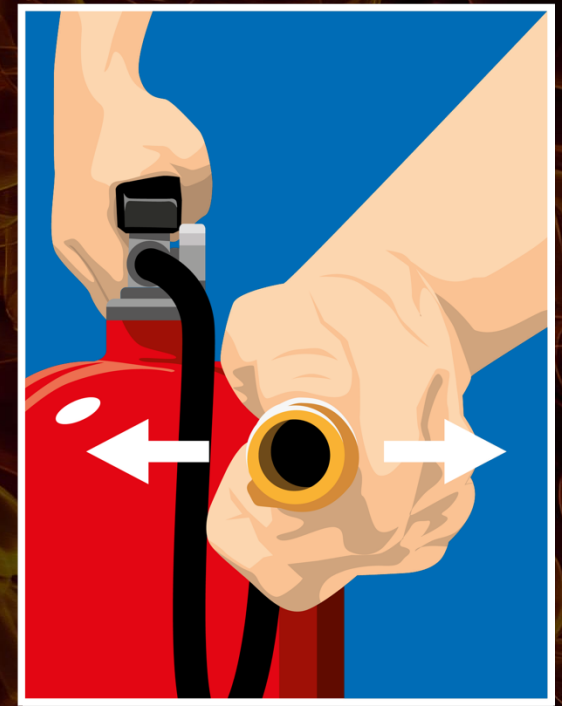
PULL



AIM



SQUEEZE



SWEEP

Watch area for re-ignition and repeat steps Aim, Squeeze, and Sweep if needed

When in doubt, **EVACUATE IMMEDIATELY!**

Fire Extinguishers

Maintenance is important

- Inspect bottle, handle, hose, and gauge for proper working order
- Month and Year put in service current (annual)

Extinguisher product still free-flowing inside bottle
(turn upside down and/or shake)



Know your firefighting department

In the heat of the moment:

- Facilities might not have addresses
- Describing location of fire might be difficult
- Difficult to alert firefighting team of all hazards at your farm

It is important to invite your firefighter department to your farm

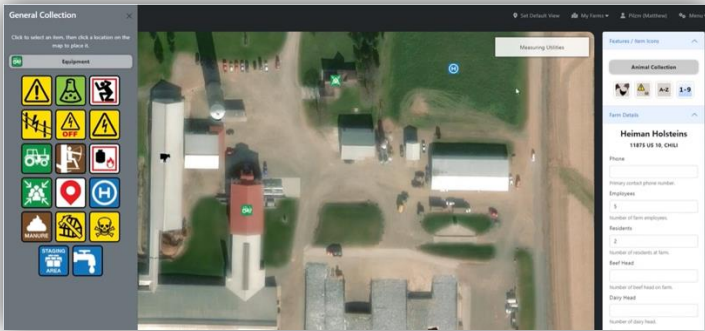
- Get to know them
- Get feedback from them



Provide firefighting team knowledge of your farm

National Farm Medicine Center

farmmapper.org



FARM MAPPER

Farm Mapping to Assist, Protect and Prepare Emergency Responders

This project explores using digital maps of farming operations to provide emergency responders on-site information about hazards and resources. The goal is to expedite responses to farm emergencies and protect responders who may be unfamiliar with an individual farms layout. A brief [video tutorial](#) of the platform is also available.

Login

Register

Username OR Email

Password ([Forgot Password?](#))

Login

Farm Mapper

farmmapper.org

The screenshot displays the Farm Mapper web application interface. On the left, a 'General Collection' sidebar is open, showing a grid of safety and farm-related icons. The 'Equipment' category is selected, and icons include a general warning, chemical hazard, falling person, electrical hazard, power off, high voltage, tractor, falling person with tool, fire, biohazard, location pin, hospital, manure, farm structure, and skull and crossbones. Below these are 'STAGING AREA' and a water tap icon. The main map area shows an aerial view of a farm with several buildings, a large silo, and a red barn. A green 'X' icon is placed on a building, and a blue 'H' icon is on a field. A 'Measuring Utilities' button is visible in the top right of the map. On the right, a 'Features / Item Icons' sidebar is open, showing 'Animal Collection' with a cow icon, a warning icon, and filters for 'A-Z' and '1-9'. Below this is the 'Farm Details' section for 'Heiman Holsteins' at '11875 US 10, CHILI'. The details include fields for 'Phone', 'Primary contact phone number', 'Employees' (5), 'Residents' (2), 'Beef Head', and 'Dairy Head'.

Conclusion

- A fire can start anytime; preparedness is crucial
- Prevention can
 - Reduce chance of fire
 - Reduce impact of fire



<https://www.fsi.illinois.edu/>

Upcoming 2026 Webinars

June 10: Sharing the Road

July 8: Severe Trauma on the Farm

August 12: Grain Bin Rescue

September 9: Field Fires

October 14: Farmer Mental Health

November 11: Manure Pit Gases

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Agricultural Safety & Health Research Lab

We are dedicated to reducing risks and improving safety in farming through research, innovation, and education.



<https://go.illinois.edu/ISSA-lab>

Grain entrapment is a frequently fatal agricultural hazard that occurs when workers enter silos to clear blockages, a problem that has recently seen a disproportionately high number of cases in Illinois. To combat this issue, the program is researching high-pressure air extraction methods, developing machine learning models to predict entrapments, and offering specialized safety training.