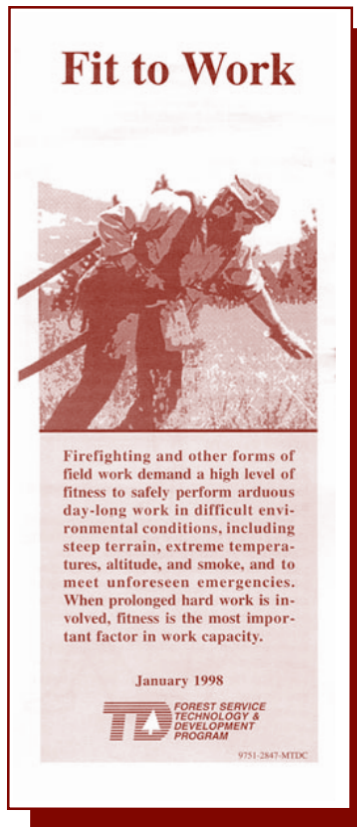


## Individual Responsibility


All firefighters are ultimately responsible for their own safety and well being. Several areas are totally within the individual's control:

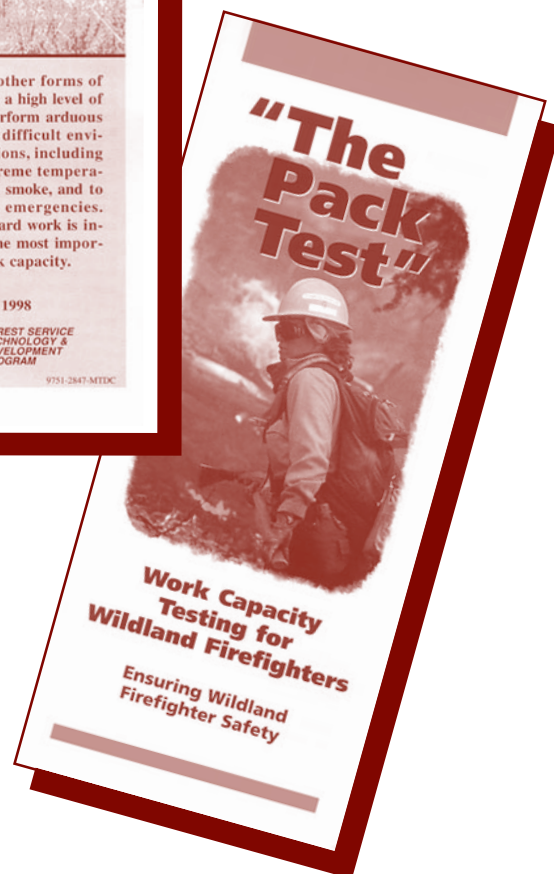
### Physical Fitness

Wildland firefighting requires a high level of fitness that anyone can achieve who is willing to invest an hour a day in a physical-conditioning program, such as aerobics, running, or bicycling. An excellent firefighter fitness program is *Fitness and Work Capacity*, (9751-2814-MTDC) by Dr. Brian Sharkey of the USDA Forest Service Missoula Technology and Development Center (MTDC) in Missoula, MT. Dr. Sharkey discusses the components of a fitness program and details the procedures for the Pack Test, the new fitness test that wildland firefighters working for all Federal agencies and many State agencies must pass each year.



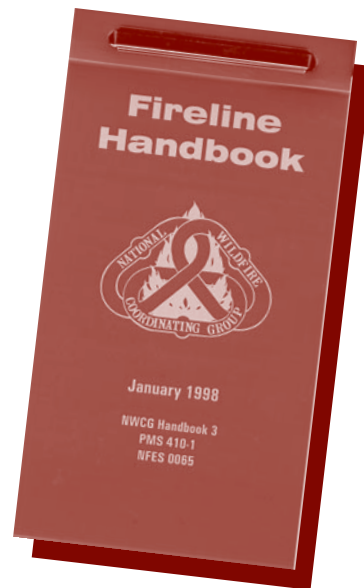
### Self Discipline

Whether someone is driving an engine, flying an aircraft, or attacking a wildfire, self-discipline can reduce fatalities. When individuals adhere to agency policies, standard operating procedures, driving laws, work/rest cycles, and other guidelines, they help ensure a safe operation and the successful completion of the fire mission. 



## Training

Training is especially critical in wildland fire operations. Firefighters need to understand the hazards of steep, winding, unpaved roads; live and dead vegetative fuels whose flammability varies with the season, as well as the time of day; and fire behavior that is directly and immediately affected by both the terrain and the weather. Understanding these factors requires specialized training.



The NWCG has developed courses from the most basic to the most advanced levels of wildfire suppression and management. These courses, along with the accompanying task books that require demonstrated performance in a field setting, should be the basis of a well-rounded training and qualifications program. Another valuable source of information is Standard for Wildland Fire Fighter Professional Qualifications (NFPA 1051).

## Strategy and Tactics

The way we fight fire, both on the ground and in the air, can play an important part in reducing wildland fire fatalities.

Guidelines can help the firefighter operate safely in a hazardous environment:

- The *18 Situations That Shout "Watch Out"* are intended to call attention to various conditions or events that, if not mitigated, can have potentially serious or fatal consequences.
- The *10 Standard Fire Orders* are direct statements of positive actions a wildland firefighter must take to operate safely. They have evolved over the years as a direct result of wildfire fatalities that occurred when those actions were not taken. The *18 Situations* simply alert firefighters

to events, but the *10 Standard Fire Orders* are rules that must be adhered to.

- Many other guidelines and memory joggers have evolved over recent years. The acronym LCES does the best job of focusing attention on the critical factors affecting wildland fire safety.

Numerous opportunities exist to reduce accidents and fatalities during aircraft operations, both fixed and rotary wing.

- Exposure rate, measured in numbers of hours flown, can be reduced by properly applying strategy and tactics. Air tankers and water-dropping helicopters should only be used when they can help the fire suppression. Air tankers are often ineffective under

conditions of extreme fire behavior in heavy fuels with high winds. The grounding of aircraft limits their exposure, saving them for a more appropriate time and place. Although the public and media have come to expect aircraft operating continuously during daylight hours, it is often not the best or safest approach.

- With aircraft being mobilized nationwide to support wildfire suppression, it is possible to have more than 20 aircraft operating on a fire at one time. Highly qualified air operations personnel are essential to ensure safety. When they are not available, some or all of the aircraft should be grounded until a safe operation can be guaranteed.

## Personal Protective Clothing and Equipment

**P**ersonal Protective Equipment can help protect firefighters when they find themselves in areas of high radiant heat or direct-flame contact.

- Wildland protective clothing should comply with NFPA 1977. This standard offers adequate levels of protection for the wildland firefighter without causing undue heat stress or fatigue. An alarming trend of heat-stress injuries and fatalities on wild-fires is developing. In addition, several wildland agencies are requiring double layering of either Nomex or a Nomex/cotton combination on both the upper and lower torso to increase protection from radiant heat, allowing firefighters to stay closer to the fire

for a longer time. In Australia, the recently completed *Project Aquarius* looked at the physiological effect of PPE on firefighters, and concluded that the majority of heat stress in a firefighter was internally generated. The study found that PPE should be “designed to let heat out, not keep heat out.”


- Fire shelters should be carried by every wildland firefighter and on every piece of apparatus involved in wildfire suppression. Fire personnel should be trained using the practice fire shelter, with a mandatory refresher each year. Training should NOT be conducted during live fires because of the safety risks.

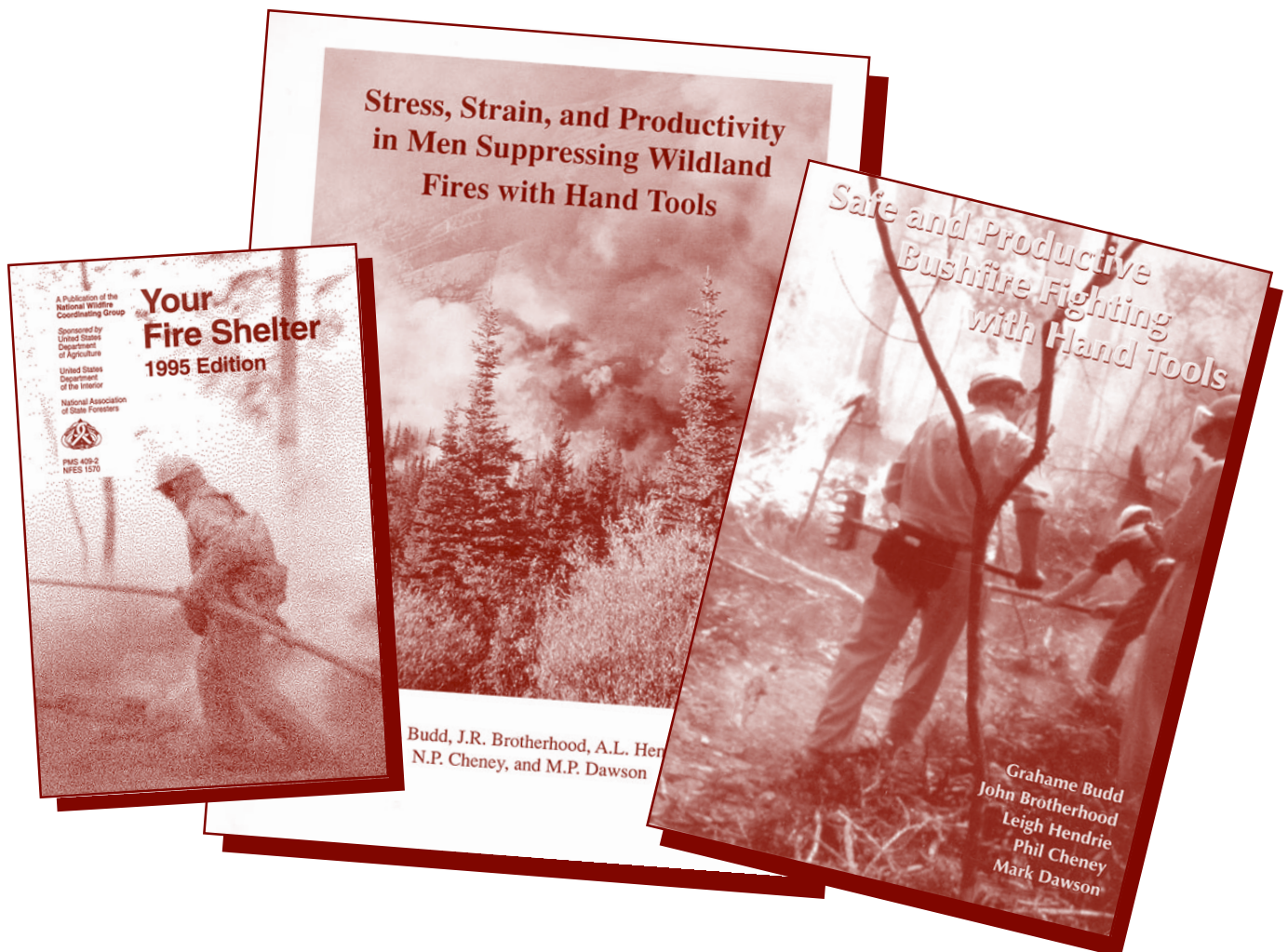
A pamphlet entitled *Fireline Safety References* has been published by the NWCG Safety and Health Working Team in cooperation with MTDC. It lists a wide variety of publications, videos, and training packages available to enhance firefighter safety, as well as the sources for the materials. It can be requested from MTDC at:

Phone: (406) 329-3978

Fax: (406) 329-3719

E-mail: [wo\\_mtdc\\_pubs@fs.fed.us](mailto:wo_mtdc_pubs@fs.fed.us).

The deaths of wildland firefighters are tragedies we must strive to prevent. We must not fail to apply the lessons learned from those deaths. 



## About the Author

Dick Mangan (retired) was Program Leader for Fire, Aviation, and Residues at MTDC from 1989 to 2000. Before coming to the Center, he spent more than 20 years working on ranger districts and national forests in Washington and

Oregon, participating in the full range of wildland fire activities. He served on the National Wildfire Coordinating Group (NWCG) Fire Equipment and Safety and Health Working Teams, and was chairperson of the National Fire

Protection Association (NFPA) 1977 Technical Committee for Wildland Fire Personal Protective Clothing and Equipment.

## Library Card

Mangan, Richard. 1999. Wildland fire fatalities in the United States: 1990 to 1998. Tech. Rep. 9951-2808-MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 14 electronic p.

Summarizes the causes of death for 133 persons who died while involved in fighting wildland fires in the United States from 1990 to 1998. Burnovers were the leading cause of death, followed by aircraft accidents, heart attacks, and vehicle accidents. Fatalities are analyzed by geographic area and by agency. The main components of a

program to reduce fatalities and injuries would include: individual responsibility, training and qualifications, strategy and tactics, and personal protective clothing and equipment.

Keywords: fire fighters, fire fighting, firefighting, safety, safety at work

---

### Additional single copies of this document may be ordered from:

USDA Forest Service, MTDC  
Bldg. 1, Fort Missoula  
Missoula, MT 59804-7294  
Phone: (406) 329-3978  
Fax: (406) 329-3719  
E-mail: wo\_mtdc\_pubs@fs.fed.us

### Electronic copies of MTDC's documents are available on the Forest Service's FSWeb Intranet at:

<http://fsweb.mtdc.wo.fs.fed.us>

### For additional technical information, contact George Jackson at MTDC.

Phone: (406) 329-3967  
Fax: (406) 329-3719  
Lotus Notes: George Jackson/WO/  
USDAFS  
E-mail: gjackson@fs.fed.us