FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT REPORT

DESIGN AND CONSTRUCTION OF A SMALL-SCALE HUMAN FECES INCINERATION TOILET.

BY

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A final year project report submitted to the Department of Water and Mining Engineering in partial fulfillment for the award of the Bachelor Degree of Science in Water Resources Engineering of Busitema University.

ABSTRACT

Recent estimates suggest that approximately 40% of the world's population does not have access to an adequate sanitation system. This lack of access is one of the major causes of child mortality, mainly due to diarrhea. The development of technology in the emergency sanitation sector has not been emphasized sufficiently. In an attempt to increase access to emergency sanitation in Buwali Internally Displaced Persons Camp there was a need to develop sustainable toilets that can be used in areas without an electrical grid or sanitary plumbing. These criteria allow the toilet to be placed in rural areas without access to an electrical grid and in environments where water is scarce. This report describes the design and construction of a solid human waste partial-incinerating burner for use in emergencies that was developed in response to the inadequate sanitation in Buwali Internally Displaced Persons Camp. The incineration process was chosen because the high operating temperature ensures the elimination of pathogens. The device was developed by understanding the fundamentals of fecal material and the physical and chemical fuel properties. The critical variables estimated include the mass and volume of the fecal matter, source energy requirements, the stochiometric air requirement and waste generation. The exhaust gas from the combustion is used for drying of the biomass or fecal materials fed in the next batch. The char is used as a binder to produce charcoal briquette from biomass waste. Briquets production and exhaust gas usage provides a sustainable energy source for the toilet. The result is a prototype powered by bioenergy that can sanitize fecal waste.

DECLARATION

I declare that this project report, except where specifically acknowledged is my original work. This report has not been in whole or in part submitted for any degree or examination at any other University.

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SIGNATURE…… DATE……

APPROVAL

This project report has been submitted for examination to the Faculty of Engineering with my due approval as the University Supervisor.

MR. MASERUKA S. BENDICTO

SIGNATURE…… DATE……

ACKNOWLEGEMENTS

First of all, I would like to thank God for His guidance throughout my life as the lamp unto my feet. Secondly, I would like to give special thanks to Mr. Maseruka S. Bendicto for the guidance and support on this wonderful project from the first day of its inception. Now I can say that I have irreplaceable time to work under his wings. I would like to recognize my class mates for their care and help including Ronald Ray Okeng, Francis Lokubal, James Ocen and Waren. I would like to thank sponsors of the research including Christine Anyait, Naleleti Erwatu for their support on the pursuit of emergency sanitation. I hope that this report can be a reflection of everyone's contribution for the greater good of this concept and pursuit of accessible and adequate sanitation.

DEDICATION

I dedicate this report to all my family members, lectures and friends for the love and support rendered to me and for the pursuit of accessible and adequate sanitation.

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LIST OF ACRONYMS

IDP:	:	Internally Displaced People
LHV		Lower Heating Value
UNESCO	:	United Nations Education Scientific and Cultural Organization
HHV	:	Higher Heating Value
UNHCR	:	United Nations High Commission for Refugees

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