

Time domain reflectometry analysis of surface crown pillar deformation over abandoned underground mine openings at Goldenville, Nova Scotia

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The Goldenville monitoring site lies on the southern limb of a major anticline in an area where extensive underground mining has taken place since the late 1800s. Abandoned stopes excavated in stratiform gold-bearing quartz veins are tabular in shape, strike east-west and generally dip steeply to the south. Surface crown pillars are typically 1 to 2 m wide and as little as 1 to 3 m thick. The near-surface bedrock is characterized by tabular to wedge-shaped decimetre-scale blocks.

Rock masses in and around surface crown pillars were monitored in eight boreholes by time domain reflectometry between 1991 and 1993. The time domain reflectometry data indicate that the bedrock is deforming by pervasive shear and extension along numerous discrete discontinuities. These data

imply that the wallrocks and crown pillars are undergoing progressive gravity-controlled degradation. Such degradation, if it continues, must lead to eventual failure and surface caving. Although surface subsidence is evident above several of these stopes and has been increasing in magnitude for the last few years, a direct causal relationship between crown pillar failure and subsidence has not been established.

The technique of monitoring rock deformation by time domain reflectometry is currently being used to assess highwall stability at the National Gypsum Mine in Milford, Nova Scotia. This project will continue until late 1995, and is supported by quantitative laboratory evaluation of induced voltage reflections.