

## Chapter 13-4

### Standard Operating Guideline for Firefighting Operations Using Class B Foam

Effective 1-1-04

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#### 1. Purpose

This SOG covers the strategy and tactical considerations for using foam to suppress a class B fire.

#### 2. Scope

This SOG applies to all officers and firefighters that may assume the role of acting officer.

#### 3. Definitions

*Foam concentrate:* The raw material used to create foam, carried in pails or bulk storage tanks

*Foam solution:* The mixture of foam concentrate and water

*Finished foam:* The final product made from agitated foam solution that is applied to the fire

#### 4. Background

PVFD has a portable foam eductor and at least 2 pails of foam on each fire engine. The foam carried on the engines is Aqueous Film Forming Foam- Alcohol Resistant (AFFF/ATC, or AR/AFFF).

The tanker has an around-the-pump foam proportioning system that is connected to a 45-gallon foam storage tank. The concentrate carried on the tanker is F-500. The tanker also carries several extra pails of F-500 and AFFF/ATC in the hosebed.

AFFF/ATC and F-500 both control class B fires, but they must be used in slightly different ways. AFFF/ATC must be applied to create an uninterrupted barrier between the fuel and air, using the roll, bank, or rain-down methods only. **AFFF/ATC** must be proportioned at **3% for hydrocarbons and 6% for polar solvents** or unknown hydrocarbons. Runoff of AFFF/ATC and flammable liquid may also create an environmental hazard.

F-500 can be used with the same nozzle tactics as if the fire was a class A. F-500 can be injected or mixed into the flammable liquid without negative results. The white plume created during F-500 application is primarily just steam, which helps to smother the fire. **F-500** is proportioned at **1% for all hydrocarbons or polar solvents**. F-500 is biodegradable, and helps minimize environmental hazards from the flammable liquid. F-500 has a 15-year rated life span, and is not corrosive to plumbing.

AFFF/ATC and F-500 concentrates can't be mixed together, but finished foam made from each may be used at the same time. If this is done, the tactics used with the F-500 must be the same as those used with AFFF/ATC.

#### 5. Response

Various incidents may require the use of foam. However, the most likely incidents will be traffic accidents or train wrecks involving spilled petroleum products. Apparatus response should be as per the response sheet for the type of incident dispatched. If the dispatch or other information indicates that a flammable spill has occurred, 8467 should respond directly after the first engine. All units should try to position so that they are uphill and upwind from the spill area. Consideration must also be given to stopping the spill from affecting exposures, or running into the sewer system.

## 6. Mutual Aid Responses with 8467

If mutual aid is given by PVFD for a foam incident, 8467 and 8433 will respond as a 2-piece company. This SOG shall be the basis for actions by PVFD personnel at such mutual aid incidents. PVFD personnel shall not engage themselves in operations that will place them in unreasonable danger, or that violate the intent of this SOG. Otherwise, PVFD crews shall work within the ICS structure as requested.

## 7. Scene Organization

The first arriving officer shall survey the scene and begin organizing it according to the following guidelines. All personnel must be aware of these guidelines, and know how the guidelines affect their individual actions on the scene.

1. Gather information:
  - What is burning?
  - Can scene be safely approached by fire crews?
  - Is there a rescue or immediate life hazard problem?
  - Where are the exposure and runoff areas?
  - If this is a chemical fire, will runoff create more hazard than smoke from controlled burning?
  - Is mutual aid needed?
2. Form an attack plan. Pay special attention to the following:
  - Safe approach by fire crews
  - Fire spread and contamination from runoff
  - Adequate water supply
  - Adequate amount of foam on hand *before* attack
  - Method of controlling fire and confining spill using least foam possible
3. Gather resources
  - Adequate foam concentrate
  - Adequate water supply
  - Additional resources such as Haz-Mat team, EPA, Coast Guard, EMA,
4. Implement attack plan
  - Use water streams where possible to provide exposure protection and fire control
  - coordinate foam attack to maximize effectiveness
  - do not use water streams in areas of foam use (prevent wash-off of foam blanket)
5. Evaluate results and revise plan as necessary

## 8. Calculating Quantity of Foam Concentrate and GPM Needed

Before fire suppression using foam can be successfully implemented, two items must be addressed. First, water fire streams must be used as much as possible to control exposure fires, thereby minimizing the amount of foam needed for use on the burning liquid. Second, the quantity of needed foam concentrate and its flow rate must be established, and that quantity must be in place before the attack begins.

To determine the needed amount of foam concentrate, the area of the spill or fire surface must be estimated. *Length of spill x width of spill = Area of spill*. The area is then multiplied by the following factor, to determine the gpm needed to control the fire. This gpm requirement is multiplied by the percentage of foam concentrate used and the result is the amount of foam concentrate needed for the *initial* attack.

**Area x gpm factor = gpm foam fire stream needed ( $Q_{ffs}$ )**

**$Q_{ffs} \times \text{concentrate reduction \%} = \text{Gallons of foam concentrate needed per minute}$**

Type of Spill	% AFFF Needed	% F-500 Needed	gpm factor
Hydrocarbon	3%		.1 gpm/sq. ft
Polar Solvent	6%		.2 gpm/sq. ft
All types		1%	.2 gpm/sq. ft

*Example 1:*

There is a fire due to a leaking gasoline tanker. The exact type of fuel is unknown, so it is assumed to involve polar solvents. The length of the spill is approximately 100'. The width of the spill is approximately 40'. It is decided to use AFFF/ATC as the foam concentrate.

The amount of AFFF/ATC concentrate needed is as follows:

$100' \times 40' = 4000$  square feet = Area of spill

$4000 \times .2 = 800$  gpm foam fire stream needed ( $Q_{ffs}$ )

$800 \times .06 = 48$  gallons of foam concentrate needed *per minute*

NFPA 11 requires that a successful foam fire attack be sustained for at least 15 minutes. With this in mind, the above example would need  $48 \times 15$  (720) gallons for a successful sustained attack.

To simplify these calculations, use the following chart when determining ***the total amount of foam concentrate needed for a sustained attack.***

Type of Spill	Foam Quantity Factor *	*Note: these numbers are rounded up for ease of calculation
Hydrocarbon	.05	
Polar Solvent	.2	
Any F-500 use	.03	

***Foam Quantity Factor x Spill Area = Total foam concentrate needed for sustained attack.***

In example 1, this would be  $.2 \times 4000 = 800$  gallons AFFF/ATC foam concentrate.

*Example 2:*

You have a fire involving spilled acetone that is 20' long and 80' wide. You decide to use F-500 to extinguish the fire.

The area of the fire is  $20' \times 80' = 1600$  square feet

The total F-500 concentrate needed is  $.03 \times 1600 = 48$  gallons

## 9. Recovery of Expenses

Any time an incident is declared to be a Haz-Mat, provisions exist to allow for the reimbursement of expenses by the responding agencies. Therefore, PVFD staff must keep track of all items used by all agencies present. This information should be coordinated with the head of the responding Haz-Mat team, or the highest ranking person representing the local EMA.