

A CHARACTERIZATION OF GAS MOVEMENT AND METHANE CONTROL TECHNIQUES IN LONGWALL GOBS USING TRACER GAS

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ABSTRACT

Eight releases of SF₆ tracer gas (7 underground releases and 1 gob gas venthole injection) were successfully completed at a western Pennsylvania underground coal mine to characterize gas movement in longwall gobs. Tracer gas releases into the ventilation airflow generally stayed in the bleeder system. A maximum of 0.7% of the tracer gas released from an underground location reached a gob gas venthole. Flow paths of the tracer gas released underground followed the ventilation airflow towards the bleeder fans located at the back (start-up) end of the panels. The velocities of the SF₆ arrivals at the bleeder fans from the underground release points ranged from 17 ft/min to 259 ft/min. Tracer gas injected into the gob via a gob gas vent hole generally stayed in the gob, as long as the associated gob gas vent holes on the panel were operating. Variable production from the two gob gas vent holes influenced the pressure at the shut-in injection hole, indicating that all three boreholes on the study panel were in communication. The arrival of tracer gas at the venthole adjacent to the injection hole, an estimated path length of 3,888 ft, occurred after 1.1 days at an average velocity of 2.4 ft/min. The arrival of tracer gas at the next gob gas vent hole on the panel, an estimated path length of 8,036 ft, occurred after 15.6 days at an average velocity of 0.36 ft/min. Gob gas vent holes located at the start-up end of the panels (closest to the bleeder fans) produced methane at higher rates for a longer time than holes located in the central or completion end of the panels.