

SYNOPSIS

Title: Evaluation of New Respirable Silica Monitoring Tools for the Aggregates Industry

Organization: Virginia Tech

Principal Investigators: Emily Sarver

Partnerships: Working with mining companies

Topic: Injury & Disease Exposure & Risk Factors - **Priority Area:** Surveillance and Epidemiology Methods

Research Need: Respirable crystalline silica (RCS) is a serious occupational health hazard, and mine workers have some of the highest exposure risks. In the US, although much of the attention on RCS has historically been focused in coal mines, workers in other sectors are also exposed. In April 2024, the Mine Safety and Health Administration (MSHA) published a 'new silica rule' to lower RCS exposure limits and unify monitoring and control requirements across all mine sectors. In some ways, there may be an outsized impact on the aggregates sector (i.e., sand, stone, gravel), which includes about 70% of all US mines and about 26% of mine-employed workers. Thus, while representing a huge workforce, aggregate operations tend to be relatively small—likely with less experience and resources dedicated to dust monitoring and control than, for example, large metal mines. To assess their baseline conditions, identify key RCS sources and evaluate controls, these operations have a critical need for monitoring tools that can provide frequent and reliable data. Of the tools that are currently available, two appear promising to meet this need: (1) direct-on-filter analysis of traditional samples by Fourier transform infrared spectroscopy (DOF FTIR), which could enable rapid (e.g., end of shift) results; and (2) a newly released particle counter with advanced optical-refraction technology, which is being marketed as the first real-time RCS monitor. However, neither has been extensively field tested for use in aggregates where site-specific calibrations may be necessary. And, of course, the gap between availability and adoption of new technology can also be wide.

Project Goal: The overarching goal of this two-year project is to determine if, where, and how the above two RCS monitoring tools might be effectively used on aggregates sites. The research plan is therefore highly practical, and work will occur largely in the field with support from numerous industry partners. Three specific objectives are to:

1. Evaluate the technical performance of both tools on a variety of aggregate sites.
2. Demonstrate both tools to site personnel, and solicit feedback regarding potential usefulness and readiness for adoption.
3. Develop informational materials which convey key findings to aggregate operators, or other interested stakeholders, in general.

Impact of the Research: The main impacts of this research will be through the generation of field data related to the above two RCS monitoring tools—both in terms their technical performance and general sentiments on readiness/barriers for adoption. If these tools are demonstrated to be effective for use in aggregates, they could accelerate compliance with the 'new silica rule'. More importantly, they could support efforts toward consistently lower RCS exposure risks (i.e., between compliance audits) to enhance worker protection.