



DEPARTMENT OF LABOR

Mine Safety and Health Administration

30 CFR Parts 7 and 75

RIN 1219-AB79

Refuge Alternatives for Underground Coal Mines

AGENCY: Mine Safety and Health Administration, Labor.

ACTION: Request for information.

SUMMARY: The Mine Safety and Health Administration (MSHA) is requesting data, comments, and information on issues and options relevant to miners' escape and refuge that may present more effective solutions than the existing rule during underground coal mine emergencies. The Agency continues to reiterate that in the event of an underground coal mine emergency, a miner should seek escape as the first line of defense. Responses to this Request for Information (RFI) will assist MSHA in determining if changes to existing practices and regulations would improve the overall strategy for survivability, escape, and training to protect miners in an emergency. MSHA will review the comments to determine what actions, if any, the Agency will take in response to comments.

DATES: Comments must be received by midnight Eastern Daylight Saving Time on [Insert date 60 days after the date of publication in the FEDERAL REGISTER].

ADDRESSES: Comments and informational material may be sent to MSHA by any of the following methods. Clearly identify all submissions in the subject line of the message with RIN 1219-AB79.

- Federal E-Rulemaking Portal:
<http://www.regulations.gov>. Follow the on-line instructions for submitting comments.
- Facsimile: 202-693-9441.
- Mail or Hand Delivery: MSHA, Office of Standards, Regulations, and Variances, 1100 Wilson Boulevard, Room 2350, Arlington, Virginia 22209-3939. For hand delivery, sign in at the receptionist's desk on the 21st floor.

FOR FURTHER INFORMATION CONTACT: George F. Triebsch, Director, Office of Standards, Regulations, and Variances, MSHA, at triebsch.george@dol.gov (e-mail); 202-693-9440 (voice); or 202-693-9441 (facsimile). These are not toll-free numbers.

SUPPLEMENTARY INFORMATION:

Concurrent Limited Reopening of the Record

Elsewhere in this issue of the *Federal Register*, MSHA is publishing a notice of the Agency's limited reopening of the record on a training provision in the Refuge Alternatives rule published December 31, 2008 (73 FR 80656). In response to a challenge to the final rule, the U.S. Court of Appeals for the District of Columbia Circuit directed MSHA to explain the basis for requiring some training annually rather than quarterly, or to reopen the record and allow additional public comment on the issue.

Availability of Information

MSHA will post all comments and information on the Internet without change, including any personal information provided. Access comments and information electronically at <http://www.regulations.gov> or on MSHA's website at <http://www.msha.gov/currentcomments.asp>. Review comments in person at the MSHA Office of Standards, Regulations, and Variances, 1100 Wilson Boulevard, Room 2350, Arlington, Virginia. Sign in at the receptionist's desk on the 21st floor.

To subscribe to receive e-mail notification when MSHA publishes rulemaking documents in the *Federal Register*, go to <http://www.msha.gov/subscriptions/subscribe.aspx>.

I. Statutory and Regulatory History

The Mine Improvement and New Emergency Response Act of 2006 (MINER Act) amended the Federal Mine Safety and Health Act of 1977 (Mine Act). Section 2 of the MINER Act added a requirement that each underground coal mine operator develop and adopt an Emergency Response Plan (ERP) to improve accident preparedness and response at each mine and periodically update the ERP to reflect changes in the mine, advances in technology, or other relevant considerations. An ERP must provide for the evacuation of all persons endangered by an emergency and the maintenance of persons trapped underground when escape is impossible.

Section 13 of the MINER Act directed the National Institute for Occupational Safety and Health (NIOSH) to conduct research and tests concerning the use of refuge chambers in underground coal mines, and to report the results to Congress and the Secretary of Labor (Secretary). The MINER Act directed the Secretary to respond to the NIOSH Report by reporting to Congress the actions, if any, the Secretary intended to take based on the NIOSH Report, including proposing regulatory changes and the reasons for such actions.

NIOSH finalized its *Research Report on Refuge Alternatives for Underground Coal Mines* (NIOSH Report) in

December 2007. The report drew from NIOSH experience, independent research and testing, and a survey of existing research related to mine refuge chambers.

In December 2007, Congress directed the Secretary to propose regulations, consistent with the recommendations of the NIOSH Report, requiring rescue chambers, or facilities that afford at least the same measure of protection, in underground coal mines not later than June 15, 2008, and to finalize the regulation not later than December 31, 2008 (Consolidated Appropriations Act of 2008, SEC. 112(b)).

MSHA published a notice of proposed rulemaking on June 16, 2008 (73 FR 34140) and the final rule on December 31, 2008 (73 FR 80656). The final rule established requirements for refuge alternatives in underground coal mines.

II. Key Issues on Which MSHA Requests Comment

MSHA is seeking information on an overall strategy for survivability and escape in the event of an underground coal mine emergency, with escape as the primary option. Specifically, MSHA is requesting information on escape and refuge options that may present more effective solutions than the existing rules for miners' escape and safety. MSHA is also seeking information on effective options to the specific requirements in the existing rule. Comments

should address escape strategies, refuge alternatives, training, and certification.

Since the refuge alternatives rule became effective on March 2, 2009, refuge alternatives have been placed in underground coal mines across the country. During this time, mine operators, miners, manufacturers, MSHA, state governments, NIOSH, and other parties have gained experience and perspective on how all aspects of a mine's emergency preparedness program must work together to provide effective escape and alternatives for refuge for miners. To benefit from this experience and perspective, MSHA has compiled a series of questions and requests to obtain additional information on the following topics: Training, In-place Shelters, Escape Methodology, Replacement of Brass Fittings, Part 7 Testing and Approval, Apparent Temperature, Physiological and Psychological Factors, and Additional Requests for Information.

Continued development of refuge equipment and technology is crucial to enhance the effectiveness of refuge alternatives and improve miners' chances of surviving a mine emergency. Responses to this RFI will assist MSHA in determining an appropriate course of action with respect to escape and refuge capabilities in underground coal mines.

In responding to this request for information, please consider the requirements of the Mine Act, as amended by the MINER Act; knowledge gained through NIOSH research and development; practical experience with existing technology; and other information, such as economic and technological feasibility. When responding, please address your comment to the topic and question number, for example, "A. Miner Training on Refuge Alternatives, Question 1." Please explain the rationale supporting your views. To the extent possible, provide relevant information on which you rely, including past experience, studies and articles, and standard professional practices. Include any scientific or technical information or data related to shelter and escape methods or equipment, particularly advancements or improvements.

MSHA is particularly interested in data and information that would help the Agency evaluate any escape or refuge options. Where appropriate, include cost data, such as cost for additional boreholes as mining advances, or reductions in costs, such as eliminating the cost of carbon dioxide scrubbing when breathable air is supplied through a borehole or piping from the surface.

A. Miner Training on Refuge Alternatives

The NIOSH Research Report on Refuge Alternatives for Underground Coal Mines (NIOSH Report, Dec. 2007) included recommendations on training miners on refuge alternatives. It separately addressed motor task (hands-on) training on the operation of a refuge alternative, decision-making training on when to use a refuge alternative, and expectations training to help miners reduce the level of panic and anxiety associated with using a refuge alternative. MSHA's training requirements in the Refuge Alternatives rule include the types of training addressed in the NIOSH Report.

MSHA's existing rule requires decision-making training during the quarterly mine emergency evacuation training and drills. Miners practice mine evacuation quarterly based on four varied scenarios (gas or water inundation, fire, explosion) and discuss when it is appropriate to use a refuge alternative. During the quarterly drill training, miners must also receive training on procedures for deploying and operating refuge alternatives and components. MSHA requires annual expectations training that includes hands-on (motor task) training in the deployment and operation of refuge alternatives and components under simulated, realistic mine emergency conditions. Again,

this training emphasizes that the refuge alternative is an option only when escape is impossible.

MSHA requests comment on the effectiveness of training provided to miners under the existing rule for deploying (e.g., the tent component of a prefabricated unit); operating (e.g., the air monitoring or breathable air component); and using (e.g., the airlock) refuge alternatives and components.

1. At the time of the final rule, training units for refuge alternatives and components were not available. Now that some manufacturers offer training units, describe if and how such units have been incorporated into required refuge alternatives training and quarterly emergency mine evacuation training and drills. How effective are these training units? What are the costs associated with the use of training units? What is the service life of a training unit?

2. What publicly-available or commercial training products and guidance have you used for training miners about the deployment and use of refuge alternatives? In your experience, were these training aids adequate? If so, what features of the products or guidance were the most useful or effective and why? Please provide specific suggestions for improvement, if appropriate.

3. Discuss training experiences, e.g., frequency of miners' training needs for in-place shelters and prefabricated units.

B. In-place Shelters

For purposes of this request for information, an "in-place shelter" is a unit consisting of 15 pounds per square inch (psi) stoppings constructed prior to an event in a secure space with an isolated atmosphere that meets the refuge alternative requirements in 30 CFR parts 7 and 75, and that provides breathable air using either boreholes or pipelines from a surface installed compressor or fan. The in-place shelter has an unlimited air supply as opposed to 96 hours of air generally provided in cylinders. In addition to providing shelter until rescue, the in-place shelter could be used by miners during an evacuation as a "stopping point" to establish communications, to plan for the remainder of the escape, and possibly to refill personal air supplies, such as a self-contained breathing apparatus (SCBA), or to transfer to a fresh self-contained self-rescue (SCSR) device.

MSHA requests comment on the following related to the utility, advantages, and disadvantages of in-place shelters:

4. How could in-place shelters improve safety for escaping miners if they were incorporated into an evacuation and SCBA/SCSR storage plan? MSHA requests information on how to design an escape strategy using one or more in-place shelters to facilitate escape.

5. Stoppings for in-place shelters must be at least 15 psi. MSHA seeks information and supporting rationale on the adequacy of 15 psi stoppings to assure the post-explosion integrity of SCSRs (or SCBAs) stored in an in-place shelter located between adjacent escapeways.

6. Currently, refuge alternatives are required to be located within 1,000 feet of the face. Provide options for the location of in-place shelters that provide equivalent protection and include your rationale for the options.

7. If there is an in-place shelter located between the working face and the mouth of the section, what are the advantages and disadvantages of also requiring a prefabricated refuge alternative within 1,000 feet of the face?

8. Discuss (or list) the advantages, disadvantages, and restrictions on providing breathable air and communication through a borehole to an in-place shelter. Please share your experiences with implementation of in-place shelters,

e.g., surface access rights, difficult terrain, limited access, other land uses, and cost.

9. What are appropriate design characteristics, including doors, for a stopping used to construct an in-place shelter to ensure an isolated atmosphere following a mine emergency?

10. Discuss the advantages and disadvantages of (1) an in-place shelter and (2) a prefabricated refuge alternative. Please include specific costs, such as the cost of installation of piping and associated components to an in-place shelter. What are the maintenance costs for (1) an in-place shelter and (2) a prefabricated refuge alternative?

11. MSHA standards require the doors of the in-place shelter to remain closed to maintain an isolated atmosphere and prevent the accumulation of methane or toxic gases and to protect the interior components from overpressure and flash fire. Describe how the in-place shelter could be ventilated during normal mining operations to prevent coal dust, smoke, and gas accumulations in the interior of the in-place shelter.

12. If mine air is used to ventilate the in-place shelter, what concentrations of carbon monoxide, methane, and other toxic gases should an in-place shelter be

designed to purge following an explosion or fire to accomplish the initial purge in 20 minutes?

13. How can piping used to supply breathable air to an in-place shelter be protected from mining activity, as well as an explosion or fire? Explain what type of piping and protection should be used and why.

14. If the pipe is buried or covered, how could the operator maintain and inspect the pipe to ensure that breathable air can be provided in acceptable quantities to the in-place shelter?

15. Breathable air, air monitoring, and harmful gas removal components of refuge alternatives must be approved under 30 CFR part 7 by December 31, 2013. What are the specific costs for retrofitting existing prefabricated refuge alternatives to meet MSHA's part 7 approval criteria? How do these costs compare to the costs associated with installing in-place shelters?

16. Discuss technology that can be used to provide emergency communications to the in-place shelter by taking advantage of the protected piping system or borehole that delivers breathable air.

C. Escape Methodology

MSHA considers long-term shelter in a refuge alternative as a last resort to protect persons who are

unable to escape from an underground coal mine. Refuge alternatives can also be used to facilitate escape by sustaining trapped miners until they receive communications regarding escape options. NIOSH stated, in its report on refuge alternatives, that—

... the potential of refuge alternatives to save lives will only be realized to the extent that mine operators develop comprehensive escape and rescue plans that incorporate refuge alternatives.

Manufacturers are continuing to conduct research and develop improved SCSRs with greater than one-hour rated capacities. Additionally, the use of SCBAs in conjunction with refill stations may provide greater than one-hour rated breathing capacities. These developments may impact escape strategies in the future and potentially increase the distances permitted between SCSR caches or SCBA refill stations.

MSHA requests information related to incorporating in-place shelters into the escape strategy in mine evacuation plans.

17. If an SCBA system is used, discuss the feasibility of using full-face respirator masks, recognizing the need for fit testing and for miners to be clean shaven.

18. Please provide information regarding how maximum distances between in-place shelters could be affected by

using improved SCSRs or SCBAs with greater than one-hour ratings.

D. Replacement of Brass Fittings

On January 9, 2011, a catastrophic failure occurred in an oxygen cylinder fitting connected to the breathable air system in a refuge alternative located in an underground coal mine. Subsequently, a brass fitting failure in a second refuge alternative was discovered, and MSHA learned that cracks had been discovered in both the brass fittings and cylinder valves of a third refuge alternative.

The refuge alternative manufacturer, state inspectors, and MSHA examined the refuge alternatives to determine the cause of the failures. MSHA sent representative samples of the brass fittings to the OSHA Salt Lake City Technical Center (SLTC) laboratory. The OSHA report stated the following:

The analysis performed at the SLTC revealed that the cracks are a result of stress-corrosion cracking (SCC) and the evidence suggests that dezincification is a contributing factor. The stress-corrosion cracks that have formed in the fittings and valves indicate that they are on the path to failure. The demonstrated short and unpredictable service life of the CGA brass valves and fittings is troublesome. The current situation left unchecked represents a safety hazard.

As a result of the premature failures of brass valves and fittings on breathable air components, the West

Virginia Office of Miners' Health Safety & Training (WVOMHS&T) issued an order on October 14, 2011 (Order), requiring the refitting of state-approved underground mine shelters. The Order generally established an October 31, 2011 deadline for manufacturers to inspect all mine shelters. In accordance with the Order, shelters found to contain valves or fittings showing signs of corrosion, stress corrosion cracking, or having improper dimensions were to be taken out of service immediately, unless the manufacturer provided a signed statement that the shelter is safe to remain in service until the scheduled refit date. The Order further required replacement of all brass compressed gas cylinder valves and associated fittings used in mine shelters by the scheduled refit date.

MSHA agreed with WVOMHS&T in recognizing the safety hazard associated with existing brass valves and fittings and concurred with the procedures established in the Order. The Order affected all West Virginia-approved refuge alternatives regardless of the state in which the units are used; however, refuge alternatives that are not West Virginia-approved are not subject to the Order. MSHA issued a policy consistent with the WVOMHS&T Order to address the hazard with respect to refuge alternatives in

all underground coal mines. The policy provides for timely replacement of brass valves and fittings.

MSHA requests comments and information related to the replacement of brass fittings and valves in refuge alternatives.

19. Brass fittings and cylinder valves used in refuge alternatives have exhibited degradation over time and are currently being replaced by fittings and valves made from materials such as Monel and stainless steel. Please provide information regarding the need for a predictive maintenance or replacement schedule for these new fittings and valves to guard against leakage or failure and the cost to retrofit and maintain these units. Include information from specific experience, if applicable.

E. Part 7 Testing and Approval

The approval requirements for refuge alternatives are included in 30 CFR part 7—Testing by Applicant or Third-Party. The regulation for refuge alternatives provides approval criteria, allows alternatives to the requirements, and promotes the development of new technology.

MSHA has a 20-year history of administering the part 7 approval program. Subpart L of part 7 requires that an applicant or a third-party must test the refuge alternative or component. The applicant, usually a manufacturer,

provides the required information and test results to MSHA to demonstrate that the refuge alternative or component meets the applicable technical requirements and test criteria. MSHA will issue an approval for a refuge alternative or one of its components based on the Agency's evaluation of the information and test results submitted with the approval application. The MSHA approval under part 7 assures operators and miners that the refuge alternative can be used safely and effectively in underground coal mines and that the components can be used safely.

MSHA requests comment on the following testing and approval issues:

20. Based on your experience, what issues have arisen during the operation, calibration, or maintenance of gas monitoring equipment?

21. Based on your experience with the part 7 approval requirements for refuge alternatives and components, provide other options that offer equivalent product performance, thus assuring equivalent or greater protection for miners.

F. Apparent Temperature

Apparent temperature is a measure of relative discomfort due to the combined effects of air movement,

heat, and humidity on the human body. The likelihood of adverse effects from heat may vary with a person's age, health, and body characteristics; however, core body temperatures in excess of 104°F are considered life threatening, with severe heat exhaustion or heat stroke possible after prolonged exposure or significant physical activity. NIOSH recommended that the apparent temperature within the occupied refuge alternative should not exceed 95°F.

Existing MSHA regulations require that the apparent temperature in a refuge alternative must be controlled so that, when it is used in accordance with the manufacturer's instructions and defined limitations, the apparent temperature in the fully-occupied refuge alternative does not exceed 95°F. MSHA requires that ERPs specify the maximum mine air temperature at each location where a refuge alternative will be placed, as well as the maximum mine air temperature under which the refuge alternative is designed to operate when the unit is fully occupied.

MSHA requests the following information related to the apparent temperature in a fully-occupied refuge alternative:

22. Provide information on the availability, use, and cost of air conditioning units in refuge alternatives to control apparent temperatures.

23. Please provide information on the effects outside air temperatures have on the apparent temperatures in in-place shelters; include your rationale.

G. Physiological and Psychological Factors

MSHA developed the refuge alternatives rule based on Agency data and experience, NIOSH recommendations, research on available and developing technology, state regulations, and comments and testimony from the mining community. MSHA considers refuge alternatives as a last resort to protect persons who are unable to escape from an underground coal mine in the event of an emergency. When miners have no other option and must endure the conditions in refuge alternatives for up to 96 hours, the physical and mental stress of the occupants must be considered.

During rulemaking, several commenters expressed concern that refuge alternatives have not been proven effective in an actual mine and that human subject testing is necessary to assure proper functioning and durability of the units. In the preamble to the final rule, on the issue of human subject testing, MSHA stated:

... MSHA is aware that NIOSH is developing a protocol and seeking approval for human subject testing. If approved, the results of this human subject testing will not be available prior to the effective date of the final rule. The Agency [MSHA] will consider the results of such testing for future rulemaking, if warranted. (73 FR 80658)

NIOSH's work in this area is ongoing. At this time, MSHA is not aware of any 96-hour human subject testing conducted in the United States. However, MSHA is aware of shorter duration tests, and tests where miners were allowed to enter and leave the refuge alternative, that have been conducted in the United States in the years since the final rule.

MSHA requests comment on the following related to the physiological and psychological factors for miners in a refuge alternative:

24. Provide comments on miners' confidence in the effectiveness of existing refuge alternatives or their willingness to use one during an emergency.

25. Recognizing that an in-place shelter would allow direct connection to the surface, through which unlimited breathable air and communications can be provided, and would not require a miner to depend on a carbon dioxide scrubbing system, how might the use of in-place shelters affect a miner's psychological and physiological well-being when escape is impossible?

26. Regarding space and volume available to miners, what advantages do in-place shelters provide over prefabricated units with regard to the psychological and physiological well-being of trapped miners? Please be specific.

H. Additional Requests for Information

Since the MINER Act was passed, MSHA, mine operators, miners, refuge alternative manufacturers, and states have gained experience in the deployment, use, maintenance, and inspection of refuge alternatives. Based on this experience, MSHA requests comment on the following issues related to the existing refuge alternative rule:

27. What innovations in the areas of escape and refuge should be considered to improve miner safety?

28. Some manufacturers conduct inspections of prefabricated refuge alternatives at regular intervals, such as every 6 months. Based on your experience, what would be an appropriate examination interval for refuge alternatives and what should this examination include? Please be specific and include detailed rationale for your recommendation. Who should conduct these examinations and what qualifications or training should the person conducting these examinations possess?

29. 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?

30. How can an inflatable stopping (to be installed post-event) be an effective and safe means for creating a protected, secure space with an isolated atmosphere? What factors should MSHA consider when determining whether to allow the use of inflatable stoppings in conjunction with boreholes or piping to provide effective shelter?

31. Please provide information regarding the prevention of oxygen enrichment (greater than 23%) in the interior atmosphere of a refuge alternative when only oxygen is provided by breathable air components over a period of 96 hours.

Please provide any other data or information that you think would be useful to MSHA as the Agency evaluates the effectiveness of its regulations and standards related to refuge alternatives in underground coal mines.

List of Subjects

30 CFR Part 7

Coal mines, Incorporation by reference, Mine safety and health, Reporting and recordkeeping requirements, Underground mining.

30 CFR Part 75

Coal mines, Mine safety and health, Reporting and recordkeeping requirements, Safety, Training programs, Underground mining.

AUTHORITY: 30 U.S.C. 811.

Dated: August 2, 2013

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Mine Safety and Health.*

[FR Doc. 2013-19029 Filed 08/07/2013 at 8:45 am;
Publication Date: 08/08/2013]