



A COMPARATIVE ANALYSIS OF HEAT STRESS ASSOCIATED WITH SELECTIVE TURNOUT GEAR ENSEMBLES

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Turnout gear protects the fire fighter from external heat and flame contact; the clothing also increases the physical stress placed on fire fighters. In 1997, the leading cause of fire fighters' deaths was stress-related heart attacks.

This study compared the physiological and perceptual responses of subjects wearing two types of turnout ensembles of different weights while performing a typical workload in a controlled environment. An extensive physical testing process was used to select subjects. Six male student fire fighters wore two different NFPA compliant turnout ensembles, in two different environmental conditions, during a protocol of acclimation, exercise, and recovery/ rest. Perceived comfort sensation and exertion, skin temperature, sweat rate, core temperature, and heart rate were the dependent variables assessed over time.

A significant time effect was found for all dependent variables. Both physiological variables and perceptual responses typically increased over the length of the experiment, followed by a leveling off stage and decrease that varied by the dependent variables. Heart rate and core temperature often increased after the strenuous exercise had ended. A significant suit by time interaction was found for skin temperature, mean weighted skin temperature, sweat rate location, rate of perceived exertion, and some comfort descriptors. Graphs of the two-way interactions showed interesting results from a clothing and safety perspective.