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Course 9893

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# Fire Extinguisher Training for Fire Watch and Designated Workers Course 9893

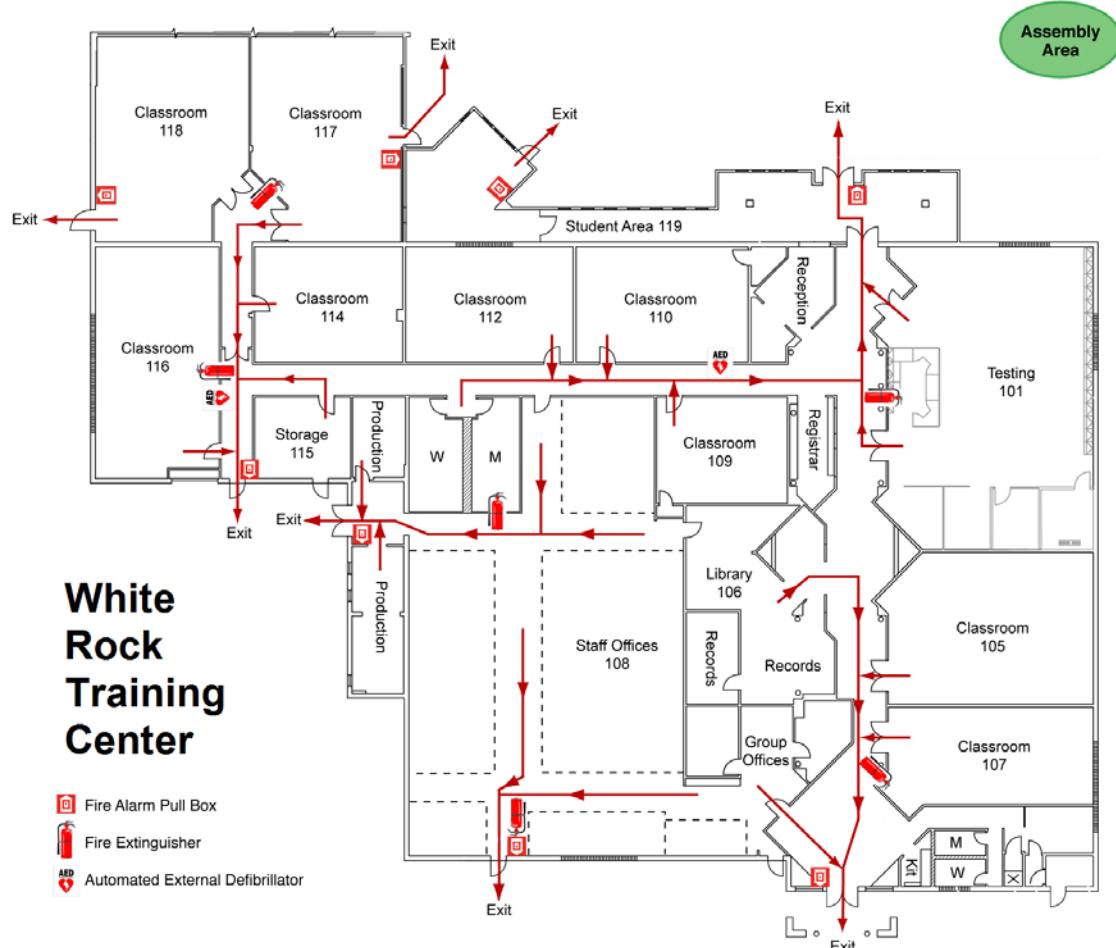


*April 2016*



EST. 1943  
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# Introduction

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## Course Overview



At Los Alamos National Laboratory (LANL), all workers must be aware of LANL fire protection policies and be trained on what to do in the event of a fire. This course, *Fire Extinguisher Training for Fire Watch and Designated Workers* (#9893), provides awareness-level and hands-on training for fire watch personnel and designated workers.

Fire watch personnel and designated workers are appointed by line management and must receive both awareness-level training and hands-on training in the use of portable fire extinguishers to extinguish an incipient-stage fire. This training meets the requirements of the Occupational Safety and Health Administration (OSHA) Code of Federal Regulations (CFR) 29 CFR 1910.157, *Portable Fire Extinguishers*, and Procedure (P) 101-26, *Welding, Cutting, and Other Spark-/Flame-Producing Operations*.

## Course Objectives

After completing this course, you will be able to

- recognize responsibilities of designated workers and fire watch personnel,
- identify fight or flight considerations,
- recognize the five classes of fires,
- identify types of portable fire extinguishers used to fight incipient fires,
- recognize the pull, aim, squeeze, sweep (PASS) method of portable fire extinguisher operation, and
- successfully extinguish a simulated fire.

## Target Audience



This course is intended specifically for *fire watch personnel* and *designated workers*. Any other workers interested in the basic operation of a fire extinguisher may attend.

### Course Limitations

This course does NOT provide the rigorous training required to be a firefighter.

### About This Course

*Fire Extinguisher Training for Fire Watch and Designated Workers* (course #9893) consists of an introduction, two modules, a resources/references section, a video presentation, and a hands-on exercise.

### Retraining

Retraining is required every 24 months.

### Acronyms

CFR	Code of Federal Regulations
DOE	Department of Energy
EM&R	Emergency Management & Response Office
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
P	procedure
PASS	pull, aim, squeeze, sweep
PD	program description
PPE	personal protective equipment
SWP	special work permit



### Definitions



**Class A fire.** A fire in which the fuel is composed of ordinary combustibles, such as paper, wood, cloth, plastic, upholstery, or trash.

**Class B fire.** A fire in which the fuel is flammable or combustible liquids, such as gasoline, kerosene, oil base paint, paint thinner, propane, or grease.

**Class C fire.** A fire in which the fuel is energized electrical equipment, such as appliances, switches, panel boxes, power tools, machinery, or circuit breakers.

**Class D fire.** A fire in which the fuel is a combustible metal, such as magnesium, titanium, potassium, sodium, plutonium, uranium, or lithium.

**Class K fire.** A fire in which the fuel is vegetable or animal fat as found in commercial deep fat fryers or similar cooking media.

**designated worker.** A person appointed by a line manager and trained in the use of portable fire extinguishers to extinguish incipient-stage fires.

**fire watch.** A person trained in the use of portable fire extinguishers and assigned to observe a spark- or flame-producing operation, watch for developing fires, and take appropriate emergency action.

**incipient-stage fire.** A small fire that is in the initial, or beginning, stage and that can be controlled or extinguished by a portable fire extinguisher.

**loaded stream.** A water fire extinguisher that has antifreeze or salt added to the water to prevent freezing.

**operator.** The person engaged in performing a spark- or flame-producing operation.

**PASS method.** The method for using a portable fire extinguisher: Pull the pin, Aim the nozzle at the base of the fire, Squeeze the lever, and Sweep the nozzle from side to side.

**pyrophoric.** Describes materials that spontaneously ignite in air at temperatures below 130°F.

### Definitions—continued

**spark- or flame-producing operation.** Work activities that produce enough sparks or flames to be considered a fire or health hazard. Examples include welding, cutting, burning, brazing, and grinding operations.

#### Lessons Learned

A worker draining tar from a kettle into a bucket noticed that the surface of the tar had caught fire. The worker accidentally tipped the bucket over, spreading the fire. The fire engulfed the tar kettle trailer and a utility trailer that held a 25-gallon liquefied petroleum gas tank. When the tank exploded, the end cap was hurled about 130 feet, causing a small grass fire. A second LPG tank vented but did not explode. One worker sustained first-degree burns to his forearm from splattered tar.

*December 1994 edition of the DOE Occupational Safety and Health Observer*



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# Module 1: Fire Watch and Designated Worker Responsibilities

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## Module Overview



LANL has established emergency procedures for all personnel to follow in the event of a fire. These procedures, taught in General Employee Training and in facility-specific training, specify what to do before, during, and after a fire. In addition, LANL has established procedures for fire watch personnel and designated workers. Following these procedures will make the workplace safer for both you and your coworkers.

LANL is required to maintain a fire protection program based on the requirements negotiated in the Department of Energy/Los Alamos National Security (DOE/LANS) contract\*. Program Description (PD) 1220, *LANL Fire Protection Program*, describes the requirements of the LANL fire protection program, including fire prevention, fire protection, and life safety. Procedure (P) 101-26, *Welding, Cutting, and Other Spark- or Flame-Producing Operations*, establishes the requirements for fire watch personnel before, during, and after spark-or flame-producing operations.

*\*Fire watch responsibilities and procedures presented in this document are also taken from the National Fire Protection Association (NFPA) 51B, Standard for Fire Prevention during Welding, Cutting, and Other Hot Work, 2009.*

## Module Objectives

After completing this module, you will be able to recognize

- fight or flight considerations before fighting a fire,
- responsibilities and procedures for fire watch personnel, and
- responsibilities and procedures for designated workers.

### Emergency Information and Preparations



In the event of a fire—regardless of whether you are trained and designated to use a portable fire extinguisher—you should be familiar with the information in your building's emergency plan, including the

- technical area number, building number, and the locations of fire alarm pull stations, building exits, and assembly areas;
- sound of your building's fire alarm; and
- locations and types of portable fire extinguishers in your building.

**Note:** Most Laboratory-owned buildings have a slow whoop alarm. LANL-leased buildings may have different fire alarms.

### Fight or Flight Considerations

First and foremost, LANL is concerned with your safety. The decision to fight a fire is always up to you.



The decision is always yours whether or not to fight a fire. If you do not think that you can extinguish a fire safely, follow the procedure for evacuation and notification. Use a mental checklist to help you make a fight or flight decision. Before you decide to fight a fire, consider all of the following conditions:

- You have pulled a fire alarm and called 911.
- The fire is small and contained (in the incipient stage).
- There are no flammable materials or large quantities of combustible material likely to ignite immediately.
- An exit is clear, and you can fight the fire with your back to the exit.
- You can stay low and avoid breathing smoke.
- An appropriate extinguisher is available.
- You are trained and confident about using the extinguisher.

**Note:** Do not fight the fire if your instincts tell you not to. If you are uncomfortable with the situation for any reason, just let the fire department do its job.

People who are inexperienced or unfamiliar with the use of fire extinguishers have commonly encountered

- difficulty in removing the extinguisher from the wall fastener,
- difficulty in handling the weight of the extinguisher,
- difficulty in breaking the pin retention device or tamper-indication device (TID), and
- reignition of a fire that appears to be extinguished.

### Fire Extinguishers as Pressure Vessels

Correct handling and maintenance of fire extinguishers can be extremely important because of pressure-related hazards. If a fire extinguisher is damaged and releases its contents suddenly, injuries can occur when workers come in contact with the released contents or when the extinguisher jets around the room.

#### Woman Killed in Fire Extinguisher Accident

A freak accident at a New Zealand truck and transport business claimed the life of a 32-year-old woman, hit in the head by a flying fire extinguisher. Occupational Health and Safety experts said the valve of the fire extinguisher was damaged when it fell over—or was knocked over—and the sudden discharge of high-pressure gas sent the cylinder spinning, then flying. The cylinder spun around several times on the ground before becoming airborne. It punctured the lower leg of a 54-year-old man while on the ground then flew through the air, hitting the woman in the head and smashing through a corrugated plastic window high in the wall.

Ambulance officers tried to save the woman, but she died at the accident scene. It is understood she was walking into a mechanical workshop at Uhlenberg Haulage in Eltham when the accident occurred. The man, whose injuries were described as moderate, was taken to the emergency department.

[http://www.nzherald.co.nz/nz/news/article.cfm?c\\_id=1&objectid=10120915](http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10120915)

### Fire Watch Personnel

A fire watch is a person trained in the use of portable fire extinguishers and assigned to observe a spark- or flame-producing operation, watch for developing fires, and take appropriate emergency action. A fire watch is required to be present whenever spark- or flame-producing operations are performed in locations where other than a minor fire might develop, or any of the following conditions exists:



- combustible material in building construction or contents is closer than 35 ft to the point of operation;
- combustible materials are more than 35 ft away but are easily ignited by sparks or hot slag;
- wall or floor openings within a 35-ft radius expose combustible material in adjacent areas including concealed spaces in walls or floors; and
- combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

### Fire during Welding Operation

On February 13, 1997, a maintenance worker at Oak Ridge National Laboratory was fatally burned during a welding and cutting operation. The worker was wearing anti-contamination clothing while removing a converter from a cell in a radiological area during decontamination and decommissioning work at the K-25 site. Sparks from the welding and cutting operation ignited the worker's cotton anti-contamination clothing. The worker received third-degree burns over 95% of his body. He was administered first aid at the scene and was transported first to a hospital in Oak Ridge and later to a burn center in Chattanooga. The worker died the following morning.

An investigation of this accident identified two root causes:

- failure to use flame-retardant, anti-contamination clothing and
- failure to identify a fire watch with responsibility for personnel safety.

--EH2TEC/04-97/01AI

### Conditions Requiring a Fire Watch

Gas barbecue grills are strongly preferred to other types of barbecue grills, such as charcoal grills, during high-danger wildfire seasons.

**Spark- or flame-producing operations** are defined as “work activities that produce enough sparks or flames to be considered a fire or health hazard.” Examples of spark- or flame-producing operations include welding, cutting, burning, brazing, and grinding operations. Additional examples might include the use of such equipment as portable grinders, portable metal saws, propane torches, tar pots, and thermite welding charges, as well as barbecue grills (during high-danger wildfire seasons).

**Degraded fire alarm, detection, or protection systems** may occur for a period of time because of system testing or equipment failures. A roving fire watch may be put into place to help with detection/notification when fire safety systems are not working as designed.



### Responsibilities of Fire Watch Personnel

**Fire extinguishing equipment**—items such as portable fire extinguishers, fire blankets, buckets of sand, or pails of water, depending on the nature and quantity of the combustible material exposed.

**Operator**—the person performing the spark- or flame-producing operation.

The responsibilities of fire watch personnel are specified in P101-26. If fire watch personnel are required, they must

- ensure that the correct fire extinguishing equipment is readily available and accessible;
- be trained in fire watch responsibilities and the use of fire extinguishing equipment;
- be familiar with the local work area emergency response requirements and have a means to communicate and summon emergency assistance if an emergency occurs;
- sign the spark- or flame-producing operations permit;
- monitor the operation for changes that may affect operational safety or health and take required action;
- watch for fires during the operation and for 30 minutes after completion of the operation. If a fire is detected, implement emergency response requirements. The fire watch shall not attempt to extinguish a fire unless the risk of personal injury is minimal and the fire is clearly within the capacity of the equipment available; and
- inspect the operator's apparel for the presence of hot slag and smoldering fabric before the operator leaves the area.

Additional requirements of the spark- or flame-producing permit that may affect the preparation and/or responsibilities of fire watch personnel include the following stipulations:

- Combustible, flammable, or hazardous materials shall be moved at least 35 ft horizontally from the spark- or flame-producing operation or shall be protected from ignition by suitable fire-resistant covers or guards.
- Openings in walls or floors within 35 ft of the operation shall be protected with suitable fire-resistant covers or guards.
- Combustible floors within a 35-ft radius shall be kept wet, covered with damp sand, or protected by fire-resistant shields. If the spark- or flame-producing operation will be conducted outdoors, the area around the operation within a 35-ft radius shall be clear of combustible ground cover or otherwise protected from ignition.



## Module 1: Fire Watch and Designated Worker Responsibilities

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**Warning:** Because of extreme wild land fire conditions, special or unique restrictions may be placed on your work. Such work could include explosive shots, outdoor operational burns, construction sites, forest-fire and defensible space mitigation efforts, outdoor spark/flame-producing operations, motorized and nonmotorized outdoor activities, and off-road travel.

### Fire Possibly Caused by Cutting Operation Spark

In June 1994, workers at a LANL facility were cutting a pipe with a cutting torch. The pipe was a decommissioned 3-in.-diameter chilled-water system pipe that passed through a wall to the outside of the building. Workers had already cut off the pipe on the outside of the building, leaving only a short remnant that extended about 6 in. from the wall. As the workers cut the pipe inside the building, a small grass fire started outside; presumably a spark from the cutting operation had passed through the pipe remnant and landed on the grass. The grass fire ignited exposed tarpaper on the exterior of the building. Approximately 80 sq. ft of tarpaper burned before the fire was extinguished.

What responsibilities of fire watch personnel were not performed or were inadequately performed in this incident?

## Procedural Steps for Fire Watch Personnel

If a fire breaks out, the fire watch should perform the following actions in the order presented:



1. Stop the work, and have the workers move away from the fire.
2. Determine the class of the fire (you should already know this).
3. Verify that you have the appropriate size and type of fire extinguisher.
4. Extinguish the fire using the PASS method.
5. Allow workers to resume their activities.

**Note:** If a fire is put out and resumption of the activity sparks another fire, the initial fire prevention steps probably failed and additional mitigation may be necessary. Notify the supervisor or manager as specified in the special work permit for the operation. If the fire escalates beyond your control, pull a fire alarm, call 911, and then evacuate and report to your assembly area.

## Module 1: Fire Watch and Designated Worker Responsibilities

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During and after an operation, fire watch personnel must

- wear all necessary personal protective equipment (PPE), including fire-resistant clothing;
- ensure that exits and escape routes remain unobstructed;
- assist the operator in keeping the work area clean and safe;
- stop work and notify the operator's supervisor if an unsafe condition develops during the operation;
- make fight-or-flight decisions in the event of a fire; and
- fight an incipient-stage fire with a portable fire extinguisher based on their decision to fight a fire.

Specific requirements for spark- or flame-producing operations can be found in P101-26.

### Notify Facility Personnel When an Extinguisher Has Been Used

Notify your facility coordinator that the portable fire extinguisher you used must be refilled, even if some extinguishing agent remains in the extinguisher. If you are fire watch personnel and used a portable fire extinguisher that you brought to the job site, call the Fire Protection Group at 667-9045 to have the extinguisher refilled.

***Note:*** Any discharge of a fire extinguisher requires a call to 911.



### Lesson Learned

**Lesson ID:** B-2007-OR-BJCK25K27-0901

#### **Class “F” Fire Extinguisher ? or Fire Watch Personnel Uses Inappropriate Extinguishing Equipment**

Fire watch personnel should always use the appropriate extinguishing media when responding to a fire.

**Discussion:** On the afternoon of 7/16/2007, a small crew of laborers was assigned the task of size reducing 8-in.-diameter iron piping with a plasma arc torch. The piping had been previously removed from the system and staged for size reduction. The work was organized with one individual cutting and two individuals designated as fire watchers.

All three workers were dressed in fire-retardant clothing and leather work boots. After the third cut was made on a piece of pipe that was approximately 16 feet long, one of the fire watchers noticed that an object inside the pipe was smoldering. The employee reached into the end of the pipe with his leather glove and removed the object (an old pair of coveralls). After the coveralls were removed, the coveralls started to flame.

The two fire watch employees immediately attempted to extinguish the flame by stomping the flames out with their feet. After a small period of time and after being urged by others, a 20-lb ABC extinguisher that was present as a requirement of the Hot Work Permit was used to extinguish the coveralls.

**Analysis:** During the critique of the event, the crew believed that the quickest and simplest way to extinguish the fire was by stomping on it with their feet. Additionally, the crew discussed that they were hesitant to use the fire extinguisher because they would have to call the onsite fire department if an extinguisher was used.

#### **Actions:**

1. Briefed all employees associated with hot work activities that a fire extinguisher shall always be the primary means of extinguishing an incipient or small fire.
2. Briefed all employees associated with hot work activities that during an accident event, the natural reaction of conscientious employees is to try to correct or stop adverse consequences by using their hand or foot; however, a fire extinguisher or fire-retardant cloth is the right tool, and employees should never place themselves in imminent danger.
3. Clarified with all employees associated with hot work activities that the fire department is always to be summoned in the event of a fire, regardless of the manner used to extinguish the fire.
4. Evaluated the hot work procedure and fire watch training to determine if changes needed to be made that emphasizes body parts, even if protected by PPE, should be the last resort in combating an accident condition.

### Personal Considerations during Fire

If you are on fire, stop, drop, and roll:

- **stop**, do not run;
- **drop** to the ground; and
- **roll** to snuff out the fire.

Then get medical attention immediately.

If you see someone on fire, tell him/her to stop, drop, and roll. You may attempt to snuff out the fire with a fire blanket. If you choose to use a portable fire extinguisher, be aware that some types of fire extinguishers can cause asphyxiation, and a CO<sub>2</sub> fire extinguisher can cause frostbite.

### Designated Workers

A designated worker is a person appointed by a line manager and trained in the use of portable fire extinguishers to extinguish incipient-stage fires. It is the responsibility of designated workers to

- know the work area, operations, processes, and emergency procedures in their facilities;
- be prepared before an emergency occurs;
- follow appropriate procedures before, during, and after a fire;
- make fight-or-flight decisions in the event of a fire; and
- maintain current training—including hands-on practice on test fires—on the use, capabilities, and limitations of portable fire extinguishers.



### Procedural Steps for Designated Workers



If a fire breaks out and you are a designated worker, perform the following actions in the order presented.

1. Pull a fire alarm.
2. Call 911—answer all questions the operator asks and do not hang up until the operator tells you to do so.
3. Fight the incipient-stage fire (if you choose).

**Warning:** *If you are unable to extinguish the fire with one portable fire extinguisher, evacuate and report to your assembly area.*

**Note:** *Pulling the fire alarm notifies only the Los Alamos Fire Department and the Emergency Management and Response Office (EM&R). You must call 911 to give detailed information about the emergency and any need for medical or rescue response.*

**Note:** *Always follow site-specific procedures, i.e., TA-55. Call 5-5911 for the emergency response team.*

**If you call 911 from a cell phone,** immediately tell the operator that you are calling from a cellular telephone, give the name of the town nearest you, and ask for the location of the 911 center that you have accessed. Cellular calls are automatically routed to the closest relay station. Vital time may be lost reporting a fire outside the 911 response area.



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# Module 2: Fire Fundamentals

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## Module Overview

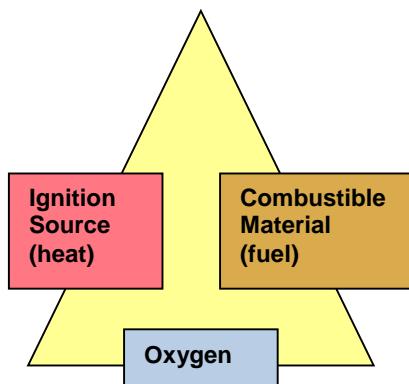
An **incipient-stage fire** is a small fire that is in the initial, or beginning, stage and that can be controlled or extinguished by portable fire extinguishers. To fight an incipient-stage fire effectively, you must be familiar with the different types of fires, which types of portable fire extinguishers work on the different types of fires, and the proper way to use a portable fire extinguisher.

## Module Objectives

After completing this module, you will be able to

- identify the five classes of fires,
- identify the type(s) of portable fire extinguisher that can be used for each class of fire, and
- recognize the PASS method of extinguishing fires.

## The Fire Triangle



***The fire triangle***

Oxygen, heat (an ignition source), and fuel are frequently referred to as “the three legs of the fire triangle.” Add a fourth element, the chain reaction that leads to rapid oxidation (burning), and you actually have a fire “tetrahedron.” The important thing to remember is that if you take any one of these four things away, you will not have a fire or the fire will be extinguished. For example,

- water can remove heat,
- carbon dioxide removes oxygen, and
- cutting a fire line during a forest fire can remove fuel.

## Classes of Fires

Each of the five classes of fires is based on the types of material (the fuel) that is burning. Each class of fire requires a specific type of portable fire extinguisher. For this reason, portable fire extinguishers are labeled with fire class letters and/or industry-standard decals to indicate the classes of fire for which the extinguishers can be used.

**Warning:** *Using the wrong type of extinguisher can make the fire worse and/or create additional hazards.*



***Each class of fire requires a different type of fire extinguisher***

The table below lists the five classes of fires, gives examples of materials in each class, and shows the industry-standard decal for each class.

Class of Fire	Description	Examples	Label
<b>A</b> 	Ordinary combustibles	Paper Wood Cloth Plastic Upholstery Trash	<b>A</b> TRASH • WOOD • PAPER 
<b>B</b> 	Flammable or combustible liquids	Gasoline Kerosene Oil-based paint Paint thinner Propane Grease	<b>B</b> LIQUIDS • GREASE 
<b>C</b> 	Energized electrical equipment	Appliances Machinery Switches Panel boxes Power tools Circuit breakers	<b>C</b> ELECTRICAL EQUIPMENT 
<b>D</b> 	Combustible metals	Magnesium Titanium Potassium Sodium Plutonium Uranium Lithium	COMBUSTIBLE <b>D</b> METALS 
<b>K</b> 	Cooking media	Vegetable oils Animal fats	

### Types of Fire Extinguishers

Portable fire extinguishers vary in size from small, handheld models that weigh only a few pounds to large models on wheeled carts that weigh up to 100 pounds. Several commonplace types of fire extinguishers are described here, along with their use, appearance, range, and duration.

The **range** (the maximum distance at which an extinguisher can effectively be used) and **duration** (the maximum time of continual operation) often depend on the size and weight. Because of the great variety of extinguishers, the ranges and durations provided on the following pages are only approximate.

Most portable handheld fire extinguishers operate for a very short length of time before they are spent. If you are beyond the effective range of the extinguisher when you activate it, the contents may not initially reach the fire, and the extinguisher's contents may run out before you have extinguished the fire.

**Remember:** *Using the wrong type of extinguisher can make the fire worse or create additional hazards.*

#### Portable Fire Extinguisher Rating

Portable extinguishers may also be rated for the size of fire they can handle. These numerical ratings allow you to compare the relative extinguishing effectiveness of various fire extinguishers. The higher the rating, the greater the extinguishing capacity. For example, an extinguisher that is rated 4A:20B:C indicates the following information:

- The A rating, for a Class A fire, is a water-equivalency rating. Each A is equivalent to 1-1/4 gal. of water. In the above example, 4A = 5 gallons of water.
- The B rating, applied to a Class B fire, is equivalent to the amount of square footage that the extinguisher can cover *when operated by a professional*. 20 B = 20 sq. ft of coverage.
- The reference to C indicates that it is suitable for use on electrically energized equipment.

Note that there is no numerical rating for Class C or Class D fires.

### Water Fire Extinguishers

A “loaded stream” indication on a water fire extinguisher means that antifreeze or salt has been added to the water to prevent freezing.

**Use:** Class A fires

**Appearance:** Chrome or stainless-steel tank, a pressure gauge, and a hose with a small plastic nozzle at the end

**Range:** About 25 feet

**Duration:** 40–60 seconds

**Warning:** Never use water fire extinguisher on Class B, C, or D fires.



**A water fire extinguisher**

### Fire Extinguisher Inspection

All portable fire extinguishers must be inspected monthly to confirm that the extinguisher is where it is supposed to be, there are no obstructions to access or visibility, operating instructions on the nameplate are legible and facing outward, and tamper seals are not broken or missing. In addition, extinguishers must be examined for obvious physical damage, corrosion, leakage, or clogged nozzles and to verify that pressure gauge readings or indicators are in the operable range or position. The fullness of each extinguisher may need to be determined by weighing or hefting. Monthly inspections are documented on a tag that is attached to the fire extinguisher. If you find an out-of-date inspection tag or if you have a concern about an extinguisher, notify facility personnel.

### Dry Chemical Fire Extinguishers

**Use:** Class A, B, and C or Class B and C only

Chemicals that may be used in dry-chemical fire extinguishers include ammonium phosphate, sodium bicarbonate, and potassium chloride.

**Appearance:** Red or chrome tank, a pressure gauge, and a short, stubby nozzle. On smaller units, the nozzle is attached directly to the cylinder; on larger units, the nozzle is attached to the end of a short hose.

**Range:** 5–20 feet

**Duration:** 8–25 seconds



*A dry-chemical fire extinguisher*

**Warning:** NEVER use a dry-chemical fire extinguisher designed for use against only Class B and C fires to fight a Class A fire.

### Halon Fire Extinguishers

**Use:** Class A, B, and C fires

**Appearance:** Red or chrome tank, a pressure gauge, a stubby nozzle similar to the type found on dry chemical extinguishers, and a halon label.

**Range:** 10–40 feet

**Duration:** 8–15 seconds

**Warning:** Never use a halon fire extinguisher on Class D fires.



*A halon fire extinguisher*

### Carbon Dioxide (CO<sub>2</sub>) Fire Extinguishers

Carbon dioxide fire extinguishers work by reducing the amount of oxygen that is available for the fire.

**Use:** Class B or C fires

**Appearance:** Red, heavy steel or aluminum tank, no pressure gauge, and a large tapered nozzle or “horn.”

**Range:** 3–10 feet

**Duration:** 10–30 seconds

**Warning:** Never use a CO<sub>2</sub> fire extinguisher on Class A fires.



**A CO<sub>2</sub> fire extinguisher**

Before you use a CO<sub>2</sub> fire extinguisher, consider the following unique hazards:

- CO<sub>2</sub> can displace oxygen and reduce the oxygen concentration in the air. Do not activate a CO<sub>2</sub> fire extinguisher in a person’s breathing zone, and do not use CO<sub>2</sub> fire extinguishers in confined spaces. In small rooms, you may need to verify the level of atmospheric oxygen before allowing personnel to reenter an area where a CO<sub>2</sub> fire extinguisher has been used.
- CO<sub>2</sub> extinguishers are under high pressure. Care should be used not to drop a CO<sub>2</sub> cylinder because the sudden pressure release could cause the cylinder to become a deadly projectile.
- The CO<sub>2</sub> released from an extinguisher is very cold and can cause frostbite, especially if the end of the horn nozzle is touched during or immediately after use.

### Dry Powder Fire Extinguishers—Class D

**Pyrophoric**

describes materials that spontaneously ignite in air temperatures below 130°F.

Dry powder fire extinguishers are usually found in machine shops, glovebox facilities, and other areas where pyrophoric metals, such as magnesium, titanium, and lithium, are stored or handled. Metl-X and Lith-X are examples of dry-powder extinguishers.

**Use:** Class D fires

**Appearance:** Red or yellow tank, a squeeze-type nozzle, and a small nitrogen cylinder with a puncturing lever that pressurizes the extinguisher just before use.

**Range:** 6–8 feet

**Duration:** Depends on use

**Warning:** NEVER use Metl-X fire extinguishers on lithium or lithium hydride fires. Although lithium and lithium hydride are classified as Class D combustible metals, you must use a Lith-X or graphic extinguisher on these metals.



### Wet Chemical Fire Extinguishers—Class K

Wet chemical fire extinguishers are used for commercial-size deep fat fryers and other cooking appliances. For commercial applications with installed fire suppression systems, always wait until the installed system is empty before using portable Class K fire extinguishers.

**Use:** Class K fires

**Appearance:** Silver or red tank, a squeeze-type nozzle, a pressure gauge and a hose. Tips may be designed to help direct contents into the fry chamber.

**Range:** 10–12 feet

**Duration:** 50–110 seconds



#### Accident 014498695 - Portable Fire Extinguisher Activated; Struck Employee

Several employees were cutting a hole in the deck of a supply boat when a tarpaulin caught fire. The employee on fire watch exhausted his fire extinguisher but failed to put the fire out. Other employees in the vicinity saw what was happening and began looking for more fire extinguishers. Additional extinguishers were obtained, and the fire was extinguished. The employees were told to gather up all the empty extinguishers and place them in the back of a truck, to be taken for recharging. An employee noticed a fire extinguisher located on the top of a wing wall of dry dock #1. He knew it had been there a long time, so he climbed a ladder to the top of the wing wall. He passed the extinguisher down to employee #1, who went to take the extinguisher down a 4-ft wharf ladder to the ground. The employee who had passed employee #1 the extinguisher noticed a hissing sound and a cloud of white dust. After the dust cleared, he saw employee #1 in the water between the dock and the float. Apparently, the extinguisher pin had been pulled and the extinguisher activated. It became a projectile while employee #1 was holding it, and it struck him in the left arm and the left side of his face, killing him.

OSHA Accident Investigation Search

## Operating a Portable Fire Extinguisher

Remember the  
PASS-word!

To operate a portable fire extinguisher, use the PASS method—pull, aim, squeeze, and sweep. The table below explains the four steps in the PASS method.

	Step	Action
<b>P</b>	1	<b>P</b> ull the pin. [Twisting while pulling can help break the tamper-indicating device (TID).]
<b>A</b>	2	<b>A</b> im the nozzle at the base of the fire.
<b>S</b>	3	<b>S</b> queeze the lever.
<b>S</b>	4	<b>S</b> weep the nozzle from side to side.

### Accident 014542179—Employees Burned in Flammable Liquid Fire Accident

Employee #2, the store manager, was mixing a 5-gal. can of paint with a Red Devil mixer when the mixer sparked, igniting the open can of paint. Another open can of paint also caught fire. Employee #2 tried to put out the fire with a fire extinguisher, but the extinguisher did not function properly. Employee #1 entered the storage room to help employee #2 extinguish the fire. Both employee #1 and employee #2 were burned in the expanding fire. Employee #1 died the following day, and employee #2 died 9 days later.



**Notes . . .**

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# Resources and References

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## Resources and Referrals

For information about fire videos in the Training Services Group (SI-ITS) library, call 5-7952.

The link to the LANL Fire Protection Program Manual is  
[http://int.lanl.gov/orgs/fp/services\\_docs/fire\\_program\\_manual.shtml](http://int.lanl.gov/orgs/fp/services_docs/fire_program_manual.shtml)

The link to home fire safety publications is  
[http://www.cpsc.gov/cpscpub/pubs/fire\\_sfy.html](http://www.cpsc.gov/cpscpub/pubs/fire_sfy.html)

The link to the National Fire Protection Association Web site is  
<http://www.nfpa.org>

### Organizations Involved in Fire Protection

The table below contains information about the organizations that have fire protection responsibilities at LANL. You can contact these organizations for information and assistance with fire protection issues.

The...	is responsible for...	and can be reached at...
Fire Protection Division (FP-DO)	all areas of fire protection including inspections, fire suppression systems, and representation of LANL in fire protection issues.	667-9045.
SI-ITS	fire extinguisher awareness and hands-on fire extinguisher training	667-0059.
Industrial Hygiene and Safety Division	all occupational safety and health issues at LANL	667-5231.
Emergency Management and Response Office (EM&R)	The management and investigation of emergencies and occurrences at LANL	667-6211.
Los Alamos Fire Dept.	responding to fires at LANL	911*
TA-55	responding to emergencies at TA-55	5-5911

*\* If you call 911 from a cell phone, immediately tell the operator that you are calling from a cellular telephone, give the name of the town nearest you, and ask for the location of the 911 center that you have accessed. Cellular calls are automatically routed to the closest relay station. Vital time may be lost reporting a fire outside the 911 response area*

## **References**

29 CFR 1910.157 {Code of Federal Regulations}, Portable Fire Extinguishers

29 CFR 1910, Subpart Q {Code of Federal Regulations}, Welding, Cutting, and Brazing.

Los Alamos National Laboratory, Welding, Cutting, and Other Spark-, Flame-Producing Operations, Procedure (P) 101-26.

Los Alamos National Laboratory, General Employee Training, Module 10.

Los Alamos National Laboratory, LANL Fire Protection Program, Program Description (PD) 1220.

National Fire Protection Association, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA 51B

National Fire Protection Association, Standard for Portable Fire Extinguishers, NFPA 10.

# Before You Sit Down . . .

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- Pick up course materials at the back of the room.



# When in the Classroom . . .

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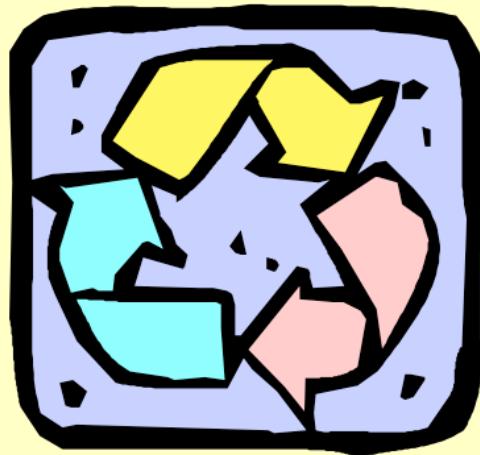
- Be sure to sign the roster.
  - print your name legibly
  - sign your name
  - print your Z number
- Turn off cell phones or put them on vibrate.



# Please Be Courteous!

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- Always push in your chair when you take a break or leave the classroom.
- Place trash and recyclables in the appropriate receptacles located in the front lobby. Please don't leave trash at your seat.



# Emergency Evacuation

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- If an alarm sounds, all personnel shall evacuate the building and immediately report to the assembly area designated for the building.
- Eating, drinking, and smoking are prohibited during evacuations and at the assembly area.



# Emergency Exit Routes



Go to the assembly area when you exit for an emergency.

- DO NOT LEAVE AREA
- NO FOOD OR DRINK
- NO SMOKING
- MINIMIZE TALKING

# White Rock Training Center

## Evacuation Assembly Area



After exiting the building during an emergency, assemble at the grassy knoll beside the front parking lot.

# Fire Extinguisher Training for Fire Watch and Designated Workers

Course #9893

May 2016



Fire\_Extinguisher\_9893\_VG,R1.1

7

# Module 1 Objectives

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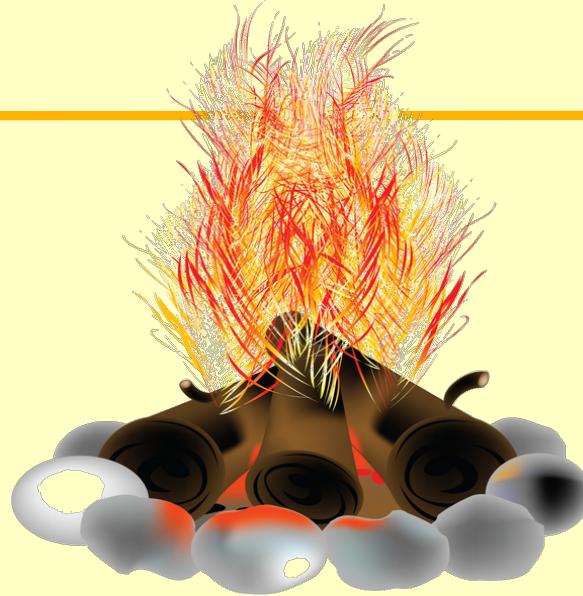
- Recognize fight or flight considerations before fighting a fire
- Recognize responsibilities and procedures for fire watch personnel
- Recognize responsibilities and procedures for designated workers



# Definitions

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- **Class A fire.** A fire in which the fuel is composed of ordinary combustibles, such as paper, wood, cloth, plastic, upholstery, or trash.
- **Class B fire.** A fire in which the fuel is flammable or combustible liquids, such as gasoline, kerosene, oil-based paint, paint thinner, propane, or grease.
- **Class C fire.** A fire in which the fuel is energized electrical equipment, such as appliances, switches, panel boxes, power tools, machinery, or circuit breakers.



## Definitions—cont.

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- **Class D fire.** A fire in which the fuel is a combustible metal, such as magnesium, titanium, potassium, sodium, plutonium, uranium, or lithium.



- **Class K fire.** A fire in which the fuel is vegetable or animal fat, as found in commercial deep fat fryers or similar cooking media.

## Definitions—cont.

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- **designated worker.** A person appointed by a line manager and trained in the use of portable fire extinguishers to extinguish incipient-stage fires.
- **fire watch.** A person trained in the use of portable fire extinguishers and assigned to observe a spark- or flame-producing operation, watch for developing fires, and take appropriate emergency action.



## Definitions—cont.

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- **operator.** The person engaged in performing a spark- or flame-producing operation.
- **PASS method.** The method for using a portable fire extinguisher: **P**ull the pin, **A**im the nozzle at the base of the fire, **SS**weep the nozzle from side to side.
- **spark- or flame-producing operation.** Work activities that produce enough sparks or flames to be considered a fire or health hazard. Examples include welding, cutting, burning, brazing, and grinding operations.



# Fight or Flight?

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- **Do not fight a fire if the overall circumstances make you feel uneasy.**



# Fight or Flight?—cont.

- Consider all of the following conditions:
  - You have pulled a fire alarm and called 911.
  - The fire is small and contained (in the incipient stage).
  - An exit is clear, and you can fight the fire with your back to the exit.
  - You can stay low and avoid breathing smoke.
  - An appropriate extinguisher is available.
  - You are trained and confident about using the extinguisher
- *If you are unable to extinguish the fire with one portable fire extinguisher, evacuate and report to your assembly area.*



# Fire Watch Personnel

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A **fire watch** is a person trained in the use of portable fire extinguishers and assigned to

- Observe spark- or flame-producing operations
- Watch for developing fires and take appropriate emergency action
- Be present whenever spark- or flame-producing operations are performed in locations where other than a minor fire might develop



# Fire Watch

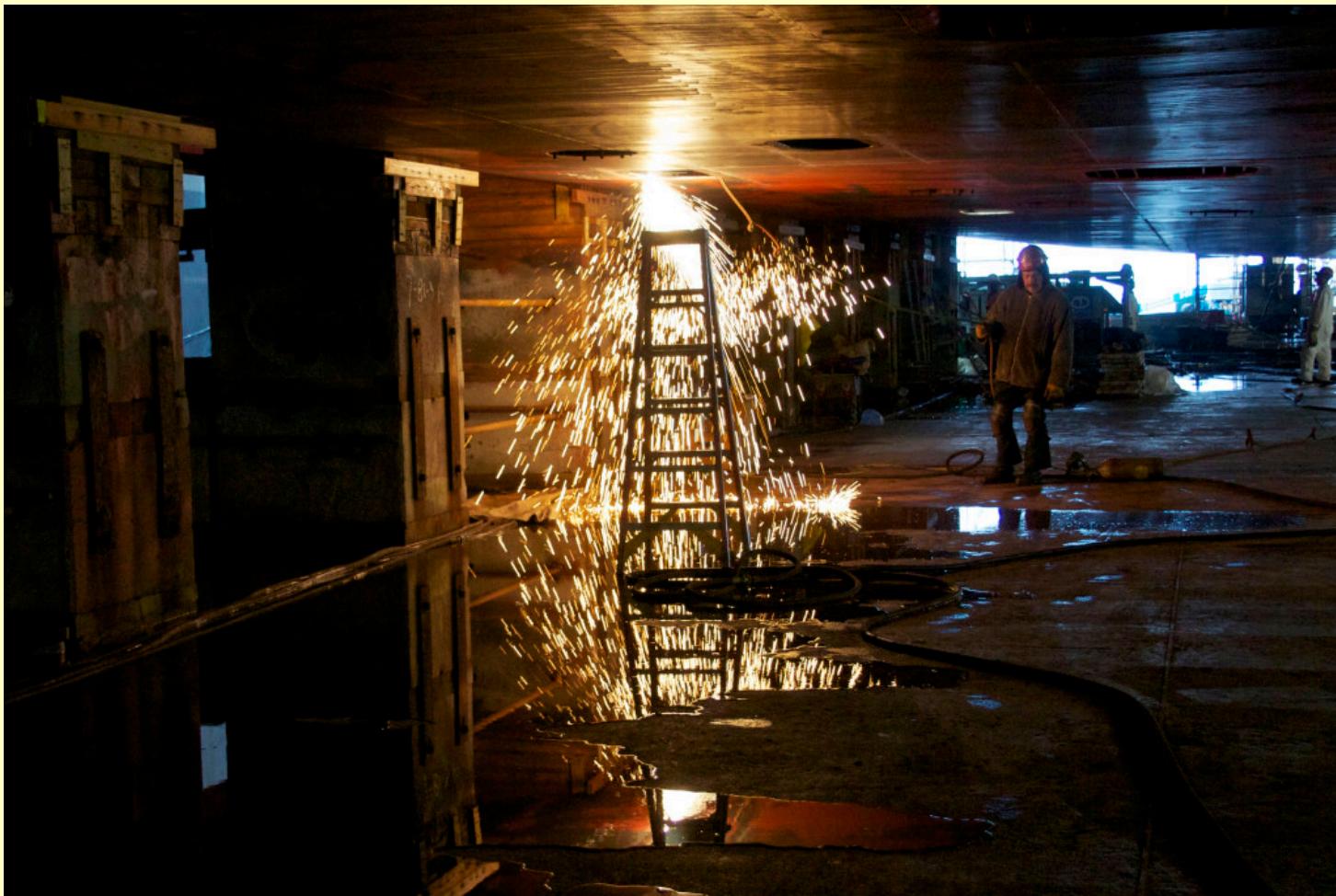
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Any  
concerns?



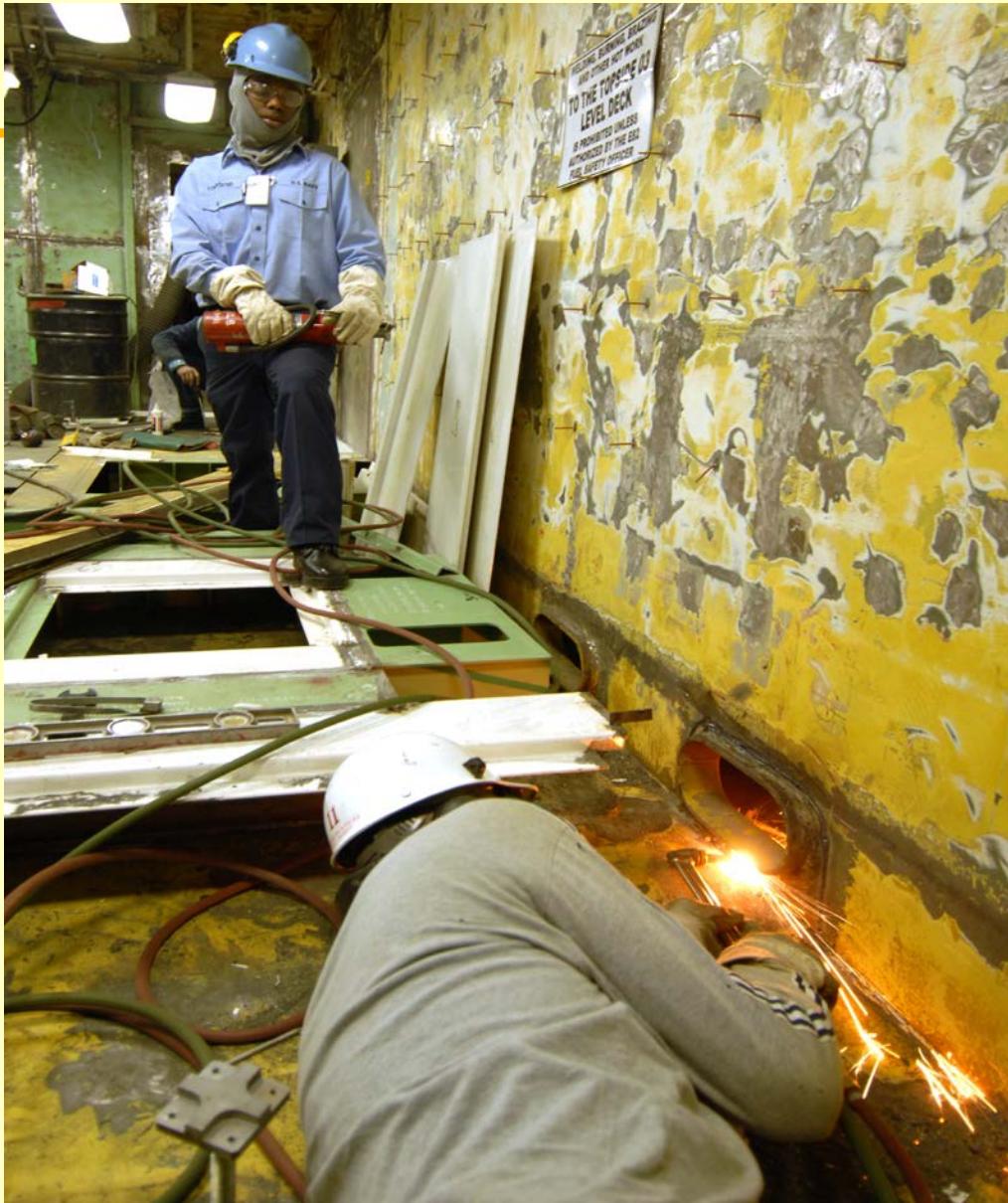
# Fire Watch

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# Fire Watch

Any concerns?



Fire\_Extinguisher\_9893\_VG,R1.1

18

# Fire Watch

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Any  
concerns?



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# Fire Watch

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Any  
concerns?



# Fire Watch

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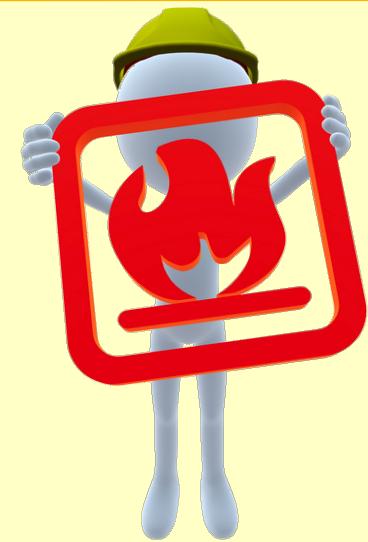
Any  
concerns?



# Other Conditions Requiring Fire Watch

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- Combustible material, in building construction or contents, is closer than 35 ft to the point of operation
- Combustibles are more than 35 ft away but are easily ignited by sparks or hot slag
- Wall or floor openings within a 35-ft radius expose combustible material in adjacent areas, including concealed spaces in walls or floors



# Other Conditions Requiring Fire Watch—cont.

- Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation
- Degraded fire alarm, detection, or protection systems



# Responsibilities of Fire Watch Personnel

- Ensure that the correct *fire extinguishing equipment* is available and accessible
- Be trained on fire watch responsibilities and the use of fire extinguishing equipment
- Be familiar with the local work area emergency response requirements and have a means to communicate and summon assistance
- Sign the spark- or flame-producing operations permit

Spark- or Flame Producing Operations Permit					
Request Date	Starting Date	Expiration Date	Integrated Work Document (IWD) Number	Work Order Number	
Responsible Line Manager	Telephone			Mail Stop	
Work Location	Building			Organization	
Designated South of Pathogenic Waste Area	Indoors			Work Area Building Construction	
Designated South of Pathogenic Waste Area	Outdoors			Combustible	
Yes	No			Non-Combustible	
Initial Issue <input type="checkbox"/> Annual Renewal <input type="checkbox"/>					
Description of work to be performed and equipment to be used					
Special Requirements/Comments					
Low-Hazard (P200 A/B)		Moderate-Hazard (P200 A/B)		High-Hazard/Complex (P200 A/B)	
Work Statements					
Responsible Line Manager					
I have read and understood the requirements on the back of this form and the work site meets those requirements. A fire watch is <input checked="" type="checkbox"/> is not <input type="checkbox"/> required. The fire protection system with <input checked="" type="checkbox"/> is not <input type="checkbox"/> (circle one) is taken out of service or is not <input type="checkbox"/> (circle one) in operation. I will inspect the apparatus or the operator of the hot and shrinking fabric before the operator leaves the area.					
Name		Signature		Date	
Fire Watch of Required					
Appropriate extinguishing equipment and emergency communications are available at the work site. I will monitor ongoing operations for change that may affect operational safety and health, and stop work as appropriate. I will shut off and/or de-energize equipment or apparatus that may pose a threat to safety and health. I will inspect the apparatus or the operator of the hot and shrinking fabric before the operator leaves the area.					
Name		Signature		Date	
Operator					
I am aware of the hazards of the operation and confirm that the controls required to perform the work safely are in place. I will monitor ongoing operations for change that may affect operational safety and health, and stop work as appropriate. I will shut off and/or de-energize equipment or apparatus that may pose a threat to safety and health. I will inspect the apparatus or the operator of the hot and shrinking fabric before the operator leaves the area.					
Name		Signature		Date	
Reviewers					
Fire Protection Division Office (PP-400)					
If required by the operation, will be taken out-of-service or potentially affected. Required if a fire watch has been determined not to be required. Required for exterior operations during wind-driven fire restrictions.					
Name		Signature		Date	
Hot Personnel					
If required, if conducted in a confined space, if the operation is to be performed near a chlorinated solvent, if the operation involves the use of cleaning compounds or other materials containing caustic, corrosive, flammable, zinc leach, benzene or perchlorate, or if the operation involves the use of any other material or compound that may pose a threat to safety and health, or any materials or substances which, when subjected to heat, produce flammable or toxic vapors, or flammable or explosive vapors, or if the operation involves the use of any other material or compound that may pose a threat to safety and health.					
Name		Signature		Date	
Authorization					
Responsible Line Manager and/or Facility Operations Director (POD)					
Name		Signature		Date	
Name		Signature		Date	
Use signature continuation sheet on page 2 as needed for transfer of roles or multiple day operations.					
Form 1563 (1983)			SAVE PRINT CLEAR FORM		

# Responsibilities of Fire Watch Personnel—cont.

- Monitor the operation for changes that may affect operational safety or health, and take required action
- Watch for fires during the operation and for 30 min after completion of the operation
- Inspect the *operator's* apparel for the presence of hot slag and smoldering fabric before the operator leaves the area



# Procedural Steps for Fire Watch Personnel

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In case of **fire**,

- STOP the work
- INSPECT workers' clothing for hot slag, flame, or smoke
- ENSURE that workers move away from the fire



# Procedural Steps for Fire Watch Personnel—cont.

Also, you must

- DETERMINE the class of the fire (you should already know this)
- VERIFY that you have the appropriate size and type of fire extinguisher
- EXTINGUISH the fire using the PASS method
- ALLOW workers to resume their activities

If a fire develops that is too big to fight, pull the fire alarm, call 911, and evacuate!



# Designated Workers

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A **designated worker** is appointed by a line manager and trained in the use of portable fire extinguishers to extinguish incipient-stage fires. It is the responsibility of designated workers to

- Know the work area, operations, processes, and emergency procedures in their facilities
- Be prepared before an emergency occurs



# Designated Workers—cont.

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- Follow appropriate procedures before, during, and after a fire
- Make fight-or-flight decisions in the event of a fire
- Maintain as current any required fire extinguisher training



# Procedural Steps for Designated Workers

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- **If you call 911 from a cell phone, immediately tell the operator exactly where you are, starting with the nearest town.**



# Procedural Steps for Designated Workers—cont.

If a fire breaks out, perform the following actions in the order presented:

**1. Pull a fire alarm.**

**2. Call 911**—answer all questions the operator asks, and hang up after the operator tells you to do so.

**3. Fight** the incipient-stage fire (fight-or-flight considerations).

- Determine the class of the fire.
- Select an appropriate fire extinguisher.
- Extinguish the fire using the PASS method.



# Why Calling 911 and Pulling Alarm First Is Critical

## Tenant tries to put out apartment fire before calling 911; 18 people displaced

Posted: Jan 27, 2016 7:50 PM MST

Updated: Jan 27, 2016 7:50 PM MST

By WBTV Web Staff [CONNECT](#)



(John Sparks | WBTV)

CHARLOTTE, NC (WBTV) - Eighteen people were displaced Wednesday evening due to a fire at an east Charlotte apartment complex.

The fire broke out just after 8 p.m. at the Wendover Garden Apartments on Eastway Drive. Investigators said someone was cooking, and left the food unattended.

Firefighters at the scene told WBTV that the fire was able to spread so quickly because the tenant tried to fight the fire themselves before calling 911. They said an open door also allowed the flames to spread.

Once 911 was called, it took 50 firefighters to get the fire under control in about 12 minutes. However, eight units were already damaged.

The Red Cross also responded to the complex to assist the 18 people displaced by the damage.



(John Sparks | WBTV)

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# Module 2 Objectives

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- Identify the five classes of fires
- Identify the type(s) of portable fire extinguisher that can be used for each class of fire
- Recognize the PASS method of extinguishing fires
- Extinguish a simulated fire



# Exercise – Extinguish a Simulated Fire

	Step	Action
<b>P</b>	1	<b>P</b> ull the pin. 
<b>A</b>	2	<b>A</b> im the nozzle at the base of the fire. 
<b>S</b>	3	<b>S</b> queeze the lever. 
<b>S</b>	4	<b>S</b> weep the nozzle from side to side. 

