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FIRE CONTROL NOTES

A PERIODICAL DEVOTED TO THE TECHNIQUE OF FOREST FIRE CONTROL

FOREST SERVICE • U. S. DEPARTMENT OF AGRICULTURE

FORESTRY cannot restore the American heritage of natural resources if the appalling wastage by fire continues. This publication will serve as a channel through which creative developments in management and techniques may be communicated to and from every worker in the field of forest fire control.

Volume 20 Number 2

FIRE CONTROL NOTES

A Quarterly Periodical Devoted to the

TECHNIQUE OF FOREST FIRE CONTROL

The value of this publication will be determined by what Federal, State, and other public agencies, and private companies and individuals contribute out of their experience and research. The types of articles and notes that will be published will deal with fire research or fire control management: Theory, relationships, prevention, equipment, detection, communication, transportation, cooperation, planning, organization, training, fire fighting, methods of reporting, and statistical systems. Space limitations require that articles be kept as brief as the nature of the subject matter will permit.

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INDIVIDUAL DEVELOPMENT: POWERHOUSE FOR SUCCESSFUL FIRE CONTROL

JACK KERN
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Saving and protecting human lives, natural resources, and private properties of great value—these are the Nation's continuing objectives in fire control. Each of us is bound to these objectives —through our work, beliefs, and respect for the people in the fire-fighting organizations.

A hard-hitting, successful fire combat team is made up of highly trained and developed individuals. Training gives the basic experiences in instruction, learning, and doing to meet basic job requirements. Development includes continuous training but goes far beyond it—

To help an individual reach his maximum capacity for service on a job.

To prepare him for greater responsibilities through widened perspective and experiences that broaden understanding.

To change attitudes.

To deepen the sense of responsibility for aiding the development of others—through good supervision.

To inspire self-development—from which all of the above actions must start.

One of our greatest sources for increased fire manpower—without employing more people—is to increase the competence, the understanding, and the skills of those now in our respective organizations. And actually this increase in power can be quite a simple and effective process—if we want it to be:

It starts with setting a personal *individual goal*—to be the best lookout, a highly competent fire dispatcher, the best "fire general" in the unit, a highly skilled research scientist or staff specialist in fire control.

It progresses by following a considered trail, which charts how the man and his employing service can work toward that goal through self-improvement and good supervision.

These steps require joint action between the man and his supervisor—leading to increased competence and satisfying careers. The results will provide added manpower—critically needed in the complex years ahead.

Devising an individual development plan takes analysis, which is hard work. But a firm start can be made with purposeful friendly discussions between the supervisor and the individual. Such talks give the supervisor a chance to gage the individual's strong points based on performance—the opportunities for im-

proved performance—experiences gained or needed—skills in need of sharpening—additional knowledge required for a new assignment—encouragement for study in a new subject. To be most useful these discussions should lead to a simply written individual training or development plan. Here are some of the points to consider in preparing this plan:

1. What are the training or development objectives (instruction in crew leadership, aerial operations, line construction, fire boss responsibilities)?
2. Who can best help—instructor (crew foremen, dispatcher, staff fire specialist)?
3. How to best do it—method (field demonstration, technical study, seminars)?
4. When—sequence and timing (during fire season or nonfield season)?
5. Where—place of training (on-the-job, training school, university)?
6. Provision for followup (field inspections, discussions on progress, encouragement in further reading and special studies).

These individual plans form a basis for preparing a broad development program for each work unit—because they reflect individual needs.

With a copy of the plan in hand, the man has set down, through joint analysis with his supervisor, some personal goals for self-development. These goals become shared values. His organization establishes the scheduled opportunities and facilities to help reach them. These are acts of good supervision—for which there is no substitute. But the will of the man to learn, to grow, to improve by inspired leadership—this is the core of personnel development.

Here then is the dynamo. The individual, generating self-created power, gains momentum with job counsel, coaching, and systematic planning of broadening experiences. For example, older and more skilled personnel can be assigned to take instructor courses or to plan and lead fire schools—or join the Toastmaster's Club to improve speaking skills—or be appointed to serve on inter-unit work committees or inspection teams.

In the Forest Service, with the personal leadership of our Chief and our Director of Fire Control and with strong field support, a substantial start in this process is underway. Our results to date show promise. In essence, we believe that skillfully *planned* investment of time with our people in training and development is needed now—to insure an effective operation in the future. We will welcome the ideas, the questions, and the thinking of others in working toward a mutual goal—achieving the best possible administration of the fire services with competent and inspired people who can travel along highly productive and satisfying careers.

THE NATIONAL FIRE TRAINING FILM PROGRAM

E. M. BACON
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Training is essential to insure the availability of competent personnel for fire control work. Since stepped-up prevention efforts reduce the number of fires, and more adequate manning and effective suppression reduce the size of fires and acreage burned, training must increasingly supplement extensive experience.

One phase of the accelerated training effort in fire control has been the development of a national fire training film program. Many diverse fire control subjects are suitable for training films. Establishment of a training film program and determination of subject priorities has been made difficult for that reason. A factor bearing on this is the level of fund allocation for such a program, which competes with other fire control needs and fire training approaches. The final decision on subject coverage in the film program was made following review and comment by Forest Service regions and stations. Priority was assigned to fire behavior training and the tactical use of aircraft in fire suppression.

The Fire Behavior I Series is designed for fire crewmen and foremen in initial attack. Series II includes more advanced instruction dealing with fire behavior factors in large fire suppression. In addition to the national program, regional film production of subjects having local application will continue.

This plan for fire control training films will insure orderly development designed to meet existing needs on a priority basis within the limits of funds allocated to this work. Development is not yet complete. The more complex fire behavior relationships will require research not only to obtain a more clearcut understanding of these relationships, but also to determine the best techniques for film presentation. As these progress and as changes in needs and priorities occur, adjustments will naturally follow. Still, in this program we have a longer look ahead; a charted course that will constitute both a mandate for action and a specific plan to meet objectives in fire training.

Film Title	*To be completed in fiscal year—*
1. Prescribed Burning in the South	1959
2. Fire Equipment—Plows	1959
Fire Behavior I Series	
3. Introduction	1959
4. Current Weather	1961
5. Fire Behavior Principles	1961
Fire Behavior II Series	
6. Fire Weather	1962
7. Advanced Fire Behavior	1962
8. Safe Practices in Fire Suppression	1960
9. Slash Disposal	1960
Air Attack Series	
10. Helicopter	1960
11. Air Tankers	1960
12. Fire Prevention Methods	1961
13. Snags Can Kill	1962
14. Suppression Tactics	1962
15. Fire Danger Measurement	1963
16. Fire Danger Rating Application	1963
17. Air Traffic Control, Management and Operation	1963

THE FIRE CONTROL TRAINING PROGRAM OF THE NORTHEASTERN FOREST FIRE PROTECTION COMMISSION

ARTHUR S. HOPKINS
Executive Secretary

The Northeastern Forest Fire Protection Commission was created by an interstate Compact approved by the Congress and ratified by the six New England States and New York in 1949. Its purpose was to promote effective prevention and control of forest fires on a mutual aid basis in the 43,000,000 acres of forest land within the seven Compact States.

At its first annual meeting, the most significant action taken was the establishment of a technical committee composed of the seven State Foresters to supervise its training program. The program was to be designed to make it possible for the Commission, on short notice, to assemble from the several States uniformly trained overhead personnel capable of functioning as well-coordinated, smoothly operating teams to handle large fires anywhere in the region. Small or normal size fires were deemed to be the responsibility of the States.

This objective differed widely from that of the training programs of the several States in that it was to be confined to the training of overhead personnel in fire control organization, methods, and techniques. State administrative paper work, law enforcement, fiscal regulations, etc., were not considered to be a responsibility of the Commission but that of the particular State in which a mutual aid team might be called to operate.

It was out of the question for the Commission to hold training meetings in all the States. Some method of training on an interstate basis had to be developed, through which the training could be carried back to each separate State.

Interstate training sessions lasting 3½ days are held annually in February. The subject matter is prepared in lesson plan and narrative form and presented by the Compact training team to about 40 trainees. These men are State fire control officers of the district chief or ranger grade. The trainees are trained to act as training officers in their own States. It was early recognized that the States that were most aggressive in in-state training would benefit most from membership in the Commission.

In developing its training program, the training team has worked out a unique and practical procedure of assembling and presenting its material in complete and noncontroversial form. At the start it was thought possible to rotate the training team mem-

bers from year to year. However, as the project proceeded, it was evident that a background in previous lessons was essential and that the trainers greatly improved the quality of their subject matter and the manner of presentation as they became more experienced. The training team now consists of one or two representatives of six of the States, two or three from the Forest Service, and the Executive Secretary who, with one of the Forest Service members and a State Deputy Commissioner, act as Advisors. The procedure is as follows:

1. Subjects are determined and assigned in late spring or early summer at a preliminary meeting of the team. This gives each member time to do some work on his assignment before the final preparatory meeting.
2. The team and advisors meet in the offices of Region 7 of the U. S. Forest Service in Upper Darby, Pa., about December 1 of each year for a period of a week or more.

   At this meeting the lesson plans and narratives are prepared. The team members work at a large table and when one member has completed the first draft of his subject, he reads it to the others who discuss it in detail and may offer suggestions for changes.

   The member then redrafts his material to make it conform to the consensus of his teammates. The draft is then read and rediscussed. A third draft is sometimes necessary. When agreement among all the members is reached, the draft is submitted to the advisors and discussed with them. If substantial changes are then indicated, the whole process is repeated, i.e., from team members to team advisors.

   When fully approved by everyone, the material is processed for mimeographing and inclusion in the lesson material for the next winter meeting to be held the following February.

   This procedure results in resolving differences of opinion and produces material which can be applied throughout the region or wherever similar conditions are found.

This "Teacher Training College" approach has worked out exceedingly well and the combined in-state programs of the various States now reach over 1,000 individuals and groups annually. In these in-state sessions the material presented by the trainee teachers is tailored to the capabilities of the particular group attending.

For example, in one State woods industry employees, such as foresters, camp superintendents, and woods foremen, are trained in the line overhead jobs only. In another, where the National Guard is under orders to provide food and quarters for fire fighters, its officers have been trained in the appropriate jobs in the service section. State personnel, both fire control and others, are also similarly segregated for training purposes in accordance with their experience and ability.

In order to make its lesson material more available, the Commission published in 1954 a "Manual for Fire Control Organization" for reference use. This has had wide distribution in the

United States, Canada, and overseas. A second manual, "Forest Fire Fighting Methods and Techniques," is now on the press.

The standardization of fire control organization and methods brought about by the Commission's training programs and manuals has enabled the fire control personnel of the Compact States, when confronted by similar conditions of fuel, topography, wind, and weather, to think alike, plan alike, and act alike on the fireline.

SUMMARY

1. The Commission has established for its area uniform procedures for the suppression of both large and small fires.

2. By cooperative training, it has built up an interstate organization of high esprit de corps available to handle forest fire emergencies in any of the Compact States.

3. By in-state training, it has brought about a progressive improvement in the efficiency of the fire control job generally.

4. The Commission has proved beyond a doubt that interstate cooperation in forest fire control, and especially in training, is possible and very much worthwhile.

COMPACT FIRE TRAINING COMES TO THE SOUTH

S. D. BEICHLER
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The Interstate Compact idea is not new. Interstate Compacts have covered many activities for many years. However, Compacts in the field of forest fire prevention and control are comparatively new. The first such, the Northeastern Forest Fire Protection Compact, was authorized by Act of Congress in 1949 and has been active ever since. This embraces the States of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.

An act of Congress in 1954 authorized establishment of the Southeastern Interstate Forest Fire Protection Compact. This embraces the States of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. It was subsequently ratified by the legislatures of all the concerned States and has been active ever since.

This 1954 act also authorized establishment of the South Central Interstate Forest Fire Protection Compact embracing the States of Arkansas, Louisiana, Mississippi, Oklahoma, and Texas. This too has been ratified by the State legislatures and has been active.

The purpose of these Compacts is to promote more effective forest fire prevention and control through integrated fire planning and to facilitate mutual aid among the compacting States. Provision is made in each case for an annual Compact meeting.

In addition to adopting a Compact fire plan, the Southeastern Compact voted to prepare and adopt a Compact fire organization manual. A manual committee was appointed and, working with representatives of the Division of State and Private Forestry, Region 8, U. S. Forest Service, prepared and published a forest fire manual. This was intended to be an organizational manual covering organization buildup from the small one-or-two-crew fire to the large campaign-type fire. Its purpose was to foster mutual understanding and agreement as to organization, responsibilities, duties, etc. Much use was made of material from a number of sources, including a similar manual prepared by the Northeastern Compact and material of several of the Compact States. The manual was published in February 1957. At the 1957 annual meeting of the Compact it was voted to hold a Compact-wide training session on the manual itself.

Borrowing from the experience of the Northeastern Compact, a training team was set up composed of one member from each Compact State, along with representatives of the Region 8 Division of State and Private Forestry. An agenda was worked

up for a 3-day session covering all sections of the manual. Topic assignments were made to members of the training team, along with suggested format for lesson plans, and time allotted for presentation. Each member then wrote up his material and prepared training aids. A "dry run" of the program was held in May in the regional office at which time final changes and polishing put the material in the form in which the team agreed it should be. An effort was made to use as many different types of training aids as were adaptable. All lesson plan material was reproduced and assembled in individual binders to be given to each trainee at the beginning of the session.

The training session was staged in August with a total of 58 registered, including training team, trainees, and observers. These people represented nine States, two national forests, the Northeastern Compact, U. S. Weather Bureau, Forest Fire Research, the Chief's office, and two regional offices. The consensus was that the session was well worthwhile and did much to promote understanding of big fire organization and to effect standardization among different organizations.

Subsequent to the session, similar in-state training sessions have been held by a number of States. It is hoped that these are forerunners of a series of profitable Compact-wide training sessions.

FIRE CONTROL TRAINING IN GEORGIA

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Disastrous project-sized forest fires raged through drought-stricken north Georgia in 1952 and south Georgia in 1954 and 1955. Thousands of acres of timberland were consumed by the raging flames before willing but uncoordinated government, industrial, and other fire fighters finally contained the fires.

These destructive fires vividly emphasized the need for prearranged, coordinated plans for use against fires that are severe enough to require the combined efforts of State, federal, and private forces to contain them. The men and equipment had proved themselves willing, competent, and adequate, but unified direction was needed to utilize them quickly and efficiently.

Plans were made after the 1955 fires to start classroom work on fire fighting organization. Field drills to apply the classroom work were also set up; practice in the field, without the stress of a going fire, was an urgent need. Fire fighting manuals of the Northeastern Forest Fire Protection Commission, the U. S. Forest Service, and others were studied to obtain a southern organizational plan. Georgia observers also journeyed to other southern States to watch their fire fighters conduct field exercises.

The first classroom instruction began in 1955 at the Forestry Commission's state-wide training school at Rock Eagle 4-H Center. District foresters and State headquarters personnel taught classes on the fundamentals of fire organization. In 1956 an actual fire camp using the organization outlined in the Southeastern Interstate Forest Fire Protection Compact commission manual was set up at Rock Eagle. Commission personnel were conducted through the camp and the duties of each fire organization position were explained to them.

The Forestry Commission followed up that summer session with an actual field exercise in November 1956. A complete fire camp and suppression organization utilizing key plans, service, and line positions was set up in Jones County on pulp company property. The exercise was conducted from start to finish with the same sense of urgency that an actual fire calls forth.

One hundred twenty selected county forest rangers, district office fire control personnel, fire investigators, and State fire control headquarters personnel participated in the problem, which lasted 2 nights and parts of 3 days.

"Operation Dead Out," as it was called, required that a crew comprised of Commission personnel relieve at dawn a theoretical crew that was already battling the fire. Camp was established the first afternoon and a "fire" line, following the boundary of the pulp company land, was marked so that fire fighters would have

a definite fireline the next day. All personnel met to hear the problem, which was then given to the fire boss. He met with the plans, service, and line bosses to organize the men into their various key jobs in each section of the fire organization. The service and plans sections then began to print maps of the "fire" and assign tractors and vehicles so that the problem could become quickly operational the following morning. They operated from the mobile communications trailer (fig. 1).

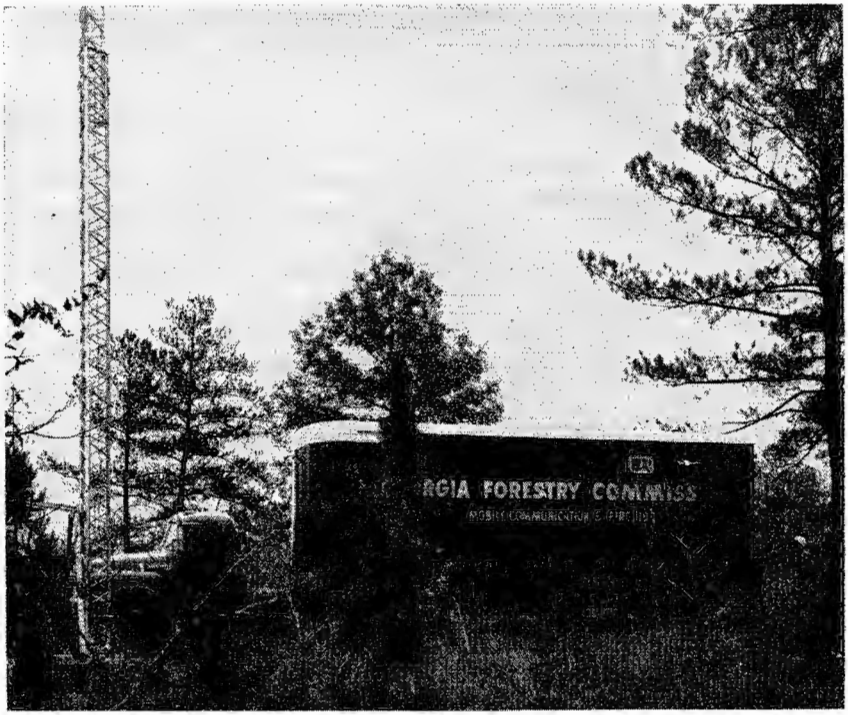

FIGURE 1.—Headquarters trailer was nerve center of "Operation Dead Out."

The men rose early the following morning and replaced the theoretical crew on the "fire" line at 6:00 a. m. Each major position of the line, plans, and service sections was assigned an umpire, who not only made notes for the post-exercise critique, but also submitted various operational problems during the exercise to the bosses assigned to him. These problems were typical situations which arise in the course of an actual fire, such as vehicles running out of fuel, breakovers, equipment breakdowns, injuries to personnel, or requests for maps. Personnel involved went through all the steps necessary for their problems' solution. The problems were submitted to the crews on the fireline so that the chain of command upwards could be exercised in requests for help, in giving orders, and in shifting personnel and equipment. This method provided more training for all involved and insured the complete functioning of the organization.

Following a simulated large breakover which required a major realignment of both reserve personnel and those on the fireline, the problem was declared over. Smoke bombs had been set off during the day to mark smaller breakovers and add to the realism. Law enforcement personnel assisted in traffic control and apprehension of simulated arsonists. Air patrol was flown by Commission pilots, who used blocked-off highways for landing strips (fig. 2).

The men were fed from a field kitchen (fig. 3). Lunch was delivered to the crews in the field. All hands slept in tents provided by the Commission from its emergency warehouse at Macon. Camp was dismantled the second morning and the men returned to the Georgia Forestry Center at Macon for a detailed critique. Each umpire reported. The bosses of the segments of the organization who had an umpire were allowed to make rebuttals. The men all agreed that the field training was invaluable, so plans were begun for five bi-district field problems in 1957.

In November 1956, State foresters and fire control chiefs from throughout the South approved the manual of the Southeastern Interstate Forest Fire Protection Compact commission. "Dead Out" had already followed the manual closely in its setup and execution. Subsequent Forestry Commission field problems would do likewise.

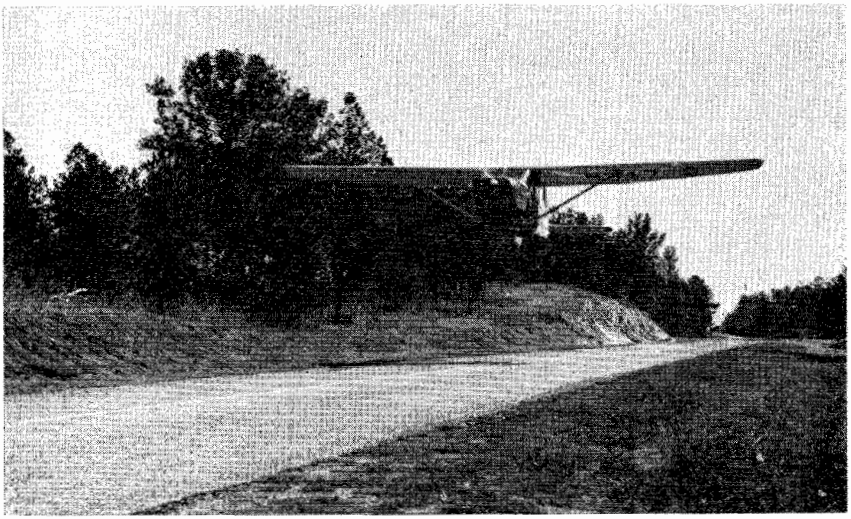

FIGURE 2.—Commission pilots landed on blocked-off highway during "Operation Dead Out."

The 1957 series of field exercises lasted a day and a half each. They opened with afternoon camp erection and briefing. Actual field work took place the next morning and critique and camp breakup followed in the afternoon. Approximately 110 men participated in each problem. They came from all agencies represented in the district fire committees, including the Georgia Forestry Commission, U. S. Forest Service, U. S. Corps of Engineers,

FIGURE 3.—County rangers served as cooks on "Operation Dead Out," November 1956. Range is located in kitchen trailer.

U. S. Army, U. S. Fish and Wildlife Service, National Park Service, Lockheed Aircraft, pulp mills, sawmills, land companies, and individual landowners. The district fire committees are the heart of the fire fighting organizational system, for they are composed of representatives of government agencies, industry, and individuals who possess forest fire fighting equipment and the desire to join forces with the Commission should the need arise.

Positions of authority were divided on each exercise among the participating groups, except for the fire boss, who was always a Forestry Commission district forester. In most cases, personnel from the organization on whose land the "fire" was being fought were assigned to the fire boss as staff advisors. Umpires checked personnel as before and submitted individual problems to them for solution (fig. 4). The umpires were experienced fire fighters who were more familiar with the organization than were the men they worked with. Thus, they were able to furnish sound constructive criticism, or praise when it was merited. Critiques again followed each exercise (fig. 5).

Camp facilities, including mobile headquarters and field kitchen trailers, portable radio antenna, water and lighting systems, service and fuel trucks, supply trailer, tents, cots and sleeping bags, were furnished by the Commission from their emergency stores at Macon. The kitchen had a daily capacity of 1,000 meals.

FIGURE 4.—Simulated repairs were made on fireline in Treutlen County, August 1957.

Air patrol planes and pilots were provided by the Commission. Ten to twelve fire suppression tractors furnished by state and forest industry were used by the line sections at each exercise. The exercises were organized on the basis of three sectors, each of which was manned by three tractor units. Specialist crews operated bulldozers and chain saws. Service, plans, and supply personnel operated out of the camp headquarters.

The exercises functioned smoothly and without injury to the men despite rain, dust, fog, and temperatures that ranged from below freezing to almost 100°F. Camp sites were located in Waycross State Forest, on private property in Treutlen County, on U. S. Forest Service and pulp company property in Dawson County, and on pulp company land in Jones and Worth Counties.

Morale was high and all hands agreed that invaluable insight and experience were gained in the problems of directing large numbers of men and equipment against a big fire. Flaws in equipment operations and the execution of problems were revealed. These could be remedied at later study sessions.

In 1958, key Forestry Commission personnel were selected to teach classes on the Southeastern Compact commission manual in every forestry district. Beforehand, the instructors attended a

FIGURE 5.—Commission Fire Chief J. C. Turner, Jr., presided over Treutlen post-exercise critique.

training school taught by Commission and U. S. Forest Service personnel who had attended an earlier regional Southeastern Compact commission training session. The 1958 schools also included critiques and analyses of the 1957 field problems. Plans are now being drawn by Forestry Commission fire control chiefs for another series of field exercises which will give further training in the operation of the fire fighting organization prescribed by the Southeastern Interstate Forest Fire Protection Compact commission manual.

OPERATIONAL AND SAFETY TRAINING FOR SMOKEJUMPERS

DIVISION OF FIRE CONTROL
Region 1, U. S. Forest Service

Smokejumping has become recognized as a very essential part of our fire fighting organization, as indicated by the expansion of some of our present units and the development of a new station by the Bureau of Land Management in Fairbanks, Alaska. The Bureau of Land Management has requested Region 1 to recruit and give refresher training to a 16-man crew to be transferred to them in time for the 1959 fire season. The plan is to recruit experienced jumpers from Regions 1, 4, 5, and 6 to fill this crew. The Bureau of Land Management will, in the future, establish a training base of its own in Fairbanks.

The Missoula unit also recruits and trains a 24-man crew for basing at Silver City, N. Mex., from early May to July 15 during the peak of Region 3's fire season. This crew is normally composed of jumpers from the combined regions and headed up by a smokejumper foreman from Region 3. The Region 3 season is such that these jumpers can report back to their respective home regions for the peak fire season there.

Region 1 has maintained its Missoula unit at 150 jumpers. Thirty-three States, Canada, and the Hawaiian Islands were represented among the trainees in 1958. A majority of the recruits are college students representing numerous fields of study; forestry students are most numerous.

The type of individual desired for the smokejumper job is a self-reliant one, accustomed to rugged outdoor life with at least one season of forest fire fighting experience and a good recommendation from his former supervisor. There are strict physical requirements, and the recruit must pass a physical examination. Even then, some of the recruits lack the coordination and physical ability to make the grade as jumpers and are washed out in training.

PARACHUTE TRAINING

New smokejumpers receive intensive physical and mental conditioning during their 4 weeks of training. Prior to the first jump, the training is directed toward two major objectives. The first of these is to have the individual in top physical condition. This is accomplished by regular calisthenics and running before breakfast. The second major objective is mental conditioning, instilling confidence and know-how in the individual.

After completing the classroom and orientation phases of training, the new jumpers spend 32 hours on the parachute training units. They spend 4 hours a day learning the techniques they will be using while making actual jumps.

The parachute training consists of four phases; namely, the mockup, letdown, tower, and Canadian swing landing trainer. Training received at the mockup includes practice exits from replicas of aircraft, learning to steer and handle the parachute, ground-to-air signaling, and suiting up within the aircraft. At the letdown, the trainees learn how to get down out of trees safely via a 100-foot nylon rope which is carried in a pocket attached to the right pant leg. The emphasis is on speed, correct procedure, and safety. At the tower, from a height of about 30 feet, the men learn how to maintain proper body position when dropping from aircraft. The Canadian swing landing trainer has recently been employed to teach men how to hit the ground when landing. Physical conditioning is also stressed in the teaching of landings.

The parachute training is carried on in an individualized manner. Each trainee is helped and guided in accordance with his own particular needs and ability. Individuals are warned if they show weaknesses and additional time is often spent correcting them. Daily grades are kept for each phase. At the end of the training the weak trainee is placed at a job for which he is better fitted.

The instructors are all foremen and squad leaders with years of experience. The materials and methods taught have been standardized over the years and represent the most safe and efficient way of parachute jumping.

After the men have progressed from the parachute training units, they make seven practice jumps. The first is made in a large field. The jump spots get progressively smaller and more skill is required if the trainee is to land in them. The fifth jump consists of a timber jump where each jumper hangs up in a tree. After landing, they learn how to retrieve their parachutes from the trees. The seventh, or graduation jump is made under conditions much like those experienced in an actual fire jump.

The training is much shorter for smokejumpers with previous experience in this field. They receive 1 week of refresher training that includes 8 hours on the parachute training units; they make two parachute jumps during this week. These men are required to report for work in good physical condition.

The equipment that is used for jumping is continually being improved. Two parachutes are used at all times. One of these is a standard 24-foot-diameter chest-type parachute which is used only in case of emergency and is manually opened. The other is the 28-foot-diameter back-pack parachute which is opened by means of a static line attached to a cable within the aircraft. This parachute opens within 2 to 3 seconds after the jumper leaves the plane. A 32-foot-diameter parachute has been brought into use recently. This parachute decreases the rate of descent but in strong winds has a tendency to be harder to handle. However, it has good possibilities.

The smokejumper suit consists of a pair of trousers and a jacket constructed of heavy canvas duck. This suit is well padded in the critical areas. A heavy webb strap has been incorporated into the trousers. This strap fits under the instep of the boot and forms a loop up into the crotch area.

A regular football helmet with a wire mesh mask attached is used for headgear. The nylon letdown rope is carried in a pocket attached to the trouser leg. The parachute harness is constructed of heavy nylon webbing.

FIRE TRAINING

Smokejumper fire training is accomplished simultaneously with the parachute training to break up the monotony of just one phase of training. The time each day is divided equally between the two phases.

New jumpers are subjected to 84 hours of fire training (lecture and field time inclusive) basically designed to fully train even an entirely green individual to the minimum standards of a skilled smokechaser. The variety of previous experience of men from different parts of the country makes it necessary to so plan the fire training phase. Additional time up to 16 hours is devoted to bringing the slower individual to the desired level of performance. If he fails to meet this standard he is released from the project.

Individual fire training classes consist of the following:

Safety, 4 hours
Smokejumper behavior, 4 hours
Tool instruction and demonstration, 8 hours
Orientation lecture, 4 hours
First aid, 8 hours
Fireline building instruction, 4 hours
Snagging, 4 hours
Spur instruction and cargo retrieving, 8 hours
Maps, 4 hours
Area compensation and pacing, 4 hours
Compass, 4 hours
Woodsmanship, 4 hours
Radio training, 4 hours
Fire suppression lecture, fire behavior and escape, 8 hours
Rescue and litter training, 4 hours
Practice fire suppression, 8 hours, with additional time if needed.

The 4-hour safety lecture is followed up throughout the training and jumping season. A yearlong project officer is designated as the Project Safety Officer and heads up a very aggressive safety program. For training purposes this Safety Officer position is rotated annually among the yearlong project employees.

HELICOPTER TRAINING

In addition to the training given in use of specialized fire equipment such as chain saws and powered trenchers, smokejumpers are familiarized with helicopter usage to facilitate correlation with the jumper program. In 1958, all Region 1 jumpers were checked out in helicopter safety rules and in requirements for helicopter landing spots. In addition, 89 men with previous smokejumping experience were trained in helijumping techniques and made 3 training jumps. These are free-fall jumps from a helicopter flying at low elevation to permit delivery of men to locations where the machine cannot land.

FIRST-AID TRAINING AND RESCUE TRAINING

Smokejumpers receive 8 hours of first-aid instruction during their initial training. An equal amount of time is devoted to lecture and to practical application. This training is extremely

important because of the time element and the difficulties involved in transporting an injured person from an inaccessible area. Experienced jumpers receive 4 hours of refresher first-aid training. Foremen and squad leaders who are employed throughout the year are required to hold advanced first-aid cards. A pain-relieving drug, demerol, is available for emergencies. Human albumin is also available and can be administered by trained personnel.

The parachute project maintains a rescue unit and a one-wheeled stretcher. A ten-man crew is normally dropped with this stretcher. Smokejumpers receive 4 hours of training in stretcher bearing and related rescue training. In recent years the helicopter has been used predominantly for evacuation of the injured. An arctic toboggan, or pulka, and snowshoes are available for winter rescues. The regular crew of smokejumper personnel, supplemented by a number of experienced smokejumper students attending Montana State University and local smokejumpers on leave for the winter, make up the rescue teams for off-season missions.

SPOTTER TRAINING

Due to the turnover in qualified personnel, the job of training spotters is constant and will probably go on as long as there are smokejumpers. The spotter, a fully qualified smokejumper with special training, finds the fire by using maps and then directs the plane and the assigned jumpers in the dropping operation.

Selection of jump spots involves dropping drift streamers (strips of crepe paper 10 inches wide, 9 feet long, and usually pink), which fall at approximately 1,000 feet per minute. This is done to determine wind drift and velocity. Final selection of the target spot is affected materially by the amount of wind, type of terrain, and hazards involved. The decision to jump is the responsibility of the spotter.

The spotter candidate usually undergoes a training period covering an entire summer's operation before he is dispatched to spot without supervision. The spotter trainees, numbering from four to ten, are given 4 hours of ground training involving map reading, safe flight techniques, radio procedures, checking jump gear, jump spot selection, and spotter to pilot signals, both hand and light.

During the jump training of new smokejumper candidates, the spotter trainees are given every opportunity to acquaint themselves with spotting. Most training jumps are made in early morning to predetermined locations, so that the spotter trainee has opportunity to work out other problems that will confront him without contending with spot selection or wind correction.

All spotters start their training in the Ford and Travelaire aircraft, principally because their slow speed gives the man better opportunity to learn map reading and also gives him more time when spotting to make any necessary corrections.

Aircraft on fire missions are required to give periodic position reports. The spotter does not necessarily make this report himself but works closely with the pilot who usually has control of the

radio. A fully qualified spotter of several years' experience accompanies the new man on the first three fire missions and on the first flight in a new aircraft.

Cargo dropping is another job in which spotters are given training. Close cooperation between pilot and dropper is necessary for a safe and satisfactory performance. The pilot is in full control of this operation and signals the dropper or droppers by bell or voice when to release a bundle. Putting the cargo in the right place and readily accessible to the men on the ground is an essential operation in aerial fire control.

Pilot training usually follows the same pattern as spotter training; that is, an experienced pilot rides with the trainee through several jumper runs until the trainee has the procedures, such as signals, cutting the engines, slow flying, and cargo dropping, sufficiently in hand so that he can operate by himself. A pilot, just as a spotter, is continually learning for the first few years and does not attain full proficiency until he has dropped jumpers and cargo under varied conditions.

Pilots and jumpers must be trained to take immediate action on all fire calls with no unnecessary delays. We are constantly striving for better methods and new ideas to improve our getaway time in the safest manner.

There is constant effort to improve equipment and techniques in all phases of smokejumping. For example, it is hoped that we can eventually come up with a jump gear and fire pack arrangement so condensed that jumpers will be able to economically pack their own gear out of the woods for distances of 5 or 6 miles at least. Work is being done now on a bicycle-wheeled carrier for retrieving smokejumper equipment by the jumpers on their return from the fires.

AIR TANKER ATTACK—TRAINING IS THE KEY

NOLAN O'NEAL
Assistant Chief of Fire Control, Region 5, U. S. Forest Service

The chemical-dropping air tanker has established itself as one of the most effective and promising of all fire tools. More than any previous type of equipment, it is the result of desire and effort by fire fighters, research personnel, equipment development technicians, and private industry. In 1954 a few rather ineffective trial drops were made on a fire in Southern California's Cleveland National Forest. In the summer of 1958, over a million gallons of chemicals were dropped on 135 fires in California's national forests (fig. 1). With enthusiastic help from the California Division of Forestry, 50 airfields have been approved and equipped with mixing and storage facilities. Veteran Forest Service pilots have led the way with converted surplus Navy torpedo bombers. Four such ships have been used to set standards, develop techniques, and provide leadership. Dozens of private aircraft and pilots have been carefully checked to establish a fleet of air tankers ranging from the versatile little Stearman with 120 gallon tanks through TBM's, PBY's, F7F's, a B-25, and a PB4Y-2, the latter capable of laying down a 2,000-gallon retardant band in a single pass.

The fire boss who orders air tankers has at his command a fire fighting weapon of great speed, flexibility, and effectiveness. He must realize that he is using a costly and potentially dangerous technique—a technique that demands planning, organization, coordination, and control to a degree beyond any fire suppression

FIGURE 1.—TBM air tanker in action on the Monrovia Fire, Angeles National Forest, Calif., October 1958. (Los Angeles County Fire Department photo.)

method he has previously employed. With this realization, follows the obvious need for continuous, intensive training. Just as the handtool fire fighter needs training to work with his new ally, so people in the air attack team must be taught the skills of mixing, loading, communicating, directing, dropping, and gaging terrain, fuels, and air movements.

The following limited agenda is for all air attack personnel but is aimed specifically at the air attack pilot. Use only pilots and fire fighters who are thoroughly experienced and good instructors to do the training. Use all possible aids, such as recent air tanker movies and slides. Handbooks, illustrations, rules, and regulations are now available to help presentation. Most important of all, accept only seasoned mountain pilots as trainees, select men who temper confident aggressiveness with calm, mature judgment. Beware of "hams" or "hot pilots." Take carefully picked air attack men and school them in these essential subjects:

Fire behavior.—Emphasize atmospheric factors, local winds, fuels, and topography.

Fire organization.—Chart organization of personnel and equipment from small through large fire situations. Stress coordination and the place of air attack in the overall effort.

Air attack organization.—Detail duties and responsibilities of air tanker pilots, lead plane pilots, air officer, air attack boss, air service manager, air traffic officer, fire and line boss. Show how each of these positions functions on a large fire or how they are combined on smaller ones.

Airbase procedures.—Credentials and checking in; landing; taxiing; spotting; loading; communications; takeoff procedures; precautions associated with load weight; airfield surface and length; altitude; temperature; visibility; traffic; turbulence; rules regarding passengers, photographers, news interviews, and local field procedures.

Communications.—Radio—Forest net, air net, unicom, other agencies. Visual communications—air to air, ground to air. Communication is the indispensable key to proper use of air tankers. Air tanker attacks should never be used until contact and control are established.

Strategy and dropping techniques.—Initial attack without lead plane—a job for experienced fire pilots only. Variations in dropping to fit the fire situation considering: intensity; spread; fuel types; ground obstructions; visibility; terrain; values; local winds; turbulence; and coordination with ground crews and equipment.

Safety.—The rules, regulations, knowledge, skills, and attitudes that must be observed to fly without accidents. A review of tragic accidents, and near misses, while using aircraft will make it evident that training to the point of perfection is imperative. Many air attack pioneers have given their lives in the past 30 years, including ten men lost in 1958, six of whom were fighting fire with air tankers. These men believed in the program and we owe it to them to see that its successful development continues. At the same time, we must resolve to expand air tanker use only as fast as intensified training can assure effectiveness with safety.

CALIFORNIA DIVISION OF FORESTRY TRAINING CENTERS

W. G. FRANCIS, *State Forest Ranger*, and D. L. RUSSELL, *Associate State Forest Ranger, California Division of Forestry, Southern California Training Center*

In its 1956 fire plan revision, the California Division of Forestry concluded that "With increasingly complex equipment and increasing resource values to protect, it is apparent that our fire-going personnel must be given more formal and comprehensive training in order to be competent in all phases of their job."

The initial stride toward accomplishing this objective was made in July 1957 with the establishment of two training centers; one at Ramona in San Diego County for personnel in the southern part of the State, and one at Sutter Hill in Amador County for northern personnel.

Established primarily for the teaching of basic skills and techniques to classes of new fire control and administrative employees, each training center is staffed with a ranger and an associate ranger. Qualified personnel from the districts in which the two centers are located assist with the instruction.

The initial training year began November 4, 1957, and terminated June 12, 1958. This included five 20-man classes of 5 weeks duration for forest fire truck drivers. The 1958–59 program, scheduled October 13, 1958, through June 12, 1959, will have five classes for truck drivers and one 5-week course for forest fire fighter foremen. This will be a pilot course for the following year.

In the forest fire truck driver program, each class extends for 5 weeks, Monday through Friday, the only interruptions being major fire calls (there have been some). Each day (8 a.m. to 5 p.m.) is devoted to scheduled subjects, while the evening hours (7 to 9 p.m.) are devoted to review and study, as needed.

The trainees perform all station, equipment, and kitchen upkeep between the hours of 6 and 8 a.m., during the noon break, and between 5 and 6:30 p.m.

The driver curriculum includes 52 different subjects dealing with the job of the forest fire truck driver. The bulk of the instructional time, however, is devoted to fire control and forest fire truck operation. Safety training is part of the curriculum.

The training center field area covers approximately 140 acres. Most of the training hours are spent in specially designated parts of this area that have been developed to give practical field training in basic driving, fire practice (fig. 1), fire road and truck trail driving, precision driving, hand fireline construction, hose lays, acreage estimation, heavy equipment operations, physical training, and pump operation and drafting. Classroom work includes theory, principles, and demonstration.

FIGURE 1.—Single truck fire fighting instruction. Five-man crew making a moving attack on a running fire in light brush and grass. (Simulated, by using oil in a trench.)

The two training centers are the first organized units with the specific job of training for the Division of Forestry. Their future appears assured; field reaction indicates that the graduated trainees are well equipped with the basic knowledges required of their jobs.

As the training centers continue in operation and gain additional experience, develop new training aids, work up lesson plans, and new courses and techniques, their benefits will be demonstrated throughout the organization by the increased efficiency of better trained employees.

DEVELOPING AND TRAINING A FIRE WARDEN

CARL BURGTORF
Ranger, Cumberland National Forest

In areas where forest fires endanger timberland values, a program is necessary whereby fire-suppression crews can be trained, equipped, and alerted so that fire can be attacked at a moment's notice. Again and again over a period of many years the National Forest Warden organization has proved its worth in fire control. These dependable volunteer fire fighters perform yeoman service each fire season. The work by fire wardens and crews in Region 7 has been estimated to be worth at least $75,000 each year, based on fire prevention and on savings resulting from early attack on going fires.

When national forests were established in the East shortly after passage of the Weeks Law in 1911, well-known responsible residents of forested areas were appointed as rangers. An outstanding example was the late Arthur A. Wood, who was made an assistant ranger on March 1, 1914, and rose to the position of Supervisor of the Monongahela National Forest in West Virginia.

Arthur Wood's early years on a farm in the Lost River Valley of West Virginia served him and the Forest Service well in the task of preventing and controlling wildfire on newly acquired national-forest land. For many years, he and his Lost River neighbors had collaborated to keep forest fires from their lands and buildings. Working together they used every means at their disposal to divert wildfires from their timber, rail fences, and farm structures. Pitchforks, forked sticks, branches, and brooms were used to rake firelines and beat out flames. At times they backfired from roads, trails, or fields; on several occasions, small communities were saved when backfires were set at strategic points.

As a ranger, Arthur Wood enlisted the leadership and cooperation of these local fire fighters. With obvious respect, a hearty handshake, and a friendly smile he appointed them as wardens and left them a bundle of tools (fig. 1). He always made personal contacts and displayed a sincere interest in the wardens and their families. Arthur Wood often said: "Local wardens are dependent on the land for their living. They, like us, are personally interested in its protection. We are natural cooperators." His policy and philosophy of cooperation have been preserved and they have continued to yield fine results.

Today, our fire wardens run the gamut of vocations from railroad president to marginal-land farmer with a $600 annual income. All are dependent on the land. Many wardens develop keen loyalty and independence. When asked the whereabouts of the local ranger, one elderly warden replied: "I haven't seen the ranger for quite a spell as I haven't had any fires. I'm taking care of my end of the district and he's taking care of his." This kind

FIGURE 1.—National-forest warden sign and tool box. Sign with name is erected at roadside in front of residence. Here District Assistant Ledford Perry and Warden Harrison Bryant discuss tool maintenance. Wardens also issue campfire permits to hunters and hikers.

of personal responsibility is impossible to buy, but it is often found in wardens and it usually extends to timber trespass and forest protection other than fire.

When forest fires occur, the wardens begin control action according to a plan that mobilizes manpower and equipment. The warden and his men usually are familiar with every acre in their assigned district; in fact, they may know the ground so well that it is difficult to get them to use a map. Most fire wardens can be reached by telephone. In some cases a telephone-messenger arrangement is necessary. Few causes of fires escape the attention of these alert wardens. They know the folks who are clearing land, cutting timber, and operating sawmills. They know how to "reach" these people.

In presuppression planning, it is recognized that fire wardens have regular day-to-day work to perform, and therefore cannot be expected to stand by without compensation. The usual procedure is for a lookout or dispatcher to inquire where individual wardens plan to work during the day and to arrange for a relay of messages to them. Cooperation of the wardens is remarkable. However, experience has proved that the fire organization must be strengthened as the fire danger increases. One time-proved plan is to alert a warden when the fire danger reaches High (80 on the Man-Hour to Control Curve of the Cumberland National Forest) and to place this warden on standby in pay status. If the fire

danger mounts to 90 on the curve, the warden's crew of six men may be placed on standby in pay status. This system provides a flexible organization adjusted to actual burning conditions and to the risk factor. Standby man-hours are doubled under high-risk situations such as the opening day of hunting season. This plan of operation insures that almost daily contact will be made with wardens during fire weather. They become familiar with district personnel and feel that they are a valuable part of the Service organization.

In return for his services a fire warden receives wages while on duty. But the average warden is not entirely motivated by pay; he takes pride in his job as warden. This feeling is further developed when wardens gather at training meetings. There they review experiences and see training movies and new equipment. This fellowship is an important part of the warden's reward, especially when meetings are planned in advance so that the men realize that the interesting and educational break in their normal routine is being arranged especially for them. At one meeting a national-forest warden, a Dartmouth graduate, became most articulate as he described his action on a particularly severe fire. Undoubtedly, he lost considerable income by being away from his business; however, the fire had occurred on a national-forest area where he liked to hunt and he was anxious to help.

It is most desirable for a ranger to consider forest fire wardens for positions as towerman, game manager, smokechaser, and patrolman or to offer them temporary jobs on tree planting or other crews. This provides incentives for younger men on the warden crews, strengthens the organization, and provides many other less tangible benefits. The ranger should strive to implant in the mind of each resident of the forest community the idea that ". . . the forest is a part of my environment, my community. When the forest benefits, I benefit. What is good for the forest is good for me."

For a forest fire warden organization to achieve and maintain top efficiency, it must have top leadership. Rangers should take advantage of every opportunity to improve efficiency through training and actual fire experience. The "4-step" training method has withstood the test of time: "Tell them why," "Show them how," "Have them do the job," and "Check them out." Use of this method can prevent accidents and lower suppression costs.

A lack of means for quick communication is a great handicap for a warden. This can be overcome by backing up the warden crew with regular Service personnel and their radio equipment.

Many wardens reveal an inability to direct others. Even where choice men have been selected, it has been observed that bright and energetic fire fighters who are willing and anxious to get results, do not know how to do so efficiently and safely. However, many aids are available to instructors and rangers. The new film BUILDING THE FIRELINE is tops in the field of visual aid. Such aids, together with leadership and practical demonstrations, will build proficiency.

Development of a warden organization is dependent upon the resident population, landowners, and permanent forest users. Many areas of remote forest land can be protected efficiently only by professional fire fighters. However, Region 7 fire planning is based on a volunteer warden organization. These volunteer firemen who assume responsibilities in protecting our natural resources should have the benefit of modern training methods. It is axiomatic that they must know fire behavior and suppression techniques in order to operate efficiently and safely.

Wardens should be given all necessary training when they are appointed. A minimum of one day a year refresher training should be planned. We have used the following check list in determining training needs and guiding the warden-training plan:

Job Elements	*Proficiency Expected*
Fire Prevention:	
a. Personal contacts	Explain the reasons for fire protection. Make courteous, friendly contacts with neighbors. Be well informed on fire laws.
b. Investigation	Determine fire cause, find and preserve clues. Identify witnesses and suspects.
c. Forest fire hazards	Recognize hazards, "what" and "why," and report to ranger.
d. Risks	Recognize risks. Instruct neighbors and others in the dangers of the use of fire.
Suppression and Presuppression:	
a. Map reading	Read a map sufficiently well to know one's own position and to locate other points.
b. Locate and report on fires	Tell where fire is located, fuel type that is burning, and expected fire behavior.
c. Operate & maintain a telephone	Change batteries, check fuses, identify symptoms of trouble, and report trouble.
d. Ground patrol	Serve as patrolman; make fire prevention contacts; use maps and fire tools, telephones, and radios.
e. Fire behavior	Know: (1) how a fire burns; (2) heat transfer; (3) moisture content of fuels; (4) size and arrangement of fuels; (5) weather; (6) topography; (7) how to recognize "blow-up" or unsafe situations.
f. Fire organization	Use tools, organize crews, and construct safe firelines.
g. Fire suppression	Control "one-crew" fire (point of attack; line location; mopup; fireline patrol).
h. Maintenance of tool caches	Maintain equipment to a satisfactory standard.
i. Calculate probabilities of fire spread and manpower needs	Compute initial fire-spread probability and relate it to manpower needs.
j. Personnel safety	Training in first aid.
k. Timekeeping	Keep time records.

TRAINING FIRELINE PLOW-UNIT FOREMEN

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Mississippi National Forests

As with other national forests, World War II left Mississippi without its trained manpower to control an annual average of 1,100 forest fires. By early 1945 though, the Regional program for mechanization of fire control forces had developed a reliable tractor-plow unit. Forest officers soon recognized the possibility of making initial attack on all fires with such tractor-plow unit equipment, provided that proficient operators could be developed.

The original team consisted of 5 men: a foreman, tractor-plow operator, and three fire fighters. To synchronize their efforts toward perfection and speed in the operation of tractor-plow units became a job of top fire priority for the rangers. It was recognized at once that strong foremanship was needed to guide and lead these mechanized fire suppression teams.

Initial guides and standards were prepared by the rangers for the training of a foreman and members of his team. Training progress was hastened by immediate analysis of performance on actual fires. Over a period of 12 months critiques were held on several hundred fires immediately following suppression action. At

FIGURE 1.—The foreman gives clear instructions and exercises positive control in guiding his plow unit.

these critiques, members of the fire crew discussed frankly all phases of the suppression operation. Ideas about the training of each member of the team were cataloged under three headings: responsibility, qualifications, and duties. The end result was a simple but effective set of standards for training these mechanized teams. In this training, initiative and alertness by every member of the team were stressed. The importance of clear instructions and positive control was never overlooked (fig. 1).

Parallel to the development of training standards was the discovery and improvement of special devices, such as tie-down locks for tractor and plow, unloading facilities, mud tongs, and other special items that made plow operation faster and safer. Modern transports, developed for hauling tractor-plow units, plus an improved network of roads, made forest fires more accessible to initial attack by mechanized teams. The average size of a fire during 1939–41 when manpower was plentiful and handtools were used, was 36 acres. During 1946–49, when mechanized teams were learning the tricks of the trade, the average fire was reduced to 15 acres. Now, with better equipment and better trained teams, the average fire size for the past 3 years has been 5 acres.

The development of proficiency by unit crew foremen has been made possible because: (1) detailed job-tested standards for every phase of the operation are documented in lesson plans, (2) all members of the crew are trained with the foreman and work together on a full-time, yearlong basis as a resource crew as well as a fire crew, and (3) suggested improvements in equipment or crew operation are recognized and adopted with majority approval.

PLANNING AND ORGANIZING A FIREMAN SCHOOL

JACK HEINTZELMAN
Fire Staff Officer, Mt. Hood National Forest

For years, Region 6 of the U. S. Forest Service has used a standardized 3-day spring training camp program for new and relatively inexperienced firemen. Similar programs are conducted on each of the 18 national forest units just prior to the fire season.

While it is recognized that experienced firemen cannot be created in 3 days, the training program is aimed at three objectives: first, provide the trainee enough basic training to get him started on his new job; second, instill in him the importance of his part in the overall protection program; and third, develop group spirit, teamwork, and interest in the job.

Experience has indicated that fireman training camps should be limited to not over 70 trainees. If there are more than 70 eligibles, 2 training camps should be held. Depending on local conditions, particularly travel time, 2 consecutive camps may be held in 1 location or 2 separate camps may be advisable.

The following points should be considered when selecting a campsite. Low elevation sites are preferred because of accessibility and more favorable weather conditions. A lookout station or a point which overlooks typical forest topography should be located within 4 miles by road. Areas suitable for instruction in small fire suppression and field problems in smokechasing should be readily available. The training camp should be located on one side of a well-drained, clear, level area of 5 acres or larger in size to provide space for parking, initial instruction in compass and pacing, and recreation. The camp should be located adjacent to a surfaced road. Electric power is desirable for lights and operation of projectors.

Region 6 was fortunate in having many such campsites in old C.C.C. camps; however, many of the structures in these camps have long since fallen into decay. The trend now is to construct project work centers which can be made available for firemen training sessions as well as for other uses.

Camps are run on a fire camp basis with a camp boss to arrange for the providing of messing facilities, bunk space, classrooms, transportation, supply and maintenance of fire tools, recreation facilities, first aid, and communications. In addition to the kitchen help and the camp boss, one or two assistants are needed. It is important that one of the assistants be expert at restoring fire tools after each use.

A typical division of training programs for the 3-day training session is as follows:

Primary lookouts	*Hours*	*Lookout fireman*	*Hours*	*Fireman*	*Hours*
Map reading & use	2	Map reading & use	2	Use of fire tools	2
Detection	6	Detection	4	Small fire supp.	6
Use of fire tools	2	Use of fire tools	2	Map reading & use	2
Small fire suppression	6	Small fire supp.	6	Smokechasing	6
Detection review	4	Smokechasing	6	Small crew fires	4
General guard duties	2	Gen. guard duties	2	Gen. guard duties	2
Forest test	2	Forest test	2	Forest test	2

As many of these subjects as possible are taught in the field under actual conditions. "Detection" courses include training at a fire lookout station. "Use of fire tools" is an outside course taught by people with competence in their use. In "Small fire suppression" actual fires are built, allowed to get a good start, suppressed, and mopped up. "Small crew fires" involves the construction of firelines under varying conditions. "Smokechasing" classes culminate in actual smokechasing by individuals over typical terrain for a mile or so.

Classes should be limited to 8 or 10 trainees. In a school of 70 trainees there may be 7 classes running at the same time. In view of the number and different lengths of the classes, it proves to be quite a problem to have all the trainees occupied all the time, classrooms available for all, transportation ready, and instructors available.

Instructors usually consist of district rangers and their principal fire assistants. Each instructor ordinarily has a competent fireman assistant instructor to aid in arranging of teaching aids and individual coaching. These folks may become future instructors. Instructors use regional training plans for each subject. The plans are comprehensive and designed to give the best coverage possible in the time available. Experience has shown that the best level of instruction is achieved when the plans are followed explicitly. Instructors report to the training camp the day before classes start. This allows them time to arrange their training materials and establish their field problems on the ground.

Trainees arrive at camp in time for the evening meal the day prior to the first day of instruction. Following supper a well-planned orientation meeting is held. At this time a safety court is appointed with a judge and assistants. This court is designed to uphold a good-humored safety program. On subsequent evenings violators are brought before the court and fined. Normally, trainees receive small fines, instructors larger ones. The training camp athletic equipment fund is the beneficiary of these fines.

The orientation program ordinarily consists of an introduction by the Forest Supervisor, followed by a program presented by forest staffmen and rangers on the broad objectives of the Forest Service, how and why it functions, the role of fire control, and the place and contribution of the trainee within the fire organization. The mechanics of the training camp are explained in the concluding remarks and the meeting ends on a note of "Ready to go." Evening programs are ordinarily limited to an hour and a half.

Another evening is handled as visitors' night. On this evening, following supper, contests such as softball games, packing, dirt throwing, bucking, and compass and pacing are held. Guests are introduced, awards are made. The safety court collects its toll.

The windup of the training camp is a written quiz on the subjects covered in the school. Following grading, the fire staffman retains the papers to analyze the results of the camp. The quizzes are then returned to the district ranger to use as an aid in followup training of the individual firemen.

Many forests award a plaque to the district whose trainees achieve the highest score in the combined games, contests, and forest test. It is considered an honor to win the plaque.

The training camp is just the beginning. Followup training is a must as soon as the trainee gets on his job; the training camp, however, has given him a good start.

FIRE CONTROL TRAINING AND EXPERIENCE RECORDS USED IN REGION 3

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One of the finest guarantees of success for a fire department is to have leadership in the hands of highly trained people with sound experience gained through doing the job and constant training in fire behavior, specialized skills, and the "know-how" of fire suppression. This is no less true in the field of forest fire fighting than in a city fire department. In the wild land fire fighting business, personnel are not full-time fire fighters; they wear "many hats." As a result, key fire positions are often filled with people who are only part-time fire fighters. This is unavoidable but it places strong emphasis on the need for a system of selection that can generally assure placement of the most highly skilled people in key positions.

This selection system has not been too refined and has led many times to difficulties in fire management. Personnel are presumably selected to fill fire positions on the basis of training and experience; actually, selections are often made on the basis of years in service. Often the written record of a selectee's training and experience on fires is either incomplete or entirely lacking. Actual fire experience may be negligible.

The Southwestern Region of the Forest Service recognized this several years ago. Forest fire staff officers had agreed in 1954 that there was a need to record the training and experience of all who had an active part in fire control work. It was at this time that Gordon Bade, Kaibab National Forest fire staffman (now retired), prepared an outline for regional use.

In 1956 and 1957 the region had far more fires than any other Forest Service region. Resource losses were high. During this period, especially in 1956, the region was at times hard-pressed for manpower to handle peak fire loads. Many employees were filling fire positions for which they were not fully qualified by experience or training. A recognized need for records was delayed because of heavy work loads and changes of personnel. Actually, it wasn't until 1958 that the records were started on all the forests.

It had been the custom in the past to issue fire experience cards (Red Cards) showing the individuals' qualifications as fire fighters. The qualifications were based quite often on personal opinion or years of service rather than on actual fire experience. Many individuals carried cards showing fire boss qualifications with inadequate experience to be so qualified. Forest supervisors and fire staff people became more fully aware of this when they started to pick project fire teams for their respective zones.

There were no records on qualifying experience and a great deal of assuming entered into the selection of persons for many positions. There was a tendency, for example, to assume that a man who is a ranger must have had much fire experience. Many such assumptions lacked foundations in fact.

An analysis was made of the larger fires. Some became large because of human failure. Some failures were due to lack of knowledge of basic fire fundamentals. The region began to use the expression "assuming assumptions" to point up the mistaken judgments and to emphasize the need for better training and better experience records.

Changeover moves slowly and time is needed to develop a smooth fire organization. A ranger lacking in fire training and experience is in no position to adequately train those working under him. In fire control there is no substitute for experience and training. Many of our people have been trained through experience with only a little formal pre-fire training. Learning by experience is expensive. It often becomes learning through mistakes, and mistakes in fire control can be costly in funds, resources, and lives. Formal training should always be a prerequisite to on-the-fire experience; both are important. The individual training and experience records are equally important.

Evaluation of training and experience is somewhat complex. Fires vary in size and complexity. The degree of training and experience needed to handle the fire job also varies, depending on whether the job involves the smaller fires that make up over 90 percent of the total, or the large project fires that make up less than 1 percent. Both require a knowledge of fire fundamentals. The first type of situation demands training and experience in rapidly controlling fires when small, and in preventing escape after control. The other requires the highest degree of training and experience in fire behavior under the worst of fire weather conditions plus the ability to quickly organize and manage a large fire organization.

Region 3 realized that training and experience records must be kept. The approach has been as follows:

1. Adoption of the previously mentioned Bade Training Outline which gives a record of (a) the individual's training and experience both on and off the forest; (b) the items in which the individual has been trained, the items in which he needs training, and the progress of the training; and (c) interviews on training and experience between trainee and supervisor.

2. Background material is furnished by the individual where no previous record has been maintained for him.

While the region attempts to set up training guides and regional training meetings, it is still a forest responsibility to train its personnel. Once the basic information on training and experience is recorded for all forest personnel it becomes the forest's job to earmark the individuals who have shown ability to handle certain phases of the fire job. The forest dare not "assume" too much in a person's ability without accepting the risk of inadequate performance.

While these evaluations are being developed the region has been working on three programs:

1. Carrying out a program of training or retraining all personnel in the fundamentals of fire behavior and fire control.

2. Establishing project fire teams in the three regional zones to be available on forest call to handle the more difficult fires. The project teams are chosen by forest supervisors and fire staffmen from those individuals who have proved their ability. The list of available names will be larger once the records are available for review. An attempt is made to fill top positions with known qualified people. At present, an inadequate reservoir of the "proven" class makes some "assuming" in picking people for other positions unavoidable. A regional office project fire team is also established. All physically able "field goers" are put into fire team positions that they can fill. Those in need of training also attend regional training meetings.

3. Providing training sessions for new specialities such as aerial tanker and helicopter operation, air cargoing, and safety.

By 1960 we plan to have a complete up-to-date record of each individual's training and experience. His Red Card will show the jobs for which he is definitely qualified. We hope then to gear fire training courses to fit the major needs. There will be beginners' courses in fire behavior and fundamentals of fire control, a more advanced course on the same subjects, and a plan to assign individuals to fires for both training and experience. We fully recognize that it will take a few years to establish the full program but a sound plan is now under way. We cannot afford to continue "assuming assumptions" in fire leadership qualifications.

A fair and current record of fire training and fire experience seems to be a sound foundation on which to start building competent fire leadership. It is basically more fair to a man if he is put into a job for which he is qualified. The record helps lay a base for each man's training needs. It should result in better fire management and a reduction in fire losses due to human judgment.

TRAINING IN THE TEN STANDARD FIRE FIGHTING ORDERS

WILLIAM R. MOORE
Forester, Division of Fire Control, Region 1, U. S. Forest Service

During April 1957 a task force was appointed by the Chief of the Forest Service to study ways the Service could strengthen its efforts to prevent fire fighting fatalities. One of the recommendations of the task force was that the ten standard fire fighting orders be adopted for servicewide use and committed to memory by all personnel with fire control responsibilities (fig. 1). These orders are now in general use by the Forest Service, and are being used by some State and private fire protection agencies and by other federal agencies having fire suppression responsibilities.

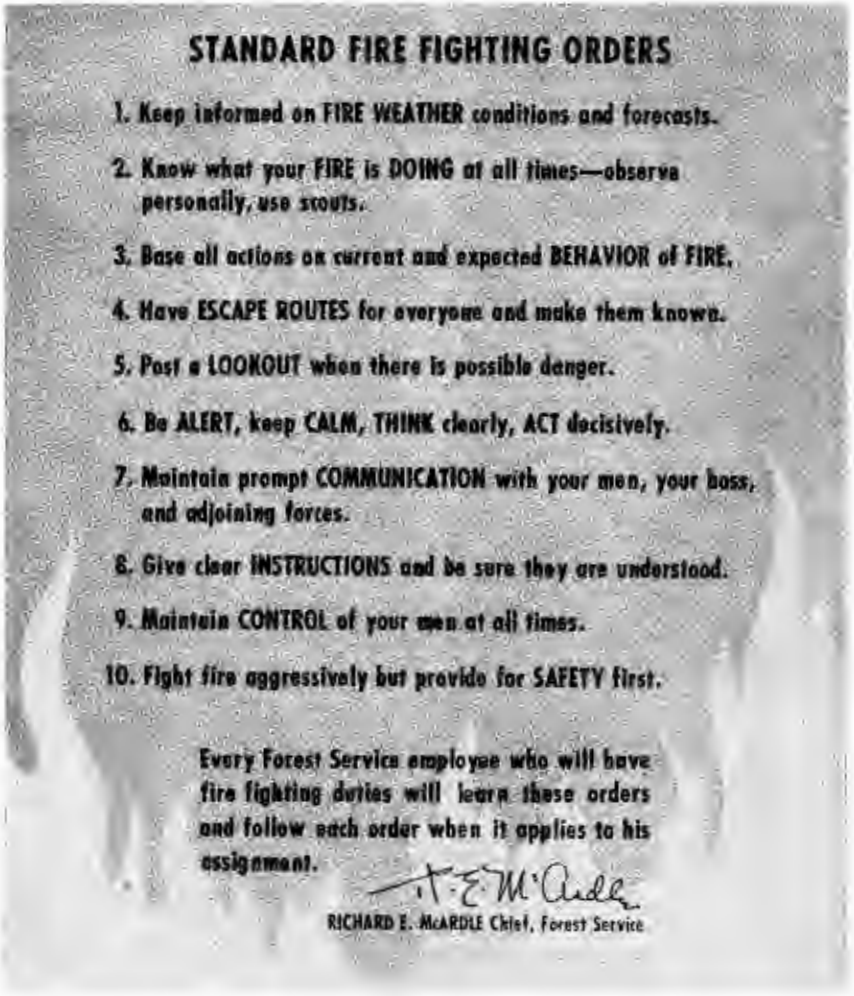

FIGURE 1.

Training, both initial and followup, is essential in order to apply these orders consistently on the fireline. Training efforts, to be effective, must probe deeply enough into the elements of each fire fighting order so that the trainee can understand *Why* the application of each order is necessary and *How* he can activate it.

The training program is logically divided into three steps:

Background: Why it is important to learn and apply the ten standard fire fighting orders.

Application: How these orders can be applied effectively on the fireline.

Followup: Further training on the job and a check on how well the orders are being applied.

Let us study each of these steps and develop some material to help instructors put across the important points.

Background.—The fire task force made a detailed study of 16 fires in which 79 men lost their lives from burning. This study revealed 11 factors which were significant in the burning of fire fighters and which were common to many of these fires. The ten standard fire fighting orders were developed to be used as a constant reminder for fire suppression people to strengthen their action in the areas where these critical factors were present. Large charts were developed at the 1958 Missoula Fire Behavior School which show these factors and the ten standard fire fighting orders. With the use of these charts an instructor can clearly show how application of the ten standard orders will strengthen performance in the critical factor areas. He can further enlarge on this subject with a brief review of fire case histories.

Application.—A series of cards large enough for small group instruction, and showing fire case histories which dramatized success or failure of each of the ten standard fire fighting orders, was developed at the Missoula Fire Behavior School; 35-mm. slides were made from these cards for use in instructing large groups (fig. 2). The application of the ten standard orders can be effectively illustrated by using these training aids.

Followup.—This is the payoff step in training and in the application of the ten standard fire fighting orders. You will recognize the orders as being a statement of fundamentals which should be second nature to every man with fire suppression responsibilities. Enthusiastic application of these fundamentals is necessary if we are to fight fires effectively and safely. It is on the fireline that the line officer can observe the results of the training program. He can conduct on-the-job training in the application of the ten standard orders. And perhaps most important of all he can detect weaknesses that will point the way to future training programs. For example, frequent failures in the application of standard orders 8 and 9 might indicate a need for intensive foremanship training; failures in applying orders 1 and 3 could indicate a need for more fire behavior training; inadequate equipment to meet the requirements of order No. 7 could be a warning that the fire equipment cache needs a change.

Strong emphasis should be placed on standard fire fighting order No. 10 at training sessions and during followup training in order to prevent the trainee from developing fear or hesitancy when he has the job of controlling difficult fires. Training is not complete until the trainee is convinced that the safest, most effective way to fight forest fires is to understand the enemy and to attack it aggressively, applying sound suppression tactics until it is beaten.

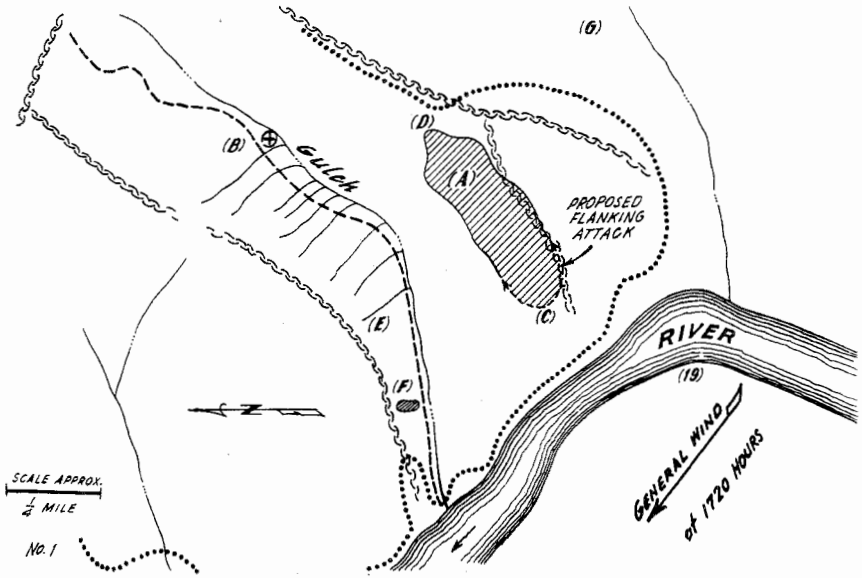

FIGURE 2.—Case history designed to emphasize standard fire fighting order No. 1. "Keep informed on *Fire Weather* conditions and forecasts."

The Situation

Fuels in this area were very dry. The afternoon burning index was about 70 and the temperature was in the 90's. The fire (*A*) was burning on a ridgetop in combined Douglas-fir, ponderosa pine, and grass fuels and was about 60 acres in size. The side of the gulch opposite the fire had light, fast fuels of dense cured grass and scattered grass and timber. A 16-man crew was positioned near the head of the gulch (*B*) and prepared to attack the fire. Scattered cumulonimbus clouds were present and moving in a northwesterly direction over area at (*G*). Rain evaporated before it reached the ground.

Proposed Action

1. Because of the size of the fire, the crew would proceed from point (*B*) around the slope opposite the fire and approach the fire from below.
2. Anchor a central line at bottom of fire (*C*) and construct line uphill both ways in a flanking action.
3. Continue flanking action until the fire is pinched off at the head (*D*).

The Results

1. The plan was activated and the crew moved down the slope opposite the fire to (*E*).
2. The fire across the canyon had begun spotting and moving downhill. From (*E*) the crew could see that a spot fire (*F*) had crossed the canyon and was spreading rapidly toward them in fast fuels.
3. Downdrafts from the cumulo-nimbus clouds present probably caused this reversal of expected fire behavior.
4. The crew, having found themselves trapped in front of a fast moving fire, retreated toward the ridgetop. Two men outran the fire to safety. One man set an escape fire and was saved. Thirteen men were overtaken by the fire and burned to death.

TRAINING LARGE FIRE ORGANIZATION

LYLE BEYERS
Protection Assistant, Oregon State Board of Forestry

The Oregon State Forestry Department has found that special emphasis must be placed on training in fire organization, using a combination of the lecture, written material, and on-the-job training. No single method of instruction is wholly adapted to training in large fire organization. Because of the nature and complexity of the organization, the particular advantages of each method of instruction that can be applied in presenting the subject should be used.

The lecture method with visual aids is the best approach for presenting the subject. The fire organization can be shown by the use of a large scale map of a fire, around which the complete suppression force is developed and portrayed by symbols. There should be one chart for each level of overhead as it is added to the fire picture. The first step shows the fire boss in complete charge and having the responsibility of directing all activities pertaining to control of the fire. His channel of command is represented by a circle completely around the fire area.

The second is a breakdown of the fire boss job into the primary functions showing the plans chief, the service of supply chief, the assistant fire boss, and the line function (fig. 1). The fire is divided into divisions, each under a division boss. Each chief and division boss is connected by a line to the circle representing the command of the fire boss. The next chart repeats the second and adds to it the breakdown of divisions into sectors with a sector boss in charge of each sector. On the fourth chart the foremen are added, each one connected by a line to his sector boss.

The final chart of the series is the map of the fire showing the distribution of men and machines about the fire (fig. 2). Every man and major machine should be represented on the fire line by a separate symbol. This helps to portray the large number of men and machines that are required on a large fire, and to point out how important it is to have an organization to coordinate this force. These symbols should be distributed about the fire so that they represent a realistic situation. Crews and sectors should vary in size and several kinds of machines should be shown.

The overhead is represented by a symbol for each level of command. Every man is connected to his boss by a line representing the channel of command. These lines also represent the lines of responsibility.

Throughout the presentation of the structure of the large fire organization, the principle of the four "definites" should be emphasized. These are definite channels of command, definite distribution of duties, definite understanding of duties, and definite responsibility. The lines which connect one position to another

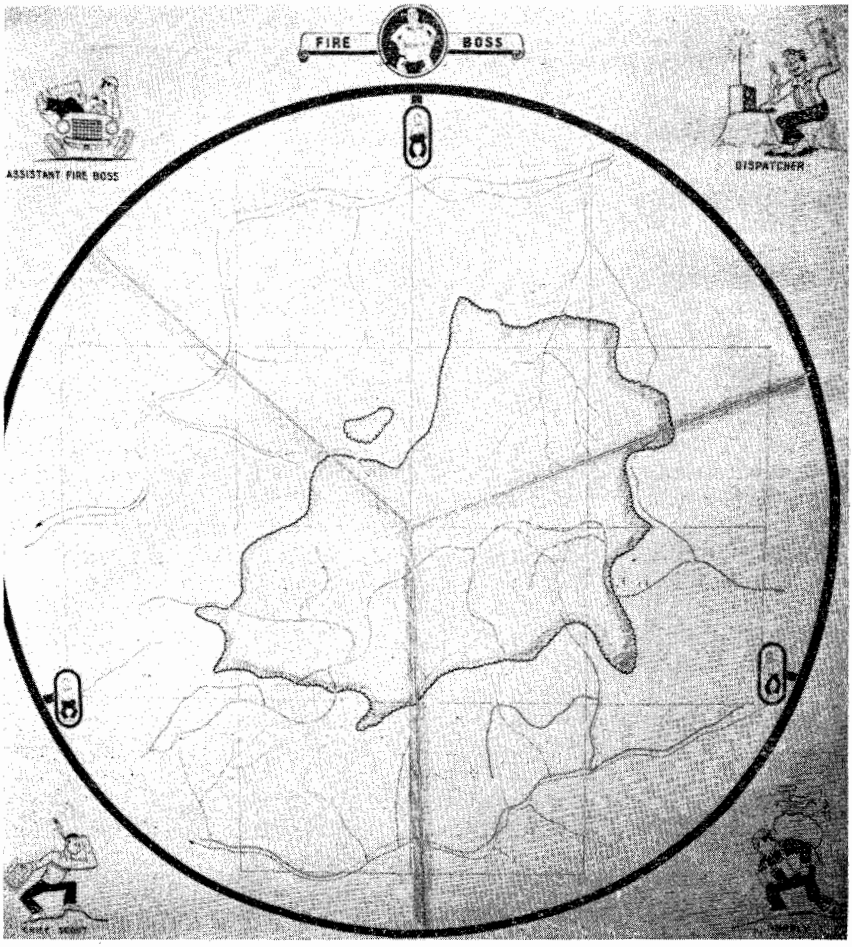

FIGURE 1.—Second break: fire boss and top staff.

represent the channel of command and lines of responsibility. There is only one line from a man to his boss with only one channel of command to that man. This principle must be learned and followed before the command function can operate without confusion.

A definite distribution of duties and understanding of these duties are essential to a competent organization. Finally, every man in the organization must understand that he has a definite responsibility to do his job.

At each level of command, these principles are pointed out, particularly as they apply to the particular job. Several examples of failure to follow these four definite principles should be given to point out the confusion or chaos which may result.

The complete organization should be presented to all potential overhead, as it is outlined above. They should then be divided into

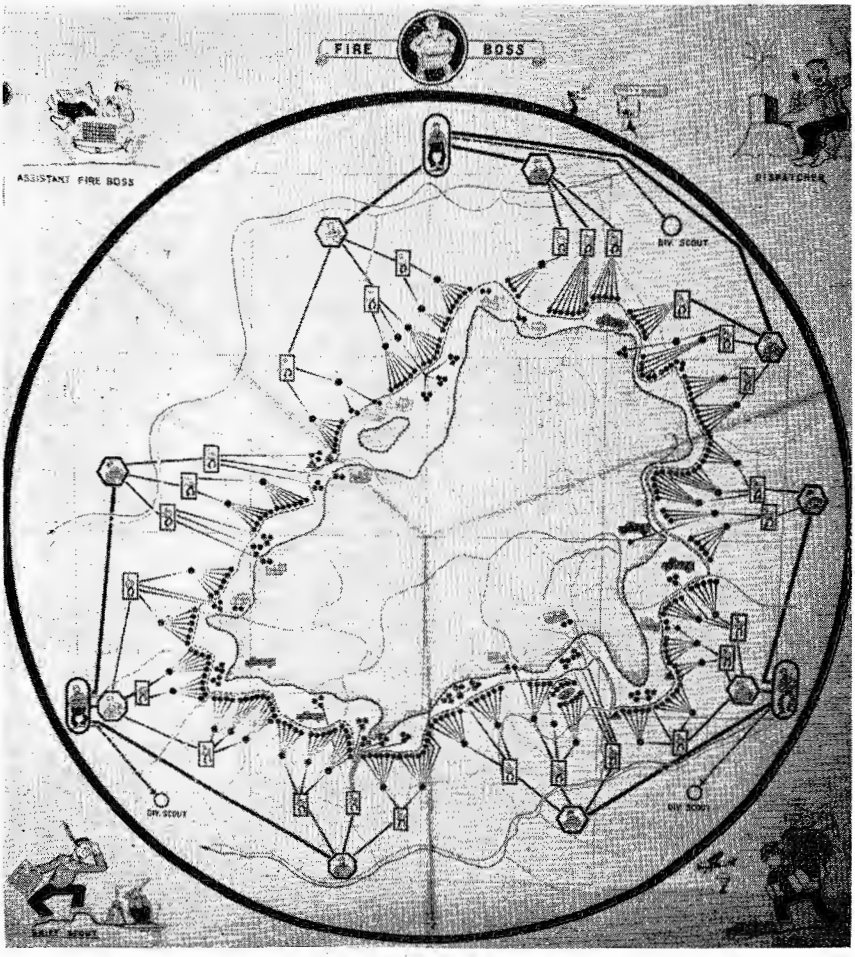

FIGURE 2.—Final chart.

levels of command or jobs to which they may be assigned. Each man in the group is then instructed specifically on the duties of his job and responsibilities. This department has selected qualified men from its personnel throughout the State and assigned them to five overhead teams to fill the top 10 jobs in a large fire organization. These men are trained specifically for these jobs and to work as a team.

The sector boss level of command is filled by experienced men from the district and headquarters. This group receives concentrated instruction at the district fire schools.

The foremen used in our large fire organization are mostly from the lumber industry; they are foremen of the organized crews which make up most of the labor forces. In several of the districts, special training schools designed for foremen from industry have been held in cooperation with the U. S. Forest Serv-

ice. At these schools, the large fire organization is presented as outlined, followed by special instruction on the definite duties and responsibilities of the foreman.

The use of written material as a method of instruction is used principally in listing the distribution of duties assigned to the various overhead. These are particularly valuable for further study and as a reminder list on the job.

On-the-job training should be given to further train an organization for use on a large fire. The occasional large fire is a training ground that should not be overlooked.

The medium-sized fire also offers a chance for very good on-the-job training. This can easily be done by overstaffing the organization with the personnel who would normally be assigned to a large fire. The particular jobload may not be great, but the duties of each job are usually present. The channels of command can be followed, and the lines of responsibility adhered to.

We have, on several medium-sized fires, overstaffed for training purposes by putting not only one but two overhead teams on the fire, one for day shift and one for night. In every case, one or two instructors in fire organization are present on the fire to serve as an advisor, observer, and critic.

Following each fire, which is staffed to train overhead in large fire organization, a critique is held immediately afterwards where not only fire control is discussed but also the functioning of the fire organization is reviewed. Notes should be taken of this discussion and presented at the fire schools the following spring.

To summarize: Training fire organization should be presented as realistically as possible with visual-training aids. Written material should be available to give out for further study and to keep as a reminder list. Every opportunity should be used for on-the-job training and experience, which includes the instructor's supervising the doing of the job. Finally, large fire organization training must be carried on year after year so that fire control is not caught short of trained overhead when a bad fire year occurs.

HOW MUCH FOREST FIRE PREVENTION?

WILLIAM W. HUBER
Director, Cooperative Forest Fire Prevention

Forest fire prevention in the United States has been symbolized for the past 15 years by Smokey the Bear. Smokey was created by the advertising firm of Foote, Cone and Belding, Inc., of Los Angeles, Calif., in 1944, and appeared on posters in 1945. This firm, the appointed task force of The Advertising Council, has handled the Cooperative Forest Fire Prevention account free of charge since 1942. Its clients are the Association of State Foresters and the Forest Service of the U. S. Department of Agriculture, and the aim of the ad men is to stamp out range, woods, and forest fires. The tools used to attain this objective are the various public-relations media of television, newspapers, magazines, radio, posters, car cards, films, exhibits, and such items as Smokey Bear dolls, tent cards, wobblers, snuffits, to name a few.

The Smokey Bear campaign has been a very good one. The proof is in the reduction of forest fires from 210,000 in 1942 to less than 100,000 fires in 1958. The acreage burned has been reduced from 30,000,000 acres in 1942 to 3,000,000 acres in 1958. Of course, nobody can say that the Smokey program alone has been responsible for the remarkable success we are experiencing in forest fire prevention. The Keep Green Associations, the county, State, and Federal forest fire organizations all cooperate with Smokey, and are working hard to prevent forest, woods, and grass fires, and to put them out quickly if they start (fig. 1). Public opinion has turned, too, and the public is demanding better laws and better law enforcement to cope with the careless and deliberate setters of forest fires. Smokey the Bear is the focal point around which millions of Americans and Canadians interested in the protection of natural resources have rallied.

Yet a better job needs to be done. How much forest fire prevention is enough? The excuse given in most cases of poor forest fire prevention work is lack of money. Isn't it ironic that in the United States we spend 50 cents per person to control forest fires, and less than 5 cents per person to prevent them? In the past, when we were building up fire protection organizations and adequate fire control equipment, it might have been necessary to emphasize fire presuppression and suppression at the expense of forest fire prevention. But now, with management replacing protection alone, we cannot afford even one fire that might have been prevented, especially since we still have over 75,000 man-caused forest fires each year, all of which could have been prevented. What has happened to the old adage, "An ounce of prevention is worth a pound of cure"? If there ever was a field requiring greater concentration of effort to reach a goal, it is in forest fire prevention.

FIGURE 1.—A new brush burning poster is being used in 1959.

Our forest management program includes prescribed burning in many areas. We need to tell the public why we are doing prescribed burning and how carefully this planned burning is tied in with research and weather conditions. The national CFFP program cannot handle this type of project, but much forest fire prevention work on the local level is needed before prescribed burning projects can be successfully carried out. Like "either-sex" deer hunting, prescribed burning is going to require a lot of public-relations work.

The tools we use for the national CFFP program are good ones, and each year we come up with new items. Let's take a quick look at the Smokey material prepared for 1959. The basic theme is, "A match can be a deadly missile!" The basic poster gives visual form to this missile theme (fig. 2). The TV shorts feature "The Space Age." The news ads stress "Don't be a missile flipper" and "A spark can be a deadly missile." The theme, of course, ties in with orbiting and military missiles, which we feel are topical.

The trend is toward higher average highway speeds. Hence, larger Scotchlite posters with fewer printed words are replacing the smaller posters. Even the range poster this year is larger than usual.

The CFFP Committee is cognizant of the use of smaller handout items. These include the Smokey tent card, the small easel, the Smokey record book, the "True Story of Smokey" comic book, the Smokey calendar, and the Smokey bookmark. The new Junior Forest Ranger badge is included in the Junior Forest Ranger Kits, and this is proving very popular with our young Americans.

Personal contact is an important part of public-relations work. Yet we in the various forest services and fire protective associations are weak in our contact work in forest fire prevention. Many

lookout towers are visited by hundreds of people annually, affording excellent opportunity for educational contact by the towermen. They need careful training to make these contacts fruitful. Many towermen lack sufficient forest fire prevention handout material.

The national CFFP and Keep Green programs are developing many new public-relations ideas. With the help of The Advertising Council and the task forces, Foote, Cone and Belding, Inc., of

FIGURE 2.—"A Match Can Be A Deadly Missile" is the basic theme for this poster and the 1959 CFFP Campaign.

FIGURE 3.—This float won the Governor's Trophy on January 1, 1959, in the Pasadena Tournament of Roses Parade, competing with 61 other floats.

Los Angeles, and Liller, Neal, Battle and Lindsey of Atlanta, Ga., advertising agency for the Southern States CFFP program, the best public-relations media and advertising techniques are used in the interest of forest fire prevention. A unique example of this was the forest conservation postage stamp. This stamp was cancelled on the first day of issue with the figure of Smokey's head and the words, "Keep America Green." The year 1959 started off with a Smokey float winning the Governor's Trophy in the Tournament of Roses parade at Pasadena, Calif. (fig. 3). This promotion was carried out by field personnel—proof of the good work that can be done on the local level.

Smokey material must be used in the field to be effective. District foresters, rangers, fire wardens, and all field employees of the various forestry organizations need to give more attention to forest fire prevention. Schools, newspapers, TV and radio stations must be contacted; posters must be put up; and all foresters should eat and dream forest fire prevention. If they don't, we're all going to eat a lot of fire-camp grub, sleep in paper sleeping bags, and fight a lot of forest fires. And this is probably the hardest work in the world, no matter how scientifically we go at it!

INFORMATION FOR CONTRIBUTORS

It is requested that all contributions be submitted in duplicate, typed double space, and with no paragraphs breaking over to the next page.

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 unit.

Any introductory or explanatory information should not be included in the body of the article, but should be stated in the letter of transmittal.

Illustrations, whether drawings or photographs, should have clear detail and tell a story. Only glossy prints are acceptable. Legends for illustrations should be typed in the manuscript immediately following the paragraph in which the illustration is first mentioned, the legend being separated from the text by lines both above and below. Illustrations should be labeled "figures" and numbered consecutively. All diagrams should be drawn with the type page proportions in mind, and lettered so as to permit reduction. In mailing, illustrations should be placed between cardboards held together with rubber bands. *Paper clips should never be used.*

When Forest Service photographs are submitted, the negative number should be indicated with the legend to aid in later identification of the illustrations. When pictures do not carry Forest Service numbers, the source of the picture should be given, so that the negative may be located if it is desired.

India ink line drawings will reproduce properly, but no prints (black-line prints or blueprints) will give clear reproductions. Please therefore submit well-drawn tracings instead of prints.