



**CBIRF initiated, TSWG & MCSC
Supported Enhanced Personal Protective
Projects**

6 March 2006



Realistic Testing & Evaluation

- 1) Duplication of actual conditions in combat and the field
- 2) Develop testing methodologies, verification and validation techniques that truly measure realistic conditions found in the field. And not necessarily because they are easy to perform or duplicate in the sterile and clinical venues of the standard laboratory.
- 3) Develop verification and validation measurements that encompass entire systems testing. (all closures interfaces and ancillary equipment and their impacts considered)
- 4) As a result, testing development must continue in the arenas of articulated mannequins and other techniques that duplicate human physiological characteristics in order to more accurately evaluate the performance of total systems IPE in live agent conditions.

CBIRF PARTNERSHIPS



USAF AFFPBL



USCG NSFCC



FDNY



DTRA



US EPA ERT



S.F. Fire Dept



NGB CST



DOE



Balt. City F.D.

National Guard Bureau



NMRC-BDRD



FBI HMRU



D.C. Fire Dept



NIOSH-CDC



FEMA



Tech Escort



U.S. Capitol Police



NYPD

PAST AND CURRENT PROJECTS

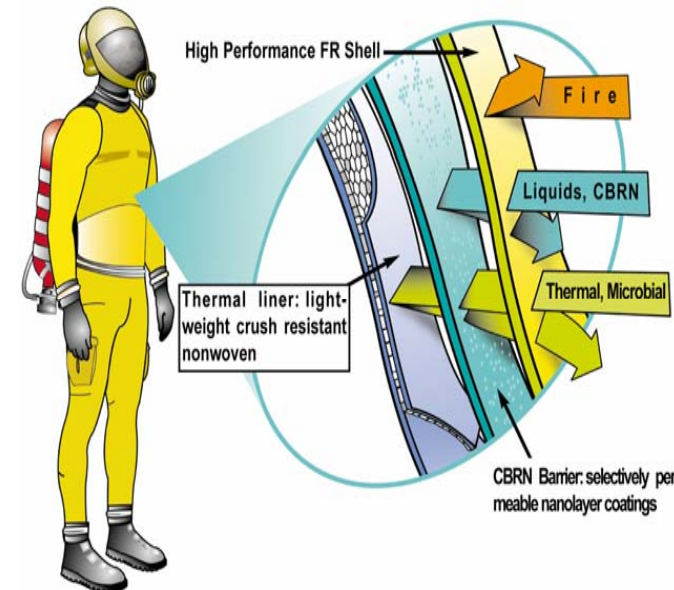
- Improved Filter Protocol
- Drinking Tube W/COTS Mask
- Heat Index Calculator
- Improved Level A Ensemble
- First Responder Decision Matrix
- Personal Decontamination Wipe
- Victim Location Device
- CBIRF Chemical Concentration Detector/Monitor



All projects will have a dramatic impact on the operational readiness of both Department of Defense (DOD) and Civilian First Responders

Improved Level “A” Ensemble

- Paradigm Shift – Protective factor vice physical description
- Reduce heat related injuries
- Compatible with existing commercial & military PPE –
 - SCBAs, rebreathers, PAPRs & negative pressure masks
- Durable and Fire Retardant Fabrics
- Moisture management & external venting
- Tested against NBC warfare agents and a broad selection of TICS & TIMS
- Cost on a par w/current level A ensembles
- Awarded to Interspiro and W. L Gore



Improved Filter Protocol

- Broad protection from war gases & TIC's.
- Filters tested at realistic human respiration rates of volume & velocity.
 - Cyclic human respiration rates from 50 to a peak of 700 PIAF (Peak Inhalation Air Flows).
- M40A1 & PAPR applications.
- Filter canister failure times in minutes.
- NavAirSysCom and commercial testing of actual Marines' respiration cycles.
- Testing is complete, a whiz wheel was demonstrated with a future computer format to be designed.

Filter Test Plan Overview

- Chemicals to be tested:

- acrolein
- carbon disulfide
- chloropicrin
- cyanogen chloride (CK)
- cyclohexane
- DMMP
- formaldehyde
- GB
- hydrogen chloride
- hydrogen cyanide (AC)
- methyl mercaptan
- phosgene
- phosphine

- Canisters to be tested:

- C2
- C2A1
- 3M FR-57
- 3M FR-64
- Scott CF32 E2-P3
- Scott CF32 A2B2E2K2-P3
- MSA Europe
- MSA IMP2
- Consideration given to the SEA 50032



Future Considerations (What to do with the results)

- **Filter Performance Database**

- **Filter Performance Predictive Model**

- **Whiz Wheel**

- **Hand held PC device**

- Used to provide needed data in the field
- Can provide information such as protective life or what canister would be best suited for a given situation

- **Look-Up Table (Nomogram)**

- Less compact version of the computerized device
- Would provide same information in a tabular/booklet format

Filter Performance Tool

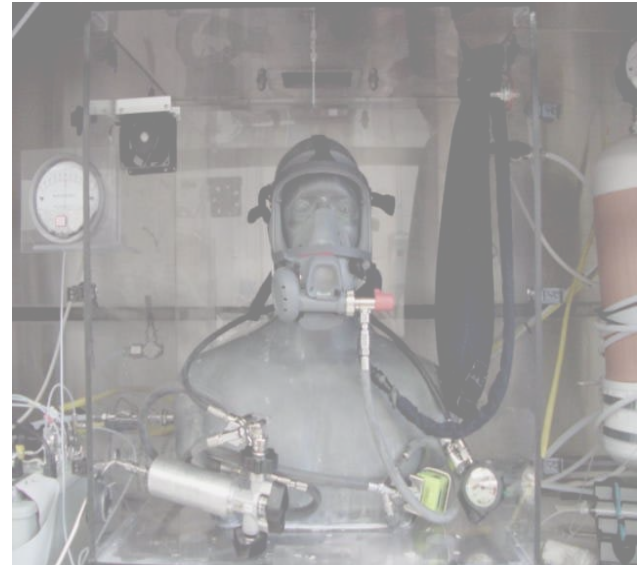
Approach

Using measured data establish design rules (i.e., interpolation) for estimating filter performance.

Develop a broad spectrum filter performance model that can estimate filter service times under a wide range of user conditions.

Re-Hydration in PPE

- Extend strength, endurance and mental acuity down range.
- Hands free drinking system.
- Adaptable to COTS – SCBAs, Rebreathers and PAPRs found in the MEU ENBC packages.
- Initial live agent testing conducted at Battelle Labs produced positive results
- Final testing protocols are completed in accordance with NIOSH
- All engineering, proof of concept, criteria are available with out cost to manufactures from the TSWG.



Heat Index Calculator

- Determine Max safe down range times for first responders in PPE.
- Prevent heat related injuries.
- Input for onsite weather conditions, temp, RH & solar load.
- Input for the level of PPE worn.
- Input for work level intensity.
- PDA configuration.
- Human Physiology thermal testing and evaluation completed with Marines and civilian fire fighters in varying levels of PPE at N.C. State University.



1st Responder Decision Matrix

- A PDA leadership tool for proper selection of PPE based on incident-site analysis and input of:
 - agent concentration
 - climatic conditions
 - personal physiology data of responders
- Establish exact failure & breakthrough times of filters & PPE at various respiratory & work rates as well as concentrations of contamination at the incident site.
- Rapidly assess stay time vs. risk to personnel



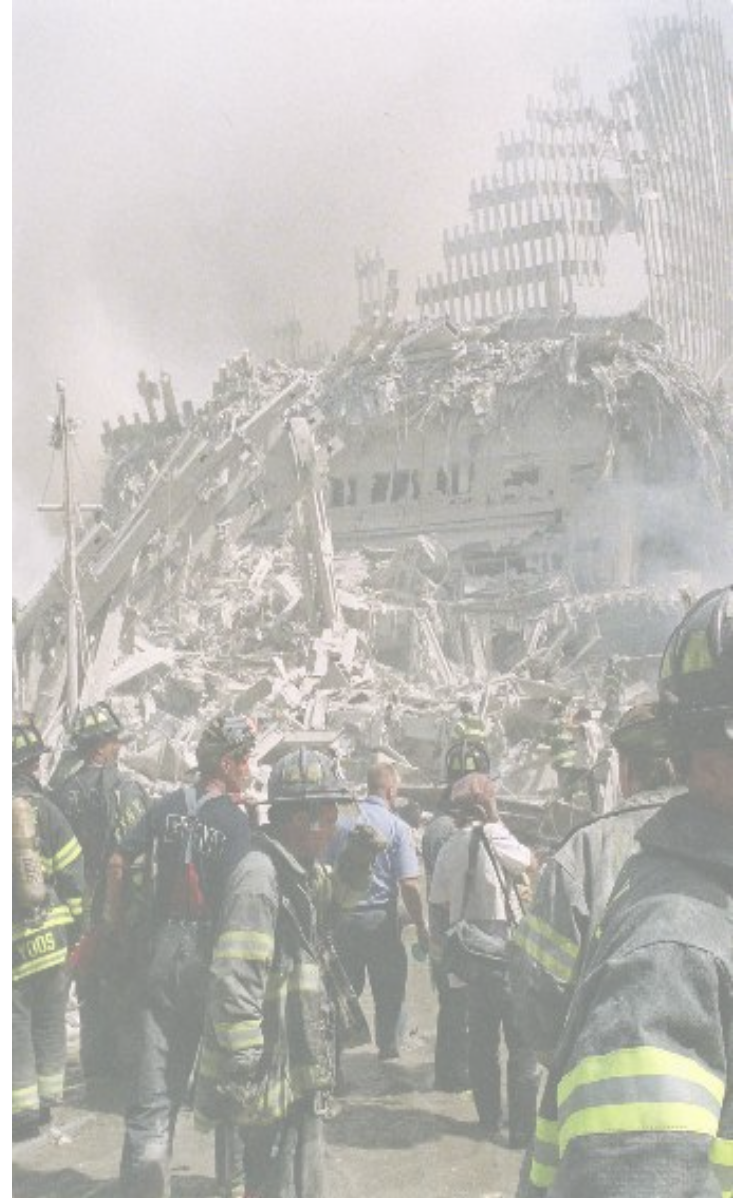
Decontamination Wipes

- Provide a “handout” decontamination packet to ambulatory & coherent victims (take decon to the victim)
- Begin the decontamination process w/minimum instruction.
- A mitt or sponge type applicator
- Safe for skin, wounds & mucus membranes
- Color or dye to contrast clean & contaminated areas
- Must neutralize NBC agents or immobilize un-neutralized agent
- Soap & water soluble
- Complete instructions on the external packet
- Replaces the M291 Kit
- LLNL optimizing solution for maximum efficacy.



Victim Location Device

- Determine casualty location and viability to concentrate rescue efforts
- Function in all-environments i.e. heterogeneous rubble, smoke, dust, & urban canyons
- Function in -20°F to 120°F (inclusive).
- Self testing and maintainable by operator.
- Battery and portable generator powered.
- 10' minimum search scan with maximum stand-off distance.



CBIRF Chemical Concentration Detector

- Set up W/I 5 min.
- Individual or “series” operation.
- Battery ops 24 hrs or Hard wired or telemetry.
- Deconable.
- Detect and monitor War Gases and TIC’s CTs @ not more than IDLH.
- Indoor and out door operation (temp range, precip.& RH)



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