DESIGN OF SUBSURFACE VENTILATION SYSTEM

by

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ABSTRACT

Subsurface ventilation is often achieved by a combination of natural ventilation system for shallow mines and mechanical system involving use of fans for relatively deep mines. If fan ventilation is not well organized, a significant financial loss is incurred in moving air in the openings due to airway resistances and still ventilation goal is not achieved. This can often lead to unhealthy working environment with both short and long term health effects. In this project, Karebe gold mine limited in western Kenya which is one of the most advanced underground mines in the country was taken as a case study. Ventilation survey was done especially in the recently connected mining district (Rock Corry) and information regarding existing pressure - air distribution was obtained. Comparison was made between the existing quantities of flow with the standard requirements and the cost of ventilating the system was then considered. Ventsim simulation software was used to show air flow in the mine and determine flow characteristics. The existing system was found to cost approximately Ksh 10 million per year and very inefficient to supply adequate air requirements to the working faces. Extensive use of ventilation ducting and ascensional flow against gravity were found to be some of the major causes of high frictional resistance in the system. A proposed system involving reversed flow direction and minimum use of ventilation ducting was found to improve the efficiency considerably from 4.7% to 16.9%. Moreover, the proposed system was found to be three times more economical than the existing system with approximate cost of Ksh 3 million.