

# Barricade® Fire Blocking Gel

## Field Guide

This guide contains common themes for the various scenarios encountered while in the field. Presently, Barricade recommends the use of any of the common “end-of-the-line” eductor/nozzle systems designed for use with liquid fire gel concentrates. The advantages of these application systems such as those manufactured by Akron Brass, POK or Barricade Inc. include the fact that they can be used in all ground applications and these systems are quickly deployable and offer precise metering. Barricade requires no proprietary equipment for mixing or application.

No deviation from routine cleaning of apparatus or fittings is required. This guide also provides directions for batch mixing practices.

**IMPORTANT !-** Barricade contains no NPEs (nonylphenol ethoxylates) and poses no threat to the environment or firefighter health and safety. The containers are recyclable.

### Hand Crews



For hand crews, we recommend our Structure Pretreatment Kit. Use a progressive hose lay with 1½ inch trunk line, break off the laterals using wyes or tees. To maintain maximum reach, use 1 inch NPSH line with a 1 inch NPSH X ¾ GHT reducer at the eductor/nozzle. Use ¾ mop-up hose around the structure for vertical surfaces or brush. Use a Mark III or similar pump with a portable tank or a suitable water source to provide a minimum of 30 psi water pressure. The Structure Pretreatment Kit can also be used with municipal water sources if such resources should exist.

Leave the lines in place, if possible, to support sprinkler kit installations. These lines can also be used to rehydrate the gel; use a standard mop up wand with water for this purpose. Under most conditions, a properly applied coating of gel should remain effective for 6 to 8 hours. The gel coating may be rehydrated with a light misting spray of water to extend its effectiveness for longer periods of time.

For crews supported by engines, a 90psi working pressure is optimal for supporting hose lays. A good way to be able to move from mission to mission while remaining mobile and supplying crews hose is to use the hard-line from the reel with a forester nozzle as a gated wye by removing the tips and attaching  $\frac{3}{4}$  hose.

The Structure Pretreatment Kit can be used as needed, any unused portions can be staged at various locations for reapplication of the product. Encourage crews to treat hazards, such as vehicles, firewood/brush piles, propane tanks (until they can be safely removed), and all other fuels that may reduce threats to safety or valued property as time permits. Crews should coat surfaces with enough Barricade to make the surface appear white or approximately  $\frac{1}{8}$  to  $\frac{1}{4}$  inch thick. The gel can be cleaned off of structures with a pressurized water stream. In some cases where the gel may have dried, a pressure washer can be used.

## Engines

For most engine company gel deployment scenarios, it is recommended that engines use the 5-gallon Barricade container and the backpack along with the eductor/nozzle. This method of gel application is generally preferable over batch mixing methods. The back pack system is the most efficient and cost-effective way to protect a structure or coat fuels, which validates the carrying of the pack. The back pack system allows the gel to be applied easily, quickly and with a minimum of clean-up effort. Most of the commercially available gel eductor/nozzles that have been designed to be used with the backpacks have a convenient flush mode for cleaning.

When working around structures, always leave 100 gallons of water in the tank, and position the engine in the direction of egress. When extremely receptive ladder fuels pose a problem for beginning line construction, a mixture that exhibits slight adhesion characteristics may be beneficial for knockdown. In this case, engine batch mixing may prove effective; this may be done with any available equipment with drafting capabilities.

On a typical wildland engine or heavy equipment with water, such as a skidgine or pumpercat, open the tank-to-pump valve and the tank-fill valve, prime, and start the pump. The water is now circulating. Next, slowly add 1 gallon of Barricade concentrate per 100 gallons of water into the tank. When using a Forrester nozzle with gel, it is important to only use the straight stream. If a fog application is required, use adjustable gallonage nozzles. Increase the throttle on the pump for appropriate pressure.

Engine crews will encounter many common fire scene challenges where gel capabilities will provide new and more effective mitigation options. As an example, burning snags can be effectively treated with a small amount of gel solution (when

compared with the amount of plain water that would be required to fully extinguish this snag). Simply gelling a snag may prevent it from falling later and rolling down the hillside causing increased fire spread.

One of the highest and best uses for Barricade gel may be for the protection of personnel and apparatus in potential burn-over situations. When faced with such an emergency, relatively small amounts of Barricade gel solution can be quickly deployed and crew protection can be significantly enhanced using systems designed for booster hose reels and one gallon containers of gel concentrate.

Likewise, gel can be considered for use in pre-treating and protecting vehicles from becoming involved in fire or gel can also be used by crews to extinguish vehicle fires more quickly and more safely while significantly reducing the amount of water required to mitigate these incidents.

**SAFETY TIP!** Always use extreme caution when working around mixed Barricade product, it is *very* slippery. When working around roadways, always leave lights on for safety.

Barricade gel is an invaluable tool for fire prevention officers who work with light slip-on units, or Type 7s. Use the 1-gallon jug with eductor/nozzle when “soaking and circling”, or in mop-up to enhance firefighter and water effectiveness.

After use, flush the tank, hoses and nozzles with sufficient amounts of plain water to remove all traces of gel residue. The diluted solution from the tank rinsing should be used for standard mop-up operations if they are underway.

With product familiarity and practice, you will find many ways to accomplish more with less effort. Structure task forces and divisions often have personnel who have received formal gel training. One may be surprised to find personnel on incident who are gel trained, and can provide assistance to others.

## **Water Tenders and Tactical Water Tenders**

For water tenders with a monitor or deck gun, replace the stackable tips, or adjustable GPM nozzles, with the gel eductor/nozzle and use the 5-gallon Barricade container. Affix the container in a secure manner for travel (using p-cord is NOT recommended)

Wet-line operations can be enhanced with the use of gel when compared with plain water or class A foams. Flow rates and pressure control may be achieved by varying the speed of the pump as in any pump and roll operation. Be sure to coat the receptive fuels above grade as well as the duff below the ground to prevent “skunking” during wet line or burn out operations. Make multiple passes as necessary to thoroughly coat fuels or to protect road signs and fence posts.

Occasionally it becomes necessary to batch mix Barricade in a water tender for delivery as mixed product. Barricade has contractors who specialize in batch mixing procedures and vendor provided field representatives to assist in these operations. When batch mixing without these resources becomes necessary, remember the following key points:

**IMPORTANT:** The viscosity obtained as Barricade is added to water is NOT a straight-line gradual progression. The graph below shows the region where rapid change in viscosity occurs as Barricade is added.

**CPS**

1,000

800

600

400

200

0.5%      0.6%      0.7%      0.8%      **% Gel in Water**

**Important!! – Never attempt to “thin” Barricade® II concentrate by adding water!!!**

Plan your operation! Fill the tender with the amount of water for gallons of finished product you desire. Connect a suction hose from the tank supply outlet to the suction end of the draft pump; tenders that fill from the top work best! Allow the water to circulate, then add the Barricade into the stream mixing the product in the tank. 1 gallon gel:100 gallons water will make the desired 1% solution. For solutions over 1%, Barricade recommends ordering a contractor provided mobile gel base.

In the field, modified marsh funnels and viscosity cups are often recommended as aids in determining proper gel solution mix ratios. While these items are always available through Barricade authorized contractors, here is a helpful hint to remember when evaluating proper gel consistencies. Simply think “Milk, Honey or Mayonnaise”! A finished gel consistency of Milk would be desirable for batch mixing and open-top tank operations. Honey describes the desired gel consistency for clinging and “wrapping” various vegetative fuel models and Mayonnaise is the consistency that a firefighter desires during structure protection missions.

If operations require filling of a portable tank with finished product from a tender, circulate the tank with a Mark III or similar pump. Connect the suction end of the pump to the fitting at the bottom of tank and discharge into the top opening. Use the circulation pump to fill engines or other water handling equipment. Thoroughly flush all tanks and pumps with water after use, if mop-up operations are underway, use the diluted solution from the tank rinsing for mop-up. Diluted product from rinsing the tanks may also be considered for dust abatement while road watering.

## **Rotor Wing**

Mixing for Helicopter operations is best achieved using a Type 1 Mobile Gel Base. The rigid helicopter dip tank supports a range of operations including filling SEATs. Barricade® can be ordered F.O.B. Origin on a BPA through NIFC to keep up with demand. A typical operation involves vendor equipment procured through EERA or I-BPA. An agency provided portable tank could be used if the opening was deemed large enough to support the bucket. A portable pump should be plumbed into the tank, attach a suction hose to the bottom fitting of the tank. Make sure that the hose is long enough to reach above the height of the tank. Attach a large in-line eductor to the discharge side of the pump, and secure the discharge hose so that it flows back into the top of the tank. (Large inline eductors are available at most tanker bases.) Fill the tank with a known quantity of water and decide on the objective for direct attack. In most fuel types, a 1% solution is best, for example, in a 1000 gallon tank, 10 gallons of concentrate would be added. Place only the concentrate needed for the amount of water to be used. Start the pump, place the hose from the eductor into concentrate and allow it to mix. **DO NOT SHUT DOWN** the pump. Allow the pump to continue to circulate the solution after mixing. If a test kit is available, a Marsh Funnel time of 19-23 seconds with a viscosity of 750-1300 cPs are desired.

When protecting valued resources, such as log decks and parked heavy equipment, a 2% solution may be desirable. (Think “Honey”) A thicker solution will decrease problems associated with drift. This thicker solution will adhere more thickly to these objects, providing for increased thermal protective qualities.

Stay in communication with ground personnel and check to see if coverage levels are meeting objectives. Adjust the mix ratio proportions based on the field test kit, water quality, and input from field observers.

Wash down typically involves contractor supplied self supporting tank filled with plain water. Experience shows that simply dipping and dumping the bucket just a few times is adequate to remove any residue of the gel. A spill containment pad is always placed under the tanks and all spills should be reported to U.S. Forest Service, Wildland Fire

Chemicals Program at (406) 329-3900 within 24 hours of the spill. Remember that Gel concentrate and mixed solution is slippery and proper precaution should be taken when working around aircraft.

## **Fixed Wing SEATS**

Most SEAT Support Trailers already have a system for education of foam concentrate from a foam concentrate tank into the water stream through the circulation pump. With minor modifications, these systems can also work well with Barricade gel. The addition of an adjustable control/metering valve between the concentrate tank/container and the point of education will enable the SEAT Support Team to vary the rate of education of the gel concentrate. Circulation through the pump and discharging back into the tank increases the mixing/shearing action and results in homogeneous, consistently mixed gel solutions. For the desired consistency for SEAT operations, use 1 to 1 ½ percent mix ratios or more simply, think “Milk.”

**Important!! – Never attempt to “thin” Barricade II concentrate by adding water!!!**  
**Never allow water to enter the concentrate container. You will have a significant mess to clean up in addition to wasting the Barricade concentrate.**

There are common variable factors that may affect the viscosity of the mixed gel solutions. These factors include temperature, water quality, and the amount and quality of shearing/mixing energy imparted. As an example, if your water is being supplied from different sources, you may find different mixed gel solution viscosities, even though the amount of concentrate used remains the same. Similarly, you may find that solutions that are mixed for longer periods of time or at different pump speeds (shearing/mixing energy) result in a different viscosity than an identical solution mixed for a shorter period of time.

Gel test kits are available to assist in analyzing proper mix ratios ranges in the field. However, it is important to understand that this testing equipment is relatively primitive and is to be used only as a general guide to determine that the mixed solution falls within a desired range. These measurement devices such as the Marsh Funnel or viscosity cups are known to produce “consistently inconsistent” findings due to the non-Newtonian fluid characteristics of mixed gel solutions. Experience with gel operations and accurate results-based feedback and observations from the field should always among be the most important factors when determining proper mix ratios.

## **Fixed Wing VLAT**

Very large airtankers can play an important role in direct attack as fighting fire in beetle killed forests becomes an inevitable reality. Erratic fire behavior imposes a change on the safe positioning of resources; valued resources and infrastructure can be threatened even if separated by multiple drainages. Barricade can be mixed and loaded at any fixed tanker base using the same equipment commonly available for liquid concentrate long-term retardants. The same procedures used for flushing tanks and pumps from retardant exposure should be used for gel. Be careful not to mix retardants with gel, the two neutralize each other.

Note: Barricade is not currently approved by the USFS for airtankers, and VLATS are not currently approved for USFS use.

Full operational procedures are available from Barricade International Inc.  
[www.firegel.com](http://www.firegel.com)