

# **SECOND-GENERATION SELF-CONTAINED SELF-RESCUERS**

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## **ABSTRACT**

It appears to be technologically feasible to develop a second-generation SCSR that is approximately twice the size and weight of an FSR and that has a rated duration of 1 h. This paper summarizes proposed performance criteria, test methods, and approval and certification procedures for second-generation SCSR's. If designed and developed to meet the proposed standards, the resulting SCSR would be safe and reliable, and could be worn by a miner as personal equipment.

## **INTRODUCTION**

Federal mining regulations (30 CFR 75.1714) require that every person who goes into an underground coal mine in the United States must be supplied with a self-contained self-rescuer (SCSR). An SCSR is an emergency breathing apparatus designed for use during mine escape. It must be capable of providing a breathable atmosphere, regardless of the ambient environment, and it must have a rated duration of 1 h. Only SCSR's approved by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH) can meet the provisions of the regulations.

Four models of MSHA- and NIOSH-approved, 1-in-duration SCSR's are commercially available: CSE AU-9A1, Draeger OXY-SR 60B, MSA 60-min SCSR, and Ocenco EBA 6.5. In order to meet the 1-h-duration requirement, all of the SCSR's are closed-circuit breathing apparatus. Both the Draeger OXY-SR 60B and the MSA 60-min SCSR use potassium superoxide ( $\text{KO}_2$ ), a solid chemical, to generate  $\text{O}_2$  and remove  $\text{CO}_2$ . The CSE AU-9A1 and the Ocenco EBA 6.5 store  $\text{O}_2$  as a compressed gas and use lithium hydroxide ( $\text{LiOH}$ ) to absorb  $\text{CO}_2$ . All of the 1-in-duration SCSR's are much larger and heavier than the conventional filter self-rescuer (FSR), which a miner wears on his belt as personal protective equipment. Unlike SCSR's, FSR's protect only against low levels of  $\text{CO}$ .

Because of the large size and weight of the current 1-h SCSR's, miners and mine operators have elected to either store or carry and store SCSR's in daily operational use rather than wear SCSR's as personal protective equipment.

It appears to be technologically feasible to develop a second-generation SCSR that is approximately twice the size and weight as an FSR, and that has a rated duration of 1 h, if testing and certification criteria are changed. Such an apparatus has been designated as a person-wearable self-contained self-rescuer (PWSCSR). A PWSCSR meeting these requirements could be worn on a miner's belt and replace the FSR. The mining industry, mine workers, breathing apparatus manufacturers, and MSHA are interested in an emergency breathing apparatus of this kind.