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An economic evaluation of extraction of no 1 seam pillars at Elandsfontein Colliery, Witbank Coalfield.

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2021
https://hdl.handle.net/10539/33400

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ABSTRACT

The reserves of the Witbank Coalfield in Mpumalanga Province are diminishing leaving coal companies with no option but to explore the possibilities of pillar extraction. The purpose of the study is to conduct an economic evaluation of the pillar extraction at Elandsfontein Colliery. The geological, mining, coal handling and plant preparation, and environmental elements are evaluated. A Cashflow is calculated and discounted to determine the net present value, internal rate of return, and the payback period of the project.

A detailed literature study was undertaken on the Witbank Coalfield geology, mining methods, spontaneous combustion, and subsidence management. The colliery's borehole, assay, rock engineering, and groundwater data were obtained from the company's reports. This data was used to calculate gross in situ resource, reserves, production schedule, mining costs, processing costs which were used to compute cashflow.

The No.1 Seam generally is high-quality coal with raw ash of 32,87% and a Caloric value of 20,99 MJ/Kg. The gross tons in situ resource of the underground workings is 1,2 million and the mineable tons in situ is 1,04 million. Based on the competent roof of the No.1 Seam and other aspects including pillar width and surface subsidence the applicable method is checkerboard at the rate of 35 000t/month. The run-of-mine coal from the underground No. 1 Seam resources will be split between the export and domestic (Eskom) at 53,6% and 46,4% respectively.

Surface subsidence in collieries applying the checkerboard pillar extraction method is either minimal compared to those practicing full extraction or doesn't occur at all. There is no vertical hydraulic movement and the mine void does not impact the

shallow weathered aquifer. In underground mines, spontaneous combustion can occur where the air gets into the workings through cracks and openings and in the case where broken coal is left underground.

The export price is projected to be $61/t in 2021 which equates to R915/t. The Eskom coal price is currently R19GJ which equates to R380/t. The total capital expenditure is estimated to be R17.8 M. The total operating expenditure is estimated to be R270,04 M. The project has a high net present value and internal rate of return which amounts to R12,59 million discounted at 15% and 91% respectively. It has a short payback period of 3.8 months; therefore, the project is deemed economically viable.