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FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

Analysis of Non-Revenue Water

A Case Study of NWSC – Jinja Area

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A final year project report submitted to the Department of Mining and Water Resources Engineering in partial fulfillment for the award of a Bachelor's Degree in Water Resources Engineering

MAY 2015

ABSTRACT

Uganda is called the pearl of Africa because it is well endowed with natural resources beautiful environment and abundant water covering about 18% of her surface area. With the increasing population and poor management of resources, stress has been put on these existing resources where by pollution of existing water sources both surface and ground water is increasing. This has put the cost of treating surface water for urban (municipal) water supply very high therefore for effective and sustainable use of treated water; there is need for proper infrastructure management.

Municipal water supply systems in Uganda and other developing countries are faced with problems of aging infrastructure and high amounts of NRW which affect the financial viability of the systems and intermittent water supply situations some of which run for weeks therefore, every water utility company need to carry out an assessment of NRW to step up the efforts in fighting it and increasing on the efficiency of the system operation. This research focused on identifying the causes of high amounts of NRW and identifying the suitable counter strategy measures for fighting these high losses.

Chapter one consists of the background, problem statement, justification, purpose of the study research questions, objective and scope of the research; this is where the importance of this research is elicited. Chapter two consists of the relevant literature of this research, all the literature about NRW management using various methods are mentioned in a simplified form, it is recommended for systems which have no or local NRW reduction strategies. Chapter three consists of the methodologies that were used by the researcher to come out with the findings which include interviewing, observation and document review to achieve the objectives.Chapter four consists of the research findings that came out after the methodologies were carried out.Chapter five analyses the findings of the research and looks at the existing situation of the system. Chapter six has conclusions, recommendations challenges and future research that can be carried out. The recommendations were made by the researcher basing on the field findings and the existing situation, if implemented can help to reduce on the high amounts of NRW.

DECLARATION

I **Mageni Moris Ombworoh** Registration Number***BU/UG/2011/205*** hereby declare that this work is an output of my efforts and has not been submitted to any institution of higher learning for the award of a degree, or any professional accolade.

Sign: .....

Date:.....25th/05/2015.....

APPROVAL

I affirm to the best of my knowledge that **Mageni Moris Ombworoh**, registration number: ***BU/UG/2011/205*** has tirelessly compiled this project report under my supervision, and it can be submitted to the University management for academic award.

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ACKNOWLEDGEMENT

I extend my sincere gratitude and thanks to the Almighty GOD, who gave me the knowledge, kept me healthy and protected me in all ways that I managed to come up with this research project report amidst all the challenges that I went through.

My humble appreciation also goes to my supervisors Mr. Muyingo Emmanuel and Mrs. JaquelineAbbo for their kind support and guidance they tirelessly rendered to me during the course of this research.

I also extend my sincere appreciation to the entire NWSC from the research manager at IREC Bugolobi, the general manager Jinja area, the Engineers Jinja area, the SNARP team and the entire staff of NWSC – Jinja area for being so hospitable and accepting to give me the information that has helped me so much to achieve the objectives of this research, may the Almighty Father in heaven reward them abundantly.

I extend further appreciation to my fellow students of Water Resources Engineering for the encouragement and help in the literature searching over the internet and their prayers and comfort that I got from them especially Mr. Ogen Moses

I finally thank my family for the support they have given me during this time of project report writing; their prayers and encouragement are invaluable, may the almighty GOD reward them abundantly.

LIST OF ACRONYMS

ALC	–	Active leakage control
AWWA	–	American water works association
AZNP	–	Average Zone night pressure
AZP	–	Average Zone Point
BABE	–	Bursts and background estimates
CAPL	–	Current Annual Physical loss
CARL	–	Current annual real losses
DC	–	Direct Current
DMA	–	District Metered Area
ELL	–	Economic Level of Leakage
ESPB	–	Equivalent Service Pipe burst
GIS	–	Geographic Information System
GoU	–	Government of Uganda
GPRS	–	General Packet Radio Services
GSM	–	Global System for Mobile Communication
IDAMC	–	Internally Delegated Area Management Contract
ILI	–	Infrastructure Leakage Index
IWA	–	International Water Association
LC	–	Local council
MAAPL	–	Minimum achievable annual physical loss
MDG	–	Millennium Development Goal
MNC	–	Minimum night consumption
MNF	–	Minimum Night Flow
NDF	–	Night-to-day factor
NFT	–	Night flow test
NNF	–	Net night flow
NRW	–	Non-Revenue Water
NWSC	–	National Water and Sewerage Corporation
PACE	–	Performance Autonomy and Creativity Enhancement

PMA	–	Pressure Management Area Programme
PRV	–	Pressure Reducing Valve
SCADA	–	Supervisory Control and Data Acquisition
SIM	–	Subscriber Identification Module
SNARP	–	Suppressed Accounts, Non-Revenue Water, Arrears Reduction
SWITCH	–	service coverage, water sales innovation teamwork customer care harnessing resources
TARL	–	Target Annual Real Loss
UARL	–	Unavoidable annual real loss
US EPA	–	United States Environmental Protection Agency
USAID	–	United States Agency for International Development
USD	–	United States Dollar
w.s.p	–	When system is pressurized
WLTF	–	Water Loss Task Force

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CHAPTER I: INTRODUCTION

1.0 Introduction

The distribution of water on the Earth's surface is extremely uneven. Only 3% of water on the earth's surface is fresh; the remaining 97% resides in the oceans. Of freshwater, 69% resides in glaciers, 30% underground, and less than 1% is located in lakes, rivers and swamps. Only one percent of the water on the Earth's surface is usable by humans, and 99% of the usable quantity is situated underground.

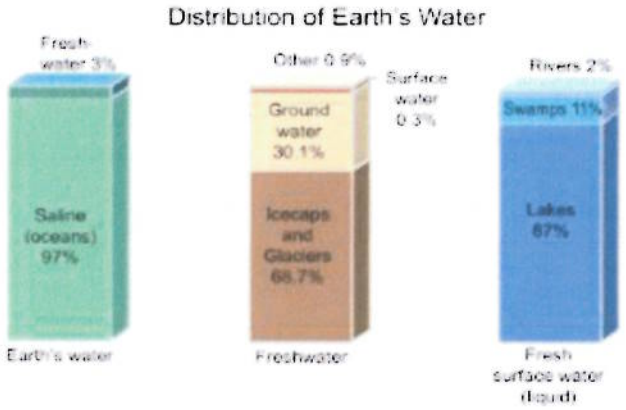

Figure 1.1 Distribution of earth's water

Uganda's fresh water resources are considered to be a key strategic resource, vital for sustaining life, promoting development and maintaining the environment. Uganda's rivers and lakes, including wetlands, cover about 18% of the total surface area of the country, with rainfall being the greatest contributor to the surface and ground water resources. (www.wikipedia.org/wiki/water_supply_and_sanitation_in_Uganda)

According to the Ministry of Water and Environment (MWE) 2014, the urban population in the 198 urban councils in Uganda is estimated at 6.55 million. These towns comprise of 66 urban councils served with piped water by the National Water and Sewerage Corporation, (population 4.32 million), and 132 Small Towns under the Ministry of Water and Environment/Directorate of Water Development (77 of which are served with piped water), with a population of about 2.23 million. During this FY 2013/14, 38 towns were transferred from DWD to NWSC for operations and management.

- In the existing DMAs, average zone points (AZP) should be established with pressure measurement provisions to enable pressure measurements to be carried out and analyzed.
- A clear record of system pressures should be kept for daily monitoring of pressures and also a pressure management system should be installed because basing on document review, it indicated that as much water is pumped into the system, much is lost meaning the network is aging and needs pressure management.
- The whole system should be updated in GIS maps so that leak detection can be done effectively and all staffs should be trained in map reading
- All meters that are installed vertically should be changed to horizontal installation *(refer to appendix C)*

5.3 Challenges

- Company policy of restricting accessibility of data like monthly billing reports, leakage reports hindered a standard analysis of the research.
- Lack of information such as books from IWA publishers where the researcher only accessed a few of them,
- Lack of funds to facilitate the researcher in accommodation, feeding and transport to the office, this made the field work to be cut short before enough data was collected,

5.4 Future research:

Data based analysis (analysis of NRW based on long term data from billing, DMA and water works)

Potential of pressure management in NWSC – Jinja Area water supply system

Effective infrastructure management of the system as regards expansion versus NRW management and rehabilitation (meters and mains replacements)

5.5 References

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