

Wildland Firefighters Advanced Personal Protection System (WLFF – APPS)

Heavy Equipment and Extreme Heat Put Wildland Firefighters in Danger

Wildland fires have no boundaries. Wildland firefighters must hike to remote and sometimes distant locations to respond to fires. These challenges are made more difficult by the extreme heat and humidity that typically accompany wildland fires. Additionally, the heavy personal protective gear needed to perform duties makes heat stress a major concern for wildland firefighting personnel.

From 1999 to 2009, California Department of Forestry and Fire Protection (CALFIRE) data indicated the average number of heat stress injuries of their personnel increased from 6.75 per year to 53.5 per year.



CALFIRE requested the assistance of The U.S. Department of Homeland Security Science & Technology Directorate to develop new garments to reduce

the number of heat stress injuries experienced by their wildland firefighters.

The Wildland Firefighter Advanced Personal Protection System initiative aimed to develop a National Fire Protection Association (NFPA) 1977 and 1975 certified garment system that improved radiant thermal protection; reduced heat stress; and improved the form, fit, and function of the garments.

Testing Existing Garments and Identifying New Materials

In partnership with the U.S. Army Natick Research, Development and Engineering Center National Protection Center (Natick), CALFIRE, the U.S. Fire Service, and local California firefighters, DHS S&T designed a new garment ensemble for wildland firefighters.

Through this collaboration, S&T tested existing protective garments and established baseline data for enhanced solutions. S&T and Natick collected information about

fire-resistant fabrics through a Request for Information (RFI) in Federal Business Opportunities and chose materials based on manufacturer supplied technical data. The materials were then tested and compared by an independent laboratory at North Carolina State University. Using these test results, S&T and its partners selected materials for the prototype garment systems. Prototype garment systems were designed and manufactured to meet NFPA 1977 and 1975 certification standards. System level testing of the entire garment ensemble was conducted both in the laboratory and in wear test trials.

Testing Garments in Live Fires

Approximately 1000 prototype test garment ensembles were provided to participating wildland firefighting agencies for the 2012 and 2013 fire seasons. Operational personnel were asked to wear the prototype garment systems and compare the performance of the prototype garment systems to their current garment systems. S&T collected feedback from operational wildland firefighters



at the conclusion of each fire season. This data was analyzed to determine how the prototype garment systems performed under operational conditions and whether they met firefighters' needs.

Results

Both the laboratory and the wear trial system test data indicate that the garment ensembles reduce heat stress burden on the wearer and fully met the goals of the program. A copy of the Final Report for this project is available on FirstResponder.Gov. The garments developed during the project have been commercialized and are available from at least two companies: Workrite Uniform Company (<http://www.workrite.com/>), and Crew Boss PPE (<https://crewbossppe.com/>).

