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Mosiane, Fezekile Pearl

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EVALUATION OF THE GROUND CONTROL DISTRICTS CLASSIFICATION AND SUPPORT METHODOLOGY AT KOPANANG MINE

Fezekile Pearl Mosiane

0305916R

A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Science in Engineering.

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Evaluation of the Ground Control Districts Classification and Support Methodology at Kopanang Mine

Name: Fezekile Pearl Mosiane

Student ID: 0305916R

Supervisor: Professor Rudrajit Mitra

Department: School of Mining Engineering

University: University of the Witwatersrand, Johannesburg, South Africa

Degree: Master of Science in Engineering (Mining)

DECLARATION

I declare that this research report is my own, unaided work. It is being submitted for the Degree of Master of Science in Engineering at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.



Fezekile Pearl Mosiane

October 2021

In Johannesburg

ABSTRACT

This research project aims to review the classification of ground control districts at Kopanang mine. A ground control district (GCD) is defined as a portion of the mine in which a given set of geological conditions, with associated rock-related hazards, permits a common set of rock engineering strategies to be employed to minimize the risks.

Ground control districts at Kopanang mine are currently delineated to address those areas that display a measurable and unique response to mining, either in the form of mining induced seismicity, or some other measurable rock mass response such as closure rate, geological structures or rock mass fracturing. However, there have been recent concerns regarding the unstable footwall behaviour in some portions of the mine and the inability of the current support system to address this instability. The factors driving this kind of footwall behaviour are currently not well understood at the mine. It is envisaged that if these factors can be understood, then the ground control districts can be re-delineated. This will ensure that specific support strategies are applied to precisely address specific ground control or rock mass problems.

This research aims to establish a method to delineate these ground control districts to ensure that, ultimately, suitable mining and support strategies are being utilized in the relevant areas.

To achieve this, rock mass classification methods were used to determine the quality of the rock mass and to establish the influence of lateral variation in the Vaal reef package across the mine. Results of numerical modelling analysis were also used to evaluate the influence of stress on the rock mass quality across the mine. Lastly, a comparison was done between the actual support installed in the different regions or zones of the mine and the requirements as determined by rock mass classification methods and numerical modelling.

Conclusions were then drawn, and recommendations made on the proposed classification or delineation of the ground control districts at Kopanang mine.