Preface to the MME Special Focus Issue on Mine Ventilation Innovations

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Mine ventilation plays a critical role in the overall function of underground mines in maintaining the health and safety of miners. Ventilation systems provide fresh air to underground mine workings and dilute harmful gases, dust, and aerosols to concentrations below hazardous limits.

Mine ventilation engineering requires prudent design and maintenance of airways and ventilation controls; continuous monitoring of air quantity and quality; and control of respirable dust, diesel particulate matter (DPM), and other hazardous aerosols. Over the life of a mine, the ventilation system with fans and regulators requires continuous adjustment as miners extend drifts, open new mining panels, and seal mined-out areas.

This special focus issue highlights the following key areas of innovation in mine ventilation:

- Ventilation on demand (VOD), automation, and control technologies
- Thermal management—cooling and heating of mine air
- Changes in ventilation and cooling requirements when switching from diesel to battery-electric equipment
- Atmospheric monitoring systems (AMS); methane, gas, dust, and DPM control
- Mine ventilation planning, design, and economics

- Prevention of mine fires and explosions, including spontaneous combustion
- Main and booster fans, auxiliary ventilation, and controlled recirculation
- Research needs, mine ventilation training, and competence

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