FIRE CHIEF

Alan Conkle, Lake Township (Ohio) Fire

There are no good reasons to avoid using foam — but there are many to justify its use. *By John Lund*

A Compelling Argument

Class A foam is now used by more than 60% of the fire departments in the United States. With well-documented benefits such as faster knockdown time, fewer rekindles, and a reduction in water damage, why haven't the other departments adopted use of Class A foam as part of their standard operating procedures?

It's not because they don't read industry publications like Fire Chief that regularly publish the science behind putting the wet (and white) stuff on the red stuff. It's also not because these departments don't talk to their Class A foam-using neighbors — because they do. Rather, there seems to be six common excuses the non-believers use to justify their failure to utilize this property-, evidence-, time- and life-saving tool.

Confusion between Class A and Class B foam agents

On occasion I've asked a fire officer, "Do you use Class A or Class B foam in your department?" More than once I've been told that the department uses Class A, only

to find out the label on the side of the bucket reads AFFF — (aqueous film-forming foam, a Class B agent). This confusion leads to other problems as well.

Without getting into a chemistry lesson, the two types of foam function very differently. Class B foams are used on two-dimensional hydrocarbon fires and are available in both polar and nonpolar formulations. The foam works by creating a skin/film over the surface of the combustible liquid, separating the fuel from the air. The fuel must be contained or diked in order for the film to form, so Class B agents are not highly effective on running fires. Class A foams, on the other hand, are used on three-dimensional fires of ordinary combustibles and are technically known as synthetic detergent hydrocarbon surfactants. This agent breaks the surface tension of the water, creating smaller molecules, resulting in better adherence to the combustible material and faster cooling of the fire.

In addition to the obvious functional difference between the products, there is a big difference in price ($12 to $15 per gallon average for Class A versus nearly double that for most Class B agents). There also is a significant difference in the application rate. Class B agents are applied at ratios between 1% and 6%, with 3% being the most common. Class A on the other hand is generally applied at ratios between 0.2% for overhaul operations (wet foam) to 1% for exposure protection (dry foam) with 0.5% being commonly used for initial attack.

Questions about the environmental impact of Class B foams that contain perflurochemicals (PFCs) have created additional confusion. While these chemicals have been removed from many Class B foams currently on the market, their use has caused many to wonder about the safety of using Class A foams in structural firefighting. Class A foams generally do not contain perflurochemicals, and many are certified by the U.S. Forest Service as biodegradable and non-hazardous. As such, they generally are safer for the environment than most household laundry detergents.

In a world of acronyms that sometimes look like alphabet soup, it certainly pays to know your As and Bs.

My city has hydrants every 300 feet.

Some chiefs cling to the belief that water is free, plentiful and available on every street corner. Though easy to say, that simply is no longer true. With pressure from the EPA and other organizations to limit runoff, plus a real water shortage in some areas of the country, cutting your water consumption with Class A foam makes good sense, no matter where you get your water supply.

While the origins of Class A foam did indeed begin with use in wildland/urban interface areas, it didn't take long for metropolitan departments to discover the benefits of applying foam to structural fires. Water naturally has a high surface tension and therefore causes much of the heat-absorbing potential to be wasted, as the water droplets roll off the combustibles and away from the fire. Because Class A foam breaks the surface tension of the water, molecules separate from each other more readily, creating greater available surface area to cool the fire. The foam/water solution also penetrates further into the combustible material, providing superior initial-knockdown characteristics and greater ability to reach deep-seated fires. This helps prevent rekindles hours after the fire is out and the crews have gone home.

Consider for a moment the impact of reducing water consumption by 71% via the use of Class A foam, as shown by the 2001 Palmdale study. The resulting dramatic reduction in water damage in the course of fighting structure fires does not go unnoticed by insurance companies — many have reimbursed departments for the cost of foam due to lower claims. Additionally, ISO now is giving credit for carrying Class A foam and proportioners on apparatus. Even if water theoretically is "free," by reducing the water load placed into a structure you reduce the risk to your crews given the challenges associated with lightweight construction. Simply stated, less water equals less load on the structure — and, thus, less risk of collapse for your firefighters.

Fire hydrants on every street corner are great, but Class A foam makes them even better.

Class A foam is expensive — my department can't afford it

Budgets have gotten tight for many departments — really tight. It's easy to understand why a chief would be concerned about adding additional cost every time his crew stretched a hose line to a fire.

Consider, however, that good Class A foam can be purchased for around $12 to $15 a gallon. How much water did you flow on your last room and contents fire? 50 gallons? 100 gallons? Even if you were to flow 500 gallons at 0.5% foam for initial attack, you're looking at a bill of only $30. More realistically, you've flowed about 50 gallons of water and your cost is closer to $3.75. Now, what's the cost of a rekindle and a call back to the same address four hours later? Comparatively, even $30 seems pretty reasonable, doesn't it? As I've heard more than once in this business, "Make sure it's out the first time — we don't like to do warranty work."

If the cost-versus-value equation still is not making sense, consider that the number-one cause of firefighter deaths is sudden cardiac arrest, and the number-two killer is vehicular accidents that occur when traveling to or from a call. If Class A foam reduces the time to initial knockdown by 50% and provides better wetting characteristics to reduce rekindles, doesn't that equate to less time laboring in SCBA gear and fewer instances of driving to and from the scene?

The question then isn't whether you afford to use Class A foam, but whether you can afford not to.

I had a bad experience with foam.

Admittedly, using foam wasn't always easy and it wasn't always good. Remember batch mixing? Eductors? Light water? Balance pressure systems? But if you are a chief officer and haven't looked at using foam since you were a firefighter, you would do your department a great service to take a look at what's available today.

In many departments without Class A foam, you typically will find an eductor buried deeply in some side compartment that comes out once a year for the department's annual foam training. You'll hear the department officer say that foam operations are difficult to establish. For instance, is the nozzle matched to the eductor? How long is the hose lay? What elevation will the crew be working at? How many buckets of foam do we have handy? There are a lot of things an engineer has to consider in order to be successful using foam — especially in an emergency situation where he already has a lot to think about.

Don't get me wrong, these older proportioning systems certainly did their job back in the day. In fact, they still have their place in some situations today. But they're just not something you want to set up or manipulate every time you stretch a line.

In contrast, today's direct-inject foam systems are accurate and so easy to run that a probie can do it. No longer do you need to calculate pressure drop or losses in flow as you did with eductors. You don't even have to worry about the length of your hose lay. Now it's just a matter of getting your engineer/driver to turn the system on when they get to the pump panel. If you're really worried about it, you can even have the system programmed so that it turns on with your water pump and sets your percentage for initial attack automatically.

Compact and efficient, some 12-volt direct-inject systems can treat up to 1,000 gpm at 0.5%. That's enough for most departments to run up to four hand lines, or a master stream and a hand line in combination. If your department needs even more firepower for the occasional Class B fire, direct-inject foam systems with hydraulic motors are available to treat higher flows at 1%, 3% or 6% injection rates, while still capable of low-flow operations down to 0.1%.

If your idea of foam operations is still an eductor and a 5-gallon bucket of foam, you owe it to yourself to check out what's new.

If I use foam, I'll have to change my fireground tactics.

Some departments have avoided Class A foam because they mistakenly believe that they will have to change tactics in order to apply it properly. Though there certainly are some advantages to creating a well-structured foam blanket for cooling and suppression using a low-expansion foam nozzle, the tactics for fighting your ordinary structure fire don't have to change.

The primary benefit of using Class A

CAFs Top 10 List

A countdown of the common problems and complaints of mechanics and EVTs

10] **System uses excessive amounts of foam concentrate or compressor oil.** This is usually due to the system being out of calibration or poor-quality foam concentrate. Excessive oil use often is due to flowing more air than normal, use of incorrect oil, or lack of proper service.

9] **Mechanics/EVTs often are not familiar with large rotary screw compressors.** The rotary screw air compressors used on most CAF systems are designed for industrial applications. With proper service, the compressor will last for many years. EVTs must understand the compressor air-control circuit in order to properly diagnose problems.

8] **Mechanics/EVTs received no training when CAF apparatus were added to their fleet.** Users and mechanics need CAF-specific training when such systems are added to the fleet. Topics such as tactics, operating procedures, maintenance needs and troubleshooting should be covered.

7] **Users do not understand the system and are unable to explain problems to mechanics/EVTs.** See problem No. 8. Users need training to recognize when the system is operating correctly and when there is a problem. Users and mechanics need to be able to describe challenges using the same terminology.

6] **Users/mechanics were unaware of the necessity of "exercising" the system.** See problem No. 8. CAF systems require regular use. They consist of components that must be exercised on a regular basis.

5] **Users have a negative experience with the CAF system and assume that the system is defective.** See problems Nos. 7 and 8.

4] **Mechanics/EVTs do not understand the operational problems that the firefighters are experiencing with the system.** See problem No. 8. Mechanics/EVTs need a basic understanding of the operational uses of the CAF system. Being able to recognize different foam types and their uses is important.

3] **System components sometimes are found in inaccessible locations.** CAF systems consist of multiple components. Many of these components require access to check fluids, replace filters, clean screens or drain fluids. Easy access to these components is critical to proper maintenance.

2] **Systems are too complicated.** CAF systems are more complex than a non-CAF System. The addition of an air compressor and associated systems increases the complexity of the system. But all of the systems are designed to be reliable. With proper training, the system easily can be operated and maintained.

1] **System does not perform as expected.** A successful CAF program requires effort. The program should begin with the purchase of a quality system. The use of a quality foam concentrate of the proper type also is a requirement. Training for the users and mechanics also is needed. Following the manufacturer's recommended maintenance program also will help the system perform as expected. The final piece to the puzzle is regular practice.

— Bill Dunlap, ICL Chemicals (Phos-Chek)

foam is its value as a surfactant. When combined with water, the foam breaks the surface tension of the water, allowing it to sneak into places it wouldn't normally go. One of my favorite demonstrations of the effectiveness of Class A foam is to place two separate drops of water onto a piece of cardboard. Place a drop of foam, or even dish soap, into the first droplet of water and the water quickly penetrates the cardboard. After a half hour, the non-treated droplet is still beaded up on top of the cardboard.

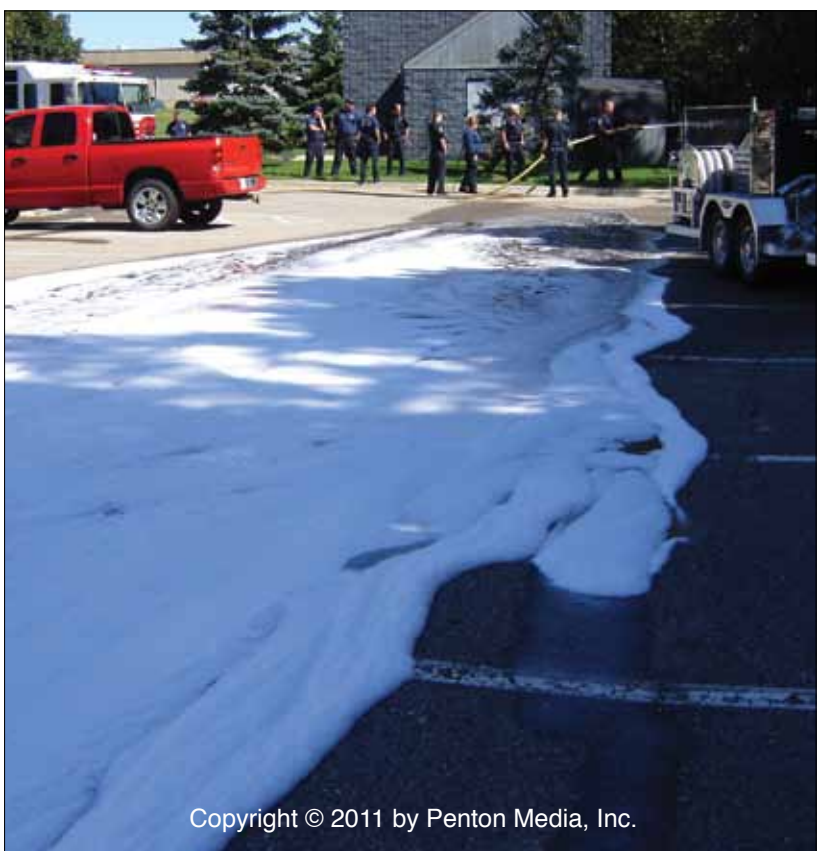
If your idea of foam operations is still an eductor and a 5-gallon bucket of foam, you owe it to yourself to check out what's new.

Now think about it — if foam placed into the water stream effectively breaks down the molecules of water being applied to the fire, does it matter whether the stream is air-aspirated? If you're trying for exposure protection, it does. But how about initial attack or overhaul? (Remember, you're creating a greater quantity of small heat-absorbing molecules either way.) Foam is an absolute improvement over water alone during initial attack or overhaul. Note that in such applications an automatic nozzle, combination nozzle or smooth-bore nozzle will give you similar results. While these appliances won't necessarily do as good of a job creating the foam blanket that clings to combustibles compared with a low-expansion nozzle, each will provide an advantage over water alone.

Chief, it's your call. Direct or indirect attack; low-expansion, automatic, combination or smooth-bore nozzle—with Class A foam, it's all good.

If I use Class A foam, I'll eventually lose manpower.

Some departments fear Class A foam because it can help extinguish fire in half the time as water alone. The thought of some chiefs and firefighters is that jobs will be lost and less manpower will be required if fires are extinguished more quickly.



The fact is, while Class A foam does help extinguish fires more quickly and helps to prevent rekindles, it doesn't reduce manpower requirements on the fireground. The same number of firefighters is required on each hose line, on each engine and on each ladder. Moreover, the need for support operations remains the same — the big difference is that the fires go out more quickly and that overhaul operations are conducted more effectively.

While Class A foam does help extinguish fires more quickly and helps to prevent rekindles, it doesn't reduce manpower requirements on the fireground.

While I love fighting fires as much as the next guy, I don't relish the thought of sending crew after crew into stubborn fires that refuse to go out. Foam will never replace a single firefighter; it is simply a tool that helps us do our jobs more safely and effectively.

The majority of the fire departments in the United States now use Class A foam. In Canada and Europe the percentages are even higher. For the departments that have yet to convert their apparatus to be foam-capable, what are you waiting for? Specify your next piece of apparatus with direct-injection foam capabilities, or contact your dealer for a demonstration. Some systems can even be retro-fit into existing equipment, providing world-class upgrades in budget-conscious times. For those non-believers, what other initiative could your department consider that would have as significant an impact for your department? Think about it. ■

John Lund is a director for FoamPro and also a captain on a suburban fire department serving a population of 52,000.