

# 2018 Structural Component Approval for Refuge Alternatives

MSHA Technical Support, Approval and Certification Center  
Applied Engineering Division

NIOSH Refuge Alternative Partnership Meeting  
June 7, 2017  
Pittsburgh, PA



# Refuge Alternatives for Underground Coal Mines; Final Rule

- Effective Date March 2, 2009
- Establishes requirements for refuge alternatives
- Includes testing, performance, and documentation requirements for approval
- Implements Section 13 of the MINER Act of 2006

# Approved Refuge Alternative Components

- **Breathable Air** – approved in 2013
- **Air Monitoring** – approved in 2013
- **Harmful Gas Removal** – approved in 2013
- **Structural** – allowance for state approval expires after 12/31/2018
  - Applies to Pre-Fabricated Refuge Alternatives
  - Includes Steel Structure and Inflatable, if applicable

# Feedback from Partnership and NIOSH research

- In 2013, MSHA received applications for structural component approval
- Based on the discussion at these partnership meetings, MSHA delayed evaluating these approvals so that NIOSH apparent temperature research could be completed
- Key research topics resulted in
  - Supporting that 95 degree F apparent temperature is protective
  - Establishing that the full occupancy heat rate (117W) per person is appropriate
  - Establishing moisture input per person
  - Establishing an acceptable relative humidity when dry tests are performed
  - Documenting the temperature rise in strata and mine air surrounding the refuge
  - Describing acceptable temperature measurement strategies (average temperatures)
  - Describing acceptable general test procedures (pre-conditioning, data logging, instrumentation, etc.)

# MSHA Actions

- MSHA reviewed apparent temperature test procedures and results included with structural component approval applications whose evaluations had been delayed.
- Applicants were informed of any additional items or changes that needed to be addressed based on the results of NIOSH research and reports.

# Structural Tests and Design Requirements

- For MSHA part 7 approval consideration, applicants must
  - Conduct 8 tests and provide results
    - Apparent Temperature, Over-pressure, Rip & tear, Flash Fire, Gases & Odor, Deployment, Repair, and Stretcher
  - Submit design documents addressing 13 requirements
    - Space/Volume, Isolation, Preshift, Unauthorized entry, Pressurization, Human waste, Exterior gas measurement, Durability, Transport, Two way communication, Flame Resistance, Maintenance accessibility, Loss of pressure

# Refuge Alternative Retrofits

- Most of the existing refuge alternatives had scrubbing chemicals and provisions replaced during the 2013 retrofit
- The 2018 effective rule date coincides with the five year replacement schedule for scrubbing chemicals and provisions for many units
- The majority of tent type units will need to be brought outside for resupply. Steel units may be resupplied underground, if manufacturer allows

# Refuge Alternative Retrofits

- Tents may need to be replaced in order to:
  - Meet the puncture and tear resistance requirement
  - Increase in airlock size to accommodate an injured miner on a stretcher
  - Meet floor space and volume requirements



# Refuge Alternative Retrofits

- Steel storage containers for tent type units may require modification to:
  - Accommodate a larger sized tent
  - Provide ability to conduct preshift examinations without entering the structure
- Replacement of scrubbing chemicals and provisions
- Cylinders may need to be re-certified (DOT requirement)
- Refuge alternatives will be out-of-service during retrofits

# Mine Operator Responsibilities

- Pre-fabricated refuge alternatives in service after December 31, 2018 must have MSHA part 7 approvals for structural components as well as breathable air, harmful gas removal and air monitoring components
- Pre-fabricated refuge alternative structures with only State approvals will no longer be accepted
- Emergency Response Plans (ERPs) may need to be updated to reflect the refuge alternative structural component approval
- Mine operators must provide training on the refuge alternative in the approved ERP

# Mine Operator May Encounter

- Change in maximum occupancy rating
  - Many tent units will maintain close to current maximum occupancy – discuss with your manufacturer
  - Reductions in occupancy for steel units may affect the ability to provide refuge for the maximum amount of persons expected to use the refuge alternative
- Change in maximum mine air temperature rating
- Modification (retrofit) of the refuge alternative to comply with 2018 requirements

# Scheduling and Coordination

- Mine operators are encouraged to contact the manufacturers who supply refuge alternatives to their mines if they have further questions or need additional information.

# Approval Update

- MSHA has issued two Structural Component approvals that cover the following refuge alternative models:
  - Strata M2624-4.0
  - Strata M2630-4.0
  - Strata M2630-3.0T
  - Strata S-M3636
  - Strata S-MC3635
  - Strata S-M3630

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QUESTIONS?