BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

A STUDY OF THE ENVIRONMENTAL IMPACT OF SYNTHETIC DYE EFFLUENT

CASE STUDY: SOUTHERN RANGE NYANZA LIMITED, JINJA-UGANDA

BY

ABAINE AMBROSE

BU/UG/2014/94

Email: ambroseabaine@gmail.com

Tel:0786022993/0706022993

A final year research report submitted to the faculty of engineering in partial fulfilment of the requirements for the award of a bachelor degree in textile engineering of Busitema University, May 2018.

ABSTRACT

The purpose of the study was to assess the impact of dye effluents on the surrounding environment from Southern Range Nyanza Limited in Jinja. The study's specific objectives included; to establish the impact of synthetic dye effluents on the quality of water around Southern Range Nyanza Limited, to establish the impact of synthetic dye effluents on the health of workers in Southern Range Nyanza Limited, and finally to analyze quality control parameters of the dye waste water from Southern Range Nyanza Limited using ANOVA analysis tool in MS excel.

In conclusion, the study established that the use of synthetic dyes in Textile industries has contributed to water and air pollution. This is through the dyes used in the industries that are poured into swamps and water channels when they are not well treated. This has contributed in increasing the costs of treating water by National Water and Sewerage Corporation and also pollution of the soil around SRNL.

The study recommended that Textile industries should improve their effluent treatment systems so as to reduce the cases of pouring half treated wastes into water channels. NEMA and other environmental bodies, departments and ministries should improve the enforcement of rules and regulations regarding waste treatment by local industries

DECLARATION

I, **Abaine Ambrose,** declare that this research report entitled, "The environmental impact of synthetic dye effluents, a case study of Southern Range Nyanza Limited" is my original work and has never been presented anywhere to any institution of higher learning or University before for any award.

Signature…… Date…30/05/2018…

ABAINE AMBROSE

BU/UG/2014/94

APPROVAL

This research report was produced under supervision and is submitted with approval of the following;

Dr Nibikora Ildephonse ....

Main Supervisor ***Signature*** ***Date***

Mr Kassedde Allan .....

.....

Co- supervisor ***Signature*** ***Date***

Mr Wandera George ....

Co-supervisor ***Signature*** ***Date***

DEDICATION

This research report is dedicated to my parents Mr. Sergius Bamwiine and Mrs. Helen Ahimbisibwe for all the support rendered towards the achievement of this academic milestone in my life. May God bless you abundantly.

ACKNOWLEDGEMENT

I would like to thank first the Almighty God, without Him this truly would not have been a success. Thanks for loving me and your abundant gift of life.

I thank my supervisors for the invaluable academic supervision and guidance throughout this report, as well as for the support and confidence provided every meeting and point of discussion that occurred from start to finish.

My gratitude goes to all my family members without whose love, financial support and wisdom I could not have been where I am today.

Further thanks go to the Management of Southern Range Nyanza Limited for allowing me to conduct this study in their company. Appreciation must also go to the people who agreed to undertake the surveys, without which the study would have seriously been compromised.

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CHAPTER ONE

INTRODUCTION

1.0. Introduction

This section consists of the background of the study, the problem statement, research objectives, hypothesis, scope and significance of the study.

1.1 Background of the Study

It is estimated that over 10,000 different dyes and pigments are used industrially and over 7 x 105 tons of synthetic dyes are annually produced worldwide. Textile materials can be dyed using batch, continuous or semi-continuous processes. The kind of process used depends on many characteristics including type of material as such fiber, yarn, fabric, fabric construction and garment, as also the generic type of fiber, size of dye lots and quality requirements in the dyed fabric. Among these processes, the batch process is the most common method used to dye textile materials (Kirk-Othmer, 2004).

In the textile industry, up to 200,000 tons of these dyes are lost to effluents every year during the dyeing and finishing operations, due to the inefficiency of the dyeing process. Unfortunately, most of these dyes escape conventional wastewater treatment processes and persist in the environment as a result of their high stability to light, temperature, water, detergents, chemicals, soap and other parameters such as bleach and perspiration. In addition, anti-microbial agents that are resistant to biological degradation are frequently used in the manufacture of textiles, particularly for natural fibers such as cotton. The synthetic origin and complex aromatic structure of these agents make them more recalcitrant to biodegradation. However, environmental legislation obliges industries to eliminate color from their dye-containing effluents, before disposal into water bodies (O'Neill et al., 2010).

The textile industry consumes a substantial amount of water in its manufacturing processes used mainly in the dyeing and finishing operations of the plants. The wastewater from textile plants is classified as the most polluting of all the industrial sectors, considering the volume generated as well as the effluent composition. In addition, the increased demand for textile products and the proportional increase in their production, and the use of synthetic dyes have together contributed to dye wastewater becoming one of the substantial sources of severe pollution problems in current times (Forgacs, Cserháti & Oros, 2004)

During the dyeing process it has been estimated that the losses of colorants to the environment can reach 10–50%. It is noteworthy that some dyes are highly toxic and mutagenic, and also decrease light penetration and photosynthetic activity, causing oxygen deficiency and limiting downstream beneficial uses such as recreation, drinking water and irrigation (Hubbe et al., 2012).

The ministry of water and environment(MWE) set the maximum acceptable values for the effluents before being released into the receiving environment. In particular, the pH acceptable range is 6.0-8.5, while the maximum acceptable values for BOD, COD, and TDS are 50,100 and 1200 mg/l respectively. (NSOER, 2014) Unfortunately, not these standards are met accordingly mainly due to the inefficiency of the treatment methods and the costs of treatment resulting into increasing levels of pollution

1.3 Statement of the Problem

The textile industry consumes a substantial amount of water in its manufacturing processes used mainly in the dyeing and finishing operations of the plants. The wastewater from textile plants is classified as the most polluting of all the industrial sectors, considering the volume generated as well as the effluent composition. In addition, the increased demand for textile products and the proportional increase in their production, and the use of synthetic dyes have together contributed to dye wastewater becoming one of the substantial sources of severe pollution problems in current times. This has led to increased levels of environmental pollution and therefore creating the need for the study to assess the environmental impact of the use of synthetic dyes in the textile industries

1.4 Objectives of the study

1.4.1 General Objective

To investigate the impact of synthetic dye effluents from Southern Range Nyanza Limited on the surrounding environment.

1.4.2 Specific Objectives

The study was guided by the following specific objectives;

- To establish the effect caused by synthetic dye effluents on the quality of water around Southern Range Nyanza Limited.
- To analyze the PH, BOD, TDS and COD values of the wastewaters from Southern Range Nyanza Limited using ANOVA tool in MS Excel.
- To determine the impact of synthetic dye effluents on the health of workers.

1.5 Hypothesis:

H_1: Synthetic dye effluents have an impact on the environment.

H_0: Synthetic dye effluents don't have an impact on the environment

1.6. Scope of the study

The study did focus on assessing the environmental impact of the use of synthetic dyes by textile industries. Specifically, the study was to establish the impact of synthetic dye effluents on the quality of water, to examine the impact of synthetic dye effluents on the health of workers and to carry out an analysis of the discrepancies of the selected dye waste water parameters over an interval of two weeks for a period of six consecutive weeks. The geographical scope of the study did include, Southern Range Nyanza Limited, Uganda located in Buikwe district. The data time scope is all the time after 2011.

1.7. Significance of the study

The study results will be useful in the following ways;

- The study is a tool to aid in combating pollution problems around SRNL in Buikwe.
- The study is for the different stakeholders engaged in policy making to come up with polices that will promote environmental protection.
- The study has a great contribution to the body of knowledge. Academicians may use it as a useful addition to the body of the available information on assessing the environmental impact of the use of synthetic dyes.

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