BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT

DESIGN OF THE MINE SHAFT

Case study; SYANYONJA, BUSIA DISTRICT

OCHOM MOSES

BU/UP/2013/1483

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This report is submitted in partial fulfillment of the award of Bachelors of Science in Mining Engineering

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EXECUTIVE SUMMARY

Many underground operations consist of several tunnels acting as accesses, haulages, production levels, and airways but there is only a limited number of shafts that can be developed for any given ore body and these shafts must be sunk in the right place with the correct configuration to get optimum operational benefit. Despite the increasing widespread use of shafts as a primary means of access to the ore body for many mineral resources in Uganda, there is little current and comprehensive reference material which provides a central body of knowledge spanning the various design and cost factors involved in shaft design . The purpose of this study is to (1) cover some aspects which have to be considered when designing mine shafts and to design a mine shaft,(2) to determine the geotechnical properties of the host rock and (3) to carry out economic comparison with the current surface mining. Laboratory tests on rock samples indicate that host rock is in category of weak rock .The dimensions of a collar, for example, its depth, cross section and thickness depend on shaft functions, character of over-burden rocks, hydrologic conditions, ground pressures and sinking method. The thickness of lining required depends upon the strength of the lining material, the safety factor used, the relative stiffness of the rock and support systems, the rock mass strength, the field stresses, the extent of the broken zone at the time of lining installation, and the shaft diameter. It is hoped that this paper will be used throughout industry as a quantitative basis for the comparison of various mine access options both for new and existing mines. This should form an integral part of any mine design process. Mine design is an inexact science. The inability to define the geologic environment, to determine the rock mass properties and to define the in situ stress field necessitates design under a high degree of uncertainty. No mine design is ever complete until it is tested in actual practice.

DECLARATION

I **OCHOM MOSES**, declare that all the material portrayed in this project report is original and has never been submitted in for award of any Degree, certificate, or diploma to any university or institution of higher learning.

Signature Date

..... 12/06/2018.....

APPROVAL

This project report has been submitted with the approval of the following supervisors

MAIN SUPERVISOR: Mr. NASASIRA MICHAEL

SIGINATURE----------

Date.....

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LIST OF ACRONYMS/ABBREVIATIONS

Symbol	Description	Unit
GIS	Geographical Information System	
ASGM	Artisanal and small scale gold mining	
IRR	Internal Rate of return	
NPV	Net present value	
UCS	Uniaxial compressive strength	
Ø	Internal friction angle	
A -	Diameter of shaft	m
E	Modulus of Concrete	MPa
fc	compressive Strength of Concrete	MPa
GSI	Geological Strength Index	
k	Horizontal Stress to Vertical Stress	
σ_H	Horizontal Stress	MPa
σrr	Radial Stress	MPa
σθθ	Tangential Stress	MPa
τrθ	Shear Stress	MPa
σz	Vertical Stress	MPa
σci	Compressive Strength of Intact Rock	MPa
pi	Support Pressure	MPa
po	Outer Pressure	MPa
ro	Outer Radius of Lined Shaft	m
R	Questioned Distance	m
tc	Thickness of Lining	m
ur	Radial Displacement	mm
uθ	Tangential Displacement	mm
γ	Unit Weight of Rock	MN/m3
ν	Poisson's Ratio	
z	Depth of Shaft Section	m

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CHAPTER ONE

1.0 INTRODUCTION

This chapter includes the following; Background of the study, Statement of the problem, Purpose of the study, Justification of the study, Objectives of the study, and finally the Scope of the study.

1.1 BACKGROUND

Escalating gold prices worldwide has rapidly attracted growing number of people into gold mining in Africa and the rest of the world .Mining is mainly done by open pit or underground method using a shaft.(Gonçalves, 2016)

In Uganda particularly, at least 20,000 of miners are engaged in gold mining via artisanal and small scale gold mining [ASGM], which has become relatively important activity in the regions of Busia ,karamoja Kigezi,and Buhweju gold fields across the country(Fripp & Ziemkiewicz, 2000).

The unlicensed, informal ASGM gold production is very low, estimated to be 151 kg in the east and a total of 1210 kg in the whole country annually and mainly use open pit mining method.

A small number of small scale miners are using shafts for underground gold access in Uganda.

Generally, Shaft sinking is a critical task in mining that requires technical mining techniques, as the shaft must be sunk in the right place with the correct configuration to get optimum operational benefit. The methods used for shaft sinking vary, also demand considerable flexibility.

The mineral resource must be converted into a mineral reserve before one can start designing a mine shaft. An economically mineable reserve is therefore a pre-requisite for engineers to be able to start on the design process..

1.2 PROBLEM STATEMENT

The mining of gold in Busia has picked up at small scale level, with many artisanal miners in syanyonja gold mining fields. Despite the wide spread open pit mining in this area with little production, little have been done to exploit the ore that is too deep to mine economically by open pit method. This has geared towards shaft sinking to access the ore that cannot be exploited

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