USE OF CHEMICAL FIRE RETARDANT

at

WIND CAVE NATIONAL PARK

Deane Shilts, March 1975
Revised October 1977

We have worked with "Fire-Trol 936"[1,3] fire retardant at Wind Cave National Park since 1973. Primarily, the retardant was used in preparation of control lines for prescribed management fires in grassland. We also used it when burning firebreaks and small research plots and in suppression of a going fire. For the going fire, we constructed a control line (to backfire from) with retardant through grassland and middle-aged to mature ponderosa pine.

"Fire-Trol 936" is a liquid concentrate of ammonium polyphosphate, a corrosion inhibitor, a wetting agent, and a coloring agent. It is usually applied by a ground tanker equipped with a blender and pump. The concentrate is drawn from a tank, blended with water from another tank and discharged through a fog nozzle at 150-170 pounds pressure. We found the fog sometimes only wet the tops and sides of fuel plants. To get higher pressure and obtain a better "boiling action" for greater fuel coverage, we purchased a "John Bean"[2,3] model 6-25 MTB commercial type sprayer which is skid mounted, has abrasive resistant packing in the pump, and a stainless steel 300-gallon tank and agitator. It is equipped with two live reels, each with 150 feet of ½ inch I. D. hose, and "Bean Spraymaster" nozzles.

The concentrate is dumped into the spray unit tank from 5-gallon plastic "Jerry Cans," and the tank is then filled with water. Once mixed by the agitator the concentrate does not settle out of the water. A disadvantage to this method is that the strength of the mixture can only be changed by the addition of more concentrate or more water to the tank. With the blender method, the strength can be changed at any time by turning a dial.

Before equipment is purchased for use of retardant, chemical and pump manufacturers should be consulted to make sure the chemical is compatible with the machinery.

To construct control lines in grassland, we drive the truck at 4 to 6 mph, depending upon terrain, with two nozzlemen riding on the back. They lay down two strips of mixture about 6 to 8 feet apart, with nozzles at 3/4 fog and 450 to 500 pounds pressure. One or two men with drip torches follow the truck and fire the area betwen the retardant strips to create a solid black line. We can create a mile of control line in 30 minutes using 75 to 100 gallons of mixture. We also have a spray bar mounted on the front of the truck that has four fan nozzles. This unit is capable of laying down an eight foot line at 450 psi for 19 minutes. It has proven effective in suppression of grassland fires as well as laying down an effective retardant line to fire from immediately before igniting a prescribed burn.

A 1,000-gallon, 6x6 nurse tanker is dispatched with the retardant unit. The nurse tanker is equipped with side racks to carry 12 additional "Jerry Cans" of retardant and a Pacific Marine Pump so that refilling of the retardant unit can be accomplished at most any point on the fire line.

We used mixtures as light as 11 to 1 for grass under conditions of 0-15 mph wind, 30° to 50° temperature, and 30% to 50% relative humidity. A 6 to 1 mixture was used on the going fire to lay a solid 4-foot line for backfiring. This backfire was ignited under conditions of gusting, 25 mph winds, 82° temperature and 12% relative humidity. The line held except for one spot with very heavy duff.

Price of retardant for our last purchase was $2.40 a gallon. Cost savings realized from reduced time of line construction should be considered in cost-planning for use of this material.

Guidelines for use of retardant at Wind Cave:

1. Principles governing fire line construction with retardant are similar to those for construction of line by any other method. Retardant mixture strengths and width of the line depend upon temperature, humidity, wind, fuel moisture, type of fuel, and slope. Experience is the best teacher, but a rule of thumb is to construct a control line 1½ times the height of the flash fuels (on level terrain - varies with slope and winds).

2. A steady, even application of mixture is best. DO NOT rotate the nozzle during application because this creates gaps the fire can burn through. Use a fog pattern (the only exception would be use of a high pressure stream to cut through duff to mineral soil or to knock down a hot fire before moving in with fog).

3. The mixture should be applied from above at a slight angle to cover all fuel from top to ground. Cover trees and brush outside but next to the line to prevent fire ladders.

4. As in all fire lines, avoid square corners. If a sharp bend must be made in the line, double or triple the width at that point.

5. Keep the pumper tanks as full as possible while constructing a line. Emergencies do occur (we learned the hard way).

6. When firing a prescribed burn, fire away from the control line against the wind first. Once fuel has burned away from the line, 360° firing can take place.

7. Equipment should be cleaned after each use. All pumps must be flushed with clean water, all fittings must be properly lubricated.

8. Take advantage of every opportunity to gain experience in use of retardant and apply it to the park's program.

1. Product of Chemonics Industries
   P. O. Drawer 21568
   Phoenix, Arizona 85036

2. Product of FMC Corporation
   Agricultural Machinery Division
   Jonesboro, Arkansas 72401

3. Reference to trade names does not imply government endorsement of commercial products.