IWA Approach to Water Loss Management

K J Brothers

City of Ottawa Utility Services Branch, 110 Laurier Avenue West, Ottawa, Ontario, K1P 1J1 Canada, Ken.Brothers@Ottawa.ca

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The IWA Water Loss Task Force has evolved from a small group of international specialists to over 84 members in 32 countries across five continents in 2005. The Task Force is currently embarking on its third Specialty Conference following the last two successful Water Loss Specialty Conferences held in Brno, Czech Republic and in Limassol, Cyprus, 2002.

The Task Force created Specialty Work Teams comprising of international specialists. The Task Force established Leak Detection, District Metered Area, Performance Indicator, Real and Apparent Losses, Economic Leakage Assessment and Publication Teams.

The focus of the Task Force has been to develop and promote international best management practices and measurements in water loss management. The Task Force advocates water loss reduction activities, comprising of actively control, pressure management, speed and quality of repairs and in infrastructure renewal. The IWA Standard Water Balance has been adopted by the American Water Works Association and a number of countries as the preferred national standard. The convergence of water industry professional associations and national standards to a singular standard water audit process and terminology will ensure a consistent assessment and reporting of water accounting and losses around the world.

The Task Force has undertaken a number of initiatives, which include further development of component analysis of water uses and losses for system analysis. There needs to be further international work on the estimated water use components arising from different plumbing codes, cistern sizes and water use patterns specific to countries, climates and cultural habits. The components of water losses, including background water seepage and active leakage loss rates will likely see further discussion and debate as various countries adopt these principles.

The Task Force has also been involved in development of district metered area and pressure management area design criteria, best techniques in active leak control and detection equipment and an exploration into apparent water loss control strategies. There will be further work in all of these areas in the next number of years as technologies evolve in the hardware availability for metering, pressure measurement and control and leak detection instrumentation.

The Task Force has advocated that losses be described in the volume of water lost. The percentages of “unaccounted for" have long been dismissed as inaccurate, inconsistent and in some applications, a misleading descriptor of water leakage. The Task Force has adopted the concepts of volumetric accountability for water, both for estimated and metered water and to express the value of the volume of water losses to assess the least cost, highest beneficial strategy in water loss reduction. The infrastructure leakage index (ILI), the ratio of annual real loss volumes to calculate unavoidable annual real loss, is advocated by the Task Force as the preferred system leakage performance indicator.

The Task Force has been actively working on the economic level of leakage approach over past several years in an attempt to provide the international community with a relatively straightforward calculation template and methodology. In addition, advances have recently been achieved in the calculation of the economic level of active leak control

intervention frequency. This will be discussed in several papers at the Conference and at the Water Loss Task Force Meeting.

The overall approach of the Task Force has been to explain emerging best management strategies in water loss reduction, which in many respects, is a change from the traditional thinking of water auditing and leakage repair. For proactive Utilities seeking out the best in management practices and water loss reduction, the notion of reducing losses without necessarily the excavation repairs of leaks, real loss reduction through management practices of active and responsive repair procedures and ultimately defining the lowest in target levels of losses for any specific Utility has provided significant changes to how Utilities manage and operate their systems. In fact, adopting the IWA water loss strategies can provide a vehicle for change management by focussing on water loss reduction and allowing continuous change of operational activities and administrative support processes to lower overall water losses and increase revenue generating accountability for all water uses in the system.

The Task Force, in concert with IWA Publications, sets out a practical process for water loss management. This is advocated through the recent publication of "Water Losses and Distribution Systems" "(Farley and Trow)". This practical approach textbook sets forth a process to determine how much water is lost (assessment) and where is it lost (system-wide or in specific sectors). Then, determine why the water is lost, whether this be through leaking, unauthorized use or apparent losses. The Utility can select the appropriate loss reduction strategy for the identified problem. The four water loss reduction activities include actively control, pressure management, speed and quality of repairs (responsiveness to repair process) and infrastructure renewal for systems in very poor condition and beyond normal repair processes.

Standard water balance adopted by IWA and AWWA provides the framework to undertake a top down water audit to determine real water losses. The notion of unaccounted for water is no longer used in the international community.

The Task Force also advocates the concept of pressure effects on system leakage. The term fixed and variable area discharge paths (FAVAD) describe water leakage flow rates as proportional and sometimes increase variably with increases in pressure. This notion of fixed and variable area discharge paths and the effects of pressure have now been assessed, tested and validated to the extent that we can predict reduction in water losses resulting from pressure reduction in sectors of the system.

The Task Force has also undertaken district metered areas (zones) and pressure management areas which can be assessed for night time flows, calculation of net loss rates and water loss reduction opportunities through pressure regulation, reduction or modulation to even further reduce active and background losses in discreet sectorized areas. This pressure management concept, with its predicting tools of fixed and variable area discharge paths, provides powerful tools to Utilities to provide the maximum benefit in water loss reduction capabilities on a sector-wide basis.

The Task Force has also focussed on the tactics of speed and quality of repairs in distribution systems. This new focus on administrative processes underscores how important it is to minimize leakage run time by proactively reducing the leak location time, administrative resourcing and planning repair time. Reducing the leak location and repair times also has the effect of reducing the known leakage run time. Water loss management can be achieved by focussing on reducing the leakage flow rate time and thereby mitigating the overall water loss volume through management practices.

The Task Force has categorized water leaks as "reported" and "unreported leaks". Reported breaks, those leaks that come to the surface and are generally reported by the public to a Utility, are typically repaired in a short period of time by Utilities supporting the repair of all surfacing leaks. However, unreported leaks, those leaks that have occurred underground but have not come to the surface, must be found by active leak detection

programs. Many Utilities do not practice an active leak control program to detect and pinpoint unreported leaks on a regularly scheduled basis.

There are many factors that affect the percentage of leaks that surface in a specific Utility. These may include the type of soil in the area, depth of bury, location within the right-of-way or proximity to underground storm or sanitary systems. In many cases, water systems installed in fractured rock provide easy drainage paths for water leakage that may occur and contribute to a higher percentage of leaks that do not surface to ground level.

This situation exists in many areas along the northeastern coastline of North America where water main depths of two meters are installed in rock conditions. Many of these mains and service leaks do not come to the surface and as a result, water loss volumes may become excessive due to longer leakage run times. Active leak control programs, using best management practices, can locate these leaks for repair utilizing the active leak detection methods advocated through the Task Force leak detection recommendations.

The Task Force Teams have also worked on the District Metered Area Design Manual, which will be available to the Task Force this year. The Apparent Water Loss Team has also been working on a variety of strategies to reduce the existing apparent losses in systems through various strategies in improving water accountability and the data handling.

The Halifax Leakage 2005 Specialty Conference promises to further advance the concepts and strategies used to assess water losses, reduce real and apparent losses and adopt the business case economic approach for the determination of active leak control intervention frequency in an overall economic level of leakage target for Utilities adopting the IWA methods. Through the continuing work of the Task Force Team Leaders and other international specialists on the Task Force, we hope to continue with advances in all aspects of water loss control and management to achieve the highest degrees of water accountability and loss control effectiveness for application in Utilities all around the world.

This summary of the IWA Water Loss Task Force forms the basis of discussion for the Leakage 2005 Conference.