



for the Improvement of Mine Safety and Health, Inc.

The Alpha Foundation is pleased to present its 2021 Annual Report.

The report provides a summary of activities directed toward the realization of the Foundation's mission to improve mine health and safety through funding research and development projects by qualified academic institutions and other not-for-profit organizations.

The Covid-19 pandemic continued to impact several grant performances during 2021 resulting in additional no-cost time extensions ranging from a few months to one year. Fortunately, all active grants have been able to adjust funding allocations to accommodate the research delays without any additional cost to the Foundation.

Grantmaking Summary

Two grants completed their research efforts this year and 6 grants started research activities at the beginning of 2021. There were no new grants awarded in 2021. The Foundation had an interest early in the year in pursuing research on exoskeletons for mining applications and the application of machine learning and advanced data analytics for mining health and safety. Although solicitations for these topics were issued and proposals received, it was ultimately decided not to fund any studies. This decision was guided by the present abundance of existing research by several organizations on exoskeletons and concern over the inexperience with processing and the quality of available mining data for artificial intelligence applications in mining health and safety.

Since its beginning in 2011, the Alpha Foundation has supported a portfolio of research that comprises 99 projects awarded to 34 institutions including 35 active grants in 2021. These grants address the four major focus areas of the Foundation, with award percentages as indicated (<https://www.alpha-foundation.org>):

- Safety and Health Interventions - 55%
- Mine Escape, Rescue & Training - 6%
- Safety & Health Management & Training - 9%
- Injury & Disease Exposure & Risk Factors - 30%

Grant Planning Efforts in 2021

Over the previous 9 years, the Foundation has allocated most of the available funding and is now entering into planning stages for award allocations for the remaining funds. As part of this

planning, the Foundation has identified some priority research topics and has extended an invitation for proposals from selected universities to address 5 specific topics. These proposals are due on January 30, 2022, with award decisions planned for the first quarter of 2022.

- Physical Testing and Numerical Analysis of Pressure-Time curves and the Dynamic Loading Factor used for Seal Design
- Feasibility And Health and Safety Impact of Replacing Mobile Diesel Mining Equipment with Modern or Advanced Battery Technologies.
- Integrated Roof Strata Reaction Curves (RSRCs) for Roof Bolt Design with Standing Support Ground Reaction Curve (GRC) Design for Longwall Gateroad Support Optimization
- Improvement of Rib Support Design Utilizing Recent Advancements of the Coal Pillar Rib Rating
- Rationale and Proposed Research Related to Opioid Hazard Awareness and Opioid Safety Culture in Coal Mining

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