

DESIGN OF VENTILATION SYSTEM FOR OSIRI-MACALDER GOLD MINES

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ABSTRACT

Mine ventilation involves ensuring that the environment of a mine is comfortable and safe for the workers. The ultimate goal for ventilation planning is to design a system that will be capable of adequately ventilating all working faces, airways, and areas underground at minimum costs. This has an indirect effect on the productivity of the mine. Underground mine ventilation provides a sufficient flow of air to the underground workings of a mine to dilute and remove dust and harmful gases and to regulate temperature. This project was aimed at designing a proper mine ventilation system for Osiri-Macalder Gold Mine which is situated in Nyatike Subcounty of Migori County. Given that the mine lacks any artificial ventilation system and relies only on natural ventilation, this project's goals included providing air in sufficient amounts to all working places and passage ways in an underground mine to dilute the noxious gases to acceptable conditions, availing fresh air for face ventilation, lowering the natural heat in the mine and ensuring exhaustion of noxious gases from the mine. The methods used to achieve these objectives involved data collected on the mine layout and its physical dimensions, measurements of temperature, pressure and air velocities in the mine. These data were then used to simulate the airflow in the mine using Ventsim software. As a result of this, the right type of a forcing fan operating at a speed of 930 rpm and providing airflow of 12.6 m³/s at a velocity of 5.0 m/s was chosen. The airpower delivered by the fan was found to be 2099.894W. Furthermore, the cooling coil system of 61.625 BTU with a cooling capacity of 6,892.996 W was to be employed to cool the ventilation air.