

Submission by Rory Paton-Ash, President of Strata Products (USA) Inc., Marietta Georgia

RIN 1219-AB44

A. Rapid Deployment Systems

The Portable Fresh Air Bay can be used in the event of an emergency underground. Because of its portability, the Fresh Air Bay can be deployed within a safe distance from an accident/incident site and used in the following circumstances:

- As a temporary fresh air bay underground to allow Rescue teams to rest and recover. Team members can remove breathing apparatus, rest, discuss the situation and drink water and eat as necessary without having to go all the way outside of the mine. This technique is used in mines rescue work in South Africa.

- To stabilize an injured worker who may be having difficulty using breathing apparatus or a SCSR.

Description of the Strata Products Portable Fresh Air Bay.

I. Strata Products Portable Fresh Air Bay

The Portable Fresh Air Bay is an inflatable refuge chamber that can be folded up and moved around to different locations in the mine. In the event of an emergency, the Fresh Air Bay can be inflated in minutes and the miners can remain in the chamber breathing normally.

- Can be inflated using compressed mine air or breathable air bottles
 - Compressed air:
 - Specialized filters installed to purify compressed mine air.
 - Air continuously flows through the chamber and out through exit air valves
 - Breathable Air and Oxygen Bottles:
 - Bottles are located outside the chamber.
 - The valve is opened to inflate the chamber.
 - An Oxygen Flow Meter inside the chamber allows miners to regulate oxygen flow into the chamber from inside the unit.
 - Wasted gas escapes through door zipper and relief valve
 - CO2 Absorbent Curtains or the Powerless Scrubber System can be used in conjunction to scrub the CO2 out of the air
 - A CO2 metering device included to monitor CO2 levels
 - Other optional accessories:
 - A chemical toilet in a separate compartment

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- Drinking water for all occupants
- Food for all occupants
- Standard time the system is designed to function as a refuge is 48 hours. This is scalable up or down
- All equipment is loaded on a movable skid to allow rapid and easy movement inside a underground mine environment.

D. Rescue Chambers

General Comment

A distinction needs to be made between rescue chambers and a change over station. A change over station can be placed in various parts of the mine to facilitate the safe change over from one system to another. There is significant risk when a miner has to change from one SCSR to another. This can be safety achieved in a Change over station that is equipped with breathable air systems. The station is a simple, inexpensive structure that can assist and facilitate the evacuation plan in the event of an emergency.

A change over station can be equipped with scrubbing systems and breathable air controls that are activated in the event of an emergency.

1. Should Rescue Chambers be required?

Cost effective options are available to provide a refuge in the event miners cannot self escape for a mine. These chambers provide an alternative option to self escape and allow rescue teams to reach these designated points and achieve the orderly evacuation of miners after an incident. If miners are injured, chambers offer an alternative and attractive option to allow time for rescue teams to stabilize the injured worker and then effectively evacuate the injured worker from the refuge station.

2. Characteristics of Chambers

Products and technology are available to allow mine operators to make informed decisions as to what they require. As mining operations move so quickly, a combination of permanent and portable stations seems feasible to provide the mine with a plan to allow the safe evacuation in the event of an emergency.

Simple change over stations can facilitate the orderly evacuation of the mine and these stations can be built in or mobile. Given the known limitations of SCSR's the mine can then place change over or refuge chambers at locations that are accessible and within reasonable walking distances from the current working environment or on the primary means of egress from the mine.

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If possible, permanent stations should be connected to mine air or outside air sources and these systems need to be backed up and be shall be able to work without any power source. These systems are available at present. Simplicity and ease of operations needs to be the hallmark of these systems that require a minimal amount of training and that can be operated by following simple instructions.

Mine operators should be given the leeway to generate plans that suit the environment that they operate in as is the case with other operating plans (such as support and ventilation) that they currently submit to State and Federal authorities for approval.

3. How long should they support breathable air

This needs to be determined on a mine by mine basis based on the mine plan. Evacuation routes, depth, alternative access and number of entries. It however seems reasonable that a minimum standard should be established so that miners who have to make the choice of using a chamber know that they have at least a certain amount of time in the chamber before they can reasonably expect to be rescued. It is possible to scale the amount of breathable air available without dramatically increasing the cost of the chamber. Adding additional scrubbing materials and oxygen bottles is relatively inexpensive to provide additional time to allow rescue teams to reach these sites. Most counties that specify chambers require a minimum of 36 hours of breathable air.

Prolonged use of a chamber will cause significant discomfort and so health and safety, and sanitation issues need to be addressed the longer the anticipated period of occupation of the chamber.

4. Number of people

Chambers for up to 30 people are available on the market. This needs to be determined on a mine by mine basis based on the safety and emergency evacuation plan that the mine should submit.

5. Number of Chambers

As self rescue should be the primary evacuation plan, the mine plan should be based on a reasonable assessment of the risks at each mine. The Safety Officer or mine management should submit a plan that deals with the evacuation plan/rescue plan in the event of an emergency and should deal with the likelihood of miners being trapped. The number of chambers should then be based on that assessment as well as the distance to the outside of the mine as “change over” stations may be required to achieve an orderly evacuation of a mine!

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J. Government Rule

1. Equipment and technology for mines rescue

RIN 1219-AB44,

Underground Mine Rescue Equipment Technology, Supplementary Information: III Key Issues

D. Rescue Chambers

Strata Products (USA) Inc. has taken action to find solutions to increase underground safety because we are concerned about the physical and financial health of miners and mining companies. We understand the economics of small mines and are working to provide a cost effective alternative to the originally proposed SCSR system.

Strata Products (USA) Inc. is now providing the following:

1. Strata Products Portable Fresh Air Bay

The Portable Fresh Air Bay is an inflatable refuge chamber that can be folded up and moved around to different locations in the mine. In the event of an emergency, the Fresh Air Bay can be inflated in minutes and the miners can remain in the chamber breathing normally.

- Can be inflated using compressed mine air or breathable air bottles
 - Compressed air:
 - Specialized filters installed to purify compressed mine air.
 - Air continuously flows through the chamber and out through exit air valves
 - Breathable Air and Oxygen Bottles:
 - Bottles are located outside the chamber.
 - The valve is opened to inflate the chamber.
 - An Oxygen Flow Meter inside the chamber allows miners to regulate oxygen flow into the chamber from inside the unit.
 - Wasted gas escapes through door zipper and relief valve
 - CO2 Absorbent Curtains or the Powerless Scrubber System can be used in conjunction to scrub the CO2 out of the air
 - A CO2 metering device included to monitor CO2 levels
 - Other optional accessories:
 - A chemical toilet in a separate compartment
 - Drinking water for all occupants
 - Food for all occupants
- Standard time the system is designed to function as a refuge is 48 hours. This is scalable up or down

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2. ExtendAir® CO2 Absorbent Curtain

The ExtendAir® Lithium Hydroxide curtain is a passive CO2 absorbent intended for use in enclosed areas. When hung with all sides exposed it quickly and effectively absorbs the CO2 out of the air. These units require no electrical power.

- Packed in rigid ammo box with eight (8) curtains per box
- Packages in sets of two in a soft foil protective inner pouch
- Uses LiOH (Lithium Hydroxide) to scrub the CO2 out of the air. .794 lb CO2/lb LiOH
- Utilizes the same technology approved by the US Navy for 7-day emergency atmospheric control on submarines
- Used in conjunction with Oxygen bottles for the Fresh Air Bay rescue system
- Depending on number of occupants, a set number of curtains are hung upon entrance into the chamber. At 12 hour intervals, additional curtains are added.

3. Emergency Refuge Station

The Shairzal® Emergency Refuge Station is a purpose built, steel constructed safety chamber for miners to seek refuge in the event of hazardous gases, toxic smoke, poor ventilation and depleting oxygen levels imposes a threat to human life.

- Size:
 - Standard sizes are: 7' W x 20' L x 7' H
7' W x 16.5' L x 7' H
7' W x 13' L x 7' H
7' W x 12' L x 7' H
 - Customized sizes to any specifications customers and mines require.
- Can be used with compressed mine air or oxygen bottles and a CO2 scrubber
 - Compressed Mine Air:
 - Indefinite supply of fresh breathing air
 - Air flows through filtration system before entering chamber
 - Oxygen bottles and CO2 scrubber
 - Stand alone CO2 scrubber system attaches to oxygen bottles that release oxygen at controlled rates
 - Utilizes soda lime chemicals to scrub the CO2 out of the air.
 - Standard equipped with 48 hours supply of oxygen and soda lime.
This is scalable up or down
- Chambers are powered by the mines main power source or battery back-up system
 - Mine power:
 - Indefinite supply of electrical power

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- Battery back-up:
 - 36 hours of battery back-up power supply
 - Power all electrical equipment
- Electrical equipment:
 - 12 volt lighting
 - Air conditioning unit
 - CO2 scrubber system
- Air Conditioning
 - Regulates internal temperature
 - Temperatures setting range between 77° F & 86°F
 - Will shut off when battery back-up is exhausted
- Safety Features:
 - Self closing door
 - Impact resistant window
 - Entrance area with heavy clear strip curtain to minimize contaminants entering main chamber
 - Fire extinguisher
 - External location lights and warning siren
 - Rear escape hatch which opens inward
- Other accessories:
 - Drinking water for all occupants
 - First Air Kit
 - Chemical toilet in separate compartment
 - Storage areas
 - Forklift guides, lifting facility and skid base for easy relocation
- Powerless chamber option
 - Chambers can be provided without electrical power, air conditioning or lights
 - These can be used as a "change over/refresher" unit for miners as they work to exit the mines
 - Powerless Scrubber System is available to provide fresh breathing air while occupants are in the station

4. Stand alone carbon dioxide scrubbing system

This self contained system is designed to provide oxygen at controlled rates and remove carbon dioxide from the air in enclosed areas

- Provides 48 hours of breathable air using oxygen bottles and CO2 scrubber system. System is required to be turned on in the event that no compressed mine air is available.
 - Oxygen:
 - Attaches to G-size oxygen bottles
 - A Flow Meter valve controls the amount of oxygen being fed into the chamber
 - This is set according to the number of occupants

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- Clear instructions are available on or near the unit
- CO2 Scrubbing:
 - A unit 3-fan design draws the wasted air into the unit and forces it through a tray of soda lime chemicals.
 - Soda lime scrubs the CO2 out of the air
 - The color of the soda lime will change when it is no long effective
 - Replacement chemicals are stored in the chamber
 - The length of time the soda lime will last depends on the number of occupants
 - Operating instructions are located on the front of the scrubber

5. Powerless Scrubbing System

This is a patented design for providing breathable air. It consists of an oxygen bottle and compressed breathable air that induces movement of the air through a bed of soda lime which scrubs the CO2 out of the breathed air. No power is required as the energy is provided by the flow of air through the system.

6. Equipment into Mine rooms

Scrubbing systems, such the Extend Air Lithium Hydroxide Curtains or the Shairzal 48 hour powered or powerless scrubber can be installed in a mine room or evacuation. These need to be combined with Medical grade oxygen that can be metered in to the room at a certain rate depending on the number of occupants in the room. These products and systems are available from Strata Products (USA) Inc.

Contact information

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