FOAM CONCENTRATES

THE USE AND BENEFIT OF USING CLASS A FOAM CONCENTRATE IN WATER

In an ideal situation, it would be possible to apply water like a shroud over a burning building and keep it there. It would be advantageous if water would penetrate a Class A material instead of beading up and running off. The water blanket would smother the fire by preventing air (oxygen) from being part of the combustion process and it would also cool the fuel to below its ignition temperature; combustion would cease. Unfortunately, the physical properties of water with its high surface tension and the effect of gravity make this ideal situation normally unobtainable. This is why the firefighter will typically use a considerable amount of water to gain extinguishment. In other words they tend to overwhelm the fire and beat it into submission. Just recently, a new foam concentrate was developed. By adding a small percentage of this new concentrate to water, it dramatically altered the physical properties of the water stream. Those property changes are:

- The surface tension of the water is lowered considerably giving it the ability to penetrate and soak into Class A fuels. The National Institute of Standards and Technology has estimated that water having been treated with a Class A Foam Concentrate can wet a Class A fuel up to 20 times faster than untreated water.
- The solution also has a foaming ability. The foam bubble will adhere to vertical or three dimensional surfaces longer than plain water.
- This allows the reduced surface tension water in the bubble a chance to soak into the Class A fuel. Plain water would fall off due to gravity.
- Foam causes water to be in a bubble form. A greater surface area is now available for more rapid heat absorption while decreasing run off.
- A plain water droplet, being solid, has a limited surface area available to absorb heat. In contrast, the foam droplet being hollow and with a greater surface area will turn to steam quicker and will absorb heat from the fire more rapidly. The benefit to the firefighter is faster extinguishment, less water usage and less heat stress.
- The National Institute of Standards and Technology states that water treated with a Class A foam concentrate makes the water 3 to 5 times more efficient at fire extinguishment than untreated water.

USES FOR CLASS A TREATED WATER

Water treated with Class A benefits firefighters tremendously during a fire.

Direct Attack: There is no need to change your current method of attack, flow rate or equipment during a fire fighting emergency. All that is required is to have the ability to inject the Class A foam concentrate into the water stream at the correct proportioning rate resulting in a noticeable decrease in extinguishment time. In many cases direct attack with an air-aspirating foam nozzle has been used. This nozzle gives a greater expansion to the discharging foam. Consequently, an increase in bubble size is experienced which in turn increases the surface area available to absorb heat.

Indirect Attack: This method of fire fighting calls for coating walls and roofs in front of the fire and allowing the fire to burn to the foam coated area. When the fire reaches the coated area, the Class A fuel has been soaked by the water draining from the foam and the flames are slowed by the foam mass. The soaking and the foam mass allow the fire to be controlled quickly.

Exposure Protection: It is often necessary to protect surrounding structures with valuable water streams to prevent those structures from becoming involved in fire. A blanket of Class A foam will help in exposure protection. This blanket works in the following manner:

- The foam is white and tends to reflect the radiant heat being generated by a fire away from the exposed structure.
- The foam blanket consists of a mass of bubbles which places a physical barrier on the exposed surface and acts as an insulating blanket.
- The water draining from the foam blanket soaks into the exposed Class A fuel and retards further combustion.

Mop-up/Overhaul: Water has a high surface tension and tends to bead up and cause run off. During the overhaul/mop-up process, large quantities of untreated water must

be used to ensure that complete extinquishment has been obtained. When water has been treated with a Class A foam concentrate, the surface tension is reduced and gives the water a greater affinity for Class A materials (carbon) and tends to emulsify resins in the wood, waxes and oils that allows the treated water to soak into the fuels far more rapidly. Class A foam concentrate allows a major reduction in the quantity of water used during the mop-up and overhaul.

PERCENTAGES FOR CLASS A FOAM CONCENTRATE

Typical percentage ranges for using a Class A foam concentrate with standard non air-aspirating or air-aspirating style nozzles are:

Direct Attack	0.04 - 0.06 percent
Exposure Prot.	0.05 - 1.0 percent
Indirect Attack	0.05 - 1.0 percent
Mop-up	0.02 - 0.04 percent

The best usage rates are obtained by training with the product to experience drain times, expansion and foam quality. The consistency of the generated foam can vary from a shaving cream or whipped cream to a predominately water solution with little or no mass. This variance is based on the amount of Class A foam concentrate being injected into the water supply and the type of discharge device. The foam will break down rapidly on a hot day as opposed to a cold day. It is imperative that training be carried out with the Class A foam concentrate so that different methods of attack can be experienced, i.e., aspirating verses a non-aspirating nozzle, drainage times, percentage ratios and the consistency of the foam being generated.

Water is the main extinguishment medium for a Class A fuel type fire; however, by adding a small amount of Class A foam concentrate to the water, it becomes 3 to 5 times more efficient.

TYPICAL SURFACE TENSION RATES

The following are typical room temperature surface tension rates in dynes/cm for water and water with a small percentage of Class A foam concentrate added at various percentages.

% Concentration	Surface Tension
Water only	72.00 dynes/cm
0.12%	23.5
0.33%	22.7
0.53%	22.6
1.00%	21.8
1.50%	21.9

USES OF CLASS A FOAM

Different uses for water treated with a Class A Foam concentrate are:

- Tire fires.
- Dumpster fires.
- Deep seated fires in landfills or hay.
- Large commercial properties which have a high fuel loading of Class A materials, coal bunkers, silo fires.
- Exposure protection.
- Short term fire breaks.
- General structure fire fighting.

If the fire area has been treated with a Class A foam, it can help prevent a flashover within the area. As the nozzle man advances into the fire area, he is to “paint” the ceiling and walls as he proceeds. The draining solution from the foam blanket will soak into any unburned or burned material retarding further combustion. During this process, notice that the majority of the water does not run off the walls or ceilings onto the floor.

ADVANTAGES OF CLASS A FOAM

- **Wetting characteristics:** The surfactants in the foam solution reduce the surface tension of the water draining from the foam blanket. This gives the solution/water the ability to spread and penetrate into Class A materials.
- **Cooling ability:** The increased surface area of the foam bubble over plain water droplets increases the ability to absorb heat dramatically.
- **Vapor suppression:** The foam blanket effectively covers and coats burned or partially burned fuels thereby trapping escaping vapors.

- The result is a rapid reduction of smoke being generated in the fire area. Chance of reignition is also reduced.
- **Radiant heat reflection:** The white color of foam when used in an “indirect” attack or for exposure protection reflects any radiant heat thereby keeping non-fire involved fuels cooler.
- **Insulation characteristics:** Generated foam is essentially entrapped air bubbles which keeps fuels cool by insulation.
- **Clinging characteristics:** Generated foam holds water on vertical or three dimensional surfaces which gives time for the water to penetrate into any Class A fuels.
- **Durability:** Depending on the type of discharge device and environmental conditions, the generated foam can last for a substantial length of time.
- **Degreasing ability:** The surfactants in the foam give the draining water/solution the ability to emulsify oily substances such as grease, wax on tree leaves, paints or other barriers, thus allowing penetration into the Class A fuels by the water.
- **Biodegradable:** Generated foam is biodegradable and does not harm the environment.
- **High visibility:** It is very easy to determine where foam has been applied.
- **Water saving ability:** Class A foam solution has been documented as being from 3 to 5 times more effective as a Class A fire suppression agent than plain water (the National Institute of Standards and Technology.)
- Due to this increased effectiveness, less water is used. This attribute greatly reduces the amount of water damage to a structure or property.
- **Inexpensive:** Due to very low mixing ratios.
- **Firefighter’s physical stress:** The fire is extinguished sooner and the overhaul is completed earlier which significantly reduces the physical stress on the firefighter and results in more efficiency.
- **Water damage:** After a typical structure fire, documentation states that 70% - 80% of the insurance payout is for water damage. The balance of the damage is the result of fire. By reducing the amount of water used to extinguish a fire, it can be assumed that water damage should be reduced resulting in increased economies.

PRECAUTIONS WHEN HANDLING CLASS A CONCENTRATE

- Gloves and eye protection should be worn. If the concentrate comes in contact with the eyes, flush with copious quantities of fresh water.
- If long term contact with the skin is experienced, a drying of the skin will be noticed (similar to dermatitis.) Use a good quality hand cream and replenish the moisture in the skin.

NOTE: In the above, no mention has been made of Compressed Air Foam Systems (CAFS.) All applications of foam described in the above are based on normal application techniques using standard water fog or air-aspirating foam nozzles.