

## **POF016: General platform presentation**

### **Human Factors of Wearable Closed Circuit Mining Escape Rebreather**

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**Abstract:**

As a result of the new NIOSH testing standards, 30 CFR 84 subpart O for Closed-Circuit Escape Respirators released in April 2013, closed circuit mining escape rebreathers (CCMER) used in underground coal mining in the United States are getting larger and heavier, especially for the one hour duration devices to be carried by underground miners in USA.

The new standards require these devices to meet increased oxygen, carbon dioxide, temperature, and peak breathing pressures stressor limits based on their oxygen capacity. The inclusion of additional safety features such as an oral nasal mask and docking valve are further enlarging these units. Despite the increased size and weight, the law still requires that these units be worn or kept within 25 feet throughout the entire shift in an already brutal environment encountered in underground mining.

Previous CCMER devices were designed as enclosed, vacuum-sealed boxes. However, the new criteria dictate a more creative form factor in order for miners to be able to wear these units and still perform their jobs. We propose a wearable backpack format for the new CCMERs. The paper outlines design process with an emphasis on human factors to determine the shape, materials, layout, and deployment of a prototype that would meet the new requirements, last for at least five years in a dusty, wet, harsh environment, maintain compatibility with miners' current tasks, and be accepted by the mining industry.