

**MANAGEMENT OF  
UNACCOUNTED FOR WATER  
IN  
GREATER COLOMBO WATER SUPPLY SYSTEM**



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**BY**

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Civil Engineering of University of Moratuwa  
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This thesis had not  
been presented in  
whole or part to  
any University or  
Institute for a  
Higher Degree



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## ABSTRACT

Water losses in water supply systems is a common phenomenon experienced by water supply facilities all over the world. Unaccounted For Water (UFW) is the difference between the quantity of water produced and the quantity of water consumed, in water supply system. The term "Non Revenue Water" (NRW) is used to define the difference between the quantity of water produced and the quantity of water which brings in revenue to the Water Authority and sometimes used instead of UFW.

UFW in a water supply system cannot be eradicated but could be minimised and maintained at a low level, by proper management of operations and controls in the system.

In this report, the author studies and analyses in depth, the problem of UFW in Greater Colombo distribution system with reference to the available figures of UFW and its components. A detailed classification of UFW is given in Fig. 1.1 and the situation in other countries also are outlined.

A literature review was carried out on methods to manage the major components of UFW, with special concern to the Greater Colombo System.

Available literature on performance of water meters were also reviewed. Also the economics of management of UFW is discussed under theoretical considerations.

A theoretical study was done on passive leakage control and active leakage control and the level of leak at which the active leakage control becomes economical was determined. Also certain indices were derived to calculate the UFW and its components, with the availability of refined field data in future.

In the field programme, field methods to control UFW were tried out. An insertion meter pipe flow testing was done to verify as a sample, the accuracy of readable production bulk meter and the reading was found to be satisfactory.

A leak repair recording format was designed to be implemented in Greater Colombo maintenance offices. The characteristics and benefits of this format is explained in section 3.2 and discussed in the discussion.

A test was done to verify the effect of throttling of stand posts. 5 stand posts were metered and throttled. This test yielded extremely satisfactory results in the field. The costing of this proposal was done under the discussion.

A minimum night flow test was carried out as a trial on a selected and isolated sample of distribution system and satisfactory results were gained on the selected stretch of distribution.

Sample testing of water meters were done on two batches of 1/2" water meters viz, turbine meters and volumetric meters. On the results obtained, it was suggested to replace turbine meters in the system and a costing calculation was done in the Chapter 4.

Author concludes that the throttling of standposts is one of the most effective means to reduce NRW in G/C. Also turbine meter replacement and caretaker system were shown to be effective means. Author further emphasizes the importance of highest attention on bulk production meters and also concludes that MNF test could be regarded as a suitable baseline to monitor UFW.

Author recommends on further study on meter replacement periods, action plan to control illegal consumption, and setting out guidelines on LR, LDR and PR. Also emphasis is made on the importance of studying on modifications to be done on the present distribution system and future distribution systems in order to facilitate reducing and easy control of UFW.



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## ABBREVIATIONS

ADB	Asian Development Bank
CMC	Colombo Municipal Council
G/C	Greater Colombo
IWSA	International Water Supply Association
L/D	Leak Detection
LDR	Leak Detection and Repair
MGD	Million Gallons per day
MNF	Minimum Night Flow
NRW	Non Revenue Water
NWS&DB	National Water Supply and Drainage Board
PR	Pipe Replacement
tcmd	Thousand Cubic Meters a day
UFW	Unaccounted for Water