From: Wes Shoff [mailto:wshoff@strata-safety.com]
Sent: Monday, August 18, 2008 9:05 PM
To: zzMSHA-Standards - Comments to Fed Reg Group
Subject: FW: RIN 1219-AB58, Comments to the Proposed Rule, Refuge Alternatives in Underground Coal Mines

Resending earlier email

Wes

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AB58-COMM-32

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August 18, 2008

Patricia W. Silvey
Director, Office of Standards, Regulations, & Variances
U.S. Department of Labor
Mine Safety and Health Administration
1100 Wilson Boulevard
Arlington, VA 22209-3939

Re: Comments to the Proposed Rule, Refuge Alternatives for Underground Coal Mines
30 CFR Parts 7 and 75, FedReg Doc. E8-13565
RIN 1219-AB58, zzMSHA-comments@dol.gov

Dear Ms. Silvey:

On behalf of Strata Safety Products, LLC, I would like to respectfully submit our comments for clarification and consideration in the preparation of the Final Rule for Refuge Alternatives in Underground Coal Mines.

The principals of Strata Safety will be available should the agency request any additional information. Please feel free to contact me at any time.

Best Regards,

Wesley E. Shoff

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Introduction

Having had representatives at all four of the public hearings, Strata appreciates the difficulties facing MSHA as they try to weigh the comments from manufacturers, coal operators, labor, and state agencies in crafting a rule that results in a refuge alternative for the coal miners of America. We will try and provide meaningful and specific commentary where requested in the proposed rule.

Strata-Safety Products, LLC (SSP) is a leading supplier of mine refuge chambers. As of August 15, 2008, Strata-Safety will have delivered over 250 refuge chambers to coal mines throughout the United States. Strata fully expects to deliver the additional 220 units currently on order by December of this year. Strata has also sold non-coal units to mines in the US, Mexico, Chile, Australia and Ethiopia in 2008.

Strata manufactures and sells both inflatable units and steel walk-in units for coal mine applications. We are therefore in a unique position to offer unbiased comments on the characteristics of the two styles.

During the development of each style chamber, Strata has involved professionals world wide in performing exhaustive research and analysis. This work, along with systems testing, remains ongoing at this time.

We have worked closely and openly with the West Virginia Task Force, our customers, our suppliers, MSHA, and NIOSH during the development of our refuge alternative products. We have made ourselves and our testing facilities available to MSHA Tech Support and NIOSH and will continue to do so during the rule making process.

As a manufacture we support the agency in mandating that refuge alternatives and their components be approved for use. We would recommend that these approvals be based on the refuge alternative's application to the environment and conditions in which it is intended to serve and that it may not be best to mandate a "one system fits all applications" ruling.

We support performance based testing of refuge alternatives done with properly defined assumptions. We do not believe "self certification," as inferred in the Part 7 Approval process, is appropriate unless all applicants are provided with very specific design assumptions.

In the following you will find requests for clarification and comments to the proposed rule as submitted by Strata Safety Products, LLC. We appreciate the opportunity to submit these and are in hope they are beneficial in developing final regulations that provide a high level of safety to the coal miners of the United States while taking into account practical manufacturing requirements and manageable operating guidelines for the underground mines.

NIOSH Testing

Strata-Safety Products submitted a 36 man inflatable-type unit to NIOSH for evaluation in late 2007. The Strata Fresh Air Bay ("FAB") was the only shelter to meet the three performance-based criteria evaluated by NIOSH: Heat below 95F Apparent Temperature, Oxygen supply for 96 hours, and CO2 scrubbing to less than 5000ppm. Because of other commitments at Lake Lynn, including follow up evaluations of other manufacturers units, NIOSH was unable to conduct an analysis of our 20-man steel, walk-in unit.

Prior to the evaluations, we invited the NIOSH scientists and engineers to visit our assembly facility to view the unit that was to be analyzed. At this time, we also discussed test protocol as it related to our products. We also openly shared our calculation methodologies, in-house testing experiences and test results.

After the evaluation at NIOSH was completed, and it became apparent our steel unit could not be scheduled for evaluation, we chose to set up our own in-house test facility. Again, we invited the NIOSH team to our facility and they openly offered suggestions and comments on our set-up. A primary purpose of our testing was to establish the maximum ambient mine temperature for our various units while maintaining the 95F inside apparent temperature.

As a manufacturer, we support independent, third party testing of refuge chambers. We further support the use a single facility to ensure that the test conditions and test procedures are identical for each manufacturer. We believe that a government agency, such as NIOSH, is the logical home for this type of testing and that funding should be made available to ensure thorough evaluation is conducted on these potentially life saving devices.

With regard to human testing, we believe there is enough data available to properly simulate the metabolic heat and breathing of humans without necessarily subjecting humans to the risks of a manned test. This is not to say that some manned testing may not be valuable to validate portions the test protocol and for training development. As pointed out by Mr. Randall Harris in his testimony in Charleston, manned testing at a Western US manufacturers' facility discovered several interesting issues that would not have been found with a pure simulation.

Useable Space and Volume

Addressed in Sections 7.503(b) (2) Approval Application, 7.505(a)(1) Structural Components, 75.1506(a)(1) Refuge Alternatives, and 75.1506(a)(2) Maximum Number of Persons

The rule, in the sections above proposes that the usable area and volume per person be 15 square feet and 60 cubic feet and exclude the space intended to serve as the airlock.

SSP would request the agency to;

1. Give explanation of reason for exclusion of space utilized as an Airlock
2. Evaluate inclusion of the airlock dimensions when determining useable area and volume available per man.
3. Consider the area and space required per man on a chamber type and occupancy orientation basis.

In support of our request we would like to offer the following;

A. Airlock Exclusion

1. In order to facilitate occupancy as quickly as possible, airlocks are designed to allow for the maximum number of persons accommodated to enter with a minimal number of entrances. Depending on the FAB model, tent size, and height, the airlock can encompass 6 to 24 percent of the total tent in area and by volume. The included "Attachment 1" illustrates the per cent of total tent for each Fresh Air Bay model offered by SSP. Furthermore, for both "Airlock Space Included" and "Airlock Space Excluded" the spreadsheet specifies the useable space and volume per man for each unit as it is designed and the corresponding maximum number of occupants that could be accommodated based on the useable space of 15 sq. ft. and 60 cu. ft. proposed by the rule. Including the airlock as useable space, an additional 1 to 3 square feet and 5 to 10 cubic feet per man respectively can be realized.

2. Strata has established a standard operating protocol for all units to include maintaining the airlock area open and common to the main tent once all men have entered. Initially chambers were sized with respect to dissipating the internal heat generated by the occupants through the chamber to the lower ambient temperature of the mine atmosphere. The surface area of the airlock is included in this calculation thus the practice of maintaining the area common.

3. Should the agency reason to exclude the airlock area to accommodate sanitation and the use of toilet facilities, we would request the handling of such be considered on a type of application basis. Although the airlock area is designated as the location for the portable toilet, waste disposal outside the chamber is provided. Other than the short time use of the toilet may be required, no sanitation issues should prohibit the airlock being used by persons during the time of refuge.

Considering that the airlock design encompasses such a significant portion of the chamber Strata finds it unreasonable in excluding it from consideration in the usable space and would request the agency to consider it's inclusion in the useable space determination or give valid reason for it's exclusion.

B. Area and Volume Required per Individual

Strata is aware of the significant amount of comments both pro and con that have been provided in the public hearings and submitted comments. We appreciate the concern the agency has demonstrated and also the consideration required in evaluating the submittals in preparing the final rule. When preparing the final parameters, we request the agency take into consideration the required minimum need to sustain persons in an emergency situation while providing an alternative that is workable and maintainable in the environment that it must be utilized.

We request the following be taken into account when specifying the final space requirements;

1) Risk exposure that the number of men to occupy the tent will be equal to the maximum occupancy.
    i) As stated in the preamble explanation of section 75.1506(a)(2), designed occupancy criteria of refuge alternatives must include all persons expected to be on or near the sections at any time and would include those miners who would join section workers during a shift change or "hot seat." Strata would strongly support that life sustaining provisions must be included to accommodate all persons who may need to occupy the refuge. Comments presented at the Charleston, WV Public Hearing by members of the West Virginia Mine Safety Technology Task Force and also submitted written by Randall Harris, a consultant to this group, support that special consideration should be given to the percentage of time that the number of "joining" miners may be on the section and thus the alternative be required to support maximum occupancy should and emergency occur. Mr. Harris's comments conclude that "between 96.8% and 93.7% of the time there is only half the number of men in the area that the shelter can support." While we understand the number of men on or near the section and the number of overlapping section workers due to hot seating may vary with operating scenarios and as a result the number of men required to be accommodated may be more than half, we agree that

the maximum exposure occurs only during 5 percent of the working day. Included on Attachment 1 are the Area and Volume calculations per man based conservatively on 70% of rated occupancy with the airlock dimensions included. A reasonable number to be anticipated at times other than during hot seat change out. It is shown that when taking into consideration this practical reasoning, the alternatives as designed today are now very close to or above the proposed requirements of 15 sq. ft. and 60 cu. ft. per person. Based on criteria in the proposed rule including exclusion of the air lock and when calculating with maximum design rating, these same chambers would be de-rated by as much as 40%.

2) Consideration of the chamber type and configuration compared to the space and volume needed to be considered "adequate room for miners using the refuge alternative." The proposed rule requires both a minimum area of 15 square feet and minimum volume of 60 cubic feet. We would request it to be considered reasonable that these two parameters are indeed independent of one another and the "adequate room needed" be evaluated based on the ergonomic orientation of the occupant along with the geological and design confinements the alternative may be deployed in.
   i) Section 7.505(a)(1) preamble illustrates an example of 6 feet in length and 2.5 feet in width to arrive at 15 sq. ft. of floor area and considers a height of four feet which would provide a volume of 60 cu. ft.
   ii) Area – the model used in the preamble closely coincides with the dimensions recommended in the US Department of Defense Human Engineering Manual (MIL-HDBK-759C) for accommodating a person in the supine position. As a note, this manual has also been listed as reference by Mr. Harris and the West Virginia Task Force. Even should one accept that 15 sq. ft. is required for individuals in the supine position, it is unreasonable to assume that if the height is decreased from four feet to three an additional five square foot of area would be required to provide adequate space.
   iii) An individuals body positioning and how one may be accommodated in the chamber must be considered. For example, the dimensions referenced above, comparable to that recommended for the supine position need not apply to applications where one may sit on a floor with legs extended or on a seat or bench in an upright position. Taking the recommendations of the report the width required for an individual is consistent, slightly less than two feet. For individuals sitting with legs extended 3.2 feet of length is recommended. Sitting in a seat with legs folded 2.5 feet of length could be expected. The area required by these criteria would be 6.5 and 5 sq. ft. respectively. In addition, one may take into account the opportunity for shared space. The 2 to 2.5 feet of width provided for upper body width would be sufficient for the extended legs of persons setting across from each other, to overlap.

iv) Establishing a standard dimension of 15 sq. ft. pushes the limits of design and feasibility of providing refuge alternatives that are workable in the mine environment thus assuring the acceptance and survivability of the units. A large portion of the industry today must account for overlapping crews when determining the number of persons to be accommodated. Accounting for this, that number ranges from 24 to 36 men. Strata provides the industry with both pre-fabricated self contained steel chambers and inflatable fresh air bays. Inflatable units have been designed to sustain up to 36 miners for the 96 hour period. Understanding the variability needed for underground mines, the width of the inflatable tent has been limited to twelve feet. At an area of 15 sq.ft. per man and exclusion of the airlock, a tent length of 58 feet would be required. Comparatively, the steel chambers provide for up to 24 miners. Due to mine designs required by the local geology, these units have been preferred by many western operations. Built at a width of 7.5 feet, the proposed area requirement would require these units to approach fifty feet in length.

In summary, we request that with respect to the occupied area and volume per man, the agency take into consideration what is adequate for survival and not what might be the most desirable for comfort. In addition, depending on application the area and volume should not be directly associated. A reduction or increase in needed area due to body positioning should not directly affect the need to increase or decrease the volume which would be accomplished in adjusting the height. And comparative deployment in varying mine heights should not require immediate adjustment of the specified floor space.

Internal Refuge Heat and Humidity Conditions

Strata recognizes that mine ambient conditions may vary from mine-to-mine and region-to-region. We also agree with the statements made at several of the public hearings that "one size" chamber does not fit all applications.

For our submittals to West Virginia, we developed heat transfer models to predict the heat AND humidity conditions (i.e., apparent temperature) inside our refuge chambers. We used these mathematical models, as well as in-house testing, to properly size our units to handle the 55F ambient conditions specified by the West Virginia Task Force. Subsequent NIOSH and in-house testing showed that our models provided a margin of safety on the critical apparent temperature conditions. These mathematical models allow us to predict the internal conditions and/or modify our designs based on the mine ambient conditions and number of occupants.
While the WV Task Force provided general design guidance by specifying the mine ambient conditions and the heat output per miner (400 Btu's/man-hr), we found it necessary to take it one step further by breaking down the heat generated into latent and sensible components. We used proven ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.) reference material in our analysis. We also added the heat and moisture produced in the carbon dioxide scrubbing process.

We support performance based testing of refuge alternatives done with properly defined assumptions on the critical heat and moisture values needed to simulate miners under the expected high stress conditions. We do not believe "self certification", as inferred in the Part 7 Approval process, is appropriate unless all applicants are provided with very specific design assumptions and testing protocol.

In the spirit of promoting innovative new technology, we would ask MSHA to consider modifying the language regarding a specified maximum apparent temperature within the refuge alternative to include the use of other technologies directed at specifically controlling the core body temperature of the miners in the unit. We offer medical chemical cooling packs and cooling vests as options in our units. While these can be used to cool the environment, they are much more effective at cooling the body directly.

We believe the intention of the apparent temperature language is to reduce the likelihood of heat stress among the miners. Alternative technologies should be allowed that address this specific potential problem.

Approval and Testing

As a manufacturer, we do not feel it is appropriate to take a stand on the issue of "grandfathering" of existing units ordered prior to the final issuance of the proposed rule. We are however concerned of how the "grandfathered units" and when available, units approved under the rule will be transitioned. We believe the complexity of the approval process, the lack of defined test requirements, the unknown availability of testing facilities, along with design changes and manufacturing will lead to an extended timeframe for units approved under the regulation to be deliverable for service.

We believe that our current units will meet or exceed the requirements of the proposed rule with the following exceptions:

1. As discussed in great detail above, the overly conservative space/volume requirements of the proposed rule cannot be met with either our steel units or our inflatable units.
2. With the proposed relaxation of the carbon dioxide scrubbing requirements from 0.5% to 1.0%, our scrubber will far exceed the proposed new standard and offer a substantial safety margin in this area.
3. With a few exceptions, we believe our units will meet the 95F Apparent Temperature requirements of the proposed rule. Where we identified mines that knowingly cannot meet this standard, we are working with the customers to develop alternate solutions.
4. Some additional purge/scrubbing tests need to be conducted to validate mathematical predictions. We understood that NIOSH was supposed to test this aspect of the designs but did not include any testing in their final protocol.

As we have stated before, we support independent, third party testing of refuge chambers using a common test facility and testing under specified assumptions and protocols. We do not believe "self certification", where components are tested by the applicants or applicant-hired third parties, is a prudent approach for such a critical piece of safety equipment.

We do support the concept of component testing to avoid having to test each and every possible permutation of chamber size and occupancy. We suggest full scale testing be conducted on an agreed-to "worse case" model and that engineering calculations be accepted for variations of this design.

Understanding the availability of alternatives meeting the requirements of the final rule may have a lead time due to the approval process and that the production of alternatives manufactured with current design parameters could continue during this period, it will be critical to determine how to transition between the effective date of the rule and availability of approved units. We would recommend the acceptance of those alternatives considered "grandfathered" until the time an approved unit could be delivered.

Non Combustible Materials

Section 7.505 Approvals paragraph (a)(6) would require refuge alternatives to be constructed of MSHA approved flame resistant or noncombustible materials. SSP would request clarification to the extent of construction materials to be included and to clarify if this is to include those materials placed into service upon deployment of the alternative post the mine emergency.

During the course of the public hearings and comments, there has been discussion that the structural strength, heat, and fire ratings should be only applicable to those materials that are exposed to the mine environment at the time an emergency may occur. It would be understood that these materials must provide adequate protection to the components and consumables housed internally and to maintain them fully functional post event.

SSP is in support of this understanding and requests the agency to clarify the definition of this section. It is recommended the language include only those materials exposed to an explosion or possible flash fire would need to comply with this provision. We may use as examples, door seals, manifolds, and valving which one may consider construction materials. These items are protected pre-event by the surrounding structure which would meet the explosion and fire requirements of the proposed rule.

The preamble for this section suggests the materials to be approved or non-combustible,. include those used in inflatable stoppings and inflatable shelters. In this case, the inflatable material is deployed and exposed to the environment post event. Should the intent of the agency be to include materials both pre and post event, then we would request it reasonable for this requirement to apply only to those materials exposed directly to the mine atmosphere and required for isolation of the environment.

Service Life

SSP would request the agency to consider the usable service life to be established by the manufacture and this be performance based as a result of the conditions the alternative is exposed to and the care and handling afforded by the operator. Certain commodities service life will be determined by a shelf life established by the manufacture. This will also hold true for the chemical catalysts used in the breathable air systems. The refuge alternatives only recently being employed have no history as to the life cycle the structural components may endure. Although in other industry, components such as compressed gas cylinders, valves and regulators have proven to last an indefinite amount of time. Housed in the enclosures of the alternatives we would expect similar service lives. We suggest each refuge alternative is inspected annually for deterioration of the systems. At each minimum shelf life of a commodity, we suggest a full inspection and testing of each unit and thereafter a manufactures recertification of the re-useable components.

Examinable Components and Inspections

SSP would request the agency to consider the type of alternative employed and refer to the manufacture's recommendation in determining the level and frequency of inspections required.

Section 7.505 (a)(2) of the proposed rule states that the structural component of the alternative shall include storage space that secures and protects the components during transport and that permits ready access to components for inspection, maintenance, and activation. In addition, 7.505 (d)(1) proposes the alternative provide a means to conduct a pre-shift examination without entering the structure, of components critical for activation. Continuing , Part 75.360 (d) states the person conducting the pre-shift examination shall check the refuge alternative for damage, the integrity of the tamper-evident seal and the mechanisms required to activate the refuge alternative, and the ready availability of compressed oxygen and air.

There is contradiction in these statements and the rule should clarify the intent. SSP manufactures pre-fabricated steel walk in and also pre-fabricated inflatable chambers, as well as survivability systems to be included in constructed rooms. Each unit employs a different type of activation and also remains in a different state of preparedness prior to an emergency. Thus inspection techniques vary and both cannot be accepted as the rule is proposed. As with other sections of the rule it is certain, the definition of "component" and "examinable" will be required. We note the following statements of the proposed rule.

1) In discussing the types of refuge alternative, Section 75.1507 (a)(1) pre-amble states "One type is a pre-fabricated self-contained unit. The unit is portable and may be used in outby applications as well as near the working section. The unit has all the components built in"

2) In Section 7.502 "Refuge Alternative is defined as "A protected, secure space with an isolated atmosphere and integrated components that create a life-sustaining environment for persons trapped in an underground coal mine. In the pre-amble for this section the definition is expanded to include, "The proposed rule addresses refuge alternatives that consist of a protective structure, an airlock, an interior space, and components that provide for breathable air, air monitoring and harmful gas removal. The refuge alternative would also include provisions for sanitation, lighting, communications, food and water, and first aid."

As we will further describe the operating systems and state of preparedness for SSP refuge alternatives, we would like the agency to consider from statement one above "components built in" and from statement two "and integrated components" from the rule while from the pre-amble "components" is intended to include the materials required in "providing breathable air, air monitoring, and harmful gas removal."

For understanding we will describe three refuge alternative methods to employ and how the proper inspections may differ.

1) Portable Pre-Fabricated Inflatable Refuge Alternative - The design of this alternative has as its' intent to contain and secure the tent, breathable air equipment and all the necessary supplies, needed to sustain trapped individuals, inside a pre-fabricated steel enclosure. This enclosure, skid/box, is manufactured to seal the contents from contamination of outside air and/or water. It is also designed in a rigid manner to withstand the rigors of transporting in the mining environment and provide protection against explosion and fire. Once commissioned into service, these units are maintained with pressurized systems to provide breathing oxygen, scrub carbon dioxide, inflate the tent, and purge the airlock. One may refer to these as an "always on" system. Upon activation at the time of an emergency, the alternative deployment and breathing air systems are placed into service. The key components of activation, valves and pressure gauges are visible, and inspect able from the exterior of the unit. To identify possible tampering with the system the activation valve and tent deployment doors are secured with replaceable seals. The access door to the compressed gas cylinders is bolted shut. Requiring the materials and commodities stored internally to be inspected beyond that recommended by the manufacture would jeopardize the integrity of the sealed environment and lead possibly to a deterioration of the materials inside.
2) Portable Pre-Fabricated Steel Walk in – Differing from an inflatable unit, the steel chamber of the walk in units provides the isolation for individuals as well as secures and maintains all materials needed to sustain the individuals in refuge. These units also provide a pre-event sealed design to protect against contamination from the mine environment. Although minimal inspection is recommended, the internal components and supplies are examinable via the chamber access door which permits entry as required. However the protocol is to provide the exterior door with a tamper proof seal, only to be entered at the recommended inspection period. Converse to the inflatable alternative, these

walk in units employ a "normally off" breathable air system which is activated upon entering the chamber at the time of an emergency. Activation includes turning on the oxygen and air cylinders. Interim assessment of the system status would require turning on the cylinders and recording the compressed air and oxygen circuit pressures. We believe that frequent, i.e. pre-shift, inspection of the internal components would lead to unnecessary contamination and that cylinder activation in order to check pressures would be more likely to cause leakage and/or loss of air. It has been proven any leak rates of the compressed cylinders are minimal and seldom catastrophic. Having the internal components available for inspection along with the breathable air being activated as needed, does not support reasoning to have system checks available for observation on the outside of the unit.

3) Constructed Enclosure with Survivability Materials Stored Inside – These systems normally provide the breathable air and other commodities required to sustain individuals stored inside a pre-constructed room within the mining environment. The life support systems inside may be either always on or always off dependent on design. In this case, considering the large areas isolated for refuge, it would be difficult to assess the systems vital to activation without entrance into the alternative.

For clarity on this issue, if you follow the manufacturer's instructions, it is not necessary or desirable to inspect the internal items such as the soda lime, water and food, scrubber or cylinders. The required replacement/inspection of those items can be recorded clearly either with the paperwork on the unit or at the mine site office. Opening the doors of the skid other than by a trained technician under the correct environment could compromise the integrity of the unit.

The examination recommended , should be limited to inspection of the pressure on the gauges, evidence that the tamper proof seals are intact and that the unit shows no evidence of handling damage. Understanding there is varying operating protocol for standby and deployment modes of the different types of refuge alternatives, SSP would request the agency to consider the inspections and examinations to be as specified by the manufacture and the procedure included in the approval of each refuge alternative.

Purging

Strata has several specific questions and requests for clarification relating to harmful gas removal.

1. The NIOSH test protocol specifically stated that all gas volumes and volumetric flow rates were at "STP", or Standard Temperature and Pressure. We found this could make a difference in excess of 8% on certain gas volume variables when measured at the expected operating temperatures. Can you clarify that all flow rates are defined at STP conditions including the assumptions of carbon dioxide production from humans.

2. In several statements, the term "harmful gases" is used. Please define the gases that need to be removed or remove this term.
3. The proposed rule provides a specific carbon monoxide starting point (400 ppm) and maximum level within the airlock (25 ppm). Can you provide the background as to how both these values were established? Accepting a 50 ppm level will reduce the required time in the airlock and allow miners to pass through into the refuge main chamber more quickly. Further dilution will occur between the airlock and the main chamber. We estimate the time to reach 50 ppm will be 25% shorter than the time to reach 25 ppm.
4. Methane in the airlock is required to be removed or diluted to concentrations of 1.5% or less. Can you define an assumed initial concentration so that purge air volumes can be computed?
5. The proposed rule provides an exception for an airlock and, we assume, the necessity for purging and or contaminant removal. The language in the preamble explains that to meet the airlock exception, the refuge alternative must be capable of maintaining adequate positive pressure to prevent outside air from contaminating the refuge alternative. Can you clarify "adequate positive pressure" and the scenario under which this exception will be accepted?

Oxygen System Materials

Section 7.506(d)(5) of the proposed rule mandates compressed breathable oxygen shall be used only with regulators, piping, and other equipment that is certified and maintained to prevent ignition or combustion. SSP would request clarification that the "compressed breathable oxygen" application of this section only applies to the equipment and materials from the regulator to the oxygen source. It should be considered that once the oxygen is downstream of the regulator it is no longer compressed nor in a high pressure state. While we heartily agree the system risk analysis as proposed in Section 7.506(h)(1) and (2) should be completed to assure all potential fire and ignition risks are analyzed and addressed by design, we do not believe the low pressure tubing, flow meters, fittings,etc. would require use of certified materials.

Permissible Electric Components

SSP would request clarification and consistent use of the terms describing use of approved electric components. In explanation, consider as follows;

1. Section 7.503 (a)(2)(i) of the proposed rule requires approval applications to include the MSHA approval number for electric equipment. Referring to the preamble for this section it explains that MSHA may have approved some equipment as intrinsically safe or permissible that may be used in a refuge alternative component.
2. Section 7.504 (a)(1) would require refuge alternatives and components to be intrinsically safe for use in underground coal mines .....

3. Section 75.313 (f) would require use of intrinsically safe electrical components in a refuge alternative during fan stoppages underground.

While 7.503(a)(2)(i) infers to allow any form of approved permissible system, sections 7.504(a)(1) and 75.313(f) would limit to those systems approved as intrinsically safe. SSP understands the term "intrinsically safe" to be associated with approvable low voltage electrical systems and does not include all permissible power systems by definition. SSP believes an equal level of safety can be achieved using additional forms of agency approved permissible and/or explosion proof equipment and consistent language should be used throughout the rule, providing for use of any approved permissible electrical device.

Signal Device to the Surface

The agency in Section 7.504(c) requests comments to the feasibility of providing a signaling device to the surface. The practice of hammering on the roof, rib, and floor has been accepted and used in emergency training as a means to assist rescuers on the surface in locating trapped individuals underground. Successful use has been limited. We would recommend a thorough risk analysis be performed before mandating this provision be facilitated into the design of a pre-fabricated portable refuge alternative. Normally the application of the portable units does not provide for contact with the roof or ribs. Providing a moving hammer or ram that, from the inside of the portable alternative, could contact the roof or rib may jeopardize the unit to be airtight. While portable chambers do sit on the floor, they rest on skids or wheels which would limit the path for sound to travel. Heavy contact with the floor through the inflatable portion of the alternative could cause a hole or tear that also would affect the isolation of the environment. We would recommend further study into the successful use and design requirements needed to incorporate such a system into a portable alternative.

MODEL DESIGNATIONS			Total Tent Less Scrubber		Air Lock % of Total Tent		AIR LOCK EXCLUDED				AIR LOCK INCLUDED				70% Occupancy Airlock Included	
							Space Per Man Airlock Excluded		Occupancy per Proposed Rule		Space Per Man Airlock Included		Occupancy per Proposed Rule		Space Per Man Airlock Excluded	
FAB MODEL	Rated Occupancy	Tent Height	Volume (ft3)	Area (ft2)	Volume (ft3)	Area (ft2)	Volume (ft3)	Area (ft2)	60 ft3	15 ft2	Volume (ft3)	Area (ft2)	60 ft3	15 ft2	Volume (ft3)	Area (ft2)
M1616	16	3	955.3	311.8	13.5	13.8	51.7	16.8	13.8	17.9	59.7	19.5	15.9	20.8	85.3	27.8
	16	3.5	645.1	177.4	23.3	24.2	30.9	8.4	8.2	9.0	40.3	11.1	10.8	11.8	57.6	15.8
	16	5.5	1017.1	177.4	14.8	15.4	54.2	9.4	14.4	10.0	63.6	11.1	17.0	11.8	90.8	15.8
M2620	20	3	890.4	286.1	17.0	17.6	36.9	11.8	12.3	15.7	44.5	14.3	14.8	19.1	63.6	20.4
	20	3.5	843.0	229.7	17.2	18.1	34.9	9.4	11.6	12.5	42.1	11.5	14.0	15.3	60.2	16.4
	20	5.5	1145.4	196.1	13.1	13.9	49.7	8.4	16.6	11.2	57.3	9.8	19.1	13.1	81.8	14.0
M2624	24	3.5	1204.2	332.9	12.9	13.4	43.7	12.0	17.5	19.2	50.2	13.9	20.1	22.2	71.7	19.8
	24	5.5	1590.9	277.1	9.5	9.9	60.0	10.4	24.0	16.6	66.3	11.5	26.5	18.5	94.7	16.5
M2626	26	3.5	1204.2	332.9	12.9	13.4	40.3	11.1	17.5	19.2	46.3	12.8	20.1	22.2	66.2	18.3
	26	5.5	1590.9	277.1	9.5	9.9	55.4	9.6	24.0	16.6	61.2	10.7	26.5	18.5	87.4	15.2
M2630&3630	30	3.5	1416.2	390.9	10.4	10.7	42.3	11.6	21.2	23.3	47.2	13.0	23.6	26.1	67.4	18.6
	30	5.5	1885.7	327.9	8.0	8.3	57.9	10.0	28.9	20.0	62.9	10.9	31.4	21.9	89.8	15.6
M3636	35	3.5	1785.8	496.5	8.7	8.9	46.6	12.9	27.2	30.1	51.0	14.2	29.8	33.1	72.9	20.3
	35	5.5	2403.8	422.1	6.3	6.5	64.4	11.3	37.6	26.3	68.7	12.1	40.1	28.1	98.1	17.2
M3636	36	3.5	1785.8	496.5	8.7	8.9	45.3	12.6	27.2	30.1	49.6	13.8	29.8	33.1	70.9	19.7
	36	5.5	2403.8	422.1	6.3	6.5	62.6	11.0	37.6	26.3	66.8	11.7	40.1	28.1	95.4	16.8
MC3636	35	3.5	1785.8	496.5	8.4	8.6	46.7	13.0	27.3	30.2	51.0	14.2	29.8	33.1	72.9	20.3
	35	5.5	2403.8	422.1	6.3	6.5	64.4	11.3	37.6	26.3	68.7	12.1	40.1	28.1	98.1	17.2