

Grant Number: AFC417-39

Title: A Holistic Approach to Reducing Coal Worker's Pneumoconiosis (CWP) using Integrated Monitoring and Response Systems for Respirable Dust in Surface Mines and Facilities

Organization: Pennsylvania State University

Principal Investigator(s): William A. Groves

Partnerships: Contura Energy

Focus Area: Health and Safety Interventions

Topical Area: Dust Control

SYNOPSIS

Research Topic and Problem Statement: The goal of this research is to reduce the occurrence of coal workers' pneumoconiosis (CWP) in miners through the development of continuous wireless real-time monitoring systems for respirable dust. The proposed research will address the problem of CWP, or black lung disease, in the coal mining industry. While the problem is associated with both surface and underground operations, this project focuses on surface mining and addresses Topical Area 1) Health and Safety Interventions with a specific emphasis on exposure assessment and control interventions related to the MSHA 1.5 mg/m³ respirable dust standard. This work is directly relevant to Alpha Foundation Priority Areas 1) Dust and Toxic Substance Control - Prevention of health risks due to generation of dust or other toxic substances, and 2) Monitoring Systems and Integrated Control Technologies - Recognition of and intervention to prevent the escalation of conditions that lead to health and safety risks before they reach hazardous levels.

Holistic Approach: A holistic approach is required to reduce the occurrence of CWP in the mining industry due to the multidisciplinary nature of the problem. Expertise in the areas of mining engineering, industrial hygiene, exposure assessment, occupational health, and engineering control strategies and interventions will be critical components of this effort to understand and control the occurrence of CWP among miners. Mining engineering is critical to understanding and identifying the processes and activities that are associated with exposures to respirable dust, while safety engineering and industrial hygiene both comprise systematic approaches to the design and implementation of control strategies or interventions. The disciplines of industrial hygiene and occupational health provide the skills necessary to anticipate, recognize, evaluate, and control hazardous agents associated with the occurrence of occupational disease such as CWP.

Proposed Outcome and Impact on Mining Health and Safety: The proposed integrated monitoring and response systems will enable rapid response to detected elevations in respirable dust concentrations including actions such as the dispatch of water trucks to reduce dust on haulage roads, use of water sprays at digging and loading benches and for dumping at the crushing facility, the repair or adjustment of existing control (e.g. ventilation) systems, or the investigation of previously unidentified sources or variables of exposure. The ability to measure exposure to respirable dust in real-time allows for an immediate and proactive control response to what can often be very transient exposure scenarios, and for which traditional sampling and analysis approaches are ineffective. Knowledge gained through the use of the integrated monitoring and response system can also be used by other researchers to develop more effective dust control technologies that target true sources of high dust concentrations. Successful development and deployment of these systems as well as the use of the resulting monitoring results in the development of improved interventions and ongoing training of workers in surface mines is expected to reduce the occurrence of CWP within this population.