



**BUSITEMA
UNIVERSITY**
Pursuing excellence

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING

FINAL YEAR REPORT

**OPTIMIZATION OF THE PERFORMANCE OF A WINNOWER TO ENHANCE
VERMICULITE RECOVERY**

CASE STUDY; NAMEKARA MINING COMPANY LIMITED

BY

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ABSTRACT

Namekara Mining Company Limited in Manafwa district is among the leading producer of vermiculite in the world and it's also the leading producer in Uganda and East Africa. However, when vermiculite is being processed especially during the winnowing process, vermiculite is lost in the waste due to suboptimal operational parameters of the winnowers which results into inefficient separation of vermiculite from waste of magnetite and grit thus resulting into increased operational costs, inefficient resource utilization, Challenges in achieving sustainability goals and waste stockpile growth.

My research aims to address this by utilizing statistical tools in Minitab software like Design of Experiments (DOE) and Response Surface Methodology (RSM) to analyze the relationship between the parameters and the recovery rates and to also come up with optimal parameters so as to maximize recovery of vermiculite.

The first chapter comprises of the introduction, which clearly shows the background, the research gap, problem statement, purpose of the study, the objectives of the study, scope of the study, justification of the study. The second chapter comprises of the literature review of the operational parameters that influence vermiculite recovery, studies that have been made about optimization of these parameters and how optimization is important and also how Minitab is an effective statistical software for optimization and the respective research gaps. The third chapter comprises of the methodology that this study seeks to apply. It elaborates how the operational parameters will be got, and how the data will be entered into Minitab so as to know the number of experiments that will be carried and then how the recovery rates will be measured using a smaller winnower and entered into the software to acquire the relationship between the operational parameters and the recovery rates, and then how Response Surface Methodology(RSM) will be used to acquire the optimal parameters and then how these parameters will be scaled up to the large winnower parameters and then how a sensitivity analysis will be carried out after to validate the optimized parameters. The fourth chapter includes the results and discussions of every specific objective. Chapter five involves the conclusion, challenges, and recommendations.

DECLARATION

I, ODARU DRASIKU HILDAH, hereby declare that all the contents in this proposal project is my original work and has not been submitted previously in whole or in part for any degree or diploma at any other institution. All sources of information used in this report have been duly acknowledged. I take full responsibility for the accuracy of the content and any opinions expressed herein.

Date....16/05/2025.....

Signature...hildah.....

APPROVAL

I, ODARU DRASIKU HILDAH, hereby submit this report of my final year proposal project with the approval of my supervisor.

Mr. KWIKIRIZA MATHIAS

Signature.....

Date 8th / 05 / 2025.....

DEDICATION

I dedicate this report to my parents, friends and supervisors.

ACKNOWLEDGMENT

I take this opportunity to thank the almighty God for the good health and the ability to research and gather information in this report. I thank my supervisors for the time, support and advice provided to me during my research.

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