



BULLETIN #1015-1

TECHNICAL BULLETIN

What Firefighters Should Know About Wildfires and Foam

DESCRIPTION:

SOLBERG® FIRE-BRAKE™ is a synthetic foam concentrate designed for Class A fires. When proportioned with water and applied with conventional firefighting equipment, FIRE-BRAKE is an outstanding Class A extinguishing agent. This Class A foam provides optimum penetrating and wetting qualities on combustibles such as wood, tires, and paper. FIRE-BRAKE is an effective water management tool and can be utilized in both structural and wild-land fire applications.

WILD-LAND FIRES AND FOAM:

A better firefighting tool for wild-land fire control is foam. Many people have talked about it, but few can explain it. In this bulletin we will attempt to explain the nuances about using Class A foam using simple terms.

What is meant by the word foam? Foam is actually hollow spheres of water or bubbles. When water is mixed with air, a foam results, however it is not stable and collapses quickly. By using FIRE-BRAKE Class A foam concentrate, it is possible to stabilize bubbles. A foam concentrate will reduce the surface tension of water, allowing the bubbles to form more readily. A good foaming agent, such as FIRE-BRAKE foam concentrate will produce small uniform bubbles. This kind of foam is much more stable than the larger bubbles produced by dish soap type foam concentrates. The small uniform bubbles make a more

rigid foam which has better resistance to heat from a fire or even the sun. The end result is a foam that will last longer.

By taking a closer look we are able to make some basic calculations on the composition of foam. We know that when foam is produced, it results in 8 to 12 times the original volume of water (i.e. one gallon of water turns into 8 to 12 gallons of foam). If we assume an average expansion of ten (half way between 8 and 12) and the foam concentrate is used at a level of 1%, we can state that the foam consists of 90% air, 9.9% water and 0.1% foam concentrate.

HOW FOAM WORKS:

Foam works like a blanket, excluding oxygen and smothering the fire, therefore, disrupting the fire triangle (heat, fuel, oxygen). These characteristics make foam useful for both Class A fuels (common in wild-lands) and Class B fuels (associated with forestry equipment).



SOLBERG is a member of PERIMETER SOLUTIONS, a global producer of leading fire retardant, gel and foam brands with a singular purpose: revolutionize the course of fire suppression technology with safer, more effective and more sustainable solutions. Together, we are Moving Industries Forward by Redefining Fire Suppression. www.solbergfoam.com

SO WHY USE FOAM?

Foam provides superior fire performance for a number of reasons:

- Foam expands your water
- Foam clings to fuels
- Foam acts like a thermal barrier
- Foam can smother a fire (i.e. blanket)
- Foam holds water
- Foam slowly releases water
- Released water has excellent wetting characteristics
- Foam is highly visible (white in color, easily seen)
- Foam can be used through virtually any water delivery system (i.e. mobile, fixed)
- Foam is environmentally safe

Foam also has a cooling effect on the fire. It absorbs heat in two ways; as an insulating material and through the evaporation of water.

FOAM – AN INSULATING MATERIAL?

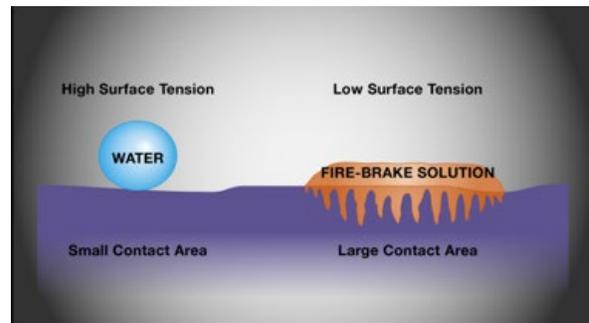
As we stated earlier, foam is 90% air bubbles. This is similar to an insulating foam; therefore, it is capable of absorbing heat from an oncoming fire keeping the fuel cooler.

Foam can also cool through the fire through evaporation. As the foam collapses, water is released. The temperature of the water will rise (absorbing heat) and eventually turn into steam. This is the normal theory of using water on a fire: cooling the fire by removing its energy.

Foam releases its water in two ways. The first method is through heat. When the air in the bubbles heats up it expands, breaking the bubble and releasing its water. The second method of releasing water is due to the effects of gravity. As the foam sits, the bubble wall will no longer be of equal thickness. The water will tend to favor the bottom of the bubble because of gravity. Eventually the bubble will become unstable, releasing its water.

The water released by the foam contains a wetting agent which allows it to penetrate deeper than normal water.

By penetrating the fuel deeper, it can increase the water content quickly, therefore, reducing its ability to burn. The “wet water” characteristic is also highly desirable for peat and dense fuel fires.



Note: cooling and penetrating capability of FIRE-BRAKE solution

Since the foam is slowly releasing its water, it is acting like a water reservoir. This along with the foam’s ability to cling to trees, allow the user to control the water. The foam will stick where it is placed, while water will run off and form puddles.

When you think of foam, the first image that comes to mind is something that is white, light and fluffy. So how could anything of this description be dropped from an aircraft and penetrate a tree canopy? Well quite simply, it does. When dropped from normal operational heights, the foam is capable of coating trees (inc. bushes and brush) and reaching the ground. Relatively speaking, more foam stays in the canopy than would normal water, however, the foam is not trapped in the canopy. The foam will still slowly drain, releasing water. This water will “rain” down from the canopy and increase the relative humidity of the immediate area. The moisture in the air will absorb heat and evaporate, cooling the fire. By increasing the moisture in both the air and the fuel, it is possible to reduce the spread rate of fire. The deep penetration of the “wet water” from the foam can keep the fuel wet enough to potentially prevent the fire from further advancing.

An interesting advantage to the foam is its color. The white foam is highly visible to pilots of rotary and fixed wing aircraft. Since the foam is easy to see, it will greatly assist the water bombing operations to construct a continuous fire break. As a result, there will be less chance of “weak point” in the fire breaks/lines.





HOW MUCH DO YOU ADD?

The recommended application rates for FIRE-BRAKE foam concentrates on wild-land fires is shown in Table 1. The minimum admixture rate on other Class A fuel types is 0.1%.

SOLBERG FIRE-BRAKE Class A foam concentrate can also be an effective agent when used by ground crews. Foam that is applied through hose lines has all the same physical properties as that of aircraft application.

When using foam in mobile equipment such as brush trucks and fire tankers, it is not necessary to have any discharge specialized equipment. A foam branch pipe produces good foam but limits throw or distance. Use standard wild-land or fog type nozzles to maximize the reach of stream. Most foaming will occur when the water stream hits the ground or fuels.

To gain the advantage of foam you only need to put foam concentrate into your water tank. Alternatively, low cost around-the-pump proportioners are available to educt the foam concentrate into the water stream, which reduces wasting foam concentrate.

FIRE-BRAKE foam concentrate can be proportioned using most proportioning equipment:

- Balanced pressure pump systems
- Bladder tanks systems
- Compressed air foam systems
- Eductors (with metering orifice)

ENVIRONMENTAL:

A final, yet important, benefit of SOLBERG FIRE-BRAKE Class A foam concentrate is its safety. Many years of time and effort have been placed in developing a foam concentrate which would be safe for people and the environment. FIRE-BRAKE is fully biodegradable. When used and disposed of properly, aquatic life is not adversely affected by this product.

APPROVALS & LISTING:

FIRE-BRAKE Class A foam concentrate is Qualified Products Listed (QPL) by the U.S. Forest Service in accordance with Fire Service Specification 5100-307a.

CONCLUSION:

SOLBERG FIRE-BRAKE Class A foam concentrate is a synthetic firefighting foam concentrate specially designed to be used for wild-land and other Class A fuel fires including structure fires. FIRE-BRAKE Class A foam concentrate has the ability to reduce the surface tension of water, which substantially increases water's overall wetting capability by tenfold. This creates a faster penetration and greater fire control when attacking combustible Class A fuels.

FIRE-BRAKE Class A foam concentrate can be proportioned at the rate of 0.1% - 1.0% in fresh, sea and brackish water.

APPENDIX:

Noted below are some definitions for the foam terminology included in this technical bulletin.

Class A: fire in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics.

Expansion Ratio: The ratio of volume of foam to the volume of foam solution used to generate the foam.

Foam: A stable aggregation of small bubbles of lower density than oil or water that exhibits a tenacity for covering horizontal surfaces.

Foam Concentrate: A concentrated liquid foaming agent as received from the manufacturer, typically packaged in 5 gallon pails, 55 gallon drums or 265 gallon totes.

Foam Solution: A homogeneous mixture of water and foam concentrate in the correct proportions.

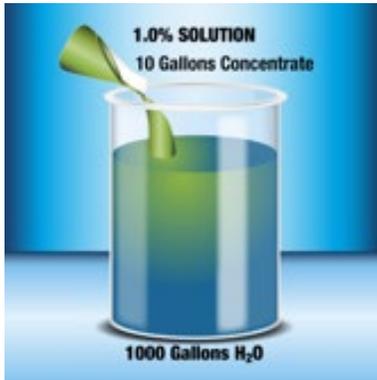
Proportioning: The continuous introduction of foam concentrate at the recommended ratio into the water stream to form foam solution.

Surface Tension: Tension within an interface between a liquid and air.

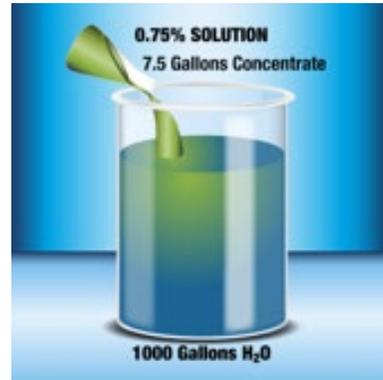
Source: NFPA, Solberg Foam Systems Design and Applications Manual

TABLE 1.

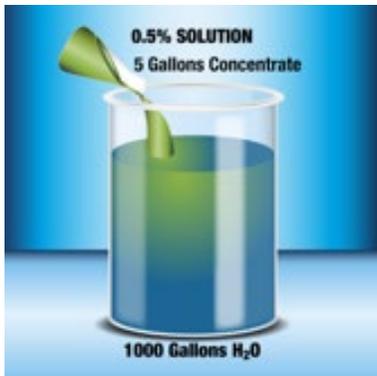
Recommended application rates FIRE-BRAKE Class A foam concentrate on wild-land fires:



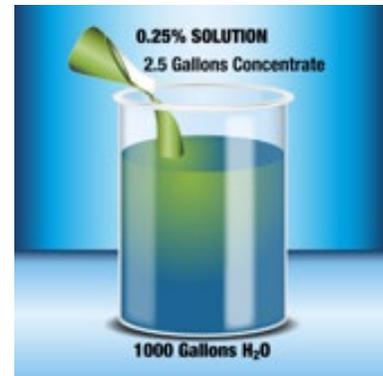
Property Protection: 1.0%
Adheres and insulates vertical surfaces



Fire Brake / Burn Back: 0.75%
Good for initial suppression or forming a barrier



Initial Suppression: 0.5%
Penetrates tree canopies, draining to forest floor layers



Mop-up: 0.25%
Suited for mop-up, quickly penetrates forest floor layers