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“THE ORE BODY DICTATES”

EXTENDING THE ECONOMIC LIFE OF WITWATERSRAND ORE BODIES

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Abstract

Almost all gold mining today in the world renowned Witwatersrand Basin in South African is done by means of deep level underground mines.

The Witwatersrand Basin sediments are considered to be between 2 700 and 3 100 million years old, and extend laterally for some 300 km east-northeast and 150km south-southeast and comprise a 6km thickness of argillaceous and arenaceous sedimentary rocks generally dipping at shallow angles towards the centre of the basin. Gold mineralisation is hosted within quartz pebble conglomerate reefs. Major reef bands are tabular and generally less than 2 meters in thickness. Collectively, 1 608 million ounces have been mined from the Witwatersrand Basin over a period of more than 100 years.

It has become increasingly difficult over the years, despite the increase in the R/kg gold price to maintain the profitability of deep level gold mines in South Africa. The majority of the mines are faced with an aging infrastructure, long travelling distances, diminishing grades and an increase in cost. Some of these mines have become very marginal and thus a different approach to define and understand the ore body and manage extraction had to be adopted.

In this paper we demonstrate how we mine ore bodies in the Witwatersrand Basin beyond their expected economic life through sound ore reserve management principles, quality mining and cost control. Some case studies that focus on ore reserve management aspects at mines that were up for closure a number of years ago is presented in the paper.

There is a discussion on the philosophy and technical aspects of the application of the various disciplines within the ore reserve management function. This includes aspects such as geo blocking, cut off and average mining grades, valuation methods, underground exploration, face length management, short interval control, and a business approach to decision making.

