

Advancing Respiratory Protective Device Technology through Breathing Gas Chemical Research –FY17 (927ZLCQ)



Objectives

1. Performed extensive product and literature review to develop a proposal for an external peer review
2. Devise a test system which enables simulation using constant air flow under a range of physiological conditions
3. Assemble and test a bench scale laboratory test system to measure SCBA and FSR canister chemical performance

Mid Year Accomplishments

- Tube reactor test system functional for pellets and powders
- Conducted flow CO₂ absorption studies on CO₂ absorbents
 - Demonstrating “effective” soda lime capacities
 - Soda lime activity suffers from interior site access
 - Superior capacities for LiOH in some cases
 - Zeolites show full site access but prefer water to CO₂
- Modifying zeolites and metal organic frameworks for selective CO₂ and CO absorption based on literature
- Propose extending project one year to finish all screening and candidate testing

Updated: 5 APR 2017

Applicable Standards related activities

- 42 CFR 84 (Subpart H and newer subpart O)
- 42 CFR 110 (Subpart I)
- Mine Improvement and New Emergency Response Act of 2006 (MINER Act)

Key Partners

- Naval Surface Warfare Center Hydrospace Lab (NSWC)
- Navy Experimental Diving Unit (NEDU)

Stakeholders

- SCSR/CCER, CC-SCBA and FSR Respirator Manufacturers
- Chemical manufacturers- Molecular Products, Micropore, etc
- Miners, divers, military personnel using devices and chemicals

Outputs

- Presentation at the Society of Mining Engineers Conference
- Planning publications of novel chemistries and test methods in chemical research literature

Outcomes

- Manufacturers may eventually incorporate novel materials into new devices that reduce worker discomfort weight burden, and confusion about performance
- Project data may be used by NIOSH to incorporate chemical performance measurements into chemical testing procedures.
- Technology may potentially be used in refuge alternatives and in future CBRN APR Escape Devices w/ CO Protection and Smoke-Hood Escape Devices