

**Mine Health and Safety Council
Research project name SIM 14-03-01**

Project Title:	<i>Technology transfer on minimising seismic risk in the platinum mines</i>		
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Category:	Rockbursts	Applied Research	Knowledge transfer

Summary

Background of the Study

This study stemmed from an earlier project that drew attention to the increasing rockburst risk experienced by PGM mines in the Bushveld Complex. SIM 10-03-01 established common causes and factors contributing to the seismic rockmass response to mining in the BC. It found that panel support in the form of chain pillars are a common source of seismicity and that the rock types associated with the MER reef horizon can be prone to brittle failure.

Another potential source of seismic energy release are irregularly shaped remnants and pillars, often created around potholes or where ground conditions become too difficult to apply standard mining configurations.

The project found indications of poor pillar cutting and a possible lack of appreciation of seismicity related issues among mine personnel and production management.

In order to better manage exposure to rockburst risk, SIM 10-03-01 also recommended to improve the collection of pertinent data on rock types and their properties, rock mass conditions, geological features and seismic response.

Objectives of the Study

The objectives of this project were to enable training of mine personnel in seismic risk mitigation and to improve the practice of data and information collection relevant to this specific risk.

Methodology

The processes used to undertake the study consisted of the development of separate sets of training materials for production personnel (shift boss and denominations above) and for rock engineering personnel (strata control officer and denominations above).

A separate set of outputs created a seismic system audit protocol and applied this protocol to nine participating mines in the Bushveld Complex.

The results of audits, including relevant recommendations for improved data analysis, were shared amongst the operators for the benefit of all participants.

Results of the study

The training materials for production personnel consist of 14 animated modules with a length of five to seven minutes each (see Figure 1). The module set includes a user interface to select relevant modules, loop a selected set or to play once-off as a sequence; it also includes an introductory and a summary module.

The animated modules were rolled out to mine training centres during train-the-trainer workshops in November 2015 and distributed by means of USB memory sticks.

The training materials for rock engineering personnel consist of a new text-based manual (43 pages, see Figure 1) on pertinent issues related to seismicity in the BC; a slide show (93 slides) with linked-in animations, research reports and text books in PDF format; and a manual published by SiM Mining Consultants covering all specific outcomes listed in the Rock Engineering Certificate syllabus that relate to seismicity (130 pages).

Three hundred sets of the manuals, including CDs with manual, slide show and referenced documents, were distributed to mines in June 2016.

The seismic system audit initiative was joined by nine mines in the Western BC. The average compliance level with the score card was 88% (range: 60-100%). Audit results suggest that ensuring seismic data quality by means of standards is common, but that the ability to replace a faulty sensor within three months is still a challenge experienced by the mines.

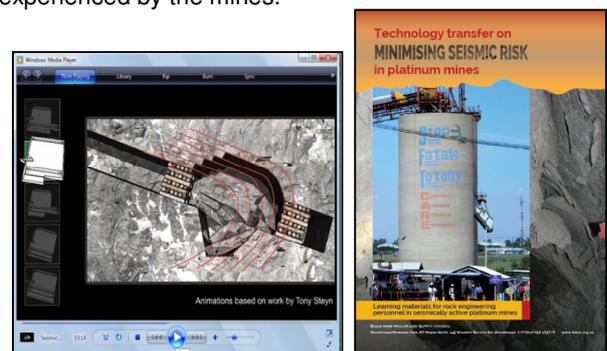


Figure 1: Module on gullies and sidings (left), manual cover.

Conclusions:

This project experienced a high level of buy-in from the mining industry in the BC throughout all of its milestone activities and through its 2-year duration. The project was completed within budget and three months ahead to time.

Recommendation:

The learning materials are well suited for incorporation into strata control training at mine training centres, especially for leave returnees and newly hired staff.