

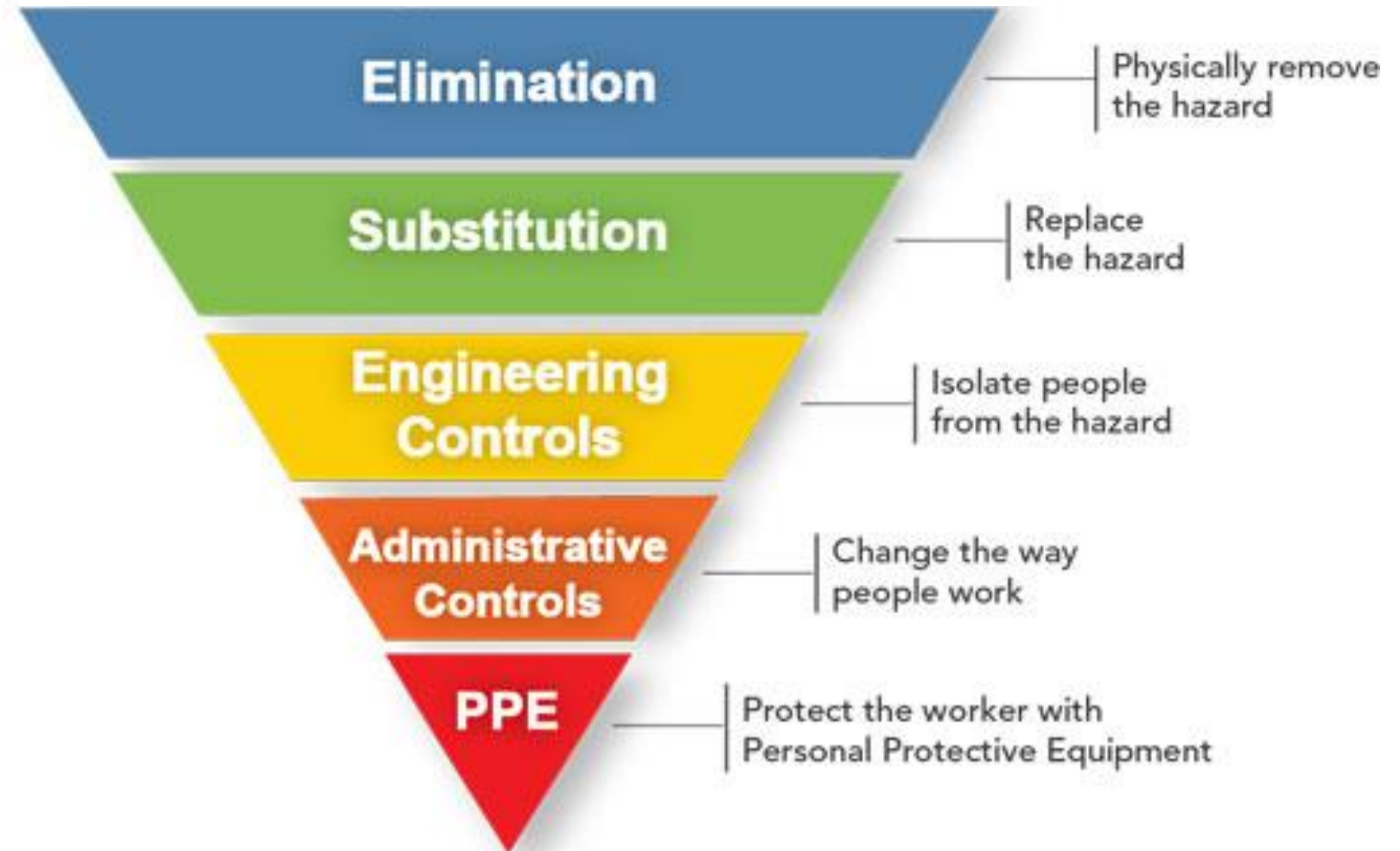


# Contamination Control in the Fire Service





# NIOSH Hierarchy of Controls

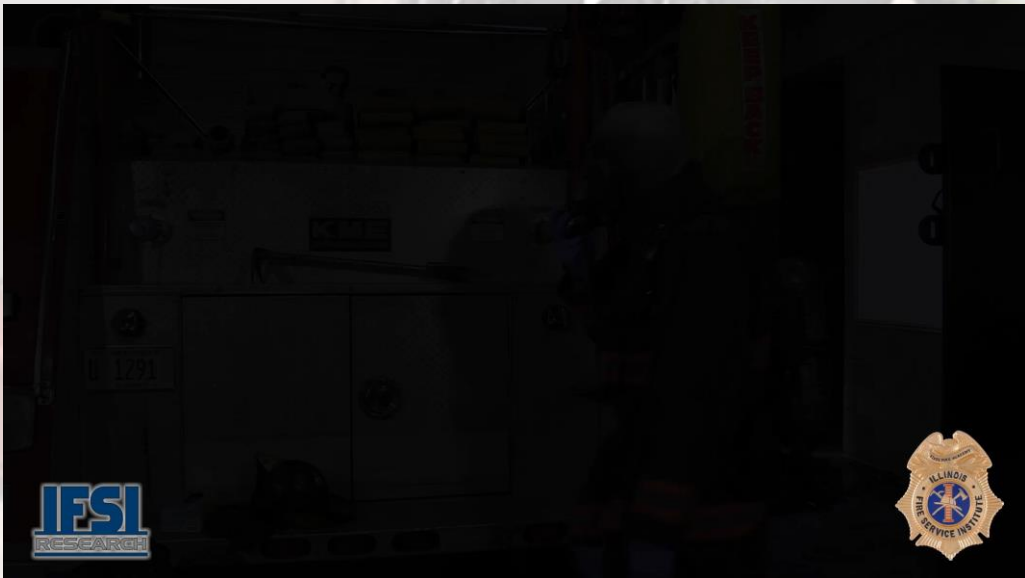




Full video at:

<https://www.youtube.com/watch?v=9uYp0ZQP158>

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ERGONOMICS  
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## Effects of firefighting hood design, laundering and doffing on smoke protection, heat stress and wearability

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### ABSTRACT

Firefighter hoods must provide protection from elevated temperatures and products of combustion (e.g. particulate) while simultaneously being wearable (comfortable and not interfering with firefighting activities). The purpose of this study was to quantify the impact of (1) hood design (traditional knit hood vs particulate-blocking hood), (2) repeated laundering, and (3) hood removal method (traditional vs overhead doffing) on (a) protection from soot contamination on the neck, (b) heat stress and (c) wearability measures. Using a fireground exposure simulator, 24 firefighters performed firefighting activities in realistic smoke and heat conditions using a new knit hood, new particulate-blocking hood and laundered particulate-blocking hood. Overall, soot contamination levels measured from neck skin were lower when wearing the laundered particulate-blocking hoods compared to new knit hoods, and when using the overhead hood removal process. No significant differences in skin temperature, core temperature, heart rate or wearability measures were found between the hood conditions.

**Practitioner Summary:** The addition of a particulate-blocking layer to firefighters' traditional two-ply hood was found to reduce the PAH contamination reaching the neck but did not affect heat stress measurements or thermal perceptions. Modifying the process for hood removal resulted in a larger reduction in neck skin contamination than design modification.

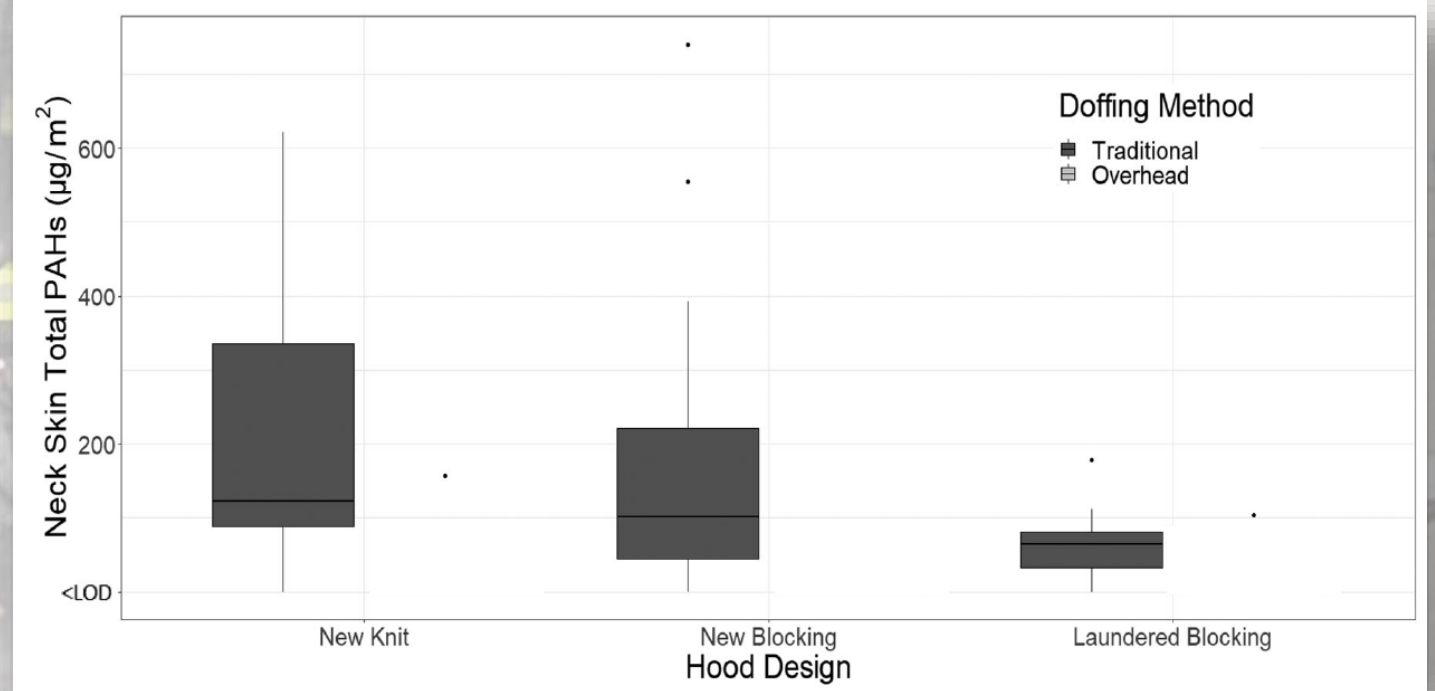
**Abbreviations:** ANOVA: analysis of variance; B: new particulate-blocking hood and PPE (PPE configuration); FES: fireground exposure simulator; GI: gastrointestinal; K: new knit hood and PPE (PPE configuration); L: laundered particulate-blocking hood and PPE (PPE configuration); LOD: limit of detection; MLE: maximum likelihood estimation; NFPA: National fire protection association; PAH: polycyclic aromatic hydrocarbon; PPE: personal protective equipment; SCBA: self-contained breathing apparatus; THL: total heat loss; TPP: thermal protective performance

### ARTICLE HISTORY

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### KEYWORDS

Personal protective equipment; firefighting; chemical exposures; heat stress; wearability





Toolkit: <https://www.fsi.illinois.edu/CardioChemRisks/>  
Facebook & Twitter: [@UL\\_FSRI](#), [@IFSIRESEARCH](#)

