

Environmental Ergonomics Evaluations of Protective Clothing and Equipment Used in Public Safety and Emergency Response

Objectives

- 1) To evaluate environmental ergonomics factors such as heat stress, comfort and mobility created by PPE (full sets or individual items)
- 2) To create a database of these factors linked to the PPE approved for specific uses through SDOs (e.g. FFE as approved by NFPA 1971)
- 3) To propose improved test methodology that realistically simulates worker exposure and be prepared for new challenge in the area of heat stress



Thermal manikin testing

Key Partners

- ASTM F23.60, NFPA, and other standards development organizations
- Other NIOSH research projects
- Academia and research centers involved in testing PPE (NCSU, SFU, Natick)

Stakeholders

- Public safety and emergency response workers
- PPE Manufacturers
- Standards Organizations
- Federal Agencies

Proposed Scope

Heat stress will be evaluated by physiological responses such as internal temperature, dehydration, heart rate, working time limits following standard test method ASTM 2668-07. This project will also evaluate and recommend possible best solutions for the relief of the heat stress (cooling strategies, hydration, work/rest ratios) following standard test method ASTM 2300-10 and it will incorporate new technologies to evaluate heat stress in real time (wireless monitoring). Comfort will be evaluated by extensive subjective perceptions questionnaires as well as cognitive functions (mood, alertness) analysis. Mobility will be evaluated by carrying out studies on postural ability, gait analysis, balance related to weight of PPE, age of users and fitness levels of workers.

Milestones

- FY17:** Complete external peer review of study protocol and IRB approval. Possibly test effects of SCBA weight, adjust requirements.
- FY18:** collect data that is missing from PPE full ensembles
- FY19:** start disseminating the data collected to this point through peer-review articles and presentations

Outputs

- Manuscripts submitted to peer reviewed journals
- Presentations to stakeholders or conferences
- Presentations to committee and public meetings

Outcomes

- Manuscripts are used for citations in scientific literature
- Project data is used in guidance documents, standards and regulations
- Recommendations are used as guidance for government and non-government organizations to select PPE
- New and/or improved ASTM method for testing PPE