

Advancing Respiratory Protective Device Technology through Breathing Gas Chemical Research – FY15 (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

MidYear Accomplishments

- Developed a two year experimental plan using a tube tester for both commercial and novel chemicals
- Visits to government testing sites to review state of the art testing strategies.
- Assembling a dedicated tube reactor test system
 - Uses LabVIEW based controls
 - Is expandable to breathing & metabolic simulation testing
- Conducted flow CO₂ absorption studies on a commercial CO₂ absorbent to verify CO₂ absorption capacity.
 - Reproduced Sofnolime™ capacity (150 L/kg), and followed absorption to complete exhaustion (284 L/kg)
- Updated review of chemical literature for CO₂ absorbents and CO oxidants, now acquiring most promising materials to test.

Applicable Standards related activities

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

Key Partners

- OMSHR technologists improving mine escape procedures
- Navy Experimental Diving Unit (NEDU), Edgewood Chemical Biological Center (ECBC) technologists performing military equipment testing

Stakeholders

- CCER, CC-SCBA and FSR Respirator Manufacturers
- Miners using these devices

Outputs

- Proposal for external scientific review
- Anticipate publications in chemical research literature
- Anticipate test methods that conform to NPPTL team and ISO standards

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 future CBRN APR Escape Devices w/ CO Protection and Smoke-Hood Escape Devices

Updated: 20 Feb 2015