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The Method of Leakage Policy Development

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Abstract: Drinking, using and irrigating water are delivered to the subscription using a transmission system after going out of the source. Water is delivered to subscription using main pipes-storage, networks, house connections, housing installation complexand sort of pipes, values, suckers and professional meters. This way sometimes covers hundreds or even thousands km. Water known as flowing liquid, is not enough to reach its place physically. It is necessary for water to reach its place in a safety healthy and sufficient way. It is impossible to reduce leakage water into lowest level for system of supplying water. The only thing to be done for leakage water is to keep up it at the same level. There is no way to reduce the leakage water under the level of 5% even on the well organized and well managed transmission system. Today; to keep the leakage water at the level of 15 % is a big success. Many cities, towns and countries are delivered to water taken off sources, to it is subscription after loosing. It is 30 % and 65 % on the way. The water reached to it is subscription is sometimes inefficient or unhealthy for people. It is necessary to choose and practice rational method in order to find out the level of leakage water.

Key Words: Material, Distribution Leakage, Leakage rate, Productivity, Management

INTRODUCTION

In order to determine the optimum leakage control policy for any water supply system, it is essential to accept a rational method of approach. The decision process followed must take into account all relevant factors associated with the system, together with the resources of the water undertaking administering the service[1].

Prior to 1980, leakage control policies were derived from subjective assessments of the benefits to be gained. At that time a procedure to determine the most appropriate policy was developed in UK by the Water Research Center (WRC), following a nationality coordinated programme of more than 500 field experiments and measurements. Although the procedure was determined from data based on UK conditions, experience gained since that time in many countries all over the world, has led to developments and refinements to the process to make it a more flexible and suitable selection process for worldwide application[2].

As a result, the main aim of this article is to emphasize the method of reduced leakage water, with its benefit of agriculture fresh water, irrigation and sanitation for people.

MATERIALS AND METHODS

Leakage levels: Leakage can arise from various sources and so this aspect was investigated during the experimental programme undertaken by the Water Research Center. The results indicated that most service reservoirs lost less than 0.5% of their capacity daily and that the majority of trunk mains had leakage levels of less than 1,000 liters/kilometer/hour. On the other hand, indirect measurement of distribution system losses from net night flows indicated that where water metering was practiced leakage levels averaged out at 6 liters/property/hour, with 3 times this figure occurring in areas with passive leakage control. The main conclusion therefore was that distribution system was generally the main source of leakage but that this could be reduced dramatically by active leakage control.

It must be emphasized that it is essential to determine or assess the level of leakage from each component of a water supply system and not to assume that the above findings apply to all water supply systems. Quantification of existing leakage component levels is essential in order to determine the likely reduction in those levels that can be achieved and hence the economic justification for a particular control policy.

There are two methods available for estimating the level of unaccounted water or leakage. Of the two, the Total Integrated flow Method is simpler to apply but is less accurate than the Total Night Flow Rate Method. The main reason for these larger errors is that cumulative flows over a period, usually at least one month, are used. These relatively large quantities are then subtracted in order to acquire the relatively small quantity of unaccounted water. The method is also liable to larger

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errors due to consumer meter inaccuracies and the necessarily fairly subjective estimates of per capita domestic consumption. The total integrated flow formula is as follows:

u = s — (m + a x p)

Where,

u = unaccounted water

s = net inflow to system

m = metered water quantity

a = average per capita domestic conscription plus an allowance for unmetered commercial consumption

p = population supplied

The preferred approach to leakage estimation is that based on total night flow rate measurements. Data on measured zone input flowrates at night (net night flow or MNF) and night flow rates to all industrial and commercial users, are utilized in the following equation to derive the estimated level of leakage.

u = s - (m a x n)

Where,

u = night leakage flow rate,

s = net night flow.

m = industrial and commercial consumer night flow rate.

a = average domestic night flow rate per property (waste).

n = no. Of properties supplied.

The night leakage flowrate derived can be converted into a total daily quantity by multiplying by 20 hours instead of 24 hours to take into account the fact that pressures at night are higher than those during the day[3].

RESULTS AND DISCUSSIONS

Benefits of reduced leakage: In distribution systems where it is not possible to supply enough water to satisfy the existing demand, leakage control measures can be used to reduce waste, thus enabling a greater proportion of the demand to be satisfied. The economic benefits of leakage control will then be represented by the resulting rise in net revenue from increased water sales. However, if demand is already totally satisfied, leakage control measures to reduce system losses will also reduce operational costs and defer further capital expenditure, the resulting economic benefits therefore being represented by cost savings.

A primary benefit of reduced leakage is derived from economic savings or increased revenue and consequently it is normally only worth implementing leakage control measures when economic benefits are greater than the cost of implementing the leakage control measures. When consumer demand is fully satisfied, the potential economic benefit resulting from the application of leakage control measures arises from two separate sources. These sources yield the following benefits:

The reduction of annual operating costs (pumping costs, treatment costs, bulk water purchase costs, etc.).

The deferment of those capital schemes or those parts of capital schemes that are required to satisfy increases in demand (sources, reservoirs, treatment works, mains, etc.).

The first element provides an immediate saving that results from a reduction in operating costs, since the water saved will not have to be treated, chlorinated or pumped. The second element is a saving that results from the deferment of demand- related capital expenditure.

A reduction in total water demand means that the next source, treatment work or pipeline will not have to be built as soon and this in itself represents a saving to the utility. Calculation of this second element is more complex, as it is based on the discounted net present value of deferring future source and distribution works. Assumptions on the future waterdevelopment programme of the utility therefore have to be made to identify the cost of this element.

The combination of these two elements gives the potential economic benefit of reducing leakage. It is more convenient to express this benefit as a unit cost per cubic meter and is frequently termed the unit cost of leakage.

In many distribution systems it is not possible to supply enough water to satisfy the existing demand and in this situations leakage control measures can be used to reduce waste, thus enabling a greater proportion of the demand to be satisfied. The economic benefit of leakage control to the authority in this case is the resulting rise in net revenue from increased water sales. The logic of the foregoing argument, however, remains equally valid[4].

Apart from economic benefits, significant secondary benefits also arise from reduced levels of leakage, largely because maintaining low leakage levels requires the system to be operated more efficiently. These secondary benefits include:

Better knowledge of the system, leading to more efficient operations.

Improved maintenance standards, giving a longer operational life for system components.

Fewer breakdowns and improved pressures, which result in better public relations and a higher standard of supply.

Though these factors are not easy to quantify in economic terms, they are nevertheless real benefits.

REFERENCES

1. Orhan A.H., 1997. The Principle of Underground Structure Management, Diyarbakir-Turkey

2. Gordon L.L., 1988. Leak Detection and Modern Methods, Cost and benefit, Reduction & Control of Unaccounted for Water” Bangkok, pp:168-170.
3. Bays L.R., 1988. Leakage Control, Reduction and control of unaccounted for water. Bangkok, pp: 63-167.
4. Moyer E.E. and M.W. James, 1988. The Economics of Leak Detection and Repair a case study. Reduction and control of unaccounted for water. Bangkok, pp:. 152- 157.