

# MINING APPLICATIONS OF LIFE SUPPORT TECHNOLOGY

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## ABSTRACT

The Bureau of Mines has conducted considerable research to improve life support technology for underground mining applications. This proceedings volume presents several new developments that may help increase the chances of mine workers in surviving underground disasters. Several papers address the performance of present self-contained self-rescuers (SCSR's) and provide proposed guidelines for the design and testing of a second-generation SCSR. Improvements in the safety and effectiveness of mine rescue and recovery operations are described, including the design of a low-profile rescue breathing apparatus and a rescue team helmet.

## INTRODUCTION

The Bureau of Mines life support research program is directed toward research into and development of breathing apparatus technology that increases the chances of miners surviving or being rescued after an underground mine disaster. When a mine disaster occurs, the basic survival technique for a miner is to escape from the mine. Following a mine fire or explosion, the atmosphere inside the mine sometimes becomes oxygen deficient or filled with toxic gases. Under these circumstances, escape is nearly impossible unless a miner is equipped with a self-rescue device that supplies oxygen without the need for breathing mine air. Federal 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), a device capable of providing at least 1 h of oxygen regardless of ambient atmosphere. Only SCSR's approved by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA) can meet the provisions of the regulations. 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 or her belt as personal protective equipment. Unlike oxygen self-rescuers, FSR's protect only against low levels of carbon monoxide. Because of the size and weight of the 1-h SCSR's, in most cases the mining industry has elected to comply with the SCSR regulations by deploying the apparatus in a carry and store mode, which involves transporting the SCSR's into and out of the mine on a shift basis. The carry and store mode allows the miner to store the SCSR within 5 min of the work site, provided that he or she continues to wear an FSR. The Bureau is conducting research to develop a second generation, person-wearable SCSR (PWSCSR) that is approximately twice the size and weight of an FSR. A PWSCSR meeting these requirements could be worn on a miner's body, making it immediately available in the event of an emergency.