



FIRE.GOV

Better Fire Fighting Through Research

Spring Issue—2001

Welcome to Fire.Gov

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Gosh, I didn't know that. How many times have you said that? And how many times have you wished that you knew about activities to improve fire fighting that you could have contributed to but missed the chance? This online newsletter (www.fire.gov) is prepared by the National Institute of Standards and Technology (NIST) and the U.S. Fire Administration (USFA) to alert readers in the fire service to research activities. The items provide information on activities that are underway and those that have produced significant results. No attempt is made to completely

review or endorse findings of the research activities reported. Contact information is provided so that the reader can find out more from the researchers. In cases where the fire service is involved directly with the research, we will take the opportunity to feature that joint cooperation. We consider all government sponsored and non-commercial fire research performed by government, universities, industry, and by fire departments internationally to be of interest. We hope to foster working relationships between the fire service and researchers to promote

innovations. Please send us comments about this first issue and helpful suggestions for improvement. In addition we will consider appropriate items for inclusion in future issues. Contact information for Dave Evans (NIST) and Bob McCarthy (USFA) is located on the last page.



NIST fire fighters wait for signal to extinguish test fire.



Study of CAFS by Professor Fleischmann

Compressed Air Foam Studied in New Zealand

In studies at the University of Canterbury, Christchurch, New Zealand the fire suppression effectiveness of compressed air foam (CAFS) is being compared with plain water using standard High

Pressure Delivery (HPD) currently used by the New Zealand Fire Service. The HPD method of attack uses a flow rate of 1 to 4 l/s (16-63 gpm) at 3000 to 3500 kPa (400-500 psi). The high pressure pro-

duces a fine water mist that has proven to be highly effective and efficient means of extinguishing a single post-flashover compartment fire. In addition to plain water, tests were conducted with the

Compressed Air Foam Studied in New Zealand (cont.)



University of Canterbury measures CAFS performance for structural fire fighting.

class A foam agent and water mixture supplied through an unmodified HPD line. Fire suppression data for shielded and unshielded wood crib fires are being collected using a 2.4 m × 3.6 m × 2.4 m (height) compartment and a flow rate of 2.8 l/s (44 gpm). The suppression effectiveness

in each test is expressed in terms of the measured reduction in heat release rate of the room fire. It appears from these experiments that the CAFS attack was as effective as HPD, but fire fighters could operate from a much greater distance from the open doorway. This allowed fire

fighters using CAFS to remain well away from the smoke and heat exiting the compartment. For more information contact: Professor Charles Fleischmann, University of Canterbury, (64) + 3-364-2399, charley@civil.canterbury.ac.nz

Looking for an alternative to AFFF

For over 30 years, firefighters have relied on foam, particularly aqueous film forming foam (AFFF), to combat flammable liquid fires. Typically, at least one fire department pumper is equipped with



Extinguishing fire test at the Navy's Chesapeake Beach Facility.

AFFF to combat auto or tanker vehicle fires. Of course, aviation and petrochemical firefighters rely on large quantities of AFFF. In May 2000, the 3M company, a major producer of AFFF, announced that it would end production of its AFFF. This action was in response to EPA findings that compounds used in the production and resulting breakdown of 3M AFFF may be persistent, bio-accumulative, and toxic. Al-

though fact finding efforts by the EPA are ongoing, the fire service should be aware that the future use of AFFF may be limited. The US Department of Defense, a major user of AFFF, has initiated preliminary planning on alternative approaches. These approaches include defining applications and discharges, defining required performance of agents for different fire scenarios, identifying containment strategies, and develop-

ing plans for potential alternative agents. In support of government and commercial users and vendors, Hughes Associates, Inc., is assessing fire protection strategies and priorities which are consistent with EPA's evolving position with respect to fire fighting foam. For more information, contact Joseph Scheffey at Hughes Associates, Inc., (1) + 410-737-8677, joe@haifire.com.

USFA Offers a Wildland Tutorial Self Study CD-ROM

Developed in partnership with the U.S. Department of Agriculture's Forest Service, the U.S. Fire Administration has created a CD-ROM covering Incident Command System

forms ICS 215 and 215A. The CD-ROM provides the tools to help develop a operational planning worksheet that would fit into an overall incident action plan. The CD-

ROM also touches on other forms that comprise the incident action plan. There are several ways to obtain a free copy of the CD-ROM. Go to the World Wide Web: USFA

Publications Online Ordering System at (<http://www.usfa.fema.gov/usfapubs/>) or telephone USFA at (1) + 301-447-1481 or (1) + 800-561-3356.

Scientists Focus on Urban-Wildland Fires

Scientists have come together to improve wildland fire fighting. The November 13-15, 2000 meeting was entitled *Integrating Research on Wildland Fuels and Fires*. Advancing the technology for suppression of wildland fires and protection of structures were highlighted. Some of those gathered at the meeting at the Los Alamos National Laboratory in New Mexico lost their own homes to the fires during the 2000 urban-wildland fires. Ways to provide reliable predictions of fire spread were discussed in detail. The challenge was also posed to provide technol-

ogy that would permit safe fire fighting at night when winds are generally lower and the burning less intense. A second meeting, entitled *Forum on Urban/Wildland Fire*, was organized by the National Disasters Roundtable for the National Academy of Sciences and Engineering, and was held in Washington, DC (January 26, 2001). This meeting featured presentations on wildland fires and risks, changing land use patterns, and a case study of the Los Alamos fire. It promoted communications between different parts of the fire safety communities. Comments at

the meeting indicated a need to understand better community-scale fires, where both structures and vegetation burn. The contribution of burning structures to urban-wildland fire spread needs to be quantified. For more information, contact Dr. Michael Bradley, Lawrence Livermore National Laboratory, (1) + 925-422-1835 or mbradley@llnl.gov; Patricia Jones Kershaw, National Academy of Sciences, (1) + 202-334-1964 or pkershaw@nas.edu; Dr. Ronald Rehm, NIST, (1) + 301-975-2704 or ronald.rehm@nist.gov.



Urban fire study at the National Institute of Fire and Disaster in Japan

Sensors simulate human skin for testing protective clothing

Work has been completed on the second phase U.S. Department of Commerce Small Business Innovation Research (SBIR) grant for developing new methods for evaluating the thermal performance of fire fighters' protective clothing. The research was lead by Dr. Ned R. Keltner of Ktech Corporation, Albuquerque, NM. Contributing to the research were Worcester Poly-

technic Institute, Beck Engineering Consultants, and the **Albuquerque Fire Department**. The research effort included the analysis of skin simulants sensor technology for measuring and predicting the potential for burn injuries, and the development of methods for estimating thermal properties of materials used to make fire fighters' protective clothing. The thermal proper-

ties estimates are needed for computer models that predict the thermal performance of protective clothing systems. Ktech is currently moving to commercialize the technology developed during the SBIR project. For more information contact Dr. Ned Keltner, at Ktech Corporation, (1) + 505-998-5848, keltner@ktech.com.



Ned Keltner of Ktech Corporation measures thermal protective properties of protective clothing.

FDNY helps to develop new measurements

Burn injuries to fire fighters could be reduced if there were greater knowledge about the full range of heat and moisture conditions that exceed the natural limits of thermal protection provided by turnout gear. The **Fire Department City of New York** (FDNY) sent its Director of

Human Performance, Lt. Kevin S. Malley, to work with NIST scientists to understand and measure the amount of protection offered by different materials and clothing assemblies. Lt. Malley worked on the USFA funded development of a new test apparatus to measure temperatures rise

through wet and dry fire fighters' protective garments including the effects of compression. Lt. Malley was especially concerned with measuring the performance of different knee pads. For more information contact Lt. Kevin Malley, (1) + 718-999-1946.



Lt. Kevin Malley,
FDNY

NFPRF Honors NIST scientists for Fire Fighter Safety Research

Mr. J. Randall (Randy) Lawson of NIST and Dr. William (Ruddy) E. Mell have been announced as the winners of the 2001 Harry C. Bigglestone Award for Excellence in Communications for their publication of the pioneering work on developing an accurate and flexible model of heat transfer through protective clothing for fire fighters. The study was funded jointly by NIST and

USFA. Since the completion of this work at NIST, Dr. Mell has moved to the University of Utah. The award winning paper, **Heat Transfer Model for Fire Fighter's Protective Clothing**, appeared in *Fire Technology*, Vol. 36, No. 1, 2000. The Bigglestone Award, sponsored by the Fire Protection Research Foundation (NFPRF), Quincy, MA, is presented to the authors of the

best paper submitted to *Fire Technology* during the previous year. The award and invited lecture are presented at the 2001 National Fire Protection Association's Annual Meeting in Anaheim, California. For more information contact Randy Lawson, (1) + 301-975-6877 or jlawson@nist.gov; or Ruddy Mell, (1) + 801-585-3926 or ruddy@eng.utah.edu.



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Better Fire Fighting Through Research

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