FIRE EXTINGUISHER AND EMERGENCY EVACUATION SOP

Author(s): T. Lavoie/ M. Saucedo/ J. Dunlop/ Mtn. Supervisor
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## REVISION HISTORY

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Approved by:

**John Dunlop**
Name, Facilities Manager

**Larry Reddell**
Name, Mountain Facilities Supervisor

_Tammie Lavoie_ 2 May 2017
Tammie Lavoie, Safety Manager Date
1.0 INTRODUCTION

This policy will pertain to all NOAO-North employees and contractor personnel. This policy outlines the acceptable safety measures when dealing with fire extinguishers, as well as how to correctly evacuate in the event of an emergency.

2.0 DEFINITIONS

**Emergency Evacuation**
The urgent or immediate escape of people away from an area that contains an imminent threat. This could be a threat to either lives or property.

**Fire Extinguisher**
A portable or wheeled apparatus that is used for putting out small fires by ejecting extinguishing chemicals.

3.0 RESPONSIBILITIES

3.1 **Supervisor**
Ensure that persons within their areas of responsibility comply with this policy and its implementing documents, and, in particular, have completed the required training prior to beginning work.

3.2 **Employees and Contractors**
Follow all guidance provided in training and work processes to safely perform fire extinguisher and emergency evacuation procedures.

4.0 PROCEDURES

4.1 **Classes of Fires**
There are five different classes of fires. It is important to understand and be able to recognize what the differences are between these classes, as they immediately relate to the types of fire extinguishers that will be used in the event of a fire. The five classes of fires are listed below.

1. **Class A**
Class A fires are fires from combustible materials that are commonly found both in and out of the workplace. Some examples of these materials include cloth, paper, plastics, trash, and wood.

2. **Class B**
Class B fires are fires from flammable liquids and flammable gases. Some examples of flammable liquids are gasoline, paint, and petroleum oil, and some examples of flammable gases are butane, and propane. Fires that result from cooking oils and grease do not fall under this class.
3. **Class C**
   Class C fires are fires from electrical equipment. Some examples of items that can cause these fires are appliances, motors, and transformers.

4. **Class D**
   Class D fires are fires from combustible metals. Some examples of these metals are aluminum, magnesium, potassium, and sodium.

5. **Class K**
   Class K fires are fires that result from cooking oils and grease. Some examples of these substances are animal fats and vegetable fats.

4.2 **Types of Fire Extinguishers**
   There are eight types of fire extinguishers. When a fire is present, selecting the correct type of fire extinguisher to use is critical. There are eight types of fire extinguishers that correspond with the classes of fire. For a complete list of all of the fire extinguishers that are present on the mountain, as well as their locations, contact the Mountain Supervisor or the Safety Manager. The different types of fire extinguishers and the classes of fire they are used for are listed below. Refer to 6.0 for pictures of these fire extinguishers and the fire triangle.

**Fire Extinguishers Available at KPNO**

1. **Carbon Dioxide (CO2)**
   Carbon dioxide fire extinguishers eliminate fires using a cold emission that removes the oxygen and heat components that are found in the fire triangle. Carbon dioxide fire extinguishers are suited for use on Class B and Class C fires.

2. **Clean Agent (Halogenated)**
   Clean agent fire extinguishers eliminate fires by disrupting the chemical reaction element of the fire triangle. This type of fire extinguisher is comprised of halon agents, and halocarbon agents that are less ozone-depleting. Clean agent fire extinguishers are matched for use on Class B and Class C fires. Depending on the size, sometimes halogenated fire extinguishers can be used on Class A fires.

3. **Dry Chemical**
   Dry chemical fire extinguishers eliminate fires by disrupting the chemical reaction section of the fire triangle. This type of fire extinguisher is suited for use on Class A, Class B, and Class C fires.

4. **Wet Chemical**
   Wet chemical fire extinguishers eliminate fires by disrupting the heat section of the fire triangle. This forms a barrier among the fuel and oxygen. This type of fire extinguisher is appropriate for Class K fires, but they may also be used on Class A fires in commercial kitchens.
Additional Types of Fire Extinguishers

1. **Cartridge Operated Dry Chemical**
   Cartridge operated dry chemical fire extinguishers eliminate fires by disrupting the chemical reaction portion of the fire triangle. This type of fire extinguisher is appropriate for use on Class A, Class B, and Class C fires.

2. **Dry Powder**
   Dry powder fire extinguishers share comparable traits to dry chemical fire extinguishers. The main difference is that dry powder fire extinguishers eliminate the heat component of the fire triangle, and they extinguish fires by parting the oxygen from the fuel. This type of fire extinguisher is appropriate for Class D fires only. Dry powder fire extinguishers will not work on any other class of fire.

3. **Water and Foam**
   Water and foam fire extinguishers eliminate fires by removing the heat portion of the fire triangle. Chemical agents in the foam also detach the oxygen element from the other elements. This type of fire extinguisher is matched for use on Class A fires only and must never be used on Class B or Class C fires. If used on a Class B fire, the stream release can disperse flammable liquids, and if used on a Class C fire, a shock hazard can be generated.

4. **Water Mist**
   Water mist fire extinguishers eliminate fires by disrupting the heat element of the fire triangle. When contamination is suspected, water mist fire extinguishers are a substitute to clean agent fire extinguishers. This type of fire extinguisher is suited for Class A fires, but they are able to be used on Class C fires, if needed.

4.3 Using a Fire Extinguisher

When a fire is suspected, or there is one present, workers are instructed to use and follow the Kitt Peak Emergency Manual as guidance. When using a fire extinguisher, workers are encouraged to use the P.A.S.S. technique. The directions on how to correctly use this method are listed below. Refer to 6.0 for pictures of the P.A.S.S. technique.

1. **Pull** the pin. When doing so, the tamper seal will be broken.
2. **Aim** low, and point the extinguisher nozzle towards the base of the fire. On CO2 extinguishers, workers must not touch the plastic discharge horn, as it gets extremely cold and will cause damage to exposed skin.
3. **Squeeze** the handle to release the extinguishing agent.
4. **Sweep** the area from side to side until the fire seems to be put out. The extinguisher nozzle should still be pointed towards the base of the fire. If the fire reignites, repeat steps 2-4.
4.4 Emergency Evacuation
In the event of a fire emergency at KPNO, all workers must immediately evacuate to the Kitt Peak Emergency Center (Fire Barn). If an evacuation from KPNO is unachievable, all workers must report to the shelter location at the pier in the Mayall 4m Telescope. The detailed protocol for both of these scenarios is located in the Kitt Peak Emergency Manual, and workers are instructed to follow the procedures, as written.

4.5 Training
The employer shall provide training to ensure that the purpose and function of this policy is understood by workers. The employer must also verify that the knowledge and skills required for the safe use of fire extinguishers, and how to conduct an emergency evacuation is acquired by workers. Retraining must be provided when there is a change in fire extinguisher inventory, or amendments have been made to the Kitt Peak Emergency Manual.

5.0 REFERENCES
The above information can be found at the following links:

- FEMA, Types of Fires
  http://www.femalifesafety.org/types-of-fires.html
- FEMA, Types of Fire Extinguishers
  http://www.femalifesafety.org/types-of-extinguishers.html
- Kitt Peak Emergency Manual
- OSHA, Extinguisher Basics
  https://www.osha.gov/SLTC/etools-evacuation/portable_about.html
- OSHA, Fire Extinguisher Use
6.0 PICTURES

Fire Tree Example

P.A.S.S. Example

Fire Extinguishers Available at KPNO

Carbon Dioxide  Clean Agent  Dry Chemical  Wet Chemical
Additional Types of Fire Extinguishers

- Cartridge Operated Dry Chemical
- Dry Powder
- Water and Foam
- Water Mist