BUSITEMA UNIVERSITY
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FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT REPORT

INVESTIGATING THE CAUSES OF ROCK UNDERBREAK DURING BLASTING.

CASE STUDY: ALJOUDA MINING COMPANY IN NAMAYINGO DISTRICT, EASTERN UGANDA

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ABSTRACT

Rock fragmentation is a fundamental goal of drilling and blasting where the most effective blasts can be achieved. Drill and blast system has been used in hard rock excavation due to its economics and adaptability to changing rock mass conditions. The blasting method is broadly used for rock excavation worldwide because of its efficiency. The blasting induced rock under break occur in the vicinity of both surface and underground openings.

Common question during mining operations is whether rock under break has been caused by blasting practice or poor rock mass quality. Critical evaluation of the factors influencing rock under break was required to address such questions. In order to understand the mysterious nature of blast damage prediction and control, the field work involved the assessment of rock mass quality during blasting operations. Therefore, the influence of rock mass features, explosive characteristics and blast design parameters on rock under break has been examined in this study. Implications of rock underbreak have also been outlined in this paper.

Investigations at Aljouda Mining company have showed increased under break as a result of low explosive strength compared to the rock strength and large spacing between the blast holes.

DECLARATION

I, **ATUHEIRE JOAN,** registration number **BU/UG/2014/46,** declare that this research project report is my original work and has never been presented to any university or institution for the award of a bachelor's degree in mining engineering or any other related award.

Signature: ...Atuheire J...

Date: ...30/05/2018...

APPROVAL

This is to certify that the research project report entitled 'Investigating the causes of rock under break during blasting' has been done under the supervision of the lecturers mentioned below and is ideally submitted for examination assessment.

Mr. Tugume Wycliffe

Signature: ………………………………………

Date: ………………………………………………

Mr. Nasasira Michael Bakama

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Date: ………………………………………………

DEDICATION

I dedicate this research project report to the discipline, perseverance and guidance of my parents' unfailing and instructive love for me that is Mr. Basiime James and Mr. Basiime Joventa.

I more so dedicate it to my beloved uncles Mr. Turyamwesiga Venance, Mr. Neema Posiano and aunts Mrs. Turyamwesiga Edith, Mrs. Neema Annet for the endless financial support towards my academics. May God bless them abundantly.

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LIST OF ACRONYMS

GPS - Global positioning system

UCS - Uniaxial compressive strength

ANFO -Ammonium nitrate and Fuel Oil

VOD - Velocity of detonation

PPF- Perimeter Powder Factor

% - Percentage

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1 CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND OF THE STUDY

In the world today, blasting remains the most inexpensive and reliable method of hard rock fragmentation (Ibarra, Maerz and Franklin, 1996). However, the cost associated with rock under break is becoming increasingly important.

(Lukhele and Zvarivadza, 2015) define **'Under break'** as the rock remaining within a specific excavation perimeter that should have been thrown out by the blast.

Also, **'Under break'** may also be defined as the rock that remains unbroken inside the neat lines in a tunnel or shaft after firing a round of explosive shots (Xiao *et al.*, 2010).

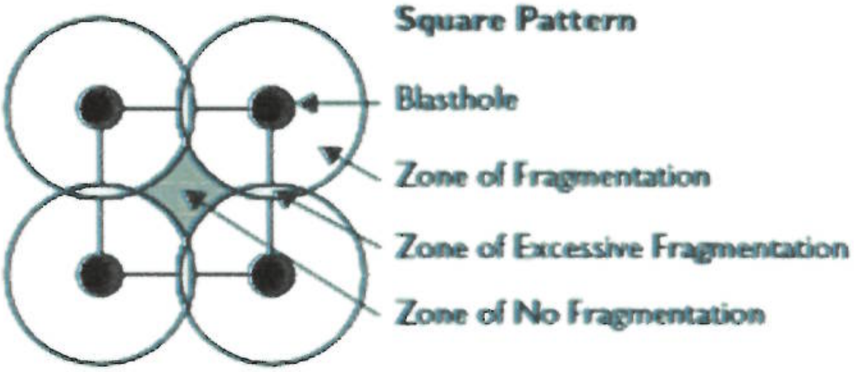

Figure 1 showing the zone of underbreak

Rock under break after blasting is directly related to the level of stress experienced by the rock and its pre-blasting condition. In high stress environments and under unfavorable geological conditions, disturbances associated with blasting may result in extensive ground control and dilution problems (Singh and Xavier, 2005).

To minimize these undesirable effects, perimeter control techniques are available, but the results of their application are often less than optimal. A study was therefore conducted to better understand the nature and extent of rock under break caused by blasting and involved the critical evaluation of the factors influencing rock under break.

The factors influencing rock under break were broadly categorized in three areas (Singh and Xavier, 2005);

i. Rock mass features.

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