FIRE CONTROL NOTES

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FIRE CONTROL NOTES

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DeHaviland Beaver Succeeds As Land-Based Air-Tanker

R. W. Johansen and H. K. Mikell

In 1968 the Florida Division of Forestry outfitted a single-engine, land-based DeHaviland Beaver with a 300-gallon-capacity, interior-mounted tank for dropping ammonium phosphate solutions on wildfires in Florida. The DeHaviland Beaver aircraft has been used as a float-plane water tanker for years in Canada with the drop tanks incorporated in the floats.

Modification Made

Before the plane could fly the following structural modifications were made to the aircraft to make room for the tank opening and to compensate for load and additional stresses:

1. Removal of the center fuel tank.
2. Rerouting of the fuel and electrical systems.
3. Removal of the skin and stringers on the underside of the fuselage for an opening 22 inches long and 31 inches wide below the position of the removed fuel tank.
4. Stressing the skin of the aircraft by use of double plate and external stringers to retain the originally designed strength.
5. Replacing the wing-lift struts with C2W115-1 and C2W115-2 struts as per DeHaviland Service Bulletin 2/3 dated 12/30/67. Special release gates that provided an opening of 550 square inches were designed for the tank bottom.

Most of the materials used in the construction of the tank itself were Federal excess property items, and accurate cost records are not available. Approximately 20 man days' labor were involved. Florida's second Beaver was converted into a tanker the summer of 1971.

Plastic Cup Tests Conducted

Calibration tests were conducted, with the use of Southern Forest Fire Laboratory equipment, to ascertain the distribution pattern of liquids dropped from this tanker at altitudes of 75 to 100 feet. A grid system of ½-gallon plastic cups was laid out on the ground, and drops were made immediately above the grid. Water was used as the drop material since it closely approximated the drop characteristics of the ammonium phosphate solutions to be used in Florida.

During the drop period the relative humidity ranged between 33 and 60 percent, and a crosswind ranging between 8

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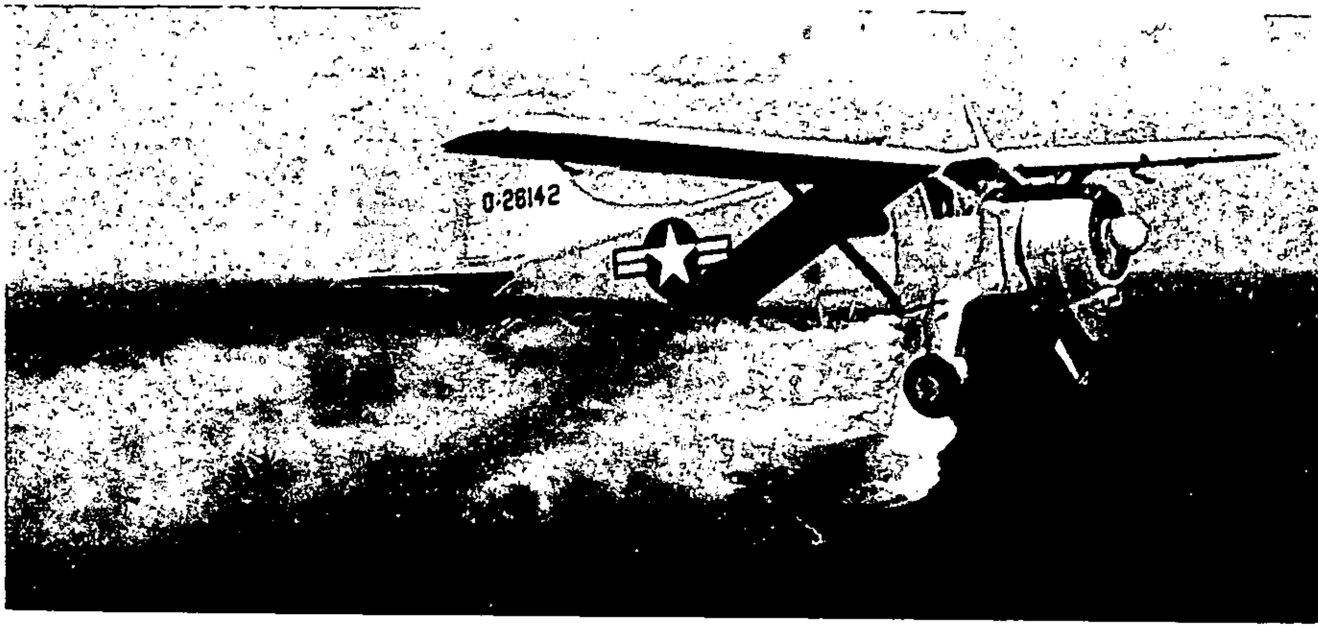


Pilot reports on the Beaver's performance are enthusiastic . . .

and 13 miles per hour persisted at the drop zone. The air tanker altitude at the time of load release was about 75 feet.

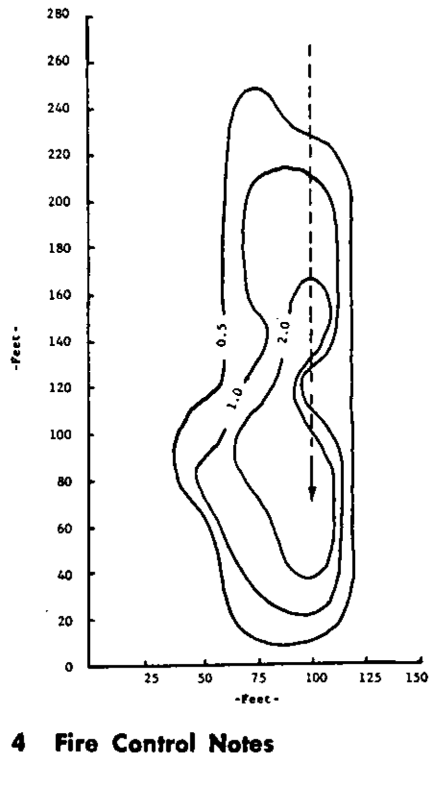
DeHaviland Drops Compare Well

The amount of liquid caught in each cup was weighed on a balance, converted to terms of gallons per 100 square feet, and recorded on a sheet representing the drop zone. All of the drops were comparable to the one shown.

While liquid was found to spread over a distance of at least 350 feet in the drop grid, some of the area covered was in amounts too little to be considered effective. The lightest effective application rate in our lighter fuels in the Southeastern States is ½ gallon per 100 square feet. In heavier fuels at least 1 gallon is needed. Drop lengths in terms of these two minimum application rates ranged from 240 to 300 feet at the ½-gallon minimum and 200 to 280 feet at the 1-gallon rate (table). Drop width at the ½-gallon minimum ranged from 50 to 60 feet and only slightly less at 1 gallon. Over 80 percent of the material leaving the aircraft was accounted for in the cups in four of the five drops. In one drop only, 70 percent of the material was accountable.

The DeHaviland Beaver drops had good conformation and could be compared favorably with drops of comparable volumes from other aircraft, such as TBM's.

DeHaviland Beaver tanker drop pattern (No. 4) with lines and numbers showing minimum application rates in gallons per 100 square feet. Arrow indicates flight direction.



Tankers Were Successful

Florida's 1969 fire season was the best in a decade; consequently, only 16 drops on 7 fires were made. Only one drop, made directly into a hot head fire in heavy fuel, was unsuccessful. The winter of 1970-71 proved to be a disastrous fire year in Florida. The Beaver tanker made 64 drops during the fire year, all of which were considered successful.

A small wildfire in heavy fuel north of Naples, Fla., was contained by the use of the Beaver alone until ground equipment could reach the area for mopup. If this fire had escaped, the Corkscrew Wildlife Sanctuary with its unique flora and fauna would have suffered immeasurable damage.

Pilot reports on the Beaver's performance are enthusiastic but are something less than this with regard to speed and comfort. A pilot should have agricultural spraying experience, at least 500 hours at low altitudes with heavy loads, prior to operating a Beaver tanker. Δ

Drop pattern, Florida Forest Service, 300-gallon DeHaviland Beaver Tanker

Drop Number	Load Size	Pattern Length Exceeding ½ gal./100 ft.[1]	Pattern Length Exceeding 1 gal./100 ft.[1]
	Gallons	Feet	Feet
1	250	240	240
2	250	260	240
3	250	260	220
4	300	240	200
5	300	300	280

Fire Simulator Room Supplements Classroom Teaching

Hershel C. Reeves and Don A. Clymer

Recognizing the growing role of simulators in the training of fire control personnel, Stephen F. Austin State University installed fire simulation equipment in its forestry building. Although designed primarily to familiarize forest managers with this specialized training aid, it shows promise as a supplement to classroom teaching.

The installation includes a portable Scott "Dynamic Situation Simulator" built to Forest Service, USDA specifications but with a specially designed sound system; an educational communication system with trainee positions; an Osborne Fire Finder; a dispatcher's wall map; and supplemental devices.

Simulator 'Opens Eyes'

Fire simulators have been used by protection agencies almost exclusively in training for the correction of specific problems among experienced fire control personnel. At Stephen F. Austin State University, however, the simulator is used to reinforce and supplement classroom courses on fire control. Exercises are relatively simple and emphasize fire size-up, initial attack, coordination of equipment and manpower, setting priorities, and dealing with emerging problems. The simulator is operated by faculty and students who prepare and present the exercises for students in the fire class each semester. The fire simulator gives the students a chance to gain an insight into the complexities of fire behavior and suppression prior to actual field experience.

The fire finder can be used in conjunction with the fire simulator for lookout training.[1] While fixed lookout towers are decreasing in number due to the increase in aerial detection, the use of fire-finders, such as the Osborne, will continue to be stressed at Stephen F. Austin State University for the near future.

5 Projectors Used

The Dynamic Situation Simulator integrates four overhead projectors into a single unit.[2] Fire and smoke are simulated by scribing on opaqued glass plates on two of the projectors. Movement of fire and smoke is indicated by manipulating motorized perforated discs located inside the projectors. Background scenery is provided by duplicate transparencies on the remaining two projectors. Fire char and changes in smoke can be added on special plates above the background transparencies. An additional projector permits simulation of fire lines or other detail by scribing.

The stereo sound effects are made by a portable recording unit providing for transfer of sound between reel-to-reel and cassette tape and by either reel-to-reel or cassette recording from an external source. Additional sound recording is provided by a 2-track monaural cassette recorder, which may be

Hershel Reeves and Don A. Clymer are associate professor and graduate student, respectively, School of Forestry, Stephen F. Austin State University, Nacogdoches, Tex.

[1] Burnaugh, J. A. and I. T. Kittell, 1969. Fire simulation livens lookout training. *Fire Control Notes* 20(4): 3-4.

[2] Specifications are available from Scott-Engineering Sciences, 1400 S.W. 8th St., Pompano Beach, Florida 33060. See also Ball, H. E. 1971. New compact simulator provides new versatility. *Fire Control Notes* 32(3): 7-8.

The fire simulator room is adaptable to many problems . . .

operated by battery for recording sound effects in the field.

Simulator sounds are played from reel-to-reel or cassette tapes into six 8-inch dual-voice-coil wall-mounted speakers. The speakers are wired so that each will operate on either the monaural public address system, the stereo sound effects system, or both simultaneously, as selected at the control center. During the simulation exercise the recorders are operated to provide three different, simultaneous sound effects by adjusting volume controls. Additional sound effects are produced by changing cassettes during the exercise.

Equipment Versatile

The educational communication system can be used alone or in conjunction with fire simulation. It affords 2-way vocal communication between the instructor and class members and from student to instructor by a responder, transmitting a choice of answers to specific questions. At the instructor's console, four pointer dials indicate simultaneously the percentage of students selecting each of four (or fewer) choices on any multiple-choice question. A light panel indicates each student's choice. In addition, the scores of individual students can be accumulated on counters, so questions can be weighted in value if so desired.

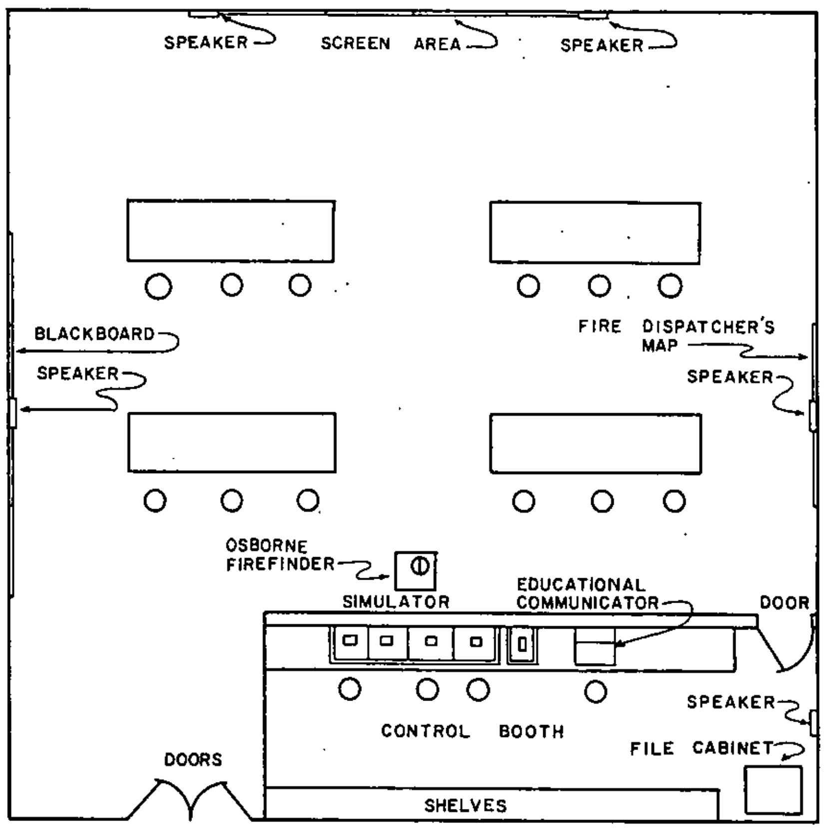
Other equipment available for use in the overall communication system includes microphones and earphones for each student and headphone sets for supervisory personnel. Each student desk has a telephone which can be used to call the control booth. Instructional personnel can ring all student phones simultaneously or individually.

Telephone and microphone conversations can be amplified through the wall speaker system, and tape recorded, if desired, for later reference in debriefing sessions.

Room Has Many Uses

The fire simulator room and its equipment is adaptable to problems in watershed management (especially flood control), recreation planning, civil engineering (forest road construction), and law enforcement. The educational communicator permits use of modern teaching methods, including instant response testing of student comprehension, and seminar-type discussions based upon projected visual aids. The combination of learning and teaching facilities in the Stephen F. Austin State University simulator room provides the student valuable supplements to classroom instruction. ∆

Interior arrangement of Fire Simulator Room, School of Forestry, Stephen F. Austin State University.



Hydraulic Seeder Sprays Retardants

Franklin R. Ward and John D. Dell

Figure. 1. The hydraulic seeder can be used effectively for application of fire retardants before and during prescribed burning operations.

A commercially available hydraulic seeder was tested for the mixing and ground application of fire retardants. It is normally used for mixing and spraying water, seed, and fertilizer along with other soil stabilization materials. Powdered and liquid retardants were satisfactorily mixed and sprayed with the seeder on roadside vegetation.

Early Sprayers Used

Use of fire retardants for wildfire and prescribed burning has increased the demand for application of this material with ground tankers. Several types of equipment have been designed or adapted for this purpose. In 1963, the San Dimas Equipment Development Center reported on a specially designed tanker-mixer slip-on unit.[1]

A few years later, Region 6 successfully field-tested a small compact trailer-mounted retardant mixer.[2] More recently, the Missoula Equipment Development Center contracted for a high-volume retardant sprayer custom-assembled from stock components.[3] This unit was tested for perimeter treatment on a number of prescribed burns in Regions 1, 5, and 6.

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Seeder Used

In 1970, the Pacific Northwest Region decided to test a commercially available hydraulic seeder that is used regularly by the Oregon State Highway Department for roadside maintenance (fig. 1). Normally, the State uses this equipment as a mixer and sprayer for application of water, seed, and fertilizers together with limestone and/or other materials (such as wood cellulose) for soil stabilization alongside highways and roads. We found it very satisfactory for mixing and applying any of the powdered or liquid fire retardants normally used for pretreatment of prescribed burn areas.

In a test conducted on forest roadsides in the Williamette National Forest, it took only 8 minutes to cover understory vegetation on a strip 1,000 feet long and 30 feet wide. A total of 700 gallons was used at a rate of 2.33 gallons per 100 square feet. On a second strip (600 feet long and 30 feet wide), 500 gallons (2.77 gallons per 100 square feet) were applied in 6½ minutes. Aerial and ground fuels were adequately covered in both cases.

The unit was also tested for spraying hard-to-reach vegetation on top of steep cutbanks above areas (fig. 2), where fire spotting might occur during

[1] Arcadia Equipment Development center. A new ground chemical tanker-mixer for forest fire fighting. *Fire Contr. Notes* 24(1): 17-19, illus., 1963.

[2] Franklin R. Ward, John D. Dell, and William C. Wood. New trailer-mounted fire retardant mixer successfully field-tested. *Fire Contr. Notes* 29(3): 15, illus., 1968.

[3] Arthur H. Jukkala. High-volume retardant sprayer. *Fire Contr. Notes* 30(1): 4, illus., 1969.

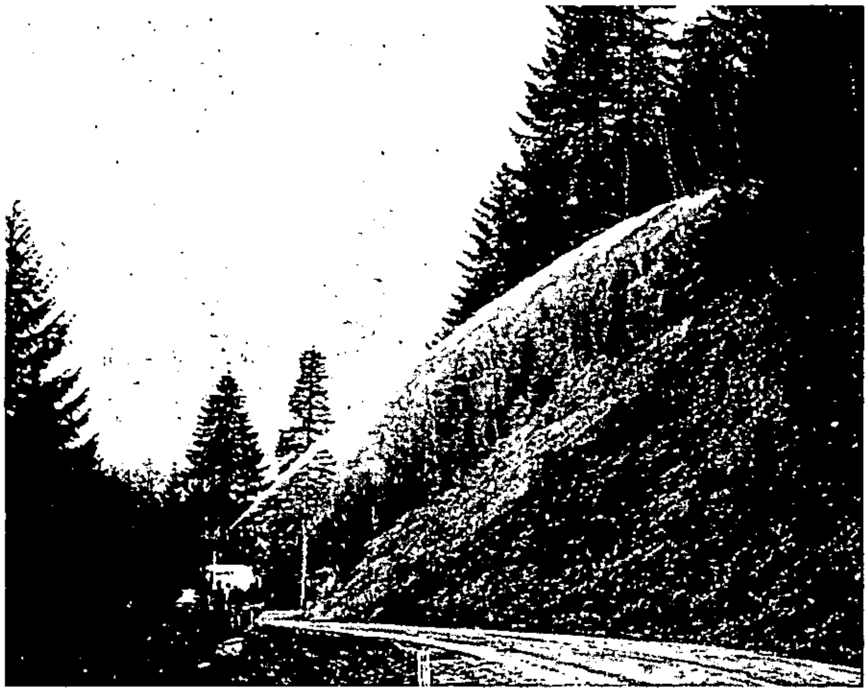


Figure 2. The hydraulic seeder can also be used to treat fuels on high cutbanks above cutover areas.

burning operations. Although this required more time and care in application, these fuels received adequate coverage.

The equipment used was a Finn Super 1000 Hydroseeder Model HSUSX manufactured by the Finn Equipment Company of Cincinnati, Ohio. There are however, other manufacturers producing similar equipment which we did not investigate. The Hydroseeder was capable of pumping 180 gallons per minute at 110 pounds per square inch with a variable discharge distance from 20 to 200 feet. The pump and nozzle clearances were able to pass solid material up to 1 inch in diameter. The retardant is mixed by a paddle type agitator that works in conjunction with recirculation.

Deck Gun Delivers

A favorable feature of the equipment is its "deck gun" discharge assembly. The nozzle for this deck gun is mounted on a stand on top of the tank and is capable of 360 degree horizontal rotation and 120-degree vertical travel. Six quick-coupling nozzles are available, varying from fine spray to straight stream (fig. 3). The hose fitting is also quick-coupling. There is a 1½-inch outlet for using a hose on hard-to-reach areas. The tank has a 1,000-gallon capacity and is coated with an epoxy substance which prevents corrosion. It has a 400-square-inch top opening including a bag cutter. The model we tested has a 57-horsepower water-cooled engine with electric starter, generator, battery, air cleaner, muffler, and clutch. It is also available with a 56-horsepower air-cooled engine. It is not capable of drafting, but it can be filled by hydrant or portable pump. The approximate weight of the entire slip-on unit is 4,300 pounds. This Hydroseeder cost about $5,300 (1969 prices) and is delivered complete, ready for operation.

The Oregon State Highway Department has used its unit almost constantly for over 7 years. They report that it has held up extremely well with normal maintenance.

Our tests show this equipment is suitable for retardant application on prescribed burns in Northwest forest areas. Also, it is multifunctional, being suitable for slope stabilization, seeding, fertilizing, and wildlife control operations. △

Figure 3. Quick-coupling nozzle tips ranging from straight stream to a fine spray are available.

Hand Labor Is the Key To Fire Fighting

Jim Casey

Maybe some day industry will come up with a machine that can crawl around a smoke-filled apartment looking under beds and opening closets. Maybe some day industry will come up with a machine that will be able to climb an 85-foot aerial and hand-wrestle a hysterical or semi-conscious woman out of a top-floor window. Maybe, too, there will be an automated gadget that can take a hose line up a twisting stairway, free the . . . [couplings] that get stuck at the turns, force a door and then open the nozzle on the fire. Maybe this will all come about, but we doubt it.

Like the infantryman's the fire fighter's job will always involve "hand labor." You just can't get along without it.

We often hear that 10 men with a hoe have been replaced by one tractor-drawn cultivator and "why can't this technology be applied to the fire service?" However, [as] in the garment industry, the hallmark of quality is still the label "hand-made." It's expensive but it's good.

Good fire protection is also expensive because it, too, is hand labor. On top of this, it requires intelligence, skill, and courage. Why should our communities settle for anything less? △

Jim Casey is editor, Fire Engineering.

Fire fighters may need to rest, but their pulaskis are always ready.

'Big Ed's' Pulaski Still Going Strong

Each year the Forest Service and other agencies purchase about 25,000 pulaskis from GSA at a total cost of about $138,000.

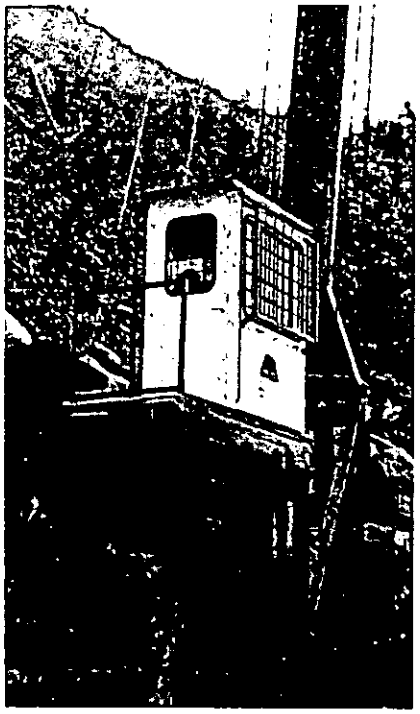
The pulaski fire tool, half mattock and half axe—a basic weapon of the fire-fighter—is the product of an early ranger, Edward C. "Big Ed" Pulaski, who distinguished himself in the great Idaho forest fire of 1910.[1] He saved the lives of his crew by leading them to the safety of an old mine tunnel while the blaze swept over, and in the process lost most of his eyesight. He was the descendant of the Polish commander Casimir Pulaski, a hero of the American Revolution.

While essentially the same tool as before, the pulaski's specifications were revised just last year. This valuable tool now boasts better steel, handles, and bonding.

'Big Ed' would be proud. △

[1] In the August 1910 fire, 85 persons lost their lives, 74 of them fire-fighters. Several towns and nearly 3 million acres of forest were destroyed.

Yarding Spar Stores Water



With a few adjustments, the hollow steel spar of a yarder machine can double as a water tank.

MacMillian Bloedel Limited, British Columbia, stores a minimum of 500 gallons of water at each logging site for initial attack on an operational fire during the fire season. This water storage takes a number of different forms, ranging from natural streams or pools, trailer mounted tanks, tank trucks, and, since the advent of the hollow steel portable "spar tree," the spar itself.

Vents & Couplings Added

The spar is 27 inches in diameter and will hold 29.7 U.S. gallons per lineal foot. The normal procedure is to seal off the spar 20 feet up from the base, install a threaded vent hole to the outside just below the 20-foot mark and to provide two 2-inch pipe couplings 3 inches above the base, one facing the machine and the other directly opposite. The outlet facing the machine is for the pump suction and the other to help flush and clean out if this becomes necessary.

The fire pump and hose are normally mounted on the yarder carrying the spar, near the spar base, and coupled to it by a valve and suction hose. The flexible hose allows the spar to be lowered for moving without disconnecting the pump. When the pump cannot be mounted near the base of the spar, the suction line is installed along the frame of the yarder to the pump location as is the case when a power take-off pump is used off the yarder engine. During a move the vent is normally plugged to prevent slop-spill.

Advantages Outnumber

As is the case in most innovations, some people like and use this water storage arrangement while others prefer to have tanker trucks at each site. The following are the advantages and disadvantages as expressed by operators.

Advantages:

1. There is no additional outlay for truck, trailer, or tank.
2. Water supply is always in the geographic center of the area being logged by the yarder, whereas other forms of tankage may be up or down the road some distance due to the lack of space around the yarder and loader.
3. The tank is never left behind when the machine moves to a new location.
4. It does not add to the congestion around the yarder where space is always at a premium.
5. The pump takes suction under a positive head and thereby eliminates any priming problem.

Disadvantages:

1. The water supply is "tied-to" the machine, thus it cannot be moved to a fire outside the "setting."
2. The added weight of the water can sometimes be a problem when moving the yarder in steep terrain and also puts added strain on the spar raising equipment. Some operators drain the spar before lowering or moving which then necessitates refilling upon arrival at the new yarding site.
3. Confirming the water level in a spar tank is not as easy as in a tanker or trailer. A low calibrated pressure gauge could be used but workers consider it unreliable due to constant violent vibration of the yarder and spar, and they make a practice of topping up to the overflow weekly.

Give your spars a long, hard look. Perhaps you can use this idea. △

Probability Makes Fire Danger Index More Reliable

Peter Kourtz

Fire danger index forecasting can reflect forecasting uncertainty by including ranges of probability for a given index. Including probability makes the index more reliable. Fire danger index forecasts are prepared by many Canadian fire control agencies (Nikleva, 1970; Paul, 1970; and Pouliot, 1968).

These forecasts are used for short-term presuppression planning, for instance, fire control manning levels, work plans, or detection strategy. Slash burns, the closing down of industrial operations, and the revocation of campfire and travel permits also may be based on such forecasts.

The general procedure for preparing an index forecast for an area is:

1. Calculate the *current index value* using yesterday's index values and today's weather. This calculation can be made using either index tables or equations.
2. Get a *local weather forecast.* This forecast must be in specific values, for example, relative humidity, 45 percent; temperature, 72 degrees F.; and wind speed 5 m.p.h.
3. Combine the current index values with the forecasted weather to obtain the *index forecast.*

Peter Kourtz is research scientist, Forest Fire Research Institute, Canadian Forestry Service, Department of the Environment.

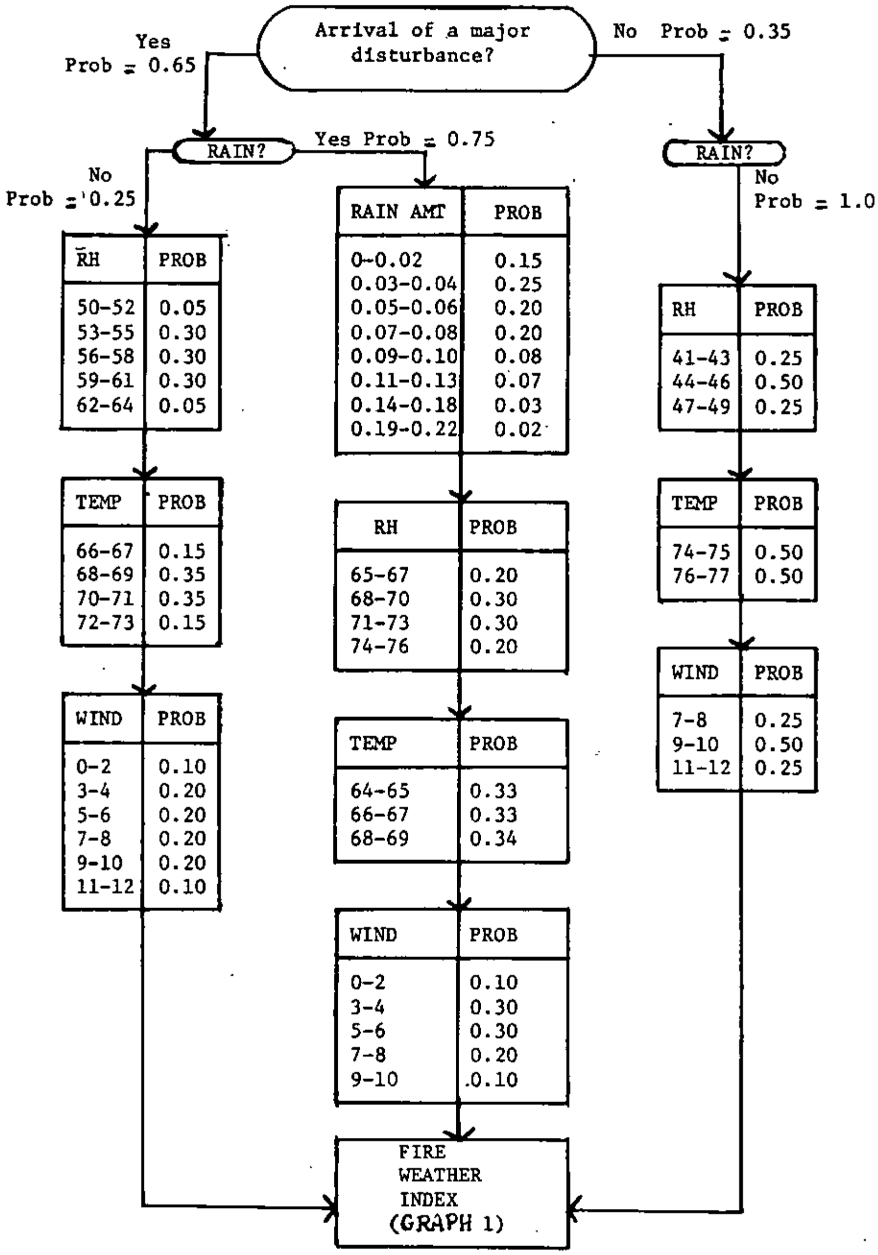
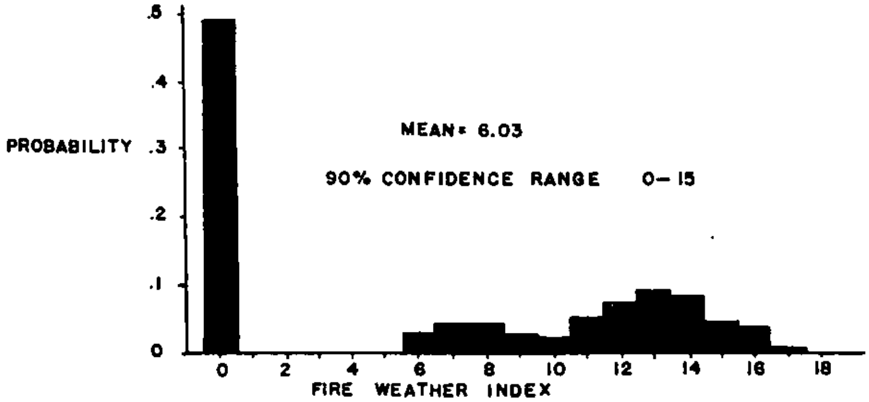


Chart 1.—An Uncertain Weather Situation (See graph 1)

It is becoming economically desirable to have an index forecast that can be relied upon for short-term planning. However, forecast reliability is less than it might be in the current forecasting scheme because weather can't be accurately predicted and because fire danger ratings are sensitive to small changes in wind speeds and precipitation amounts.

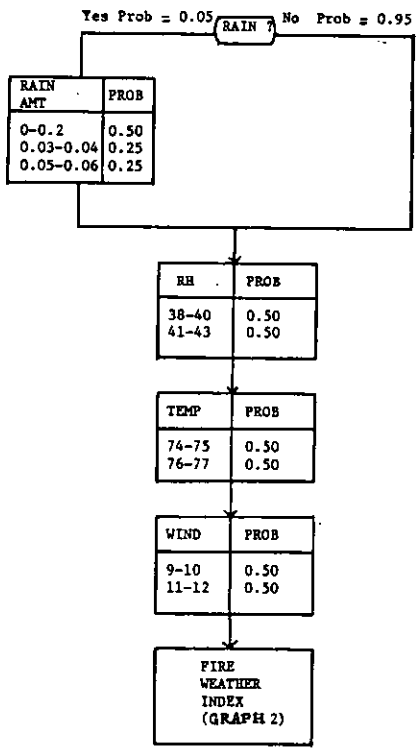
Incorporate Uncertainty

One possible approach to improving the forecast reliability is to incorporate the forecaster's uncertainty of his predictions into the index calculation. The result will be an index forecast in a range of probabilistic terms (see charts). An uncertain weather situation likely will result in a wide confidence range

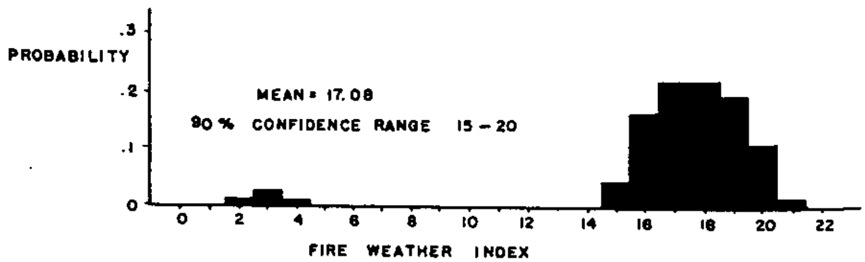


Graph 1.—Fire Weather Index Forecast Distribution for an Uncertain Weather Situation.

Chart 2.—A More Certain Weather Situation (See graph 2)



Graph 2.—Fire Weather Index Forecast Distribution for a More Certain Weather Situation.



(graph 1) for the forecasted index, an index into which little faith should be placed. An index forecast in which the forecaster has a great deal of confidence will have a narrow confidence range (graph 2).

The forecasted weather data for probabilistic fire danger forecasts would be in terms of *conditional, distinct probability distributions.*[1] For example, the forecaster might feel that the chance of rain tomorrow is about 1 in 3, or 33 percent, and furthermore, if it does rain, the amount of rain will have the following distribution:

Amount (inches)	*Probability*
0.00-0.05	0.50
0.06-0.10	0.40
0.11-0.20	0.10

Here, the forecaster is expecting only a light rain if it rains at all. Note that this method of presenting a forecast avoids the necessity of predicting specific values for weather events. This is a desirable feature of the method from both the forecasters' and users' viewpoints, especially during uncertain situations.

Computers Forecast

A small computer program has been written to demonstrate this method of forecasting. The charts present two sets of hypothetical forecast data. The resulting index distributions are presented in the graphs. The first example represents an uncertain forecast situation. The second example represents a reasonably certain forecast. The Canadian Forestry Service's Fire Weather Index system was used to make the index calculations.

Output for each forecast area could be reduced to three numbers—the upper 90 percent confidence limit, the lower 90 percent confidence limit, and the mean index value (see graphs).

Future fire danger forecasting schemes likely will be partially or even fully computerized. The addition of the probabilistic feature to the forecast will represent only a minor increase in the cost of such a system.

Forecasters with computers are capable of predicting in terms of distributions. But are these predictions reliable enough to justify their use? △

[1] The Monte Carlo sampling technique (Hillier and Liebermann, 1965) provides the mechanism to combine the forecast distributions and today's indexes within the framework of the index calculation procedure. The result is a probability distribution for tomorrow's forecasted fire danger index.

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'Zinger' Fire Prevention Slogan Needed

'I Can't Believe It Burned The Whole Thing!'

"We need a zinger," Richard E. Bland declared, "like 'I can't believe I ate the whole thing.' If a single slogan like that can make a man want to avoid a bellyache, we ought to be able to find a catchy one that will help keep him from burning to death."

Bland, appointed Chairman of the National Commission on Fire Prevention and Control by President Nixon last June,[1] posed the question at the opening session of the 76th Annual Meeting of the National Fire Protection Association (NFPA). Some 3,000 fire safety experts attended the week-long conference.

Is the public apathetic about fire or is fire of such personal consequence that concern is unconsciously suppressed?

Whatever the case, according to Bland, "It is absolutely necessary that we find a way to remove fire prevention from the 'ho hum' category exemplified by National Sandwich Week.

"In a society deluged visually and audibly with the cola generations, super time-saving detergents, and soft toilet tissue, you and I are going to have a hard time getting public attention by continuing to place posters on the firehouse door or the school bulletin board," he continued △

[1] See: A Look at What Killed 12,000 People Last Year. *Fire Contr. Notes*, Spring 1972, 33(2): 20.

Pocket-size Fireline Handbook Off the Press

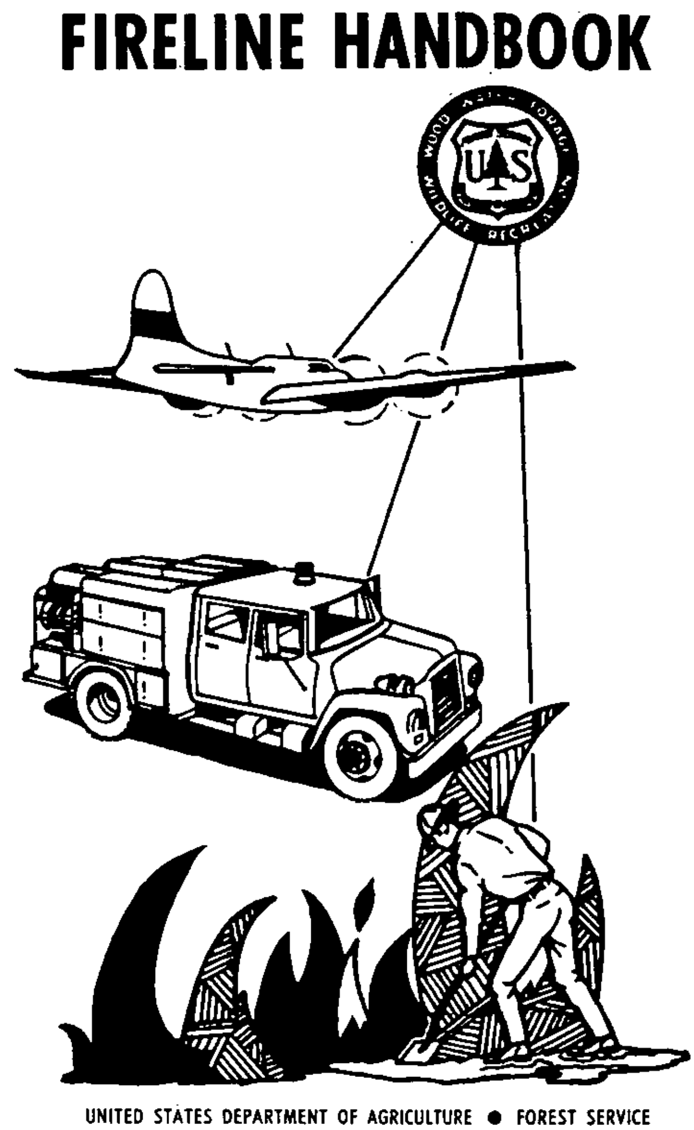
The new Forest Service *Fireline Handbook* is a ready reference to fire suppression principles, policies, and data.

It can be used to better:

1. Size up the job in relation to fuels, weather, and topography.
2. Plan the men, equipment, and facilities needed.
3. Organize and direct the job decisively and efficiently.

The *Fireline Handbook* is for sale for $3 from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402—Stock number, 0101-0076.

The cover design is pictured here. △



Computers Help Plot Area-Seen Maps

Peter Kourtz and Shirley Nozaki

Computers can make the task of plotting area-seen maps easier and shorter by coordinating elevation data onto a grid centered on a predetermined lookout site.

First Maps Sketches

Area-seen maps of lookout coverage have been made since towers were first used to detect fires. Early maps consisted of sketches of the areas directly visible from potential or actual lookout locations. Later, survey instruments were used to pinpoint area-seen boundaries (Chorlton 1951). Two drawbacks of sketching were: 1) Many distances had to be estimated and, 2) only the areas directly visible could be mapped. Accuracy of distance estimates have been improved by the use of range finders, helicopters, and photography.

As topographic or contour maps became available for most forest regions, a profile technique was developed. This technique required the drafting of terrain profiles along lines radiating from the lookout location. Straight lines were projected from a proposed lookout location to identified terrain points. All points along the profile were classified visible or invisible, and the distances below line-of-sight could be calculated from the appropriate topographic map.

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Profile Board Simplifies

Then the profile board method was developed to speed up mapping (Catto 1969). Point classification could be made without drafting profiles, and the board provided a simple procedure for correcting elevations for the earth's curative (VanWagner 1965).

The most accurate area-seen maps to date have been made from within the lookout using a combination of the profile board and sketching methods.

A Computer Can Develop Area-Seen Map

Although the accuracy of a computer map is no better than one produced by the profile method, the computer can greatly simplify the task of making maps.

The computer program requires a uniformly-spaced grid of elevation points to be established over the area to be mapped. The lookout location is the center of the grid. The computer adjusts each elevation value for the effects of earth curvature and refraction.

A terrain profile is constructed from the lookout location to each elevation point in the grid. For a specific profile, a straight line is established between the grid point of interest and the lookout. Elevations along this line at all points where there is an intersection with a line of the grid are calculated using linear interpolation. Each profile consists of a vector of numbers where each element represents a function of the vertical angle from the lookout to a specific intersection point on the line. Once the profile vector is established, the distance below line-of-sight of the grid elevation point is calculated in a manner similar to the profile method.

Data Input Required

The elevation values for this program may be obtained either manually from contour maps or from previously digitized topography data banks.

Computer tapes containing digitized elevation data for most of the forested area of the United States are available to Government agencies from the U.S. Department of Defense. Each tape contains data for one degree of latitude and longitude, the grid spacing for these points being about 210 feet. A special computer program is required to obtain a subset of these data.

Most of the terrain detail of Canada has not been digitized. There are available, however, excellent topographic maps for most of the forested regions of Canada.

The accuracy of the computer maps is dependent upon the density of grid points and the precision of elevation data. Although computer maps will not be as accurate as those produced by the sketch-profile board method, the total cost in man-hours and dollars to make a computer area-seen map is significantly less than to make a sketch-profile board map.

Additional information can be obtained from the authors, Forest Fire Research Institute, Canadian Forestry Service, Nicol Building, 331 Cooper Street, Ottawa, Ontario KIAOH3, Canada. △

References

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Catto, A. T. Visibility mapping for fire protection. *Pulp and Paper Magazine of Canada, Woodlands Rev., Convention Issue*: 4-20, 41, 1960.

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25th Anniversary of Holocausts Remembered

This article is excerpted from the testimony of Sen. Edward Muskie in the June 8, 1972, Congressional Record.

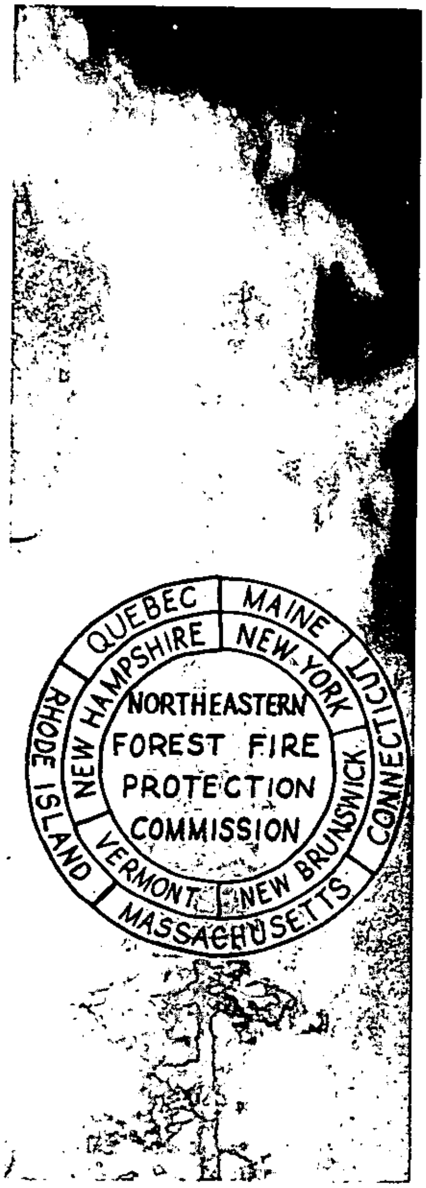
. . .

1972 marks the 25th anniversary of an event which resulted in passage of one of the most unique and significant pieces of forest fire protection legislation ever enacted in the history of our country.

The Northeastern Forest Fire Protection Compact, created by an act of Congress, was the first intergovernmental body of its kind and has served as a model of mutual aid for other sections of the country. Its establishment was a direct result of a series of disastrous forest fires which burned throughout New England and the Northeast during the autumn of 1947.

The events of 1947 pointed up the critical importance of interstate and Federal cooperation to deal effectively and promptly with forest fires. As a consequence, the 81st Congress on June 25, 1949, enacted Public Law 129 authorizing the Northeastern Forest Fire Protection Compact. Three years later on May 13, 1952, the 82nd Congress enacted Public Law 340 authorizing Canadian participation in the compact.

. . .



Within 4 months, [after enactment] six of seven specified member States had become party to a northeastern interstate forest fire protection compact. Rhode Island, whose legislature was not in session the previous year, became the seventh State by joining in 1950.

. . .

Although the Province of New Brunswick seriously considered becoming a member of the compact in the early 1950's, it was Quebec which was the first Canadian Province to become a member of the Northeastern Forest Fire Protection Compact on September 23, 1969.

The Northeastern Forest Fire Protection Compact . . . has served as a model of mutual aid for other sections of the country.

. . .

Within a year, following "The Quebec Joinder,[1]" the Province of New Brunswick became a member of the Northeastern Forest Fire Protection Compact.

. . .

NFFPC Works

Mutual aid provisions of the compact were invoked for the first time in August of 1952 when extremely dry conditions and stubborn fires were affecting Maine, New Hampshire, Massachusetts, and Rhode Island. Arrangements were made through the Secretary and when calls for assistance resulted Vermont provided New Hampshire with pump operators and standby service. Maine received pumps and hose from New York in less than 5 hours from time of request.

. . .

The latest call for compact assistance came through the U. S. Forest Service in Washington for possible assistance of the Province of Ontario. Fifty thousand feet of hose and 23 portable pumps were made available for transport by military aircraft. Fortunately the situation cooled and dispatch was not necessary. Δ

[1] See *Fire Control Notes*, Summer 1970, 31(3): 9.

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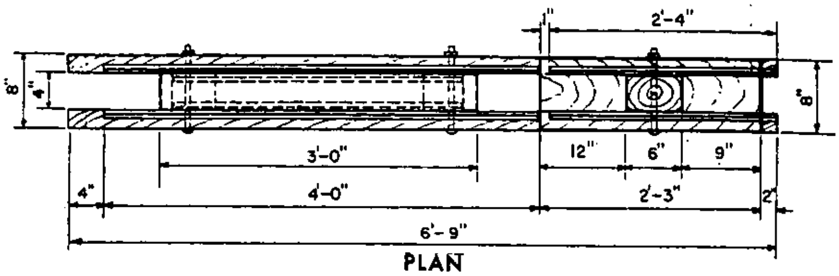
Smokey Figure, Fire Danger Adjectives Available For 1973 Campaign



In "Smokey's 1973 Campaign" catalog are two prevention items you may wish to use: One is the Smokey bear figure and the other, a set of standardized fire danger adjectives. Both are designed to go on a sign you build that says "Fire Danger __ Today, Prevent Forest Fires" (see cover).

This official rendition of Smokey is in color. It is adhesive-backed vinyl and comes left- or right-handed.

The five fire danger adjectives are also adhesive-backed vinyl and are color-coded and reflectorized. The colors are those accepted and used by most wildland fire protection agencies.

You can build the complete sign with the construction plans furnished with each order of fire danger adjectives.

To get the figure, adjectives, or both, contact your State forester or the Forest Service. Consult your "Smokey's 1973 Campaign" catalog for further information on these and other prevention items. △