FACULTY OF ENGINEERING

DEPARTMENT OF MINING ENGINEERING

FINAL YEAR PROJECT:

SLOPE STABILITY ANALYSIS AT NAMEKARA VERMICULITE OPEN PIT MINE

BY

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A final year project proposal report submitted to the department of mining engineering in partial fulfillment of the requirements for the award of the Bachelor of Science in MINING engineering degree of Busitema University.

ABSTRACT.

Vermiculite mining is being carried out in Bugobero sub county at Namekara mining company in Manafa district and it is the leading producer of vermiculite ore in Uganda, East Africa and it's also among the leading producers in the whole world. The method of mining used in the ore extraction is a surface open pit mining method. However, this forms benches of a bout 20m and slopes which may become unstable with time so there was need to analyze the stability of slopes at the mine to assess the major critically unstable failure zones and modes of slope failures, the possible geometric design parameters and to obtain the factor of safety for an optimal stable slope. The purpose of slope stability analysis by Roc science slide 6 and Flac3D software is not only to assess the overall stability of the slopes in the mine, but also including obtaining the possible geometric design parameters and optimal factor of safety for an open pit mine of Namekara mining company so as to reduce on chances of slope failure to avail safe working conditions to workers and also increase on the daily productivity. Based on parametric studies it can be concluded that, slope angle plays a major role on slope stability, factor of safety varied from o.8 to 1.53 for varying slope angle of 35 degrees to 75 degrees but also increasing the height of the slope, decreased the factor of safety indicating less stability. Therefore, it is recommended to maintain the slope angle not steeper than 45 degrees for an open pit mine and F.O.S was evaluated by varying the slope angle and height of dump. This was observed that as the angle and height of the slope increases, F.O.S decreases.

DECLARATION

I TENYWA IBRAHIM, BU/UP/2019/1486, declare to the best of my knowledge that the work presented in this project report is out of my effort and has not been published or submitted before to any university or higher institution of learning for the award of a bachelor of science in mining engineering.

Sign………………………………………………………….

Date………………………………………………………….

APPROVAL

I TENYWA IBRAHIM, submits this report of my final year project to the faculty of engineering in the department of mining engineering for examination with approval of my supervisor.

Mr. Tugume Wycliffe

Signature:………………

Date:……………………………

Mr. Kidega Richard

Signature:……………………….

Date:…………………………………

DEDICATION

This research is dedicated to my lovely parents and family for the efforts they have made towards my academic who have stood by me and always believed in me. May the almighty God bless you.

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LIST OF ABBREVIATIONS

FOS

UCS

PSA

MDD

PI

LL

PL

CBR

DGMS

IRA

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INTRODUCTION:

This chapter outlines the relevant information about the project, problem statement, and justification, objectives of the study, purpose of the study and the scope of the study.

BACKGROUND

Pit falls are becoming a problem all over the world in most open pit mines and quarries due to poor geotechnical analysis during the design of the pits, analysis of the geological structure of the soils in the area and poor consideration of the design parameters(Zou et al., 2019). Mining generates an economic contribution in the world at large and Open pit mining as a surface mining method is part of the income generating projects. The number of active open pit mines in the world are increasing as compared to underground mines this is due to relatively low costs of operation, high productivity and low investment costs(Vazri et.al.2010.).

Open pit mining operations involves design of slopes with stable benches as continuous production increases downwards in the pit. As production proceeds,theres is a change in open pit dimensions including ,its depth, bench height, bench width, slope angle as a result of the massive number of material produced (Carvalho, n.d.).Alterations in the dimensions of the pit causes issues of stability consequently .Therefore, it's essential to assess the various types of failure happening in the bench slope and to implement control measures to minimize and limit the risks associated with slope stability as well as to assess and offer a secure and working environment for the expensive machinery and personals in the mine(Pradhan, n.d.). These slopes must remain stable throughout for safer mining operations to avoid death, ore dilution, and high production costs (Keaton,2007). The design involves determination of the optimal factor of safety for the establishments of stable benches with the respective geometrical design parameters like bench height, bench width, slope angle, overall slope angle and width of the ramp.

The stability of slopes in open-pit mining operations and quarries is extremely important from both economic and safety points of view. The stability of rock slopes entails the design of safe, economical, and functional excavated slopes to attain equilibrium conditions of natural slopes(Stacey et, al.2002).

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