National Foam®

Foam Lines

Cottrell Associates, Inc. September 2012

What's Quarter Life Got To Do With It?

By: Jim Cottrell

Like beer, the light ones loose their head fast. The stouter brews tend to stay around a while.

Water weight in a foam blanket is what holds flammable vapors down, not the bubbles in the foam. Some foams release water fairly fast. Class A foam, for instance, begins loosing its water pretty much as soon as it leaves the nozzle, since its mission is to wet, or soak any dry fuel it lands on.

In the case of AFFF such as found in an airport crash truck, it too looses its water fairly fast, because it's formulated to allow an aqueous film to continue spreading on a jet fuel spill from three to five minutes after initial foam application. The reservoir for the draining aqueous film is the foam blanket and needs to drain fairly fast.

The mechanism that controls drain time is largely a function of how much foam chemical (surfactant) is present in the finished foam and how well it is aerated. If you proportion 3% foam at 6%, you have doubled the foaming compound. If you want 3% AFFF foam to last twice as long, proportion it at 6% - 94 parts water and 6 parts foam concentrate. Same for class A foams. If you want long lasting exposure insulation, proportion Knockdown at 1% rather than 1/2%.

The term used to define firefighting foam drainage is *quarter life*. Firefighting foam's quarter life is the time it takes 25% of the foam's water weight to drain; much as beer or cola does after it's poured into a glass. The time it takes to drain 25% of foam's original liquid weight is the time at which the industry recommends you refresh your foam blanket. This is particularly critical when dealing with highly volatile, un-ignited spills, or recently extinguished gasoline fires which have pooled or soaked into the earth.

When it comes to long term vapor suppression at gasoline or ethanol spills, quarter life is a most important metric, for several reasons:

- The longer the quarter life, the less frequently you have to reapply.
- The longer the quarter life, the less water you need on scene.
- The longer the quarter life the less needs to be cleaned up after you're finished.

Use the following real-life jet fuel situation for quarter life examples:

Let's say you have regular 3% AFFF and its quarter life is four minutes, which is average for 3% airport AFFF. This means you apply foam every four minutes after the fire is out.

Say you have a 100 gpm eductor and it takes a minute to re-coat the spill. You will use three gallons of foam and 97 gallons of water, every four minutes. If you need to keep the spill secure for an hour, you will use about 45 gallons of 3% AFFF concentrate and 1445 gallons of water. If you're on a highway, with no hydrants, you'll

need three, 500 gallon rigs or a tanker on scene to make it happen; double the numbers for a more likely two hour event.

Let's say you have an E-15 gasoline spill and are using the same rig with the same eductor, but are using 3-6% AR-AFFF, which is indicated for gasoline/ethanol fuel fires or spills. You will need to proportion it at 6% if you want optimum performance.

Note: the sugar-like compound in alcohol resistant (AR-AFFF) slows down drain time. The more sugar, the longer the quarter life and the thicker the foam concentrate.

Average quarter life of 3/6 AR foam, proportioned at 6% is six minutes. The on-scene math for a two hour event reveals the following:

Twenty applications uses 120 gallons of 6% foam concentrate and 1880 gallons of water.

The numbers for a two hour event using a straight 3% AR-AFFF with six minute quarter life are:

Twenty applications, use 60 gallons of 3% AR foam concentrate and 1940 gallons of water. If you double the proportioning ratio to 6% you will still use 60 gallons of foam concentrate, but the amount of water needed is halved, because doubling the concentrate doubles quarter life and reduces applications to ten.This water saving tactic is only for use on un-ignited events, as the finished foam will be too rigid to flow freely on ignited fuel surfaces.

Using very thick, Universal Gold 1-3% AR-AFFF, quarter life at 3%, using fresh water is 25 minutes, and at 6% it's 50 minutes.

Using Universal Gold reduces applications from twenty - to five. Five applications uses 15 gallons of 3% Universal Gold, and 500 gallons of water. If proportioned at 6%, the same quantity of foam concentrate will be used, but only 250 gallons of water is needed.

Using Gold at 6% makes a lot of sense when it comes to remediation (clean up) expense and runoff impact, which is why our marketing literature recommends 1% for use on jet fuel spill fires, 3% on ethanol fires and 6% for long term, post fire or spill protection.

Do the replacement cost analysis. You will find using Universal Gold costs much less to replace, because you use two to three times less concentrate to do the same as a the best competitor's AR-AFFF.

Once the fire is extinguished, bump up your proportioning ratio to save water, and the environment.

Post fire and spill security is where it's happening for the highway firefighter. The longer the foam holds its water the easier it is on everyone, to include the budget officer.

Page three shows the how-to's of testing foam quarter life and how alcohol resistant it is - or isn't.

Jim

The author

Jim Cottrell has been a National Foam and TFT factory rep. / product development consultant since 1988.

For more, visit
www.cottrellassociates.com/Training.html

Using water and a lab. graduate, mark a 1000 ml. water bottle at 25, 100, 500 and 750 ml. Using a medication syringe or eyedropper, add 3 ml. of foam concentrate, then add water to the 100 ml. line You have now made a 3% solution. AFFF will disperse instantly. AR-AFFF will not, due to its sirup or gel-like alcohol resistant polymer. It will need to be swirled till 3 ml. of concentrate in the bottom has dissolved.

Note: If the eyedropper lifts AR-AFFF foam, so will a foam eductor. All National Foam products are UL listed for use with foam eductors.

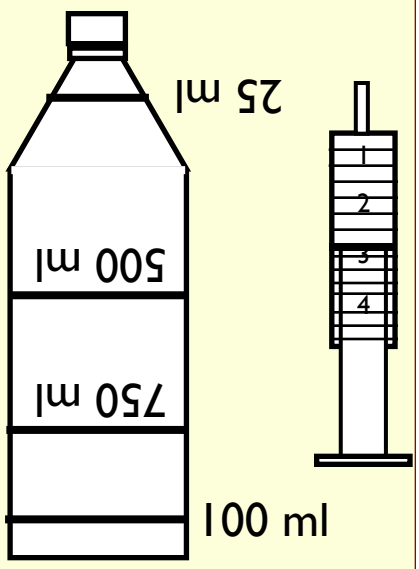
Once dissolved, shake the bottle vigorously for at least twenty seconds; turn the bottle on its cap and start the clock. Lightly tap the capped end on the table or desk and record the expansion ratio. If the foam sample has filled the bottle, you have achieved a 10:1 expansion ratio. Just about what a low expansion foam nozzle, or nozzle attachment will achieve. If it goes to 750, you are at 7.5:1 expansion and so on. Record the expansion ratio, water source and its temperature, as water temperature and its clarity may have an effect on the test result. Salt water may cut drain time by 40 - 50%.

When 25 ml. of liquid has accumulated at the capped end, stop the clock; the foam has reached its quarter life. At this point the foam has lost 25% of its vapor suppression ability, which means it's about time for reapplication. Airport foam (regular AFFF) will go in less than five minutes. Universal Gold should go 19-25 minutes @ 3% depending the water source and how accurately you measured the foam concentrate sample. At 6% it will go 45 to 50 minutes. The longer the better, as this quarter life business is what that determines foam replacement cost and how much waste needs to be cleaned up.

Let the sample continue to drain. When it's all drained you will still have foam in the bottle, which was almost useless minutes after you reach quarter life.

Re-shake the bottle for twenty seconds and put a dollop of finished foam on some acetone or denatured alcohol. If it disappears as fast as you apply it, it's not alcohol resistant.

More at combatsupportproducts.com



Test your foam and system: Take concentrate sample from your engine's foam tank and the water from its booster tank. Do the 3% bottle shake and record the time.

Run your foam system for twenty seconds, capture a solution sample from a hose coupling and put 100 ml. into another bottle, shake it and compare the two times. If the system sample is faster, it's lean. If it's slower, it's rich. You can be 1% rich, no lean.