

Request for Proposal

Topic: Stopping Design for Hardening Emergency Escapeways

Background: Much attention has been given to seal design for explosion prevention including criteria for design and approval by MSHA for use of a specified design, but no specific attention has been given to the integrity of stoppings in entries designated as escapeways. Stoppings are only required to pass ASTM E-72 specifications on a free-standing 4x8 ft section of wall with sealant applied to the exterior faces. Under these test conditions, they are required to provide 39 psf (lbs/ft²) of load resistance which is primarily provided by the sealant tensile strength while the block material is largely ignored in this test protocol. The intent is primarily to ensure they are capable of handling the air pressure differentials associated with mine ventilation practices. While primary explosions in active areas are likely to destroy ventilation stoppings, a hardened stopping design should be able to survive smaller secondary explosions (on the order of 10 psi or more) if properly designed especially if the boundary conditions are designed to permit rigid arching.

Project Goals: To determine the feasibility of designing stoppings that can provide 10-15 psi of transverse loading capability for hardening of emergency escapeways.

Scope or Work: The submitter has flexibility to tailor the proposed scope of work to meet the project goals, but the following requirements must be met.

Phase 1 – Explosion Pressure Survey

- Determine if 10-15 psi stopping design is a reasonable target for hardening mine escapeways.
- If not, identify and justify an appropriate specification.

Phase 2 – Survey of Stopping Materials

- Identify stopping block materials currently used in stopping construction in escapeways
- Identify any construction/design practices that correlate to mine parameters such as ventilation pressures etc.
- Develop spreadsheet of block material properties (i.e. size, compressive strength, etc) that are relevant to (explosion) pressure loading.
- Document results of previous research that determined stopping transverse loading capacity.

Phase 3 – Methods to Assess Structural Capacity of Stoppings

- Identify/develop methodology to assess stopping transverse loading capacity.
- Develop plan to enhance stopping capacities to 10-15 psi or justified alternative value.

Phase 4 – Block Specifications and Stopping Construction Practices

- Determine block specifications and construction practices necessary to provide 10-15 psi loading capability.
- Analyze stopping designs with designated block specifications.
- Summarize stopping's performance outcomes relative to project objectives.

Phase 5 – Guidelines Document

- Prepare guidelines document for construction of stoppings to enhance preservation of mine escapeways from secondary explosions.

Funding Plan: The project will be funding in phases according to the Scope of Work with funding for subsequent phase dependent on a successful outcome in the previous phase.

Submission Requirements: The submitter is required to submit a proposal not to exceed 20 pages in length to provide documentation of how the scope will be accomplished, the project team and its experiences, a detailed budget to support the project costs and a project timeline. Proposals with advanced planning or more detail with how the scope of work will be accomplished will be rated higher than those lacking detail.

Evaluation Criteria:

- (35%) Knowledge of stopping design criteria and performance assessments
- (25%) Innovation in proposal relative to solution considerations
- (20%) Cost and timeline validation
- (10%) Working relationships with mining companies