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## LEAKAGES IN WATER DISTRIBUTION SYSTEMS- A REVIEW

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**Abstract:** - Over the last few decades water stress has been increasing both due to an increase in water demand and reduced water supply. Water leakage reduction in public water systems is a crucial part of water demand management. Leakage is usually the largest component of distribution loss yet it is not subject to regulation other than management decision by utilities. Leakage in public water supply systems results in loss of purified drinking water but also means wasting the energy and material resources used in abstraction, transportation and treatment. It results in secondary economic loss as well, in the form of, damage to the pipe network, public health concerns as it increases the risk of bacterial contamination of water resources in cities for human consumption, and can increase pollution loads into the environment. Leaks in pipe networks can result for several situations. A water operator must have an understanding of the causes of leaks so that they can be both repaired and prevented in the future.

**Keywords:** Types of leakages, Causes of leakages, Consequences of leakages, Leak detection Systems, leak detection.

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## INTRODUCTION

Water is a transparent fluid which forms the world's streams, lakes, oceans and rain, and is the major constituent of the fluids of living things. Water pollution is the contamination of water bodies(e.g. lakes, rivers, oceans, aquifers and groundwater). This form of environmental degradation occurs when pollutants are directly or indirectly discharged into water bodies without adequate treatment.

## II TYPES OF LEAKS

The American Water Works Association has identified three major categories of “losses” in a water distribution system. These categories are:

1. Accounted for losses
2. Real losses
3. Apparent losses

### Underground Leaks

The underground piping on either side of a water meter should be maintained. Leaks in underground plumbing can be caused by many different factors, including rusting through from age or from stray electric currents from other underground utilities that can prematurely rust metallic piping, driving over piping with heavy trucks or equipment, poor initial installation, freezing and thawing of a pipeline, leaking joints or valves, or transient high pressure events such as opening and closing valves or starting and stopping pumps quickly

### Unaccounted-for Water

Un-accounted for water (UFW) is the quantity of water, which is not actually billed for and water charges for the same are not realized from the consumers.

The UFW water can be of two types:

- Physical loss and
- Nonphysical loss.

## CAUSES FOR LEAKAGE

1. Water chemistry

2. pH of the water
3. Amount of oxygen in the water
4. Temperature of the water
5. Velocity and pressure of the water in the pipe
6. Leaky Water Pipes
7. Deterioration Or Shifting:
8. Temperature Change:
9. Unregulated Water Pressure:
10. Clogging action
11. Bad Workmanship

#### **IV Necessity for analysis of leak detection**

- Avoided costs for treatment plant and distribution system expansion
- Increased knowledge of the water distribution system
- Reduced risk of water contamination
- Increased fire fighting capability
- Less wear and tear on pumps, treatment plants and distribution systems due to less water going into the system
- Less property damage resulting in fewer insurance claims or lawsuits
- Enhanced public relations through more efficient service to customers
- Delayed expansion of treatment plant and distribution system
- More efficient leak repair, resulting in fewer “surprise” leaks or breaks
- Less overtime required of utility workers for fixing leaks at odd hours

- Reduced flow to wastewater treatment plants due to less inflow into sanitary or combined sewers
- Improved overall environmental quality
- Increased revenue to the utility

## **V CONSEQUENCES OF LEAKS**

1. It can contribute to the cost of pumping, treating and distributing water to be unnecessarily higher than normal.
2. If extreme leakage occurs, it can cause utilities to look forward and develop a plan to expand the existing water treatment plant.
3. Environmental consequences
4. Water Quality Deterioration
5. Health aspects

## **VI Leak Detection and Repair Strategies**

1. Coordinating Leak Detection and Repair with Other activities
2. Managing Water Distribution Systems
3. Water audit

## **VII Leak detection systems**

### **A. Internal leak detection systems**

1. Volume balance
2. Pressure analysis
3. Real time transit modelling

### **B. External leak detection systems**

1. Accoustic emissions
2. Liquid sensing

3. Vapour sensing
4. Fibre optic sensing
5. Leak detection by using helium gas.

### VIII CONCLUSION

Discussing leakages in water distribution system brings up a dif-fuse, complex series of issues. Some leakage problems can and have been successfully addressed. Knowing that the growing environmental condition has intensified the problem of leakages in water distribution system. It is clear that we each need to get involved in contributing to the solu-tion. It will require a high degree of partici-pation and collaboration at the individual, industry, and govern-ment levels.

Efforts at all of these levels become more ef-fective with elevated public awareness about leakage sources and impacts. Because of the value of science in dealing with leak effects, there is a need to devote resources to research, improved monitoring, and the continued development of strategies and technologies.

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