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FIRE CONTROL NOTES

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A New Jersey home and woodland—April 1963 (p. 3)

FIRE CONTROL NOTES

A quarterly periodical devoted to forest fire control

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INFORMATION FOR CONTRIBUTORS

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The title of the article should be typed in capitals at the top of the first page, and immediately underneath it should appear the author's name, position, and organization.

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THE FOREST FIRES OF APRIL 1963 IN NEW JERSEY POINT THE WAY TO BETTER PROTECTION AND MANAGEMENT

WAYNE G. BANKS *and* SILAS LITTLE, *Research Foresters, Northeastern Forest Experiment Station*

In the spring of 1963, conditions conducive to severe forest fires prevailed rather generally throughout the Northeastern States. Scant rainfall, low humidity, and high winds combined to produce high and extreme fire-danger ratings for prolonged periods. On April 20 fire danger reached a peak in several areas. As a result, fast-moving fires of unusual intensity burned out of control.

The New England States were fortunate in escaping really large fires: the largest was approximately 700 acres in northern Maine. However, New England did have many small fires. Massachusetts, for example, had 4,861 forest fires in April, a record for that State and possibly for any State.

Fire disasters made the headlines of many newspapers. In New Jersey, newspapers reported more than 200,000 acres burned and 458 buildings destroyed (fig. 1). These reports listed 7 persons dead, many injured, and 2,500 evacuated—of whom 1,000 were left homeless. New York newspapers reported that a brush fire on Staten Island covered 10 square miles and destroyed 100 homes. In the suburbs of Philadelphia, and elsewhere in Pennsylvania, homes were threatened by numerous woods fires. Fast-moving fires were reported in Maryland. West Virginia, Virginia, and Kentucky were also hard pressed to control their many fires.

Whether these newspaper statements were correct in all details is probably not very important. But what should be important to foresters and the general public are the reasons for these disasters, the ways of preventing them, and the probability of similar conditions occurring again. The second seems particularly important because on April 20, when most of the damage occurred in southern New Jersey, fire suppression techniques and presuppression measures proved woefully inadequate.

Weather Conditions

April 1963 was the driest April on record in New Jersey. Only 0.31 inch of rain fell during the first 29 days of the month, and 0.52 inch on the 30th. On 22 days, maximum wind velocities at Trenton were 20–40 m.p.h. In the 30 days prior to April 20, precipitation deficiency amounted to 3 inches. Relative humidity on that day dropped from 50 percent at 6 a.m. to 23 percent at 10 a.m. and remained between 20 and 23 percent until nearly 5 p.m. Temperature was 80° F. at midday, dropping to 53° at midnight. Fuel moisture indicator sticks at two fire-danger stations showed 3.5 and 4.1 percent fuel moisture at 2 p.m. At both stations the buildup index was 100 and the burning index was 200 on the 8-0 meter.

The estimated average wind velocity for April 20 was 20 m.p.h. The average of the maximum wind velocities reported from the three nearest Weather Bureau offices was 33 m.p.h., and gusts were probably as high as 50 m.p.h. Turbulence prevailed at low levels, and many small whirlwinds developed. Prevailing wind direction veered during the day from northwest to west, then back to northwest, and to almost north late at night.

Comparable Conditions in the Past

Because April was such a black day for fire protection in New Jersey and in sections of neighboring states, we attempted to determine the past frequency of such weather conditions. Weather Bureau records for the previous 49 years indicated that the spring fire weather was never quite so bad as in 1963. During that half century only four spring days had conditions that approached those of April 20, 1963. In early May 1930, when fires were rampant in South Jersey, surface burning conditions on two days approached those of April 20. The chief difference was that, in the 30 days preceding April 20, 1963, there had been an inch less precipitation than in the 30 days preceding May 2 and 4, 1930.

However, previous seasons have had conditions comparable to April 20 in both wind velocity and drought. Since 1913 there have been six fall days of apparently similar conditions, and one summer day and four fall days when conditions approached those of April 20. However, because of less wind within stands in summer and early fall, the shorter days of fall, and less fresh leaf litter, we doubt that any of these days actually provided burning conditions as critical as on April 20, 1963.

On several other days of that April there were high winds. Fuel moisture was low, and at one danger station the buildup index registered 100 on 10 days. But at no time did all the elements of

fire danger combine to create conditions so severe as those on April 20, although April 29 was fairly close.

Fire Behavior

Because of the drought, low humidity, and high winds, some of the fires of April 1963 started and spread in fuels so light that normally they are considered insufficient to maintain a fire. Owing to intensity, rapid spread, and ability to carry across very light fuels, suburban fires were difficult to suppress, and many buildings were lost.

In the heavier and more flammable fuels of the New Jersey Pine Region, the wind-driven fires burned with great intensity and caused severe damage to both oaks and hard pines. Fires spread rapidly across upland sites where there was relatively little fuel, as on areas where prescribed burning had been done 1 or 2 years earlier. On such sites a very light cover of pine needles was sufficient to maintain a fire. Oak leaves, where present, were blown across bare spots so that fires advanced rapidly even in scattered fuels.

Because fuels contained so little moisture and winds were so strong, the rate of spread of fires on April 20 was extreme almost regardless of fuel type. One of the larger fires, which started just north of the Lebanan State Forest, advanced about 3½ miles in 2 hours and 9 miles in 6 hours. Probably the rate of spread on April 20, 1963, has been matched or even exceeded by other fires for short periods. However, foresters and wardens with many years' experience in fighting South Jersey fires could recall no case where the sustained rate was as high as on April 20. The Forest Fire Service of the New Jersey Department of Conservation and Economic Development provided data from 1924–63 that showed only 1930 to be comparable to April 1963 in number of large fires and their rate of spread. The two fires with the greatest area burned per hour were in 1963 and covered about twice as much ground per hour as any of the much-publicized 1930 fires for which complete data are available. The data also emphasize the importance of April and May in local protection problems.

Suppression Difficulties

The New Jersey Forest Fire Service uses a combination of suppression techniques and several kinds of machines. The latter include trucks of various sizes up to 500-gallon tank trucks equipped with 4-wheel drive; aircraft equipped to drop 150–200 gallons of retardant; and tractor and plow units. Backfiring and handtools are also used, and backfiring plays a large part in stopping head fires and tying in flank fires.

On April 20 none of the suppression methods proved effective. For example, only one of the three pilots employed for firefighting was willing to fly, considering the 40-m.p.h. winds and the low-level turbulence. Effectiveness of tractor and plow units on April 20 was confined to areas with no more than 1 year's accumulation of litter, and that mostly pine needles. Tank trucks and handtools were useful in controlling spot fires in 1-year needle litter, but in oak leaf litter neither was enough. For example, at about 1:45 p.m. between New Lisbon and Route 70, a spot fire started along a road within 50 feet of a tank truck, its crew, and several men with handtools. At that particular moment, a small whirlwind spread this fire for 100–200 feet. High winds forced the abandonment of suppression attempts, even though the area had only a year's litter since the last prescribed burn.

The extremely dry and windy conditions caused much difficulty in backfiring. Attempts to backfire and hold the line along sand, gravel, and even blacktop roads had to be done slowly and carefully to prevent the backfires from jumping the road. Backfires along a State highway crossed the road even though the cleared strip in that area ranged from 75 to 120 feet wide. In some places head fires arrived before backfiring could be completed.

Effectiveness of Prescribed Burns

Prescribed burning in the winter to facilitate suppression of fires in the South Jersey Pine Region has long been advocated. However, this measure too proved less effective on April 20, 1963, than in previous wildfires.

In general, prescribed burning 1 or more years before the wildfires of April 20 did not facilitate suppression appreciably, especially where oak litter was an important component of the fuel complex. In these areas the 1963 fires were not stopped under fuel conditions that had permitted the suppression of earlier wildfires.

More recent burns that left some surface fuel remaining only reduced the damage, and others that removed nearly all the fuel did not stop the fire. On one firebreak where the 1962–63 winter burn had consumed only the top litter, the fire burned with sufficient intensity to kill many of the oaks and severely scorch the crowns of the pines (fig. 1).

Figure 1.—The stands on both sides of this road had been prescribe-burned in the winter of 1962–63. A good burn had been obtained on the left side, and here the fire of April 20, 1963, burned only a few scattered patches. On the right side, only the top litter had been burned by the winter fire, and much damage was done in April.

Rapid combustion of wind-tossed dry fuels in the April 20 fires created extreme temperatures and greater damage on prescribed burn areas than in other years. On areas with 1 year's accumulation of litter after periodic burns, head fires killed most of the oaks but not the overstory pines. Strong flank fires on such areas killed about half of the overstory oaks. Damage to oaks in areas with 2 or more years' accumulation of litter was usually about as severe as in stands with no previous prescribed burning. However, any reduction of fuel was apparently effective in reducing damage to pines.

Preventing Similar Disasters

Prevention.—One of the major fires of April 20–21 reportedly started where a debris burner had a permit for night burning. The fire held over in a brush pile and broke out on April 20. At the nearest fire-danger station the buildup index had reached 59 on April 12, climbed steadily to 100 on the 17th, dropped to 97 on the 18th, but was back at 100 on April 19th.

We suggest that no burning permits, for either day or night, be issued when the buildup index is 60 or more according to the system now in use in the Northeast. Any permits issued when the buildup index is less than 60 should be so limited in time that they will expire before the index reaches 60.

Camping should be prohibited at remote sites when the buildup index reaches 60, and at all areas when the index is 80 or more. Prohibiting camping may meet resistance; yet such a measure is needed as much for the safety of the campers as for fire prevention. On April 20, 1963, a large group of Boy Scouts were camped in the Lebanon State Forest, where only a slight shift in wind direction would have brought a head fire, quite possibly before they could have been evacuated.

Another important prevention activity is reduction of fuel through prescribed burning during the winter in types where these burns are silviculturally desirable. Earlier recommendations for the South Jersey Pine Region appear to remain sound:

1. For maximum protection of improved property, burns at 1- or 2-year intervals be used.

2. For extensive forested properties, barrier zones be prepared by the prescribed burning of belts of upland sites, which would reinforce swamps or other natural firebreaks.

3. Eventual development of a checkerboard pattern on upland sites in the larger unimproved holdings, i.e., a pattern of young unburned stands and of older, periodically burned stands. Prescribed burns at 4- or 5-year intervals are considered essential in a protection program.

In years like 1963, only recently burned areas will be effective barriers against fire. But in view of the rarity of such extreme fire danger, an annual and more costly fuel reduction seems justified only near buildings or other improved property.

Management for pine over oak, besides favoring the production of timber, can facilitate fire control under certain conditions. Periodic prescribed burning in areas with few oaks results in less rapid combustion of the rather compact needle litter. In April 1963 the burning needles were not carried long distances by the wind as oak leaves were. Suppression was therefore easier in stands that had few oaks.

Presuppression.—What can be done in presuppression to help ensure initial-attack success under fire conditions such as had developed in April 1963? We suggest broadening the scope of the working agreements between the New Jersey Forest Fire Service and other State agencies, companies, and individuals to furnish equipment when it is needed. Needed equipment from outside sources should be on standby whenever the fuel and weather conditions indicate a conflagration threat.

Protection agencies might also consider providing tanks of 500-gallon capacity or larger and equipped with their own pumping units. These tanks could be strategically located, and stored in such a way that they could be mounted on flat-bed or dump trucks and put into operation quickly.

The responsibilities of most forest fire protection agencies today extend to much more than protecting woodlands alone. The extension of residential building and industry into rural wooded areas, the reversion of farmland to forest, and the development of forest recreational areas are now making high-value improvements and even lives dependent on the efficiency of forest fire suppression. Public recognition of these increasing responsibilities must be encouraged if protection agencies are to receive the financial support that they need.

Suppression.—What can be done to control fires under conditions such as prevailed in New Jersey and other parts of the Coastal Plain in April 1963? When the high winds eliminated the small airplane as a working tool, suppression forces found themselves back to conventional weapons—tanker trucks, plows, and hand crews—which were inadequate. Perhaps larger aircraft, carrying heavier loads and effective under windier conditions, and larger tanker trucks with multiple pumping units might be feasible. Although the latter might not be adequate for such fires as occurred in April 1963, they should prove effective against many fires that cannot now be attacked directly. They could also be a valuable aid to backfiring.

Also the use and coordination of equipment could be improved. Much difficulty was experienced in holding backfires, even along wide cleared rights of way. Could tanker units of the type available, supported by large tank trucks for refilling them, adequately fireproof the fuels on the opposite side of the roadway to permit rapid and safe backfiring from such roadway? This type of operation might require planning and practice. It might very well resemble the "one-lick" method used by hand crews, with several tankers proceeding in tandem at a reasonably good speed, each one spraying a designated portion of the fuels. Studies to determine the feasibility of this approach should be initiated.

FOREST FIRES AND FIRE WEATHER CONDITIONS IN THE ASHEVILLE, N.C., FIRE WEATHER DISTRICT—SPRING SEASON, 1963

EARNEST A. RODNEY, *Meteorologist in Charge, Weather Bureau Office, Asheville*

The Asheville Fire Weather District comprises an area of some 257,000 square miles with 78,550,000 acres of forest land under national, State, and private protection. The acreage and fires occurring on the nine national parks in the District were not available for inclusion in this summary.

In the District there are 117 administrative units of Federal, State, and private forest lands. During the spring season from February 15 through May 15 fire weather forecasts are forwarded to approximately 100 of these units six days each week. Four-day outlooks are included on Mondays, Wednesdays, and Fridays. Owing to the critical forest fire conditions existing in 1963, some routine forecasts were continued into June. From March 30 through May 19, 1963, 91 special forecasts were issued for "going fires" for various units in the area. The spring fire-weather season of 1963 was probably that of the most devastation since spring of 1942. In the 4-year period 1959 through 1963, 968,073 acres of forest were destroyed by fire in the District, an average annual loss of about 242,018 acres or 0.3 percent of all forest land under protection. In the spring of 1963 (table 1) three times as much of the forests burned, compared with the annual average for the previous 4 years.

Precipitation

Most of the District had below-normal rainfall in three of the four months from January through April. South Carolina is possibly the only area with near-normal precipitation for the 4-month period. Most of the heavy precipitation was over by March 15-20, setting the stage for the dry (fig. 1), warm weather of April. On April 6 and 7 there was some heavy rain in North and South Carolina, but in general there were no beneficial rains until the end of the month. This deficiency of rainfall had its effect in keeping the forest fuels dry during the later part of March and all of April.

Temperature

Temperature over the entire District averaged from 4 to 10 degrees below normal in January and 6 to 8 degrees below normal for February. After the first few days in March, temperatures were above normal, and the month averaged 4 to 6 degrees warmer than normal. April also was about 4 to 6 degrees above normal and can be characterized as warm, dry, windy, and dusty.

TABLE 1.—*Summary of fires on protected forest areas, Asheville, N.C., Fire Weather District, by States, Jan. 1–June 30, 1963*

State	State and private				National Forests			
	Forest area	Number of fires	Average size	Area burned	Forest area	Number of fires	Average size	Area burned
	Acres		*Acres*	*Acres*	*Acres*		*Acres*	*Acres*
Ky.	9,854,000	3,351	65.6	219,975	575,000	94	18.1	1,706
N.C.	17,279,000	3,449	76.3	263,000	1,485,000	151	33	4,987
S.C.	11,175,000	3,856	14.6	56,173	621,000	133	21.7	2,892
Tenn.	10,119,000	3,371	11.2	37,890	937,000	128	46.2	5,909
Va.	14,033,000	2,369	16.3	38,542	1,709,000	149	16.1	2,403
W. Va.	9,007,000	1,552	45.2	70,121	906,000	15	1.5	22
Ga.	....	....	....	....	850,000	53	14.8	786
Total	71,467,000	17,948	....	685,701	7,083,000	723	....	18,705

Upper Air

Figure 2 shows the mean circulation existing in April 1963 and gives the average height, isotherms, and resultant winds at the 700-mb. surface. The flow is also representative of that which prevailed during the latter part of March. During this time mean troughs were located off both coasts of the United States and a ridge over the Central States. Thus the general flow over the Asheville district was from the west and west-northwest. Not only does this type flow restrict the northward and eastward transport of moisture, but also the anticyclonic nature of the circulation tended to inhibit precipitation.

When the flow of air was from the Gulf of Mexico, the frontal systems moved through so fast that the warm air did not attain sufficient moisture content for much precipitation before being forced off the east coast. Also, because of the general upper-air circulation, any of the lows developing to the west moved from the southwest to the northeast. This resulted in only the trailing cold fronts passing through the District. This type of front seldom has much precipitation associated with it as it passes through the southeastern states.

Surface

On April 3 at 1:00 p.m., e.s.t., a front was oriented northeast-southwest in the vicinity of Chicago, Peoria, Little Rock, and southwest into Texas. Temperature readings in the District were in the 80's to low 90's with dewpoints 55 to 60 degrees. Winds were generally light southwesterly. During the following 24 hours the front moved 25 to 30 m.p.h. to the coastal areas of North and South Carolina. To give some idea as to how dry this frontal passage was, *Climatological Data* for the States of North Carolina, South Carolina, Virginia, and Georgia lists a total of 0.08 inch of rainfall.

At this time forest fires were burning in many states of the District, and foresters faced great difficulties in fighting the head and flank fires as the dry, cold frontal system moved through.

April 4, 1963, was one of the most critical fire-weather days during the spring season. In North Carolina this date is referred to as "Black Thursday." Then, over 127 fires burned throughout the State. At least 43 class E (over 300 acres) fires were reported, with one fire of over 30,000 acres and another of 23,000 acres. A total of 185,000 acres burned in North Carolina on April 4. Air-

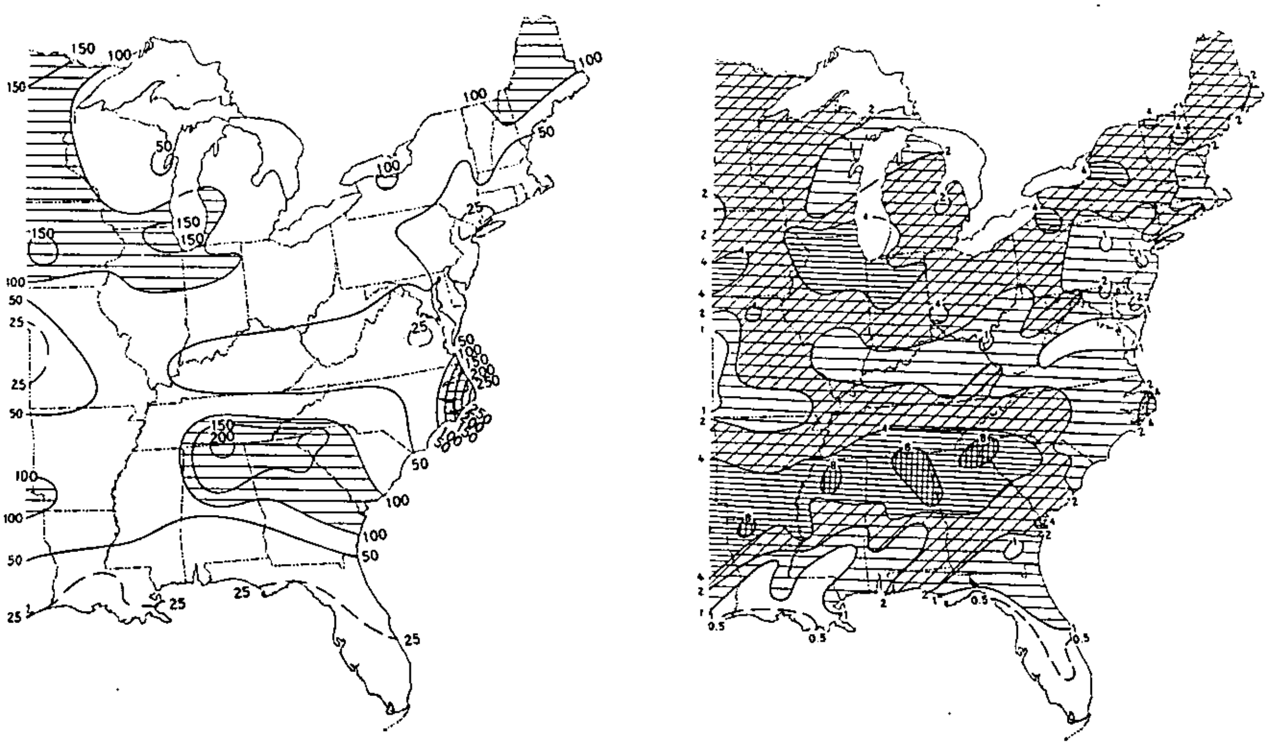

Figure 1.—Precipitation, April 1963: ***Left,*** **Percent of normal;** ***right,*** **total (inches).**

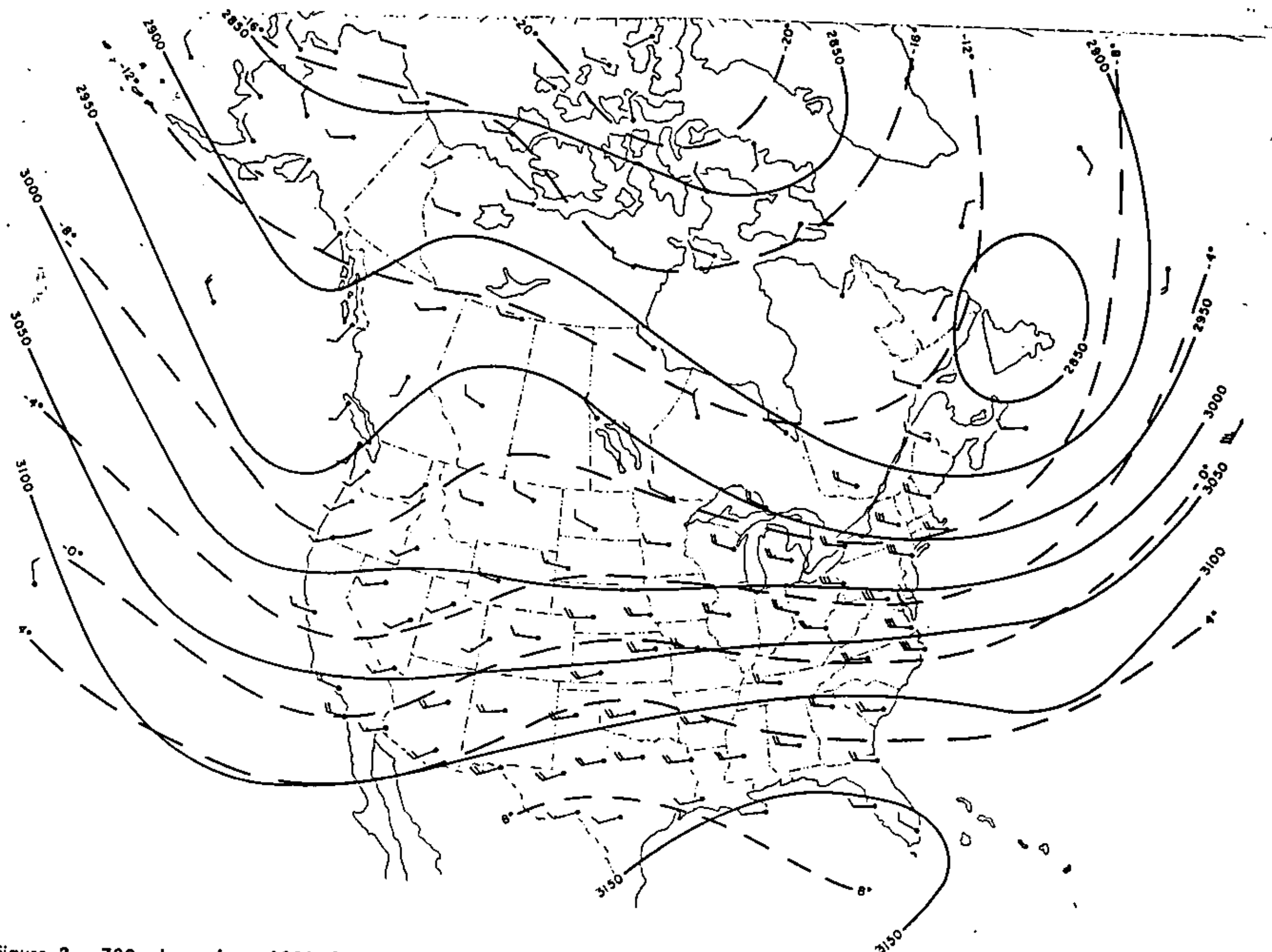

Figure 2.—700-mb. surface, 1200 G.m.t., April 1963: average height (geopotential meters) and temperature (° C.), and resultant winds. (Windspeeds in knots; flag represents 50 knots, full feather 10 knots, and half feather 5 knots. Wind data based on rawin observations.)

craft, chemicals, and ground attack were used during this critical situation, but the control organization was hampered by the size and number of fires.

Fuel Moisture, Buildup Index, and Classes of Fire Days

The fuel moisture is the moisture content of fine dead fuels, such as the surface layers of hardwood leaves or pine needles on the forest floor. The buildup index is a number on a 100-point scale that is directly related to the dryness of the layer of litter-type fuels (approximately 2 inches deep) that lies immediately beneath the surface layer. It is computed by cumulating daily factors according to the surface fuel moisture as reflected by the fuel moisture indicator sticks.

A day may be designated as one of five classes of fire danger. The fuel moisture, buildup index, windspeed, and condition of lesser vegetation are integrated by means of a fire-danger meter (Southeastern Station Meter, Type 8) to give a Burning Index. The range of Burning Index is divided into five classes for planning and operational purposes. Class 1 indicates low fire danger, and class 5 indicates extreme fire danger. With the buildup index already high, combined with a dry cold front, wind, etc., all areas except northern West Virginia experienced a class 4 or class 5 fire danger day on April 4.

Summary

1. The temperature was above normal in March and April.

2. Precipitation was below normal for the most part in all but March. After March 15 most of the precipitation fell on a few days through April.

3. The combination of lack of precipitation and above-normal temperature and sunshine caused the forest fuels to be very dry and brought about the most critical spring fire-weather season since 1942.

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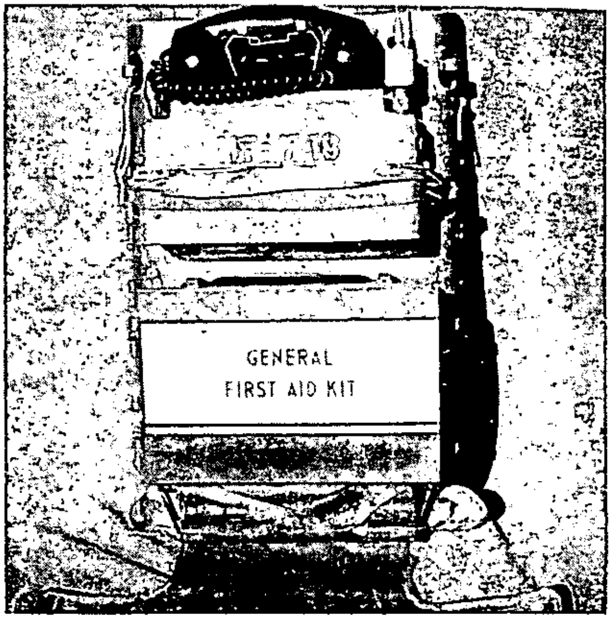
THE EMERGENCY BACKPACK KIT

Gerald F. Ewart, *Supervisory Fire Control Aid,*

San Bernardino National Forest

The emergency backpack kit illustrated provides a radio for communication, first aid kit adequate for a 25–30-man crew in case of multiple injuries, and fusees to be used for emergency escape, burning out and firing. This pack was used extensively during the 1962 and 1963 fire seasons by the Del Rosa suppression crew and proved to be very practical. It provides for the crew's safety so many times overlooked because these items were not available when the crew began work. Previously the items were handcarried to the fireline, which resulted in their not being readily available when needed.

The contents of the pack are mounted on a canvas backpack board. A piece of nylon cord secures the radio, two small blocks of wood keep it level, and a short length of aluminum angle keeps it from sliding down. The first aid kit is mounted just below the radio with four small bolts. The fusees are mounted at the bottom of the packboard with heavy elastic. A cover is need to protect the radio and first aid kit from dirt and scratches. This can be made at any canvas shop for about $10. Other crews should also find this pack useful and easy to make up.



Emergency backpack kit.

A PORTABLE FIRE-WEATHER FORECAST UNIT FOR USE ON BACK-COUNTRY FIRES

Howard E. Graham, *Meteorologist,*
Division of Fire Control, Pacific Northwest Region

A portable fire-weather forecasting unit, developed by the Forest Service in cooperation with the Weather Bureau, will make local fire-weather forecasting available to firefighters in unroaded back country. This information has been unavailable because meteorologists were unable to take conventional mobile fire-weather forecast units into remote areas. The new unit contains all items needed for forecasting by the meteorologist at the fire and can be taken wherever horses can walk or helicopters can land.

The portable fire-weather forecast unit is compatible with Weather Bureau mobile units and other Weather Bureau communication equipment, and contains all items needed by the fire-weather forecaster for receiving weather data and compiling a forecast. Not included are topographic maps of the fire area and personal needs. Included are (fig. 1)

1. Radio for receiving current weather conditions from observers around the fire, and long-distance radio for receiving worldwide weather data from a special Weather Bureau transmitter.
2. Tent, worktable, chairs, and weather plotting charts.
3. Instruments for sampling weather conditions near the fire.
4. Small items such as paper, pencils, erasers, envelopes, and antennas for long-distance radio.

The equipment is packed for shipment in five wooden boxes (fig. 2). Total weight is 720 lb. Upon arrival at the fire camp, the equipment must be unpacked and assembled before the meterologist can begin forecasting.

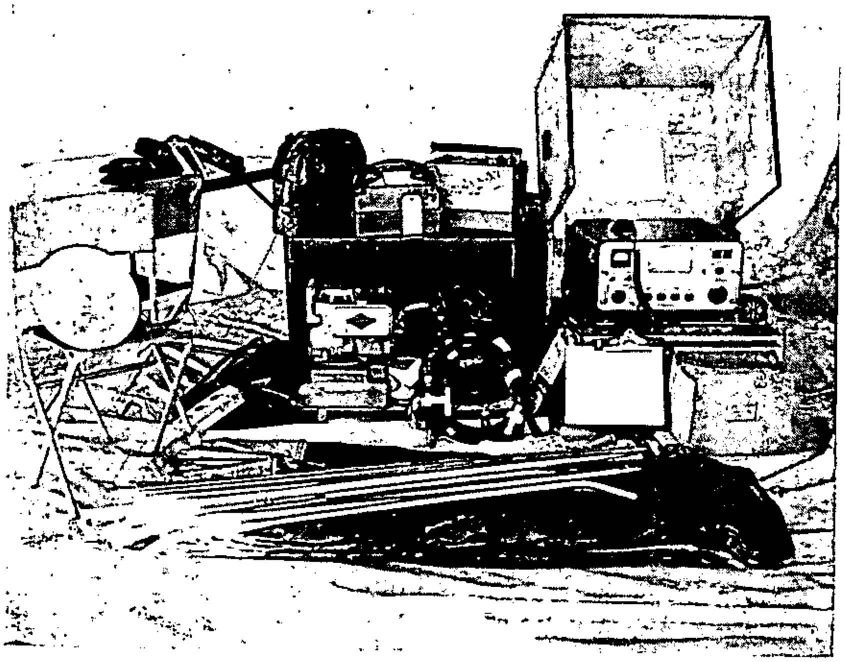


Figure 1.—Components of portable fire-weather forecast unit.

Figure 2.—Portable fire-weather forecast unit ready for dispatch when needed.

Once assembled, operation will be similar to regular Weather Bureau mobile units. By agreement, Weather Bureau fire-weather meteorologists will operate the portable forecast unit whenever they are available. Therefore, although the unit will be ordered by the fire control agency, the decision for its use should be made jointly by fire control officials and Weather Bureau meterologists. One, possibly two, meterologists will operate the equipment. They will need to be assisted by one or two weather observers provided by the fire boss.

The portable fire-weather forecast unit is available for use anywhere in the country. It is stored in the Region 6 Fire Cache at Portland, Oreg. Dispatching will be handled like any other firefighting equipment. If the unit is needed, the Regional Dispatcher should be contacted to arrange transportation and other details.

AN UNUSUAL POTENTIAL CAUSE OF FOREST FIRES

C. S. CHESTER, *Research Officer*, and E. J. HOPKINS, *Technician*,
Forest Research Branch, Ontario District Office, Canada

Stories of forest fires caused by focusing the sun's rays on a suitable fuel by pieces of broken glass or water in bottles are usually discredited as highly improbable or merely imaginative. Occasionally, though, one finds firsthand an ignition source that adds credence to the stories.

In April 1963, as part of a silvicultural project, small greenhouses (6.5×6.5×5 feet, sloping to 4 feet at rear) were erected in an aspen stand located in Essa Township near the town of Barrie. The greenhouses, of light frame construction, were covered with polyethelene sheeting.

On June 17, Department of Forestry personnel detected the smell of something burning and, on investigating, found a strip of charred and smoldering duff approximately 12 inches long in one of the greenhouses (fig. 1). Close examination revealed that rainwater had collected on the roof of the shelter, and the resultant pool was acting as a burning lens. The pool was dumped and the smoldering material extinguished.

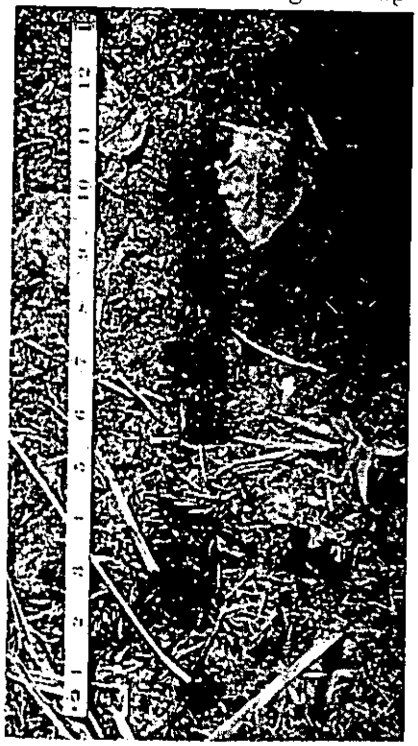


Figure 1.—Charred strip in duff.

At the time of discovery the pool was approximately 2½ inches deep and contained an estimated 1½–2 gallons of water (fig. 2). No information is available on how long it had been there. The shelter was in full sunlight from about 7:30 a.m. (e.s.t.) on the morning of June 17. The smoldering duff was discovered at 2:35 p.m. and according to calculation had been smoldering for approximately 50 minutes.

Conditions inside the greenhouse at the time of the incident were as follows:

Drought.—The duff layer was extremely dry, having received no moisture since the greenhouses were erected in April.

Air temperature. — The maximum air temperature on the day of the incident was 102° F. inside the shelter and 86° F. outside. Inside and outside minimum temperatures the night before were 38° F. and 36° F. respectively.

Relative humidity. — The relative humidity inside the shelter was approximately 25 percent; outside it was 23 percent. The higher relative humidity inside the shelter was probably due to transpiration and restricted air movements which prevented this moisture from being readily carried away.

Wind.—Ventilation of the greenhouses was by means of small vents located just under the roof. Air movements inside were thus minimal.

Duff.—The floor of the shelter was covered with partly decomposed aspen leaves, bracken fern fronds, and other herbaceous ma-

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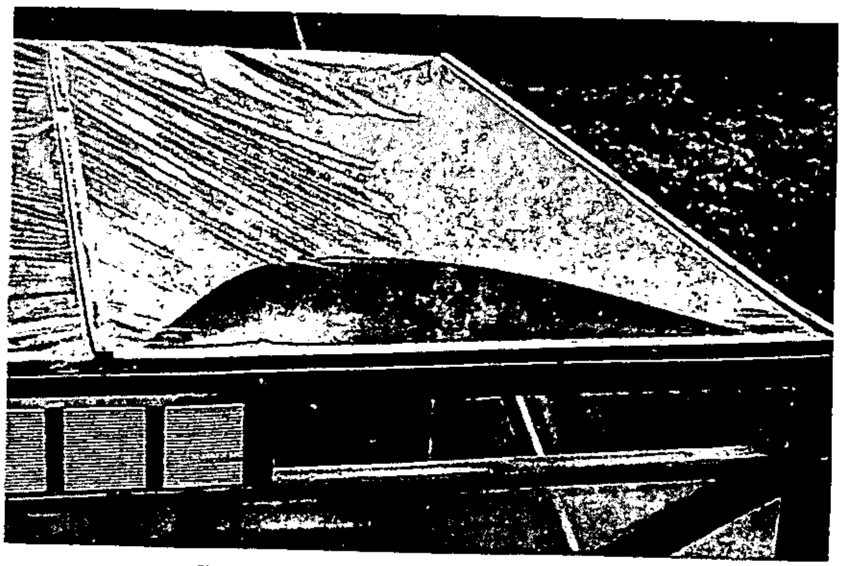


Figure 2.—Pool of water on greenhouse roof.

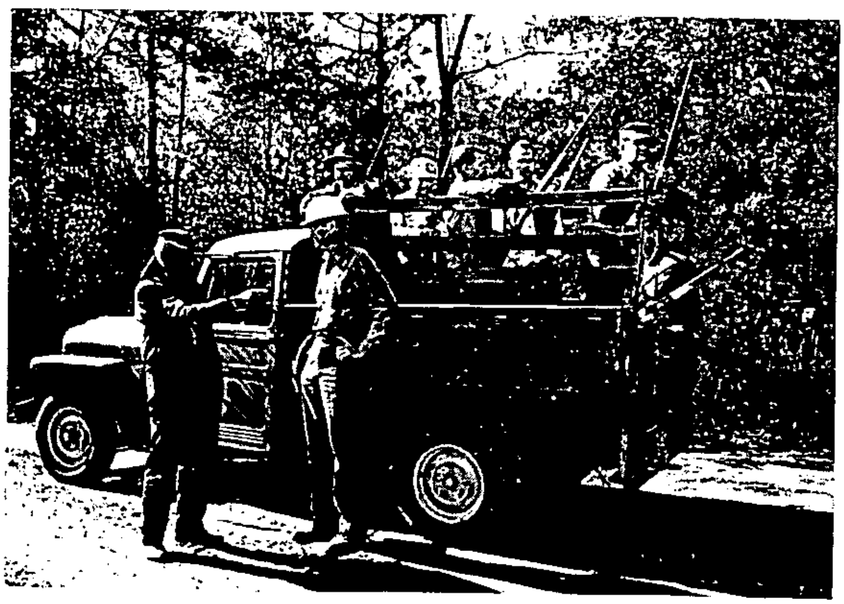
DEER HUNTERS ARE CAREFUL WITH FIRE WHEN PROPERLY APPROACHED

DAVID D. DEVET, *Forester, National Forests in South Carolina*

What would you do if 9,000 deer hunters descended on your Forest and scattered over 800,000 acres during the driest October in 22 years? This was the problem facing the South Carolina Forestry Commission and the Sumter National Forest in the piedmont area of South Carolina in October 1963. Personnel of the South Carolina Wildlife Resource Department went "all out" to help.

A series of planning and strategy meetings with representatives from the Wildlife Resource Department resulted in many procedures to make the hunters conscious of fire prevention. Game wardens contacted and registered every hunter and asked their cooperation. Posters reminded hunters to be careful. Newspaper articles invited hunters to participate in organized hunts and requested their help in preventing fires. The South Carolina State Forestry Commission conducted a series of TV and radio programs about the dry forests and hazards of fires.

James W. Webb, Director of the South Carolina Wildlife Resource Department (left), receives citation from Forest Supervisor Ray W. Brandt of the National Forests in South Carolina for outstanding cooperation in fire prevention during the drought of October 1963, when 9,000 hunters visited the Sumter National Forest.



Carolina for outstanding cooperation in fire prevention during the drought of October Forest, contacting a group of deer hunters in October 1963.

U.S. Forest Service personnel conducted an intensive hunter contact program. The theme was: "You are welcome—come and enjoy yourself—this is your forest—the woods are extremely dry—please help us in preventing fires—we are confident you will be careful." Information concerning roads, hunter camps, and deer concentrations was provided. Game wardens helped organize drives and provided guidance and direction. The dry weather practically eliminated stalking.

Continued on page 15

NEW SPARK ARRESTER LEGISLATION IN CALIFORNIA

The California State Legislature passed Senate Bill No. 643 at its 1963 session, and Governor Brown approved it on July 23, 1963. The sections pertaining to spark arresters follow:

Section 20. Section 4167 of said code is repealed. (Public Resources Code)

Section 21. Section 4167 is added to said code, to read:

4167. Except as provided herein, no person shall use or operate any internal combustion engine which is operated on hydrocarbon fuels on any forest, brush, or grass-covered lands without providing, and maintaining in effective working order, a spark arrester attached to the exhaust system. For the purposes of this section, a spark arrester is a device constructed of nonflammable materials specifically for the purpose of removing and retaining carbon and other flammable particles over 0.0232 of an inch in size from the exhaust flow of an internal combustion engine that is operated by hydrocarbon fuels. Motor trucks, truck tractors, buses and passenger vehicles, except motorcycles, are not subject to the provisions of this paragraph provided the exhaust system is equipped with a muffler as defined in the Vehicle Code.

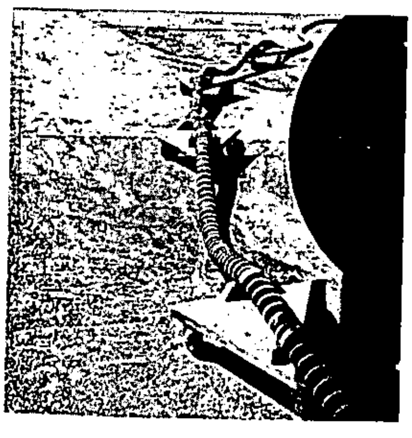
Provided, further, that spark arresters affixed to the exhaust system of engines or vehicles, as described in this section, shall not be placed or mounted in such a manner as to allow flames or heat therefrom to ignite any flammable material.

Provided, further, that all mobile equipment, including trucks, tractors, bulldozers, and other mobile equipment engaged in lumbering, logging, and other industrial operations in any forest, brush, or grass-covered land, shall also be equipped with and carry at all times a serviceable shovel for use in the prevention and suppression of fire, except that mobile equipment used in the business of a common carrier or railroad does not have to be equipped with or to carry a shovel for use in the prevention and suppression of fire.

RETARDANT HOSE SKATE

George Carberry
Wenatchee National Forest

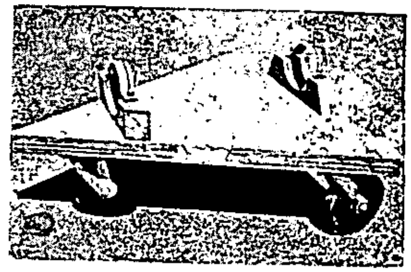
At a retardant base, up to three men are required to drag charged hose from aircraft to aircraft without hose skates. A hose skate which eliminates excessive wear on retardant transfer hose for filling air tankers was developed for the Wenatchee Air Tanker Base.

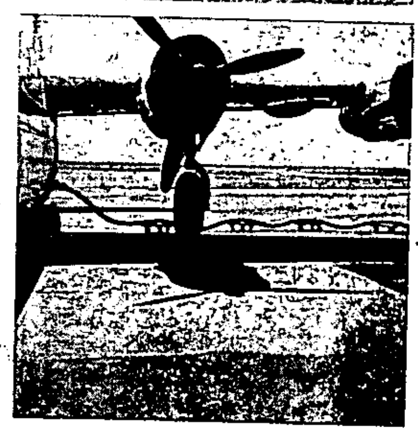


(See photographs.) With skates placed about 7 feet apart, one man can move a hose line easily. The cost of construction and materials is soon repaid in reduction of manpower and hose wear. One sheet of 4 by 8-foot plywood will make eight complete hose skates.

List of Materials

Item	*Quantity*
¾-inch outdoor plywood, 24×24×24 inches	2 pieces
Lumber, 2×4×8 inches	2 pieces
5-inch ball-bearing rubber-tired casters	3
3-inch conduit clamps	2
5/16×7-inch bolts	4
¼×2½-inch bolts	12





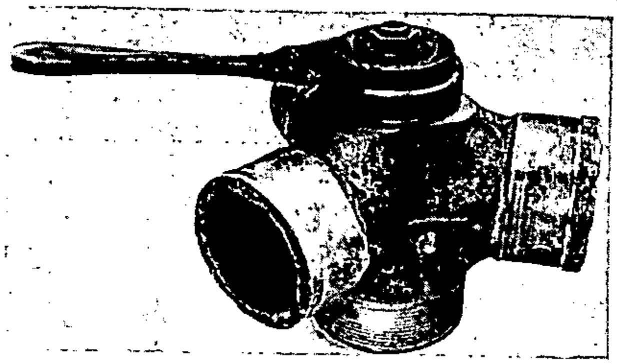
MODIFICATION OF 3-WAY VALVE ON RETARDANT PUMPS

HORACE G. COOPER, *Fire Equipment Engineer, Pacific Northwest Region*

Here's how Region 6 solved a problem involving 3-way valves used on retardant handling pumps at air tanker bases. The 3-way valve is used on both the suction and discharge sides of retardant pumps. This valve permits adjustment of the nuts that attach the handle to the rotating plug. It is necessary to tighten the adjustment in the suction line to prevent air leakage. On the discharge side, the pressure often wedged the plug so tight that the valve became very hard to turn. As originally designed, the valves were hard to operate.

One manufacturer developed a modification of the valve so they could space the plug. This made the valves easier to work, but the plug attachment was still critical. If it was loose, it leaked air; if a little tight, it turned hard. Corrosion between the aluminum casting and the brass plug presented a problem.

We have installed a grease fitting in the valve to lubricate the plug, with a waterproof lithium-base grease. The grease fitting is placed about midway between two of the outlets and about midway



between the top and bottom of the valve (see photo).

With the grease fitting installed, the grease is forced in as the plunger is turned. Thus, the aluminum face of the casting and the brass face of the valve plug are coated with the waterproof grease. The treatment is effective in making the valves work easily, in stopping minor leaks of both air and retardants, and in preventing corrosion and sticking of the aluminum and brass parts of the valve.

Forest Fires and Fire Weather—*Continued from page 9*

4. Approximately 10 frontal systems passed through the District in April. Generally the fronts were lacking in moisture content.
5. The surface winds associated with these dry frontal passages in April made the work of controlling fires more difficult.
6. The high temperatures and low dewpoints and relative humidities caused fuel moisture values to be as low as 3 percent on many days in April.

Acknowledgements

We wish to thank the U.S. Forest Service Regional Offices at Upper Darby, Pa., and Atlanta, Ga., and the Southeastern Forest Experiment Station, Asheville, N.C., for furnishing the data in table 1, and the National Weather Records Center, Asheville, N.C., for most of the information in the figures.

Unusual Cause of Fire—*Continued from page 12*

terial. The surface of the duff had been lightly disturbed by raking, and the light litter removed before the greenhouses were erected.

Herbaceous plants. – Scattered bracken ferns up to 23 inches high were the dominant vegetation in the shelter. Also found were aspen suckers, wintergreen, and bindweed. Density of the plant cover was never sufficient to provide heavy shading of the duff.

Deer Hunters—*Continued from page 13*

This outstanding cooperation among the hunters, State organizations, and the Forest Service resulted in an almost perfect record. Only one small fire occurred during the entire season, and it was quickly extinguished by hunters and game wardens. Thus, intensive personal contact, use of cooperating agencies' personnel, mass media appeals, and welcoming the hunters and expressing confidence in their care with fire paid big dividends.

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The April '64 Fire Control Notes contained an article, "Use of Air Pressure Powered Water Tanks in West Tennessee," which described a simple low-cost slip-on forest firefighting tanker. It has been called to our attention that industrial safety codes in some states prohibit the use of certain types of water tanks in air-pressure discharge systems. Persons contemplating construction of pressurized water tanks should follow local industrial safety codes to ensure that proper tank types and appropriate pressure relief valve systems are used.

PROPANE GAS INSTALLATION FOR LOOKOUT TOWER

Howard Burnett, *District Ranger,*
National Forests in North Carolina

Provision of utilities at isolated lookout tower installations has long been a "bugaboo" for fire control supervisors. Albert Mountain Lookout on the Wayah Ranger District of the National Forests in North Carolina presented such a problem. Heating and cooking were done with wood stoves, lighting was by means of kerosene lamps, and there was no refrigeration.

When modernizing this tower, the decision was made to convert to a propane gas system. For a total charge of $701.90 a local propane gas company furnished and installed a 500-gallon propane tank; gas piping, valves, etc., to the tower cab; two 50-watt equivalent gas lights; a 60,000 B.t.u. vented heater; and a 2-cubic-foot refrigerator and 3-burner gas stove combination unit.

An alternative to the gas installation was to run a powerline about 5 miles cross-country, and provide a complete electric installation, at an estimated cost of $10,000. A gas installation is by far the less expensive of the two. In addition to the cost savings compared with electric power at this location, other advantages over wood or coal fuel are compactness; cleanliness, no ashes or wood chips; faster and easier cooking; refrigeration; and elimination of cutting, hauling, and storage of fuel.

The gas is purchased from a local propane supplier for 20¢ per gallon. We use about 500 gallons of the gas per year, costing us about $100. The 500-gallon tank requires only one refill trip per year. Because of the rough road to Albert Mountain, passable in dry weather, it may be feasible to locate the tank some distance from the tower.