

An evaluation of current working canine decontamination procedures and methods for improvement

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Decontamination Defined

- Gross decontamination
 - *Emergency*
 - Immediate reduction of contaminant (life-threatening)
 - *Non-emergency*
 - Bulk removal of contaminant (non-life threatening)
- Technical decontamination
 - *Emergency (medical)*
 - HazMat or WMD
 - *Non-emergency (medical)*
 - Complete removal (future complications)
 - *Dust particulates*
 - *Sewage water*



Decontamination Overview

- Hazard exposure during mission
- Chemical
- Biological
- Radiological
- Cross contamination
 - *Human health risk*



Decontamination Overview

- Time consuming
- Personnel and equipment intensive
- For US&R personnel and rescued victims or as directed
- Evidence preservation
- Decon equipment provided to TFs is based on mission requirement



Why are dogs different?

- No PPE
- Multiple route of exposure
 - *Ocular*
 - lack of eye protection
 - *Inhalation*
 - sniffing near ground where contaminants may concentrate
 - *Ingestion*
 - self-grooming
 - *Dermal*
 - fur traps contaminants
 - *Injection*
 - paws are unprotected
- And others...



Evidence for contamination in dogs

- NYPD canines deployed to the World Trade Center
 - *Prolonged vs brief exposure*
 - *Lead in blood significantly higher (prolonged only)*
 - *Quinoline*
 - *3-methyl quinolone*
 - *Isoquinoline*
 - *Diphenylamine*
 - *Surfynol*
 - *2-(1-phenylethyl) phenol*
 - *Fox, PR. 2008. JAVMA VOL 233*



Prior decontamination studies in dogs

- Procedures adapted from human protocols
- No evidence available for validation of protocol effectiveness in canines



Objectives:

- To test the effectiveness of the existing canine decontamination protocol utilized in a field exercise conducted by Federal Emergency Management Agency teams.
- Comparison of current decontamination practices to a modified protocol via removal of a simulated environmental contaminant.



Materials and Methods



Animals

- Southern Illinois University IACUC approved (protocol #15-032).
- 12 working canines were used
 - *Two canines were used for both*
- Breeds:
 - *Labrador Retrievers*
 - *Golden Retrievers*
 - *Belgian Malinois*
- FEMA certified HazMat technicians
 - *6 per day; blinded*
- Randomly assigned
 - *Protocol A*
 - *Protocol B*



Contaminant Administration Procedure

- Oil based pseudo-contaminant (UV light visible)
 - *Glo Germ®*
- Locations Applied:
 - (1) *throat latch*
 - (2) *between the shoulder blades*
 - (3) *inner right flank*
 - (4) *hind left paw*
- Contaminant verification
 - *Visual inspection (blinded reviewers) of image and quantification using previously validated fluorescent marker reduction scale*
- Standard mock-search followed by decontamination



Decontamination Procedure - Protocol A

- Current FEMA standard
- Protocol A:
 - *stiff bristle brushes*
 - *a non-specific generic pet shampoo*
 - *multi-step rinse system (DHS, 2012)*



Decontamination Procedure - Protocol B

■ Protocol B:

- *Substitution of rubber grooming brush*
- *Substitution of Johnson & Johnson's[®] head-to-toe wash*
- *Addition of grated flooring*
- *Same multi-step rinse system*



Pre- and Post-Decontamination Imaging Comparison

- Scored on a 0 – 3 scale as previously described (Lee and Lee, 2014)
 - *Blinded observers*
 - *94% agreement*
- Scored as:
 - *0 = <25% contaminant reduction*
 - *1 = 26-50% contaminant reduction*
 - *2 = 51-75% contaminant reduction*
 - *3 = >76% contaminant reduction*

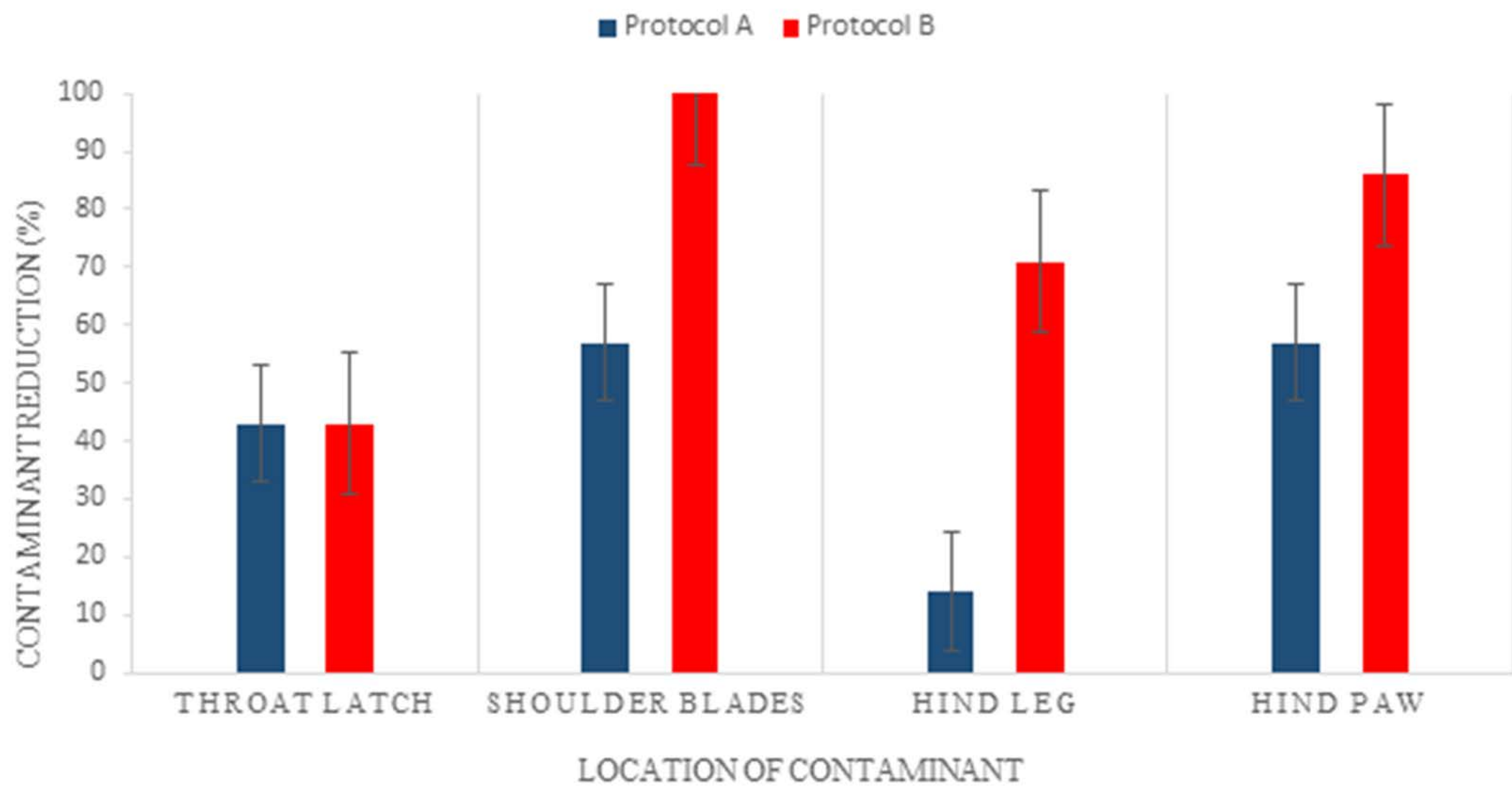


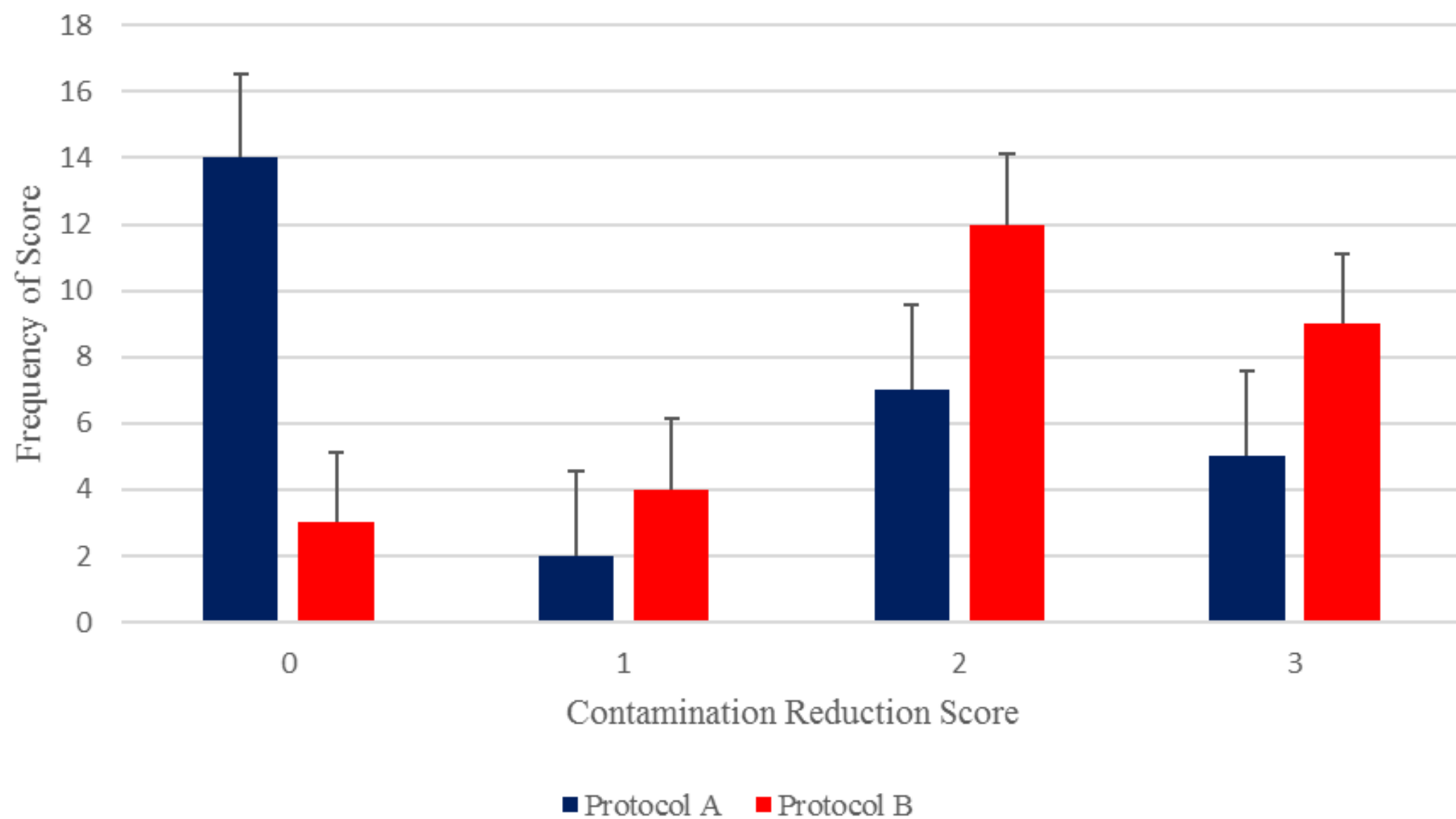
Statistical Analysis

- Categorical data were analyzed using PROC FREQ procedure of SAS (version 9.4) as a Chi Square for each treatment and all locations.
- Effective decontamination = $\geq 50\%$ contamination reduction
- Significance was set at $P < 0.05$.

Results







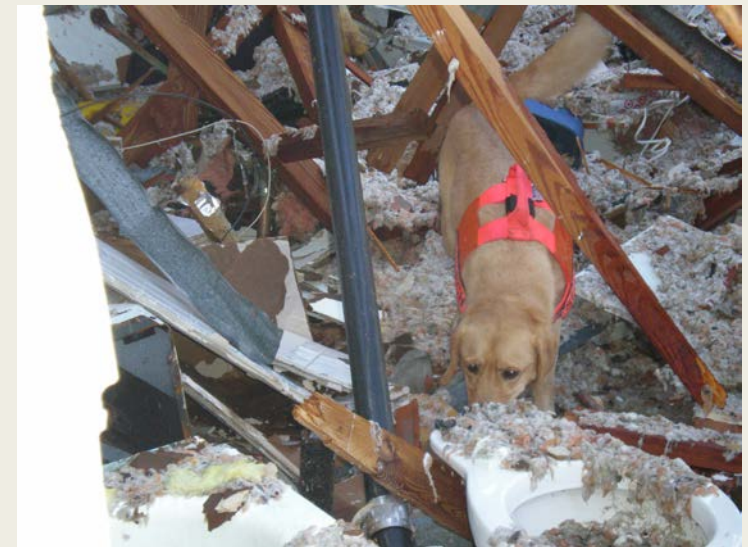
Results

■ Protocol:

- *B greater frequency of effective contamination reduction ($P=0.01$)*
 - *>50% contamination removed*
- *Protocol B dogs were cleaner than Protocol A dogs*

■ Location:

- *1 (throat latch) consistently dirty $A = B$ ($P>0.05$)*
- *2 (shoulder blades) Protocol B $> A$ ($P<0.05$)*
- *3 (inner flank) Protocol B $> A$ ($P<0.05$)*
- *4 (hind paw) Protocol B $> A$ ($P<0.05$)*



Discussion

- Protocol variation
 - *Soft grooming brushes (Protocol B)*
 - *Change in cleanser*
 - *Grated flooring*
- Location effect
 - *Likely areas of contamination*
- Consistent failure to remove leash/collar
 - *Exploration of equipment decontamination*
- Transfer to human team members



Discussion

- Further research into convenient and effective protocols
- Canine specific HAZMAT technician training
- Collar removal during decontamination



To help us remember...

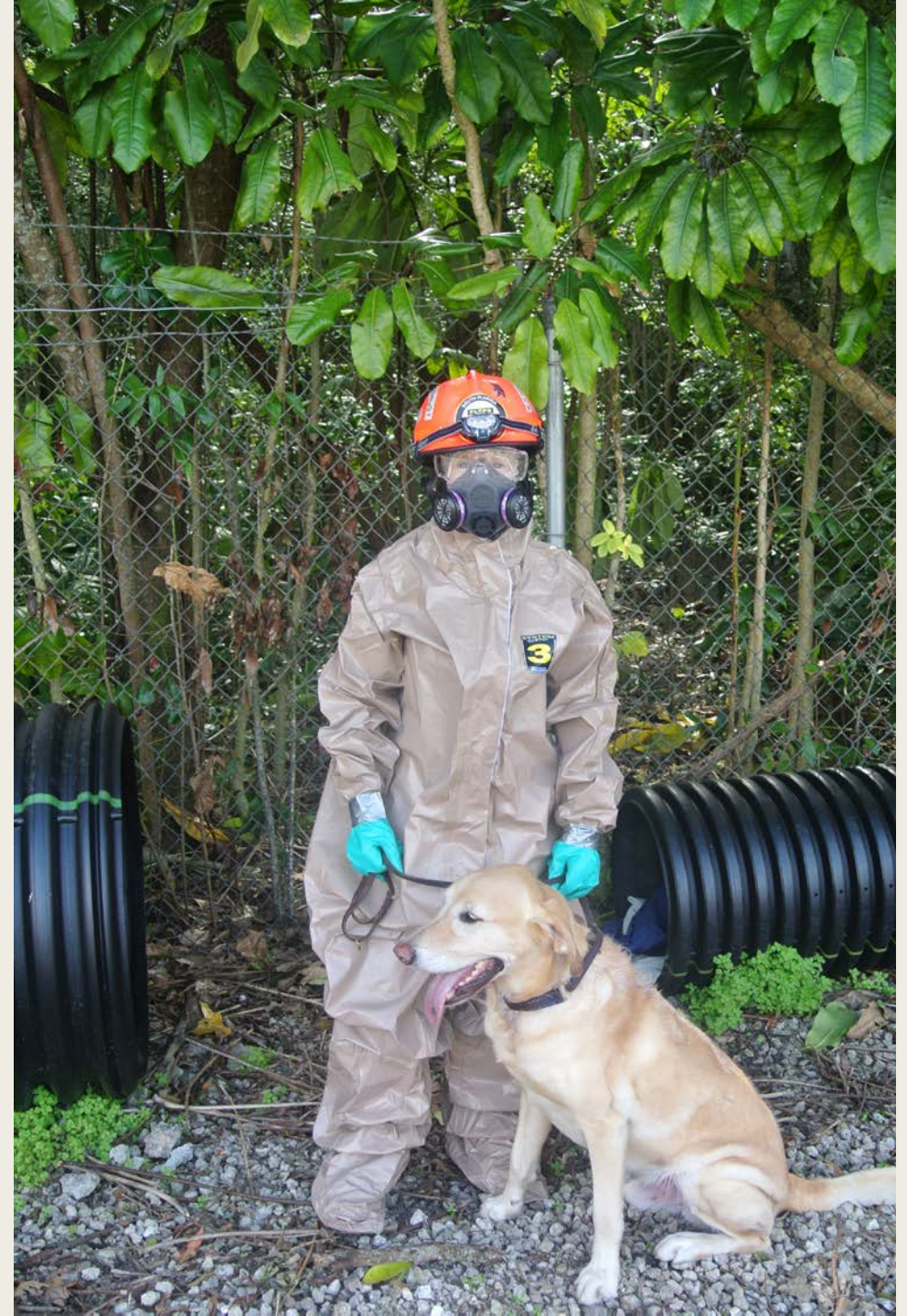


Disclaimer

- The findings and conclusions in this project are those of the authors and do not necessarily represent the official position of the Federal Emergency Management Agency or the U.S. Department of Homeland Security.

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Thoughts & ideas welcome!

