

## Control Method Cost and Effectiveness

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**Abstract:** As being underground of system, it is quite difficult to find out of leakage water. This is a disadvantage for us. Besides the cost of economical side it has also social side. For this reason we should have a wide aspect on the leakage water subject. There are 6 areas where the leakage water occurs. These are 1. Reservoir-storage, 2. Main pipe, 3. Network, 4. Zones which have house connection and fitting, 5. The zones whose water sources used in an uncouth and unregistered way, 6. Misreading of the meter and its errors. One of the researches made on 15 countries and 81 habitats shows that the amount of leakage water occurs mostly, %3 at the first step of getting water, 64 % on the main pipes on treatment plants and main storage, the rest of it (33%) on the house connection, network and on the system of meter. We need some new methods to improve control system and prevent leakage water. It's necessary to measure the control system which is more beneficial. As not being under control of leakage water will cause harm on the water management. Any management can't tolerate this.

**Key Words:** Leakage Water, Economic Value, Leak zone, Save and Management

### INTRODUCTION

Each control method has a different cost associated with it and will archive a different level of leakage reduction. In this section the reductions likely to be achieved and their costs are briefly considered.

**Pressure control:** The likely reduction in leakage for a given reduction in pressure can be predicted from Fig. 1, having determined the current average night pressure in the zone at night. Where ground levels differ appreciably in a zone the average night pressure is given in Fig. 1.

- C Present net night flow = 18 i / prop /hr average zone night pressure = 90 metres
- C Original leak index =790
- C Proposed average zone night pressure = 50 metres Proposed leakage index = 35
- C Reduction factor =Proposed leakage index /Original leakage index = 0.443

Predicted net night flow = 18 x 0.443 = 8.0 i /prop/hr  
 $S \times \text{max. night pressure} + (1-S) \times \text{min. night pressure}$ ,

where; S is the proportion of the system with pressure greater than the average of the max. and min. night pressures in the zone. The potential reduction in pressure can be estimated by examing the lowest daily pressure which occurs in the zone and determining how much this

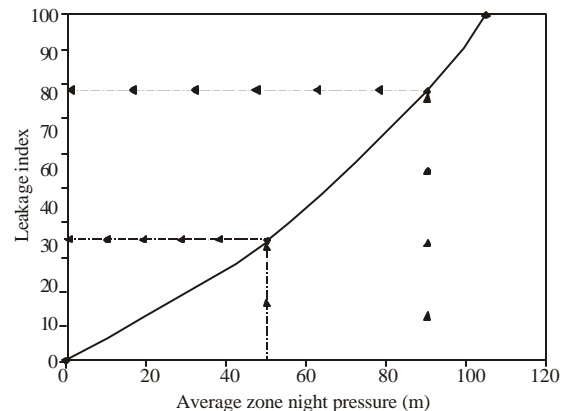


Fig. 1: Prediction of reduction in minimum night flows with pressure control

could be reduced by to still maintain a minimum desirable pressure. The leakage indices for the engine and the reduced average zone night pressures can then be determined and the predicted reduced net night flow (NNF) calculated as demonstrated in Fig. 1<sup>[1]</sup>.

The reduction in NNF can then be determined an converted into a daily quantity. To allow for pressure variations throughout the day it has been found that multiplying NNF rates by 20 hours gives a satisfactory estimate of the daily leakage. The annual cost saving is then given by:

- C reduction in NNF x 20 x 365 x unit cost of leakage.

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Operation	Details
Record minimum night flow (mnf)	8 man hours including 3 at overtime rates
Perform a step test	13 man hours at overtime rates
Sound houses/fittings	20 properties per hour
Read district meters	1 man + vehicle can read 40 per day
Repair backlog of leaks (per 1,000 properties)	2 man—weeks + vehicle
Locate reported leaks with passive leakage control (per 1,000 properties)	2 man—days + vehicle
Planning and checking district	2 man—weeks
Frequency of. district inspection for regular sounding and district metering	annually
Frequency of meter reading	weekly
Frequency of recording mnf	4 to 6 times annually
Frequency or step testing	1.5to 2.5 times annually
Frequency of district inspection. for waste and combined metering	2.3times annually on 65X of the steps

The associated leakage control costs are those attributable to the installation and maintenance of the pressure reduction equipment. Annual costs can then be derived from:

$$C = \text{installation cost} / \text{pay—back period (say 5 years)} + \text{annual maintenance cost}$$

**Regular sounding and metering control options:** The anticipated reductions in leakage levels for these options can be assessed by considering the likely benefits obtainable when compared with a passive leakage control policy. This is achieved by considering the likely values of NNF in urban areas for each method, these values being derived from the WRC experimental programme as detailed in Table 1.

These values can be expressed graphically as in Fig. 1. By comparing the initial measurement of NW in a zone, the intrinsic leakage level can be read of I for the existing control method and for any other method that is being considered. The likely reduction in NW by changing from one policy to another can then be assessed and the anticipated annual saving derived as above. It has been found by experience that in some developing countries the reductions achieved in NW have been less than those predicted. Accordingly, for cost—benefit analysis purposes it is recommended that a correction factor of 0.67 should be applied to take account of this and to reflect different Standards and conditions pertaining in such countries<sup>[3]</sup>.

Having derived the anticipated cost saving for each control option, the capital and operating costs of implementing each method must be derived. These should be determined locally to reflect local conditions and practices. However, some guidelines are given below<sup>[4]</sup>.

Table 1. Levels of net night flows in large urban areas

Leaka4e control method	Areas where leakage is typically		
	Low (1/prop/hr)	Medium (1/prc'p/hr)	High (1 /prop/hr)
Passive leakage control	15	10	25
Regular sounding	8	10	14
District metering	6.5	8	11
Waste metering	5	6	8
Combined metering	5	5	8

By summing the annual costs of leakage and the costs of leakage control, the total for each method of leakage control can be determined (Fig. 1. ). Because of the assumptions and estimates inherent in the procedure it is unlikely that methods that total cost differences of less than 10% between two methods will have much significance. Only those methods with a total annual cost greater than 20% above the minimum total cost should be excluded as being uneconomic<sup>[4]</sup>.

Final selection between the remaining economic options is then determined by consideration of local factors which cannot easily be determined in economic terms. Some of the unquantifiable benefits and constraints are likely to include, the following:

**Benefits:**

- C Better knowledge of the system
- C Better accounting of water distributed
- C Better system maintenance
- C Improved public relations

**Constraints:**

- C Man power policies
- C Night work limitations
- C Financial constraints
- C Political constraints
- C Local physical features, e.g. status of existing apparatus
- C Current leakage control methods.

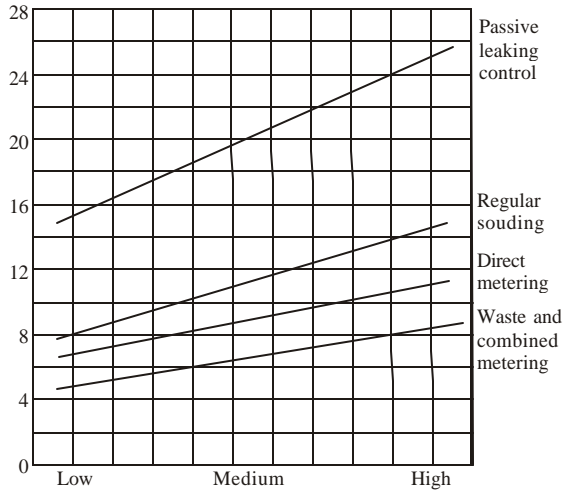


Fig. 2: Prediction of net night flows for different control methods

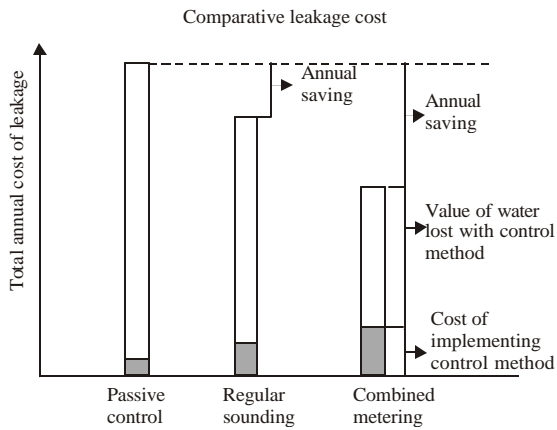


Fig. 3: Intrinsic leakage levels

## RESULT AND DISCUSSION

When we discriminate of the leakage water we have to take into consideration all the system. Because according to the law of mass position the water quantity which input must be equal the output<sup>[2]</sup>.

It is impossible to keep the leakage water around "0". it is approximately %15, %10. The leakage of this level must be gained and while doing this air pressure tanksystema specially causes to the misunderstanding.

It is necessary for us to practice the rules of "Engineering Economy" on every stage. If we compare the cost of the leakage and the cost of economical factors we will have to obey the economical rules<sup>[5]</sup>.

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