

# Fire and Aviation



*Dick Mangan,  
Fire and Aviation Program Leader*

Dick has been Program Leader for Fire, Aviation, and Residues at MTDC since 1989. Before coming to the center, he spent more than 20 years working on Ranger Districts and National Forests in Oregon and Washington, participating in the full range of wildland fire activities. He serves on the National Wildfire Coordinating Group (NWCG) Fire Equipment and Safety and Health Working Teams and is chairperson of the National Fire Protection Association (NFPA) 1977 Technical Committee for Wildland Fire Personal Protective Clothing and Equipment. Dick remains active in the field, representing MTDC on fire entrapment investigations and serving as Operations Section Chief on a National Type 1 Overhead Team.

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## Technical Services— Fire and Aviation Management

Technical services provided by MTDC's Fire and Aviation Management Program are used to transfer information and technology from specialists to the field units. MTDC personnel stay current on technologies and issues that affect the wildland firefighting

community through their involvement in groups such as the National Fire Protection Association (NFPA), National Wildfire Coordinating Group, and National Fire Equipment Systems (NFES) committee. By maintaining a close relationship with workers in the field—those folks in the yellow shirts—MTDC anticipates new needs, enabling the Forest Service to provide a safer, more productive work environment.



*Dick Mangan (left) provides technical services in many field settings.*

## National Wildfire Coordinating Group

The National Wildfire Coordinating Group (NWCG) is an organization whose membership includes the National Association of State Foresters, National Fire Protection Association, the U.S. Fire Administration, and all Federal agencies responsible for wildland fire management. NWCG provides national



coordination for training techniques and the latest technologies affecting fire management. Specific areas of concern are handled by working teams and subcommittees comprised of experts from across the country. MTDC fire management personnel serve as advisors to several teams, including the Fire Equipment Working Team (FEWT), the Safety and Health Working Team (SHWT), and the National Fire Equipment System (NFES) Subcommittee. Center Specialists offer expert technical advice to these groups and often work on specific projects assigned by them. Recent projects in which MTDC fire management personnel have played a major part include:

- Maintenance of the national fire entrapment data base
- Review of the 100-person first aid kit stocked by the fire caches
- Leadership in the continuing study of the Health Hazards of Smoke.

## General Services Administration

The Fire Program at MTDC coordinates with the General Services Administration to provide quality wildland firefighting equipment at a reasonable cost. The specifications and drawings for many items are produced at MTDC, then sent to GSA, where large numbers are procured under contract. Articles produced during the first production run are carefully inspected by MTDC technicians before GSA stocks contractors' fire equipment.



*Close inspection of the fire shelter provides clues of temperature ranges experienced during an entrapment.*

## Fire Entrapment Investigations

MTDC Fire Program personnel are often involved with onsite investigations when fire entrapments occur. They collect tools, personal protective equipment, and other personal effects. In addition, they record extensive photographic evidence. Many times these examinations lead not only to improvements in equipment, but also give insights into the effectiveness of firefighter training and the actions firefighters take when faced with life-threatening incidents. In 1995, MTDC published a technical report on investigations, *Investigating Wildland Fire Entrapments* (9551-2845-MTDC).

## Vehicle Entrapment Studies

For many years, wildland firefighters have debated what to do when entrapped with a vehicle (engine, tender, pickup, sedan): is it best to "ride it out" in the vehicle, or abandon the vehicle and get into a fire shelter? There have been lots of gut-feeling responses, and some real-life experience on both sides of this question, but little hard data to compare conditions under similar situations. MTDC has conducted a study to quantify what really happens—inside the cab of a vehicle and inside a fire shelter—when a burnover occurs. The study was conducted in cooperation with the Florida Division of Forestry, the Montana Depart-




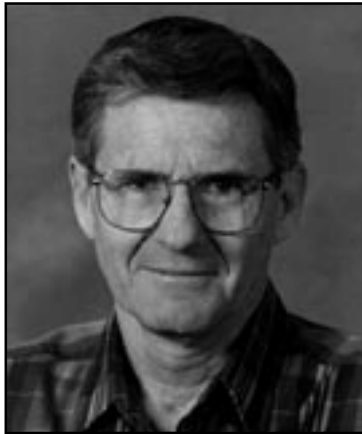
*These vehicle entrapment tests in Dillon, MT, provided field comparisons of the effects of heat on fire shelters and engines.*

ment of Natural Resources and Conservation, the Beaverhead National Forest, and the Los Angeles County Fire Department.

The study measured radiated heat and maximum temperatures inside a variety of vehicles. The vehicles, which were no longer in use, were

subjected to direct flame and were burned over in conjunction with prescribed burns. Data were collected from three field tests around the country in several fuel types. Several fire shelters and shelter prototypes were outfitted with instrumentation and set up adjacent to the vehicles. Gases

collected from selected vehicles and fire shelters were analyzed. In 1997, MTDC published a technical report documenting this project, *Comparing Conditions Inside Vehicles and Fire Shelters During Fire Entrapments* (9751-2817-MTDC). 



Brian Sharkey

Brian Sharkey completed a Ph.D. in exercise physiology at the University of Maryland before coming west to join the faculty of the University of Montana and begin a long association with MTDC. His work for the Forest Service has included research and development on fitness tests and programs, heat stress, hydration, nutrition, protective clothing, tools, work/rest cycles, employee health (wellness), and more.

A researcher, author of several books, and past president of the American College of Sports Medicine, Dr. Sharkey practices what he preaches, participating regularly in running, mountain biking, cross-country skiing, backpacking, canoeing, and other pursuits. His work has recently been honored with a USDA Distinguished Service Award, and a Forest Service Technology Transfer Award.

## Job-Related Work Capacity Tests

In response to a need for a work capacity test that reflected the physical demands of wildland fire-fighting, Dr. Sharkey and MTDC began a process to replace the Step Test with something more suitable, that would be just as easy to administer throughout the nation. The result is a new job-related work capacity test, the Pack Test. It has received extensive laboratory and field testing and is being recommended for adoption in 1998.

## Fitness and Work Capacity

*Fitness and Work Capacity* (9751-2814-MTDC), a booklet published by MTDC in 1977 under the direction of Dr. Sharkey, was intended to provide employees with the information they needed to maintain the level of physical fitness required by wildland workers. The publication has been

updated with the latest fitness and work performance information, and incorporates many of Dr. Sharkey's other publications, giving firefighters and other employees an easy-to-use reference tool.

## Health Hazards of Smoke

Dr. Sharkey's role in this long-term study has been to coordinate national efforts for ongoing and future studies on the effects of wildland fire smoke on firefighters. He conducts lab and field studies, works with regulatory and standard-setting organizations, and fosters communication among fire managers, firefighters, researchers, manufacturers, organizations, and others with a semiannual report (*Health Hazards of Smoke*), visual presentations, displays, and personal communications. This effort culminated in April 1997 with a symposium at Missoula, MT. All the findings were presented, and a risk management plan outline was developed for field use. ☞



The new edition of *Fitness and Work Capacity* will help Forest Service workers keep fit for work.





*Bob Hensler*

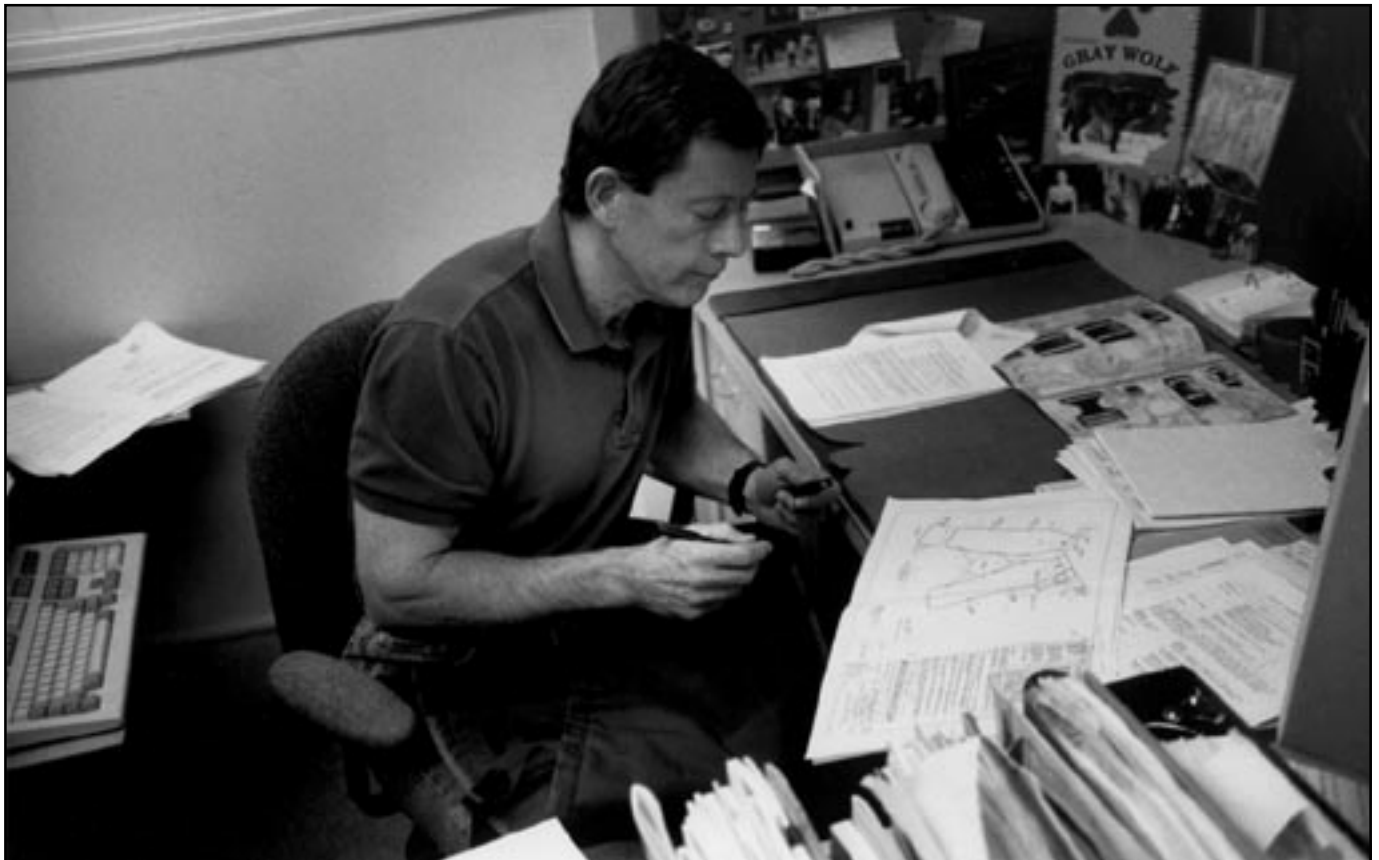
Bob has worked at the Center since 1974. He served as the Center's senior writer-editor until 1987. During that period he edited the Center's fire and safety publications, and audiovisuals. In 1987 he became a Project Leader working on fire and safety topics and assumed duties for Centerwide technology transfer. He took over the specifications program in April 1990.

## Specifications

The specifications maintained at MTDC include major personal protective items used by wildland firefighters, such as the fire shelter, Nomex clothing, and chain saw chaps. Other MTDC specifications include fireline handtools, such as the Pulaski and the Combi tool. Many other items used by firefighters and other wildland resource workers must meet the specifications kept at the Center. Sleeping bags, first aid kits, waterbags, and field packs are just a few items whose specifications are established and monitored at MTDC.

These specifications serve as the technical requirements in General Services Administration (GSA) pro-

urement contracts. The GSA will not award contracts to suppliers unless their products meet the specifications maintained at the Center. This process assures that affordable, safe, and functional equipment specially designed for the needs of wildland firefighters is made available to the agencies that require it. Twenty or more contracts may be ongoing at any one time, and MTDC works closely with GSA contracting and quality assurance people around the country to facilitate this process. In a typical fire season, Federal and State resource agencies buy more than \$15 million of fire items controlled by MTDC specifications. Before that equipment reaches the GSA shelves, it must first pass a stringent physical inspection by technicians at MTDC. ☞



*Bob Hensler maintains specifications for more than 50 items used by wildland firefighters.*





Pat Wilson

Pat Wilson, Project Leader for Smokejumper Technical Services, joined MTDC in 1997 after spending more than two decades working in fire management. His career began in 1974 on an engine crew for the Idaho Department of Lands. In 1978 he became Assistant Crew Foreman for the Coeur d'Alene Hotshot Crew. Pat became a smokejumper at Missoula in 1980. He transferred to Grangeville, ID, in 1982, where he was Smokejumper Unit Manager from 1987 until joining MTDC. Pat is the leader of a group developing the *Interagency Smokejumper Operations Guide*, and is a member of the National Aerial Delivered Fire Fighter Study. He is a master parachute rigger and a designated parachute rigger examiner for the Federal Aviation Administration. Pat graduated from the University of Montana in 1981 with a degree in Forest Resource Management. He will work alongside Dave Pierce (Project Leader for Smokejumper Technical Services since 1980) for 6 months while training to replace Pierce when he retires.

## Smokejumper Technical Services

From the broadest perspective, little has changed in more than 50 years of smokejumping. Fires are reported, jumpships take off, and jumpers parachute into areas where the response time or terrain preclude any other response. A closer look reveals a system under continuous scrutiny, change, and improvement. Changes are driven by the desire to reduce the risks of this unique and time-honored method of initial attack. A better parachute canopy, a more protective jumpsuit, or advanced training techniques are some of the areas that Smokejumper Tech Services pursues to reduce those risks.

Past projects have included developing a computerized parachute manipulation simulator for smokejumper training and preparing training videos for smokejumper pilots and spotters. The unceasing effort to improve the smokejumper parachute's characteristics and performance has culminated in development of the FS-14, a canopy with greater stability and a slower descent. The new canopy is expected to decrease injuries related to landings. As it becomes available for operational jumps, the canopy may be modified for additional fine-tuning, keeping the process current and the technology cutting edge. ☺



Test jumps during development of the new FS-14 canopy.



*George Jackson*

As an equipment specialist with a strong textiles background, George has helped develop many of the items used by the wildfire community. A former smokejumper, George remains actively involved with wildland firefighting as an Air Attack Group Supervisor. His more than 20 years of firefighting experience gives him the insight required to design equipment for firefighters that is safe, functional, and durable. George is Project Leader for chain saw chaps development, and for the wildland firefighter helicopter rappelling program.

## Helicopter Rappelling Technical Services

The use of helicopter rappelling for initial attack has increased over the past several years. MTDC supports field operations at helicopter bases across the country with technical standards, equipment specifications, and training techniques consistent with the

helicopter rappelling program's needs. This support is intended to increase safety and productivity in the program. Standards for rappelling accessories like the harness, helmet, spotter tether, and cargo letdown equipment are developed under the supervision of MTDC, which is responsible for providing the technology transfer to the field.



*These firefighters are relying on expertise provided by the Helicopter Rappelling Tech Services project.*

## Personal Gear Carrier Retrofit

The red-bag personal gear carrier has been in the system since the mid-1970's. With a change in weight restrictions for organized crews (maximum allowable weight was increased from 35 to 45 lbs) and the firefighters' desire to include personal tents with their gear, a larger carrier is needed. Rather than completely redesigning the present bag, an accessory system is being developed for use with the current personal gear carrier.



*Firefighters' personal gear bags, known as red packs, will be redesigned to include a strap so firefighters can carry a tent as well as their personal belongings.*

## Fire Shelter Containers for Heavy Equipment Operators

The present container for the fire shelter is intended to be worn on the belt or attached to the firefighter's fieldpack. This container is impractical for operators of bulldozers, tractor plows, and other heavy equipment used on the fireline. In the past, when dozer operators left their machine because a fire was overrunning them, they often left their fire

shelter behind. This project is testing a prototype chest-mounted carrying system that will not interfere with the normal operation of heavy equipment.

## Bus Seat Restraints for Tools and Equipment

School buses are the most common vehicle used to transport wildland firefighting crews. The Department of Transportation (DOT) regulations prohibit hauling unsecured gear inside school buses. Agencies must provide chase vehicles to carry firefighters' personal gear and tools, at a substantial cost to the Agency.

By the end of 1997 this project will develop a cargo restraint system that will secure gear and equipment without blocking emergency exits. The system will be presented to the NWCG National Fire Equipment System Subcommittee for possible inclusion in the National Cache System. ☺



*Jerry Jeffries*

Jerry, the Project Leader for Safety and Health, has been involved with fire management his entire career. He served as Northern Region Safety and Health Specialist for Fire and Aviation Management before coming to MTDC. One of his primary responsibilities is to oversee revision of the Forest Service's Health and Safety Code, which includes all aspects of wildland fire safety and health concerns. In addition, Jerry heads up the fireline dozer and tractor plow safety project and the wildland fire driving program. His duties also include assisting wildland fire accident and fatality investigations and developing firefighter training programs, especially in the area of chain saw safety. He serves as a member of the Forest Service's Safety and Health Advisory Council.

## Health and Safety Code


Jerry Jeffries oversees the rewriting of the Health and Safety Code Handbook. This requires many updates and clarifications in addition to incorporating new information. Jerry coordinates information sent in by many contributors involved with health or safety concerns for Forest Service employees. The handbook is critical to the wildland firefighting community. Jerry's strong background in fire suppression helps ensure complete treatment of the subject.

## Tractor/Dozer Plow Safety

The safe and effective use of bulldozers to construct fireline is of critical importance. Many times, the operator may have very little experience working in the wildfire environment, and may be unfamiliar with the Incident Command System. This can lead to dangerous

situations where communications breakdowns may result in life-threatening events. The Tractor/Dozer Plow Safety Project is intended to address the problems inherent to heavy equipment use on the fireline, adopting procedures and creating solutions that will produce a safer work environment. The risk to dozer operators can be greatly minimized through education, training, and information sharing.

## Fireline Driving Video

The Fireline Driving video is an offshoot of the Mountain Driving video, emphasizing the dangers one might expect when driving on a wildfire. It is not intended for firefighters, but for others who might find themselves working on fires, such as caterers, or National Guard troops. Jerry is compiling interviews to be used in the video, and is planning followup interviews with many of the subjects this fire season. The video is to be finished in Fiscal Year 1998. 



*This field test considered the effects of sprinklers inside the dozer's rollover cage. The sprinklers were designed to protect the operator if a fire burns over.*



*Jim Tour*

Jim is a Project Engineer at MTDC specializing in explosives and incendiaries. Jim began working for the Forest Service in 1970, spending 8 years as a technician at the Technology and Development Center in San Dimas, CA. He received his degree in mechanical engineering at California Polytechnic Institute Pomona, and came to MTDC shortly afterward. He has helped develop the Premo MK III aerial ignition device and has helped redesign the helitorch.

## Explosives Technology

The Explosives Technology Project provides continuing technical support to the wildland firefighting community. MTDC participates in national and regional explosives workshops, and serves as technical liaison with the Society of Explosives Engineers, the Institute of Makers of Explosives, the Bureau of Mines, and other government agencies. The Explosives Technology Project oversees and updates the Forest Service's Fireline Explosives Qualified Products list and has helped implement the adoption of a wireless blasting device.

## Ground Ignition Systems

The Ground Ignition Systems Project evaluates devices such as flare pistols and fusee launchers to determine their potential for use in prescribed burning and in backfiring on wildfires. Each device is judged on its suitability, safety, and cost effectiveness. MTDC has helped produce a Ground Ignition Systems Guide addressing the characteristics of the various approved devices.



*Jim Tour tests flare launchers to determine their suitability for ground ignition.*

## All-Terrain Vehicle Use in Firefighting

The use of all-terrain vehicles (ATV's) on the fireline has increased dramatically, raising many questions regarding their safe, efficient use. The ATV project

is testing and evaluating ATV's under conditions common to wildland fire: rough terrain, narrow trails and firelines, limited visibility due to smoke and dust, and any other factors that affect the safe operation of ATV's. In addition, ATV's are being used with pre-

scribed fire, performing tasks like transporting fuel or personnel, or as a mobile platform for ignition devices like the fusee launcher. Standards for safe operation of ATV's for prescribed fire will be developed with the help of information learned by this project. ☞



*The Center is developing ways to use all-terrain vehicles more effectively in wildland fire applications.*



*Keith Windell*

Keith is Project Leader for several fire and residues projects. He has a bachelor of science degree in mechanical engineering from Montana State University, as well as an extensive firefighting background. He has worked for the California Department of Forestry, Bureau of Land Management, and the Forest Service. Positions he has held include engine crewperson, helitack crewmember and foreman, hotshot crewmember, and smokejumper.

## Helicopter Rappelling Accessories

As helicopter rappelling programs grow throughout the wildfire community, standards need to be set. The Interagency Helicopter Screening and Evaluation Board, still in its formative stage, will set these standards. The Helicopter Rappelling Accessories Project will provide engineering support for the Board's activities. Tasks will include the design, fabrication, and evaluation of helicopter rappel attachment points and related accessories. In addition, all engineered attachment points will be approved by the Federal Aviation Administration.

## Understory Biomass Reduction

Fire suppression efforts over the past 80 years have significantly changed the character of ponderosa pine stands throughout the West. A method must be found to reduce the biomass without dramatically increasing ground fuels. This would allow fire to be reintroduced to the ecosystem under more manageable conditions. This project is in its infancy, so initial actions will include defining the problem in greater detail, viewing possible solutions, searching the literature and the open market to determine if solutions already exist that can be modified to fit our needs, and forming an action plan to address this project. ☹



*Testing rappel anchor plates for several models of helicopters.*



*Applying stress to the anchor plate for a Bell 206-L3 helicopter.*



*Ted Putnam*

Ted Putnam is a fire and safety equipment specialist at MTDC. Ted began working for the Forest Service in 1963, spending several years on District fire crews and 11 years as a Northern Region smokejumper before joining the Center in 1976. He holds a Ph.D. in experimental psychology from the University of Montana and is a member of the National Fire Protection Association standards-setting committees for protective clothing and equipment. In addition to the projects he heads for the Fire and Aviation Program, Ted is Project Leader for Forest Service and National Park Service uniforms, ensuring that manufacturers meet construction and sizing specifications, and materials requirements.

## Protective Clothing

The protective clothing project considers special needs for sizing or environmental factors like climate, and reviews feedback from the field regarding the clothing's general comfort and utility. A field questionnaire is currently being developed to evaluate prototype Nomex fire pants patterned after the military-style BDU's (Battle Dress, Utilities). These pants were field tested by some crews during 1996. When the survey is completed and field test results are compiled, the Nomex protective clothing with the fit and features most desired by firefighters will be established as a new contract specification.

## Human Factors Workshop

Ted Putnam's background in psychology, coupled with his extensive fire experience, gives him a unique perspective (and more than a passing interest) in the human factors affecting decisionmaking processes in risky, stressful situations on the fireline. His interest in this subject led him to organize a workshop that brought together experts in the fields of psychology, sociology, organizations, fire safety, and wildland firefighting. A paper was written and published by MTDC outlining the workshop's findings and recommendations.




*Ted Putnam's work with fire shelters has led to many improvements in their design and in training firefighters in their use.*



*Human interaction is critical to firefighter safety.*

## Fire Shelters and Entrapment Investigations

The fire shelter is a proven life-saver. However, it is necessary to continually monitor the performance of fire shelters in the field and keep abreast of new technologies and materials. Ted Putnam is part of a team that responds to fire shelter deployments and entrapments nationally, collecting physical evidence for later analysis to determine whether the personal protective equipment in general—and the fire shelter in particular—perform as designed. 



*MTDC developed fireproof boxes to protect video cameras used when recording the effects of fire during vehicle entrapments.*

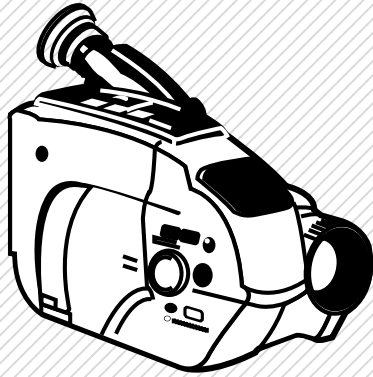


*Firefighting equipment found after an entrapment is carefully examined.*



*Bret Butler, Intermountain Fire Sciences Lab, helped prepare instrumentation for data collection equipment during the simulated vehicle entrapments.*

## Audio/Visual Support



The Audio/Visual Support Unit works very closely with the Project Leaders and technicians who perform experiments in the field and develop equipment at MTDC. Reports may explain results, but pictures, slides, and video enhance the message. Whether the Audio/Visual Support Unit is shooting still photographs in the studio or field, or filming smokejumper exits on actual fire jumps with high-speed, state-of-the-art camera equipment, the unit's staff is up to the challenge. When special tasks present themselves, they use imagination to solve problems. For instance, the vehicle entrapment study called for video cameras to be set up in several locations around the site, which would then be burned over. Fireproof boxes with special glass windows and a cooling system were needed—something not found on the shelf at the local photo shop. Unable to purchase the boxes, the Audio/

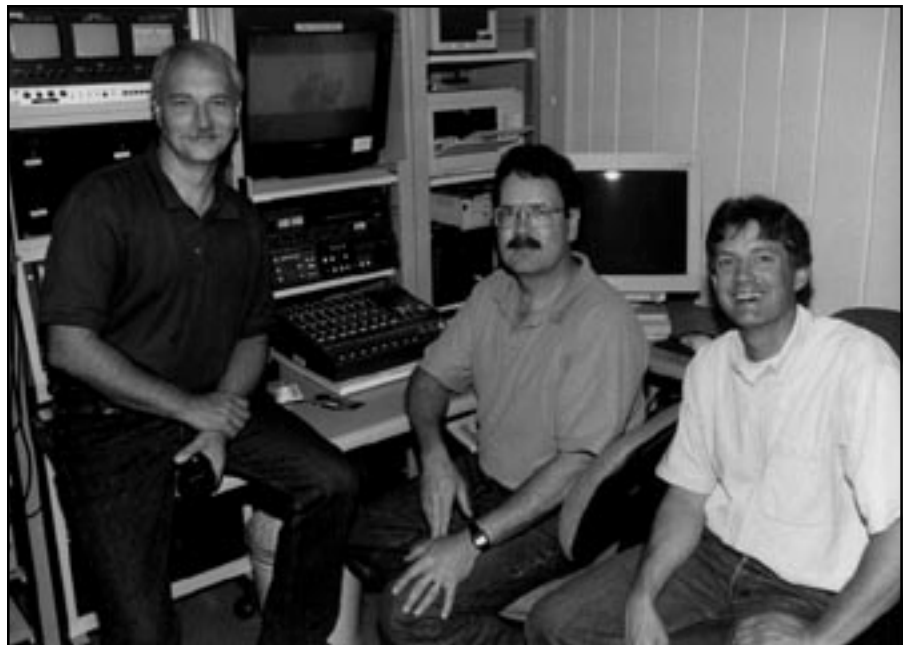
Visual Support Unit worked with MTDC's fabrication shop and constructed the necessary items. Fire videos produced by MTDC's Audio/Visual support unit include: *Your Fire Shelter*, *Wenatchee Heights Entrapment*, *Smokejumper Pilot*, and *Smokejumper Spotter*.

**Jim Kautz** is a videographer and photographer at MTDC. He began his career with the Forest Service as a firefighter on the Sula Ranger District, Bitterroot National Forest, and was a Northern Region smokejumper for 2 years. He holds a degree in film and television from Montana State University, and is responsible for photographic documentation of MTDC's wildland fire entrapment investigation team.

**Mark Wiggins** is an audio/visual production specialist at MTDC.

He began his Forest Service career by spending several summers on lookout towers in the Northern Region. Mark has been in the forefront of the use of infrared imagery on fires in the Northern Region. His involvement with infrared since the mid-1970's includes stints as an instructor, interpreter, and regional and national coordinator. He has worked at MTDC for the past 3 years.

**Bob Beckley** is a photographer at MTDC. He has worked on nearly every type of fire crew during his more than 20 years working in or around fire suppression. He has worked on engine crews and helitack crews and spent several years smokejumping. He has worked with fire information units and been dispatched to photograph fires on numerous occasions. ☺



Mark Wiggins, Jim Kautz, and Bob Beckley produce the Center's photography and videos.

## Publications



*Sara Lustgraaf, Bert Lindler, and Ted Cote produce MTDC's technical reports.*

The Publication Unit's experience in designing and producing printed documents pays off in attractive, useful publications for firefighters and fire managers. The unit's experience extends from the days when the publications were pasted up by hand to today's computerized desktop publishing and electronic publishing over computer networks. Sophisticated computers with the latest graphics software allow the unit to manipulate photographs and drawings. Top-quality printers, a color plotter, scanners, and a film recorder allow the unit to prepare everything from book-length reports to brochures, poster displays, and slides for presentations.

An editor and two visual information specialists work with the Center's Project Leaders to create documents for publication. Another Center employee oversees distribution of Center publications

and videos. Each year the Publications Unit prepares about 50 reports and Tech Tips that are widely distributed within the Forest Service.

**Bert Lindler** has been the editor at MTDC for the past 2 years. After receiving a master's degree in science writing from the University of Missouri, Bert worked for a year as a writer and editor at the Forest Service's Intermountain Fire Sciences Laboratory in Missoula, MT. That experience helped him during the 15 years that he covered natural resource issues—including wildland fires and prescribed fires—for the *Great Falls Tribune* in Great Falls, MT. He rejoined the Forest Service in 1992, working as an editor for the Intermountain Research Station in Ogden, UT.

**Ted Cote** is a visual information specialist at MTDC. He began his Forest Service career as an engi-

neering draftsman at MTDC in the mid-1970's. He went back to college in the early 1980's and earned a bachelor's degree in art (he also has an associate's degree in applied science).

Ted has worked in desktop publishing since the mid-1980's and has considerable experience in layout and graphics programs such as Pagemaker, Illustrator, and Photoshop.

**Sara Lustgraaf** is a visual information specialist at MTDC. She began her Forest Service career in 1969 at the Northern Region's Cartography and Graphics Unit.

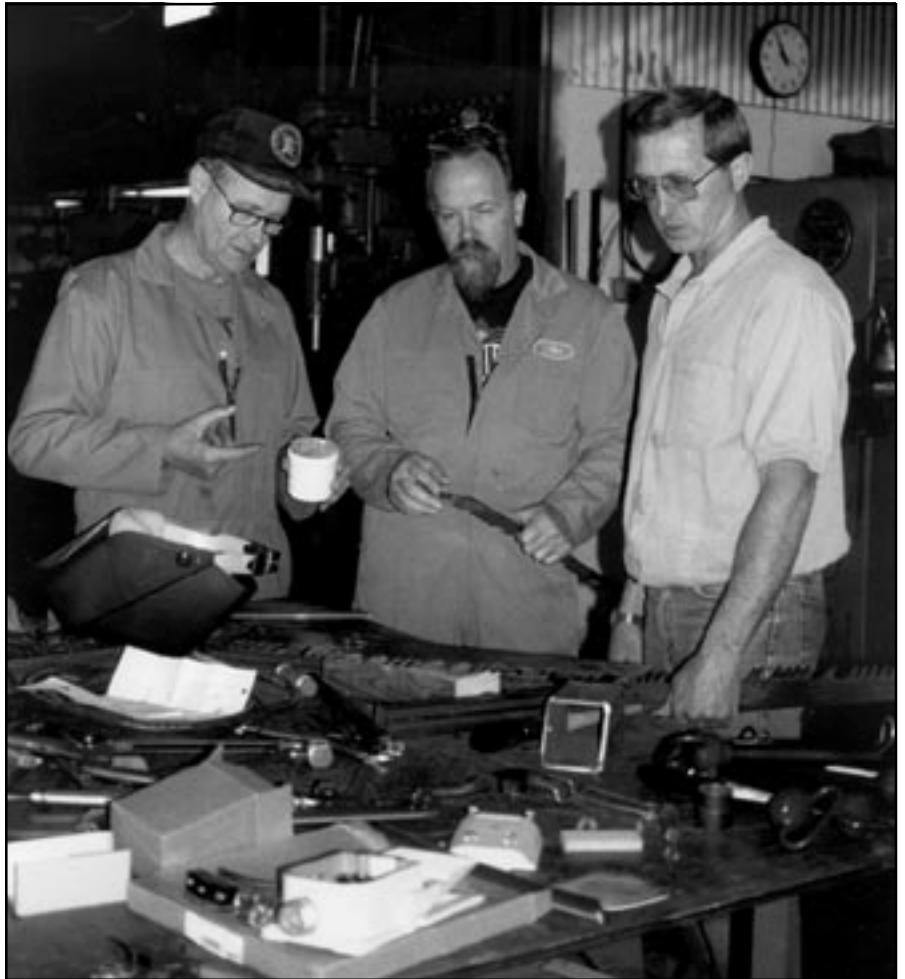
She came to work at MTDC in 1994, where she has been designing Center reports using desktop publishing software. She also produces brochures, flipchart presentations, graphs, and other materials. ☞

## Fabrication Shop



Working with Project Engineers, the Fabrication Shop staff produces prototype items designed to meet the special demands of the Fire and Aviation Management Program. The Shop recently built prototypes of rappel anchor plates for helicopters, and storage bins that double as spotter seats in smokejumper aircraft. In addition, the Fabrication Shop houses several specialty vehicles that the Fire Program uses on occasion, such as a semitruck and trailer, ATV, forklift, and 1-ton truck. The Shop's facilities include computerized milling machines, metal lathes, welding equipment, and other specialized equipment.

**Neal Maier** has been MTDC's shop supervisor since 1997. He began working at the Fabrication Shop in 1976 as a mechanical engineering technician. His Forest Service career started in 1966 in cartography for the Northern Regional Office at Fort Missoula. He later worked in the printing shop at Fort Missoula, and the



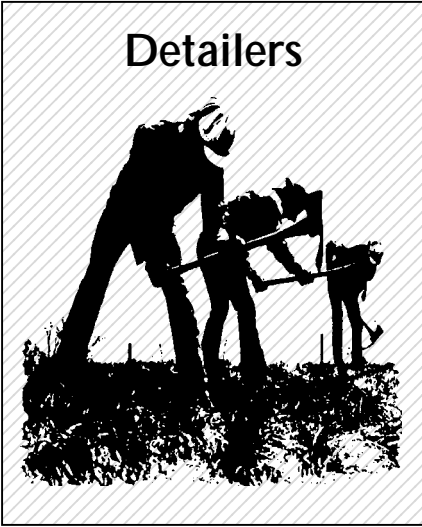
*Windy Hayden, Mike Huey, and Neal Maier produce prototypes at MTDC's Fabrication Shop.*

duplicating shop in the Regional Office, where he was supervisor. He was Office Services Supervisor in the Regional Office before coming to MTDC.

**Mike Huey** received an A.S. degree in ship construction from Long Beach City College in 1975. He worked as a weapons machinist in the Long Beach Naval Shipyard from 1971 until 1977. He has served as an engineering technician at the MTDC machine shop since 1980.

**Windy Hayden** has worked as a mechanical engineering technician in the Fabrication Shop since 1979, when he left his own machine shop in Hamilton, MT, to join the Forest Service. He has worked as a machinist, heavy equipment operator, and an electrical lineman during his career with firms such as Boeing in Seattle, the Cummings and Roberts Mining Company in Darby, MT, and the Montana Power Company in Hamilton, MT. ☞

## Detailers



The Fire and Aviation Program depends on the help it receives from individuals detailed into MTDC during the winter months. They come from Districts, smoke-jumper units, the Fire Sciences

Laboratory—wherever field expertise can be found. MTDC provides the opportunity for the detailers to see another side of the business of suppressing wildfire, and at the same time the Center profits from the experiences of folks with hands-on experience. This connection to the field is fundamental to the Fire and Aviation Management Program. These detailers help the Program remain current, and focused on real problems in the firefighting community.

The people who come to MTDC on detail perform many technical tasks for Project Leaders and accomplish a great deal of the legwork required to get a project up and running. Detailers may write Tech Tips produced by the Center, or use their familiarity with

instruments such as computerized data loggers, or their experience in rappelling or paracargo operations during field tests. Some technicians construct prototype models of wildland fire equipment—like the fire shelter or field pack. They use industrial sewing machines and the latest in fabrics and components when doing so.

One project that detailers are working on will determine the suitability of electronic psychrometers in wildland fire environments. A product search will be made, and several models will be tested for accuracy, durability, and cost.

Another project involves design of a face and neck shroud for firefighters. ☞

# Fire and Aviation Documents and Videos

These documents and videos are currently available:

## — Documents —

- Wildland Fire Entrapment/Fatality Initial Report Form
- 5-Gallon Backpack Drinking Water Bag
- 5-Gallon Backpack Suppression Water Bag
- Dangerous Techniques for Fire Shelter Training
- New Standards for Wildland Firefighting Protective Clothing and Equipment
- Flail Trencher Progress Report
- Water Bag System
- 55-Gallon Drinking Water Bag
- 55-Gallon Suppression Water Bag
- Ground Ignition Systems Guide: An Equipment Guide for Prescribed and Wild Fires
- Lessons Learned: The Use of Personal Protective Equipment on Wildland Fire Entrapments in 1993
- GPS Use in Wildland Fire Management
- Face/Neck Shroud
- Carbohydrate/Electrolyte Replacement Beverages
- Fusee Launcher
- Handling Bio-Hazard Material
- Static Bonding and Grounding When Handling Flammable and Combustible Fuels
- Maintaining and Inspecting Your Hardhat
- Making a Crew—Part I: Putting a Crew Together
- Making a Crew—Part II: Keeping a Crew Together
- Handtool Sharpening Gauge
- Surviving Fire Entrapments: Comparing Conditions Inside Vehicles and Fire Shelters
- HR-1 Helicopter Rappel Harness
- The FS-14—An Improved Smokejumper Parachute Canopy
- Health Hazards of Smoke: Summer/Fall 1991
- Health Hazards of Smoke: Fall 1992
- Health Hazards of Smoke: Winter/Spring 1992
- Health Hazards of Smoke: Spring 1993
- Health Hazards of Smoke: Fall/Winter 1993
- Health Hazards of Smoke: Spring 1994
- Health Hazards of Smoke: Fall 1995
- Health Hazards of Smoke: Spring 1996

## — Videos —

- Fire Entrapment
- Smokejumper Pilot
- Smokejumper Spotter
- Wenatchee Heights Entrapment
- Your Fire Shelter

**Single copies of documents and  
videos may be ordered from:**

USDA Forest Service, MTDC  
Building 1, Fort Missoula  
Missoula, MT 59804-7294  
Phone: (406) 329-3900  
Fax: (406) 329-3719



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