

Oatman Fire Department

In the early 1990's, compressed air foam systems have been used in structural firefighting, with the promises of greater fire knockdown, less water used, lighter hose lines, and less water damage.

Water has several properties which make it a good extinguishing agent. Water excels at cooling because it has a high thermal inertia and latent heat of vaporization, which means it can absorb more heat mass than most other substances.

The chief limitation of water's ability to extinguish fires is its high surface tension. This is the force that causes water to bead up, form droplets, and roll off surfaces. Consequently, only 5 to 10% of the water used becomes involved in extinguishment. In addition, this surface tension makes it difficult for water to penetrate many fibers.

Class A foam addresses these limitations.

Plain water cools most effectively when the droplet size is in the range of 0.01 to 0.04 in., and the best results are obtained when the droplets are fairly uniform in size.

Class A foam addresses these limitations. However, Class A foam does have a few drawbacks. The concentrate is a hazardous material and should be treated as such. The corrosiveness is triple to that of common dish soap. It can be irritating to the eyes and upper respiratory tract. The foam also creates slip hazard beyond plain water.

Is there an alternative?

Yes - E.S.P.

The Oatman Fire Department has been testing a 1.5 inch inline E.S.P. Unit on CAF661. CAF661 is a 150gpm/60SCFM compressed air foam attack truck. The truck was placed in service in 1995 and has had over 400 hours of CAFS firefighting. In 1998, we supplemented its capabilities with an E.S.P. Module. Our initial results show that the E.S.P. Module is as effective as using Class A foam and enhances the suppression capabilities when used in conjunction with Class A foam or CAFS. The module was easy to retrofit and required very little maintenance or training for its use.

We have approximately 100 hours of use with the E.S.P. Module and it has been an extremely effective tool. The E.S.P. Module needed no maintenance during this period - our foam system was repaired twice!

Crib Fire 30 gpm	Time To Extinguish	Gallons Of Water Used	Time To Extinguish W/E.S.P.	Gallons Of Water Used W/E.S.P.
Water Only	51 sec	26	47 sec	21
0.5% Foam	35 sec	18	33 sec	17
CAFS@0.3%	12 sec	6	11 sec	6

3 Tire Fire	Time To Extinguish	Gallons Of Water Used	Time To Extinguish W/E.S.P.	Gallons Of Water Used W/E.S.P.
Water Only	2.7 min	135	2.2 min	105
0.5% Foam	1.7 min	88	1.6 min	80
CASF@0.3%	0.6 min	31	0.6 min	28

% Drain Times	W/O E.S.P.	W/E.S.P.
0.3%-10w/10a	15 min	18 min
0.3%-20w/10a	9 min	13 min
0.3%-20w/20a	12 min	15 min
0.3%-30w/20a	7 min	10 min
0.5%-10w/10a	17 min	19 min
0.5%-20w/10a	12 min	16 min
0.5%-20w/20a	21 min	29 min
0.5%-30w/20a	16 min	20 min

The data above is not theoretically calculated but actual field gathered. As the field data shows, the E.S.P. Module enhances the ability of water to suppress fires, penetrate fibers, and provide for a more stable and consistent bubble structure when used with Class A foam. In many instances, I have turned off my foam injector and used water with E.S.P. in situations where I would have normally used Foam. The results were comparable.

A further advantage of the E.S.P. module when used in conjunction with Class A foam is that it creates a light bubble structure with different water "types". We have found that we are consistently using 0.1 to 0.3% less foam concentrate in our regular fire suppression.

Vas Naiker
Operations Officer
Oatman Fire District