Closed Circuit Escape Respirator

Presented to Members of the NIOSH NPPTL PPT Program Stakeholders Meeting March 29, 2011
Drivers for a new generation of devices

• Little advancement in re-breather technologies for mining applications in 20 years
• Recent audits of in-service products have demonstrated potential performance & safety issues
• New standard drafted by NIOSH to enhance CCER safety and performance
• Improved designs with modern technologies now being adopted to prevent a recurrence
• Additional user-focused design features to make operation easier and safer in a life threatening event
New Generation - Compressed O₂ CCER

Key Features

• Oxygen-supplying pendulum rebreather
• O₂ delivery system operates on both demand and constant flow
• Incorporates Modern ExtendAir® LiOH CO₂ scrubber
• Unique docking valve allows user to add or exchange breathing devices without breaking seal
• 60-min. & 10-min. breathing durations for the mining community.
• Units weigh 7.0-lbs. and 3.0 lbs. respectively

60 minute SCSR
**CO₂ Scrubber**

- Historically issues with dusting - ‘toxic cocktail’
- State-of-the-art technology now available using polymer binders
- More consistency & durability against vibration

**Old Technology**

Granular CO₂ absorbents

**New Technology**

ExtendAir® CO₂ absorbent cartridge
New CO$_2$ Scrubber Technology

ADVANTAGES

- Eliminates dusting common to granules, even with shock and vibration
- Engineered for consistent breathing resistance and CO2 scrubbing performance
- Exceptional short term water tolerance
- More efficient utilization of absorbent material - up to 500% higher absorption rate than granule
- Duration improvement - 25% to 300% increase with the same mass or volume or same duration with smaller, lighter scrubber
Docking Valve Feature

- Allows user to add or exchange air supplies without breaking seal

1. Closeup of attachment
   - New SCSR or FSR to be attached
   - Nearly spent SCSR or FSR

2. Slide connector fitting into docking valve

3. Connection is made

4. Docking valve can now be turned (opened) to fresh CCER or FSR
   - Valve Handle

5. Spent CCER can be discarded

USER BENEFITS
1. Safer
2. Longer protection
3. Simple
Carbon Monoxide Filter Self-Rescuer (CO FSR)

Current in-service Hopcalite FSR
- ~60-min. duration
- Susceptible to moisture during use
- Can cause discomfort to mouth

State-of-the-art technology CO FSR
- Long duration (8 hours @ 3,000ppm challenge)
- Resistant to moisture during use
- Uses proprietary precious metal catalyst
- Light weight - nearly half the weight of the current Hopcalite FSR
- Supplied with a flanged fitting for docking CCER for both high CO and low O₂ protection
- **Option** - supplied with a mouth bit for use as a self-contained FSR for CO protection alone
Breathing Air Monitor (BAM)

• Current devices can be complex, expensive and short-lived for ‘global’ use
  ➢ Digital display
  ➢ Data logging
  ➢ PC connectivity
  ➢ 2-yr sensor life
  ➢ 2-yr battery life

Alternative

• Low cost Breathing Air Monitor w/ 5-year sensor life measures low O₂ & high CO with LED’s and audible alarms
• Is offered as a hand-held device or incorporated in the cap lamp battery as follows:
  ➢ Factory-assembled to new cap lamps or,
  ➢ Provided as an insert for retrofitting legacy batteries
  ➢ Flashed lamp to alert wearer of gas hazards
Hybrid CCER

Three devices consisting of a compressed oxygen CCER plus…
Carbon Monoxide Filter Self-Rescuer plus $O_2$ & CO-sensing Breathing Air Monitor that combine to form an integrated survival system for maximum respiratory protection
Hybrid CCER
Flexible Options

Use the O2 Self-Contained Self-Rescuer (CCER) by itself

Or the CO Filter Self-Rescuer (FSR) by itself

Or the CO & O2 Breathing Air Monitor (BAM) by itself

Use each device individually...
Or combine them as an integrated system of survival devices for maximum protection
TACTICAL REBREATHER

Emergency Entry SCBA

- Low profile tactical mask and hose fittings
- Swivel fittings on manifold allow users to split hoses or wear both on same side of mask
- ExtendAir™ CO₂ scrubber
- 2-hr. & 4-hr. durations planned
- CBRN or non-CBRN protection
- Draft NIOSH CBRN standard awaited to complete program
Thanks go to NIOSH & CDC

Questions?

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