

**Project Title:** Connecting Dust Characteristics and Worker Health in Underground Mining

**Organization:** University of Pittsburgh

**Partnerships:** Virginia Tech  
Alpha Natural Resources, Inc.

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**Focus Area:** Health

## SYNOPSIS

***Problem Statement and Justification:*** Recent observations have found increased incidence of coal workers' pneumoconiosis (CWP) or other lung disease, particularly amongst young miners in the eastern US, raising questions over both the cause(s) for these concerning trends and potential strategies for combating them. Presently, the regulatory community is moving toward a reduced limit on permissible exposures to respirable coal dust concentrations, but many argue this approach may be ineffective because excessive dust *concentrations* are perhaps not the primary root of the problem. In fact, little is known about the influence of specific dust *characteristics* and associated exposure patterns on lung disease in underground coal miners. Few studies have examined these potential causal factors in detail, and none have collected the comprehensive data required to make connections between specific dust exposures and health outcomes. The specific objective of the project is to perform a comprehensive study considering characteristics of occupational coal mine dust exposures and associating these data with individual worker lung function. Multiple underground coal mines in both Central Appalachia (CA) and Northern Appalachia (NA) will be used as study sites to provide access to a range of mining-specific factors of interest and a large cohort of miners.

***Impact of the Research:*** After 30 years of decline, the recent and unexplained rise in debilitating lung disease in young coal miners represents an urgent concern – and a renewed need for vigilance in both identifying and preventing the responsible exposures. Because obstructive lung disease often occurs in miners without detectable abnormalities on routine chest x-rays, recent recommendations by NIOSH include regular lung function tests to detect rapid functional decline and permit timely interventions and preservation of lung health. This project will associate lung function among coal miners with exposure to specific dust characteristics. The Central Appalachian mines will provide the opportunity to study relatively small, “low-seam” operations in the region where CWP appears to be on the rise. The inclusion of Northern Appalachian mines will allow a contrast in mining practices, occupational and employment differences, and rock and dust characteristics (i.e., longwall, larger mines, thicker seams, and lower observed incidence of CWP). The project will address a critical gap in the understanding of dust exposure related to coal mining and worker lung function and disease.

***Objective and Research Approach:*** To meet the stated objective, UPitt and VT researchers will perform a three-year project of intensive field study to gather and analyze critical data. The two major aims are: 1) comparison of respirable dust exposure characteristics by primary occupation and mine environmental conditions (VT); and 2) associations of worker lung function, personal risk factors, and occupational history, with primary occupation and mine environmental conditions (UPitt). Data will be collected on dust characteristics related to coal mining seam heights and mining conditions, job classes, and lung function tests among groups of coal miners in various types of mines and jobs from Alpha mines in the Central Appalachian and Northern Appalachian regions, with control for potential confounding factors, such as smoking and occupational history.