TOPIC: Types of Fire Fighting Foam

TIME FRAME: 1 Hours

LEVEL OF INSTRUCTION:

BEHAVIORAL OBJECTIVE:

Condition: A written quiz

Behavior: The student will describe the capabilities and differences of various types of fire fighting foam.

Standard: With a minimum of 70% accuracy

MATERIALS NEEDED:

- Example of various foams
- Applicable visual aids
- Chalkboard

REFERENCES:

- IFSTA, Essentials of Fire Fighting, 2nd Edition, Chapter 9
- Fire Foam Information Catalog, USDA, Bureau of Land Management, Chemeketa Community College

PREPARATION: Foam is the extinguishing agent of choice for fighting flammable liquid fires. Foam is also available for fighting fires in Class "A" materials, and for containing hazardous materials spills. It is important for the firefighter to know what the different foam agents are and when to use each.

PRESENTATION	APPLICATION
I. TYPES OF FOAM	
	What types of foam are there?
A. Chemical	
	How is chemical foam made?
1. Formed when an acid and alkaline salt come together in solution.	
a. Chemical reaction causes aeration/discharge.	
2. Equipment maintenance problems are created by corrosive nature of the mixture.	
3. Mixing often results in clogging problems.	
4. Tends to harden and crack.	
5. Are considered obsolete but can still be found in some industrial installations.	
6. Typically found in old "foam" fire extinguishers.	
a. Most untested for years and unsafe.	
	INSTRUCTOR NOTE: Used in old "chemical engines" common in early to mid-1900's.
b. Manufacture halted in U.S. in 1969.	
c. Extinguishers similar to old soda-acid types.	
B. Mechanical Foams	

PRESENTATION	APPLICATION
1. Created by the mixing of foam concentrate, water and air.	
2. Properties	
a. Light in density.	
b. High water content.	
c. Blanketing tendencies.	
d. Resistance to rapid breakdown.	
3. Extinguishing principles	
	How do these properties aid in extinguishing flammable liquid fires?
a. Float over burning flammable liquids.	
b. Smothers the fire.	
c. Cools hot objects in or near the flammable liquid (water based).	
4. Vast majority of today's foams are "mechanical".	
II. TYPES OF MECHANICAL FOAMS	
C. Protein Foams	
1. Regular protein foams are chemically broken down natural protein solids referred to as protein polymers.	
a. Excellent elasticity, and tends to cling to vertical surfaces.	
b. Good water retention capabilities.	
c. High strength.	

PRESENTATION	APPLICATION
d. Non-toxic, but causes metal containers to deteriorate.	
e. Not well suited for:	
(1) Polar solvents.	Where is it not appropriate to use protein foam?
(2) Extremely cold temperatures.	
(3) Subsurface injection - Foam systems that are installed below liquid surface.	
(4) Use with dry-chemical powders	
f. Mixed in 3% to 6% solutions.	
(1) The difference in concentration is due to technological advancements.	
2. Fluoroprotein foams are regular protein foams fortified with fluorinated solvents.	
a. "Fuel Shedding" - tends to separate from flammable liquids that are mixed into the foam.	
b. Excellent for subsurface injection.	
c. Excellent for surface application where foam becomes agitated with the flammable liquid.	
d. More stable than regular protein foam.	
e. More compatible with dry chemical.	
3. Alcohol foams developed for use on polar solvents.	

PRESENTATION	APPLICATION
	What does the word miscible mean? Capable of being mixed; soluble in each other.

a. Examples of polar solvents include:

(1) Alcohol

(2) Lacquer thinner

(3) Acetone

(4) Ketones

b. Derived from regular protein foam mixed with heavy-metal salts suspended in organic solvents.

c. Must be gently applied to burning surface.

(1) Lobbed

(2) Bounced

(3) Flow down backstop

d. Must be applied immediately after eduction into the water stream.

e. Mixed into water stream at or near the nozzle.

D. Synthetic Foams

1. Alcohol foams

a. Do not have to be applied gently.

b. Can be pumped long distances.

c. Two types:

PRESENTATION	APPLICATION
(1) Catalytic alcohol foam is the result of mixing a polymer and catalyst.	
(a) Very stable alcohol resistant foam.	
(2) Multi-use foam	
(a) Effective on both polar and hydrocarbon liquids.	
E. Detergent Foams - Wildland Foam	
1. High yield foam.	
2. Less stable than other foams.	
3. Low resistance to heat and physical damage.	
4. Reduce water surface tension.	
5. Effective on Class "A" fires.	
6. Sometimes forms a frothy emulsion on top of flammable liquids.	
7. Breaks down other foams.	
F. Aqueous Film Forming Foams	
	What is this type normally referred to as?
1. Commonly referred to as AFFF or A triple F.	
2. Dual action synthetic foams.	
3. Have good air-entrapping qualities.	
4. Strong foam blanket.	
5. Retards vaporization of the flammable liquid.	

PRESENTATION	APPLICATION

6. Forms a film of aqueous solution void of bubbles across the surface of the flammable liquid.

7. Aqueous film is self-healing.

8. Generally strengthened by fluorinated solvents.

9. Available for 3% and 6% solutions.

G. High Expansion Foams are Foam Concentrates Mixed into a 2% Solution and Then Mixed with Air to Form High-Air-Content, Good Quality Foam.

1. Useful for fighting fires in structures and inaccessible places.

2. Must provide ventilation in structures so foam will flow properly.

3. Acts to extinguish through oxygen displacement in a confined area.

4. Provides a good insulating blanket.

5. Non toxic but hazardous due to reduced visibility. May become toxic when products of combustion are mixed with the foam.

6. Products of combustion cause the foam to break down rapidly.

SUMMARY:

There are three basic types of foam agents; chemical foam, protein foam and synthetic foam. Chemical foams are obsolete and found in old industrial installations. Protein and synthetic foams have different properties making each preferred for specific fire situations.

EVALUATION:

A written quiz.

ASSIGNMENT:

To be determined by the instructor(s).