

# **Mine Aftershocks and Implications for Seismic Hazard Assessment**

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## **ABSTRACT**

A methodology of assessing the seismic hazard associated with aftershocks is developed by performing statistical and deterministic analysis of seismic data from two South African deep-level gold mines. A method employing stacking of aftershocks is employed due to the small number of aftershocks succeeding each mainshock. Mine tremor aftershocks were found to obey statistical relations governing aftershocks (Gutenberg-Richter frequency-magnitude, Modified Omori law and the density law, with the exception of Båth's law) as natural earthquake aftershocks do. This analysis was used to approximate the time periods when the seismic hazard due to aftershocks has decreased to background levels. These time periods can be used to draw guidelines governing the re-entry periods to working areas following a larger seismic event. Deterministic analysis revealed that aftershock productivity is not strongly influenced by mining conditions (i.e. local stresses, strain rates, and the proximity to geological features such as faults and dykes