

Developments in Water Loss Control Policy and Regulation in the United States

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Introduction

The world's water resources are finite but exist on a planet with a constantly growing population. The development of water resources to man's benefit has been a fundamental factor in the evolution of civilizations throughout history. But, as our populations continue to grow and shift, the availability of quality water resources is in decline. Pollution, climate change and construction of cities in dry regions are some of the factors exacerbating evolving supply/demand imbalances. Given these factors, it is essential that man utilize existing water resources in the most careful, efficient manner. This includes the use of a holistic water resource management strategy with emphasis on proper water accounting, loss control, water conservation, efficiency, reuse and recycling; in appropriate balance with the careful development of new water resources. Many innovative technologies have been developed in recent times to assist the efficient delivery and utilization of drinking water. Yet the ultimate level of success achieved in wise water resources management in any jurisdiction depends greatly upon the policies, regulations and practices promoted by industry leaders and promulgated by its governing bodies.

The environmental movement in the United States (US) has greatly raised awareness of the importance of water *quality* over the past thirty years. This quality focus includes the health of water resources, storm water management and drinking water quality; all of which are now addressed by substantial regulatory structures at the national level. Until recently, much less attention has been given to the *quantity* perspective of water resources management. Not surprising, relatively little regulatory structure exists in this regard (at least compared to water quality structures) and, consequently, much less rigor exists in tracking and reliably managing volumes of water going to drinking water consumption and other uses such as agriculture and power generation. Still, a number of important developments have come about since the year 2000 to increase the focus on water quantity management. Reliable methods and technologies have been advanced to track drinking water supplies, driving the relevant question: can the advent of rational policy development and regulation be soon in coming to the US drinking water industry?

The United States Drinking Water Regulatory Structure

Appreciation of, and governance over, water resources varies throughout the world. In dealing with existing supply/demand imbalances, or anticipating such in the near future, a number of countries have taken progressive steps to manage water resources to promote long-term sustainability. Efforts have focused upon total water management by granting authority for policy-making based upon watersheds or river basins, rather than political boundaries. Smart growth, building and development philosophies have been employed with efficient water resources management in mind. Regulations have been enacted and enforced to provide accountability in both water supply and consumption. Progressive regulatory and policy structures such as these now exist in the United Kingdom, South Africa, Australia and a number of other countries.

As one of the largest and most geographically diverse countries on the planet the US includes regions of plentiful water resources as well as vast areas of desert. Parts of the western US have witnessed extended drought reaching six consecutive years. Two of the fastest growing cities in the country – Las Vegas and Phoenix – exist in deserts where water must be transported great distances to provide supply. One of the great rivers of the world – The Colorado – often runs dry at its mouth to the Gulf of California while its waters are withdrawn to provide supply to several states which are often at odds with each other on how best to manage the river while achieving their water supply goals.

The drinking water industry in the US is highly fragmented, in terms of both the ownership of water utilities and the regulatory bodies that oversee them. Over 161,000 public water systems operate in the US. Of this total, over 54,000 are community water systems, but only 3,700 of the largest systems serve 80% of the US population. Many community water systems are operated by municipal governments, others are profit-making private companies; still others are between these two models existing as water authorities. Some purveyors are identified as irrigation districts as their initial mission was to provide water for agriculture. Some are large wholesalers providing bulk volumes to smaller suppliers, but the majority of water suppliers provide water strictly to retail distribution systems. Several large private water companies own systems in a number of different states; yet the greatest number of systems are “small systems” supplying singular rural communities. The regulatory structure varies from state-to-state and water utilities usually fall under the auspices of two or more regulatory agencies that may include governmental environmental agencies, public utility commissions, river basin commissions, water management districts as well as one or more federal agencies. Other important stakeholder organizations such as county conservation districts, planning commissions and watershed associations may also be party to the input and discussion about water resources management.

With such a highly fragmented and complex water supply and regulatory structure, how well are the US drinking water services managed? Certainly, the economic prominence of the US on the world stage validates that adequate supplies of quality water exist in the nation. However, upon closer scrutiny, the answer is also quite varied. In assessing the structures and performance for assuring high water quality, much success has been gained in the past thirty years in regulating and attaining strong water quality. The amendments to the Safe Drinking Water Act in 1996 have motivated new programs and structures that have certainly elevated the overall quality of drinking water across the land. This effort has come about from strong centralized legislation and oversight at the federal level, administered by the United States Environmental Protection Agency (USEPA). In recognition of this experience in improving water quality, one can surmise that a similar approach will be necessary to improve the structures that affect water quantity.

On a cultural basis, water in the US is often taken for granted. In a country with a proud history of building and development, it is often assumed that water will be there when needed. Water pricing, which is often controlled in the political arena, is often substandard; with water rates frequently perceived more as a tax than the price of a commodity or service. In areas of shortage, the drinking water industry is more apt to look for the next source of water, rather than to conserve existing supplies via conservation and loss control practices.

While drought, shortages and water conflicts continue to make headlines throughout the US, a relatively casual, inconsistent policy and regulatory structure continues to exist for the quantitative management of drinking water supplies. It is apparent to a growing number of drinking water professionals that policy improvements are needed to promote more sustainable supplies. The road to such improvement must include:

- Broad recognition that insufficient policy structures currently exist and acknowledgement of the need to improve
- Consensus on the best practice structures, programs and policies to utilize
- Codification of new best practice policies, with emphasis on standardization of methods and uniformity of implementation
- Implementation of new policy structures, leading to the gathering of extensive and revealing data on the true status of quantitative management of water resources

The path leading to a reliable oversight structure for the quantitative management of drinking water supplies will no doubt be a long and arduous one. However, despite the complexities of the US water industry, and as exhibited by the improvements in drinking water quality, sustainability of water supplies in the US is well within reach. Indeed, as this paper reports, a number of water resource agencies have already grasped the above tenets and have begun to implement solid quantitative water resources management.

Current Status of United States Quantitative Water Resources Policy

Policy on drinking water supplier efficiency in the US is best described as ineffectual. The United States Geologic Survey collects data on water withdrawals (abstractions) from water resources. While labeling this effort as the water “use” report, it is noted that data from 1995¹ (USGS, 1995) showed, for a total of 151,500,000 cubic meters per day (40 billion gallons per day) of water withdrawal from all sources, 22,725,000 cubic meters per day (6 billion gallons per day) was identified as “public use and loss”. This amount of water is more than sufficient to supply the ten largest cities in the US, yet the USGS has no capability to validate the accuracy of this amount of water, or segregate it into real or apparent water losses. Similarly, no national strategy exists to control these losses.

Another symptom of the limited oversight of water management is the confusion of often overlapping and insufficient terminology and definitions. Many practitioners have gone on record to identify the weaknesses of the term “unaccounted-for” water and the unaccounted-for water percentage. Other inconsistencies of terms abound. In the 2003 report “Waste Not, Want Not: the Potential for Urban Water Conservation in California²” (Pacific Institute, 2003) it was noted that “confusion over terms such as water use, consumption, withdrawal, new water, real water, conservation, productivity, efficiency, and so on can hinder policy analysis. Some efforts should be made to standardize terms related to water use and conservation.”

In 2001 the American Water Works Association (AWWA) conducted a comprehensive survey of the extent of accounting and loss control policies existing in the US. The project, entitled *Survey of State Agency Water Loss Reporting Practices*³ (Beecher, 2002), or the “States Survey Project”, was conducted in 2001 by Beecher Policy Research, Inc. The survey was successful in garnering valuable information from 46 jurisdictions, including 43 state agencies and 3 regional agencies. The survey attempted to seek information regarding ten practices, as shown in Table 1.

Table 1: Ten Practices Covered in the AWWA “States Survey” Project

1. **Water-loss policy.** Does the state have a policy regarding the loss of water by water utility systems? If so, where is the policy stated (statute, regulation, directive, etc)? Which agency or agencies are responsible for implementing the water loss policy?
2. **Definition of water loss.** Does the state or agency provide a definition of water loss or unaccounted-for water?
3. **Accounting and reporting.** Does the state or agency provide a method to account for and report water loss?
4. **Standards and benchmarks.** Does the state or agency identify a standard or benchmark for water losses, such as a specific percentage?
5. **Goals and targets.** Does the state or agency specify a goal or target for water-loss reduction?
6. **Planning requirements.** Does the state or agency address water-loss issues in the context of water resource, conservation, or other planning requirements?
7. **Compilation and publication.** Does the state or agency compile and/or publish data on water losses by water utility systems?
8. **Technical assistance.** Does the state or agency provide any form of direct technical assistance to water utility systems to help reduce water losses?
9. **Performance incentives.** Does the state or agency provide any form of performance incentive for water-loss reduction?
10. **Auditing and enforcement.** Does the state or agency implement any form of auditing or enforcement in relation to the water-loss policy?

Source: Survey of State Agency Water Loss Reporting Practices, 2002

The reported findings note “proper management of any resource must include accurate measurement of the resource throughout its life cycle. In any proper accounting system checks and balances must be provided via the use of independent audits, consistent reports and rational procedures. U.S. water systems do not consistently account for water or apply consistent methods of water accounting.” Additionally, “most analysts agree that a better system of *accounting* is the foundation for a better system of *accountability* for the drinking water supply industry.” Figure 1 shows 2001 state standards, as expressed by varying definitions of “unaccounted-for water percentages”, vary from 7.5% to 25%, with some states using different standards set by different agencies. Table 2 gives a summary of findings for all ten practices and shows that only one state – Hawaii – currently has jurisdictions with programs addressing all areas.

The States Survey Project was highly successfully in capturing a large response from many state and regional agencies and thereby providing a credible baseline of the structures in place to monitor drinking water supply efficiency. Unfortunately, this project also confirmed that the structures in place are highly cursory in nature, of limited sophistication (most rely upon some definition of an “unaccounted-for” percentage as the sole performance indicator) and, most importantly, include scarcely any auditing or enforcement to validate the performance of drinking water utilities and spur improvement where needed. Among the state and regional agencies (with some notable exceptions to be discussed) these structures are still in place today.

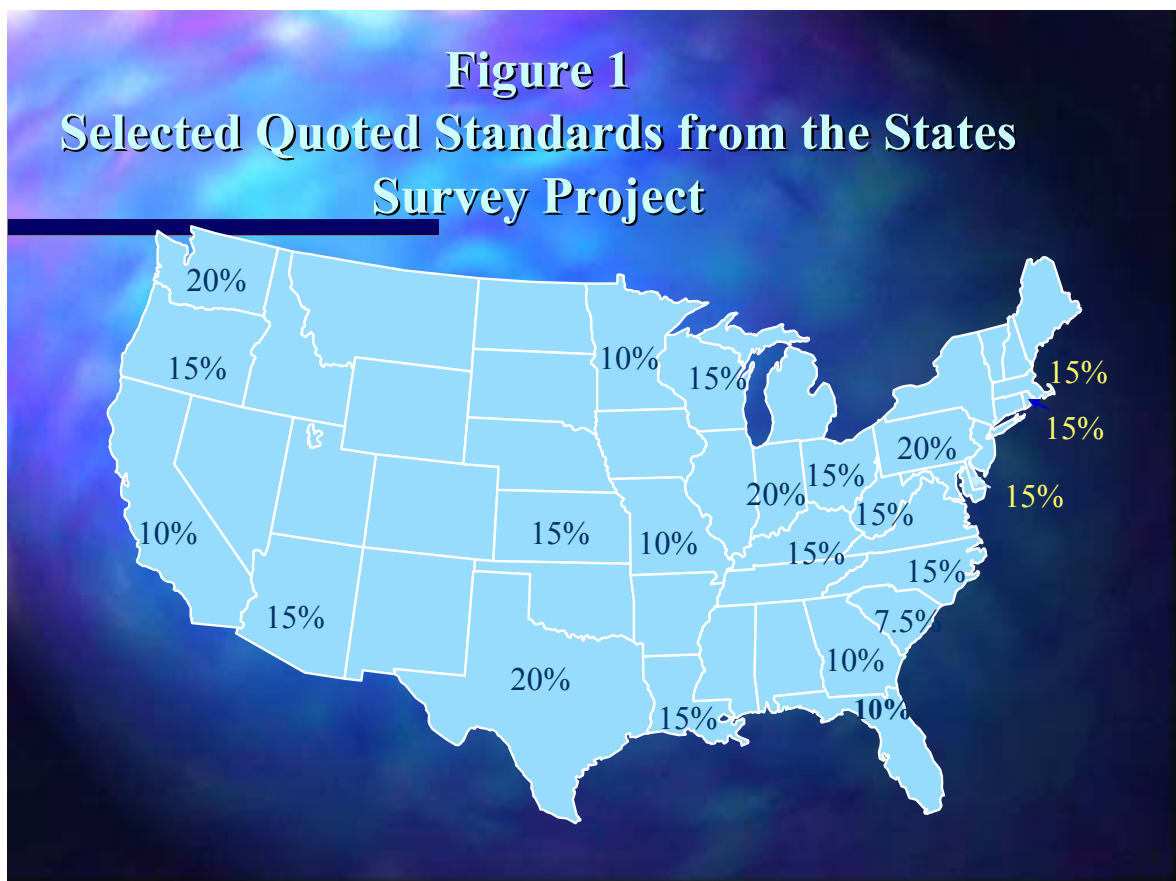


Figure 1: Selected Quoted Standards from the States Survey Project

Source: Survey of State Agency Water Loss Reporting Practices, Beecher Policy Research, 2002

Water Audit Methodology Creates a Needed Tool and Platform for Change

Over the past several years the International Water Association (IWA) and AWWA have exhibited a growing interest in the quantitative management of water resources. Both organizations pooled resources to form the Water Loss Task Force (WLTF), which worked diligently for three years to develop a best practice water audit method, which was published in the IWA publication *Performance Indicators for Water Supply Services* in 2000⁴ (Alegre et al., 2000). The water audit methodology features rational terms and definitions and an orderly water balance format. Its array of robust performance indicators makes it greatly superior to the inept “unaccounted-for” water percentage so often unreliably quoted. This method was quickly embraced by AWWA’s Water Loss Control Committee (WLCC) as the method of *accounting* so needed to instill *accountability* in drinking water utilities in the US. In its 2003 Committee Report “Applying Worldwide Best Management Practices in Water Loss Control⁵” (Kunkel, et al, 2003) the WLCC recommends use of this method as the best practice approach to auditing drinking water supplies, and rejects any continued use of the term “unaccounted-for” water.

Table 2: States Survey Project: Summary of Number of Responses in the Affirmative

Issue	Jurisdictions	States (n = 43)	Other (n = 3)	Total (n = 46)
Water-loss policy	AZ, CA, CT, FL, GA, HI, IN, IA, KS, KY, LA, MD, MA, MN, MD, NV, NH, NY, NC, OH, OR, PA, RI, SC, TN, TX, UT, VT, VA, WA, WV, WI, WY, DRBC, SWFWMD, SJRWMD	33	3	36
Definition of water loss	AZ, CA, GA, HI, KS, MD, MA, MN, MO, OR, PA, RI, SC, TX, WI, DRBC, SJRWMD	15	2	17
Accounting and reporting	AZ, CA, GA, HI, IA, KS, KY, MD, MA, MN, MO, NY, OH, OR, PA, RI, TX, WV, WI, WY, SWFWMD, SJRWMD	20	2	22
Standards and benchmarks	AZ, CA, GA, HI, IN, KS, KY, LA, MD, MA, MN, MO, NC, OH, OR, PA, RI, SC, TX, UT, WA, WV, WI, DRBC, SWFWMD, SJRWMD	23	3	26
Goals and targets	AZ, CA, FL, GA, HI, KS, KY, ME, MD, MN, MO, NM, OH, OR, PA, RI, TX, WI, SWFWMD, SJRWMD	18	2	20
Planning requirements	AZ, CA, CT, FL, GA, HI, IA, KS, MD, MA, MN, MO, NV, NH, OR, PA, RI, SC, TX, VT, VA, WA, WV, WI, SWFWMD, SJRWMD, DRBC	24	3	27
Compilation and publication	AZ, CA, HI, KS, KY, MN, PA, RI, WI, SWFWMD	9	1	10
Technical assistance	AK, CA, FL, GA, HI, KS, KY, ME, NV, ND, OR, PA, RI, SC, TN, TX, VT, WI, SWFWMD	18	1	19
Performance incentives	CA, GA, HI, IN, IA, LA, MN, NC, RI, TX, VT, SJRWMD	11	1	12
Auditing and enforcement	AZ, GA, HI, KS, MD, MN, NH, OH, OR, PA, SC, TX, WI, SWFWMD, SJRWMD	13	2	15

Source: Survey of State Agency Water Loss Reporting Practices

In accepting the water audit methodology developed by the IWA Water Loss Task Force, the WLCC resolved to rewrite its manual of practice on water auditing and loss control; the M36 publication *Water Audits and Leak Detection*⁶. Writing of the new publication, in the format of the water audit method developed by the WLTF, is progressing with a new manual expected in print by late 2006 or early 2007. Additionally, the WLCC is finalizing a basic water audit software package, in standard spreadsheet software, that will be available from the AWWA website for free download to users.

It is believed by this writer that one reason for the limited focus on water sustainability has been the lack of a reliable water audit method. This has changed since the publication of the new water audit method by the WLTF and the support of this method by the WLCC of AWWA. The WLCC has conducted considerable outreach to all areas of the

US in promoting the standardized best practice approach of the new water audit method. As the water audit software, and ultimately the new M36 publication, become available AWWA will be able to refer users, regulators and policy-makers directly to these tools. It is envisioned that they will provide the mechanics necessary to reliably track water supplies and serve as a platform for policy and regulatory decision-making.

The Seed of Change: Pacesetting Water Supply Agencies Adopt Water Audit Best Practice Method

A number of factors are converging to create the impetus for innovative water quantity policy structures. Several western states have been pressured by ongoing drought, swelling populations and distant, expensive water sources that are in competition from other users. In her 2004-2005 year as AWWA president, Katie McCain stressed for greater recognition of the "value" of water. Certainly, good accountability must exist if we are to appropriately value our water. The USEPA has launched an effort to assess management of water in distribution systems, with a goal of setting future regulations. While this effort has initiated from a water quality perspective, it is believed that reliable policy and regulatory structures will only come about if the quantitative functions of the distribution system (supply efficiency in particular) are taken into account.

With these and other factors impinging on the US drinking water industry, a number of drinking water oversight agencies have launched efforts to improve the policy structures and establish regulations for sound quantitative drinking water management. In 2003, the Texas State Legislature passed House Bill 3338⁷, which includes in its language a requirement for drinking water utilities to submit a water audit every five years. The Texas Water Development Board (TWDB) was charged to identify the method to be used for these water audits and has established the method developed by the IWA Water Loss Task Force. The first water audits will be collected in 2006.

The California Urban Water Conservation Council (CUWCC) is a consortium that enlists metropolitan drinking water utilities in California to sign a memorandum of agreement to institute a series of 14 best practices to conserve water and promote supply efficiency. Best Practice #3 "System Water Audits, Leak Detection and Repair", by the admission of Executive Director, Mary Ann Dickinson, has been the least observed of all of the BMPs overseen by the council⁸. The CUWCC is moving to update BMP3 to make it a more robust, reliable and auditing and loss control guideline to ensure that the member drinking water utilities are indeed operating accountably.

The Delaware River Basin Commission (DRBC) is an intrastate agency that includes representatives from the federal government (United States Army Corps of Engineers) and the states of New York, New Jersey, Pennsylvania and Delaware. Chartered in the early 1960s after a controversial attempt to establish a large-scale dam on the Delaware River, the DRBC was one of the earliest efforts in the US to promote management of water resources on a watershed basins and to coordinate the various activities of numerous governmental and non-governmental agencies in doing so. Over the years the DRBC has established a number of resolutions, including those addressing source and customer metering, leak detection and water audits, that it requires the member states to enforce in the Delaware Basin portions of their jurisdictions. These resolutions, as found in the States Survey Project, attempt to measure water supply efficiency via a form of "unaccounted-for" water percentage. The DRBC has monitored the work of the AWWA WLCC with great interest and has become a partner with AWWA in developing its water audit software and recruiting water utilities to test the software. The DRBC has established an action plan to assist these efforts with tentative goals of incorporating them into revised versions of their key resolutions over a period of several years.

A number of other water oversight agencies, including those in Washington State, Maryland, Pennsylvania, New Mexico are reviewing state regulations, statues and water plans for opportunities to improve long-term water sustainability via better water supply efficiency. In all of these efforts an important tenet being forwarded by the WLCC has been to establish not only a rational water auditing approach but one that is consistently instituted across the land, using a truly worldwide BMP method. Consistency across the broad extent of water supply agencies is critical to the evolution of improved drinking water supply efficiency in the US.

A Vision of Broad Recognition for Water Sustainability by Water Supply Regulatory Agencies

The efforts detailed above are occurring at the state and regional level. Thus far a similar effort has not arisen at the federal level. Given its role in implementing improved water quality regulations over the past several decades, it is likely that the USEPA is the federal agency that would most likely play an eventual role in establishing any centralized water quantity regulations. As the number of state and regional agencies doing this increases, a groundswell of activity is likely to be noted by the USEPA. It will presumably be at the federal level that truly consistent water supply policy and regulation is implemented. However, the USEPA can likely draw upon the successes of the pioneer state and regional agencies in developing new structures at the federal level.

The US has traditionally lacked rational, robust and enforceable structures to ensure that water resources are used wisely and with minimal loss. However, recent developments represent outstanding opportunities to begin to move the drinking water industry forward to measurable accountability. The AWWA, through its Water Loss Control Committee and Water Conservation Division, and the IWA, via its Water Loss Task Force, have teamed to create a focus on water efficiency and the creation of methods and technologies to promote accountability and minimize losses in drinking water supplies. Continued outreach and collaboration is needed so that these methods can be incorporated into the fabric of the existing patchwork of governmental regulatory policy.

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