3.2.3.6 Foam Operations

	YOUR ORGANIZATION STANDARD OPERATING PROCEDURES/GUIDELINES
TITLE: Foam Operations	**SECTION/TOPIC:** Tactical-Strategic Guidelines
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These SOPs/SOGs are based on FEMA guidelines FA-197

1.0 POLICY REFERENCE

CFR	
NFPA	
NIMS	

2.0 PURPOSE

This standard operating procedure/guideline addresses use of foam on emergency incidents, including when and how to apply foam.

To promote the safe, appropriate use of Class A foam and Compressed Air Foam Systems (CAFS) in firefighting.

3.0 SCOPE

This SOP/SOG pertains to all personnel in this organization.

4.0 DEFINITIONS

These definitions are pertinent to this SOP/SOG.

5.0 PROCEDURES/GUIDELINES & INFORMATION

5.1 Use of foam on emergency incidents, including when and how to apply foam:

CLASS A FOAM

Class A foam is a synthetic detergent that affects the physical properties of water, thereby enhancing its ability to extinguish fires. Foam solution is created when 0.1 – 1.0% foam concentrate is added to water. The concentrate acts by reducing surface tension of water and enabling it to penetrate materials more effectively.

Foam solution by itself is very effective for combating Class A fires, but if air is added to the solution, its firefighting capabilities are further enhanced. The formation of bubbles (droplets of foam solution) gives foam a “sudsy” appearance. These bubbles effectively increase the surface area of water, thereby increasing the steam conversion and allowing for a greater absorption of heat and carbonized particles.

Foam insulates materials by keeping them wet and cool longer, making them less likely to ignite or rekindle. As the foam begins to break down, the bubbles collapse allowing the water droplets to soak into the affected material. Foam’s clinging property is advantageous over water when protection of vertical surfaces is necessary. Lastly, foam adds opacity or color to water, giving it the ability to reflect heat away.

Class A foam should be considered the primary extinguishing agent for any fire involving Class A materials. Attacks being mounted on offensive structure fires should utilize Class A foam solution with the initial and subsequent hose streams. Class A foam is not limited to fires involving vegetation, vehicles, or debris. It has also been very effective in extinguishing deep-seated fires, which can involve agricultural products (hay bales, alfalfa, cotton) or recycled materials (paper, tires, rail road ties, saw dust). Foam allows water to reach the seat of the fire quicker, thereby saving time and reducing manpower needs.

Class A foam will not suppress flammable vapors. Caution should be used when making attacks on fires that could involve flammable/combustible liquids (vehicle fires, fuel spills). Class A foam should not be applied to water reactive materials. Additionally Class A foam should not be mixed with Class B foam, as the concentrates will become gelatinous and clog most foam systems.

CAFS

Compressed Air Foam Systems (CAFS) employ the use of air compressors in conjunction with foam solution to produce foam bubbles. This process yields homogenous foam that is far superior to foam produced with air-aspirating nozzles. CAFS introduces a balanced volume of compressed air into the foam solution while it is still within the plumbing of the apparatus, creating what is referred to as a “high-energy” hose stream.

By utilizing an air compressor to blend foam, firefighters have the ability to determine the consistency of foam produced. Increasing the amount of air introduced into the foam solution will produce dry, shaving cream-like foam. Dry foam is desirable for pre-treating or protecting exposures. Dry foam will readily cling to vertical surfaces, remain in place longer, and act as an insulation blanket against thermal exposure. **Dry foam will not provide adequate thermal protection to crews who are attempting to fight structure fires from offensive, interior positions.** For an interior attack, crews should disable the air compressor and utilize foam solution. This will ensure enough water is present to protect firefighters against excessive heat. Decreasing the amount of air introduced into the foam solution will yield, wet, sudsy foam. Wet foam is high in water content and will provide greater protection against thermal insult. In general, crews should primarily use wet foam to combat fires, and drier foam for protecting exposures. CAFS and non-CAFS hose streams should not be combined when making coordinated attacks. Regular hose streams will disrupt foam making it less effective.

Although CAFS requires no specialized equipment besides a proportioner and air compressor, additional measures can be taken to further enhance its performance. CAFS can be delivered through peripheral tip nozzles, but best results are obtained when streams are produced with smooth bore tips. Peripheral tip nozzles tend to disrupt the stream and can actually degredate the consistency of the foam. Greater reach and penetration are achieved with smooth bore nozzles. The presence of air in handlines during CAFS operations will make them more likely to kink when maneuvered around tight corners. Firefighters must utilize proper hoseline management to prevent kinking to ensure proper flow to the nozzle.

CAFS is an adjunct to Class A foam, and as such, it should be utilized to combat fires involving Class A materials (brush, debris, vehicles, agricultural products and recycled materials). **When combating offensive structural fires, CAFS should be implemented at the start of overhaul.** Its encapsulating qualities can suppress post-fire products of combustion, significantly reducing toxic exposure to personnel. The application of CAFS during overhaul allows for better coating of materials and significantly reduces the chance of reignition. Consideration should be given to a brief, well placed exterior attack on structure fires, prior to making entry. This may give officers time to assemble an IRIC while allowing a single firefighter the opportunity to impact interior conditions from a safe location. A CAFS stream has the potential to remotely affect the fire and reduce heat and smoke levels throughout the structure, making the subsequent entry safer.

CAFS is appropriate for large defensive fires, but incidents that produce significant thermal columns (“stick cities”, “big box” fires) may present a challenge to the use of CAFS. Thermal columns have a tendency to rapidly consume CAFS streams if they are applied directly on the main body of the fire. Limited foam supplies may be exhausted without having any discernable effect on the fire. Instead, crews should reserve CAFS for exposure protection or attempt to direct CAFS streams to perimeter sections of the fire and slowly work their way in towards the main body of fire.

CAFS is designed to operate using Class A foam. Although manufacturers are attempting to develop a combination A/B foam, **Class B foam should not be dispensed through a CAFS unit unless specifically approved by Support Services personnel.**

CAFS continues to be a new technology to the fire service. The dynamics of CAFS can be confusing and difficult to master. Firefighters must receive adequate training and utilize it on a regular basis if they are to become proficient in its use.