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**FACULTY OF ENGINEERING**

**DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING**

**FINAL YEAR PROJECT REPORT**

**PERFORMANCE EVALUATION OF A DRINKING WATER TREATMENT PLANT**

**CASE STUDY: NWSC DRINKING WATER TREATMENT PLANT, TORORO**

**BY**

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

## **ABSTRACT**

In Uganda conventional water treatment plants face major challenges in terms of assessing their operation and performance due to inappropriate technologies, insufficient equipment and deficiency in skilled expertise. Simple but efficient technologies are therefore necessary for reasonable evaluation of the daily performance of the plant. In this study the performance of National Water and Sewerage Corporation water treatment plant, Tororo was assessed. The study was conducted by assessing unit process capability, design, operation and maintenance potential to meet optimized goals. From results of the assessments, root factors limiting optimum performance were identified and improvement options were proposed. The results of the assessment found that with all units at full operation the plant had the capability to satisfactorily treat water at peak daily demand of 2300 m<sup>3</sup>/day. The assessment results indicated that, settled water turbidity was measured less than 10 NTU. And filter turbidity spike of 6.5 NTU following backwash with a reduction to 0.6 NTU after one hour was observed. Jar test experiments were conducted to evaluate the effectiveness of Aluminum Sulphate and Polymer (recently used by the treatment plant) by comparing the optimum dose for highest turbidity removal and relative costs. From the jar test results Aluminum Sulphate was found to be the effective chemical with 27 mg/l optimum dose mixed with 13.56 mg/l of Polymer. Results of the analysis showed that all of the measured parameters were within the acceptable range. In the assessment of factors limiting performance of the treatment plant; major factors were categorized as design, operational and maintenance. No single factor was responsible for poor plant performance, although in general the study found that all factors influence the plant's ability to work properly. Some of the primary operational problems and the intake structure's adequacy significantly affected performance. Operational factors were found to have the highest rank. This finding, coupled with the fact that the plant had adequate capability, indicates that improving process control could significantly improve performance.

## **DECLARATION**

I **Kedi Joel**, declare that this research is my original work, except where due acknowledgement has been made. I declare that this work has never been submitted to this University or to any other institution for funding or for partial fulfillment for any award.

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## **SUPERVISOR APPROVAL**

This research project was carried out under my direct supervision and has been submitted with my approval for examination and award of Bachelor's Degree of Science Water Resources Engineering at Busitema University.

NAME: MR. BAAGALA BRIAN SEMPIJJA

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## ABBREVIATIONS

BOD	:	Biochemical Oxygen Demand
COD	:	Chemical Oxygen Demand
GDWQ	:	Guidelines for Drinking Water Quality
MATLAB	:	Matrix Laboratory
NTU	:	Nephelometric Turbidity Unit
NWSC	:	National Water and Sewerage Corporation
PH	:	Potential of Hydrogen
SDG	:	Sustainable Development Goal
TU	:	Turbidity Units
WHO	:	World Health Organisation
USEPA	:	United states environmental protection agency
CCP	:	Composite Correction Program
CPE	:	Comprehensive Performance Evaluation

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