AN INVESTIGATION OF THE MINE CALL FACTOR AT MAZOWE GOLD MINE IN ZIMBABWE

Kenneth Mpofu

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Abstract

This study sought to establish the causes of a persistent low Mine Call Factor (MCF) at Mazowe Mine in Zimbabwe. The theory of Mine Call Factor expresses the total metal recovered and in residue, as a percentage of the metal indicated by the mine's estimation method. From 2001 to 2016 the average MCF was 55%. Historically, the mine is characterized by a low MCF. It is estimated that over the past 50 years, unaccounted for gold amounts to 284,000 ounces. During the period under review, a total of 308,000 ounces of gold was called for, but only a total of 170,000 ounces or 55% was accounted for. This suggests that, theoretically, there was a loss of 45%, which implies that about 45% of the expected revenue was not realized. This adversely impacts the mine's ability to achieve its financial goals. On average, a total of 5,680 ounces is unaccounted for per year. The research methods included a literature review, mine visits to familiarise with the mine, collect data and observe and assess protocols and practices along the mining value chain that impact the MCF. The study revealed that the cause of the low MCF is primarily grade loss. The main sources of the grade loss are the resource estimation method which overstates the grade and the loss of high- grade fines. The loss of grade is aggravated by the lack of operational flexibility. Due to the shortage of mining faces, the mine is forced to produce from resources, rather than reserves. The bulk of the production comes from inferred resources, which are not adequately evaluated. Consequently, the grade is impacted by unplanned dilution and ore/waste misclassification. The estimation method, unplanned dilution and ore/waste misclassification contribute to the apparent loss. The real loss is constituted by the loss of gold along the mining value chain. The main contributing factor is the loss of fines, which are associated with high grades, primarily in the stopes. Whilst there are both apparent and real grade losses, it appears that the loss is primarily apparent and mainly attributable to the method of resource estimation. However, the real loss component is quite significant and largely attributable to the loss of fines. This is evident from the fact that fines reclamation has a significant positive impact on the MCF. To minimize the apparent loss of grade, adoption of geostatistical resource estimation methods, review of grade control and QA/QC protocols, and improvement of operational flexibility in order to reduce production from inferred resources, are recommended. In order to minimize real grade losses, the blasting pattern needs to be modified to optimize fragmentation and reduce the generation of fines. Fines reclamation operations must be prioritized, better planned, better resourced, ramped up and conducted in current stopes, rather than abandoned stopes as is the practice at present.