

An Overview: Auditing of Water Use on Construction Site

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Abstract – Water is essential for the living beings. The construction of cities in arid regions impedes imbalances between supply and demand. The water supplied by private supplier for construction purposes is not mentioned. That is why Innovative technology has been developed to support effective delivery called as water audit. In the late 1980s, water audits were conducted to overcome drought-related problems, scarcity, leaks, and losses. Water Audit provides a rational, scientific framework that categorizes the total water consumption in the system. The water audit is carried out mainly for the water that is not detected. The water audit helps to identify and quantify the additional water consumption and losses. The International Water Association (IWA) / American Water Works Association (AWWA) have commenced a massive effort to mitigate related issues with the help of audits.

Keywords - AWWA, IWA, Water Audit

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1. INTRODUCTION

Water is essential for the living beings. Currently, with 4% of water resources, India must support population and livestock. Available water resources are considered insufficient to meet all future needs. Audit of water minimizes losses and optimizes various applications, allowing construction sectors as well as other sectors of water use such as households, electric power; industries also can save considerable water. Audit of water determines the amount of water used for construction. The water quality audit determines the amount of water lost from the distribution system due to theft, the fraud or fraudulent withdrawal from the system and the leakage.

Water is main resource of construction industry. Water audit and its analysis can save valuable resources and public funds as well as many water related problems. The purpose of the audit is to express an opinion on the person / organization / system etc. of the problem under the evaluation based on the work done on the test basis. Water audit provides a reasonable scientific framework to classify the use of all water in your system. Water audit provides a detailed profile of distribution system and water users.

2. LITERATURE STUDY

2.1 Water audit- a tool for assessment of water losses: R. A. Ganorkar studied that the water audit

study should cover the overall approach to total water resources and their distribution. P.I.Rode stated that the purpose of the audit is to express an opinion on the person / organization / system etc. of the problem under the evaluation based on the work done on the test basis. With the help of water check they found the leakage, calculated losses in the system and stated to take the necessary measure for the future and determine the performance objective to improve the service level standard for the area. They used the standard water balance framework to classify and to estimate the water quantity used for water checking.

2.2 Water audit and inevitability of water meter: Mansi Master studied the water consumption is above the water usage limit. Therefore she suggested installing of water meters. After the installation of the water meters, a water control is performed and the comparison for the analysis in both cases is completed. They have performed some programs like detection program leak, to know where the losses have happened. With the help of study they concluded that after installation of the water meter, the water usage limit has decreased to 8%.

2.3 Water Audit for Trimbakeshwar Council: Patel Harshit J stated that water audit helps to find water leakages and calculate the losses in the system. According to their study effective water management is the major problem that we need to work on it. The water audit helps to quantify all forms of losses and helps reduce unrecovered water. A water audit

determines the amount of water lost by a water supply system and the cost of that loss to the utility. Most losses that occur in water systems can be better managed using a water audit.

2.4 Water Audit: Isha.P. Khedikar stated part of the total water use is leakage, in part due to inaccurate measurements and unauthorized use and water delivered to customers. The level of detail of the water audit will vary depending on the information available on the system. The loss of water costs money, paid by the system and the customers. Most of the losses that occur in water systems can be better managed by using a water audit. According to their study there are two categories, apparent loss and actual loss, the two components of water loss. Apparent loss is the category of water that is delivered to an end user but is not properly measured or recorded. Apparent losses consist of water that is not properly recorded on the paper. Apparent losses are more expensive for the system than actual losses.

2.5 Water Loss Performance Indicators: R. Liemberger argued that the best performance indicators of simple traditional real losses are "per service connection" or "per km of pipeline"; they should be accompanied by an estimate of the average pressure and, preferably, a calculation of the leakage index of the infrastructure. The Working Group on Water Loss should use a "hands-on approach" to "develop and promote international best practices in water loss management". The water exported from a system or subsystem, then for a given volume of NRW, the % NRW will be lower than in the case where no water is exported. From 1996 to 1999, the Water Loss Task Force was tasked with identifying the best traditional performance indicators for both non-water and real losses, and developing improved performance indicators for these parameters.

2.6 A Survey on "Water Monitoring System": Pragya Jain stated water auditing is an emerging method of increasing accountability for water utility systems. She proposed the system that will monitor the amount of water usage so that the unwanted usage of water can be avoided. With the help of IoT they are monitoring the water usage. The importance of the system is that they are monitoring the water usage remotely. This system can be extended to apply in a big place where the water wastage must be avoided.

2.7 Water Audit: Kedar Chimote stated water audit study shall be covered the holistic approach towards total water resource, distribution and its efficient use to reduce the capital and operating cost as an added advantage over the optimized use of water resource with environment protection. The portion of total water use is leakage, some of it is due to inaccurate metering and some of it may be unauthorized use. According to them the first step in

completing the standard water balance is determining system input.

3. FORMULAE

Following are the equations with the help of which losses are calculated. With the help of below equations Infrastructure leakage Index is also determined.

1. Water Losses = Apparent Losses + Real Losses.
2. Nonrevenue Water = Water Losses + Unbilled Authorized Use.
3. Apparent Losses = Metering Inaccuracies + Unauthorized Use.
4. $ILI = CARL/UARL$
5. $UARL \text{ (liters/day)} = (18 \times Lm = 0.8 \times Nc + 25 \times Lp) \times P$

Key word: - Infrastructure Leakage Index (ILI), Current Annual Volume of Real Losses (CARL), Unavoidable Annual Real Losses (UARL), Length of mains (km) (Lm), Number of service connections (Nc), Total length of private pipe, curb-stop to customer meter (km)(Lp), average pressure (m)(P).

4. CONCLUSION

The purpose of present study is to understand the necessity of water audit and hence the conclusion can be made that the water audit study should cover the overall approach to total water resources. With the help of Water Audit, leakages can be found and the losses in the system can be calculated and take the necessary steps for the future. A water audit determines the amount of water lost by a water supply system and the cost of that loss to the utility. Most of the losses that occur in water systems can be better managed by using a water audit. Part of the total water use is leakage, in part due to inaccurate measurements and unauthorized use and water delivered to customers.

5. ACKNOWLEDGEMENTS

We would like to thank our Principal of institute Prof. Dr. D. D. Shah, HOD Civil Department Prof. Dr. A. W. Dhawale and Prof. Ankit Kulkarni and all staff and all our dear friends for their support.

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