PUBLIC SAFETY

Fire—Source of Fear

Fire is one of man's oldest enemies, yet new things being learned about it are helping either to prevent or control it, Barbara Tufty reports.

➤ FIRE!!! One of man's oldest sources of fear is being fought with latest modern methods developed by research and experiment programs costing $20 million a year in the United States.

As scientists with private, Federal and state industries, governments, and institutions pour more information into fire-fighting units, man's apprehension of this ancient destructive force is being lessened, since his ability to prevent and control it is increased.

Latest aids in combating fire come now in the form of newer combinations of chemicals or detergents, helicopters, improved equipment and uniforms—and a more organized understanding of just what fire is, what habits it manifests with different materials, and what methods are best in specific cases.

Fire Considered an Element

For long dark centuries, fire was considered an element, along with the other three elements of water, earth and air that formed our world. Then men discovered fire was composed of three basic ingredients—fuel, air and heat—and that the removal of any of these would kill the fire.

Today's concept of the fire phenomena is becoming even more complex as other ingredients are found to make a fire burn: chemistry of combustion, pyrolysis of wood, radiation heat transfer, convection of air, the action of water and many other factors.

In their search to determine the right chemicals and methods used to combat fires, experts are placing more emphasis upon the classification of fires.

There are four basic types of fire: 1. ember fires, from paper and wood, 2. fires feeding upon flammable liquids and gas, 3. electrical fires started around wires and fuses, and 4. metal fires with burning metals such as zinc, magnesium and sodium.

Each type of fire should be treated in different ways. For instance, one should never throw water on an electrical fire, for water is a conductor of electricity and the fire-fighter can receive a severe shock. And when water is poured on burning flammable liquids, it may spread the fire rather than put it out.

New combinations of chemicals with names that take longer to pronounce than it takes to put out a small fire are being studied and produced in an effort to find the right smothering agent to prevent oxygen from feeding the flames, to cool the fire to its extinguishing point, or to insert an inhibitor that interferes with the chemical process of the fire.

One of the latest news-making chemicals for fighting flammable liquids is potassium bicarbonate, or Purple-K as it is nicknamed for its identifying color. This dry powder, developed to knock out airplane crash fires fast for the Navy, is now on immediate reserve call at Cape Canaveral launching pads and at the recently opened Dulles International Airport at the nation's capital. At Cape Canaveral, Purple-K put out a gasoline fire spread out over 4,000 square feet in exactly 38 seconds.

Another important new fire-extinguishing agent is the silicone-treated chemical called monoammonium phosphate, developed by the Ansul Chemical Company in Wisconsin. This chemical puts out the flames and sticks to the surface, forming a coating that retards further burning. It is safe for handling all types of fires, and is recommended for home and office use, replacing the dangerous carbon tetrachloride in extinguishers once found so often in private homes and organizations.

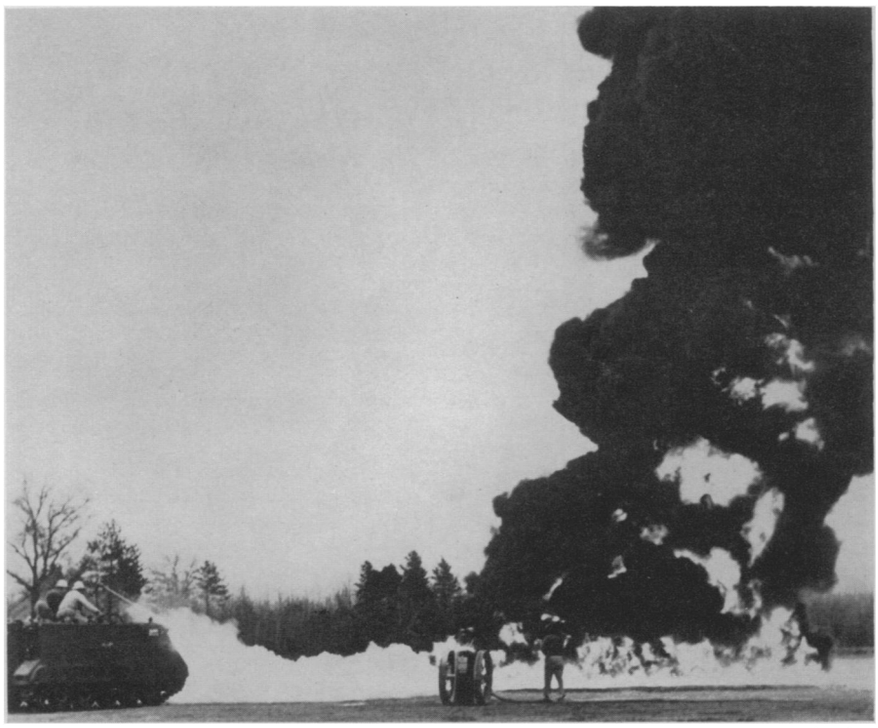
Carbon tetrachloride extinguishers have caused some deaths by the poisonous fumes of phosgene gas that forms on contact with flame, and they have been banned by industries, the U.S. Coast Guard and several states in a progressive effort to halt the use of this dangerous chemical.

Detergent-like chemicals, or wetting agents, have the property of decreasing the surface tension of water and thus increasing the speed with which it will penetrate a porous surface. In short, they make water wetter, and permit this water to penetrate into dry dusty materials such as kapok, cotton, hay or layers of decayed leaves or pine needles where fire could smolder for a long time without being discovered.

Detergent Keeps Fire Out

These chemicals are particularly effective in keeping a fire "knocked down" after the fire-fighters have passed on to other burning spots. Sometimes a fire may seem to be extinguished but springs to life again when the water has evaporated or the material gets hot enough to rekindle itself.

Air foam continues to be another successful method developed to suffocate man's ancient enemy. Air foam is a fire-smothering mass of bubbles produced by physical or mechanical action. Added to a flowing water stream under pressure, the foam-making compound, a protein liquid, is churned with air to form a free-flowing foam blan-



Ansul

STAND BY FOR FIRE—Whenever a manned space flight is attempted from Cape Canaveral, Fla., the U.S. Air Force has a new fire-fighting weapon standing by on an emergency basis. The weapon is a combination of a new, powerful chemical extinguishing agent kown as Purple-K and a tank-like vehicle capable of pouring 1,200 pounds of the chemical onto the fire in two minutes, as shown in this photograph of a demonstration test in Wisconsin.

ket that kills fire in oil, gasoline and other flammable liquids.

Aircraft have been used to fight brush fires over open country for years, but now for the first time helicopters are dropping water and chemical solutions over burning housetops in the Los Angeles area.

County fire department chief Keith E. Klinger, who is reported to be the highest paid fire chief in the world, predicts that fire departments throughout the United States will soon use helicopters to drop walls of fire-smothering agents faster and more effectively than men fighting from the ground are able to pump the materials up.

Today's fire-fighting uniforms can now be coated with a new nitroso rubber that not only protects the wearer but extinguishes the flames by means of a gas that is expelled when the rubber comes in contact with the flames. Fire-fighters' coats, hats and gloves can be coated with this chemical, which remains flexible and usable at 40 degrees below zero Fahrenheit, as well as resistant to solvents and strong chemicals.

As information about fire and methods to control it is discovered and dispersed to the public, small fires are able to be stopped before they grow into roaring infernos. Individual awareness in the home and office can lower the high cost of fire, estimated at $5 billion in the United States annually.

Modern plants, such as the Chocolate Bayou Plant of Monsanto Chemical Company in Texas, have installed programs of trained crews, streamlined and up-to-date equipment in the form of pumps, foam trucks, hose trucks, and monitor nozzles that can be directed by a single man at ground level through a system of ratchets, rods and wheels and can be left unattended after aiming.

Fire experts agree that man's oldest problem can often be solved by man's oldest weapon: common sense.

The individual should observe basic rules on fire prevention and control in general and in case of a nuclear attack. These rules can be as simple as keeping your house clear of trash piles, rubbish or stored odds and ends that accumulate around the house, and keeping a supply of water, sand or, better still, a chemical extinguisher handy to use at the first sign of fire.

In an introductory statement in the recent publication "Rural Fire Defense—You Can Survive," issued by the U.S. Department of Agriculture's Forest Service in cooperation with the Department of Defense, Secretary of Defense Robert S. McNamara stresses the value of preparedness in fire defense.

"If our nation should suffer a large-scale nuclear attack," he wrote, "the measure of our ability to survive and recover will be the courage with which we appraise the dangers and the vigor with which we act now to prepare for them."

• Science News Letter, 83:90 February 9, 1963

MEDICINE

Smoking as Cancer Risk

➤ SMOKING multiplies other risks of getting lung cancer, scientists at the Roswell Park Memorial Institute in Buffalo, N. Y., have concluded from experiments.

Inhaled dangerous material increases as the cigarette butt gets shorter. The first puff draws in 2.5 times less tars than the 10th puff.

In the first study, by Drs. Joseph A. DiPaolo and Paul R. Sheehe, two sets of animals were tested—one with urethan, an animal anesthetic known to produce cancer, and the other set with urethan plus a solution of the tars inhaled by a cigarette smoker.

With the tars added, it was as though 52 times the actual dose of urethan had been given to the tested mice, increasing its cancer-causing potency that many times. The urethan was injected and the tars were painted on the throats five times a week for six months.

Although these and other scientists have previously shown that cigarette smoke contains traces of several chemicals, any one of which can cause cancer when applied to the skin of experimental animals, this is the first time it has been proved that the cigarette smoke chemicals multiply the effect of urethan to such an extent.

The American Cancer Society, which partly supported the two investigations, said that if a moral can be drawn from this phase of the study it would be that smoking multiplies the risk of exposure to smog, industrial fumes and other sources of cancer-causing chemicals.

Drs. Saxon Graham and Morton L. Levin, with Miss Shirley Crouch, reported the second phase of the studies, showing that early puffing on a cigarette is safest.

They said smokers will run a lowered risk of lung cancer if they will limit themselves to about four puffs to a cigarette.

But the safest thing is not to smoke at all, inasmuch as Roswell Park studies have shown that all cigarette smokers, regardless of the amount or method of smoking, run a risk of lung cancer six times higher than that of non-smokers.

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ASTRONOMY

Supernova Discovered Low in Northern Sky

➤ SUDDENLY blazing forth with a brightness many million times that of the sun, a supernova, or exploding star, has appeared in Coma Berenices, Berenice's hair, low in the northern sky.

Despite the supernova's intense brilliance, the object is so far away that its magnitude is only 15, too faint to be seen except through large telescopes. It was discovered at the Astrophysical Observatory of Padua University, Asiago, Italy, Prof. L. Rosino, director, reported to Harvard College Observatory, Cambridge, Mass.

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Psoriasis, a chronic recurring disease of the skin that has been known from Biblical times, is still not curable, although in many cases it can be controlled.