DHS Science and Technology Directorate

Advanced Multi-purpose Base Ensemble for Emergency Responders

Addressing first responder base protective workwear needs

The need for clothing and equipment that provides protection against "all hazards in an unpredictable response environment" was identified in the *Project Responder 3* report. The first responder work environment requires a multi-threat base protective ensemble that can be worn as a normal duty uniform (i.e., "Base Ensemble") and it must be compatible with the specialized protective garments required to meet the needs of specific public safety disciplines (e.g., firefighting, EMS). Some specialty areas (e.g., explosive ordnance disposal, HAZMAT, etc.) require a different level of performance and protection than this Base Ensemble will provide. Currently no base ensembles meet this capability gap.

Designing and developing a new multi-hazard protective base ensemble

The Advanced Multi-purpose Base Ensemble for Emergency responders (AMBER) garment is being designed and developed for S&T by North Carolina State University's Textile Protection and Comfort Center (T-PACC). T-PACC will partner with Protect the Force, Inc., a company that provides products for military and first responder applications. This team will identify and select commercially available materials that meet various protective requirements to develop a base ensemble that provides protection against multiple threats and maximizes comfort for prolonged daily wear. This effort will be further supported by input and feedback from The Department of Homeland Security (DHS) Science and Technology Directorate's (S&T) First Responders Group to ensure the AMBER garment meets first responders' operational requirements.

Key AMBER Base Ensemble design goals:

- Comfort and durability for daily wear;
- Provide limited protection against heat and flame, splash resistance, static dissipation, and cut, stab, and needle resistance; and
- Modular design for integration with primary protective clothing against specific hazards and to address unique design requirements of female responders.

NFPA Standards for Emergency Responder and work wear personal protective equipment (PPE), as well as National Institute for Justice Standards for Law Enforcement PPE, provide guidance on testing methods for developing an ensemble prototype.

AMBER will incorporate commercial-off-the-shelf technology into a base ensemble that will increase first responder protection

Testing to determine the garment's ability to meet performance goals will be carried out at T-PACC's research and testing facilities, which will enable systematic testing and evaluation of the base ensemble prototype. These will include tests for fire and heat protection, repellency and splash protection, as well as evaluation of thermal comfort and heat stress. In addition, human subject ergonomics evaluations will be performed. After the project design phase has concluded, the prototype garment will be certified to the appropriate standards. A total of 150 certified prototype garments will be delivered to DHS S&T for evaluation by responders.

Impacting the future of first responder PPE

The project has an anticipated completion date of July 2016 and will yield a new multi-threat protective base ensemble prototype that has been comprehensively developed and assessed from input from the first responder community. Based on this prototype, a technical package will be produced and made available for manufacturer production and commercialization.

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To learn more about Advanced Multi-purpose Base Ensemble for Emergency Responders (AMBER) or the Base Ensemble project, contact SandTFRG@hq.dhs.gov.

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