

Subject: RIN 1219-AB79 Comments

JUN 02 2014

From: James Rau [mailto:James.Rau@minearc.com]
Sent: Thursday, May 29, 2014 1:04 PM
To: Triebisch, George - MSHA
Subject: RIN 1219-AB79 Comments

Dear Mr. Triebisch,

Please see attached comments for RIN 1219-AB79

Regards,

James Rau
General Manager – MineARC® Systems America LLC

MineARC® Systems



Permanent Refuge Chambers

Permanent solutions for underground safety zones, excavations and break/rest areas.

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May 28, 2014

Mr. George Triebisch
Director
Mine Safety & Health Administration
Office of Standards, Regulations, and Variances
1100 Wilson Boulevard, Room 2350
Arlington, VA 22209-3939

JUN 02 2014

Re: RIN 1219-AB79

Dear Mr. Triebisch,

The following comments are submitted by MineARC Systems America, LLC ("MineARC") regarding key issue number twenty, which is restated below for ease of reference:

"Currently, state approved, prefabricated structural components that were accepted in ERPs prior to March 2, 2009, are grandfathered until December 31, 2018. What would be the impact of changing the grandfathering allowance for structural components and requiring an earlier date for part 7 approvals?"

MineARC® is a MSHA approved refuge alternative manufacturer. MineARC® Refuge Alternatives include as standard a rigid steel structure to protect miners from secondary explosions, as well as a liquid carbon dioxide cooling system to control the internal apparent temperature.

The December 31, 2013 approval deadline for harmful gas removal and breathable air components requires that manufacturers already meet a large portion of 7.505 Structural Components, except in two key areas:

- 1) Be designed and made to withstand 15 pounds per square inch (psi) overpressure for 0.2 seconds prior to deployment.
- 2) Provide at least 15 square feet of floor space per person and 30 to 60 cubic feet of volume per person according to the following chart.

AB79-COMM-3



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Mining height (inches)	Unrestricted volume (cubic feet) per person*
36 or less.....	30
>36≤42.....	37.5
>42≤48.....	45
>48≤54.....	52.5
>54.....	60

MineARC sees no issue in bringing the 15psi overpressure testing requirements forward to assure that a refuge is capable of withstanding an initial explosion. The overpressure requirements essentially mirror the West Virginia standard of 15psi for 3 seconds.

MineARC disagrees strongly however with MSHA’s statement that, *“because of the difficulty in predicting the likelihood and strength of a secondary explosion, the final rule does not include strength requirements with respect to a second explosion¹”*. A significant number of coal mining companies, miners, mine rescue experts, and MSHA staff also disagree with this view.

Ray McKinney, MSHA’s Administrator for Coal Mine Safety and Health pointed out during the Sago mine disaster that the industry *“has a rich history of secondary explosions²”*. The December, 2007, NIOSH Research Report on Refuge Alternatives for Underground Coal Mines (“NIOSH Report”) states that, *“multiple methane explosions with or without coal dust might occur within a mine.³”* The fact that the final rule remains silent on the issue of protecting refuge alternatives from a second explosion, but stipulates space and volume requirements is baffling.

The NIOSH Report included a survey taken of 105 mines from 21 different mining companies with state approved refuge alternatives. The survey revealed that 24% of companies selected rigid steel refuge alternatives (average capacity of 20 persons) because of their protection against secondary explosions, while 62% selected inflatable tents because of their lesser size and larger capacity (average capacity of 26 persons). It would have been interesting to know what percentage of companies would have selected an inflatable tent if size and capacity were not a factor.

The above survey results undeniably demonstrate that a portion of the coal mining industry would prefer rigid steel refuge alternatives over inflatable tents. The survey also shows that size and capacity

¹ 30 CFR Parts 7 and 75 Refuge Alternatives for Underground Coal Mines; Final Rule

² McAteer, D.J, “The Sago Mine Disaster”, 2006

³ Zipf, K & Cashdollar, K, “Explosions and Refuge Chambers”, 2007



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are key decision making factors when purchasing a refuge alternative. With the 2018 regulation having the effect of reducing the capacity of most steel refuge alternatives by more than 50%; mine operators that currently sit in the twenty-four percentile are being forced to purchase inflatable tents due to size and maneuverability issues. Irrespective of the mining height, there is simply a limit to the width and length that a refuge alternative can be physically transported in a mine. MineARC is already aware of numerous mine operators moving away from rigid steel refuge alternatives in anticipation of the 2018 grandfathering expiration.

It is also astonishing that while all refuge chambers must be located in the cross-cut prior to deployment; inflatable refuge alternatives are allowed to inflate into the entry post emergency. Explosion testing performed at NIOSH's Lake Lynn Mine clearly shows that debris travels in a straight line along the entries. The December, 2007, NIOSH Research Report on Refuge Alternatives for Underground Coal Mines ("NIOSH Report") states, *there is an advantage in placing refuge alternatives in cross-cuts if the debris from blow out seals is likely to travel out the entries*⁴. The Lake Lynn testing compellingly demonstrates that the occupants of an inflatable refuge alternative would be unprotected from flying debris in a secondary explosion.

MSHA states in the preamble to the final rule that the proposed 15 square feet of floor space per person is necessary for the following reasons:

- 1) Persons can conduct necessary activities in the refuge alternative.
- 2) Adequate space is needed to accommodate larger than average persons.
- 3) Adequate volume is needed for proper function of passive harmful gas removal systems.
- 4) Larger volumes are more effective at dissipating heat.

Dealing with points 3 and 4 first; MineARC Refuge Alternatives do not use a passive harmful gas removal system nor do they need large volumes to dissipate heat. All refuge alternatives include a cooling system and have undergone 96 hour simulated testing to demonstrate that they can meet the maximum 95°F internal apparent temperature at their West Virginia approved occupancy. This leaves only points 1 and 2 as being applicable to a MineARC Refuge Alternative.

The 15 square feet of floor space per person is specified as unrestricted i.e. all storage locations and components are in addition. The rule therefore assumes that 15 square feet is required for an occupant to be comfortable as well as perform necessary activities.

⁴ Zipf, K & Cashdollar, K, "Explosions and Refuge Chambers", 2007



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Necessary activities in the refuge alternative include attending to harmful gas removal, breathable air, monitoring gas levels, drinking, eating, using sanitation facilities, and attending to injured miners. None of these activities require additional floor space in a MineARC Refuge Alternative, except for attending to an injured miner. With the final rule requiring that the airlock be large enough to accommodate a stretcher, an injured miner can be accommodated in the airlock portion of a MineARC as the waste is disposed to external of the refuge.

With the average height and weight of an American male being 5ft 10in and 195 lbs, the average person lying down takes up approximately 12 square feet. Despite the fact that it is entirely unnecessary to lie down inside most refuge alternatives, the 15 square feet is still 20% more than would be required by the average American.

Included with this letter are interior photos of two separate MineARC Refuge Alternatives. The first is a 20 person unit with an overall height of 44", the second a 24 person unit with an overall height of 77". To meet the MSHA 2018 space and volume requirements, these units would be de-rated to 7 and 11 persons respectively. The 44" model shows the 7 occupants seated in a supine position with their backs along back rests, which double as storage for all necessary consumables. The refuge alternative is 22 feet long and is already at the maximum length for transport in a mine with 18ft entries. The 77" model shows the 11 occupants seated with consumable storage beneath and behind the seats. The unit is 31ft long and weighs 55,000lbs, which is the absolute maximum any mine within the United States can handle.

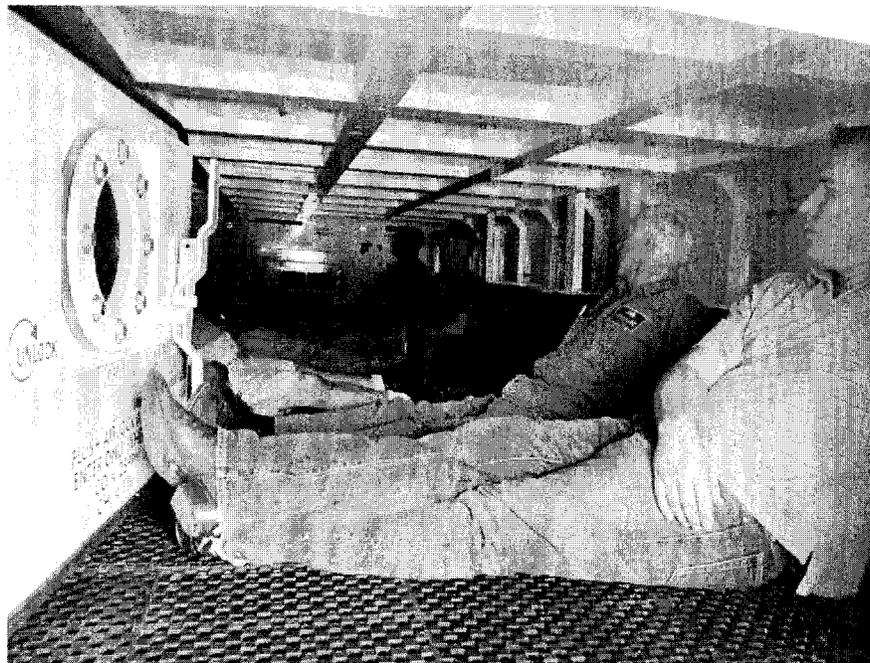
The final rule includes varying requirements for volume, based on mining height. This in itself is an acknowledgment that miners are able to perform necessary activities with far less space than stipulated for a mining height of 54" or greater. Furthermore, with refuge manufacturers using different technologies it makes no sense for MSHA to dictate the space and volume required to perform necessary tasks. If space and volume are to be included at all, it should pertain to occupant comfort only.

It is MineARC's opinion that far less than 15 square feet of floor space per occupant is essential for comfort. In an emergency situation there is no need for occupants to be able to lie down, especially when steel refuge alternatives can be designed with ergonomic seating and/or back rests. Numerous legislations around the world mandate far smaller floor space requirements than specified in the final rule or simply default to manufacturer's recommendations. The Federal Emergency Management Agency (FEMA) recommends unrestricted floor spaces ranging from 5-20 square feet per person⁵ for tornado and hurricane safe rooms applications. This is for community facilities where space is not

⁵ FEMA P-361, "Design and Construction Guidance for Community Safe Rooms", 2008

severely limited as in most underground coal mines. What's more the use of a refuge alternative is a likely life and death situation where survival should take all precedence over occupant comfort.

While refuge alternatives have undoubtedly improved a miner's likelihood for survival, the introduction of a 96 hour deadline has questionably created further pressure. History has shown that timely rescue efforts are often hindered by the risk of additional explosions. The ability for mine rescue teams to reach trapped miners is dependent on ventilation and gas levels indicating a lack of probable ignition. The safety and protection of the mine rescue teams always come first. Accordingly, any additional protection that can be offered to trapped miners from the same exact hazards is beneficial. The implementation of the 2018 floor space and volume regulation will effectively ensure steel refuge alternatives are no longer practical due to their size and weight. It will surely be a sad day, if a miner were to be killed by a secondary explosion while lying down comfortably in an inflatable refuge alternative.



44" model, 20 person refuge de-rated to 7 persons to meet 15ft² floor space per person



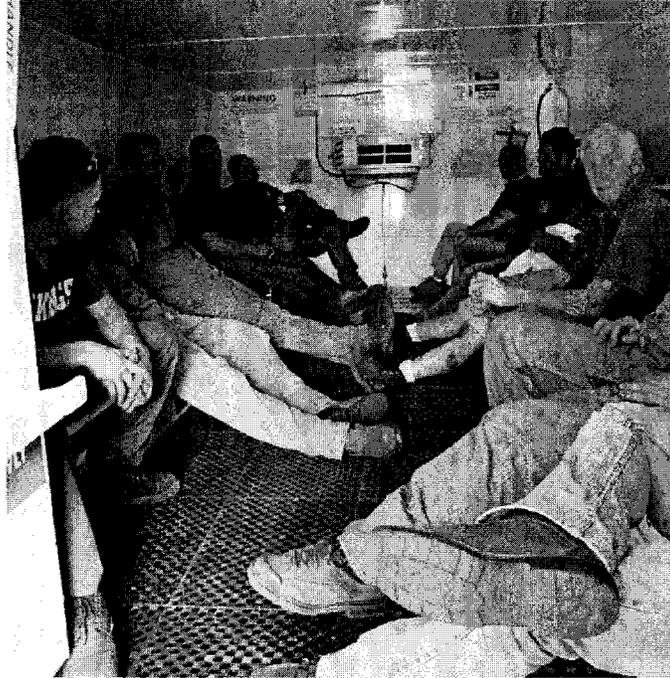
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77" model, 24 person refuge de-rated to 11 persons to meet 15ft² floor space per person