

Proposed Standard Practice for PPE Contaminated Doffing



Interagency Board
Standards Coordination
Subgroup Meeting
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Protection, Inc.™

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Need / Purposes

- Risk exists for transfer of contaminant from protective clothing to wearer or outside contamination reduction zone
- Recent Ebola outbreak in 2014 to 2015 includes several cases where health care worker infection was the result of contamination transfer was result of doffing
- Procedures needed are to assess protective clothing design and doffing procedures, particularly for multi-item ensembles
- Procedures can also be useful for training purposes for instructing end users for proper doffing and contamination avoidance
- High priority standard for Interagency Board

Prior Work

1. Bell, Todd, et al. "Ebola virus disease: The use of fluorescents as markers of contamination for personal protective equipment." *IDCases* 2.1 (2015): 27-30.
2. Zamora, Jorge, et al, "Contamination: A Comparison of 2 Personal Protective Systems." *CMAJ* 175.3 (August 1, 2006): 249-254.
3. [Casanova, Lisa et al, "Virus Transfer from Personal Protective Equipment to Healthcare Employee's Skin and Clothing." *Emerging Infectious Diseases* 14.8 (2008): 1291-1293.
4. Aragon, Aurora et al, "Reliability of a Visual Scoring System with Fluorescent Tracers to Assess Dermal Pesticide Exposure." *Ann. Occup. Hyg.* 48.7 (2004): 601–606.
5. Cherrie, John W. et al, "Use of Qualitative and Quantitative Fluorescence Techniques to Assess Dermal Exposure." *Ann. Occup. Hyg.* 44.7, (2000):519–522.

Test Principle and Methodology

- Test subject wears black witness garment; examined under UV light to establish baseline
- PPE ensemble put on according to manufacturer instructions
- Test subject subjected to spray of surrogate contaminant using fluorescent agent
- Test subject doffs PPE ensemble according to manufacturer instructions
- Test subject examined under UV light to determine contaminant transfer to body



Primary Method Attributes

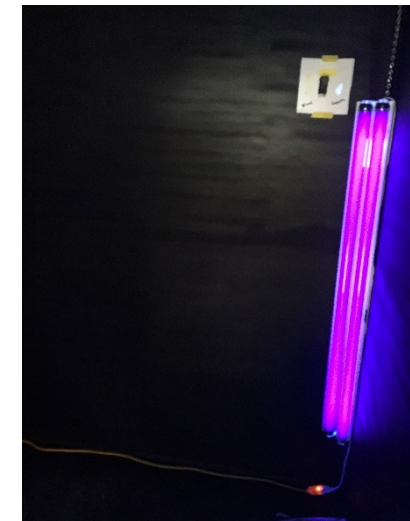
- Selection of surrogate contaminant
 - Chemical liquid
 - Biological fluid
- Method of contaminant application
 - Aerosol versus spray
- Doffing approach
 - Assisted versus unassisted
- Methods for documenting results
 - Examination and photography
 - Quantification techniques



Venturi Eductor



Instructed Doffing

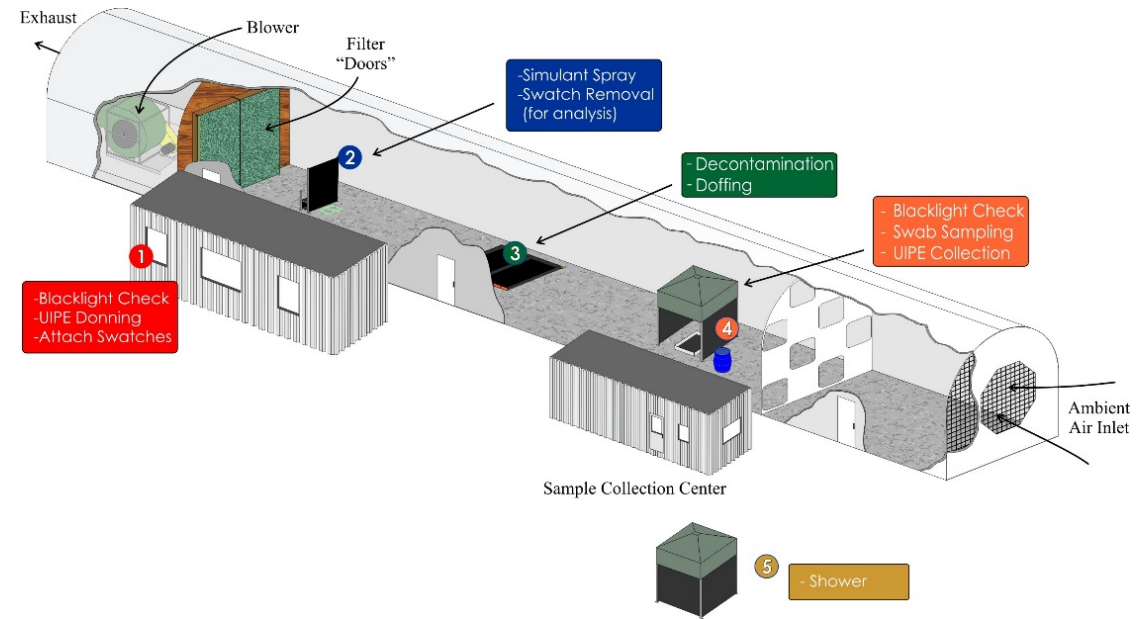


UV Light Chamber

Military Work

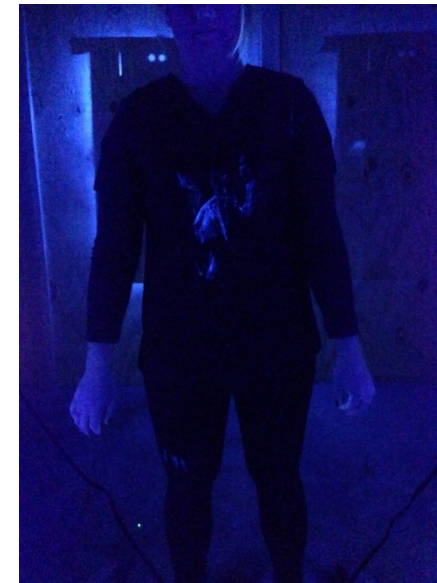
- Battelle undertook work to examine contaminated doffing of CB Ensembles and identified needed changes in doffing procedures
- A Test Operating Procedure was put together to provide guidelines for this testing

**TECMIPT Test Operations Procedures (TTOP)
Test for Cross Contamination During Doffing
of Personal Protective Equipment**



Current Work

- Several possible surrogate contaminants identified
- Procedures under development for:
 - Applying contaminant
 - Doffing techniques
 - Visualization of residual contamination
 - Potential quantification of contamination levels
 - Methods for reporting results



Preliminary Findings for Practice

- Selection of witness garment important for ensuring visualization of contaminant
- Additional patches placed on exterior during contamination process help to ensure consistent application of contaminant
- Aerosolized contaminant creates significant exposure of wearer
- Extreme care must be given to doffing procedures
- Videotaping of doffing helps to identify doffing missteps
- Design for efficient doffing may negate certain features created for improved protection

Identified Practice Limitations

- Surrogates may not be subject to ordinary decontamination methods (e.g., bleach disinfection of biological fluids)
- Assisted doffing required additional controls for tracing contaminant transfer
- Difficult to detect low levels of contaminant penetration without quantification techniques
- Photography proves difficult for capturing images of contamination
- Determination of usable test results requires careful interpretation of findings



Proposed Approach and Accomplishments

- Task group formed under ASTM Committee F23
- Proposed standard practice registered as work item (WK55144),
“New Standard Evaluating the Transfer of Exterior Contaminants from Protective Clothing During Doffing”
- Key elements of standards development
 - Permit different surrogate contaminants to represent range of applications
 - Allow options in practice to apply contaminant / undertake doffing procedures
 - Establish safety procedures
 - Create procedures for visualization of contaminant
 - Have adjunct procedures for quantification, if warranted
 - Standardize reporting and documentation

Final Notes and Requirements

- Bulk of work has been done in support of military or government programs by Battelle for both Joint Program Manager for Protection and U.S. Agency for International Development
 - Outside participation needed
- Positioning of standard practice within specifications desirable to aid in design process
- Practice also has utility as training tool but has to accommodate local jurisdiction needs

For More Information

- Contact Information

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