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Audit Report

WATER CONSERVATION I:
Reliability of Water Savings Projections
For Indoor Strategies

December 12, 2006

Office of the City Auditor
Austin, Texas

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Date: December 12, 2006
To: Mayor and Council
From: Stephen L. Morgan, City Auditor
Subject: AWU – Conservation I: Reliability of Water Savings Projections for Indoor Strategies

I am pleased to present this audit report on the reliability of water savings projections for proposed indoor conservation strategies. These projections were made by Austin Water Utility staff and first presented to the Council's Water Conservation Task Force (WCTF) on October 13, 2006. Revised projections will be used by the task force in determining recommendations to make to the Council on various water conservation strategies. Also included in this report is information on the dissemination of water usage information to Utility customers.

Our objectives were:

- To provide assurance on the reliability of water savings projections;
- To identify other Texas cities that own water utilities; and,
- To compare water usage information available to customers of the Austin Water Utility to that provided by the San Antonio Water System.

We found that:

- While the original projections of estimated water savings calculated by AWU staff were overstated, the latest revisions through November 9, 2006, are reasonable.

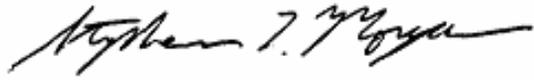
We did find that the process used to arrive at the calculated water savings projections would benefit from a more rigorous approach to developing information. This approach should include steps for quality assurance and better documentation.

- All six major Texas cities and most of those with populations over 50,000 own their own water utilities.
- While historical customer water usage information is available on a City website, such information along with comparisons to citywide and neighborhood averages could be provided on monthly billing statements.

We have offered five recommendations that we believe will improve quality, transparency, and availability of information provided by the Utility to decision-makers and to customers. As of the date of this report, we believe that AWU staff has made good progress toward implementing most of the recommendations as they go forward with phases II and III of their work for the WCTF.

This audit is a product of the on-going audit initiative at the Austin Water Utility (AWU), which was initiated in FY 2006 as part annual audit plan that was approved by Council.

We appreciate the cooperation and assistance we received from the Austin Water Utility's personnel during this audit.

A handwritten signature in black ink, appearing to read "Stephen L. Morgan". The signature is fluid and cursive, with a long horizontal stroke at the end.

Stephen L. Morgan, CIA, CGAP, CFE, CGFM
City Auditor

COUNCIL SUMMARY

This report presents the results of our audit of the reliability of water savings projections for proposed indoor conservation strategies presented to the Council's Water Conservation Task Force (WCTF). Also included in this report is information on the dissemination of water usage information to Utility customers.

The Audit had the following objectives:

- To provide assurance on the reliability of water savings projections for proposed indoor conservation strategies;
- To identify other Texas cities that own water utilities; and,
- To compare water usage information available to customers of the Austin Water Utility to that provided by the San Antonio Water System.

We found that the original water savings projections calculated by AWU staff were overstated in two respects. First, several of the items presented in the first estimate were not selected for follow-up by the WCTF. This removal lowered the earlier projection total significantly. Second, we found errors and miscalculations on some of the projections. The latest estimated figures, as refined through November 9, 2006, are reasonable.

The process used to arrive at the calculated water savings projections would benefit from a more rigorous approach to developing information. This approach should include steps for quality assurance and better documentation.

We also found that all six major Texas cities and most of those with populations over 50,000 own their own water utilities. A list of those cities, and whether they own their own water utilities, can be found in Appendix B of the report.

Finally, while historical customer water usage information is available on a City website, it not easy to identify and access. If a customer does access it, the information is presented in a confusing manner and falls short of containing any contextual information against which customers could compare their own usage. Clear and understandable information along with comparisons to citywide and neighborhood averages could be provided on monthly billing statements but there may be a cost barrier.

We have offered five recommendations that we believe will improve quality, transparency, and availability of information provided by the Utility to decision-makers and to customers. As of the date of this report, we believe that AWU staff has made good progress toward implementing most of the recommendations as they go forward with phases II and III of their work for the WCTF.

We'd like to thank the staff at the Austin Water Utility for the cooperation and assistance that we received during this audit.

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ACTION SUMMARY
AU07102 – AWU Conservation I:
Reliability of Water Savings Projections for
Indoor Strategies



Rec. #	Recommendation Text	Management Concurrency	Proposed Implementation Date
1	In order to ensure that the Council's WCTF is presented with data that is as accurate as possible, the Austin Water Utility's Director should quickly document procedures to ensure that all savings and cost estimates are properly calculated and reviewed. This includes ensuring that there is a sufficient amount of staff devoted to support the WCTF.	Concur	01/12/07
2	For phases two and three of the task force's work, the Austin Water Utility's Director should ensure that assumptions are consistently applied throughout the calculations (e.g., FTE costs, savings reported vs. savings used in payback analysis, etc.)	Concur	01/12/07
3	In order to ensure that the data presented to the Council's WCTF is easily understood, the Austin Water Utility's Director should identify the difference between peak-day and average-day water savings, and clearly identify which of the two calculations are affected by which of the proposed strategies.	Concur	01/12/07

- | | | | |
|---|--|--------|---|
| 4 | In order to enable quality assurance reviews, the Austin Water Utility's Director should adopt a structured approach to preparing information for decision making which at a minimum includes the elements detailed in the Texas Water Development Board's <u>Best Management Practices Guide</u> . | Concur | 01/12/07 |
| 5 | In order to increase water savings, Austin Water Utility's Director should explore multiple avenues for providing all consumers with usage information that would be helpful in their own efforts to reduce their water consumption. Such exploration should include direct contact with the CIS vendor to determine the cost of re-programming the utility billing system to provide usage data in graphical format and average usage comparisons and an analysis of the cost-effectiveness of providing that information to customers. | Concur | Estimate of costs to be completed by 01/12/07 |

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BACKGROUND

Water conservation as an approach to managing critical future water needs has become an issue of increasing concern and attention.

The Austin Water Utility (AWU or the Utility) is municipally-owned and charged with supplying water to customers within and outside the corporate city limits of Austin, as well as the communities of Rollingwood, Sunset Valley, Pflugerville and Round Rock, one water control and improvement district, five water supply corporations, seven municipal utility districts, and three private utilities. The Utility's 2006 Water Service Population is 820,765 (Retail 766,428 & Wholesale 54,337) through over 197,000 service connections in a service area of over 538 square miles.

Austin is one of the six major Texas cities with a population above 500,000 that own their own water and wastewater utilities. The others cities are: Houston, Dallas, San Antonio, El Paso, and Ft. Worth. In addition, most of the Texas cities with population above 50,000 own their own utilities (See Appendix B). This has resulted in much information sharing among government entities in the state regarding how to plan for meeting demand for water and providing the infrastructure needed to deliver it.

State of Texas Water Conservation Efforts. The State of Texas has recognized the critical need for strategies that manage water supply and demand to meet ongoing water needs. The State Water Plan of 2002, which reflected the cumulative results of 16 regional water groups' plans, cited conservation-based water management as one of the most effective strategies to help meet water shortfall challenges and ensure that the future water needs of Texans are met. According to that plan, conservation strategies have the potential to extend existing supplies, reduce consumer costs, and meet wildlife and other natural-resource needs. In addition, water conservation, including water reuse, may provide economical alternatives to more expensive water-supply solutions.

That first round of regional water planning resulted in the State Water Plan of 2002. In 2001, the passage of Senate Bill 2 triggered a second round of regional and state water planning that involves assessing additional opportunities for conservation-based strategies to meet an even greater share of projected water demands.

In 2003, in an effort to realize water conservation's full potential, the 78th Texas Legislature created the Water Conservation Implementation Task Force (state task force) via enactment of Senate Bill 1094. The state task force was directed to review, evaluate, and recommend optimum levels of water-use efficiency and conservation for Texas and to concentrate on issues related to (1) best management practices, (2) implementation of conservation strategies contained in regional water plans, (3) statewide public-awareness, (4) state funding of incentive programs, (5) goals and targets for per-capita water use considering climatic and demographic differences, and (6) evaluation of state oversight and support of conservation.

Overall, the state task force strongly endorsed voluntary water conservation, including water reuse, as critical if the water-supply needs of future generations of Texans are to be met.

Current history of Austin Water Conservation Efforts. The Austin City Council established a water conservation goal to reduce peak day demand by ten percent in the 1990s. More recently, there has been renewed interest by the City in finding opportunities for greater water savings in order to reduce or delay the need for additional investments in treatment capacity and to avoid increased water supply costs.

Per State law, the City is entitled to use up to 150,000 Acre-Feet (AF) of water per year without charge. In 1999, as part of the water supply agreement with the Lower Colorado River Authority (LCRA), the City prepaid for water above the 150,000 AF level at \$105 per Acre-Foot (the rate on the date of the contract) until such time as the City's demand reaches 201,000 AF per year. However, once the City's annual demand for water goes above 201,000 AF per year in two consecutive years, the City must pay the going rate per AF for use over the 150,000 AF per year, depending on LCRA's water prices at the time. The 2007 rate set by the LCRA's Board of Directors is \$126 per AF.

The same year, in discussing the agreement, Council committed to conservation and reuse strategies to extend the City's water supply. The Utility's Water Conservation Division has been working to reduce demand as much as feasible by 2016, when the City is projected to exceed the 201,000 AF trigger. Based on utility projections, the City would need to reduce current and future demand by approximately 50,000 AF per year to extend the contracted water supply to 2050. To do this, the Water Conservation Division has designed a variety of programs for all customers, including incentives to conserve water, services to reduce demand (e.g., irrigation audits), and educational programs.

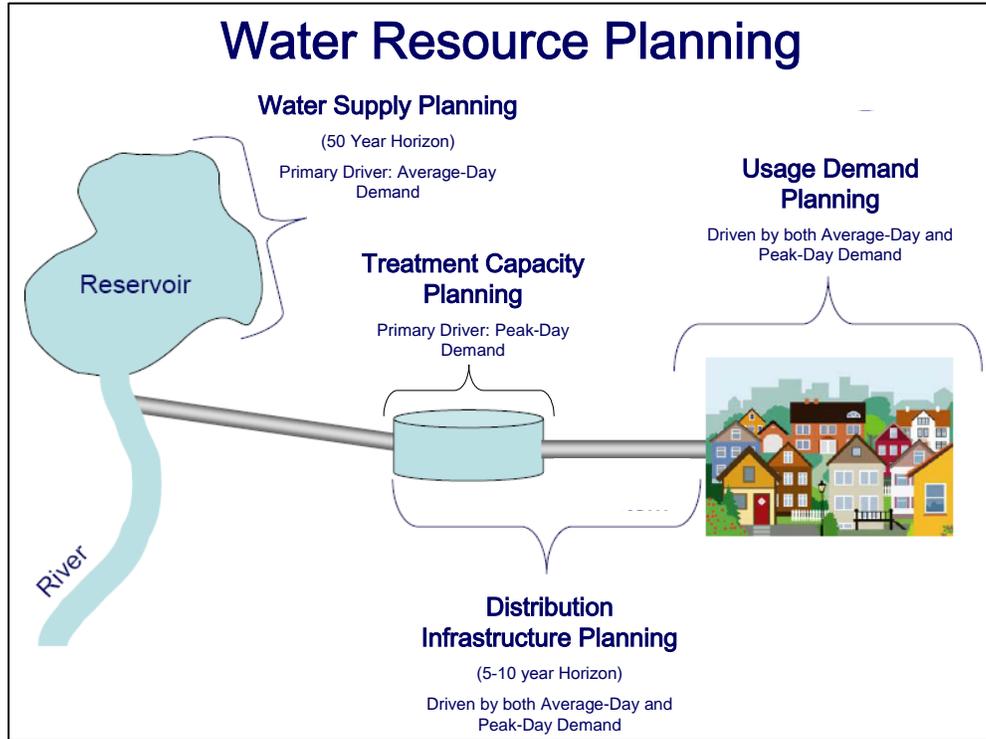
For more detail on current and proposed programs, see Appendix C.

Peak- vs. Average-Water Demand. Peak-day water demand is the amount of water needed on the day of highest water usage during any given year. Peak-day demand typically occurs in the summer due to outdoor watering. Average-day demand is the average daily amount of water used over the entire year. Both peak- and average-day demands are typically measured in million gallons per day (MGD). Annual demand is often measured in acre-feet (AF). One acre-foot equals approximately 325,851 gallons. In Austin in FY05, reported peak-day demand was approximately 237 MGD, average-day demand was 141 MGD, and annual demand was 158,000 AF.

The importance of peak-day demand is that if peak-day demand exceeds capacity within the system, including all treatment plants, pump stations and reservoirs combined, a series of events could take place beginning with low water pressure in parts of the system which can lead to problems meeting the requirements for fire suppression, and ultimately (although somewhat unlikely given AWU's history) even backflow problems and "boil water" alerts. Therefore, peak-day demand projections are the primary drivers of system treatment capacity requirements. Average demand projections, on the other hand, are the primary drivers of the total amount of

water supply needed as part of water resource planning. As such, average-day demand has more effect on total water supply costs than on treatment capacity requirements.

Exhibit 1 Relationship of Water Resource Planning Elements



SOURCE: City Council Briefing on Water Supply Strategies, June 08, 2006

Water Savings. For purposes of this report, the phrase “water savings” will refer to the amount of decrease in peak-day and average-day demand as measured in millions of gallons per day (MGD).

Recent City Concerns and Efforts. The Utility has projected that the City would need an additional water treatment plant by 2011 in order to meet peak-day demand. Currently, the City is moving ahead with preliminary engineering planning for a new water treatment plant while evaluating the potential for lowering peak-day demand enough to postpone its construction.

In support of this effort, the consultant working with the Utility’s Water Conservation Division, in the first phase of their study, evaluated twelve water conservation strategies that have the potential for significantly lowering peak-day demand over the next five years. These strategies are organized in the following three categories:

- Indoor strategies are intended to reduce the water used inside a house and/or building.
- Outdoor strategies are intended to reduce water usage outside a house and/or building and are the ones that have the biggest impact on peak-day water demand.
- City/Utility strategies are intended to reduce water usage by the City, and also include things that the Water Utility can do to reduce overall water usage throughout the City.

In the second phase of the study, the consultant and the City will perform a more comprehensive evaluation of water conservation strategies with a goal of reducing average-day demand into the future.

In June of 2006, the Austin City Council voted to direct the City Manager to begin immediate implementation of aggressive water conservation strategies and report back by the end of fiscal year 2008. In September of 2006, the City Council created a Water Conservation Task Force (WCTF). The WCTF includes City officials as well as appointed representatives from various Council boards and commissions. Other stakeholders have an opportunity to provide input during work sessions and meetings.

The WCTF's goal is to produce a policy document for Council consideration and adoption that will include recommendations for ordinances and resolutions outlining additional conservation strategies to implement. The policy document will serve as a guide for necessary ordinance changes and future budgetary decisions.

Using water savings estimates and other projections provided by the AWU Conservation Division staff, in January 2007 the taskforce is expected to recommend aggressive water conservation measures and set goals to reduce peak day usage by one percent per year for 10 years. Therefore, it is important that the AWU estimates and projections be reliable.

Origins of this audit. The Austin City Council's Audit and Finance Committee (AFC) approved a Risk and Vulnerability Assessment (RVA) of the Austin Water Utility (AWU) as part of the Office of the City Auditor's (OCA) 2006 Service Plan. Continued audit work resulting from the RVA was approved by the AFC as part of OCA's 2007 Service Plan. Among other issues, the RVA identified both conservation and water loss within the City's system as two significant issues affecting Austin's level of water use. An audit of water loss is planned for early in calendar year 2007.

This audit arose from that risk assessment, along with specific Council questions on conservation and is being conducted in conjunction with the work of the task force. This is the first in a series of reports timed to provide real-time assurance on conservation data being considered by the task force.

OBJECTIVES, SCOPE, AND METHODOLOGY

Audit Objectives:

The objectives of this audit are to:

1. Identify other Texas Cities that own their own water utilities.
2. Assess the validity and reliability of reported water savings from current conservation strategies, including the underlying assumptions, algorithms and methodologies..
3. Assess the validity and reliability of projected water savings from proposed conservation strategies being presented to the WCTF, including the underlying assumptions, algorithms and methodologies used to develop the projections. The assessment follows the grouping of strategies as follows:
 - a. Indoor strategies
 - b. Outdoor strategies
 - c. City and Utility strategies.
4. Describe the City of Austin's capability to provide customers with feedback on water usage, and identify and describe additional customer feedback provided by the City of San Antonio.

Due to the timing of this audit work in relation to the WCTF decision timeframes on proposed new conservation strategies, we are reporting the results of objectives 1, 3a, and 4 in this report. A subsequent report will be issued addressing objectives 2 and 3b-c.

This audit addresses the reliability of information presented to the task force on the water savings that can be expected from the indoor strategies selected to lower the projected peak day water demand. It also addresses the reliability of data presented on the cost of these strategies.

Scope:

The scope of this audit includes data provided to the WCTF related to the proposed future indoor water conservation strategies developed jointly by AWU Water Conservation Division staff and their consultant. Some projections were made from data dating back to 1990. .

The reliability of data on past and projected water usage levels and water production data was not addressed in this audit. It will be assessed in the audit of water loss referred to in the Background section of this report.

Methodology:

To address the audit objectives, we contacted other Texas cities to identify those owning water utilities. This information is shown in the Background section and Appendix B. We also assessed water usage information provided to customers by Austin and by San Antonio. We reviewed City staff and consultant data and methodologies on water savings from current and proposed conservation strategies, and we compared these with available data on expected savings from various strategies in the State Best Management Practices Guide (BMP guide).

This audit was conducted in compliance with the Generally Accepted Government Auditing Standards.

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AUDIT RESULTS

AWU has improved the quality of the data provided to the Water Conservation Task Force (WCTF). A more rigorous approach to developing of information used to arrive at high-risk water savings decisions would further improve both the quality of the information presented and the transparency of the process used to produce it. Additionally, information on their own water usage is not easily available to Austin Water Utility customers, who could use that information to conserve water and control their water costs.

Projected water savings and associated costs for indoor strategies proposed to the WCTF, as currently revised, are reasonably presented.

On October 13, 2006, AWU Conservation staff presented water savings projections for five indoor water saving strategies to the WCTF. The savings to be achieved from those five strategies were overstated. However, after two rounds of revision and corrections, we found the new estimates to be reasonable.

The figures presented to the October 13, 2006 meeting of the WCTF overstated savings to be achieved from indoor strategies. In Phase I of the WCTF's work, AWU Conservation staff presented five indoor water saving strategies and calculated that peak-day savings from those strategies would be somewhere between 7.9 and 8.4 MGD. (See column a in Exhibit 2 below)

Those strategies were:

- a retrofit program mandating low flow toilets, showerheads, and faucet aerators;
- a proposal for mandatory sub-metering of multi-family housing;
- plumbing code changes that would require high-efficiency fixtures and controllers for vacuum pumps and large-capacity commercial water heaters;
- changes to cooling tower controllers; and,
- limits on commercial car wash water usage.

We noted a difference in the gallons saved per capita used in the water savings calculations for future strategies and those used to calculate savings from current conservations strategies. Savings on future measures are based on 13.79 gallons per capita per toilet and savings on current measures use 25.7 gallons. The more conservative measure is derived using a 1998 National study while the current measure comes from an older AWU study that has been used by the its Conservation Division since it's inception. The explanation for this difference will be in the second audit of conservation measures scheduled for release in early 2007.

After two rounds of revision were completed, we found the new estimates to be reasonable.

AWU staff withdrew some strategies and began revising water savings calculations based on input from the WCTF, members of the public, industry sources, (see column b in Exhibit 2 below) and OCA's audit of the calculations which found errors and inconsistencies (see column c in Exhibit 2 below.) Some examples of the inconsistencies, errors, or concerns identified in our review included:

- Incorrect gallons per item used on faucet aerator savings; and
- Inconsistent assumptions about tenant savings in sub-metering calculations.

The revised estimate of water savings from indoor strategies as of November 17, 2006, is between 4.38 – 4.88 MGD, an estimate that closely matches our independent calculations (see column d in Exhibit 2 below).

Exhibit 2 below shows the evolution in estimated peak-day savings calculations made for the strategies under consideration by the WCTF.

Exhibit 2
Summary - Reliability of Projected Savings: Indoor Strategies

	(a)	(b)	(c)	(d)
	AWU Estimates originally presented to WCTF (at 10/13/06)	AWU Revised estimates after WCTF and Public Input	AWU Revised estimates with OCA input	OCA Calculated Estimates (at 11/17/06)
Program	Water Savings (MGD)	Water Savings (MGD)	Water Savings (MGD)	Water Savings (MGD)
Mandatory toilet retrofits	2.20 - 2.70*	2.20 - 2.70*	1.80 - 2.30*	2.081
Sub-metering of MF units	0.70	0.66	0.66	0.620
Plumbing code changes	2.70	1.00	0.93	0.940
Cooling towers	1.50	0.84	0.84	0.835
Car washes	0.80	0.80	0.15	0.152
Total Savings	7.90 - 8.40*	5.50 - 6.60*	4.38 - 4.88*	4.628
OCA Calculation	4.628	Diff from OCA	% Variance	within reasonable range
vs. AWU calc. at present	4.38 – 4.88*	0.252	5.44%	

SOURCE: OCA Comparisons of AWU estimates over time and of OCA calculations of same, November 2006

* Note: While AWU Conservation division staff presented a range of possible savings, OCA comparisons were done against the high side of the range. Also, one of the assumptions used in this calculation by both AWU and OCA staff is based on the results of a published scientific study and is now widely accepted as an industry standard. Past calculations used a different number: 25.9 gallons as opposed to the 13.7 gallons used in the above calculation. As noted on the previous page, the difference between these two numbers will be explored as part of our work in the second conservation audit.

Additional information on water savings from individual water savings strategies, as well as program costs and payback periods can be found in Appendix D.

Future presentations by AWU to the WCTF will include strategies for outdoor conservation (e.g. mandatory irrigation audits) and strategies that the City and the Utility can implement for additional conservation savings such as changes to park and right-of-way watering cycles.

A more rigorous approach to developing information used to arrive at high-risk water savings decisions would improve both the quality of the information presented and the transparency of the process used to produce it.

Conservation Division staff did not perform a quality assurance review of water savings and costs estimates. Additionally, peak-day and average-day calculations are not properly identified. The risks associated with both over- and under-estimating water savings are high enough to warrant better quality assurance in their production process. Further, a more structured approach to developing information used in selecting water conservation measures is available and its use would provide greater transparency into the selections of specific strategies, as well as the calculation of water savings and associated costs.

Risks associated with both over- and under-estimates of water savings are high enough to warrant better quality assurance in their production process. If the City's capacity is outstripped by demand, along with other risks, water pressure in parts of the system can fall low enough to adversely affect fire suppression requirements. These risks are high enough to encourage the use of conservative assumptions and methodologies in projecting peak-day demand and any adjustments that might be made to it as a result of water saving strategies.

On the other hand, overly conservative assumptions and methodologies in these calculations can result in costly capital outlay for unneeded capacity. The cost for excess capacity would have to be born by the Austin Water Utility rate payers until the City's demand rises to absorb the excess.

Conservation Division staff did not perform a quality assurance review of water savings and costs estimates. While staff assigned to prepare the projected water savings and program costs are highly qualified and have proceeded with care, they are working under fairly severe time constraints. Even without the time constraints, given the importance of having reliable estimates of both water savings and costs, a good quality review process would result in better information for decision makers. For the current considerations, OCA's review has served as a de-facto quality assurance review, with AWU staff incorporating our conclusions real-time.

Peak-day and average-day calculations are not identified. Decisions made about the amount of water to contract for and the system capacity needed to safely deliver it to customers should be made with carefully constructed and accurately labeled peak-day and average-day projections. The presentations made to the WCTF did not include a clarification of whether projected water demand savings affected one or both of the peak-day and average-day calculations. Therefore, it was difficult to understand that some strategies may have an effect on one or the other, or both, of the calculations. This is significant because peak-day demand is the primary driver of capacity needs. Average-day demand plays a primary role in determining water supply costs, but is a supporting figure in the calculation of need for system capacity.

Recommendations

01. In order to ensure that the Council's WCTF is presented with data that is as accurate as possible, the Austin Water Utility's Director should quickly document procedures to ensure that all savings and cost estimates are properly calculated and reviewed. This includes ensuring that there is a sufficient amount of staff devoted to support the WCTF.

MANAGEMENT RESPONSE: CONCUR

The Utility needs to clarify that the water savings to be achieved from the five water saving strategies that were presented to the WCTS are *projected* savings. Also, some of the initial strategies were withdrawn from the WCTF's meetings, and as a result the projected water savings were revised. The Utility has already instituted a more rigorous approach to calculating, documenting, reviewing, and presenting the water savings projections. Water Conservation staff is creating spreadsheets tracking all projected savings and cost estimates that are contained in the presentations to the Task Force. We have included quality assurance check within our process, as these spreadsheets are then being reviewed by another employee in Water Conservation to ensure their accuracy. Implementation is underway, and will be complete by the last WCTF presentation on January 12, 2007. To ensure corrective measures and procedures are implemented, these efforts are being overseen by the Utility's Water Conservation Division Manager and the Assistant Director for Water Resources Planning.

-
02. For phases two and three of the task force's work, the Austin Water Utility's Director should ensure that assumptions are consistently applied throughout the calculations (e.g., FTE costs, savings reported vs. savings used in payback analysis, etc.)

MANAGEMENT RESPONSE: CONCUR

Water Conservation staff initially used different FTE costs to allow for different skill levels for new work to be done under the recommendations, but has adjusted those estimates for a standard FTE cost for all new positions, and will use that cost for all new estimates in phases two and three of the task force's work. Also, as stated in the draft audit report, the Utility engaged a consultant, Alan Plummer and Associates, to perform studies in support of planning for long-range water resource needs of the Utility; the consultant's scope of work includes evaluating water conservation strategies. Due to a shortage of time, Water Conservation staff relied on the Alan Plummer report for some savings estimates and did not have time to fully check for inconsistencies. With the assistance of the auditors, those inconsistencies have been identified and corrected during phase one. In phases two and three, Water Conservation staff will institute a quality assurance check as recommended. Implementation is underway, and will be complete by the last WCTF presentation on January 12, 2007. To ensure corrective measures and procedures are implemented, these efforts are being overseen by the Utility's Water Conservation Division Manager and the Assistant Director for Water Resources Planning.

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03. In order to ensure that the data presented to the Council's WCTF is easily understood, the Austin Water Utility's Director should identify the difference between peak-day and average-day water savings, and clearly identify which of the two calculations are affected by which of the proposed strategies.

MANAGEMENT RESPONSE: CONCUR

All recommendations impact peak day and average day use, and peak day savings are what have been presented to the Task Force. As part of a more rigorous approach to presenting the projected water savings, the Utility will ensure that peak day savings and average day savings are clearly identified in WCTF presentations. Water Conservation staff will work with the auditors to provide both peak day and average day savings for the strategies recommended. Implementation is underway, and will be complete by the last WCTF presentation on January 12, 2007. To ensure corrective measures and procedures are implemented, these efforts are being overseen by the Utility's Water Conservation Division Manager and the Assistant Director for Water Resources Planning.

A more structured approach to developing information used in selecting water conservation measures would provide greater transparency into the selection of specific strategies. The Best Management Practice (BMP) Guide contains a structure for “rolling-out” the implementation of a conservation measure or series of measures that is useful, proven, cost-effective, and generally accepted among conservation experts. According to the BMP Guide: “In Texas, conservation BMPs are designed to fit into the State’s water resource planning process as one alternative to meet future water needs. As a result, each municipality’s expected use of a BMP should be clearly defined in its schedule of implementation, expected water savings, and costs of implementation.”

Additionally, each BMP structure has several elements that describe:

- the efficiency measures,
- implementation techniques,
- schedule of implementation,
- scope,
- water savings estimating procedures,
- cost effectiveness considerations, and
- references to assist end-users in implementation.

While AWU Conservation Division staff do have criteria to follow when arriving at decisions on whether or not to recommend strategies for further study and/or adoption, we found that they do not have a structured approach for documenting their process (similar to the best practices noted above), which leads to less transparency within their process.

Transparency is the opposite of privacy; an activity is transparent if all information about it is open and freely available.

Therefore, best practice would normally include documenting the underlying assumptions used in the calculation of savings and costs, implementation techniques, cost effectiveness considerations, etc. We were unable to understand the documentation and had to rely on oral testimony to confirm the logic and data used to arrive at the figures used by AWU staff. Additionally, there were some strategies that did not have comparable information to others, making them difficult to compare and evaluate.

Recommendation

04. In order to enable quality assurance reviews, the Austin Water Utility’s Director should adopt a structured approach to preparing information for decision making which at a

State BMP Guide. In the first round of regional water planning, the regional water planning groups had expressed difficulty in developing a science-based evaluation for the implementation of water conservation strategies. This difficulty hindered their ability to cost compare conservation strategies in an “apples-to-apples” manner with water management strategies. To address this difficulty, SB 1094 directed the state task force to develop a Best-Management Practices Guide (BMP Guide) for use by regional planning groups and political subdivisions responsible for water delivery service.

The state task force developed the BMP Guide consisting of 21 municipal, 14 industrial, and 20 agricultural BMPs. The practices contained in the BMP Guide are voluntary efficiency strategies that save a quantifiable amount of water, either directly or indirectly, and that can be implemented within a specified timeframe. The adoption of any BMP is entirely voluntary, although it is recognized that once adopted, certain BMPs may have some regulatory aspects to them (e.g., implementation of a local city ordinance).

minimum includes the elements detailed in the Texas Water Development Board's Best Management Practices Guide.

MANAGEMENT RESPONSE: CONCUR

However, Water Conservation staff has already presented the indoor strategies contained in the BMP guide and will review savings numbers and ranges for all others. If differences occur, staff will provide explanations for them. Implementation is underway, and will be complete by the last WCTF presentation on January 12, 2007. To ensure corrective measures and procedures are implemented, these efforts are being overseen by the Utility's Water Conservation Division Manager and the Assistant Director for Water Resources Planning.

Information on customer water consumption could be more user-friendly.

Providing historical and comparative usage information to customers is one way that customers can frequently evaluate their water usage and costs. Most of the information on conservation programs is disseminated through the AWU Conservation Division’s website, but the City of Austin’s utility billing system does not provide historical or comparative water usage information on monthly utility statements.

The historical information is available in graphical and spreadsheet format on COAUtilities.com; however, all Utility customers may not have access to their data and some may find the data hard to use because the way it is presented is not easy to interpret. Usage graphs and comparative data can be included in current billing statements, but the costs of providing usage data in graphical format on utility billing statements have not been calculated.

The City of Austin’s utility billing system does not provide historical or comparative water usage information on monthly utility statements. Utility bills for the City are produced by a Customer Information System (CIS) owned and managed by a private provider. As shown in Exhibit 3 below, we found that the City of Austin’s utility billing statements do not include data similar to that which is provided on San Antonio Water System billing statements.

**Exhibit 3
Comparison of Billing Statement Information**

Item	San Antonio Water System (SAWS)	City of Austin Utilities
Current Usage data	Provided in gallons used by billing usage levels	Same as SAWS
Historical usage data	Provided in graphical format for previous 12 months of usage	Not provided
Comparison of usage to “winter” average	Provided in narrative format	Not provided
Comparison of usage to neighborhood average (see Note 1 below)	Provided in narrative format	Not provided
Comparison of usage to citywide average (see Note 1 below)	Provided in narrative format	Not provided

SOURCE: OCA Comparisons, September 2006

Note 1 – While the SAWS billing statements show what the neighborhood average and citywide averages are, it appears that they show the same figures in both places. We did not follow-up with SAWS to determine what caused this.

Examples of both City of Austin Utilities and San Antonio Water System billing statements can be seen in Appendix E.

Customer trend data should be more readily available and easy to understand. The AWU Conservation Division’s website included information on conservation programs, but customer usage information in graphical format is available only on another City website, and is not easy to understand. Water (and electric) usage information in graphical format is available on Austin Energy’s Online Customer Care (COAUtilities.com) website, which customers must register to use in

order to access the information. However, customers may find data available on COAUtilities.com hard to understand. We found that the data on the COAUtilities.com website is presented in tables and graphs that show the most current month first on the far left. In other words chronological order is presented from right to left instead of left to right, which is opposite from how individuals normally read data. See Appendix F for examples.

We also noted that information regarding the COAUtilities.com website has not been disseminated widely by Austin Water Utility. In addition to several billing statement inserts, the Conservation Division relied heavily on their own pages in AWU’s web site to disseminate conservation information to customers. Available on these pages is an electronic newsletter that customers can register to receive automatically. There are approximately 13,088 registered readers. Until our review began, information regarding the COAUtilities.com website had been included in only two *Waterwise* newsletters (Oct 2004 and Feb 2005).

While the information is available, all Utility customers may not have access to their data. As shown in the table below, only a small percentage of the Water Utility’s customers are actually using the COAUtilities.com website to keep track of their usage for conservation purposes, and only a small percentage of Utility customers have access to the *WaterWise* newsletter. Additionally City of Austin customers without internet access are not able to access historical data on their water and electrical usage at all.

EXHIBIT 4
Percentage of Water Utility Customers accessing AWU web data

Austin Water Utility Customers	COA Utilities.com Registered Users	<i>WaterWise</i> Newsletter Registered Users
Approximately 197,000	Approximately 70,000 (35.53% of AWU Customers)	Approximately 13,088 (6.64% of AWU Customers)

SOURCE: OCA interviews of AWU/AE personnel, September 2006 and November 2006.

We did note, however, that some efforts are being undertaken by the Utility to inform a larger part of the population about water conservation. One example is the coordinated efforts with other entities such as the Lower Colorado River Authority (LCRA). Another is the inclusion of information inserts (including info on the COAUtilities.com website) with utility statements.

Providing ready access to easily interpreted historical and comparative usage data is one way that customers can frequently evaluate their water usage and costs. According to the Texas Water Development Board’s Water Conservation Implementation Task Force’s Best Management Practices guidebook: “Behavioral changes by customers will only occur if a reasonable yet compelling case can be presented with sufficient frequency to be recognized and absorbed by customers.”

Usage graphs and comparative data can be included in current billing statements.

OCA audit staff successfully inserted graphs that are small, yet readable, into a mock-up of the City’s current utility statement format. We accomplished this by moving the usage and cost information closer together (see Appendix G). This format was originally conceived in the early 1990’s and early

bills produced by CIS contained a space designated for graphs to be developed at a later date. At some point, the bill format changed and the space designated for graphs was no longer available. Usage graphs were also not included when CIS was updated in 1998. Additionally, while information on neighborhood and/or citywide average usage for the month is not currently shown on either the customer billing statement or on the website, we also believe that it could be shown on the current statement format, utilizing space on the back of the return stub that can be used for graphical information.

The costs of providing usage data in graphical format on utility billing statements have not been calculated. Although not a part of the indoor strategies presented to the WCTF, some task force members did ask OCA to look at the City's capability to provide customers with feedback on their water usage. We understand that the AWU Conservation Division will address this as part of the third phase of the WCTF's work. Their analysis should include a review of the cost-effectiveness of providing usage data to their customers.

According to the City's Customer Service personnel, who interface with the CIS provider, the cost of reprogramming the CIS billing system to show the usage graphs can only be determined by developing a requisition for the actual changes. Additionally, they believe that adding the graphs would require going to a multiple page billing statement, which would add additional paper and postage to the billing statement costs.

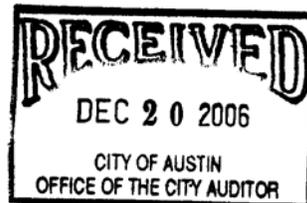
Recommendation

05. In order to increase water savings, Austin Water Utility's Director should explore multiple avenues for providing all consumers with usage information that would be helpful in their own efforts to reduce their water consumption. Such exploration should include direct contact with the CIS vendor to determine the cost of re-programming the utility billing system to provide usage data in graphical format and average usage comparisons and an analysis of the cost-effectiveness of providing that information to customers.

MANAGEMENT RESPONSE: CONCUR

Although we recognize the benefit of the recommendation, we should note that the City's billing system is in the process of being replaced. The Utility will explore the feasibility of implementing this recommendation, given that it would not be prudent to implement a costly programming change in the midst of a system replacement. As a first step in our cost estimate analysis, the Retail Customer Service division manager has recently submitted an e-CIS Control File Change Request to Austin Energy to have the CIS vendor determine the cost of reprogramming the billing system to modify the customer's bill to include a graph of their current and historical water usage and average usage comparisons. Additionally, an estimate of the costs associated with ongoing annual expenses to implement this recommendation has been requested. The estimate of the costs associated with implementation and ongoing expenses should be completed by January 2007. Upon receiving the estimate of the reprogramming and ongoing annual expenses, the Utility will share this information with the WCTF.

APPENDIX A
MANAGEMENT RESPONSE



MEMORANDUM

To: Stephen L. Morgan, City Auditor

From: Rudy Garza, Assistant City Manager

Date: December 8, 2006

Subject: Response to Audit Recommendations

I have reviewed and approved the Austin Water Utility's response to the audit recommendations in OCA's draft report titled "Conservation I: Reliability of Water Savings Projections for Indoor Strategies." Attached is the Utility's response to the audit recommendations.

Rudy Garza, Assistant City Manager
City of Austin

cc: Perwez Moheet, CPA, Deputy Director, Austin Water Utility
David Juarez, P.E., Assistant Director, Water Resources Management

Response to Audit Recommendations
Conservation I: Reliability of Water Savings Projections for Indoor Strategies

Recommendation 1

In order to ensure that the Council's WCTF is presented with data that is as accurate as possible, the Austin Water Utility's Director should quickly document procedures to ensure that all savings and cost estimates are properly calculated and reviewed. This includes ensuring that there is a sufficient amount of staff devoted to support the WCTF.

Response to Recommendation 1

Concur. The Utility needs to clarify that the water savings to be achieved from the five water saving strategies that were presented to the WCTS are *projected* savings. Also, some of the initial strategies were withdrawn due to input from the WCTF's meetings, and as a result the projected water savings were revised. The Utility has already instituted a more rigorous approach to calculating, documenting, reviewing, and presenting the water savings projections. Water Conservation staff is creating spreadsheets tracking all projected savings and cost estimates that are contained in the presentations to the Task Force. We have included quality assurance check within our process, as these spreadsheets are then being reviewed by another employee in Water Conservation to ensure their accuracy. Implementation is underway, and will be complete by the last WCTF presentation on January 12, 2007. To ensure corrective measures and procedures are implemented, these efforts are being overseen by the Utility's Water Conservation Division Manager and the Assistant Director for Water Resources Planning.

Recommendation 2

For phases two and three of the task force's work, the Austin Water Utility's Director should ensure that assumptions are consistently applied throughout the calculations (e.g., FTE costs, savings reported vs. savings used in payback analysis, etc.)

Response to Recommendation 2

Concur. Water Conservation staff initially used different FTE costs to allow for different skill levels for new work to be done under the recommendations, but has adjusted those estimates for a standard FTE cost for all new positions, and will use that cost for all new estimates in phases two and three of the task force's work. Also, as stated in the draft audit report, the Utility engaged a consultant, Alan Plummer and Associates, to perform studies in support of planning for long-range water resource needs of the Utility; the consultant's scope of work includes evaluating water conservation strategies. Due to a shortage of time, Water Conservation staff relied on the Alan Plummer report for some savings estimates and did not have time to fully check for inconsistencies. With the assistance of the auditors, those inconsistencies have been identified and corrected during phase one. In phases two and three, Water Conservation staff will fully institute a quality assurance check as recommended. Implementation is underway, and will be complete by the last WCTF presentation on January 12, 2007. To ensure corrective measures and

procedures are implemented, these efforts are being overseen by the Utility's Water Conservation Division Manager and the Assistant Director for Water Resources Planning.

Recommendation 3

In order to ensure that the data presented to the Council's WCTF is easily understood, the Austin Water Utility's Director should identify the difference between peak-day and average-day water savings, and clearly identify which of the two calculations are affected by which of the proposed strategies.

Response to Recommendation 3

Concur. All recommendations impact peak day and average day use, and peak day savings are what have been presented to the Task Force. As part of a more rigorous approach to presenting the projected water savings, the Utility will ensure that peak day savings and average day savings are clearly identified in WCTF presentations. Water Conservation staff will work with the auditors to provide both peak day and average day savings for the strategies recommended. Implementation is underway, and will be complete by the last WCTF presentation on January 12, 2007. To ensure corrective measures and procedures are implemented, these efforts are being overseen by the Utility's Water Conservation Division Manager and the Assistant Director for Water Resources Planning.

Recommendation 4

In order to enable quality assurance reviews, the Austin Water Utility's Director should adopt a structured approach to preparing information for decision making which at a minimum includes the elements detailed in the Texas Water Development Board's Best Management Practices Guide.

Response to Recommendation 4

Concur. However, Water Conservation staff has already presented the indoor strategies contained in the BMP guide and will review savings numbers and ranges for all others. If differences occur, staff will provide explanations for them. Implementation is underway, and will be complete by the last WCTF presentation on January 12, 2007. To ensure corrective measures and procedures are implemented, these efforts are being overseen by the Utility's Water Conservation Division Manager and the Assistant Director for Water Resources Planning.

Recommendation 5

In order to increase water savings, Austin Water Utility's Director should explore multiple avenues for providing all consumers with usage information that would be helpful in their own efforts to reduce their water consumption. Such exploration should include direct contact with the CIS vendor to determine the cost of re-programming the utility billing system to provide usage data in graphical format and average usage comparisons and an analysis of the cost-effectiveness of providing that information to customers.

Response to Recommendation 5

Concur. Although we recognize the benefit of the recommendation, we should note that the City's billing system is in the process of being replaced. The Utility will explore the feasibility of implementing this recommendation, given that it would not be prudent to implement a costly programming change in the midst of a system replacement. As a first step in our cost estimate analysis, the Retail Customer Service division manager has recently submitted an e-CIS Control File Change Request to Austin Energy to have the CIS vendor determine the cost of reprogramming the billing system to modify the customer's bill to include a graph of their current and historical water usage and average usage comparisons. Additionally, an estimate of the costs associated with ongoing annual expenses to implement this recommendation has been requested. The estimate of the costs associated with implementation and ongoing expenses should be completed by January 2007. Upon receiving the estimate of the reprogramming and ongoing annual expenses, the Utility will share this information with the WCTF.

ACTION PLAN
AU07102 - Conservation I: Reliability of Water Savings Projections for Indoor Strategies

Rec. #	Recommendation Text	Proposed Strategies for Implementation	Status of Strategies	Responsible Person/Phone Number	Proposed Implementation Date
1	In order to ensure that the Council's WCTF is presented with data that is as accurate as possible, the Austin Water Utility's Director should quickly document procedures to ensure that all savings and cost estimates are properly calculated and reviewed. This includes ensuring that there is a sufficient amount of staff devoted to support the WCTF.	Create spreadsheets tracking all savings and cost estimates that are contained in the presentations to the Task Force.	Underway	Tony Gregg 974-3557	1/12/07
2	For phases two and three of the task force's work, the Austin Water Utility's Director should ensure that assumptions are consistently applied throughout the calculations (e.g., FTE costs, savings reported vs. savings used in payback analysis, etc.)	Use a single figure for calculating all FTE costs. Use agreed on savings figures for all calculations. Continue to work with auditors to ensure confidence in the numbers.	Underway	Tony Gregg 974-3557	1/12/07
3	In order to ensure that the data presented to the Council's WCTF is easily understood, the Austin Water Utility's Director	For the presentation of final recommendations, show both the peak day and average day savings of each of the proposed measures.	Underway	Tony Gregg 974-3557	1/12/07

	should identify the difference between peak-day and average-day water savings, and clearly identify which of the two calculations are affected by which of the proposed strategies.	Work with the auditors on approved methodologies.			
4	In order to enable quality assurance reviews, the Austin Water Utility's Director should adopt a structured approach to preparing information for decision making which at a minimum includes the elements detailed in the Texas Water Development Board's <u>Best Management Practices Guide</u> .	Compare savings and cost estimates methodologies with those in the BMP guide. If differences occur, explain the deviation.	Underway	Tony Gregg 974-3557	1/12/07
5	In order to increase water savings, Austin Water Utility's Director should explore multiple avenues for providing all consumers with usage information that would be helpful in their own efforts to reduce their water consumption. Such exploration should include direct contact with the CIS vendor to determine the cost of re-programming the utility billing system to provide usage data in graphical format and average usage comparisons and	The Retail Customer Service division manager has recently submitted an e-CIS Control File Change Request to Austin Energy to have the CIS vendor determine the cost of reprogramming the billing system to modify the customer's bill to include a graph of their current and historical water usage and average usage comparisons. Additionally, an estimate of the costs associated with ongoing annual expenses to implement this recommendation has been requested.	Underway	David Anders, 972-0323	March 2007

	an analysis of the cost-effectiveness of providing that information to customers.				
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Status of strategies: planned, underway, or implemented.

APPENDIX B

**TEXAS CITIES WITH POPULATION OF AT LEAST 50,000
THAT OWN THEIR WATER / WASTEWATER UTILITIES**

List of Water/Wastewater Utilities in Texas for Cities over 50,000 in population

	Per 2000 US Census	Source	Web Address
> 500,000 Population Served			
<u>Water Utilities Owned by the City</u>			
City of Houston - Dept of Public Works and Engineering	1,953,631	Per Website	http://www.houstontx.gov/publicworks/index.html
City of Dallas - Dallas Water Utilities	1,188,580	Per Website	http://www.dallascityhall.com/html/water_utilities_interesting_fa.html
City of San Antonio - San Antonio Water System	1,144,646	Per AWWA BM Bk	http://www.saws.org
City of Austin - Austin Water Utility	656,562	Per AWWA BM Bk	http://www.ci.austin.tx.us/water/water_portal2.htm
City of El Paso - El Paso Utilities	563,662	Per AWWA BM Bk	http://www.epwu.org
City of Fort Worth - Fort Worth Water Department	534,694	Per AWWA BM Bk	http://www.fortworthgov.org/water/
<u>Water Utilities Not Owned by the City</u>			
NONE			
100,001 - 500,000 Population Served			
<u>Water Utilities Owned by the City</u>			
City of Arlington - Arlington Water Utilities	332,969	Per Website	http://www.ci.arlington.tx.us/water/index.html
City of Corpus Christi - Water and Wastewater Department	277,454	Per Website	http://www.cctexas.com/?fuseaction=main.view&page=1006
City of Garland - Public Works Dept. - Water Utilities	215,768	Per AWWA BM Bk	http://www.ci.garland.tx.us/Home/Departments/Utility+Services/Water+Utilities/
City of Lubbock - Lubbock Water Utilities	199,564	Per Website	http://busdev.ci.lubbock.tx.us/Quality%20of%20Life.pdf
City of Laredo - Utilities Department	176,576	Per Website	http://www.ci.laredo.tx.us/Utilities05/about.htm
City of Amarillo - Utilities Division	173,627	Per Website	http://www.ci.amarillo.tx.us/departments/utilities.htm
City of Brownville - Public Utilities Board	139,722	Per Website	http://www.brownville-pub.com/water.html
City of Abilene - Water Utilities Department	115,930	Per Website	http://www.abilenetx.com/WaterDistribution/index.htm
City of Beaumont - Water Utilities Division	113,866	Per Website	http://www.cityofbeaumont.com/water.htm
City of Waco - Waco Water Services	113,726	Per Website	http://www.wacowater.com/what-we-do.html
City of Carrollton - Utility Customer Service Dept.	109,576	Per AWWA BM Bk	http://www.ci.carrollton.tx.us/government/cityorgchart/utilityservice.shtml
City of McAllen - McAllen Public Utility	106,414	Per Website	http://www.mcallen.net/utilities/index.asp
City of Wichita Falls - Public Works Water Purification Div.	104,197	Per Website	http://www.cwfbx.net/index.asp?NID=22
<u>Water Utilities Not Owned by the City</u>			
City of Plano	222,030	Per Website	http://pdf.plano.gov/water/waterreport06.pdf
City of Pasadena	141,674	Per Website	http://www.ci.pasadena.tx.us/cityservices.htm
City of Grand Prairie	127,427	Per Website	http://www.gpbx.org/PublicWorks/WaterUtilities/
City of Mesquite	124,523	Per Website	http://www.cityofmesquite.com/utilities/
Lower Colorado River Authority- TX *	n/a *	Per AWWA BM Bk	http://www.lcra.org/water/utility_systems_list.html
* LCRA serves over 190,000 in 11 counties			
50,001 - 100,000 Population Served			
<u>Water Utilities Owned by the City</u>			
City of Midland - Water and Wastewater Operations Divisi	94,996	Per Website	http://www.ci.midland.tx.us/Utilities/cdutilities.htm
City of Lewisville - Dept. of Public Services	91,802	Per Website	http://www.cityoflewisville.com/Website/Public%20Services.nsf
City of Odessa - Utilities Department	90,943	Per Website	http://www.odessa-tx.gov/public/utilities/
City of San Angelo - Water Utilities Dept.	88,439	Per Website	http://www.sanangelotexas.us/index.asp?
City of Tyler - Tyler Water Utilities	83,650	Per Website	http://www.cityoftyler.org/Default.aspx?tabid=347
City of Denton - Utilities Dept. - Water Utilities	80,537	Per AWWA BM Bk	http://www.cityofdenton.com/pages/utlswaterutilities.cfm
City of Longview - Water Utilities Dept.	73,344	Per AWWA BM Bk	http://www.ci.longview.tx.us/services/water_utilities.html
City of College Station - College Station Utilities Dept.	67,890	Per AWWA BM Bk	http://www.cstx.gov/home/index.asp?page=2004
City of Bryan - Public Works	65,660	Per Website	http://www.bryan.tx.gov/departments/index.html?name=water_production
City of Sugar Land - Public Works and Utilities	63,328	Per Website	http://www.sugarlandtx.gov/public_works/index.asp
City of Round Rock - Utilities Department	61,136	Per Website	http://www.roundrocktexas.gov/home/index.asp?page=149
City of Victoria - Department of Utilities	60,603	Per Website	http://www.victoriabx.org/utilities/index.htm
City of Port Arthur - Department of Water Utilities	57,755	Per Website	http://www.portarthur.net/water_dept.cfm
City of Harlingen - Harlingen Water Works	57,564	Per Website	http://www.myharlingen.us/chap9vis.htm

Source: OCA Survey – August 2006

APPENDIX C

CURRENT AND PROPOSED CONSERVATION STRATEGIES

Item #	Current Strategies Comprehensive List
	Residential Programs
1	Free Toilets
2	Toilet Rebates
3	Clotheswasher Rebates
4	Irrigation Audits
5	Irrigation Rebates
6	WaterWise Rebates
7	Aerators
8	Showerheads
9	Rainwater Rebates
10	Rain Barrel Rebates and Sales
11	Indoor Audits
	Multi-Family Programs
12	Free Toilets
13	Toilet Rebates
14	Clotheswasher Rebates
	Commercial Programs
15	Free Toilets
16	Toilet Rebates
17	Clothes Washers
18	Irrigation Audits-controllers
19	Commercial Irrigation Rebates
20	Indoor Audits
21	ICI Audits
22	Commercial Rebates
23	Grinder Rebates
24	Spray Valves
25	Dental Vacuum Pumps
26	Aerators
	Education Programs
27a	Dowser Dan Shows
27	Dowser Dan Attendance
28	Water in Our World
29	Xeriscape and Rainwater Events
30	Peak Day Campaign
32	Reclaimed Water
	Plumbing Code(CY)
33	SF Homes
34	Multi-family: units
35	Commercial
36	Comm. Landscape Ord.

Item #	Proposed Indoor Conservation Strategies
	Toilet Retrofits
1	Single-Family Toilet Retrofits
2	Multi-Family Toilet Retrofits
3	ICI Toilet Retrofits
	Multi-Family Residential
4	Require Sub-metering
	Plumbing Code Changes
5	Vacuum Pump Requirements
6	Urinal Flow Requirements
7	Commercial Dishwasher Program
8	Boiler Conductivity Controllers
	Cooling Tower Changes
9	Meter, Controller & Overflow alarms
	Car Wash Requirements
10	Adjust from 75 to 55 gals/car
11	Require low-flow spray wands

SOURCE: OCA analysis of proposed strategies

SOURCE: OCA analysis of FY05 & FY06 Peak & Average Savings and Participation reports.

APPENDIX D

**ADDITIONAL INFORMATION ON
PROPOSED CONSERVATION STRATEGIES**

Comparison of Water Savings Calculations, Reliability Assumptions and
City Cost per Gallon Calculations for Proposed Indoor Conservation Strategies

Strategies	Water Savings (MGD)	Estimate of Ease of Implementation	City Cost Per Peak-Day Gal.	City Cost per Year-Round Gal.
Mandatory Toilet Retrofit	Original 2.2 -2.7	Original Very High	Original \$1.01 - \$2.23	Original \$1.01 - \$2.23
	Revised 1.8 – 2.3	No revision	Revised \$1.79 - \$2.19	Revised \$1.79 - \$2.19
	OCA 2.081	OCA Agree w/ AWU	OCA \$2.607	OCA \$2.607
			Diff was due to estimated FTE salary assumption & mgd calcs	Diff was due to estimated FTE salary assumption & mgd calcs
Submetering	Original 0.7	Original Moderately High	Original \$0.45	Original \$0.45
	Revised 0.66	No revision	Revised \$0.43	Revised \$0.43
	OCA 0.62	OCA Agree w/ AWU	OCA \$0.48	OCA \$0.48
	Orig AWU est. was rounded up		Orig AWU est was mis-calculated & OCA using lower mgd figure	Orig AWU est was mis-calculated & OCA using lower mgd figure
Plumbing Code Changes	Original 2.7	Original Not Given	Original \$0.03	Original \$0.03
	Revised 0.933	No revision	Revised \$0.11	Revised \$0.11
	OCA 0.9401	OCA Agree w/ AWU	OCA \$0.32	OCA \$0.32
	Some items not chosen by WCTF		OCA Calcs used less mgd Therefore AWU adjusts to \$0.32	OCA Calcs used less mgd Therefore AWU adjusts to \$0.32
Cooling Towers	Original 1.5	Original Moderate	Original \$0.02	Original \$0.08
	Revised 0.84	No revision	Revised \$0.18	Revised \$0.18
	OCA 0.835	OCA Agree w/ AWU	OCA \$0.18	OCA \$0.18
	Orig AWU figures incl Nano-filtration; then figure rned up	Dependent on some behavioral changes	Original AWU estimates used Nano-filtration savings	Orig. AWU estimates incl. error (not weighted to Peak-Day demand)
Car Washes	Original 0.8	Original Low	Original \$0.04	Original \$0.04
	Revised 0.152	No revision	Revised \$0.53	Revised \$0.53
	OCA 0.152	OCA Agree w/ AWU	OCA \$0.98	OCA \$0.98
	Orig AWU est was incorrect; 1 item not chosen byWCTF	Dependent on the availability of systems	Orig. AWU est. was incorrect; 1 item not chosen by WCTF	Orig. AWU est. was incorrect; 1 item not chosen by WCTF
	Orig. Total 7.9 -8.4			
	Revised 4.38 – 4.88			
	OCA Total 4.6281			

Comparison of Customer Cost
And Payback Period Calculations for Proposed Indoor Conservation Strategies

Strategies (Continued)	Cost for Customer	Savings for Customer	Customer Payback Time
Mandatory Toilet Retrofit	Original \$0 - \$200 Per toilet No revision	Original \$184/yr. for 2 toilet household Revised \$102.56	Original 0 – 2.2 yrs. No revision
	OCA Agree w/ AWU	OCA \$102.56 Orig. AWU estimate used diff savings assumption than OCA	OCA 0 – 3.9 yrs Orig. AWU estimate used diff savings assumption than OCA
Submetering	Original Landlord = \$125 Tenant = None No revision	Original Landlord = No assertion Tenant = \$80/yr./unit No revision	Original LL = Less than 1 yr. Tenant = None No revision
	OCA Landlord = agree w AWU Tenant = \$47.97/mo Diff was AWU did not consider the new w/ww costs to customer	OCA LL = \$679.59/yr Tenant = \$103.97 Landlord costs move to tenant Tenant has savings from submetering	OCA LL = 2.375 months Tenant = None
Plumbing Code Changes	Original Varies by Equip. No revision	Original Varies by Equip. No revision	Original Varies by Equip. No revision
	OCA Agree w/ AWU Costs vary depending on equipment used	OCA Agree w/ AWU Costs vary depending on equipment used	OCA Agree w/ AWU Costs vary depending on equipment used
Cooling Towers	Original \$1,000 - \$7,000 depends on tower size No revision	Original \$5,000 avg./yr. No revision	Original 0.2 – 1.4 yrs. No revision
	OCA Agree w/ AWU	OCA Small Tower = \$1,337.13 Large Tower = \$6,769.20	OCA Small Tower = 2.269 mo Large Tower = 1.323 yrs.
Car Washes	Original None Not revision	Original No Data No Revision	Original Varies by Equipt. No Revision
	OCA Agree w/ AWU No cost for adjusting system; Nozzle replacement done regularly	OCA \$1,319.13 per day Based on commercial w/ww rates this is amt saved by all car washes per day	OCA No Payback period No additional costs Therefore, savings are immediate

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APPENDIX E

**EXAMPLES OF CITY OF AUSTIN AND
SAN ANTONIO WATER SYSTEM
BILLING STATEMENTS**

City of Austin Utility Billing Statement

Page 1 of 1

		Account No. [REDACTED]	Page 2
Electric Service	Meter # [REDACTED]	Read Date	Reading
		09/19/2005	30672.00
		09/18/2005	29236.00
		Read Difference	1421.00
		Total Consumption in KWH	1,421
		Billing Rate: Residential Service Summer	
		Customer Charge	\$6.00
		Energy Charge	500.00 @ \$.0355000 per KWH \$17.75
		Fuel Charge	921.00 @ \$.0782000 per KWH \$72.02
		Sales Tax	1,421.00 @ \$.0279600 per KWH \$39.73
		TOTAL CURRENT CHARGES - Electric	\$136.86
Water Service	Meter # [REDACTED]	Read Date	Reading
		09/19/2005	4401.00
		09/16/2005	4277.00
		Read Difference in Hundreds	124.00
		Total Consumption in Gallons	12,400
		Billing Rate: Inside Residential Water	
		Customer Charge	\$4.00
		Consumption Charge	2,000 Gallons @ \$.9600000 per 1,000 \$19.20
			7,000 Gallons @ \$ 2.2900000 per 1,000 \$16.03
			3,400 Gallons @ \$ 3.7000000 per 1,000 \$12.59
		Total Consumption:	12,400 Gallons
		TOTAL CURRENT CHARGES - Water	\$34.33
Wastewater Service		Customer Charge	\$4.00
		Flow Charge	1,900 Gallons @ \$ 2.4800000 per 1,000 \$47.11
		TOTAL CURRENT CHARGES - Wastewater	\$51.11
Solid Waste Service		Anti-Litter Residential	\$2.60
		San-Res (60 Gallon Cart)	\$14.50
		Sales Tax	\$1.21
		TOTAL CURRENT CHARGES - Solid Waste	\$18.31
Drainage/Street Service		Comprehensive Drainage Fee	\$6.74
		Transportation User Fee	\$3.67
		TOTAL CURRENT CHARGES - Drainage/Street Service	\$10.41

AUTHORIZED PAY STATIONS:

Payments are accepted at most Austin-area HEB and Randall's stores, as well as:

- University Co-op (Guadalupe and Riverside locations)
- Fiesta Mart (IH35 and 38 1/2 St.)
- Rosewood-Zaragoza Center

Drop Box locations are:

- 625 East 10th Street
- 505 Barton Springs Road

*Do not include correspondence with payment. Mail all inquiries to:
City of Austin, Utility Customer Service, P.O. Box 2267, Austin, Texas 78783-2267*

Note that current City of Austin billing statement shows only customer usage and billing information.

Additionally, there are no graphs of usage data or comparisons to citywide or neighborhood averages is presented.

San Antonio Water System Billing Statement

San Antonio Water System

P.O. Box 2990
San Antonio, Texas 78299-2990
(210) 704-SAWS (7297)



DOMESTIC WATER SERVICE CHARGE 24.25
WATER SUPPLY FEE 22.25
EDWARDS AQUIFER AUTHORITY FEE 2.22
FEDERAL STORMWATER FEE 3.68
SEWER SERVICE CHARGE 14.68

13.54
7/15/06

AMOUNT DUE NOW 67.08
3% LATE FEE AFTER JUL 13 2006 2.00
TOTAL WITH LATE FEE 70.13

(Detailed bill calculation on back)

EDWARDS AQUIFER WATER LEVEL

Record High June 1999, 703.2 ft.

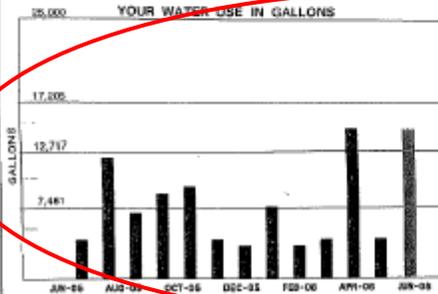


Stage I Begins 690.0 ft.
 Stage II Begins 640.0 ft.
 Stage III Begins 620.0 ft.

Record Low Aug. 1995, 612.9 ft.

** Measured in feet above sea level

YOUR WATER USE IN GALLONS



YOUR WATER USE WAS 14,962 GALLONS.

YOUR NEIGHBORHOOD AVERAGE WATER USE WAS 10,473 GALLONS.

SAWS RESIDENTIAL AVERAGE WATER USE WAS 10,473 GALLONS.

YOUR NEXT SCHEDULED METER READING DATE IS ON OR ABOUT: JUL 21 2006

PERSONALIZED MESSAGE

YOUR CURRENT MONTH USAGE IS MORE THAN THE SAME TIME LAST YEAR.

YOUR WINTER AVERAGE IS 5,337 GALLONS. THIS AVERAGE, BASED ON YOUR USAGE BETWEEN NOVEMBER 15 AND MARCH 15, GENERALLY REPRESENTS INDOOR WATER USE. WATER USE IN EXCESS OF THIS AVERAGE MAY BE ATTRIBUTED TO OUTDOOR APPLICATION. THIS MONTH YOUR WATER USE IS 9,725 GALLONS ABOVE YOUR WINTER AVERAGE.

Note that water usage graphs (presented with latest month shown at right) as well as comparisons to citywide, neighborhood, and "winter" averages are presented on SAWS billing statements.

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APPENDIX F

**EXAMPLES OF USAGE INFORMATION PRESENTATION
FROM COUTILITIES.COM**

Usage Data from COAUtilities.com

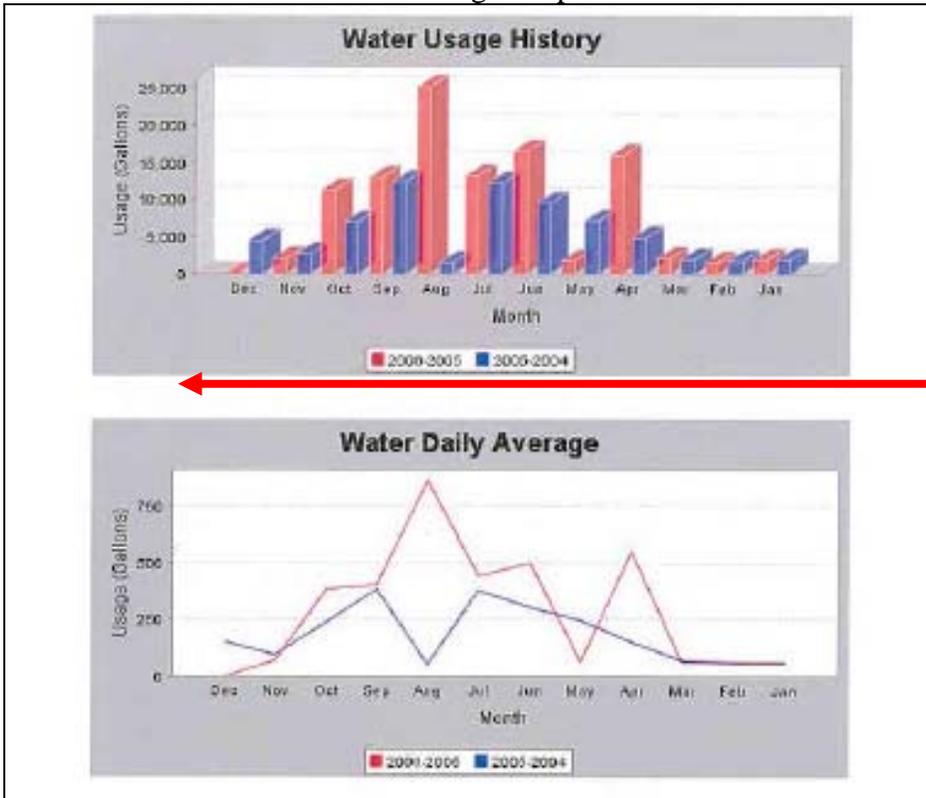
Year	2006											
Month	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	Mar	Feb	Jan
Electric												
Total (kWh)	0	525	903	1412	1373	1260	1343	761	644	476	359	444
\$ Billed	0	44.34	88.08	146.38	141.91	128.97	138.47	71.81	55.82	40.20	31.79	37.89
No. Days in Service Period	0	29	29	32	29	30	33	29	29	33	28	33
Daily Average (kWh/day)	0	18	31	44	47	42	41	26	22	14	13	13
Water												
Usage (Gallons)	0	2100	11200	13000	25200	13200	16500	1800	15900	2100	1500	1900
\$ Billed	0	7.24	30.24	36.90	109.78	37.64	53.93	5.90	50.08	6.30	5.64	5.98
No. Days in Service Period	0	29	29	32	29	30	33	29	29	33	28	33
Daily Average (Gallons/day)	0	72	386	406	869	440	500	62	548	64	54	58
Year	2005											
Month	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	Mar	Feb	Jan
Electric												
Total kWh	377	598	854	1421	1026	1152	938	503	395	341	321	449
\$ Billed	29.92	46.37	75.31	135.50	93.57	106.95	84.23	38.04	31.06	27.64	26.38	34.49
No. Days in Service Period	30	29	29	32	30	32	31	29	32	30	27	33
Daily Average (kWh/day)	13	21	29	44	34	36	30	17	12	11	12	14
Water												
Usage (Gallons)	4500	2700	7000	12400	1500	12200	9500	7100	4900	2000	1700	2000
\$ Billed	11.80	7.67	17.17	34.33	5.29	33.59	23.60	17.40	12.36	5.72	5.40	5.72
No. Days in Service Period	30	29	29	32	30	32	31	29	32	30	27	33
Daily Average (Gallons/day)	150	93	241	388	50	381	306	245	153	67	63	61

Two years of usage data for both electric and water are presented in tabular format.

Note that latest month is presented first, therefore the data is presented right to left.

Links allow download of data in spreadsheet format or viewing of data in graphical format

Usage Graphs from COA Utilities.com

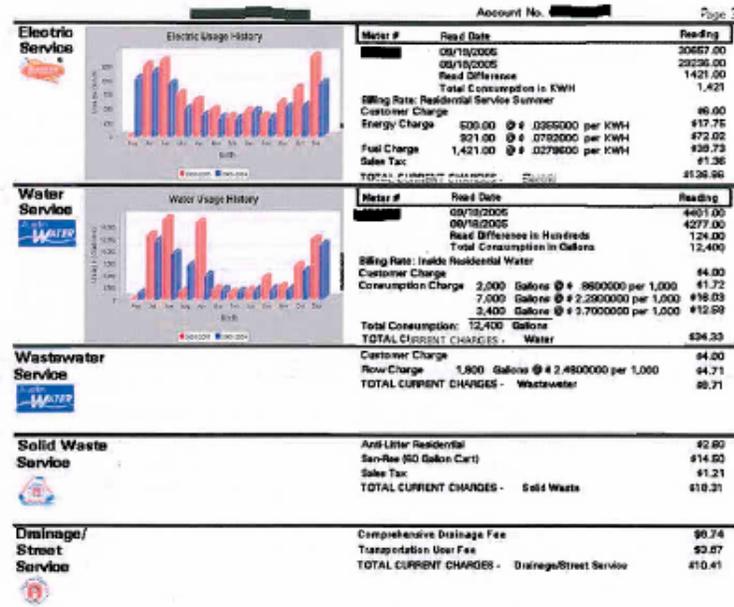


Usage graphs are also presented with latest month first, therefore data is presented right to left.

APPENDIX G

**OCA RECONFIGURATION OF CITY OF AUSTIN UTILITY BILLING
STATEMENT DATA**

OCA Reconfiguration of City of Austin Utility Billing Statement with Usage Graphs Included



This is a mock-up of what a City of Austin billing statement might look like if usage data is compressed to the right and usage graphs are added.

AUTHORIZED PAY STATIONS:
Payments are accepted at most Austin-area HEB and Randell's stores, as well as:

- University Co-op (Guadalupe and Riverside locations)
- Fleets Mart (H35 and 3B 1/2 St.)
- Rosewood-Zaragoza Center

Drop Box locations are:
525 East 10th Street
505 Barton Springs Road

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Usage graphs could also be printed on the back of the remittance stub.

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