



**BUSITEMA  
UNIVERSITY**  
*Pursuing Excellence*

## **FACULTY OF ENGINEERING**

### **DEPARTMENT OF MINING ENGINEERING AND WATER RESOURCES ENGINEERING**

#### **FINAL YEAR PROJECT**

**TITLE: DEVELOPMENT OF A STANDARD OPERATING PROCEDURE  
FOR DETERMINATION OF GOLD ORE GRADE**

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## ABSTRACT

Determining gold ore grade prior to mining investment helps to understand and determine the possible expense and whether feasible the project is. With right information about the ore grade, the ASM are able to make the rightful investment decisions. Several techniques and equipments are employed worldwide to carry out this analysis.

This study was carried out to develop a standard operating procedure by (1) eliminating cyanide consuming minerals, (2) developing the operating procedure, (3) validating the operating procedure, and (4) carrying out an economic comparison between the developed procedure and the AAS machine usage. Samples were obtained from and around Tiira gold mine in district and Optima mines and minerals from Mubende district, and absolutely prepared to ensure that the results are unbiased. The mineralogical analysis shows that, pyrite, magnetite, chalcopyrite and chalcocite are the major cyanide consumers available and they were successfully eliminated by use of concentrated nitric acid and ammonia solution. Developing an operating procedure was a step-by-step process of leaching the pretreated sample and titrating its leachate against silver-nitrate solution thus calculating ore grade. The obtained grade was higher than the actual value as determined by AAS. Validation was done to correct the procedure results using the offset and correction error. An economic comparison was carried out to show the difference in cost when an AAS machine is used with respect to the developed procedure. Results showed that the cost of AAS machine to determine gold grade is greater than 5 times cost of using the developed procedure.

The research recommends the use of a 5ml-burette for a higher accuracy of the titration results. The procedure is recommended for low-medium gold grade ores and applied to artisanal and small-scale miners.

## DECLARATION

I, **MIRO MATHIAS**, registration number **BU/UG/2016/50** declare to the best of my knowledge that this report has been fully prepared by me and is an outcome of my knowledge and original work, and has never been presented to any institution of learning for any academic award.

**MIRO MATHIAS**

SIGNATURE: .....

DATE: .....

## APPROVAL

This proposal report has been ideally submitted to the department of Mining and Water Resources Engineering for examination with approval from the following supervisor:

Signature: .....

Date: .....

**Mr. NUWAREEBA EDSON**

## ACKNOWLEDGEMENT

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## ACRONYMS

ASM	Artisanal and small-scale miners
ICDD	International Centre for Diffraction Data
AAS	Atomic Adsorption Spectrometer
Ppt	Precipitate
UGS	Uganda shillings
cc/cm <sup>3</sup>	Cubic centimeters
XRD	X-ray Diffractometer