

Facilities

Pepper-Based Coating Protects Signs and Structures

Animals don't make friends when they peck and chew buildings, signs, and equipment at Forest Service facilities around the country. A new coating that may alleviate this problem was tested recently by the Missoula Technology and Development Center (MTDC) at several Forest Service sites.

These preliminary tests produced some dramatic results. Porcupines were deterred from chewing treated signs, and horses and mules left corral rails alone. The coating may discourage woodpeckers from boring through wood siding and keep chipmunks and other small mammals from damaging plastics, such as equipment boxes and weather seals on overhead doors.

The active ingredient in this coating is a concentrated food-quality oleoresin capsicum extract. This extract is derived from a particularly potent strain of habanero peppers originally found in Central America. The coating is produced using a patented process that bonds the pepper extract molecularly to paints, stains, plastics, and rubberized products.

The tech tip, *Quit Eating My Signs! Pepper-Based Coating Discourages Animals from Damaging Structures* (0573-2313-MTDC), discusses these tests and includes information about ordering the product.

For additional information about coatings that discourage animals from damaging structures, contact Kathie Snodgrass, project leader (phone: 406-329-3922; e-mail: ksnodgrass@fs.fed.us).

To order the tech tip, contact MTDC publications (phone: 406-329-3978; e-mail: cahegman@fs.fed.us).



Electronic Physical Security

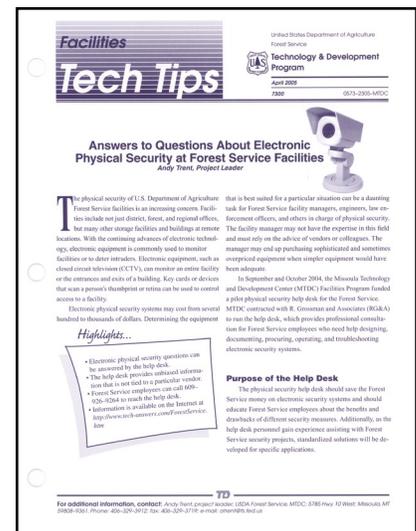
Physical security at Forest Service facilities is an increasing concern. Electronic equipment, such as closed-circuit television, can monitor facilities and deter intruders. Determining the equipment that is best suited for a particular situation can be difficult for facility managers, engineers, law enforcement officers, and others in charge of physical security. The MTDC facilities program funded a pilot physical security help desk to provide professional consultation for Forest Service employees who design, document, procure, operate, and troubleshoot electronic security systems.

The tech tip, *Answers to Questions About Electronic Physical Security at Forest Service Facilities* (0573-2305-MTDC), explains the help desk project and includes employee questions and feedback.

For more information on physical security at Forest Service facilities, contact Andy Trent, project leader (phone: 406-329-3912; e-mail: atrent@fs.fed.us).

To order the tech tip, contact MTDC publications (phone: 406-329-3978; e-mail: cahegman@fs.fed.us).

Physical security help desk services can be reached at:
<http://www.tech-answers.com/ForestService.htm>



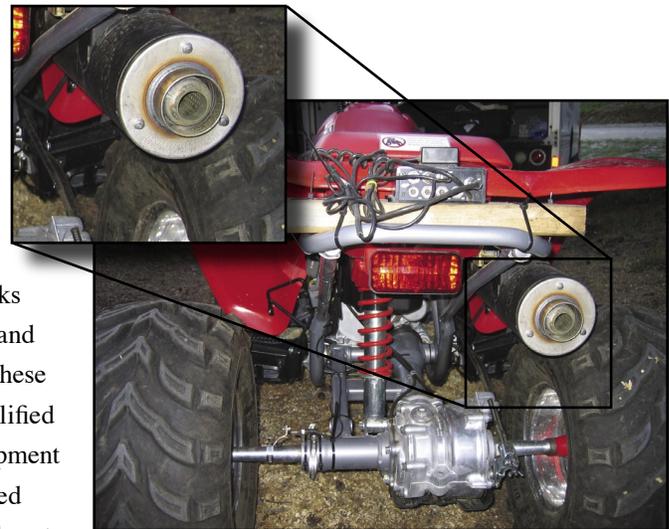
Fire

Qualification Testing of Spark Arrester Exhaust Systems

The guide for submitting equipment for testing, *Manufacturer Submission Procedure for the Qualification Testing of General-purpose, Screen, and Locomotive Spark*

Arrester Exhaust Systems (0551-1803P-SDTDC), has been revised. Off-highway vehicles, chain saws, and other machines powered by an internal combustion engine can start wildland fires if the exhaust throws sparks or if the muffler contacts wildland fuels. Spark arresters used on these devices must be tested and qualified by the Technology and Development Program before they can be used on lands administered by the Forest Service, other Federal agencies, and in most instances, States and municipalities.

The present qualification program for small- and medium-sized engines is based on performance requirements established by the Forest Service, the Society of Automotive Engineers, and the Association of American Railroads.



The San Dimas Technology and Development Center (SDTDC) has a laboratory set up specifically to test the effectiveness of spark arrester systems for internal combustion engines. SDTDC is authorized to issue a qualification notice to the manufacturer of equipment that passes these tests.

For more information on qualification testing of spark arresters, contact Ralph Gonzales, project engineer, (phone: 909-599-1267, ext. 212; e-mail: rhgonzales@fs.fed.us).

To order the guide, contact Kene Owu, SDTDC publications (phone: 909-599-1267, ext. 235; e-mail: kowu@fs.fed.us).

New, Larger Fire Shelter May Be Just Your Size

The New Generation Fire Shelter, introduced in 2003, was designed in just one size. Feedback from field employees prompted development of a larger shelter to provide better protection for larger firefighters. For such firefighters, the large shelter:

- Reduces body contact with the hot shelter material during deployment
- Provides more insulating space between the shelter material and large occupants
- Prevents the shelter from being damaged when the occupant stretches out

The tech tip, *Large New Generation Fire Shelter Now Available* (0551-2325-MTDC), provides guidelines on the size of shelter that is best for firefighters to carry, as well as information for training with the new shelter and for ordering the shelters.

For more details on the large New Generation Fire Shelter, contact Tony Petrilli, project leader (phone: 406-329-3965; e-mail: apetrilli@fs.fed.us).

To order the tech tip, contact MTDC publications (phone: 406-329-3978; e-mail: cahegman@fs.fed.us).



Effects of DEET on Nomex Clothing

Wildland firefighters may encounter lots of mosquitoes while working. Because mosquitoes transmit West Nile virus, mosquitoes are no longer just an inconvenience.

Tests were performed with DEET (N, N-diethyl-3-methylbenzamide) and permethrin (an insecticide) on various types of Nomex clothing worn by firefighters. DEET reduces the flame resistance of Nomex clothing, but permethrin does not. DEET can be applied directly to the skin, so long as the manufacturer's instructions are followed.

United States Department of Agriculture
Forest Service
Technology & Development Program
July 2005 0551-2325-MTDC
8000

Fire Tech Tips

DEET Mosquito Repellent Reduces the Flame Resistance of Firefighters' Nomex Clothing

Lester Anderson, Program Leader, and Tony Petrilli, Project Leader

The Missouri Technology and Development Center has added a new repellent (containing N,N-diethyl-3-methylbenzamide, DEET) to the list of flame-retardant materials (Nomex) in depleting supply to some wildland firefighters. Firefighters often are exposed to high populations of mosquitoes while working in the field. The arrival of West Nile virus (transmitted by mosquitoes) has increased the use of mosquito repellents (Table 1).

To test the effects of DEET on the performance of Nomex clothing, MTDC contracted with Underwriters Laboratories, Inc. to perform a flame-resistance test on materials after DEET products had been applied.

The tests were performed on the following materials:

- 5.5-ounce Nomex IIIA Brocade were used in flame-resistant pants approved for use by Forest Service wildland firefighters
- 5.5-ounce Nomex IIIA Trill used in flame-resistant pants approved for use by Forest Service firefighters
- 7.0-ounce Airtex 400 gsm Nomex IIIA 60 percent Kevlar ripstop 200 Q1000, a new repellent finish used in flame-resistant pants made by some wildland firefighters

All fabrics were washed five times before testing. Five standard samples were tested after each treatment. Results are based on the average of the five measurements.

- Each sample was tested after an application of 100 percent DEET spread in a pump dispenser
- 40 percent DEET tested
- 25 percent permethrin tested

Each test also was run on untreated control samples. The DEET tested and untreated replicates were applied and tested by four different users.

Highlights...

- DEET mosquito repellent reduced the flame resistance of NOMEX clothing worn by wildland firefighters.
- MTDC recommends that firefighters avoid applying DEET mosquito repellent to their Nomex firefighting clothing.
- Firefighters can apply DEET mosquito repellent to their skin (following manufacturer's recommendations).
- Firefighters can apply permethrin, an insecticide, to their Nomex clothing without a loss in their clothing's flame resistance, destroying the clothing's flame resistance.

Figure 1. With the spread of West Nile virus, mosquitoes are more than a nuisance to wildland firefighters.

For additional information, contact: Tony Petrilli, project leader, USDA Forest Service MTDC, 6760 Hwy 10 West, Missoula, MT 59701-0201. Phone: 406-329-3965. Fax: 406-329-3716. E-mail: apetrilli@fs.fed.us

The tech tip, *DEET Mosquito Repellent Reduces the Flame Resistance of Firefighters' Nomex Clothing* (0551-2327-MTDC), discusses DEET and permethrin products, and offers some recommendations to help firefighters contend with mosquitoes.

For more information on DEET and Nomex clothing, contact Leslie Anderson, program leader (phone: 406-329-1043; e-mail: landerson@fs.fed.us).

To order the tech tip, contact MTDC publications (phone: 406-329-3978; e-mail: cahegman@fs.fed.us).

Latest Wildland Firefighter Health and Safety Report Now Available

Wildland Firefighter Health and Safety Report: No. 9 (0551-2803-MTDC) discusses the importance of a balanced and nutritious diet that can help firefighters meet energy demands and vitamin and mineral needs. The report outlines nutritional requirements, describes how servings of fruits and vegetables are measured, and includes a sample food plan. The report provides summaries of recent field studies of supplemental feeding and its effects on cognitive function and on the influence of hydration on the core temperature of wildland firefighters.

For more information, contact Brian Sharkey, project leader (phone: 406-329-3989; e-mail: bsharkey@fs.fed.us).

To order a copy of the report, contact MTDC publications (phone: 406-329-3978; e-mail: cahegman@fs.fed.us).



Situational Awareness Fire Posters Shout Watch Out

A fire safety poster, *How is your Situational Awareness?* (0451-2M35-MTDC), is available. Copies of the poster can be sent to individuals, as well as to groups, such as fire organizations and safety committees.

To order this poster, contact MTDC publications (phone: 406-329-3978; e-mail: cahegman@fs.fed.us).

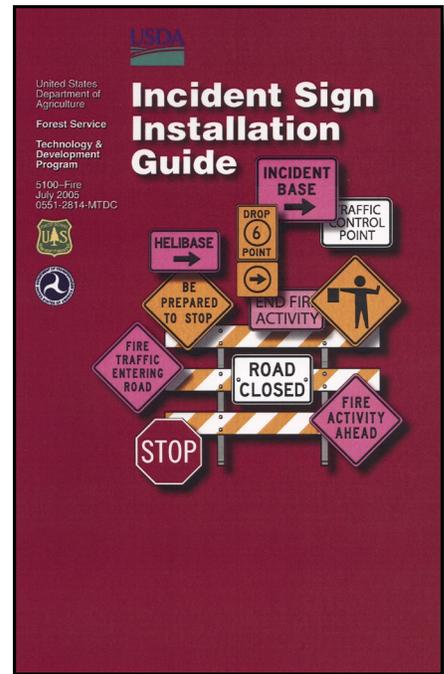


Incident Sign Guide Helps Improve Firefighter Safety

Proper use of signs during wildland fires and other incidents is important to inform drivers of hazards. Signs not only inform motorists, they also inform incident management personnel. MTDC has published the *Incident Sign Installation Guide* (0551-2814-MTDC) to explain how to use signs properly. The guide is based on standards established by the *Manual on Uniform Traffic Control Devices* and the *Standards for Forest Service Signs and Posters* (EM-7100-15).

For more information on sign installation, contact Andy Trent, project leader (phone: 406-329-3912; e-mail: atrent@fs.fed.us).

To order the report, contact MTDC publications (phone: 406-329-3978; e-mail: cahegman@fs.fed.us).



Recreation

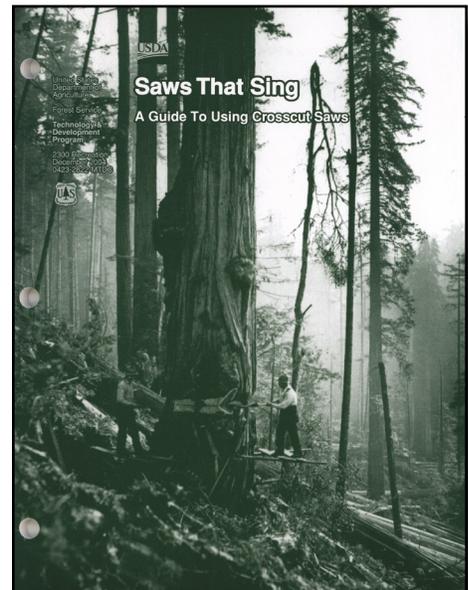
Keep Your Crosscut Saw Singing

After more than 35 years working in the woods, Tahoe National Forest Trails Program Manager David E. Michael has written a comprehensive guide to share his experience with a traditional tool—the crosscut saw—and to help wilderness trail crews, smokejumpers, historic preservation specialists, and others who want to learn more about crosscut saws.

In *Saws That Sing: A Guide To Using Crosscut Saws* (0423-2822-MTDC), Michael presents techniques for using and maintaining crosscut saws. The guide includes photos and descriptions of different types of crosscut saws, saw handles, and wedges.

For more information, contact Brian Vachowski, project leader (phone: 406-329-3935; e-mail: bvachowski@fs.fed.us).

To order the report, contact MTDC publications (phone: 406-329-3978; e-mail: cahegman@fs.fed.us).

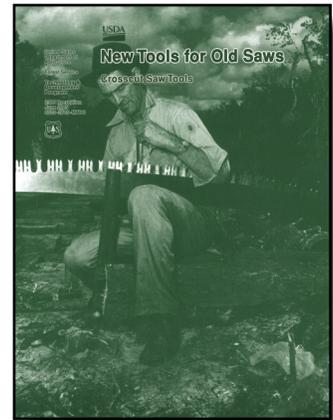


Redesigned Tools for Crosscut Saw Maintenance

Crosscut saws and the tools to maintain them are hard to find. Crosscut saws can be beneficial in nonwilderness areas and should be used in wilderness areas where the 1964 Wilderness Act prohibits the use of motorized equipment. Working from traditional designs, MTDC built prototypes of eight tools used to maintain crosscut saws. The report, *New Tools for Old Saws* (0523–2815–MTDC), describes the basic functions of these tools. Mechanical drawings of the tools are included for those who wish to build their own or have a machinist build one for them.

For more information on crosscut saw maintenance, contact Bob Beckley, project leader (phone: 406–329–3996; e-mail: rbeckley@fs.fed.us).

To order the report, contact MTDC publications (phone: 406–329–3978; e-mail: cahegman@fs.fed.us).



Marking the Way in the Backcountry

Hikers need trail markers when the path is not obvious. In rocky backcountry terrain, trails often wind through areas where only a small amount of soil covers the bedrock, making it difficult to install markers.

To help recreation crews install permanent trail markers, SDTDC developed design criteria and tested four types of anchoring systems: rock basket (least complex), stake anchor, holddown anchor, and the metal-post base anchor (most complex).

The report, *Anchoring Trail Markers and Signs in Rocky Areas* (0523–1202P–SDTDC), provides instructions and materials lists for installing trail markers and signposts without the use of heavy tools and equipment.

For additional information about anchoring trail markers and signs in rocky areas, contact L'Tanga Watson, project leader (phone: 909–599–1267, ext. 296; e-mail: ltwatson@fs.fed.us).

To order the report, contact Kene Owu, SDTDC publications (phone: 909–599–1267, ext. 235; e-mail: kowu@fs.fed.us).



Electronic Scanning of Wilderness Permits

The tech tip, *Technologies for Scanning Wilderness Permits* (0523–2324–MTDC), covers the use of optical scanning technologies to convert information on printed wilderness permits into an electronic form for incorporation into the Forest Service's Infra-WILD database. Optical scanning systems can eliminate the need to enter information from thousands of permits manually into a database.

The tech tip also includes information on optical mark recognition scanning systems that read checkboxes and shaded bubbles and on



intelligent character recognition systems that can read handwriting.

For more information on technologies for scanning wilderness permits, contact Gary Kees, project leader (phone: 406-829-6753; e-mail: gkees@fs.fed.us).

To order the tech tip, contact MTDC publications (phone: 406-329-3978; e-mail: cahegman@fs.fed.us).

Using Vitamin C To Neutralize Chlorine in Water

The tech tip, *Using Vitamin C to Neutralize Chlorine in Water Systems* (0523-1301P-SDTDC), addresses safety concerns of sanitation engineers and operators of water and wastewater systems.

Seasonal water systems must be sanitized for safe human use at the beginning of each season. Often, a strong chlorine solution is added to the water to kill bacteria and other organisms. If this water is allowed to enter a lake or stream, it can kill fish and other aquatic life. This water could upset the bacterial balance in a septic system or small wastewater treatment plant if the water were directed there.

Over time, air and sunlight would neutralize chlorine in tanks or ponds, but chemical treatments are much faster. Although sulfur compounds can be used as dechlorinators, sulfur-based chemicals are oxygen scavengers and will lower the amount of oxygen dissolved in water. Many sulfur compounds also are classified as hazardous chemicals.

Vitamin C is a newer chemical method for neutralizing chlorine. It does not lower the dissolved oxygen as much as the sulfur compounds and it isn't toxic to aquatic life at the levels used for dechlorination.

This tech tip reports the results of a series of dechlorination tests using two forms of vitamin C: ascorbic acid and sodium ascorbate.

For additional information about using vitamin C to treat water, contact Brenda Land, project leader (phone: 909-599-1267, ext. 219; e-mail: bland@fs.fed.us).

To order the tech tip, contact Kene Owu, SDTDC publications (phone: 909-599-1267, ext. 235; e-mail: kowu@fs.fed.us).



Reforestation

Alternatives to Burlap for Wrapping Seedlings

Traditionally, sheets of burlap have been used to wrap bareroot seedlings into bundles that fit in planters' bags, but rolls of polypropylene- and cellulose-based toweling are becoming more popular. These lightweight materials clean up easily, hold moisture well, and can be reused several times before being discarded.



When Kimberly-Clark Corp. discontinued cutting a favorite product, Kimtex, into the proper size needed to wrap seedlings, MTDC searched for alternative materials that might provide the needed absorbency, reusability, stability, and affordability. A DuPont product, spun-woven Sontara, worked best in limited evaluations.

The tech tip, *Reusable Toweling for Wrapping Tree Seedlings* (0524–2323–MTDC), discusses the evaluation’s results, provides contact information for two suppliers of Sontara, and includes a summary of the proper procedures for wrapping trees.

For more information on reusable toweling for wrapping seedlings, contact Brian Vachowski, project leader (phone: 406–329–3935; e-mail: bvachowski@fs.fed.us).

To order the tech tip, contact MTDC publications (phone: 406–329–3978; e-mail: cahegman@fs.fed.us).

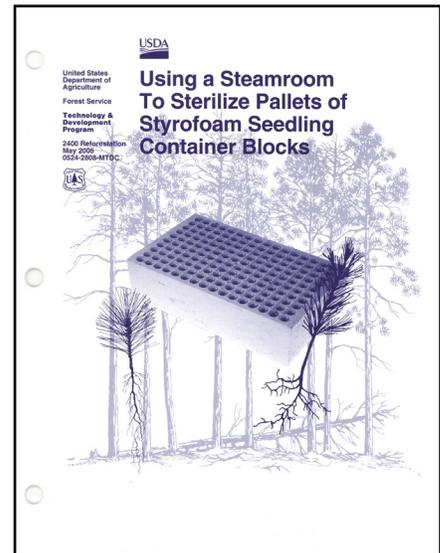
Sterilizing Pallets of Styroblocks

Styrofoam container blocks (styroblocs) are popular for growing seedlings in nurseries. The styroblocs come in various sizes and can be reused several times. Residual organic matter within the blocks may harbor pathogens that could infect future seedling crops. Sterilizing the styroblocs using traditional methods, such as hot-water dipping, is time consuming and labor intensive. MTDC evaluated several treatments for reducing fungal contamination of styroblocs.

The report, *Using a Steamroom To Sterilize Pallets of Styrofoam Seedling Container Blocks* (0524–2808–MTDC), describes testing to evaluate the effectiveness of radiofrequency waves, dry heat (low humidity), and wet heat (high humidity) in sterilizing the styroblocs. The report also describes the fabrication and evaluation of a steamroom at Lucky Peak Nursery, ID, that can sterilize 4,000 styroblocs at one time.

For more information on sterilizing styroblocs, contact Andy Trent, project leader (phone: 406–329–3912; e-mail: atrent@fs.fed.us).

To order the report, contact MTDC publications (phone: 406–329–3978; e-mail: cahegman@fs.fed.us).



Monitoring Changes at Remote Locations

In some remote areas, radio transmissions and cellular phone coverage may be unreliable. In these areas, satellite telemetry can be used to monitor environmental conditions, such as temperature, conditions at facilities, and the status of intrusion sensors. The cost of hardware and monthly fees can make some means of satellite telemetry unaffordable. The report, *AXTracker: An Inexpensive Satellite Transmitter for Sensing Changes at Remote*



Locations (0524–2802–MTDC), provides information on a relatively inexpensive and fully programmable device that can be used nearly anywhere for reliable location and monitoring reports. The AXTracker transmitter communicates using the Globalstar satellite network.

For more information on the AXTracker, contact Gary Kees, project leader (phone: 406–829–6753; e-mail: gkees@fs.fed.us).

To order the report, contact MTDC publications (phone: 406–329–3978; e-mail: cahegman@fs.fed.us).

Safety

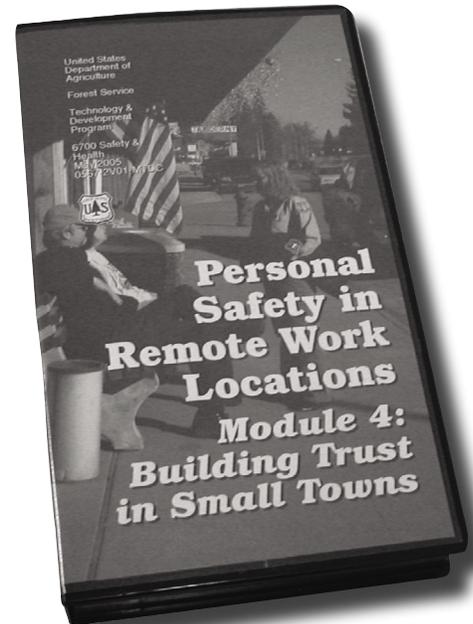
Fourth Video in the Personal Safety Video Series

The video, *Personal Safety in Remote Work Locations Module 4: Building Trust in Small Towns* (0567–2V01–MTDC), describes common sources of conflict between the Forest Service and members of small communities. The video emphasizes how building trust is the most powerful tool employees have to protect their personal safety and shows steps employees can take if hostility is ever directed at them, their families, or their personal property. The tech tip, *Personal Safety Awareness for Field Employees* (0567–2317–MTDC), provides an overview of the video.

The personal safety in remote work locations video series helps employees cope with personal safety problems encountered while working with the public. Other videos in the series include: *General Awareness* (0167–2V02–MTDC), *Supervisor Responsibilities* (0267–2V01–MTDC), and *Avoiding Trouble* (0367–2V03–MTDC).

For more information on personal safety awareness for field employees, contact Lisa Outka-Perkins, sociologist (phone: 406–329–3849; e-mail: loutka-perkins@fs.fed.us).

To order the video and tech tip, contact MTDC publications (phone: 406–329–3978; e-mail: cahegman@fs.fed.us).



Engineering

T&D Snippets: Know More with Less Effort

Be among the first to know of recently completed T&D projects. Subscribe to *T&D Snippets*.

T&D Snippets gives you a quick summary of new reports or tech tips as they become available electronically. The snippets also provide a link to the electronic version of the document so you can read it and print it out.

In February, the premiere snippet (*Fencing Out Wildlife*) was sent to T&D News subscribers, giving them an opportunity to review the snippet and subscribe if they wished.

Sample snippet: *Accident Investigation Guide: 2005 Edition* (0567–2806–MTDC)

This guide describes the procedures used by the Washington Office Chief's investigation team for serious accidents, aviation accidents, and incidents with potential of causing an accident. These procedures also apply to all accident and incident investigations conducted by any individuals working under the direction and authority of the Forest Service.

The guide can be used at the regional, area, forest, or district level. Accident investigation forms are available in two formats: Adobe Acrobat PDF and Microsoft Word.

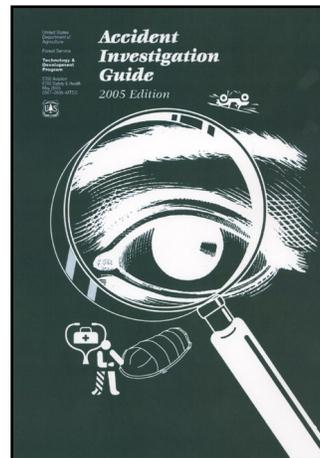
This edition replaces the 2003 and 2001 versions of the *Accident Investigation Guide*.

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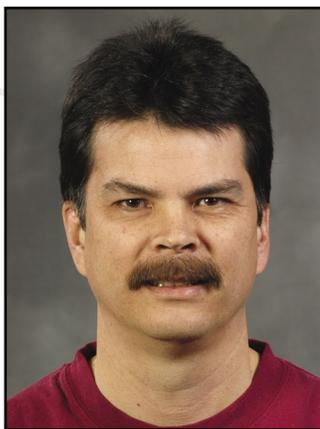
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New Faces

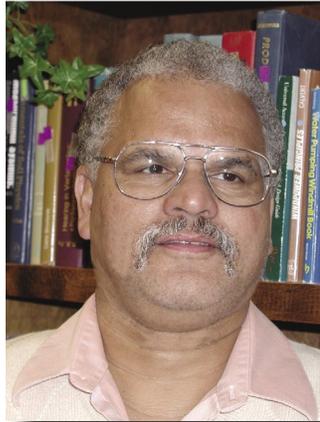
New Faces at MTDC and SDTDC



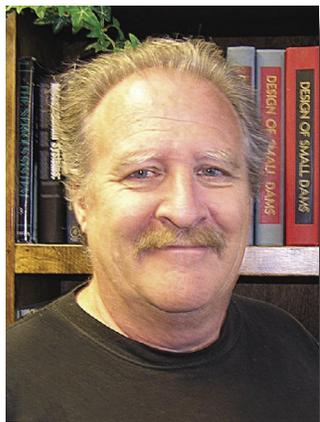
John Smith joined MTDC in February 2005 as an equipment specialist. John graduated from the University of Montana with a bachelor's degree in education and taught elementary school in Ovando, MT. He began his Forest Service career in 1974 as a district firefighter for the Superior Ranger District of the Lolo National Forest. A Missoula smokejumper for the past 23 years, John has experience as assistant loadmaster foreman, master parachute rigger, and safety program manager.



Tom Roethler joined MTDC in February 2005 as a mechanical engineering technician. He is a junior at the University of Montana in Missoula studying forestry and resource conservation with an emphasis in hydrology. Tom is also a technical engineering specialist (surveyor, AutoCAD drafting, and material testing) in the U.S. Army Reserves and has been deployed twice during Operation Enduring Freedom. He works in the fabrication shop at MTDC and helps with facility maintenance.



Rey Farve joined SDTDC in April 2005 as a project leader in the inventory and monitoring program. He received a bachelor's degree in biology from Xavier University in New Orleans, LA, in 1975 and a master's degree in wildlife biology from Ohio State University in 1978. He worked with the U.S. Fish and Wildlife Service on the Mark Twain National Wildlife Refuge in Missouri before moving to Folsom, CA, in 1979. Rey was involved in a variety of projects (including an active prescribed burn program for wildlife habitat improvement) for the Bureau of Land Management's Folsom Resource Area. In 1987, Rey moved to Los Angeles where he helped mitigate impacts of offshore oil and gas activities on marine mammals and seabirds for the U.S. Minerals Management Service. In 1991, Rey transferred to the U.S. Army Corps of Engineers' Los Angeles District and worked on a wide variety of civilian and military projects throughout southern California and Arizona.



Richard Martin joined SDTDC in August as a maintenance mechanic. He spent the majority of his career as a welder and a maintenance mechanic in the entertainment industry at Disneyland, Magic Mountain, and Pacific Park on the Santa Monica Pier in California. He also is a licensed contractor specializing in custom cabinetry.

On the Web...

- Forest Service and Bureau of Land Management employees–View MTDC and SDTDC documents at:
<http://fswweb.mtdc.wo.fs.fed.us/search>
<http://fswweb.sdtdc.wo.fs.fed.us>

- Everybody–View SDTDC documents at:
<http://www.fs.fed.us/eng/pubs/>

- Everybody–View MTDC and SDTDC documents at:
<http://www.fs.fed.us/t-d/>
(Username: t-d, Password: t-d)

Missoula Technology and Development Center (MTDC)
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Phone: 406–329–3900 • Fax: 406–329–3719
Forest Service Intranet Web site: <http://fswweb.mtdc.wo.fs.fed.us>

San Dimas Technology and Development Center (SDTDC)
444 East Bonita Ave.; San Dimas, CA 91773–3198
Phone: 909–599–1267 • Fax: 909–592–2309
Forest Service Intranet Web site: <http://fswweb.sdtdc.wo.fs.fed.us>

Library Card

Kilroy, Bill; McLean, Andrew; Wolf, Jerry Taylor. 2005. T&D news: number 2, 2005. Tech. Rep. 0571–2835–MTDC. Missoula, MT: U.S. Department of Agriculture Forest Service, Missoula Technology and Development Center. 14 p.

Describes projects that are underway and finished products that are available at the Forest Service's Missoula and San Dimas Technology and Development Centers. Topics in this issue include:

- Pepper-Based Coating Protects Signs and Structures
- Electronic Physical Security
- Qualification Testing of Spark Arrester Exhaust Systems
- New, Larger Fire Shelter May Be Just Your Size
- Effects of DEET on Nomex Clothing
- Latest Wildland Firefighting Health and Safety Report Now Available
- Situational Awareness Fire Posters Shout Watch Out
- Incident Sign Guide Helps Improve Firefighter Safety
- Keep Your Crosscut Saw Singing
- Redesigned Tools for Crosscut Saw Maintenance
- Marking the Way in the Backcountry
- Electronic Scanning of Wilderness Permits
- Using Vitamin C To Neutralize Chlorine in Water
- Alternatives to Burlap for Wrapping Seedlings
- Sterilizing Pallets of Styroblocks
- Monitoring Changes at Remote Locations
- Fourth Video in the Personal Safety Video Series
- T&D Snippets: Know More with Less Effort
- New Faces at MTDC and SDTDC

Keywords: Capsicum, cellulose, chlorine, coatings, crosscut saws, dechlorination, DEET, electronic security, fire shelters, groundwater, hydration, newsletters, Nomex, oleoresin, optical scanning, pathogens, polypropylene, safety at work, sanitation engineering, seedling wraps, signposts, signs, smokejumpers, spark arresters, sterilization, styroblocks, trail crews, vitamin C, wastewater

Forest Service Technology & Development Program
PROJECT PROPOSAL

Project Name/Title:



Date: _____

Submitted by: _____

Unit: _____

Address: _____

Phone: _____ E-mail: _____

OVERALL PROBLEM/OBJECTIVE STATEMENT *(Describe the problem, how the work is currently being done, and why improvement is needed):*

PROPOSED TECHNOLOGY & DEVELOPMENT WORK *(Describe your concept of the end product, such as a new equipment design, a PowerPoint presentation, a video, a handbook, Web site, CD, etc.):*

POTENTIAL BENEFITS *(Describe how this project will reduce cost, save time, improve safety, increase efficiency, or improve resource management):*

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TECHNOLOGY AND
DEVELOPMENT
PROGRAM



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