1.1 Background

The world’s population exploded during the twentieth century. At the close of the year 2000 approximately 6 billion inhabitants called the planet earth home, up from 4 billion in 1974. That such growth could occur is a testament to man’s unique ability to provide the essentials of clean air, water, food, and health care to its masses. However, during the latter half of the same century, man also recognized that the world’s resources couldn’t continue to sustain this rate of growth indefinitely; at least, not by using the same methods to which we have become accustomed. Our resources are finite.

The availability of safe water has been a major contributing factor in the growth of the world’s population, by serving man’s drinking water and sanitation needs. The ability to create large water supply systems to abstract or withdraw, treat, and transport vital water to whole communities’ fingertips stands as one of history’s great engineering marvels. Yet notable caveats exist to this success story. Many developing countries still do not have the water supply infrastructure to provide clean water to individual customers; or to supply it on a continuous basis. In such places, modern water systems are lacking due to the same social, political, and economic complexities that challenge all aspects of development in these lands. While these populations struggle to gain basic levels of service, many highly developed water systems, in technologically advanced countries, suffer an insidious problem that threatens the long-term sustainability of water resources for the future—water loss. Most of the world’s water systems, or undertakings, have been highly successful in delivering high-quality water to large populations. However, most of these systems have done so with a notable amount of water loss occurring in their operations. In years past, the seemingly infinite supply of water in expanding “new worlds” allowed water loss to be largely overlooked. With water readily available and relatively inexpensive, losses have been ignored by water utilities, or assumed to be naturally inherent in operating a water supply system.

As of February 2008, the world population was estimated to be approximately 6.6 billion!
But with the demands of growing populations, realization of the limits on our natural resources and increasing costs from regulations and customer demands, it is becoming increasingly unrealistic to allow water loss to be ignored.

Upon close evaluation it appears that many of the reasons for water loss from meter error, leakage, or data mishandling are actually based on human failings and lack of maintenance. Dickinson\(^2\) has concluded that while it is difficult to generalize, the most common reasons for water utilities not to address water loss in an appropriate manner are: “political infeasibility of admitting system leakage, falsifying water accounting records, lack of recognition that recapturing nonrevenue water with an upfront investment is a still great business case with fast payback, and inherent mistrust of anyone outside the utility examining their system.”

The intention of this manual is to explain the reasons why suppliers should reduce lost water and identify how to resolve water loss problems using today’s technology in an economically sound manner.

All water utilities and industrial and residential end users should practice water loss control and water conservation regardless of the size of their system or nature of their use. The level of water loss management effort that is being exercised by water suppliers worldwide varies widely. Unfortunately, most of the water industry in the United States and many parts of the world accord water loss only secondary priority since the true economic and social impact of water loss has not yet been realized by policy-makers. In this status water loss continues to suffer from a lack of good auditing practices and a failure to reduce leakage proactively; instead waiting for the next customer complaint to prompt the supplier to reactively repair the next problem leak. However, in a small but growing number of countries throughout the world, comprehensive water efficiency goals have been established. Water conservation, watershed protection, reuse and the new discipline of leakage management have been implemented as required practice by the highest level of government and supplier performance is closely monitored and sometimes regulated. This new model of water resources management is the way of the future because it must be, if mankind is to continue to sustain its growth and its environment.

### 1.2 The Purpose of This Manual and Its Structure

This manual discusses in great detail methodologies to assess the volume of water losses, water loss control methods and technology, and is aimed at providing the practitioner with all the necessary background and theory to apply proactive water loss management. However, this book also seeks to promote awareness, foster positive attitudes, and pull together not just the ideas of the authors, but also those of other specialists in the field. In addition to our ideas and thoughts stemming from many years of hands-on field intervention against water loss and inefficient use, this book also highlights up-to-date case studies and industry-specific papers to reinforce the concepts and methods already being successfully applied in the field.

Case studies are an excellent tool for assisting operators in preparing a master plan that takes an aggressive stance against water loss and inefficiency.
The fact that somebody else has done it before makes, in many cases, the job of selling an aggressive program and budget to an executive manager or board of directors more feasible. The steps undertaken in a water loss control program are discussed and reviewed in detail throughout this manual. The chapters are self-contained and do not need to be used in order although an operator with no experience in progressive water loss control methods is urged to read the entire book. The manual focuses heavily upon the progressive methods pioneered in the England and Wales in the 1990s and transferred widely on an international basis. It also consistently evaluates the more “traditional” conditions that exist in North America, and other nations, where water loss has not been a foremost priority. This is done to demonstrate that the need to proactively control lost water exists in even the most developed nations, and that easily transferable technology now exists to control water losses.

The manual includes sections that allow the reader to

- Understand the nature and scope of water loss occurring in public water supply systems
- Learn about the latest analytical methods and tools
- Assess water losses for any system by using a standardized water audit and component based analysis of real losses
- Follow through all steps of a successful water loss control (optimization) program
- Implement field interventions to control real losses
- Implement field interventions to control apparent losses
- Implement demand control
- Perform cost to benefit calculations
- Identify when and how to use a contractor or consultant

This manual is intended to be a hands-on tool for water system managers who are motivated to understand the nature of water loss and take meaningful action to reduce it. Its content provides a detailed road map for any water system operator to implement a program that is the appropriate response for an individual water system’s needs.

References