Chemical, Biological and Radiological (CBR) Collective Protection (ColPro) Project Arrangement (PA)

CBR PA No. US-CA-UK-A-03-002

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UK Technical Officer: Dr. C.J.Hindmarsh, Dstl, Porton Down

ColPro PA Objective

- To collaborate in science and technology for improved collective protection in the following areas:
  - new multi-functional shelter materials;
  - new methods for air purification associated with ColPro shelters;
  - the integration of new ColPro technologies to enhance fielded systems;
  - ColPro systems that may be rapidly deployed and having expedient implementation.

Background

- US research aimed at Joint Expeditionary Collective Protection (JECP) Program
- UK research aimed at Deployable Collective Protection System (DCPS) Equipment Line (Concept Phase 2010-2011)
- Both US and UK programs have very similar goals and challenges
- PA signed April 2004; Initial meeting held August 2004 Six year arrangement ending in UK holding an outdoor demonstration of technologies developed under PA
- UK and US will share tasks in order to avoid duplication of effort

Principal Organizations Involved

US:

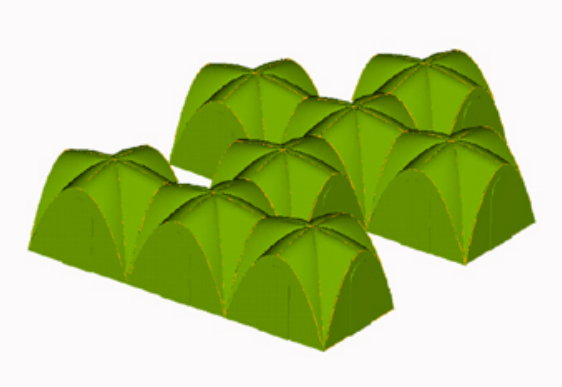
- US Army Natick Soldier Center, Natick, MA
- US Army Edgewood CB Center, Edgewood, MD
- US Naval Surface Warfare Center, Dahlgren, VA
- US Air Force Research Laboratory, Tyndall AFB, FL

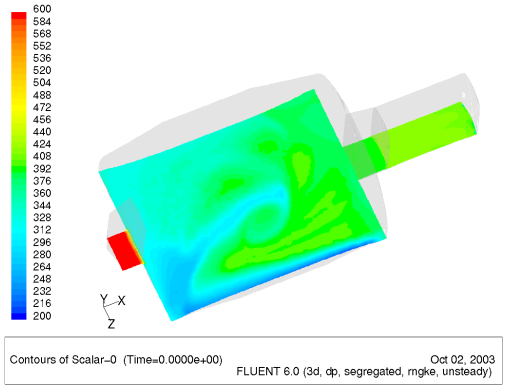
UK:

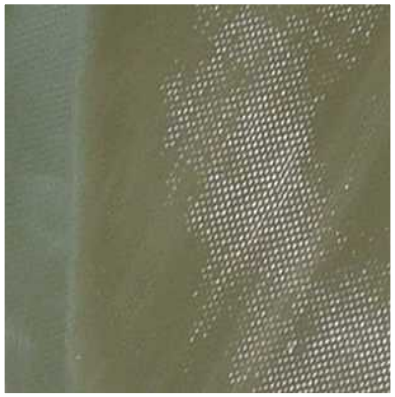
- Dstl – Porton Down

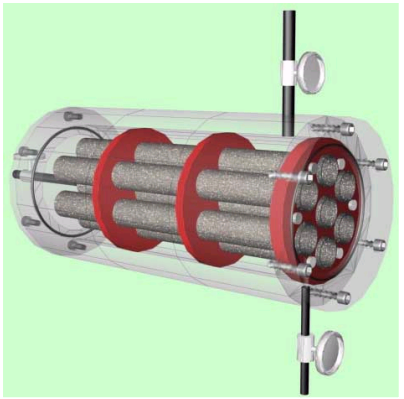
UK Tasks

- Analyze design concepts for rapidly deployable modular ColPro shelters
- Apply Computational Fluid Dynamics (CFD) to selected UK and US systems
- Develop new multi-functional materials for ColPro
- Explore advanced low power air purification technologies









US Tasks

- Explore technologies for rapid deployment of structures
- Explore entry/exit technologies and procedures
- Explore advanced materials
- Evaluate self-decontaminating materials for ColPro
- Explore new closure and seam sealing technologies
- Develop adsorbents and materials for protection against toxic industrial chemicals (TICS)

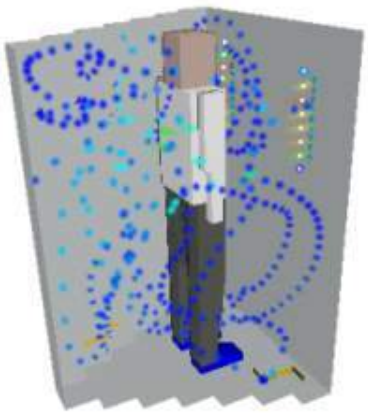


Figure 1: The Simplified Mega-Seal.

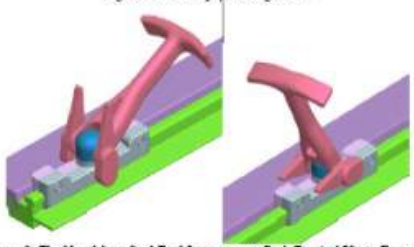
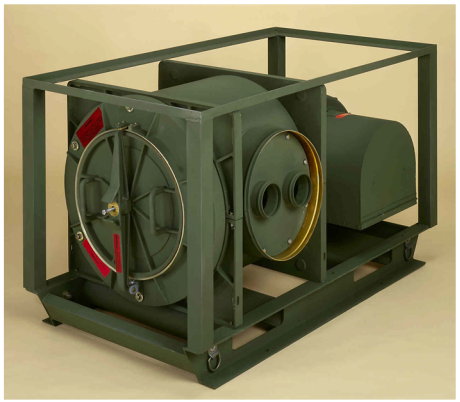
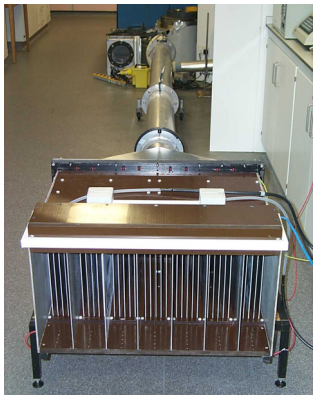


Figure 2: The New Mega-Seal Tool Incorporates Both Zip And Unzip Functions

US/UK Joint Tasks

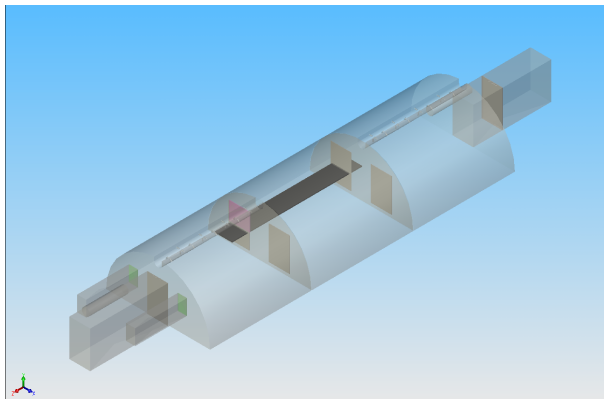
- Assess interoperability issues
- Generate performance data for advanced regenerative air purification technologies
- Investigate filter residual life technologies as applied to ColPro
- Explore advanced filtration technologies for the removal of particulates





Specific Collaboration

- Residual Life Indicators
  - UK and US both studying the pulsed probe molecule method to determine filter residual life
- Regenerable Filtration Test Methodologies
  - UK has considerable experience in testing of regen filtration systems
  - US currently defining regenerative test methodologies/ test apparatus
- Adsorbents
  - UK investigating carbon monolith technologies
  - US has considerable experience in adsorbents for toxic industrial chemicals
  - US has adsorbent database
- Computational Fluid Dynamics (CFD)
  - UK currently modeling US liner system



Specific Collaboration (continued)

- Shelter materials
  - UK developing novel shelter materials
  - US has state-of-the-art material test facilities

- Self-decontaminating materials
  - US developing self-decontaminating materials for ColPro
  - UK has experience in the testing of materials against CW agents

- Entry/Exit Methodology
  - US instigating study into determining ‘bottlenecks’
  - UK studying new forms of Contamination Control Area

- Technology Readiness Levels (TRLs)
  - Defining TRLs for different types of technology

Current Collaborate Efforts

- Background data in several areas has been shared
  - CFD Modeling of US M28 PE and UK Porton Liner
    - Previous test reports
    - Input parameters and geometry data
    - Modeling and experimental data
  - Adsorbent/filter performance
  - Reactive textile coatings for shelter materials
- UK CFD Modeling of M28 PE
- UK Testing of US Self-Decon Barrier Materals
- US Testing of UK Barrier Materials

Computational Fluid Dynamics (CFD) Modeling of ColPro Shelter Systems

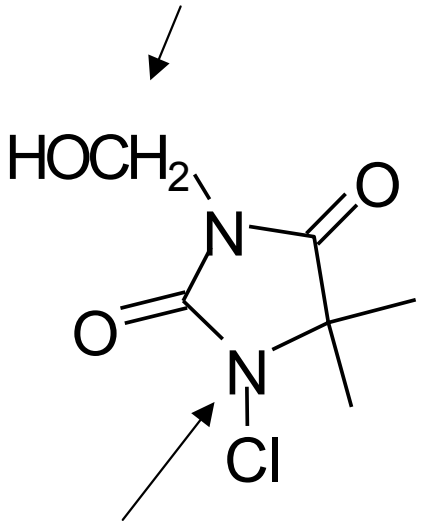
UK Item Leader Dr. C. Griffiths, Detection Dept. Dstl Porton Down
US Item Leader Mr. Kristian Donahue, RDECOM, Natick Soldier Center

- Scope: UK modelling and validating airflow within the US M28 Protective Entrance (PE)
- Goal: To develop a model that correlates well with experimental results
- Status:
  - Comparison between UK and US CFD generated models for M28 PE; Good comparison achieved
  - UK currently developing advanced CFD model of M28 PE
  - Experimental studies to validate models currently underway

UK Testing of US Self-Decontaminating Materials

UK Item Leader Dr. C.R. Willis, Dstl Fellow, Dstl Porton Down
US Item Leader Mr. J. Owens, AFRL, Tyndall Airforce Base

Fibre-reactive group



CW/BW reactive group

- Reactive materials potentially neutralise CW and BW agents
- Tyndall Airforce Base expertise in N-chlorimide chemistry
- May be incorporated into polymers and fibres (textile/ColPro applications)
- Regenerable using dilute bleach
- Active against CW simulants
- Dstl evaluation ongoing against HD and GD vapour

US Testing of UK Barrier Materials

- US Army Natick Soldier Center has expertise and test equipment to conduct thermal resistivity testing of materials
- UK requires thermal properties for use in CFD modeling of ColPro shelters with new materials
- Testing completed in May 05 which determined
  - R-Value
  - Thermal Conductivity
  - Thermal Resistance

Conclusion

- The ColPro PA
  - Provides a means for collaboration in all areas of ColPro technology
  - Permits loans materials and equipment
  - Permits the exchange of personnel
  - Reduces duplication of effort
  - Enhances the capabilities of both the US and UK