



**There's more to this than
flying over and dropping
retardant.**

Giving



Smokey a Hand

BY JEFFREY P. RHODES, AERONAUTICS EDITOR

A MAELSTROM of smoke and flames obscures the pilot's vision. Updrafts toss the plane around violently. The forward air controller points out the target, and the pilot starts his run.

This, however, is a "combat" mission of a different sort: controlling a forest fire by air-dropping fire retardant along a precise line from treetop height into a blaze so hot that it often boils tree sap.

"Wildfires have no rules," said Capt. Bruce Strickland, an aircraft commander with the Air National Guard's 145th Tactical Airlift Group, a C-130B unit based in Charlotte, N. C. "That's why aerial firefighting is one of the most exciting and interesting, but dangerous, missions there is. I have never been as scared as I was on some of the fire missions."

The fires in Yellowstone National Park in the summer of 1988 and the blazes near Tucson, Ariz., in the summer of 1989 illustrate the necessity for Military Airlift Command's Volant Forest mission. Using the Modular Airborne Firefighting System (MAFFS), three Air National Guard units and a single Air Force Reserve group dropped more than 1,600,000 gallons of retardant on

Yellowstone and vicinity in 1988 and more than a million gallons this year around Tucson in helping bring the flames under control.

The military's involvement in fighting forest fires is a response to a need. MAFFS-equipped units are called in to fight fires only when the commercial firefighting aircraft (called tankers) are committed and crews hired by the US Forest Service become overburdened by the size of a forest fire. Once the blaze is under control, the C-130 units are released.

Since their first operational use in 1973, MAFFS-equipped units have been called on to help fight fires in all but six years. All the units, which include the 153d TAG in Cheyenne, Wyo., and the Air Force Reserve's 943d TAG in Riverside, Calif., have to be federally activated before they can be tasked for fire duty. North Carolina's 145th TAG and the 146th Tactical Airlift Wing from Channel Island ANGB, Calif., can also be activated by their respective state governors.

Not As Easy As It Looks

Giving Smokey the Bear an airborne assist is not simply a matter of dropping retardant on or near a fire.

It is a complex process similar to launching an air strike. A number of players are involved in every drop, including such outside elements as the highway patrol, which has to close roads before drops.

Coordinating the entire firefighting effort is a joint effort of the air attack supervisor (or "attack boss"), who is a Forest Service pilot, and the incident commander, or "fire boss," who directs the firefighters on the ground.

The attack boss usually directs three or more air tanker coordinators ("lead pilots" flying "lead planes") who take commercial and MAFFS tankers into a drop zone. The lead pilots, much like forward air controllers, have to explain where the drop is to be made, lead the tankers into the area, and—most important—lead the tankers out.

With lead planes, two different types of tankers, helicopters (used to drop retardant on small fires or on hot spots in large ones), cargo aircraft, and other aircraft carrying smoke jumpers all flying at low level, the airspace above a fire gets crowded. Consider the firefighters on the ground, and it is easy to see why effective communications are

—Staff photo by Jeffrey P. Rhodes



Aerial firefighting is a unique mission for four tactical airlift units. Using the palletized Modular Airborne Firefighting System, the C-130 crews can drop 3,000 gallons of retardant on a blaze. This 943d Tactical Airlift Group C-130 is being prepped for the day's practice runs near Knoxville, Tenn., earlier this year.

critical. A lead pilot often has to talk or listen on four radios at a time.

The fire itself and the terrain add to the confusion. "With poor visibility from the smoke over unfamiliar terrain, it is dangerous out there," said M. M. "Buzz" Dyer, a fixed-wing aircraft specialist with the Forest Service's National Aviation Management Office in Boise, Idaho. It is so dangerous, in fact, that aircrews earn the Air Medal after fifteen missions into the fires.

A forest fire is an example of the power of nature unleashed. "The retardant will put out small fires," said Ed Kral, an ex-smoke-jumper who is now an instructor lead pilot for the Forest Service. "But you get fifty-foot-tall trees burning from the ground, and there is no way it will put that out." A number of veteran MAFFS pilots have seen trees explode from the heat as they flew over them. An additional hazard is that the fires often generate their own lightning.

Unfamiliar terrain is often an equally large problem. In 1988, one C-130 was the last of three MAFFS tankers being led into a drop area by a lead plane. The tail-end Charlie's vision was obscured by smoke and



The MAFFS-equipped C-130's loadmaster sits between the turrets on the MAFFS equipment and arms the system for the drop. This is the view from the backseat as a 145th TAG C-130 clears a ridgeline on a training run.

the cloud of retardant ahead, and the aircraft hit a tree after coming over a ridgeline. The tree tore sheet metal from the underside of the aircraft, but the crew was able to land safely.

Every spring, MAFFS units get together with the Forest Service to practice by making water drops. A refresher course for the veteran

crews, it allows new crew members to become MAFFS-qualified. For the ground troops, the week-long training session (held this year at the Southern Appalachian Air Attack Base at McGhee-Tyson Airport in Knoxville, Tenn.) is an opportunity to sharpen deployment skills and to practice loading the MAFFS equipment with water.

Tools of the Trade

Each of the eight MAFFS sets consists of five palletized 500-gallon tanks with twin eighteen-inch-diameter pipes, which can hold an additional 250 gallons of retardant each, running the length of the pallets. The pipes feed into movable nozzles, called turrets, that extend over the edge of the C-130's cargo ramp. Each MAFFS set takes about six hours to install, is owned by the US Forest Service, and is maintained by a Forest Service contract technician at the unit's home base.

Over the drop site, a loadmaster sitting at a control panel sets pressure and arms the system, although the copilot actually releases the retardant. Generally, all 3,000 gallons are dumped in one six-second release, but two of the MAFFS sets have the capability to drop retardant in 1,000- or 2,000-gallon increments.

The major difference between the commercial tankers, such as Lockheed P2V Neptunes, Douglas DC-4s, -6s, and -7s, and even six



The crews generally drop all 3,000 gallons of retardant on a fire in one six-second drop, although incremental drops can be made with two of the sets. The MAFFS equipment is owned and contract-maintained by the US Forest Service.

World War II Consolidated PB4Y-2 Privateers, and the MAFFS C-130s is that the MAFFS equipment is pressurized and sprays its load of 3,000 gallons of retardant when released. The commercial tankers use gravity for their drops.

Retardant from the MAFFS equipment tends to swirl, and thus it coats the fire's fuel, even on the underside of branches. It also provides broader area coverage. Consequently, the C-130 crews make drops either to cut off a fire or to steer it into natural or man-made firebreaks where the blaze can be contained.

The retardant weighs about nine

pounds per gallon, so a gravity-dropped load will dig a trench if it is released from too low an altitude. The concentrated nature of these drops enables the commercial tankers to extinguish a fire.

The Forest Service mainly uses two kinds of retardant: Phos-chek, made by Monsanto, and Fire-trol LCA, made by Chemonics Industries. Both cost about sixty cents per gallon. The retardant is mostly fertilizer, which holds moisture on the fire's fuel and helps promote reforestation. It also includes a red dye, so firefighters making subsequent drops can see where previous drops were made.

When mixed with water, the retardant is a gloppy mixture the crews derisively call "elephant snot." This mixture is highly corrosive to the aircraft, so a rust inhibitor is included. At a fire, all of the panels on the rear of the aircraft are taped up, and the aircraft are pressure-washed after nearly every sortie. The extensive maintenance and the cost of retardant are the main reasons only water drops are made at the annual training session.

A C-130, loaded with fuel, the MAFFS set, and a full supply of retardant, has a gross takeoff weight of about 135,000 pounds. Takeoffs frequently take place on short or unprepared strips in hot weather. Just getting off the ground requires skill. The C-130s take off with the cargo door open and the turrets extended, in case there is a need to jettison the load on takeoff.

Fighting Fires

At the fire, the first order of business is to find the lead plane, which loiters in the fire area. At this year's training session, one lead pilot said to a MAFFS pilot on the radio: "You guys add the orange [temporary day-glo orange numbers and wingtips] so we can find you, and we are as bright as possible [white Beech Baron aircraft with orange trim] so you can find us, and we still have trouble seeing each other."

Once the two aircraft link up, the lead pilot has to bear in mind that the C-130 is considerably larger than and different from his or her plane. "We don't want to fly any closer to the fire than we have to," said Capt. Newton Huneycutt, an instructor navigator with the 145th TAG. "The lead pilots have a tendency to fly *in* the fire and want to take us with them."

The MAFFS tanker flies in trail formation 500 to 1,000 feet behind the lead plane and goes to the target at a minimum altitude of 150 feet above the tops of the trees at a speed of 130 mph. The drop has to be on target, because a delay of even a half a second will give the fire the chance it needs to keep burning. Most fires can be stopped with a four-foot-wide firebreak.

Coordination between the lead pilots and the crews gets better with practice. The lead pilots start think-

—Staff photo by Jeffrey P. Rhodes



The retardant, a mixture of fertilizer, red dye, and water, is highly corrosive to the aircraft. That fact, plus the cost, are the main reasons water alone is used during training. Here, a pump crew takes a breather while one of the 145th TAG's airplanes (in the background) is refueled and refilled.



The ground crews have to pull double duty on MAFFS deployments. During the day, they man the pumps that load the aircraft with retardant or water. At night, crew members do their regular job of maintaining the C-130s. Here, a 943d TAG C-130 is refilled for another drop. The paint for the numbers and trim is mixed with soap for easier removal.

ing like C-130 drivers and make their runs accordingly, and the C-130 crews remember to tell the lead pilot such things as when the crew has changed out from the last time a particular aircraft was in the area, so there are no references to "your last run."

The tactics used for the drops have evolved over the years. MAFFS units are more accustomed to formation work than the commercial tanker pilots are, so there used to be two or more tankers following one lead plane. After the tree-strike incident, though, that tactic was re-evaluated. It was determined that flying through a fire and watching one plane (rather than a lead plane plus one or more C-130s) was enough, and there are no longer any "daisy chains."

MAC and Forest Service regulations limit the crew duty day to eight flight hours, but there is no limit on how many hours the ground crew can put in. The Guard and Reserve technicians and specialists not only work on the airplanes, they also help load the retardant and service the C-130s.

The retardant-loading operation resembles the fevered activity of a race-track pit crew. Once the aircraft is marshaled in, it is refueled,

the windows are washed, and box lunches for the crew are passed up to the cockpit.

Meanwhile, people who normally fix turboprop engines run hoses out to the MAFFS equipment and hook them on. Forest Service technicians or contract retardant-mixers check to make sure the retardant is the right consistency and also run the pumps. The retardant can be loaded in about thirteen minutes.

"The folks have to be flexible enough to do anything at a moment's notice," said Capt. Gary Jandrisevits, the 145th TAG's maintenance chief in Knoxville. "But they love it. It gives them the opportunity to become directly involved with the aircrew's mission."

There are no MAFFS missions at night; once the sun goes down, the ground crew starts on their "real" jobs. "These people put in long hours, grab dinner when they can, and then they have to turn the planes [get them ready to fly again], just to come out the next day and do it again," noted Captain Jandrisevits. After the Yellowstone fires, all of the ground crew members received the Humanitarian Service Medal.

The technicians also get practice in deployment and cross-training.

All of the units brought an en-route war readiness spares kit to the training session, but the 145th TAG ran a shuttle aircraft to bring in parts and new people. The Charlotte unit also provided major spares support for the Cheyenne group, which reciprocates when the 145th TAG is out west. The MAFFS mission is especially hard on tires, brakes, and starters because of the repeated takeoffs and landings.

Despite the danger and hard work, those involved with the MAFFS mission are enthusiastic to a fault. Only a handful of newcomers are trained each spring. Nearly everybody comes back year after year—and the same goes for the Forest Service pilots and technicians. Only retirements or transfers create openings.

One reason for the MAFFS crews' enthusiasm could be the rewards that go beyond medals. "The people in Helena [Mont., out of which the MAFFS units worked while fighting the Yellowstone fires in 1988] were so grateful for what we were doing, we couldn't buy a beer if we tried," said Captain Huneycutt. "We might have torn shingles off the guy's house with the retardant, but we had saved his house, and he appreciated it." ■