LCRA
ENERGY • WATER • COMMUNITY SERVICES

July 27, 2012

Mr. Greg Meszaros
Director, Austin Water Utility
City of Austin
P.O. Box 1088
Austin, Texas 78767

Subject: Customer Pro Rata Curtailment Plan

Dear Customer:

At the Oct. 19 LCRA Board Meeting, the Board approved the LCRA pro rata water curtailment plan for firm customers requiring customers to cut water use in response to a declaration of Drought Worse than Drought of Record. As a result, if combined storage drops to 600,000 acre-feet, firm customers must cut back their use by 20 percent. On Nov. 10, 2011, customer curtailment plans detailing their baseline allotments based on the reference period were sent to firm water customers with a request that they communicate to LCRA by Dec. 15 whether they would be seeking to modify their baseline amounts.

This letter is to notify you that LCRA has accepted your curtailment plan. Thank you for working with us through the pro rata curtailment process. I am enclosing a signed copy of the plan for your files.

When and if we hit the 600,000 acre-foot combined storage trigger you will be notified by certified mail to begin implementing this accepted curtailment plan.

If you have any questions concerning the pro rata curtailment process, or if we can be of service to you in any way, please let me know. I can be reached at 512-473-3231 or by email at anissa.menefee@lcra.org.

Sincerely,

Anissa Menefee
Raw Water Account Representative
External Relations

Received by: ______________

RECEIVED JUL 31 2012
Austin Water
Director's Office

P.O. BOX 220 • AUSTIN, TEXAS • 78767-0220 • (512) 473-3200 • 1-800-776-5272 • WWW.LCRA.ORG

Customer Curtailment Plan[1]

for Implementation of Pro Rata Curtailment of Firm Water Contracts in the event of a Drought Worse than the Drought of Record

Please make any necessary changes

Customer: City of Austin

Contract No.: N/A

Address: P.O. Box 1088

Use: Municipal

City: Austin

State: Texas

Zip: 78767

Phone Number: ____________

Part 1 - Determine Customer's Baseline Amount

Reference Year[2] (Sept. 2010 – Aug. 2011 billing periods) Water Use by Month (acre-feet):

Sep 2010	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Mar 2011	Apr 2011	May 2011	Jun 2011	Jul 2011	Aug 2011	Total
12,638.6	13,534.1	11,619.5	11,005.3	9,895.8	9,592.8	11,899.6	14,141.3	14,810.1	16,950.5	19,154.9	20,277.9	165,520.4
7.7%	8.2%	7.0%	6.6%	6.0%	5.8%	7.2%	8.5%	8.9%	10.2%	11.6%	12.3%	100.0%

Notes: (1)Water use is based on billed amounts in the billing periods, not calendar month usage.
(2) Conversion factors: 1.0 acre-foot = 0.325 million gallons; 1.0 million gallons = 3.08 acre-feet.

Baseline Annual Water Use Amount[3] default value = 165,520.4 acre-feet

Step 1. Modify the Baseline Amount if appropriate. See attachment "Guidelines for Modification to the Allotment Form" to determine if modifications are appropriate and for the required documentation.

Baseline Annual Water Use Amount as modified = 195,278 acre-feet

Step 2. Deduct the Percentage Curtailment (20 percent) from the Baseline Amount (as it may be modified in Step 1)

Curtailed Amount = Baseline Amount X 20% = 39,056 acre-feet

Step 3. Calculate the Annual Allotment[4], which is equal to the Baseline Amount less the Curtailed Amount.

Annual Allotment = 156,222 acre-feet (based on default Baseline Amount)

Part 2 - Distribute Customer's Annual Allotment by Month

Step 1. Distribute Annual Allotment into individual months.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
9,061	8,905	10,936	12,966	13,591	15,622	17,653	18,747	15,310	12,498	10,779	10,154	156,222
5.8%	5.7%	7.0%	8.3%	8.7%	10.0%	11.3%	12.0%	9.8%	8.0%	6.9%	6.5%	100%

Pro rata curtailment could start in any month and will be pro rated through the end of the calendar year.

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[1] **The Customer Curtailment Plan (this document) is the plan identifying the amount of water available and the water savings measures to be employed during a shortage in water supply.**

[2] The Reference Year is a comparable recent dry year which is used to establish a Customer's Baseline Amount.

[3] The Baseline Amount represents Customer's reasonable use during drought conditions and is determined consistent with LCRA's Water Contract Rules, section 11.5.

[4] The Annual Allotment is the amount of water to which Customer is entitled during a water supply shortage on an annual basis. This amount may be pro rated for a partial calendar year.

If monthly demand is distributed differently than in Reference Year, please explain source of distribution:

Part 3. Variances for emergency conditions resulting from pro rata curtailment.
If you believe a variance is necessary based upon the potential for emergency conditions, you will need to notify us of your intent to request such a variance.

Part 4. Identification of Drought Coordinator.
The Drought Coordinator will serve as LCRA's point of contact during drought and is responsible for implementation of Customer's Drought Contingency Plan and pro rata curtailment.

Name: Drema Gross Email: drema.gross@austintexas.gov

Office Number: 512-974-2787 Fax Number:

Part 5. Identification of Drought Contingency Measures
Please identify the specific Drought Response Stage in Customers' Drought Contingency Plan and/or additional drought response measures that Customer will implement in order to achieve the savings required under pro rata curtailment. Please note that in the event that Customer does not achieve the required water savings, Customer will be required to pay surcharges even if Customer has implemented such measures.

Please sign and date this document.

If this form is not returned to LCRA within 120 days, LCRA rules provide that the default Baseline Amount will be reduced by 20 percent in each month.

Customer

7/3/12
Date

LCRA General Manager or Designee

7-26-12
Date

From Executive Summary

Reference Year Diversions	Conservation Efforts	Growth in Customer Demand	Reclaimed Water	Loss Reduction	Preliminary "Baseline Demand"	Supply Factor for Pro Rata	Annual Allotment: 1/12-12/12
	Econometric Models	*Econometric Models*	*Meter data & Eng. Calcs.*	*Meter data & Eng. Calcs.*			
165,520	18,196	3,492	4,989	3,081	195,278	0.80	156,222

Revised annual allotment monthly distribution with reference year water conservation savings limited to the 2001 - 2011 analysis time period (June 18, 2012):

Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012	Jul 2012	Aug 2012	Sep 2012	Oct 2012	Nov 2012	Dec 2012	Total
9,061	8,905	10,936	12,966	13,591	15,622	17,653	18,747	15,310	12,498	10,779	10,154	156,222
5.8%	5.7%	7.0%	8.3%	8.7%	10.0%	11.3%	12.0%	9.8%	8.0%	6.9%	6.5%	100.0%

City of Austin

February 15, 2012

Ms. Anissa Menefee
LCRA Mailstop R325
P.O. Box 220
Austin, TX 78767

Re: City of Austin Pro Rata Customer Curtailment Plan: Municipal

Dear Ms. Menefee:

As requested, enclosed please find two copies with original signatures of the City of Austin's municipal Customer Curtailment Plan for 2012, including modifications, with supporting documentation.

Please let us know if you have any questions or need any additional information at this time. For questions concerning implementation of the plan in the event curtailment is initiated, please contact Drema Gross, Austin Water Utility's Drought Coordinator, at (512)974-2787 or questions concerning the submittal and the modifications requested please contact Teresa Lutes at (512)972-0179.

Sincerely,

Greg Meszaros, Director
Austin Water Utility

cc: Mr. Kyle Jensen, Executive Manager of External Affairs, LCRA
Mr. Robert Goode, P.E., Assistant City Manager, City of Austin
Mr. David Juarez, P.E., Assistant Director, Austin Water Utility (AWU)
Mr. Daryl Slusher, Assistant Director, AWU
Ms. Drema Gross, Water Conservation Division Manager, AWU
Ms. Teresa Lutes, P.E., Systems Planning Division Manager, AWU
Mr. Ross Crow, City of Austin, Law Department
Mr. Steve Coonan, P.E., Alan Plummer Associates, Inc.

Customer Curtailment Plan[1]

for Implementation of Pro Rata Curtailment of Firm Water Contracts in the event of a Drought Worse than the Drought of Record

Please make any necessary changes
Customer: City of Austin Contract No.: N/A
Address: P.O. Box 1088 Use: Municipal
City: Austin State: Texas Zip: 78767 Phone Number: (512)972-0101

Part I - Determine Customer's Baseline Amount

Reference Year[2] (Sept. 2010— Aug. 2011 billing periods) Water Use by Month (acre-feet):

Sep 2010	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Mar 2011	Apr 2011	May 2011	Jun 2011	Jul 2011	Aug 2011	Total
12,638.6	13,534.1	11,619.5	11,005.3	9,895.8	9,592.8	11,899.6	14,141.3	14,810.1	16,950.5	19,154.9	20,277.9	165,520.4
7.6%	8.2%	7.0%	6.6%	6.0%	5.8%	7.2%	8.5%	8.9%	10.2%	11.6%	12.3%	100.0%

Notes: (1) *Water use is based on calendar month diversions.*
(2) Conversion factors: 1.0 acre-foot = 0.325 million gallons; 1.0 million gallons=3.08 acre-feet.

Baseline Annual Water Use Amount[3] default value = 165,520.4 acre-feet

Step 1. Modify the Baseline Amount if appropriate. See attachment Guidelines for Modification to the Allotment Form" to determine if modifications are appropriate and for the required documentation.

Baseline Annual Water Use Amount as modified = 200,103 acre-feet

Step 2. Deduct the Percentage Curtailment (20 percent) from the Baseline Amount (as it may be modified in Step 1)

Curtailed Amount = Baseline Amount X 20% = 40,021 acre-feet

Step 3. Calculate the Annual Allotment[4], which is equal to the Baseline Amount less the Curtailed Amount.

Annual Allotment = 160,082 acre-feet (based on default Baseline Amount)

Part 2 - Distribute Customer's Annual Allotment by Month

Step 1. Distribute Annual Allotment into individual months.

Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012	Jul 2012	Aug 2012	Sep 2012	Oct 2012	Nov 2012	Dec 2012	Total
9,347	9,061	11,240	13,356	13,987	16,008	18,089	19,150	15,693	12,783	10,974	10,394	160,082
5.8%	5.7%	7.0%	8.3%	8.7%	10.0%	11.3%	12.0%	9.8%	8.0%	6.9%	6.5%	100.0%

Pro rata curtailment could start in any month and will be pro rated through the end of the calendar year.

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[1] The Customer Curtailment Plan (this document) is the plan identifying the amount of water available and the water savings measures to be employed during a shortage in water supply.

[2] The Reference Year is a comparable recent dry year which is used to establish a Customer's Baseline Amount.

[3] The Baseline Amount represents Customer's reasonable use during drought conditions and is determined consistent with LCRA's Water Contract Rules, section 11.5.

[4] The Annual Allotment is the amount of water to which Customer is entitled during a water supply shortage on an annual basis. This amount may be pro rated for a partial calendar year.

If monthly demand is distributed differently than in Reference Year, please explain source of distribution:

Minor adjustments in the distribution were made to reflect the fact that September, 2010 was a wet month due to Tropical Storm Hermine.

Part 3. Variances for emergency conditions resulting from pro rata curtailment.
If you believe a variance is necessary based upon the potential for emergency conditions, you will need to notify us of your intent to request such a variance.

Part 4. Identification of Drought Coordinator.
The Drought Coordinator will serve as LCRA's point of contact during drought and is responsible for implementation of Customer's Drought Contingency Plan and pro rata curtailment.

Name: Drema Gross, Water Conservation Div. Manager E-mail: drema.gross@austintexas.gov
Office Number: (512)974-2787 Fax Number: NA

Part 5. Identification of Drought Contingency Measures
Please identify the specific Drought Response Stage in Customers' Drought Contingency Plan and/or additional drought response measures that Customer will implement in order to achieve the savings required under pro rata curtailment. Please note that in the event that Customer does not achieve the required water savings, Customer will be required to pay surcharges even if Customer has implemented such measures.

The City of Austin remained in Stage 1 restrictions from November 2009 through August 2011, allowing no more than twice-per-week watering for all customers. In late August 2011, as combined storage in Lakes Travis and Buchanan was projected to drop below 900,000 AF, the City announced the implementation of Stage 2 conditions effective September 6, 2011. Stage 2 has remained in effect since that date, with continued enforcement of drought response measures that include no more than once-per-week watering, no midday irrigation, no automatic irrigation after 10 a.m., no operation of ornamental fountains, limits on vehicle and pavement washing, and the requirement to serve water only on request in restaurants. Therefore, the City of Austin is already implementing advanced stages of drought response. Over the course of the year, should drought conditions persist, in order to continue achieving water savings in the drought, the City of Austin plans to continue implementation of Stage 2 watering restrictions. Additional water savings are projected due to increases in the use of reclaimed water and continuing conservation incentives. Based on preliminary estimates through the end of calendar year 2012, these measures are projected to be sufficient to meet pro rata curtailment requirements at that time, in the event pro rata curtailment goes into effect.

With community and stakeholder input, the City of Austin is considering revisions to its water conservation code and Drought Contingency Plan (DCP) that may alter the definition of its drought stages. If changes are approved by City Council, AWU will submit a revised DCP to TCEQ and LCRA within required timeframes. AWU will continue to track water use and be prepared to implement further components of its Drought Contingency Plan as may be required to meet pro rata curtailment requirements.

Consistent with Austin's strong commitment to conservation, our intent is to meet or surpass pro rata reduction requirements should LCRA implement pro rata curtailment of firm water customers. In the event LCRA seeks additional curtailment beyond 20%, we reserve the right to seek further curtailment plan modifications in the future related to recognition of Austin's run-of-river water rights and current stage 2 DCP implementation as previously discussed in our December 14, 2011 curtailment plan-related letter.

If this form is not returned to LCRA within 120 days, LCRA rules provide that the default Baseline Amount will be reduced by 20 percent in each month.

Customer	LCRA General Manager or Designee
2/15/12.	
Date	Date

Executive Summary – Austin Water Utility Pro Rata Curtailment 2012 Annual Allotment

In accordance with state law and the water supply agreement between the City of Austin (City) and the Lower Colorado River Authority, (LCRA) the LCRA has notified the City that the LCRA Board may be in a position to declare a drought more severe than the drought of record within the coming year. The notice required the City to identify a plan for reducing its water use by 20 percent over that used during the reference year defined by the LCRA as September 2010 through August 2011, taking into account modifications. As part of the plan, the City is allowed to propose modifications to the reference year water use to reflect the affects of water conservation programs in effect during the reference year and growth anticipated between the reference year and the time during which pro rata curtailment would occur. The City retained the services of Alan Plummer Associates, Inc., in conjunction with Frontier Associates, Inc., to assist in the development of this information.

This summary presents Austin Water Utility (AWU)'s baseline allotment in the forecast year (January 2012 through December 2012) after adjusting the reference year for conservation efforts and growth in customers. On behalf of the AWU, Frontier Associates developed an industry-standard econometric, statistical model that predicts AWU's monthly water consumption based on weather variables (including precipitation and temperature) and conservation efforts. The approach used to determine AWU's water consumption in the reference year and to forecast consumption for the pro rata year is based on the standard approach used for adjusting electricity and natural gas consumption for ratemaking proceedings at the state regulatory commissions.

Three multivariate regression models were developed to predict monthly water consumption by the City of Austin for the years 1994 through 2011. Generally, these models predict water consumption as a function of precipitation, temperature, stage one watering restrictions, and water conservation measures that were in effect during the reference year. The residential model also uses lagged consumption to predict monthly consumption, which is to account for changing trends in residential consumption during the analysis period. The analysis period was chosen to begin with 1994 as it is the first year that billing data by customer class was available. Limiting the data input to fewer years would decrease the statistical significance of the model. This time-frame also corresponds to a period in which Austin's long-lasting indoor equipment change-type water conservation programs began ramping up, particularly residential and multi-family toilet retro-fit programs.

Many of the variables are estimated separately for the irrigation season (defined as April through October) and the non-irrigation season (November through March). For example, stage one watering restrictions are estimated only in the irrigation season due to the assumption that stage one watering restrictions do not significantly alter water use during winter months.

Frontier used Zellner's Seemingly Unrelated Regression (SUR) method to model AWU's water consumption. SUR is a generalization of ordinary least squares for multi-equation systems, which can lead to more efficient estimators. Noteworthy is that the SUR model gains this efficiency "when different sets of 'independent' variables appear in the equations of the system." In this method the three consumption models (residential, commercial, and multi-family) are estimated simultaneously and are then improved by taking their cross-equation correlations into account utilizing SUR.[1]

The three models predict water consumption for the three largest customer classes: residential (41% of billed consumption), multifamily (20%), and commercial (26%). The models are based on customer billing data and as such reflect the use billed to the customers. Savings estimated based on the econometric analysis correspond to billed amounts. There is a difference between the amount of water diverted by Austin and the amount of water billed to its customers. The difference includes water used at the treatment plant, water losses within the system, meter inaccuracies, and other system uses. When these volumes are removed, the difference between the diverted amount and the billed amount was 12 percent for the reference year. In other words, for every gallon calculated to be saved at the customer meter, 1.12 gallons was saved at the diversion meter. The basis for this adjustment is shown in Appendix A. The models indicate the savings at the diversion points was 19,086 (for these three customer classes: residential, multi-family, and commercial).

The other two major customer classes, large-volume and wholesale customers were considered separately. In the case of the large-volume users, AWU maintains a database that logs water savings derived from the Commercial Process Rebate Program for equipment upgrades that conserve water. Thus large-volume customer savings is an observed number and did not need to be estimated though the econometric model. The savings at the diversion meter for this program is 3,290 ac.ft. Information supporting these adjustments is contained in Appendix B.

AWU does not currently have sufficient compiled historical information on the number of accounts served by each wholesale customer to conduct an econometric analysis. Since the wholesale customers are primarily residential customers, it was determined that the results obtained for AWU residential customers could be used as a basis to make an estimate of the savings achieved in the wholesale class, with some modification. While the wholesale

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[1] In addition to SUR Frontier explored the consumption equations utilizing ordinary least squares, Iterated Seemingly Unrelated Regression, Full-Information Maximum-Likelihood, and Least-Information Maximum-Likelihood models. However, the SUR method continued to produce the best results: the equation fits were best, the parameter estimates behaved as predicted and were associated with reasonable standard errors, and the predictor variables were significant.

customers are eligible to participate in AWU's conservation programs and are required to comply with AWU's water restrictions, participation levels in the conservation programs have historically been lower than for retail customers. As a result, the amount of savings estimated for the wholesale customers is slightly less than half the rate of savings observed within the retail customer class and amounts to 596 ac-ft at the diversion points.

Adding the savings from the wholesale and large volume customers to the model results for residential, commercial and multifamily users indicates that AWU's conservation efforts in the reference year yielded 22,972 acre-feet (ac-ft) of water savings when measured at the diversion points. This 22,972 corresponds to 20,511 ac-ft of savings at a billed level. As previously indicated the difference between the billed usage and diversion usage, approximately 12%, is the amount of water used at the plant, lost to leaks, meter inaccuracies, and other system requirements. The model is discussed extensively in Appendix C.

In addition to the conservation savings identified through the econometric model, AWU operates a reclaimed water system for beneficial reuse of wastewater treatment plant effluent. This system provides reclaimed water to a number of customers within the AWU service area. In addition to other benefits, the use of reclaimed water offsets the need for these customers to use potable water, and therefore reduces the amount of water needed to be diverted by Austin. As previously indicated, the amount of savings at the diversion meter is 12 percent more than the amount of reclaimed water delivered. The calculated savings at the diversion meter during the reference year is 4,989 ac-ft. The basis for this adjustment is shown in Appendix D.

AWU has also expended resources and effort to reduce the amount of water lost through system leakage. In fiscal year (FY) 2005, AWU reported water loss to the Texas Water Development Board; that information was used to calculate an Infrastructure Leak Index (ILI) for 2005 of 3.647. Note that AWU's fiscal year begins on October 1. The ILI is a measure of real water loss compared to a minimum water loss for the specific size and conditions of a system, and therefore provides a way to account for growth in demonstrating water loss reductions. By initiating subsurface leak detection programs, improving regular valve and hydrant maintenance, replacing infrastructure and reducing response times for reported leaks and breaks, AWU lowered its ILI to 2.986 during FY2011. Had AWU not improved its ILI, it is estimated that an additional 2,951 ac-ft would have been lost during the reference year. This reduction in water loss resulted in a decreased diversion of 3,081 ac-ft. The estimate of the savings at the point of diversion is 4.4% higher than the amount of water saved in the system to reflect the amount of water that did not have to be used to treat this water. The basis for this estimate is shown in Appendix E.

Finally, an adjustment to the reference year usage was made to reflect the growth in customer base. Historical account growth within the City service area has been between 1 and 2 percent.

Additional customers and demand were assumed to be added each month, such that the annual growth rate is 1.5 percent. This growth rate results in an increased diversion of 2,492 ac-ft. In addition, one of the large volume customers initiated operations of a major expansion to their facility during the reference year. These operations increased water demands beginning in April 2011. Had the expanded facility been in operation for the entire reference year, it is anticipated that the demand at the diversion point would have been 1,049 ac-ft larger. The basis for these estimates are included in Appendix F.

Table 1 includes a summary of the modifications to the baseline usage during the reference year and the corresponding annual allotment for calendar year 2012 based on a 20 percent curtailment of the baseline usage. Table 2 includes the anticipated monthly distribution of the annual allotment. Minor adjustments in the distribution were made to reflect the fact that September 2010 was a wet month due to Tropical Storm Hermine.

Table 1 - Austin Water Utility Annual Allotment, ac-ft per year
January through December, 2012

Reference Year Diversions	Conservation Efforts	Growth in Customer Demand	Reclaimed Water & Loss Reduction	Preliminary "Baseline Demand"	Supply Factor for Pro Rata	Annual Allotment: 1/12-12/12
	Econometric Models	*Econometric Models*	*Meter Data/ Engineering Calculations*			
165,520	22,972	3,541	8,070	200,103	.80	160,082

Table 2 - Austin Water Utility Annual Allotment Monthly Distribution, ac-ft per month

Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Total
9,347	9,061	11,240	13,356	13,987	16,008	18,089	19,150	15,693	12,783	10,974	10,394	160,082
5.8%	5.7%	7.0%	8.3%	8.7%	10.0%	11.3%	12.0%	9.8%	8.0%	6.9%	6.5%	100.0%

Appendix A

Appendix A

Basis for Diversion to Billed Water Calculation

The 12% diversion to billed ratio is the percent difference between the amount billed to customers during the 12-month reference period compared to the amount of water diverted in the same period, see table below.

	Reference Year Billed (acre-ft)	Reference Year Diversion (acre-ft)	Reference Year Diversion:Billed Ratio
Residential	60,957		
Commercial	38,140		
Multi-Family	28,965		
Wholesale	10,507		
Large-Volume	8,860		
Utility	222		
TOTAL	147,651	165,520	1.12

This adjustment is necessary since the statistical water demand analysis to quantify the various customer-end water conservation savings amounts was conducted using customer billing information. Therefore, the 12% adjustment is needed to translate those amounts back to equivalent diverted water savings amounts. The 12% adjustment includes an apparent loss component since the majority of the apparent loss components would be in effect if the higher level of demand had been in place, without the added conservation.

Appendix B

APPENDIX B
COMMERCIAL PROCESS REBATE SAVINGS FOR LARGE VOLUME USERS

PROGRAM_NAME	ORGANIZATION_NAME	GPD_SAVINGS	RECEIVED_DATE
Customers Not Billed as Commercial			
COMMERCIAL SPECIAL PROCESS REBATE	UNIVERSITY OF TEXAS	1,710	September, 2008
COMMERCIAL SPECIAL PROCESS REBATE	SPANSION LLC	282,000	December, 2008
COMMERCIAL SPECIAL PROCESS REBATE	HOSPIRA, INC.	48,042	November, 2008
COMMERCIAL SPECIAL PROCESS REBATE	UNIVERSITY OF TEXAS	2,880	September, 2008
COMMERCIAL SPECIAL PROCESS REBATE	UNIVERSITY OF TEXAS	658	September, 2008
COMMERCIAL SPECIAL PROCESS REBATE	UNIVERSITY OF TEXAS	888	September, 2008
COMMERCIAL SPECIAL PROCESS REBATE	UNIVERSITY OF TEXAS	2,485	September, 2008
COMMERCIAL SPECIAL PROCESS REBATE	UNIVERSITY OF TEXAS	1,644	September, 2008
COMMERCIAL SPECIAL PROCESS REBATE	ADVANCED TECHNOLOGY DEVELOPMENT FACILITY	7,814	April, 2008
COMMERCIAL SPECIAL PROCESS REBATE	Freescale Oak Hill	171,354	September, 2007
COMMERCIAL SPECIAL PROCESS REBATE	Freescale Oak Hill	41,425	January, 2007
COMMERCIAL SPECIAL PROCESS REBATE	Sematech	25,900	December, 2006
COMMERCIAL SPECIAL PROCESS REBATE	Spansion - AMD	420,000	March, 2006
COMMERCIAL SPECIAL PROCESS REBATE	Freescale Ed Bluestein	72,000	March, 2006
COMMERCIAL SPECIAL PROCESS REBATE	Freescale Ed Bluestein	146,880	March, 2006
COMMERCIAL SPECIAL PROCESS REBATE	Freescale Oak Hill	45,685	November, 2005
COMMERCIAL SPECIAL PROCESS REBATE	Freescale Oak Hill	24,834	December, 2004
COMMERCIAL SPECIAL PROCESS REBATE	Freescale Oak Hill	18,826	December, 2004
COMMERCIAL SPECIAL PROCESS REBATE	Freescale Ed Bluestein	14,500	December, 2004
COMMERCIAL SPECIAL PROCESS REBATE	Motorola Oak Hill	50,000	February, 2004
COMMERCIAL SPECIAL PROCESS REBATE	AMD	300,000	May, 2003
COMMERCIAL SPECIAL PROCESS REBATE	AMD	8,985	January, 2003
COMMERCIAL SPECIAL PROCESS REBATE	Motorola Oak Hill	82,000	June, 2002
COMMERCIAL SPECIAL PROCESS REBATE	Samsung	170,000	June, 2000
COMMERCIAL SPECIAL PROCESS REBATE	Motorola	31,680	May, 2000
COMMERCIAL SPECIAL PROCESS REBATE	AMD	648,000	March, 1999
	Total GPD	2,620,190	
	Total Billed Savings Ac-Ft per year	2934.99	
	Total Diverted Savings Ac-Ft per Year	**3,290**	

Appendix C

FRONTIER
ASSOCIATES

Appendix C – Austin Water Utility Water Consumption Econometric Model

On behalf of the Austin Water Utility (AWU) Frontier Associates developed an industry-standard econometric, statistical model that predicts AWU's monthly water consumption based on weather variables (including precipitation and temperature) and conservation efforts. This appendix provides an overview of these multivariate regression models and the predictor variables used to analyze AWU's water consumption. The model suggests that the water savings attributable to AWU's conservation programs for the reference year (September 2010 through August 2011) are 19,086 acre-ft for residential, commercial, and multifamily customers.

A Standard Utility Commission Approach

The approach used to determine AWU's water consumption in the reference year and to forecast consumption for the pro rata year is based on the standard approach used for adjusting electricity and natural gas consumption for ratemaking proceedings at the state regulatory commissions. The general approach is as follows:

1. Construct the exogenous variables.
2. Determine whether these variables are stationary over the estimation period (the 18 year period for which fairly-complete data are available). Stationarity is tested with the Phillips-Perron and the Augmented Dickey-Fuller tests. The per-account and per-capita forms of the models avoid any non-stationarity problems.
3. Estimate the regression models. Frontier believes Zellner's Seemingly Unrelated Regressions (SUR) method is appropriate here. The regression model choice is elaborated upon in the following Regression Models discussion.
4. Simulate the models. The simulation includes setting the dummy variables associated with the indoor conservation measures variables to zero to dismiss their effects, and setting all weather variables to their reference year values.
5. Multiply the simulated per-account and per-capita customer usage by the number of customers at the end of the Reference Period.
6. For the Reference Period, compare actual water consumption to water consumption simulated under the assumption that no conservation programs had been undertaken and weather had been normal.
7. Forecast water usage for calendar year 2012 by multiplying simulated per-account and per-capita usage by AWU's Financial Department's forecasted number of accounts.

The Regression Models

Three regression models are developed to predict monthly water consumption in the City of Austin for the years 1994-2011. We chose to begin with 1994 as it is the first year that data was consistently available. The three models predict water consumption for the three largest customer classes: residential (41% of usage), multifamily (20%), and commercial (26%).

Generally, these models predict water consumption as a function of precipitation, temperature, Stage 1 watering restrictions, and water conservation measures implemented to date. The residential model also uses lagged consumption to predict monthly consumption, which is to account for changing trends in residential consumption during the analysis period. These models are specified as follows:

> *Residential Consumption per Account = f(precipitation-days, precipitation-intensity, precipitation-intensity*^{2}*, CDDs, HDDs, Res Stage1 Restrictions, Res Conservation Programs, lagged Residential Consumption, May2011)*
>
> *Commercial Consumption per Account = f(precipitation-days, precipitation-intensity, precipitation-intensity*^{2}*, CDDs, HDDs, Com Stage1 Restrictions, Com Conservation Programs, May2011)*
>
> *MF Consumption per Capita = f(precipitation-days, precipitation-intensity, precipitation-intensity*^{2}*, CDDs, HDDs, MF Stage1 Restrictions, MF Conservation Programs, May2011)*

Where,

Residential,Commercial,MF Consumption per Account = In order to account for City growth the residential and commercial models are defined on a per-account basis. The multi-family water usage is defined per-capita in order to account for growth in the number of users per meter, as apartment complexes in Austin have grown in size during the analysis period.

precipitation-days = The total number of days in a month where precipitation was recorded.

precipitation-intensity = The monthly precipitation per precipitation-day. A non-linear *version of* this variable is included to allow for reduced marginal impacts.

CDDs = Cooling Degree Days is the difference between average monthly temperature and 65, and is set to zero if the result is negative, or if it is the non-irrigation season.

HDDs = Heating Degree Days is the difference between average monthly temperature and 65, and is set to zero if the result is negative, or if it is the non-irrigation season.

Res, Com, MF Stage1 Restrictions = The interaction between 1) a dummy variable that defines whether or not Stage 1 watering restrictions are active during a particular month (0=no restrictions, 1=restrictions in effect), 2) a dummy variable that defines whether or not it is the irrigation season, and 3) per account or per capita water consumption for that month. There are different watering restrictions for residential and commercial accounts, and multifamily accounts are governed by commercial restrictions. We use this form of the variable because we expect the most measureable effect of watering restrictions to be during the irrigation season, and so that the effect varies proportional to usage.

Res,Com,MF Conservation Programs = These variables combine all conservation measures implemented during a month for each customer class. Each measure is weighted based on AWU engineering estimates, so that all measures are in the same units.

lagged Residential Consumption = Per-account residential consumption from the previous month. This variable is included to account for the trending change in residential water use over the analysis period.

May2011 = Early versions of the model continuously under-predicted water usage in May of 2011. This dummy variable was included in the final modeling runs in order to calibrate the model.

Many of the variables are estimated for either the irrigation season (defined as April through October) or the non-irrigation season (November through March). For example, cooling degree days are estimated only in the irrigation season due to the hypothesis that hot temperatures do not significantly alter water use during winter months. The same hypothesis is used to restrict stage 1 watering restrictions to estimation only during the irrigation-season. The opposite holds true for heating degree days, which are restricted to estimation only in the non-irrigation season.

Frontier initially proposed the use of Zellner's Seemingly Unrelated Regression (SUR) method[1,2] to model AWU's water consumption. SUR is a generalization of ordinary least squared for multi-equation systems, which can lead to more efficient estimators. Noteworthy is that the SUR model gains this efficiency "when different sets of 'independent' variables appear in the equations of the system."[3] In this method the three consumption models (residential, commercial, and multi-family) are estimated simultaneously and are then improved by taking their cross-equation correlations into account utilizing SUR.

---

[1] Zellner, Arnold. "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias." Journal of the American Statistical Association, Vol. 57, No. 298 (Jun 1962), pp. 348-368. Accessed February 3, 2012, JSTOR.

[2] Zellner, Arnold. "Estimators for Seemingly Unrelated Regression Equations: Some Exact Finite Sample Results." Journal of the American Statistical Association, Vol. 58, No. 304 (Dec 1963), pp. 977-992. Accessed February 6, 2012, http://www.indiana.edu/~phinite/S681/Zellner2.pdf.

[3] From Zellner (1962): "We have presented a method of estimating coefficients in generally encountered sets of regression equations which is more efficient than an equation-by-equation application of least-squares. Application of this method to estimate micro-investment functions' has led to estimates of coefficient estimator variances about 20 percent smaller than those of equation-by-equation least-squares. Such a substantial reduction in these variances is indeed a satisfying feature of the application shown above, a feature which will characterize those applications to systems in which the disturbances of different equations are highly correlated and the independent variables of different equations are not highly correlated. Further, while we have applied (and also discussed) the procedure for only the situation involving one regression per micro-unit, it is also possible to extend the method to situations in which these are several regressions per micro-unit." And Zellner (1963): "In previous work, a method of estimating coefficients in certain generally encountered sets of regression equations has been proposed and applied which yields estimators at least asymptotically more efficient than single-equation least squares estimators. This gain occurs when contemporaneous disturbance terms in different regression equations are correlated and when different sets of 'independent' variables appear in the equations of the system."

In addition to SUR Frontier explored the consumption equations utilizing ordinary least squares, Iterated Seemingly Unrelated Regression, Full-Information Maximum-Likelihood, and Least-Information Maximum-Likelihood models. However, the SUR method continued to produce the best results: the equation fits were best, the parameter estimates behaved as predicted and were associated with reasonable standard errors, and the predictor variables were significant.

Variable Processing

In order to address modeling issues such as multicollinearity and nonstationarity Frontier processed the raw data into modeling variables. This data processing is described in this section.

Instead of using consumption billed in a given month (the conun_ variable), we calendarize consumption so that we are looking at the actual volume of water consumed in a given month (the con_ variable). AWU has calculated that approximately 35% of the consumption billed in a given month occurred in that month, while 65% occurred in the previous month. So, for example, actual December 2010 consumption for inside city residential would be equal to 35% of billed consumption in December 2010 + 65% of billed consumption in January 2011.

Inside and outside city users in a given class are combined. Frequent annexation means that customers often switch between the two classes (there is often a drop in outside city accounts with a concurrent jump of the same magnitude in inside city accounts), and outside/inside city customers tend to have similar behavior.

We also combine residential and residential CAP customers for similar reasons: some of the residential population drops out to join the CAP program when it is created, and they have similar consumption patterns.

We use degree days in place of temperature. Heating degree days (HDD) is constructed as the number of degrees below 65, and is set to zero if the result is negative or if it is summer. Similarly, cooling degree days (CDD) is constructed as the number of degrees above 65, and is also set to zero if the result is negative, or if it is winter.

Indoor conservation program data are annual, so we have assumed that measures were installed evenly throughout the year. If there were 600 free toilets installed in a year, we assume that 50 were installed in January, 50 in February and so on.

Because most of the indoor conservation programs have similar start dates and ramp ups, we had to combine indoor programs into a single variable to avoid collinearity. In order to compare on an "apples-to-apples" basis we weighted programs according to engineering estimates of gallons saved per month. For example, if a new toilet is expected to save 100 gallons and a new faucet 25, the toilet has four times the impact on our conservation variable. We do not assume that the values of the engineering estimates are accurate, only the relationships between programs.

Instead of using a simple dummy variable for stage 1 we created the variable st1_*CLASS*_summer (where *CLASS* is either defined as Residential or Commercial; multi-family customers are subject to commercial watering restrictions). This is the stage 1 variable interacted with our summer dummy (our definition of summer, April through October, is reflective of the irrigation season) and then interacted with consumption per account (per capita in the case of multifamily). This reflects the hypothesis that watering restrictions have the greatest effect during the irrigation season, and that they lower consumption in proportion to use.

Variable Definitions and Data Sources

Frequently, the model variables are abbreviated within the data set and the programming language. These abbreviations are defined and expanded upon here.

conun_IDENTIFIER are the consumption amounts billed in a given month to the given class. This data comes from AWU's Billing Records. Identifier is a string consisting of the letter "i" or "o" and a class abbreviation: "i" represents inside the city and "o" represents outside the city; class abbreviations represent the customer class, and are defined in Table 1.

Table 1 - AWU Customer Class Abbreviations

Class Abbreviation	Meaning
Res	Residential
Resc	Residential customer assistance program. The CAP offers lower bills to select customers.
Mf	Multifamily
Com	Commercial
Ind	Industrial and large-volume users
Golf	Golf courses

For example conun_i_com is the consumption billed to commercial customers inside the city. These two identifiers, "i" and "com", are used consistently to label the variables. Similarly, acc_IDENTIFIER is the number of accounts for a given class in a given month, again from AWU's billing records.

mfpop is the multifamily retail service area population. It comes from AWU's consumption records, and is based on US Census data and a report from the City of Austin Demographer.

con_IDENTIFIER is the calendarized consumption amounts for a given class in a given month.

con_mf_pc_adj is the per capita calendarized inside and outside city consumption for multifamily customers. This is derived from AWU's consumption records.

eff_res_st1 is a dummy that is "on" when stage 1 watering restrictions were in place for residential consumers. This variable reflects mandatory water conservation efforts. The timing/implementation for stage 1 is provided by the AWU's Conservation Division.

eff_com_st1 is the equivalent dummy, but for commercial stage 1 restrictions. These also apply to multifamily accounts. It also reflects mandatory water conservation efforts. Again, these data are provided by the AWU's Conservation Division.

eff_CLASS_PROGRAM is the number of new measures added to a given program in a given month. The class abbreviations are the same as used above. These numbers are provided by the AWU's Conservation Division. The programs are defined in Table 2.

Table 2 – AWU Indoor Conservation Measure Abbreviations

Abbreviation	Program Name
frto	Free toilets
tore	Toilet rebates
cl	Clotheswasher rebates
aer	Faucet aerators
sh	Lowflow shower heads
gri	Grinder rebates
spr	Spray valves
den	Dental vacuum pumps

Many of these programs, but not all, are offered to multiple classes (e.g. there are residential and commercial aerator programs, but no residential dental vacuum programs).

eff_CLASS_cum_PROGRAM is the cumulative number of measures implemented in a given program through the given month. It includes the measures added in the current month.

rebs_com shows the amount (in gallons per day savings) of rebates awarded to commercial customers, not including large-volume users, in a given month. These numbers are provided by the AWU's Conservation Division.

rebs_com_cum is the cumulative amount of rebates awarded to date, including those awarded in that month. For example cumulative rebates for August 2007 is the total rebates awarded to date as of July 2007 plus the new rebates awarded in August 2007.

avg_temp is the average temperature for a given month and is provided by AWU.

prcpdays is the number of days with non-zero precipitation in a given month. These numbers are from yearly reports from NOAA (ftp://ftp.ncdc.noaa.gov/pub/data/gsod). From 1993-1999 the data come from the Camp Mabry station (identifier 722540-13958). After 2000 the reports come from the Austin-Bergstrom station (identifier 722540-13904).

prcpperday is the average level of precipitation per day with non-zero precipitation. These numbers are also from yearly reports from NOAA.

prcperdaysq is the square of the average level of precipitation per day with non-zero precipitation. The square is included to account for diminishing marginal effects. It is derived from the above variable.

Model Results

The model suggests that conservation efforts yield a baseline water use higher than actual usage in the reference year. The model results indicate that AWU's conservation efforts in the reference year yielded 19,086 acre-ft of water savings when measured at a diversion-level. This 19,086 corresponds to 17,041 acre-ft at a billed level, which is presented by customer class in Table 3, Table 4, and Table 5. The difference between the billed usage and diversion usage, approximately 12%, is the amount of water lost to leaks, meter inaccuracies, and other system inefficiencies.

Table 3 - Residential Conservation Savings (acre-ft)

Date	Actual Residential Demand	Residential Demand, No Conservation	Residential Savings
Sep-10	4811.1	5610.72	799.62
Oct-10	4209.8	5472.56	1262.75
Nov-10	4109.92	4328.62	218.7
Dec-10	3733.49	3974.26	240.77
Jan-11	3186	3767.39	581.38
Feb-11	3219.22	3659	439.78
Mar-11	4230.38	4454.52	224.14
Apr-11	5398.11	5843.25	445.14
May-11	6044.57	6635.9	591.34
Jun-11	6740.25	7125.53	385.28
Jul-11	7420.42	8040.88	620.46
Aug-11	7853.78	8762.34	908.56
TOTAL		**Billed-Level**	**6,718**
TOTAL		**Diversion-Level**	**7,531**

Table 4 - Commercial Conservation Savings (acre-ft)

Date	Actual Commercial Demand	Commercial Demand, No Conservation	Commercial Savings
Sep-10	3322.51	3960.38	637.87
Oct-10	3029.26	3697.02	667.75
Nov-10	2917.7	3065.81	148.11
Dec-10	2536.64	2756.11	219.48
Jan-11	2079.66	2615.98	536.33
Feb-11	2149.19	2741.64	592.44
Mar-11	2636.05	3291.67	655.62
Apr-11	3105.5	4026.23	920.74
May-11	3658.27	4328.21	669.94
Jun-11	4024.01	4702.29	678.28
Jul-11	4248.57	5034.94	786.36
Aug-11	4432.79	5303.54	870.75
TOTAL		**Billed-Level**	**7,384**
TOTAL		**Diversion-Level**	**8,277**

Table 5 - MF Conservation Savings (acre-ft)

Date	Actual MF Demand	MF Demand, No Conservation	MF Savings
Sep-10	2463.57	2678.24	214.667
Oct-10	2269.35	2597.01	327.66
Nov-10	2269.51	2403.33	133.819
Dec-10	2245.03	2353.15	108.118
Jan-11	2071.57	2330.71	259.132
Feb-11	2086.53	2340.72	254.195
Mar-11	2188.98	2448.89	259.91
Apr-11	2386.8	2714.7	327.902
May-11	2599.28	2825.53	226.249
Jun-11	2715.64	2972	256.356
Jul-11	2772.63	3068.52	295.892
Aug-11	2896.13	3155.74	259.608
TOTAL	**Billed-Level**		**2,924**
TOTAL	**Diversion-Level**		**3,277**

The billed-level confidence intervals and mean forecast errors for the reference year are presented in Table 6.

Table 6 - Model Confidence Intervals and Mean Forecast Error

	Lower 95%	Reference Year Savings	Upper 95%	MFE
Residential	-2,102	6,718	15,538	284
Commercial	-194	7,384	14,962	252
Multifamily	54	2,924	5,793	96

The model parameter estimates are presented in Table 7, Table 8, and Table 9 by customer class. Not surprisingly the precipitation days and intensity variables indicate that increased rainfall in a month corresponds with decreased water usage. These variables show increased significance in the residential model as commercial and multifamily customers are likely to be less responsive to rain. In other words, a computer chip manufacturing company is not going to stop production because of rain.

The other climate variables, CDD and HDD, also behave as expected. CDD is showing that warmer months lead to increased water usage and colder months lead to decreased water usage.

The Stage 1 watering restrictions variables quantify the percentage of water consumption that is saved during this restriction period, by customer sector. The negative value indicates that customers used less water when stage 1 restrictions were in effect. The same is true of the conservation program variables: a negative value indicates customers save water through the conservation programs.

Table 7 – Residential Parameter Estimates

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	6909.585	314.6984	21.96	<.0001***
Precipitation Days	-108.838	13.7145	-7.94	<.0001***
Precipitation Intensity	-2520.2	611.3604	-4.12	<.0001***
Precipitation Intensity^2	1527.204	565.7368	2.7	0.0076***
Lagged Residential Consumption	0.240669	0.029322	8.21	<.0001***
Indoor Residential Conservation	-2.12143	0.667414	-3.18	0.0017***
CDD	186.7266	10.84387	17.22	<.0001***
HDD	-27.5102	12.59803	-2.18	0.0302**
Stage 1 Watering Restrictions	-0.02842	0.021354	-1.33	0.1847
May 2011 Dummy	1615.173	764.3529	2.11	0.0359**

Table 8 - Commercial Parameter Estimates

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	69367.89	2071.712	33.48	<.0001***
Precipitation Days	-409.458	143.2713	-2.86	0.0047***
Precipitation Intensity	-11864.3	6402.088	-1.85	0.0654*
Precipitation Intensity^2	7925.235	5923.783	1.34	0.1825
Indoor Commercial Conservation	-6.48394	1.728048	-3.75	0.0002***
CDD	1438.388	96.30411	14.94	<.0001***
HDD	-598.106	132.5281	-4.51	<.0001***
Stage 1 Watering Restrictions	-0.10114	0.027582	-3.67	0.0003***
May 2011 Dummy	7994.694	8010.355	1	0.3195

Table 9 - MF Parameter Estimates

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	2471.78	39.75053	62.18	<.0001***
Precipitation Days	-6.86887	2.652535	-2.59	0.0103**
Precipitation Intensity	-172.993	117.3148	-1.47	0.1419
Precipitation Intensity^2	123.2738	108.5172	1.14	0.2574
Indoor MF Conservation	-1.58566	0.437358	-3.63	0.0004***
CDD	25.37172	1.752999	14.47	<.0001***
HDD	-3.67962	2.438961	-1.51	0.133
Stage 1 Watering Restrictions	-0.03583	0.013792	-2.6	0.0101**
May 2011 Dummy	129.7193	146.9338	0.88	0.3784

SAS Modeling Language

The models described here are programmed and modeled in SAS statistical modeling software. SAS, originally called "Statistical Analysis System" is industry-standard econometric and statistical modeling software. The programming language is included here:

```
*  Normalization adjustments for Austin Water
*  Jay Zarnikau, Jason Fialkoff, Dan Thal Frontier Associates
*  December 2011
*  This version uses proc syslin and proc simlin
* ;

 proc import datafile='Y:\Misc-unsorted\Austin Water Utility\Meetings,
Presentations\2012.02.01 LCRA Stats\Data File.csv'
 out=water replace;
 run;
data test;
  set water;

*  Define the irrigation season/summer as April through October.;
summer = 0;
if month = 4 then summer = 1;
if month = 5 then summer = 1;
if month = 6 then summer = 1;
if month = 7 then summer = 1;
if month = 8 then summer = 1;
if month = 9 then summer = 1;
if month = 10 then summer = 1;
```

```
winter = 0;
winter = 1-summer;

* Create average per-account water consumption variables for residential and
commercial, per-capita for multifamily. Combining use inside and outside of
city;
ResCon = con_i_res+con_o_res + con_i_resc + con_o_resc;
acc_res = acc_i_res + acc_o_res + acc_i_resc + acc_o_resc;
ComCon = con_i_com+con_o_com;
acc_com = acc_i_com + acc_o_com;
MfCon = con_i_mf+con_o_mf;
AvgResCon = (ResCon) / (acc_res);
AvgResConLag = lag1(AvgResCon);
AvgComCon = (ComCon) / (acc_com);
*This is from AWU files, which show consumption per estimated capita.
Adjusted by Frontier with 65/35 to match billing to consumption;
AvgMFCon = con_mf_pc_adj;

* Hypothesis is that temperature affects water use differently in the summer
and winter;
* Using pseudo degreedays;
CDD = avg_temp*summer-65*summer;
HDD = 65*winter-avg_temp*winter;
* Using standard approach of zeroing out negative values;
if CDD < 0 then CDD = 0;
if HDD < 0 then HDD = 0;

* Assumption is that stage 1 is most effective during the summer. To allow
the impact of stage 1 to vary with watering use and consumption, stage 1
dummy is interacted with consumption.;
st1_res_summer = AvgResCon*1*eff_res_st1*summer;
st1_com_summer = AvgComCon*1*eff_com_st1*summer;
st1_mf_summer = AvgMFCon*1*eff_com_st1*summer;

* Combine the effects of all indoor conservation programs for a given class.
Because they start at same time and have very similar ramp-ups,
multicollinearity prevents them from being broken out separately.;
* Using AWU engineering estimates of savings as weighting, to get every
program into the same units as the dependent variables (GPM per account and
GPM per capita);

ResConservation = 30*(eff_res_cum_frto*13.8 + eff_res_cum_tore*13.8 +
eff_res_cum_cl*15 + eff_res_cum_aer*2.6
      + eff_res_cum_sh*5.7) / acc_res;

ComConservation = 30*(eff_com_cum_frto*24.3 + eff_com_cum_tore*24.3 +
eff_com_cum_cl*90 + eff_com_cum_gri*400
      + eff_com_cum_spr*200 + eff_com_cum_aer*10 + rebs_com_cum +
eff_com_cum_den*720) / acc_com;

MFConservation = 30*(eff_mf_cum_frto*14.6 + eff_mf_cum_cl*90 +
eff_mf_cum_tore*14.6) / mfpop;

  run;

*XXXXXXXXXXX
```

```
*Model 1
*XXXXXXXXXXX;

* Using Zellner's Seemingly Unrelated Regressors method. Runs the three
models in tandem and provides a way of controlling for shocks we do not have
variables for.;
   proc syslin sur data=test outest=a;
   instruments  CDD HDD
   stl_res_summer stl_com_summer stl_mf_summer AvgResConLag prcpday
prcpperday prcpperdaysq
   ResConservation ComConservation MFConservation dmay11;
   endogenous AvgResCon AvgComCon   AvgMFCon;

   Residential: model AvgResCon =  prcpday prcpperday prcpperdaysq
AvgResConLag ResConservation CDD HDD stl_res_summer dmay11;

   Commercial: model AvgComCon = prcpday prcpperday prcpperdaysq
ComConservation CDD HDD stl_com_summer dmay11;

   Multifamily: model AvgMFCon = prcpday prcpperday prcpperdaysq
MFConservation CDD HDD stl_mf_summer dmay11;

   title 'Model 1';
run;

*  The following zeros out all conservation efforts so their effects can be
removed.
*  Also substitutes reference year weather for actual weather;
Data Normal;
  set test;
stl_res_summer = 0;
stl_com_summer = 0;
stl_mf_summer = 0;
ResConservation = 0;
ComConservation = 0;
MFConservation = 0;
prcpday = prcpdayref;
prcpperday = prcpperdayref;
prcpperdaysq = prcpperdaysqref;
CDD = (tempref-65)*Summer;
HDD = (65-tempref)*winter;
if CDD < 0 then CDD = 0;
if HDD < 0 then HDD = 0;

proc simlin est=a data=Normal type = sur outest=b;
   endogenous AvgResCon AvgComCon AvgMFCon;
   exogenous  AvgResConLag prcpday prcpperday prcpperdaysq CDD HDD
   stl_res_summer stl_com_summer stl_mf_summer
   ResConservation ComConservation MFConservation dmay11;


   id month;
   output out=c p=pAvgResCon pAvgComCon pAvgMFCon;
run;

data custadjust;
```

```
merge c test;
*  Multiply per-account simulated values by number of accounts to get
estimated consumption with the effects of indoor conservation/rate
structure/stage 1 watering restrictions removed;
* These "AF" numbers are actual consumption values;
ResConAF = 0; MfConAF = 0; ComConAF = 0;
ResConAF = ResCon / 325851.429;
MfConAF = MfCon / 325851.429;
ComConAF = ComCon / 325851.429;
* These are the simulated "no conservation" consumption estimates. We do NOT
expect these to be equal to actual consumption values.;
ResConS = 0; ComConS = 0; MFConS = 0;
ResConS = pAvgResCon *  acc_res / 325851.429;
ComConS = pAvgComCon *  acc_com / 325851.429;
MFConS = pAvgMFCon * mfpop / 325851.429;
* This is the difference of the two, so it represents savings due to indoor
conservation/rate structure/stage 1 watering restrictions;
ResConD = 0; ComConD = 0; MFConD = 0;
ResConD = ResConS-ResConAF;
ComConD = ComConS-ComConAF;
MFConD = MFConS-MFConAF;
proc print;
   var ResConAF ResConS ResConD ComConAF ComConS ComConD MfConAf MFConS
MFConD pAvgResCon pAvgComCon pAvgMFCon; run;

* The following runs a simulation of the model and compares it to actual
use.;
proc simlin est=a data=test type = sur outest=d;
   endogenous AvgResCon AvgComCon AvgMFCon;
   exogenous  AvgResConLag prcpday prcpperday prcpperdaysq CDD HDD
   st1_res_summer st1_com_summer st1_mf_summer
   ResConservation ComConservation MFConservation dmay11;

   id month;
   output out=e p=pactAvgResCon pactAvgComCon pactAvgMFCon;
   title 'Model 1 Mean Forecast Error';
run;


 data custadjustb;
merge e test;
*  Multiply per-account simulated values by number of accounts to get
estimated consumption;
* These "AF" numbers are actual consumption values;
ResConAF = 0; MfConAF = 0; ComConAF = 0;
ResConAF = ResCon / 325851.429;
MfConAF = MfCon / 325851.429;
ComConAF = ComCon / 325851.429;
* These are the simulated consumption estimates. Conservation efforts are NOT
removed, idealy these should be exactly equal to actual consumption;
PredictedResCon = 0; PredictedComCon = 0; PredictedMFCon = 0;
PredictedResCon = pactAvgResCon *  acc_res / 325851.429;
PredictedComCon = pactAvgComCon *  acc_com / 325851.429;
PredictedMFCon = pactAvgMFCon * mfpop / 325851.429;
ResConError = 0; ComConError = 0; MFConError = 0;
ResConError = PredictedResCon - ResConAf;
```

```
ComConError = PredictedComCon - ComConAf;
MFConError = PredictedMFCon - MFConAf;
proc print;
   var ResConAF PredictedResCon ResConError ComConAF PredictedComCon
ComConError MfConAf PredictedMFCon MFConError; run;

proc corr;
var AvgResCon AvgComCon AvgMFCon CDD HDD prcpday prcpperday prcpperdaysq
st1_res_summer st1_com_summer st1_mf_summer AvgResConLag ResConservation
ComConservation MFConservation dmay11;
title 'Model 1';
run;

proc corr;
var AvgResCon CDD HDD prcpday prcpperday prcpperdaysq st1_res_summer
AvgResConLag ResConservation dmay11; run;

proc corr;
var AvgComCon CDD HDD prcpday prcpperday prcpperdaysq st1_com_summer
ComConservation dmay11; run;

proc corr;
var AvgMFCon CDD HDD prcpday prcpperday prcpperdaysq st1_mf_summer
MFConservation dmay11; run;
```

FY 2010-2011 INDOOR CONSERVATION PROGRAM SAVINGS - FOR PROGRAMS IN PLACE IN 2001 and AFTER

Summary of units for long-lasting indoor equipment change-type water conservation measures

	Incremental Units Added per Year																		Total FY 10-11
	FY93-94	FY94-95	FY95-96	FY96-97	FY97-98	FY98-99	FY99-00	FY00-01	FY01-02	FY02-03	FY03-04	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09	FY09-10	FY10-11	Total # of Units
Residential Programs																			
Free Toilets - ULF	348	2,944	4,637	3,994	5,721	2,893	1,540	1,187	3,358	2,528	2,715	2,573	1,284	364	0	0	0	0	36,086
Free Toilets - HET													0	0	6,085	9,185	3,553	6,860	25,683
Toilet Rebates - ULF	1,838	1,455	1,768	2,030	853	1,345	1,579	1,282	1,526	402	1,047	826	1,078	1,805	1,817	114	0	0	20,765
Toilet Rebates - HET																4,035	5,222	3	9,260
Clotheswasher Rebates	0	0	0	200	752	1,480	1,745	1,769	1,897	2,248	2,220	2,375	2,612	3,264	4,292	4,396	5,034	2,840	37,124
Aerators	0	0	0	0	0	0	4,555	1,797	670	595	721	1,428	949	1,078	9,397	940	0	0	22,130
Showerheads	0	500	819	631	641	328	8,101	9,867	6,346	711	1,572	1,395	1,983	1,123	12,808	5,488	0	0	52,313
Multi-Family Programs																			
Free Toilets - ULF	0	0	0	0	0	4,766	5,173	3,096	1,295	1,488	2,506	1,476	1,344	262	0	0	0	0	21,406
Free Toilets - HET															1,300	2,757	263	620	4,940
Toilet Rebates - ULF	1,658	2,572	2,544	1,462	1,371	607	1,834	679	1,463	187	1,713	714	32	773	179	0	0	0	17,788
Toilet Rebates - HET																990	11,353	703	13,046
Clotheswasher Rebates	0	0	0	0	0	6	314	12	80	23	34	9	5	0	303	0	0	0	786
Commercial Programs																			
Free Toilets - ULF	0	552	137	256	14	185	20	114	202	669	429	405	96	86	0	0	0	0	3,165
Free Toilets - HET															188	415	76	119	798
Toilet Rebates - ULF	0	0	0	0	0	352	122	614	420	80	116	878	136	208	511	1,431	110	0	4,978
Toilet Rebates - HET																961	635	0	1,596
Clothes Washers	0	0	0	0	0	0	0	0	0	0	5	0	0	0	4	47	16	10	82
Commercial Rebates	0	1	1	1	1	1	1	6	1	6	8	6	6	3	3	8	2	2	57
Grinder Rebates	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
Spray Valves	0	0	0	0	0	0	0	0	0	0	263	96	15	2	0	0	0	0	376
Dental Vacuum Pumps	0	0	0	0	0	0	0	0	10	2	10	5	6	6	2	0	0	0	41
Aerators	0	0	0	0	0	0	0	0	0	0	624	217	51	0	0	0	0	0	892

Appendix D

Appendix D

						Fiscal Year 10-11							
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Wastewater Treated													
Anderson Mill	10.02	9.97	10.88	11.00	8.34	9.86	9.46	9.49	9.07	9.39	9.48	7.35	114.31
Balcones	4.55	5.77	6.12	1.55	2.96	5.99	5.45	5.77	4.96	5.03	4.95	4.96	58.08
Dessau	4.02	3.90	4.03	4.18	3.78	5.01	4.88	5.61	5.66	5.73	5.37	5.20	57.37
Harris Branch	7.80	7.98	7.72	7.49	6.17	8.44	8.20	7.57	8.72	8.06	9.24	8.38	95.77
Lost Creek	6.48	6.48	6.48	6.48	6.48	6.48	6.48	6.48	6.48	6.48	6.48	6.48	77.76
Onion Creek	5.12	5.02	5.18	5.87	5.51	5.87	5.97	6.83	5.54	5.78	7.46	5.53	69.68
SAR	1,152.11	1,084.35	1,061.77	1,096.20	1,126.58	1,245.13	1,152.03	1,205.56	1,125.93	1,170.27	1,143.77	1,125.40	13,689.11
Thoroughbred Farms	1.72	0.97	0.64	0.69	0.56	0.38	0.37	0.50	0.57	0.64	0.55	0.55	8.17
Walnut	1,507.43	1,216.76	1,396.79	1,558.83	1,371.86	1,433.20	1,336.24	1,467.29	1,386.32	1,419.27	1,436.91	1,358.42	16,889.31
Wild Horse	5.31	5.30	5.72	6.62	5.58	5.31	5.19	5.79	4.72	4.68	4.38	4.30	62.90
Total	2,704.55	2,346.51	2,505.33	2,698.91	2,537.83	2,725.67	2,534.27	2,720.91	2,557.98	2,635.34	2,628.61	2,526.58	31,122.47
Reclaimed Water Production													
Balcones	4.55	5.77	6.12	1.55	2.96	5.99	5.45	5.77	4.96	5.03	4.95	4.96	58.08
Lost Creek	6.48	6.48	6.48	6.48	6.48	6.48	6.48	6.48	6.48	6.48	6.48	6.48	77.76
Onion Creek	5.12	5.02	5.18	5.87	5.51	5.87	5.97	6.83	5.54	5.78	7.46	5.53	69.68
SAR	102.00	88.41	86.15	63.80	35.22	64.65	92.40	62.90	105.87	116.88	134.56	113.35	1,066.19
Walnut	7.90	5.86	6.08	3.77	2.43	8.26	17.97	21.63	23.11	26.17	19.97	35.00	178.14
Total	126.04	111.55	110.02	81.47	52.61	91.25	128.26	103.62	145.96	160.35	173.42	165.32	1,449.86
Total by qtr			347.61			225.33			377.83			499.09	
% of WW Treated	4.66%	4.75%	4.39%	3.02%	2.07%	3.35%	5.06%	3.81%	5.71%	6.08%	6.60%	6.54%	4.66%
% of WW Treated by qtr			4.60%			2.83%			4.84%			6.41%	
Inches of rain fall	0.06	0.92	0.80	3.67	0.64	0.15	0.19	1.91	1.39	0.05	0.00	0.01	9.79
Rainfall variance	-3.93	-2.10	-1.73	1.46	-1.38	-2.21	-2.44	-3.21	-2.03	-1.98	-1.63	-2.48	-23.66
Average Temperature	67.8	59.7	51.3	47.0	53.1	64.1	68.9	76.4	85.3	86.1	88.3	80.2	
Temperature variance	-3.0	-1.3	-1.6	-4.1	-2.4	2.0	4.9	0.8	3.8	1.8	4.6	2.4	

DATA SUMMARY FOR PERFORMANCE MEASURES					
Percentage	FY 10-11				
FY 09-10 **3.01%**	1st **4.60%**	2nd **2.83%**	3rd **4.84%**	4th **6.41%**	Year **4.66%**
Volume	FY 10-11				
Total FY 09-10 **1,093.10**	1st **347.61**	2nd **225.33**	3rd **377.83**	4th **499.09**	Total **1,449.86**
Main Installed (feet)	FY 10-11				
Total FY 09-10 **38,800**	1st	2nd	3rd	4th	Total **0**

Total in MG	1,450
Total in AF	4,449

Notes:
1. Volumes of wastewater treated come from Discharge Monitoring Reports
2. Reclaimed water production comes from plant records/meters
3. Rainfall and temperature measured at ABIA
4. All volumes are in million gallons
5. Volumes at Walnut are from meters
6. Per Lost Creek WWTP permit renewal average flow from 7/07 through 6/09 is 6.48 MG/mc

Appendix E

Appendix E

AWU Water Loss Calculation	FY05	FY 08		FY 09		FY 10		FY11		
WATER UTILITY GENERAL INFORMATION										
Water Utility Name:	Austin Water Utility	Austin Water Utility		Austin Water Utility		Austin Water Utility		Austin Water Utility		
Reporting Period:	October 1, 2004 to September 30, 2005	October 1, 2007 to September 30, 2008		October 1, 2008 to September 30, 2009		October 1, 2009 to September 30, 2010		October 1, 2010 to September 30, 2011		
SYSTEM INPUT VOLUME										
Water Volume from own Sources	48,004,300,000	53,070,779,000		53,328,130,000		43,786,936,000		52,834,738,000		gals
Production Meter Accuracy (%)	100.45%	98.00%		98.00%		98.00%		98.00%		pct.
Corrected System Input Volume	47,789,248,382	54,153,856,122		54,416,459,184		44,680,546,939		53,912,997,959		gals
AUTHORIZED CONSUMPTION										
Billed Metered	40,411,300,000	46,992,258,000	86.78%	48,184,480,800	88.55%	39,367,872,000	88.11%	48,165,313,300	89.34%	gals
Billed Unmetered	142,000,000	248,297,495	0.46%	143,796,498	0.26%	311,433,912	0.70%	187,897,505	0.35%	gals
Unbilled Metered (amount used at AWU buildings/facilities)	85,000,000	174,946,000	0.32%	70,089,600	0.13%	90,416,900	0.20%	70,478,800	0.13%	gals
Unbilled Unmetered (amount used by other city Departments) **	375,000,000	120,495,964	0.22%	135,436,830	0.25%	191,471,429	0.43%	94,550,296	0.18%	gals
Total Authorized Consumption	41,013,300,000	47,535,997,459	87.78%	48,533,803,728	89.19%	39,961,194,241	89.44%	48,518,239,901	89.99%	gals
Water Losses										
(System input volume minus authorized consumption)	6,775,948,382	6,617,858,663	12.22%	5,882,655,456	10.81%	4,719,352,698	10.56%	5,394,758,058	10.01%	gals
Total Apparent Losses	2,313,910,526	2,013,538,512	3.72%	1,212,885,736	2.23%	1,007,978,198	2.26%	1,054,967,957	1.96%	gals
Total Real Losses	4,462,037,856	4,604,320,151	8.50%	4,669,769,719	8.58%	3,711,374,500	8.31%	4,339,790,101	8.05%	gals
Unavoidable Real Losses, in MGD	3,351,732	3,866,612	2.61%	3,935,866	2.64%	3,967,109	3.24%	3,982,260	2.70%	MGD
Infrastructure Leakage Index (Equals real loss volume (div by 365) divided by unavoidable real losses)	3.647	3.262		3.251		2.563		2.986		
Real Water Loss at FY08 ILI	4,462,037,856	5,147,479,517		5,239,673,592		5,281,266,405		5,301,436,826		
Actual real water loss	4,462,037,856	4,604,320,151		4,669,769,719		3,711,374,500		4,339,790,101		
Savings in gal		543,159,366		569,903,873		1,569,891,905		961,646,725		
Savings in AF		1,667		1,749		4,818		2,951		
TWDB reliability assessment score		65		65		66		68		

14-Feb-12

Appendix E Municipal Diversions, Treated Water Pumpage, & Treated Water Usage

Reference Year: September 2010 - August 2011 - In Acre-Feet

Sep 2010	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Mar 2011	Apr 2011	May 2011	Jun 2011	Jul 2011	Aug 2011	Total (AF)	
12,639	13,534	11,620	11,005	9,896	9,593	11,900	14,141	14,810	16,951	19,155	20,278	165,520	Diversions
11,933	12,980	10,866	10,466	9,458	9,146	11,457	13,627	14,232	16,213	18,272	19,559	158,208	Treated Water Pumpage
11,834	13,063	10,854	10,445	9,470	9,119	11,476	13,650	14,247	16,155	18,294	19,570	158,176	Treated Water Usage
												7,345	Difference (Diversions - Treated Water Usage
												4.4%	Percentage difference (Difference/Diversions)
												7,312	Difference (Diversions - Treated Water Pumpage)
												4.4%	Percentage difference (Difference/Diversions)

Appendix F

APPENDIX F
LARGE VOLUME CUSTOMER ADJUSTMENT

	Large Volume Customer			
	Monthly Billed (gals)	**Monthy Billed Ac-Ft**	**Adjsutment Ac-Ft**	**Adjusted Billed Ac-Ft**
10-Sep	77,849,100	239	134	373
10-Oct	75,365,200	231	134	365
10-Nov	64,715,800	199	134	332
10-Dec	69,646,600	214	134	348
11-Jan	85,724,900	263	134	397
11-Feb	79,905,700	245	134	379
11-Mar	87,809,300	269	134	403
11-Apr	113,865,000	349	0	349
11-May	107,749,200	331	0	331
11-Jun	118,678,500	364	0	364
11-Jul	138,304,200	424	0	424
11-Aug	125,868,500	386	0	386
μ(Sep-Mar)	77,288,086	237		
μ(Apr-Aug)	120,893,080	371		
Monthly Billed Adjustment	43,604,994	**134**	**937**	4,452
Reference Year Diversion Adjustment			**1049**	

Appendix F

Period	Class	Unit	January	February	March	April	May	June	July	August	September	October	November	December
Reference year	Residential	Accounts	188882	188923	189708	189577	189934	190894	190964	192282	189038	188899	188716	188736
	Commercial	Accounts	15954	15928	15989	16006	16005	16042	16082	16143	15889	15971	15896	15903
	Multifamily	Population	327848	327848	327848	327848	327848	327848	327848	327848	322620	327848	327848	327848
2012	Residential	Accounts	190386	190500	191224	191339	191741	192796	192854	193606	192831	192676	192351	192679
	Commercial	Accounts	16116	16110	16135	16173	16152	16218	16186	16250	16274	16305	16242	16265
	Multifamily	Population	333159	333159	333159	333159	333159	333159	333159	333159	333159	338556	338556	338556

🟦 2010
🟥 2011
🟩 2012

		January	February	March	April	May	June	July	August	September	October	November	December
Percent Growth from Reference Year number of accounts/population	Residential	0.80%	0.83%	0.80%	0.93%	0.95%	1.00%	0.99%	0.69%	2.01%	2.00%	1.93%	2.09%
	Commercial	1.02%	1.14%	0.91%	1.04%	0.98%	1.10%	0.65%	0.66%	2.42%	2.09%	2.18%	2.28%
	Multifamily	1.62%	1.62%	1.62%	1.62%	1.62%	1.62%	1.62%	1.62%	3.27%	3.27%	3.27%	3.27%
		These eight months show 1 year of growth (2011-2012)								These four months show 2 years of growth			

City of Austin

COPY

April 10, 2012

Ms. Anissa Menefee
LCRA Mailstop R325
P.O. Box 220
Austin, TX 78767

Re: City of Austin Pro Rata Customer Curtailment Plan: Municipal Requested Follow-up Information

Dear Ms. Menefee:

As required, the City of Austin's municipal customer curtailment plan, with supporting documentation, was submitted on February 15, 2012. Upon review, Lower Colorado River Authority (LCRA) staff requested additional follow-up information, which is outlined in the attached list. The requested additional information, enclosed, generally includes additional statistical analysis data and historical data.

At the last City of Austin and LCRA Water Partnership Executive Management Committee (EMC) meeting held on March 30, 2012, we appreciated the opportunity to discuss the issue of limiting the statistical analysis time period for water conservation savings documentation to 2001 to 2011. As a result of this discussion, additional statistical analysis results of reference year water conservation savings limited a 2001 to 2011 analysis time period is included in the attached follow-up information. As LCRA may be pursuing future related rule changes, we hope to have an opportunity to revisit the issue of how far back is reasonable and appropriate in considering documentable savings from water conservation and reuse program investments and implementation.

Please let us know if you have any questions or need any additional information. For questions concerning implementation of the plan in the event curtailment is initiated, please contact Drema Gross, Austin Water Utility's Drought Coordinator, at (512)974-2787 or questions concerning the submittal and the modifications requested please contact Teresa Lutes at (512)972-0179.

Sincerely,

Greg Meszaros, Director
Austin Water Utility

cc: Mr. Kyle Jensen, Executive Manager of External Affairs, LCRA
Mr. Robert Goode, P.E., Assistant City Manager, City of Austin
Mr. David Juarez, P.E., Assistant Director, Austin Water Utility (AWU)
Mr. Daryl Slusher, Assistant Director, AWU
Ms. Drema Gross, Water Conservation Division Manager, AWU
Ms. Teresa Lutes, P.E., Systems Planning Division Manager, AWU
Mr. Ross Crow, City of Austin, Law Department
Mr. Steve Coonan, P.E., Alan Plummer Associates, Inc.

City of Austin Curtailment Plan
Summary Listing of Requested Follow-up Information

1. Provide additional information on the sensitivity analysis regarding the Stage 1 residential variable.

2. For Tables 3 through 5 in Appendix C, please add one variable/one column, for the monthly mean forecast values from the original equation (with Stage 1 included).

3. Provide the mean forecast error for the 1) reference period, 2) the 1994-2011 period, and 3) the 2001-2011 period. Please make sure these are calculated for the unrestricted forecast equation (i.e., that is Stage1 is included throughout these periods).

4. Provide additional data to support the 596 ac-ft savings estimate for wholesale water customers.

5. Break apart the reuse and water loss savings in Table 1 of the main text.

6. Provide additional data for accounts/LUEs for 3 years for the Appendix F growth table.

7. Provide the statistical model results documenting reference year water conservation savings using an analysis time period limited to 2001 through 2011.

Item 1

Running the three models individually under OLS, rather than as a system under SUR, did yield a significant residential stage 1 parameter. This change, however, came at the expense of the residential, multifamily, and commercial indoor conservation program variables, which all went from being highly significant to insignificant in the shift to OLS. In addition to this, the OLS results reduced the model's accuracy during the reference year: mean forecast error for the reference year increased for all three models. Given that OLS caused more significance-related problems than it solved, as well as the fact that it reduced model accuracy, Frontier opted to reject OLS, and use SUR instead.

	Reference year MFE, SUR	Reference year MFE, OLS	Percent increase
Residential Model	197.6	211.5	7.0
Commercial Model	141.6	144.9	2.3
Multifamily Model	61.8	82.5	33.5

Table 1 - Residential Conservation Savings (acre-ft)

		SUR Model		OLS Model	
Date	**Actual Residential Demand**	**Residential Demand, No Conservation**	**Residential Savings**	**Residential Demand, No Conservation**	**Residential Savings**
Sep-10	4811.1	5610.72	799.62	5530.62	719.51
Oct-10	4209.8	5472.56	1262.75	5382.43	1172.63
Nov-10	4109.92	4328.62	218.7	4252.57	142.65
Dec-10	3733.49	3974.26	240.77	3905.78	172.30
Jan-11	3186	3767.39	581.38	3661.80	475.80
Feb-11	3219.22	3659	439.78	3478.43	259.22
Mar-11	4230.38	4454.52	224.14	4232.30	1.92
Apr-11	5398.11	5843.25	445.14	5620.43	222.32
May-11	6044.57	6635.9	591.34	6523.69	479.12
Jun-11	6740.25	7125.53	385.28	6967.11	226.85
Jul-11	7420.42	8040.88	620.46	7958.64	538.22
Aug-11	7853.78	8762.34	908.56	8726.92	873.14
TOTAL	**Billed-Level**		**6,718**		**5,284**
TOTAL	**Diversion-Level**		**7,531**		**5,923**

Table 2 - Commercial Conservation Savings (acre-ft)

		SUR Model		OLS Model	
Date	Actual Commercial Demand	Commercial Demand, No Conservation	Commercial Savings	Commercial Demand, No Conservation	Commercial Savings
Sep-10	3322.51	3960.38	637.87	3940.88	618.36
Oct-10	3029.26	3697.02	667.75	3668.83	639.57
Nov-10	2917.7	3065.81	148.11	3025.34	107.64
Dec-10	2536.64	2756.11	219.48	2708.79	172.15
Jan-11	2079.66	2615.98	536.33	2564.94	485.29
Feb-11	2149.19	2741.64	592.44	2692.7	543.51
Mar-11	2636.05	3291.67	655.62	3257.44	621.39
Apr-11	3105.5	4026.23	920.74	4001.92	896.43
May-11	3658.27	4328.21	669.94	4320.76	662.5
Jun-11	4024.01	4702.29	678.28	4698.42	674.41
Jul-11	4248.57	5034.94	786.36	5025.67	777.1
Aug-11	4432.79	5303.54	870.75	5299.59	866.8
TOTAL	Billed-Level		7,384		7,065
TOTAL	Diversion-Level		8,277		7,920

Table 3 - MF Conservation Savings (acre-ft)

		SUR Model		OLS Model	
Date	Actual MF Demand	MF Demand, No Conservation	MF Savings	MF Demand, No Conservation	MF Savings
Sep-10	2463.57	2678.24	214.667	2631.54	167.966
Oct-10	2269.35	2597.01	327.66	2553.01	283.659
Nov-10	2269.51	2403.33	133.819	2353.11	83.595
Dec-10	2245.03	2353.15	108.118	2301.14	56.114
Jan-11	2071.57	2330.71	259.132	2274.34	202.766
Feb-11	2086.53	2340.72	254.195	2280.65	194.125
Mar-11	2188.98	2448.89	259.91	2403.28	214.301
Apr-11	2386.8	2714.7	327.902	2672.28	285.485
May-11	2599.28	2825.53	226.249	2779.3	180.022
Jun-11	2715.64	2972	256.356	2936.11	220.47
Jul-11	2772.63	3068.52	295.892	3027.15	254.52
Aug-11	2896.13	3155.74	259.608	3118.02	221.887
TOTAL		**Billed-Level**	**2,924**		**2,365**
TOTAL		**Diversion-Level**	**3,277**		**2,651**

Table 4 - Model Confidence Intervals and Mean Forecast Error

		Lower 95%	Reference Year Savings	Upper 95%	MFE (1993-2011)	MFE (2001-2011)	MFE (Reference Year)
SUR Model	**Residential**	-2,102	6,718	15,538	284	279	198
	Commercial	-194	7,384	14,962	252	242	142
	Multifamily	54	2,924	5,793	96	99	26
OLS Model	**Residential**	-232	5,284	10,800	275	277	211
	Commercial	2,301	7,065	11,829	249	242	145
	Multifamily	652	2,365	4,078	96	101	82

Table 5 – Residential Parameter Estimates

	SUR Model				OLS Model			
Variable	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept	6909.585	314.6984	21.96	<.0001***	5801.24	331.589	17.5	<.0001***
Precipitation Days	-108.838	13.7145	-7.94	<.0001***	-105.2	13.7295	-7.66	<.0001***
Precipitation Intensity	-2520.2	611.3604	-4.12	<.0001***	-2375.1	611.845	-3.88	0.0001***
Precipitation Intensity^2	1527.204	565.7368	2.7	0.0076***	1371.76	566.26	2.42	0.0163**
Lagged Residential Consumption	0.240669	0.029322	8.21	<.0001***	0.36774	0.03187	11.54	<.0001***
Indoor Residential Conservation	-2.12143	0.667414	-3.18	0.0017***	-1.0892	0.68741	-1.58	0.1147
CDD	186.7266	10.84387	17.22	<.0001***	165.33	11.0963	14.9	<.0001***
HDD	-27.5102	12.59803	-2.18	0.0302**	-24.293	12.6036	-1.93	0.0554*
Stage 1 Watering Restrictions	-0.02842	0.021354	-1.33	0.1847	-0.0436	0.02189	-1.99	0.0477**
May 2011 Dummy	1615.173	764.3529	2.11	0.0359**	1556.3	764.869	2.03	0.0432**

Table 6 - Commercial Parameter Estimates

	SUR Model				OLS Model			
Variable	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept	69367.89	2071.712	33.48	<.0001***	68749.9	2089.06	32.91	<.0001***
Precipitation Days	-409.458	143.2713	-2.86	0.0047***	-422.96	143.351	-2.95	0.0036***
Precipitation Intensity	-11864.3	6402.088	-1.85	0.0654*	-12469	6405.19	-1.95	0.053*
Precipitation Intensity^2	7925.235	5923.783	1.34	0.1825	8570.24	5927.49	1.45	0.1498
Indoor Commercial Conservation	-6.48394	1.728048	-3.75	0.0002***	-3.8176	2.01386	-1.9	0.0595*
CDD	1438.388	96.30411	14.94	<.0001***	1458.93	96.5507	15.11	<.0001***
HDD	-598.106	132.5281	-4.51	<.0001***	-610.73	132.604	-4.61	<.0001***
Stage 1 Watering Restrictions	-0.10114	0.027582	-3.67	0.0003***	-0.1328	0.02946	-4.51	<.0001***
May 2011 Dummy	7994.694	8010.355	1	0.3195	8442.76	8016.04	1.05	0.2935

Table 7 - MF Parameter Estimates

	SUR Model				OLS Model			
Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	2471.78	39.75053	62.18	<.0001***	2432.18	40.5824	59.93	<.0001***
Precipitation Days	-6.86887	2.652535	-2.59	0.0103**	-8.0152	2.66172	-3.01	0.0029***
Precipitation Intensity	-172.993	117.3148	-1.47	0.1419	-172.9	117.332	-1.47	0.1422
Precipitation Intensity^2	123.2738	108.5172	1.14	0.2574	127.613	108.528	1.18	0.2411
Indoor MF Conservation	-1.58566	0.437358	-3.63	0.0004***	-0.3079	0.50489	-0.61	0.5427
CDD	25.37172	1.752999	14.47	<.0001***	25.4523	1.75437	14.51	<.0001***
HDD	-3.67962	2.438961	-1.51	0.133	-4.3439	2.44204	-1.78	0.0768*
Stage 1 Watering Restrictions	-0.03583	0.013792	-2.6	0.0101**	-0.0593	0.01438	-4.12	<.0001***
May 2011 Dummy	129.7193	146.9338	0.88	0.3784	129.145	147.015	0.88	0.3808

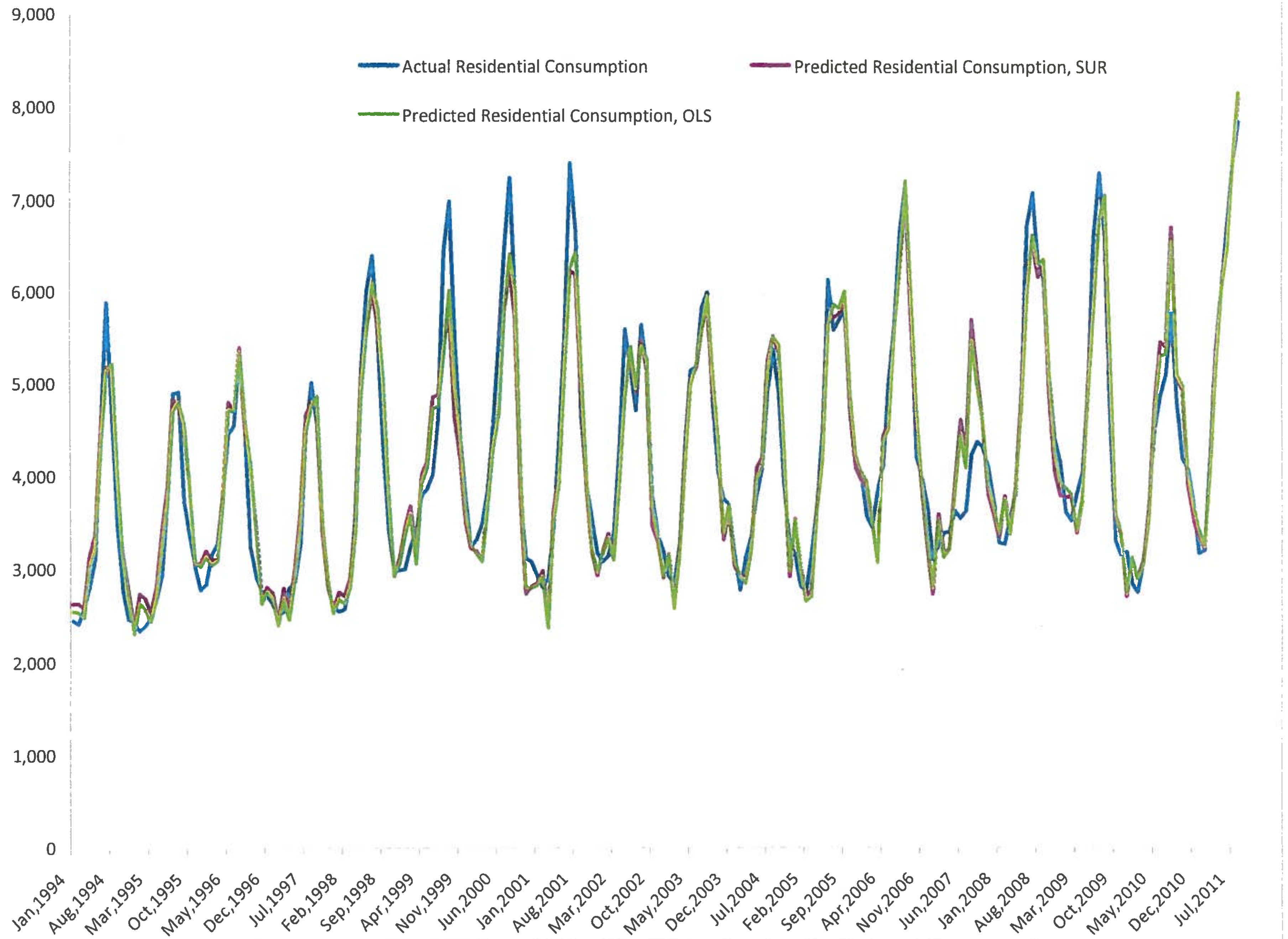
Actual consumption vs. unrestricted forecast consumption, SUR vs. OLS

Month	Actual Residential Consumption	Predicted Residential Consumption, SUR	Error	Predicted Residential Consumption, OLS	Error	Actual Commercial Consumption	Predicted Commercial Consumption, SUR	Error	Predicted Commercial Consumption, OLS	Error	Actual Multifamily Consumption	Predicted Multifamily Consumption, SUR	Error	Predicted Multifamily Consumption, OLS	Error
Oct,1993	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nov,1993	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dec,1993	2,555	.	.	.	.	1,679	1,927	248	1,895	216	1,565	.	.	.	.
Jan,1994	2,454	2,635	180	2,558	104	1,745	1,874	129	1,840	95	1,515	.	.	.	.
Feb,1994	2,414	2,637	223	2,546	132	1,704	1,903	199	1,870	166	1,534	.	.	.	.
Mar,1994	2,586	2,586	0	2,483	-103	1,887	2,056	169	2,025	138	1,267	.	.	.	.
Apr,1994	2,802	3,141	339	3,016	214	1,893	2,540	648	2,513	620	1,438	.	.	.	.
May,1994	3,108	3,372	264	3,237	129	2,046	2,437	391	2,414	368	1,642	.	.	.	.
Jun,1994	4,494	4,510	16	4,322	-172	2,672	3,035	363	3,022	350	1,806	.	.	.	.
Jul,1994	5,875	5,182	-693	5,137	-739	3,392	3,308	-84	3,297	-94	2,031	.	.	.	.
Aug,1994	4,727	5,101	373	5,218	491	3,194	3,152	-42	3,156	-38	1,976	.	.	.	.
Sep,1994	3,504	3,974	470	4,051	547	2,626	2,694	68	2,673	47	1,827	.	.	.	.
Oct,1994	2,777	3,147	370	3,123	346	2,228	2,372	145	2,348	120	1,686	1,695	10	1,667	-19
Nov,1994	2,467	2,766	298	2,703	236	1,912	2,141	229	2,110	199	1,586	1,614	27	1,584	-2
Dec,1994	2,428	2,383	-45	2,299	-129	1,659	1,885	226	1,849	190	1,522	1,569	47	1,534	12
Jan,1995	2,339	2,737	398	2,637	298	1,580	1,993	413	1,961	381	1,445	1,605	160	1,571	126
Feb,1995	2,394	2,688	294	2,577	183	1,675	2,030	355	1,999	324	1,497	1,605	108	1,573	76
Mar,1995	2,487	2,543	56	2,441	-46	1,728	2,041	313	2,009	281	1,495	1,592	96	1,559	64
Apr,1995	2,666	2,795	129	2,678	12	1,869	2,268	399	2,240	371	1,522	1,645	122	1,615	93
May,1995	2,924	3,401	477	3,225	302	2,153	2,667	514	2,650	496	1,623	1,785	162	1,761	138
Jun,1995	3,737	3,881	144	3,697	-40	2,490	2,907	417	2,894	404	1,777	1,863	86	1,841	65
Jul,1995	4,894	4,832	-62	4,707	-187	3,005	3,298	293	3,288	283	2,003	1,983	-20	1,961	-42
Aug,1995	4,909	4,761	-148	4,807	-103	3,185	3,152	-34	3,137	-48	2,122	1,933	-190	1,908	-214
Sep,1995	3,736	4,500	764	4,583	847	2,778	2,932	153	2,916	138	1,926	1,860	-67	1,839	-87
Oct,1995	3,375	3,895	520	3,888	513	2,516	2,660	144	2,642	126	1,826	1,808	-18	1,786	-39
Nov,1995	3,030	3,057	26	3,072	41	2,213	2,141	-71	2,113	-99	1,799	1,664	-135	1,640	-159
Dec,1995	2,778	3,059	281	3,030	252	1,929	2,107	178	2,079	150	1,703	1,667	-36	1,639	-64
Jan,1996	2,839	3,196	357	3,131	293	1,838	2,129	291	2,102	264	1,670	1,683	13	1,657	-13
Feb,1996	3,159	3,100	-59	3,042	-117	2,007	2,200	192	2,173	166	1,726	1,679	-47	1,654	-72
Mar,1996	3,280	3,102	-178	3,091	-190	2,088	2,161	73	2,133	45	1,703	1,667	-37	1,641	-62
Apr,1996	3,818	3,768	-50	3,716	-102	2,286	2,622	336	2,605	319	1,733	1,780	47	1,762	29
May,1996	4,456	4,798	342	4,717	261	2,708	3,216	508	3,207	499	1,877	1,977	100	1,961	84
Jun,1996	4,543	4,707	164	4,702	159	2,943	3,185	242	3,171	229	1,970	1,972	1	1,952	-18
Jul,1996	5,305	5,392	88	5,347	42	3,225	3,534	309	3,527	302	2,047	2,081	34	2,066	19
Aug,1996	4,537	4,510	-28	4,615	78	3,080	3,076	-4	3,060	-20	2,040	1,933	-108	1,910	-130
Sep,1996	3,236	4,101	865	4,152	916	2,641	2,876	235	2,857	216	1,910	1,861	-49	1,839	-71
Oct,1996	2,925	3,462	537	3,407	482	2,411	2,594	183	2,573	161	1,817	1,808	-9	1,785	-32
Nov,1996	2,767	2,669	-98	2,634	-133	2,144	2,119	-25	2,088	-56	1,737	1,676	-61	1,650	-88
Dec,1996	2,715	2,806	90	2,753	38	1,832	2,082	250	2,051	219	1,701	1,686	-15	1,660	-41
Jan,1997	2,639	2,749	109	2,694	55	1,750	1,976	227	1,943	194	1,652	1,674	22	1,643	-9
Feb,1997	2,496	2,452	-44	2,396	-100	1,793	1,954	161	1,919	126	1,624	1,649	24	1,617	-8
Mar,1997	2,553	2,795	242	2,697	144	1,822	2,272	449	2,245	422	1,577	1,704	127	1,680	102
Apr,1997	2,798	2,546	-252	2,463	-336	1,989	2,221	232	2,192	202	1,638	1,677	40	1,653	15
May,1997	2,860	3,011	151	2,902	41	2,148	2,532	384	2,507	359	1,701	1,787	87	1,762	61
Jun,1997	3,267	3,640	373	3,467	199	2,403	2,923	521	2,906	504	1,757	1,921	164	1,900	143
Jul,1997	4,461	4,666	205	4,485	25	2,966	3,362	395	3,352	386	1,911	2,066	155	2,053	143
Aug,1997	5,015	4,784	-232	4,758	-257	3,316	3,307	-9	3,299	-17	2,103	2,044	-59	2,031	-72
Sep,1997	4,565	4,792	227	4,868	303	3,176	3,203	27	3,190	14	2,069	2,000	-70	1,983	-86
Oct,1997	3,491	3,403	-88	3,534	42	2,754	2,503	-251	2,477	-277	1,896	1,884	-12	1,859	-37
Nov,1997	2,814	2,848	34	2,889	75	2,284	2,125	-159	2,094	-191	1,779	1,794	14	1,765	-15
Dec,1997	2,602	2,567	-35	2,535	-67	1,913	1,973	60	1,938	24	1,673	1,769	96	1,739	66
Jan,1998	2,555	2,757	202	2,684	129	1,801	2,167	365	2,136	335	1,613	1,806	193	1,779	166

Feb,1998	2,580	2,717	136	2,640	59	1,862	2,097	235	2,064	202	1,636	1,785	149	1,758	121
Mar,1998	2,878	2,896	17	2,795	-84	1,999	2,249	250	2,219	220	1,667	1,810	143	1,786	119
Apr,1998	3,657	3,508	-149	3,402	-256	2,418	2,619	201	2,597	179	1,767	1,902	134	1,883	115
May,1998	5,152	5,048	-105	4,914	-239	3,169	3,387	218	3,379	210	2,013	2,171	158	2,157	144
Jun,1998	6,002	5,574	-428	5,588	-415	3,732	3,615	-117	3,605	-126	2,166	2,242	76	2,226	60
Jul,1998	6,382	6,014	-368	6,100	-281	4,078	3,766	-312	3,759	-319	2,246	2,291	45	2,276	31
Aug,1998	5,531	5,633	101	5,803	271	4,035	3,550	-486	3,538	-497	2,221	2,213	-9	2,190	-31
Sep,1998	4,344	4,912	568	5,003	659	3,312	3,303	-10	3,287	-26	2,097	2,134	36	2,113	16
Oct,1998	3,433	3,832	399	3,836	403	2,692	2,794	102	2,785	94	1,919	2,013	94	1,997	77
Nov,1998	2,976	2,923	-53	2,927	-49	2,368	2,313	-55	2,281	-87	1,846	1,843	-3	1,817	-29
Dec,1998	2,995	3,118	123	3,064	69	2,135	2,229	94	2,197	62	1,821	1,859	38	1,835	13
Jan,1999	3,005	3,451	446	3,382	376	2,097	2,403	306	2,378	280	1,744	1,900	156	1,881	137
Feb,1999	3,250	3,684	434	3,602	352	2,319	2,596	277	2,575	256	1,765	1,933	168	1,919	154
Mar,1999	3,408	3,092	-316	3,062	-346	2,487	2,378	-109	2,350	-136	1,824	1,861	38	1,845	22
Apr,1999	3,804	4,022	218	3,933	129	2,653	2,953	300	2,935	282	1,893	2,033	140	2,017	125
May,1999	3,875	4,168	293	4,104	229	2,926	3,056	130	3,037	111	1,915	2,075	161	2,062	147
Jun,1999	4,026	4,856	829	4,737	711	3,076	3,458	382	3,445	369	1,976	2,206	230	2,194	218
Jul,1999	4,622	4,880	258	4,753	130	3,291	3,557	267	3,545	254	2,069	2,241	173	2,226	158
Aug,1999	6,440	5,396	-1,044	5,339	-1,101	3,979	3,646	-333	3,638	-341	2,319	2,265	-54	2,260	-59
Sep,1999	6,983	5,807	-1,176	6,010	-973	4,680	3,539	-1,142	3,532	-1,148	2,438	2,213	-224	2,208	-230
Oct,1999	5,459	4,615	-844	4,986	-473	4,126	2,795	-1,332	2,776	-1,351	2,349	2,011	-338	2,000	-349
Nov,1999	4,448	4,195	-253	4,443	-5	3,435	2,528	-907	2,506	-929	2,223	1,922	-301	1,914	-309
Dec,1999	3,781	3,512	-269	3,642	-139	2,881	2,301	-580	2,272	-609	1,984	1,868	-116	1,856	-128
Jan,2000	3,244	3,230	-14	3,274	30	2,507	2,235	-272	2,208	-300	1,820	1,861	42	1,854	35
Feb,2000	3,331	3,198	-133	3,174	-157	2,643	2,459	-185	2,433	-211	1,925	1,877	-48	1,868	-56
Mar,2000	3,505	3,098	-407	3,084	-421	2,682	2,525	-157	2,498	-184	1,882	1,861	-21	1,849	-33
Apr,2000	3,869	3,736	-133	3,681	-188	2,718	2,815	97	2,795	77	1,815	1,987	172	1,987	171
May,2000	4,548	4,378	-169	4,305	-243	3,254	3,213	-41	3,198	-56	2,045	2,127	82	2,124	79
Jun,2000	5,451	4,682	-769	4,670	-781	3,691	3,354	-337	3,339	-352	2,258	2,162	-95	2,161	-97
Jul,2000	6,472	5,789	-683	5,813	-660	3,656	3,873	218	3,867	212	2,186	2,318	132	2,325	139
Aug,2000	7,244	6,254	-989	6,397	-846	3,935	3,881	-54	3,877	-58	2,296	2,342	46	2,349	53
Sep,2000	5,898	5,694	-204	6,004	106	3,598	3,536	-62	3,524	-74	2,202	2,200	-2	2,203	2
Oct,2000	3,830	3,793	-38	4,060	230	3,018	2,697	-321	2,670	-348	2,014	1,959	-56	1,953	-61
Nov,2000	3,118	2,742	-376	2,810	-307	2,621	2,158	-463	2,125	-496	2,017	1,829	-187	1,822	-195
Dec,2000	3,085	2,816	-268	2,804	-280	2,315	2,046	-269	2,010	-305	1,959	1,835	-124	1,825	-134
Jan,2001	2,940	2,852	-88	2,830	-110	2,140	2,134	-7	2,099	-41	1,872	1,843	-30	1,833	-39
Feb,2001	2,814	2,986	172	2,928	115	2,086	2,304	217	2,277	191	1,832	1,876	44	1,871	39
Mar,2001	2,906	2,420	-486	2,371	-535	2,181	2,118	-63	2,084	-97	1,810	1,811	1	1,800	-10
Apr,2001	3,450	3,640	191	3,507	57	2,484	2,908	423	2,891	407	1,884	2,017	132	2,018	134
May,2001	4,398	4,039	-360	3,929	-469	3,079	3,161	82	3,146	67	2,087	2,104	17	2,106	19
Jun,2001	5,550	5,216	-334	5,150	-399	3,573	3,652	79	3,647	73	2,181	2,271	90	2,279	98
Jul,2001	7,402	6,226	-1,176	6,248	-1,154	4,319	4,002	-317	4,006	-313	2,364	2,398	33	2,412	47
Aug,2001	6,645	6,193	-451	6,424	-221	4,307	3,906	-402	3,922	-386	2,428	2,356	-72	2,373	-55
Sep,2001	4,658	4,884	226	5,164	506	3,741	3,221	-520	3,209	-531	2,275	2,121	-154	2,129	-146
Oct,2001	3,929	3,878	-50	4,000	71	3,296	2,799	-497	2,782	-514	2,118	1,995	-124	2,005	-113
Nov,2001	3,542	3,194	-348	3,222	-320	2,793	2,508	-285	2,499	-294	2,053	1,925	-128	1,936	-118
Dec,2001	3,178	2,940	-238	2,974	-204	2,304	2,253	-51	2,226	-78	1,977	1,874	-102	1,873	-104
Jan,2002	3,089	3,199	110	3,176	87	2,239	2,371	132	2,349	109	1,936	1,912	-24	1,917	-19
Feb,2002	3,149	3,392	243	3,354	205	2,273	2,382	108	2,360	87	1,857	1,927	70	1,935	78
Mar,2002	3,403	3,139	-264	3,105	-298	2,577	2,467	-110	2,446	-131	1,886	1,910	23	1,913	27
Apr,2002	4,359	4,044	-315	3,951	-408	2,978	3,102	124	3,093	115	2,010	2,091	82	2,100	90
May,2002	5,591	4,893	-697	4,867	-723	3,663	3,427	-236	3,424	-240	2,225	2,209	-16	2,224	-1
Jun,2002	5,179	5,326	148	5,403	225	3,825	3,668	-158	3,666	-160	2,240	2,294	54	2,306	66
Jul,2002	4,714	4,906	192	4,955	241	3,669	3,496	-174	3,490	-179	2,225	2,238	13	2,246	21
Aug,2002	5,637	5,469	-167	5,416	-220	3,929	3,808	-121	3,810	-119	2,345	2,341	-4	2,355	10
Sep,2002	5,159	5,149	-9	5,269	110	3,813	3,488	-325	3,486	-326	2,283	2,227	-56	2,243	-40
Oct,2002	3,799	3,483	-316	3,676	-123	3,098	2,674	-424	2,658	-440	2,072	1,962	-109	1,967	-104

Nov,2002	3,374	3,308	-66	3,359	-15	2,726	2,419	-307	2,403	-323	2,062	1,925	-136	1,937	-124
Dec,2002	3,206	2,912	-294	2,927	-279	2,403	2,242	-161	2,222	-181	2,013	1,885	-128	1,890	-122
Jan,2003	2,928	3,169	241	3,157	229	2,200	2,271	71	2,252	52	1,893	1,910	17	1,918	25
Feb,2003	2,850	2,623	-226	2,591	-259	2,150	2,152	3	2,130	-20	1,845	1,861	16	1,859	14
Mar,2003	3,296	3,243	-53	3,166	-130	2,314	2,558	244	2,547	234	1,854	1,945	91	1,954	100
Apr,2003	4,400	4,238	-163	4,142	-258	2,842	3,131	289	3,132	290	2,002	2,107	105	2,125	123
May,2003	5,147	5,030	-118	4,991	-156	3,422	3,543	121	3,553	131	2,190	2,265	75	2,283	93
Jun,2003	5,189	5,185	-5	5,220	31	3,633	3,636	3	3,646	13	2,230	2,291	61	2,308	78
Jul,2003	5,825	5,584	-241	5,600	-225	3,777	3,812	35	3,825	49	2,308	2,347	40	2,364	56
Aug,2003	5,989	5,878	-112	5,955	-35	4,023	3,898	-125	3,913	-110	2,435	2,381	-54	2,401	-34
Sep,2003	4,797	4,910	113	5,097	300	3,596	3,357	-238	3,363	-232	2,313	2,192	-121	2,203	-110
Oct,2003	4,061	4,307	246	4,405	344	3,207	3,076	-131	3,081	-125	2,154	2,085	-70	2,099	-56
Nov,2003	3,769	3,328	-441	3,409	-360	2,983	2,563	-420	2,563	-420	2,120	1,954	-166	1,963	-157
Dec,2003	3,711	3,670	-40	3,712	1	2,821	2,514	-307	2,516	-305	2,146	1,982	-164	1,995	-150
Jan,2004	3,165	3,043	-122	3,099	-65	2,489	2,290	-199	2,286	-203	1,963	1,914	-49	1,923	-41
Feb,2004	2,786	2,941	155	2,931	146	2,217	2,246	29	2,243	26	1,837	1,912	75	1,919	82
Mar,2004	3,131	2,933	-197	2,857	-274	2,404	2,563	160	2,568	165	1,924	1,942	18	1,954	31
Apr,2004	3,357	3,244	-113	3,183	-174	2,551	2,731	180	2,740	189	1,941	1,996	55	2,011	70
May,2004	3,807	4,104	297	3,987	181	2,853	3,226	373	3,243	391	2,005	2,167	162	2,184	179
Jun,2004	4,086	4,212	127	4,109	23	3,199	3,347	148	3,371	172	2,113	2,213	100	2,231	118
Jul,2004	4,911	5,261	349	5,143	232	3,576	3,777	201	3,807	231	2,202	2,353	151	2,379	177
Aug,2004	5,378	5,521	143	5,510	132	3,876	3,801	-75	3,833	-43	2,288	2,353	65	2,378	90
Sep,2004	4,914	5,346	433	5,425	512	3,731	3,609	-122	3,641	-90	2,264	2,288	23	2,314	50
Oct,2004	3,912	4,211	299	4,305	393	3,298	3,116	-182	3,139	-160	2,159	2,161	2	2,178	20
Nov,2004	3,300	2,928	-372	2,982	-318	2,718	2,380	-338	2,400	-318	2,126	1,943	-182	1,961	-164
Dec,2004	3,164	3,555	391	3,541	377	2,434	2,411	-23	2,439	5	2,027	2,000	-27	2,017	-9
Jan,2005	2,830	3,035	204	3,018	188	2,209	2,311	102	2,334	126	1,862	1,950	89	1,963	101
Feb,2005	2,764	2,716	-48	2,663	-100	2,221	2,251	30	2,274	53	1,902	1,926	24	1,935	33
Mar,2005	3,158	2,781	-377	2,713	-445	2,480	2,404	-76	2,430	-50	1,980	1,941	-38	1,955	-24
Apr,2005	3,716	3,719	3	3,645	-72	2,742	2,846	104	2,884	142	2,035	2,070	35	2,095	60
May,2005	4,507	4,248	-259	4,181	-326	3,244	3,164	-80	3,207	-37	2,273	2,185	-87	2,212	-60
Jun,2005	6,127	5,710	-417	5,629	-498	3,956	3,875	-81	3,931	-25	2,575	2,422	-153	2,455	-119
Jul,2005	5,585	5,726	140	5,855	270	4,176	3,772	-404	3,825	-351	2,635	2,391	-244	2,414	-221
Aug,2005	5,695	5,762	67	5,812	118	4,307	3,844	-463	3,899	-408	2,726	2,412	-315	2,438	-288
Sep,2005	5,793	5,939	146	5,998	205	4,273	3,880	-393	3,939	-334	2,673	2,424	-249	2,455	-218
Oct,2005	4,778	4,671	-107	4,901	123	3,719	3,034	-684	3,080	-638	2,410	2,166	-244	2,195	-216
Nov,2005	4,255	4,106	-149	4,257	2	3,334	2,739	-595	2,782	-551	2,356	2,070	-286	2,101	-255
Dec,2005	4,026	3,973	-53	4,071	44	3,045	2,498	-547	2,538	-507	2,227	2,049	-177	2,072	-155
Jan,2006	3,590	3,897	306	3,960	370	2,780	2,609	-171	2,651	-129	2,012	2,056	45	2,083	71
Feb,2006	3,476	3,527	51	3,549	73	2,787	2,436	-352	2,474	-314	2,084	2,020	-64	2,040	-44
Mar,2006	3,859	3,080	-779	3,082	-777	2,909	2,545	-364	2,584	-324	2,155	1,997	-158	2,021	-134
Apr,2006	4,118	4,450	332	4,382	264	2,956	3,254	297	3,307	351	2,143	2,239	96	2,272	129
May,2006	5,029	4,577	-452	4,517	-512	3,451	3,367	-85	3,420	-31	2,385	2,280	-106	2,309	-77
Jun,2006	5,623	5,554	-69	5,549	-74	4,021	3,781	-241	3,839	-182	2,637	2,417	-220	2,446	-191
Jul,2006	6,646	6,288	-358	6,315	-331	4,319	4,056	-263	4,122	-197	2,686	2,507	-179	2,538	-148
Aug,2006	7,197	7,087	-110	7,207	10	4,769	4,328	-441	4,399	-370	2,842	2,590	-252	2,626	-216
Sep,2006	5,813	5,685	-128	5,983	170	4,285	3,621	-663	3,676	-608	2,717	2,341	-375	2,368	-349
Oct,2006	4,236	4,529	294	4,747	511	3,439	3,093	-347	3,140	-299	2,379	2,220	-159	2,246	-133
Nov,2006	4,008	3,881	-126	3,966	-42	3,191	2,726	-465	2,771	-420	2,310	2,104	-207	2,132	-179
Dec,2006	3,700	3,262	-439	3,345	-355	2,885	2,346	-539	2,382	-504	2,284	2,029	-254	2,049	-235
Jan,2007	3,115	2,743	-373	2,809	-306	2,412	2,038	-374	2,066	-346	2,102	1,970	-133	1,980	-122
Feb,2007	3,270	3,602	332	3,551	281	2,429	2,554	124	2,597	167	2,049	2,088	39	2,109	60
Mar,2007	3,407	3,163	-244	3,134	-273	2,622	2,628	6	2,670	48	2,082	2,056	-26	2,082	0
Apr,2007	3,423	3,235	-187	3,223	-199	2,735	2,652	-83	2,693	-41	2,102	2,060	-42	2,085	-18
May,2007	3,637	3,959	322	3,840	203	3,008	3,215	207	3,264	257	2,204	2,258	54	2,281	77
Jun,2007	3,562	4,619	1,057	4,469	907	2,975	3,593	618	3,647	672	2,170	2,379	209	2,401	231
Jul,2007	3,636	4,255	619	4,108	472	3,017	3,444	427	3,495	478	2,240	2,338	98	2,357	117

Aug,2007	4,244	5,702	1,458	5,480	1,235	3,318	4,087	769	4,152	834	2,383	2,538	155	2,568	186
Sep,2007	4,383	5,080	697	4,985	602	3,342	3,704	363	3,764	422	2,349	2,417	68	2,448	100
Oct,2007	4,332	4,594	261	4,605	273	3,091	3,003	-87	2,960	-131	2,228	2,246	18	2,220	-9
Nov,2007	4,114	3,827	-288	3,926	-189	2,994	2,732	-263	2,778	-217	2,291	2,143	-148	2,169	-122
Dec,2007	3,759	3,607	-153	3,695	-64	2,780	2,512	-269	2,554	-226	2,299	2,112	-187	2,131	-168
Jan,2008	3,301	3,357	56	3,413	111	2,492	2,356	-137	2,395	-97	2,162	2,085	-77	2,101	-62
Feb,2008	3,283	3,801	519	3,771	488	2,566	2,747	181	2,796	230	2,078	2,160	82	2,190	111
Mar,2008	3,562	3,413	-149	3,392	-170	2,655	2,695	40	2,741	85	2,060	2,123	63	2,152	92
Apr,2008	3,822	3,919	97	3,876	54	2,791	2,757	-34	2,723	-68	2,105	2,157	52	2,140	35
May,2008	4,965	4,938	-26	4,741	-223	3,284	3,390	105	3,351	66	2,321	2,383	62	2,360	38
Jun,2008	6,731	6,146	-585	5,976	-755	3,912	3,916	4	3,866	-46	2,586	2,567	-20	2,544	-42
Jul,2008	7,079	6,549	-530	6,613	-466	4,230	3,793	-438	3,732	-498	2,636	2,533	-103	2,508	-129
Aug,2008	6,334	6,169	-164	6,293	-41	4,372	3,636	-736	3,566	-805	2,638	2,481	-156	2,449	-189
Sep,2008	6,154	6,287	133	6,344	190	3,903	3,657	-246	3,608	-296	2,628	2,454	-175	2,432	-196
Oct,2008	5,136	4,872	-264	5,137	1	3,421	2,850	-571	2,802	-620	2,405	2,267	-138	2,247	-157
Nov,2008	4,428	4,072	-356	4,278	-150	3,242	2,765	-477	2,821	-421	2,326	2,218	-108	2,247	-79
Dec,2008	4,168	3,811	-357	3,947	-221	2,986	2,507	-479	2,560	-426	2,390	2,189	-201	2,212	-178
Jan,2009	3,630	3,792	161	3,895	265	2,590	2,524	-66	2,578	-12	2,156	2,193	37	2,219	63
Feb,2009	3,541	3,802	261	3,825	284	2,500	2,750	249	2,809	309	2,037	2,223	185	2,258	221
Mar,2009	3,829	3,414	-415	3,438	-391	2,643	2,670	27	2,728	85	2,123	2,186	64	2,217	94
Apr,2009	4,044	3,747	-297	3,767	-277	2,733	2,662	-71	2,638	-95	2,165	2,187	22	2,167	1
May,2009	4,927	4,993	67	4,844	-83	3,155	3,346	190	3,323	168	2,436	2,437	1	2,417	-19
Jun,2009	6,587	5,943	-644	5,782	-805	3,775	3,824	49	3,790	15	2,629	2,621	-8	2,594	-35
Jul,2009	7,300	6,779	-521	6,780	-520	4,104	4,003	-100	3,965	-138	2,680	2,701	21	2,683	3
Aug,2009	6,626	6,944	318	7,053	427	3,841	4,015	175	3,986	146	2,558	2,694	136	2,679	121
Sep,2009	4,595	5,074	479	5,276	681	3,022	3,174	152	3,157	135	2,299	2,378	79	2,360	61
Oct,2009	3,325	3,547	222	3,632	307	2,444	2,570	126	2,561	117	2,104	2,185	81	2,170	66
Nov,2009	3,167	3,408	241	3,415	249	2,217	2,624	407	2,692	475	2,119	2,218	100	2,257	138
Dec,2009	3,201	2,727	-474	2,756	-445	2,072	2,109	36	2,164	92	2,125	2,120	-5	2,140	15
Jan,2010	2,854	3,119	265	3,140	286	1,853	2,252	399	2,312	459	1,933	2,162	229	2,195	262
Feb,2010	2,766	2,930	164	2,913	147	1,891	2,175	284	2,234	343	1,905	2,146	241	2,175	270
Mar,2010	3,100	3,111	11	3,062	-38	2,094	2,529	435	2,596	502	1,953	2,188	235	2,228	276
Apr,2010	3,716	3,674	-41	3,556	-160	2,323	2,754	431	2,756	433	2,188	2,224	35	2,220	31
May,2010	4,520	4,802	282	4,637	117	2,824	3,327	502	3,323	498	2,544	2,440	-105	2,432	-112
Jun,2010	4,874	5,468	594	5,317	443	3,160	3,657	497	3,653	493	2,568	2,574	6	2,571	3
Jul,2010	5,101	5,413	312	5,324	223	3,301	3,617	316	3,602	301	2,459	2,555	97	2,548	89
Aug,2010	5,768	6,714	946	6,563	795	3,549	4,162	612	4,152	603	2,544	2,741	197	2,744	200
Sep,2010	4,811	5,072	261	5,114	303	3,323	3,328	6	3,325	3	2,464	2,459	-5	2,460	-4
Oct,2010	4,210	4,949	739	4,991	782	3,029	3,094	65	3,092	63	2,269	2,384	115	2,393	124
Nov,2010	4,110	3,923	-187	4,044	-66	2,918	2,769	-149	2,851	-67	2,270	2,272	2	2,328	58
Dec,2010	3,733	3,566	-168	3,696	-37	2,537	2,457	-80	2,533	-4	2,245	2,221	-24	2,276	30
Jan,2011	3,186	3,357	171	3,451	265	2,080	2,317	237	2,389	309	2,072	2,199	127	2,249	177
Feb,2011	3,219	3,246	27	3,266	47	2,149	2,442	293	2,516	367	2,087	2,208	122	2,255	168
Mar,2011	4,230	4,039	-191	4,019	-211	2,636	2,992	356	3,081	445	2,189	2,316	127	2,378	189
Apr,2011	5,398	5,273	-126	5,171	-227	3,106	3,412	307	3,413	307	2,387	2,496	110	2,505	118
May,2011	6,045	6,045	0	6,045	0	3,658	3,658	0	3,658	0	2,599	2,599	0	2,599	0
Jun,2011	6,740	6,512	-228	6,456	-284	4,024	3,995	-29	3,987	-37	2,716	2,741	26	2,749	34
Jul,2011	7,420	7,406	-14	7,417	-3	4,249	4,305	56	4,285	36	2,773	2,836	63	2,837	64
Aug,2011	7,854	8,113	259	8,165	312	4,433	4,555	122	4,534	101	2,896	2,918	22	2,920	24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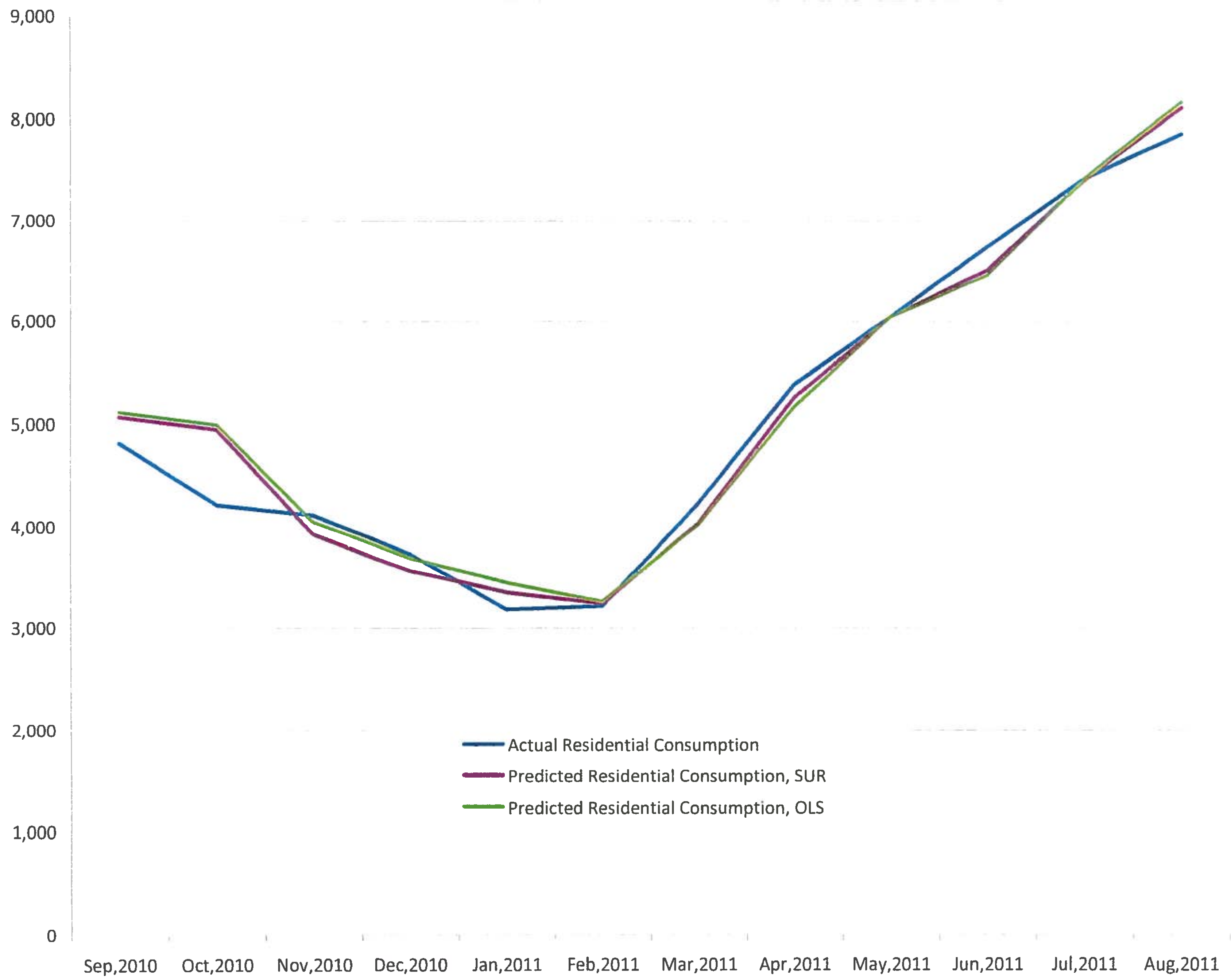
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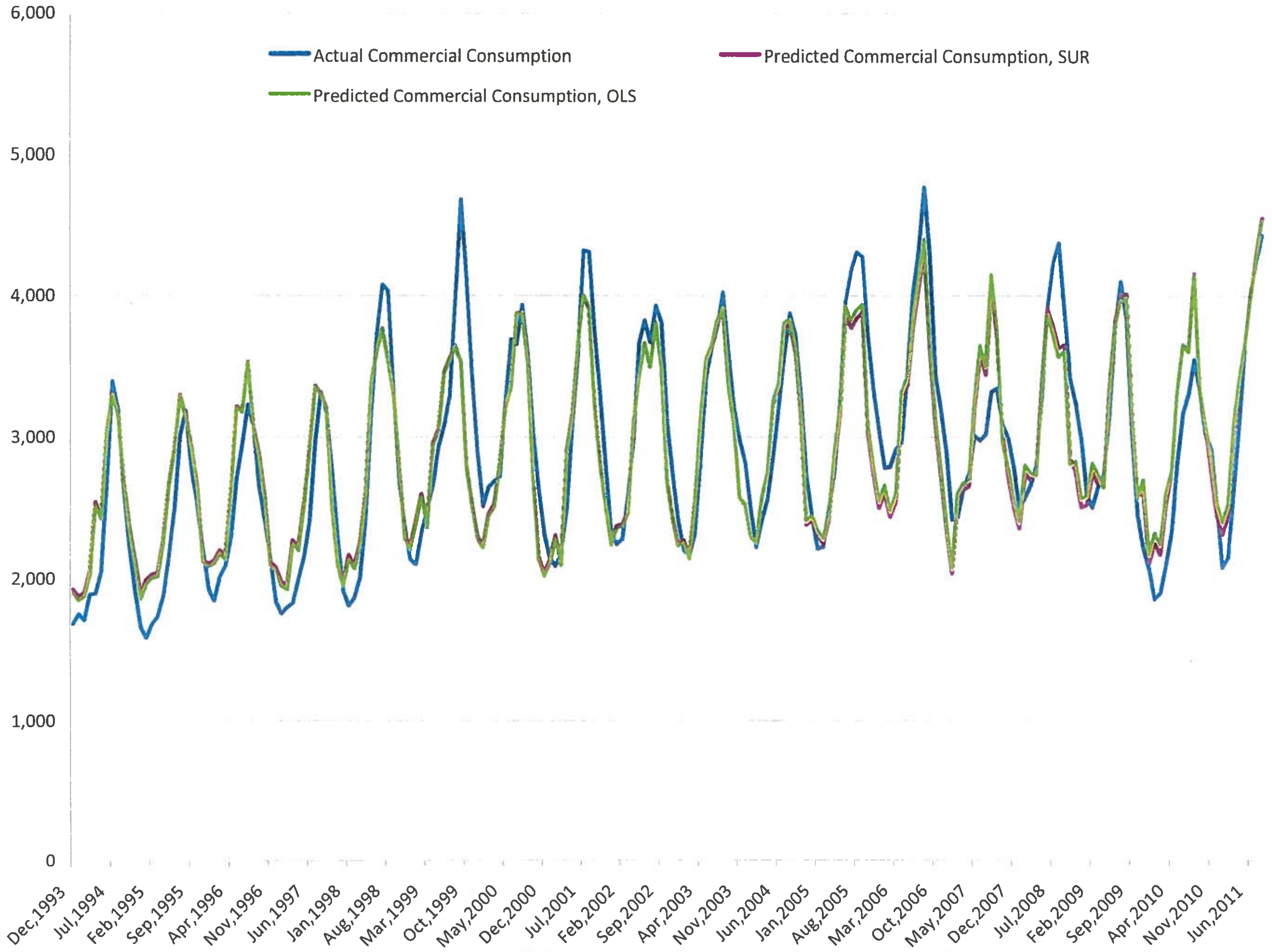
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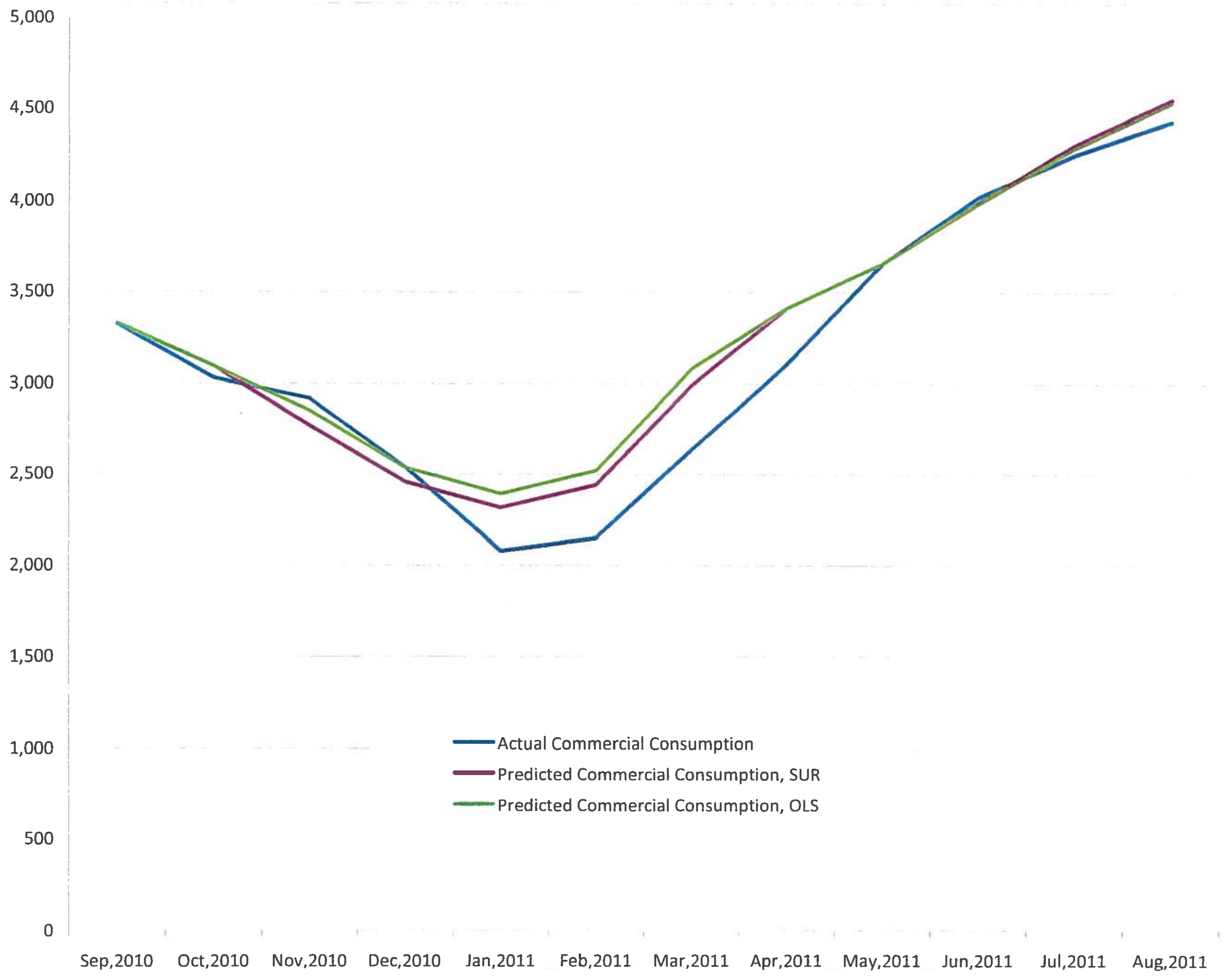
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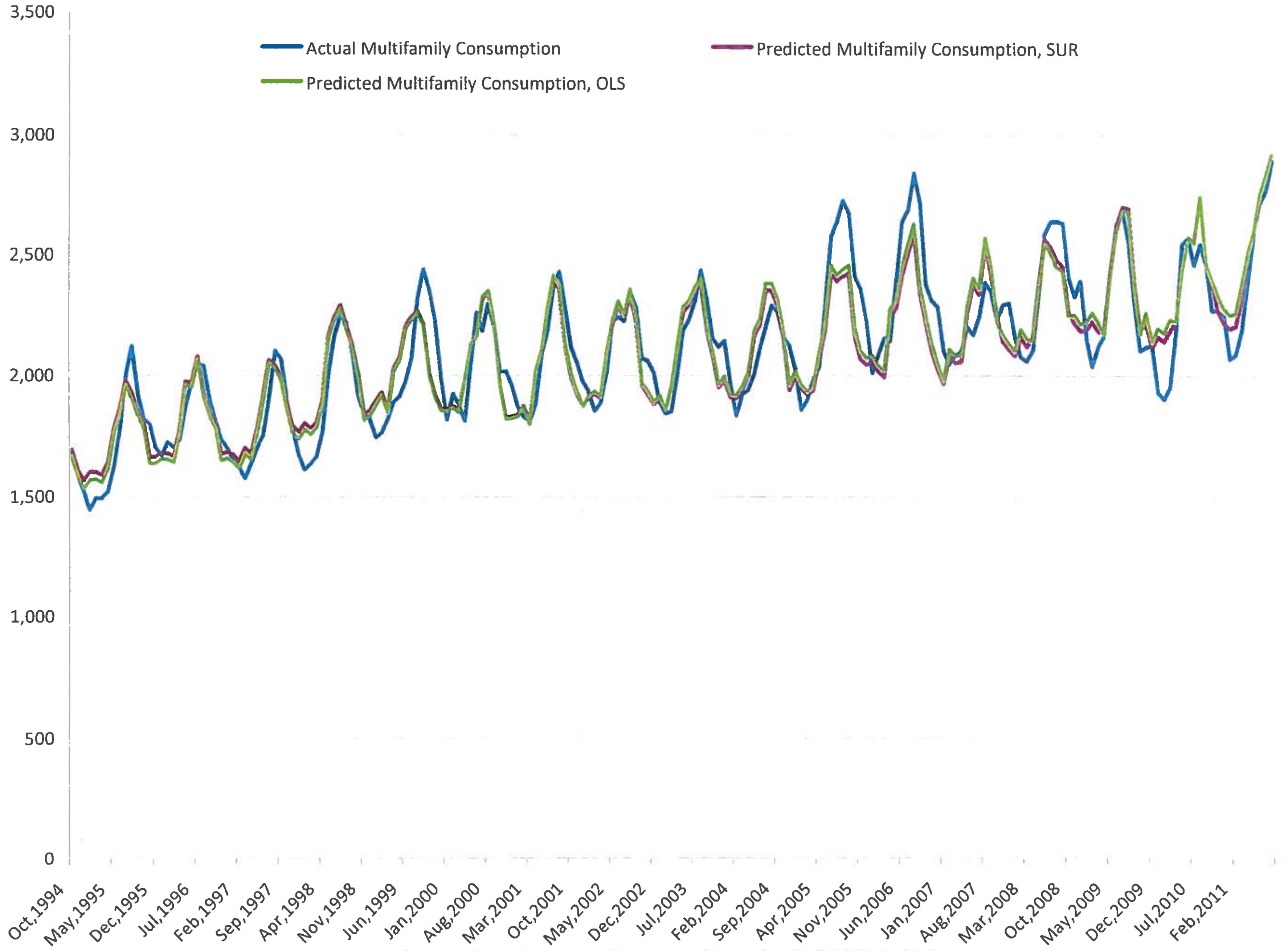
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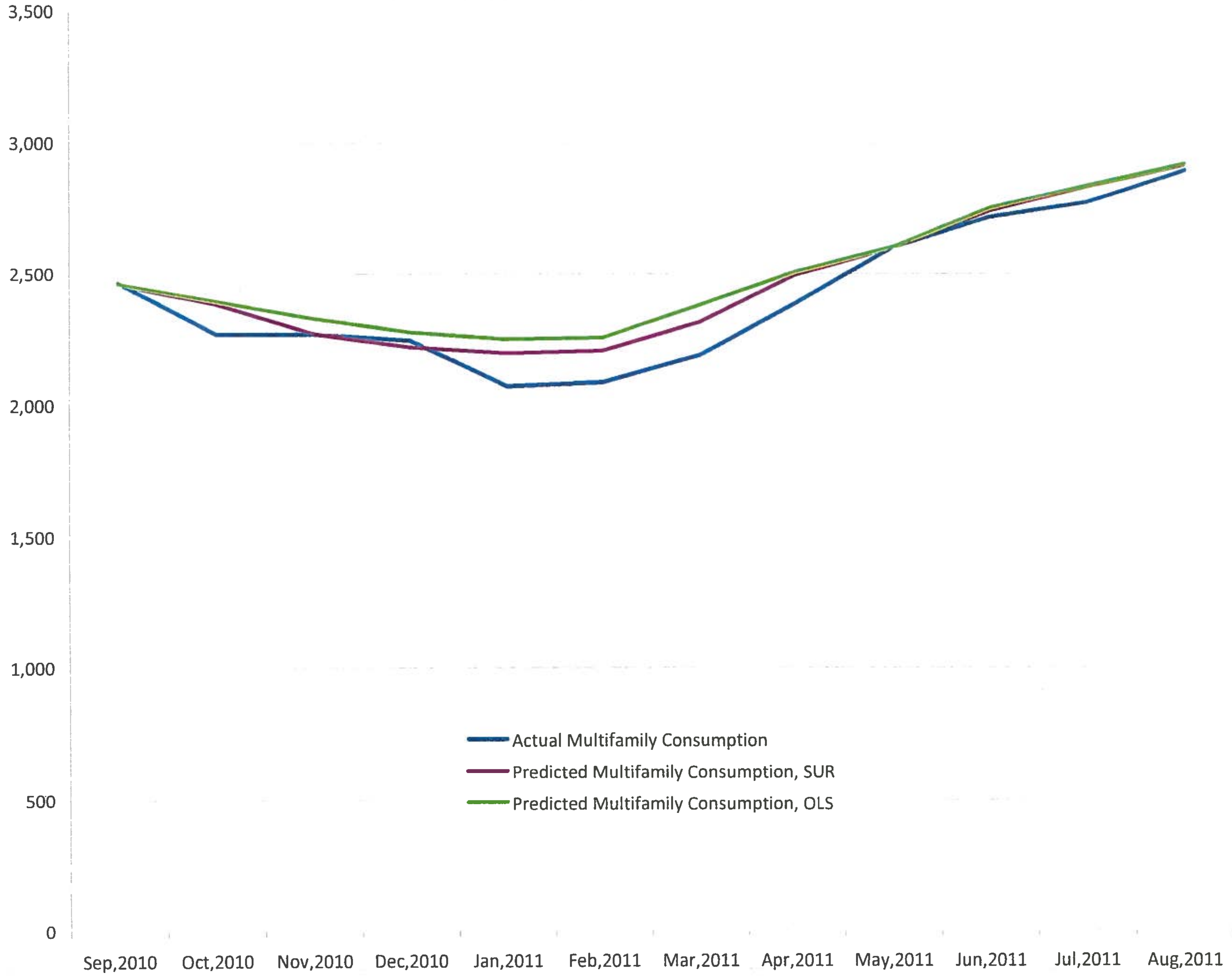
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Actual Multifamily Consumption
Predicted Multifamily Consumption, SUR
Predicted Multifamily Consumption, OLS

Item 2

Table 3 - Residential Conservation Savings (acre-ft)

Date	Actual Residential Demand	Residential Demand, No Conservation	Residential Savings	Forecast Error
Sep-10	4811.1	5610.72	799.62	361.2
Oct-10	4209.8	5472.56	1262.75	810.74
Nov-10	4109.92	4328.62	218.7	-124.13
Dec-10	3733.49	3974.26	240.77	-84.49
Jan-11	3186	3767.39	581.38	206.56
Feb-11	3219.22	3659	439.78	-34.27
Mar-11	4230.38	4454.52	224.14	-317.13
Apr-11	5398.11	5843.25	445.14	-212.28
May-11	6044.57	6635.9	591.34	0
Jun-11	6740.25	7125.53	385.28	-232.47
Jul-11	7420.42	8040.88	620.46	59.27
Aug-11	7853.78	8762.34	908.56	383.68
TOTAL	**Billed-Level**		**6,718**	
TOTAL	**Diversion-Level**		**7,531**	

Table 4 - Commercial Conservation Savings (acre-ft)

Date	Actual Commercial Demand	Commercial Demand, No Conservation	Commercial Savings	Forecast Error
Sep-10	3322.51	3960.38	637.87	53.06
Oct-10	3029.26	3697.02	667.75	279.25
Nov-10	2917.7	3065.81	148.11	13.87
Dec-10	2536.64	2756.11	219.48	85.12
Jan-11	2079.66	2615.98	536.33	235.53
Feb-11	2149.19	2741.64	592.44	19.68
Mar-11	2636.05	3291.67	655.62	-26.41
Apr-11	3105.5	4026.23	920.74	-13.63
May-11	3658.27	4328.21	669.94	0
Jun-11	4024.01	4702.29	678.28	-181.49
Jul-11	4248.57	5034.94	786.36	152.19
Aug-11	4432.79	5303.54	870.75	255.72
TOTAL	**Billed-Level**		**7,384**	
TOTAL	**Diversion-Level**		**8,277**	

Table 5 - MF Conservation Savings (acre-ft)

Date	Actual MF Demand	MF Demand, No Conservation	MF Savings	Forecast Error
Sep-10	2463.57	2678.24	214.667	43.13
Oct-10	2269.35	2597.01	327.66	195.97
Nov-10	2269.51	2403.33	133.819	-5.99
Dec-10	2245.03	2353.15	108.118	-30.10
Jan-11	2071.57	2330.71	259.132	110.53
Feb-11	2086.53	2340.72	254.195	12.02
Mar-11	2188.98	2448.89	259.91	4.03
Apr-11	2386.8	2714.7	327.902	-40.17
May-11	2599.28	2825.53	226.249	0
Jun-11	2715.64	2972	256.356	-15.15
Jul-11	2772.63	3068.52	295.892	78.79
Aug-11	2896.13	3155.74	259.608	38.92
TOTAL	**Billed-Level**		**2,924**	
TOTAL	**Diversion-Level**		**3,277**	

Item 3

Table 6 - Model Confidence Intervals and Mean Forecast Error

	Lower 95%	Reference Year Savings	Upper 95%	MFE (1993-2011)	MFE (2001-2011)	MFE (Reference Year)
Residential	-2,102	6,718	15,538	284	279	198
Commercial	-194	7,384	14,962	252	242	142
Multifamily	54	2,924	5,793	96	99	26

Item 4

Appendix – Extrapolation for Wholesale Customer Savings

Wholesale savings were extrapolated from residential savings based on their participation in the rebate process relative to retail rebate-eligible customers' participation. Relative participation was defined by the ratio of water consumed to rebates paid. This assumes that savings is proportional to rebates and water use. For example, if wholesale users consumed 10% of water and got 10% of rebates we would expect their savings rate to be equal to the savings rate of the inside-city customers. If they consumed 10% of water but got only 1% of rebates, we could conclude that they should be saving at one tenth the rate of inside-city customers. This can be computed according to the formula below:

$$Wholesale\ savings\ rate\ X\frac{WS\ rebates}{WS\ demand} = Retail\ savings\ rate\ X\ \frac{Rtl\ rebates}{Rtl\ demand}$$

This can be rearranged to:

$$Wholesale\ savings\ rate = Retail\ savings\ rate\ X\frac{\left(\frac{Rtl\ rebates}{Rtl\ demand}\right)}{\left(\frac{WS\ rebates}{WS\ demand}\right)}$$

Wholesale customers used 10,506 acre-feet of water and got $312,422.71 of rebates, so the ratio of their rebates to water use is 29.74. Retail Customers used 128,062 acre-feet of water and received $8,030,827.03 of rebates, so the ratio of their rebates to water use is 62.71. The ratio of these two, 29.74/62.71, is 0.474. This means that wholesale customers had a rate of participation that was just under half as much as retail customers, and so can be expected to save at about half the rate that retail customers do. Since residential retail savings were 11%, wholesale savings are estimated at 47% of this, or about 5.1%. The residential savings rate, rather than the higher commercial one, is used because we assume wholesale customers more closely resemble the residential sector.

	Retail, rebate-eligible	Wholesale
Water Demand, ac-ft	128,062 (92.42%)	10,506 (7.58%)
Rebates Paid	$8,030,827.03 (96.3%)	$312,422.71 (3.7%)

Item 5

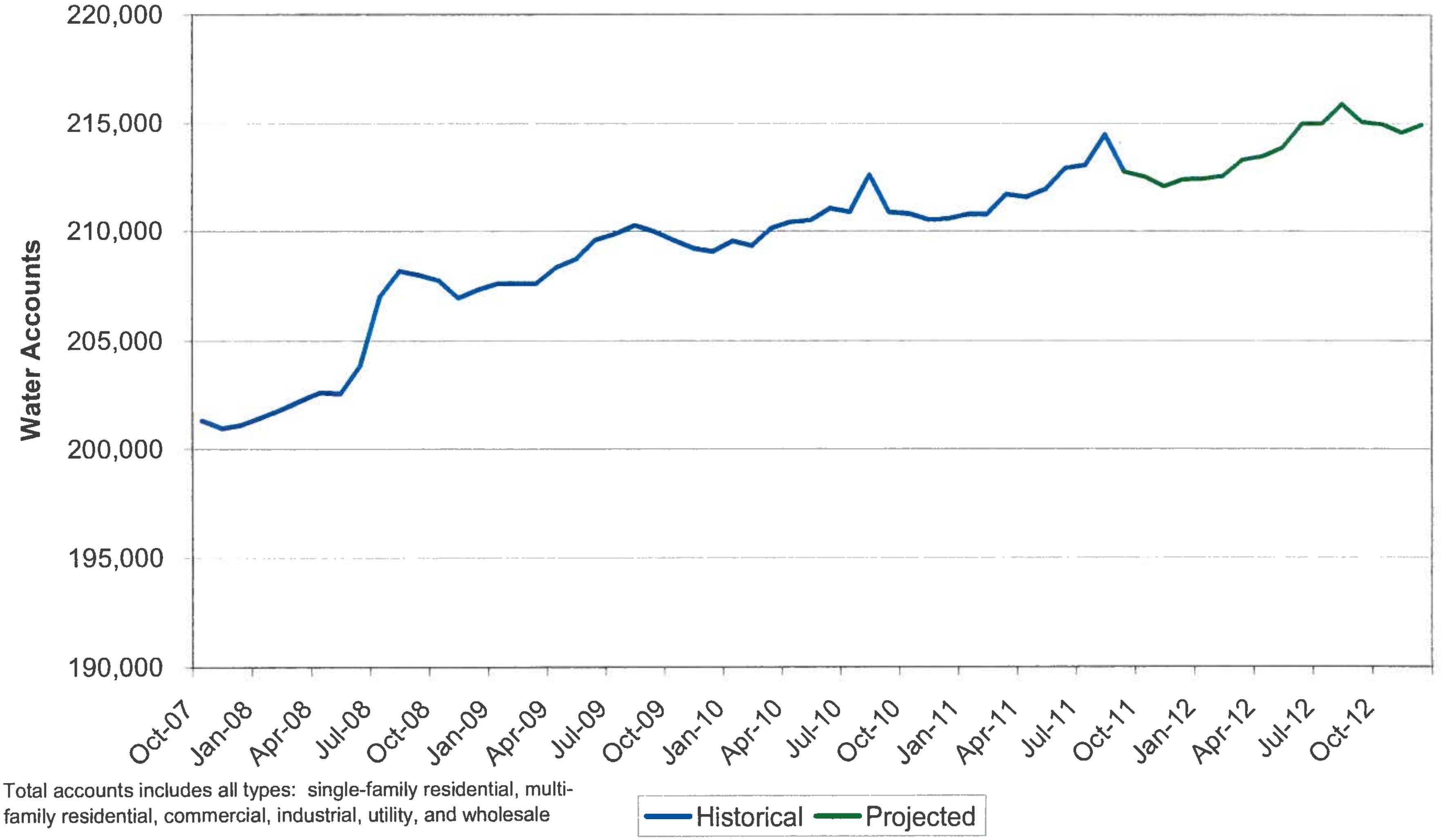
From Executive Summary

Table 1 – Austin Water Utility Annual Allotment, ac-ft per year
January through December, 2012

Reference Year Diversions	**Conservation Efforts**	**Growth in Customer Demand**	**Reclaimed Water**	**Loss Reduction**	**Preliminary "Baseline Demand"**	**Supply Factor for Pro Rata**	**Annual Allotment: 1/12-12/12**
	Econometric Models	*Econometric Models*	*Meter data & Eng. Calcs.*	*Meter data & Eng. Calcs.*			
165,520	22,972	3,541	4,989	3,081	200,103	.80	160,082

Item 6

Total Water Accounts
by Month



Total accounts includes all types: single-family residential, multi-family residential, commercial, industrial, utility, and wholesale

City of Austin: Summary of Water Accounts

3/28/2012

HISTORICAL

	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
Residential	180,106	179,830	179,994	180,375	180,646	180,956	181,356	181,329	182,360	185,609	186,664	186,353
Multi-Family	5,646	5,607	5,602	5,598	5,619	5,635	5,633	5,629	5,720	5,706	5,761	5,766
Commercial	15,405	15,365	15,357	15,340	15,419	15,498	15,477	15,449	15,604	15,571	15,631	15,740
Industrial	27	27	27	27	27	27	27	29	27	27	26	28
Golf Courses	39	39	39	39	39	39	39	39	39	39	37	41
Utility	23	21	21	24	24	23	23	25	25	25	23	24
Wholesale	48	48	48	48	48	48	48	48	50	48	45	45
Total	201,294	200,937	201,088	201,451	201,822	202,226	202,603	202,548	203,825	207,025	208,187	207,997

	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
Residential	186,120	185,424	185,830	185,997	186,022	186,078	186,712	187,115	187,939	188,239	188,552	188,255
Multi-Family	5,789	5,793	5,759	5,804	5,797	5,787	5,807	5,820	5,841	5,825	5,859	5,829
Commercial	15,718	15,624	15,619	15,681	15,673	15,646	15,703	15,663	15,686	15,682	15,735	15,777
Industrial	27	27	26	29	28	30	27	27	29	27	27	27
Golf Courses	39	39	39	39	41	37	37	37	37	37	37	36
Utility	24	22	24	21	25	23	25	24	22	23	22	20
Wholesale	46	48	47	47	50	47	49	50	48	48	48	50
Total	207,763	206,977	207,344	207,618	207,636	207,648	208,360	208,736	209,602	209,881	210,280	209,994

	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
Residential	187,844	187,562	187,377	187,815	187,672	188,441	188,699	188,834	189,319	189,147	190,694	189,038
Multi-Family	5,833	5,813	5,839	5,845	5,832	5,853	5,866	5,853	5,858	5,833	5,912	5,879
Commercial	15,768	15,713	15,733	15,759	15,706	15,738	15,795	15,759	15,799	15,840	15,905	15,889
Industrial	28	28	28	28	28	27	28	28	27	27	27	27
Golf Courses	39	39	37	36	35	25	-	-	-	-	-	-
Utility	24	21	23	26	21	26	21	22	19	22	21	20
Wholesale	48	46	48	50	48	49	48	48	47	49	48	48
Total	209,584	209,222	209,085	209,559	209,342	210,159	210,457	210,544	211,069	210,918	212,607	210,901

	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
Residential	188,899	188,716	188,736	188,882	188,923	189,708	189,577	189,934	190,894	190,964	192,282	190,633
Multi-Family	5,875	5,868	5,867	5,888	5,892	5,922	5,909	5,924	5,912	5,923	5,956	5,927
Commercial	15,971	15,896	15,903	15,954	15,928	15,989	16,006	16,005	16,042	16,082	16,143	16,113
Industrial	27	19	19	18	19	19	19	19	19	19	19	19
Golf Courses	-	-	-	-	-	-	-	-	-	-	-	-
Utility	21	22	21	12	13	15	23	15	15	26	22	14
Wholesale	48	47	48	48	48	51	48	48	50	48	48	48
Total	210,841	210,568	210,594	210,802	210,823	211,704	211,582	211,945	212,932	213,062	214,470	212,754

PROJECTED

	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
Residential	190,442	190,080	190,366	190,386	190,500	191,224	191,339	191,741	192,796	192,854	193,606	192,831
Multi-Family	5,939	5,917	5,934	5,937	5,940	5,956	5,961	5,967	5,983	5,972	6,006	5,980
Commercial	16,141	16,076	16,096	16,116	16,110	16,135	16,173	16,162	16,218	16,186	16,250	16,274
Total	212,522	212,073	212,396	212,439	212,550	213,315	213,473	213,870	214,997	215,012	215,862	215,085

	Oct-11	Nov-11	Dec-11
Residential	192,678	192,351	192,679
Multi-Family	5,993	5,972	5,990
Commercial	16,305	16,242	16,265
Total	214,976	214,565	214,934

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From Executive Summary

Reference Year Diversions	Conservation Efforts	Growth in Customer Demand	Reclaimed Water	Loss Reduction	Preliminary "Baseline Demand"	Supply Factor for Pro Rata	Annual Allotment: 1/12-12/12
	Econometric Models	*Econometric Models*	*Meter data & Eng. Calcs.*	*Meter data & Eng. Calcs.*			
165,520	18,623	3,492	4,989	3,081	195,704	.80	156,563

Annual allotment monthly distribution with reference year water conservation savings limited to the 2001 - 2011 analysis time period:

Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Total
9,081	8,924	10,959	12,995	13,621	15,656	17,692	18,788	15,343	12,525	10,803	10,177	156,563
5.8%	5.7%	7.0%	8.3%	8.7%	10.0%	11.3%	12.0%	9.8%	8.0%	6.9%	6.5%	100.0%

From Econometric Appendix

Table 1 - Residential Conservation Savings (acre-ft)

Date	Actual Residential Demand	Residential Demand, No Conservation	Residential Savings
Sep-10	4811.1	5470.52	659.41
Oct-10	4209.8	5332.46	1122.65
Nov-10	4109.92	4188.65	78.73
Dec-10	3733.49	3834.28	100.79
Jan-11	3186	3627.3	441.3
Feb-11	3219.22	3518.88	299.66
Mar-11	4230.38	4313.82	83.44
Apr-11	5398.11	5702.65	304.54
May-11	6044.57	6495.04	450.47
Jun-11	6740.25	6983.95	243.7
Jul-11	7420.42	7899.25	478.83
Aug-11	7853.78	8619.73	765.95
TOTAL	**Billed-Level**		**5,029**
TOTAL	**Diversion-Level**		**5,638**

Table 2 - Commercial Conservation Savings (acre-ft)

Date	Actual Commercial Demand	Commercial Demand, No Conservation	Commercial Savings
Sep-10	3322.51	3932.04	609.53
Oct-10	3029.26	3668.53	639.27
Nov-10	2917.7	3037.46	119.76
Dec-10	2536.64	2727.75	191.11
Jan-11	2079.66	2587.53	507.87
Feb-11	2149.19	2713.23	564.04
Mar-11	2636.05	3263.15	627.1
Apr-11	3105.5	3997.69	892.19
May-11	3658.27	4299.66	641.4
Jun-11	4024.01	4673.68	649.67
Jul-11	4248.57	5006.25	757.68
Aug-11	4432.79	5274.75	841.96
TOTAL		**Billed-Level**	**7,042**
TOTAL		**Diversion-Level**	**7,894**

Table 3 - MF Conservation Savings (acre-ft)

Date	Actual MF Demand	MF Demand, No Conservation	MF Savings
Sep-10	2463.57	2615.52	151.948
Oct-10	2269.35	2533.28	263.925
Nov-10	2269.51	2339.6	70.084
Dec-10	2245.03	2289.41	44.383
Jan-11	2071.57	2266.97	195.397
Feb-11	2086.53	2276.99	190.46
Mar-11	2188.98	2385.15	196.175
Apr-11	2386.8	2650.96	264.167
May-11	2599.28	2761.79	162.514
Jun-11	2715.64	2908.26	192.621
Jul-11	2772.63	3004.78	232.157
Aug-11	2896.13	3092	195.872
TOTAL	**Billed-Level**		**2,160**
TOTAL	**Diversion-Level**		**2,421**

Table 4 - Model Confidence Intervals and Mean Forecast Error

	Lower 95%	Reference Year Savings	Upper 95%	MFE
Residential	-3,791	5,029	13,849	284
Commercial	-536	7,042	14,620	252
Multifamily	-709	2,160	5,029	96

Conservation Savings Summary Table – Diversion Level

	Reference Year Savings
Residential	5,638
Commercial	7,894
Multifamily	2,421
Large Volume	2,223
Wholesale	446
TOTAL	18,623

Wholesale Customer Savings Calculations - Extrapolation

	Retail, rebate-eligible	Wholesale
Water Demand, ac-ft	128,062 (92.42%)	10.506 (7.58%)
Rebates and Replacement Units - see table below	73,179 (96.7%)	2,420 (3.3%)

Retail:	Rtl Units/Rtl Water Demand	73,179/128,062=0.571
Wholesale:	WS Units/WS Water Demand	2,420/10,506=0.230

WS/Rtl 0.230/0.571=0.403 or 40.3%

Residential Retail savings: ((5,029+4,417)/2)/60,957=7.7%

WS savings percentage: (40.3%)X(7.75%) = 3.1233%

WC savings: (10,506)X(3.1233%) = 328 af - billed level
WC savings: (328)X(1.12) = 368 af - diverted level

FY 2001-2011 RETAIL/WHOLESALE REBATE PARTICIPATION - SINGLE-FAMILY RESIDENTIAL

Residential Programs	FY00-01	FY01-02	FY02-03	FY03-04	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09	FY09-10	FY10-11	Total # of Units
Free Toilets - ULF	1,187	3,358	2,528	2,715	2,573	1,284	364	0	0	0	0	**12,822**
Free Toilets - HET						0	0	6,085	9,185	3,553	6,860	**25,683**
Toilet Rebates - ULF	1,282	1,526	402	1,047	826	1,078	1,805	1,817	114	0	0	**8,615**
Toilet Rebates - HET									4,035	5,222	3	**9,260**
Clotheswasher Rebates	1,769	1,897	2,248	2,220	2,375	2,612	3,264	4,292	4,396	5,034	2,840	**31,178**
Total	**4,238**	**6,781**	**5,178**	**5,982**	**5,774**	**4,974**	**5,433**	**12,194**	**17,730**	**13,809**	**9,703**	**87,558**
Total Retail Rebates and Free Toilets	Data from this period is not available to indicate whether participation was at a retail or wholesale address.			5,661	5,664	4,802	5,175	11,881	17,354	13,316	9,326	***73,179***
Total Wholesale Rebates and Free Toilets				321	110	172	258	313	376	493	377	***2,420***
Wholesale as Percentage of Total												**3.31%**

Comments:

Participation shown only for toilet and washer rebates and free toilet distributions to single-family homes. Other types of fixtures were not tracked by retail/wholesale status.

A new database was implemented in FY04 with the capability to track participation by retail or wholesale status. As a result, only data from years where this information was available were used to calculate participation percentage. The percentage of participation was used to extrapolate the percentage of wholesale savings from the cumulative impact of fixture replacement

Conservation Savings Summary Table - Diversion Level
Savings limited to 2001-2011 time-period

	Reference Year Savings (ac-ft)	
Residential*	5,290	Revised
Commercial	7,894	
Multi-Family	2,421	
Large Volume	2,223	
Wholesale**	368	Revised
Total	18,196	

*Revised based on average of residential conservation savings billed level amount of 5,029 AF (SUR model) and 4,417 (OLS model): ((5,029+4,417)

**Revised based on unit count

/2)*1.12 = 5,290 diversion-level

Table 5 – Residential Parameter Estimates

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	6909.585	314.6984	21.96	<.0001***
Precipitation Days	-108.838	13.7145	-7.94	<.0001***
Precipitation Intensity	-2520.2	611.3604	-4.12	<.0001***
Precipitation Intensity^2	1527.204	565.7368	2.7	0.0076***
Lagged Residential Consumption	0.240669	0.029322	8.21	<.0001***
Indoor Residential Conservation	-2.12143	0.667414	-3.18	0.0017***
CDD	186.7266	10.84387	17.22	<.0001***
HDD	-27.5102	12.59803	-2.18	0.0302**
Stage 1 Watering Restrictions	-0.02842	0.021354	-1.33	0.1847
May 2011 Dummy	1615.173	764.3529	2.11	0.0359**

Table 6 - Commercial Parameter Estimates

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	69367.89	2071.712	33.48	<.0001***
Precipitation Days	-409.458	143.2713	-2.86	0.0047***
Precipitation Intensity	-11864.3	6402.088	-1.85	0.0654*
Precipitation Intensity^2	7925.235	5923.783	1.34	0.1825
Indoor Commercial Conservation	-6.48394	1.728048	-3.75	0.0002***
CDD	1438.388	96.30411	14.94	<.0001***
HDD	-598.106	132.5281	-4.51	<.0001***
Stage 1 Watering Restrictions	-0.10114	0.027582	-3.67	0.0003***
May 2011 Dummy	7994.694	8010.355	1	0.3195

Table 7 - MF Parameter Estimates

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	2471.78	39.75053	62.18	<.0001***
Precipitation Days	-6.86887	2.652535	-2.59	0.0103**
Precipitation Intensity	-172.993	117.3148	-1.47	0.1419
Precipitation Intensity^2	123.2738	108.5172	1.14	0.2574
Indoor MF Conservation	-1.58566	0.437358	-3.63	0.0004***
CDD	25.37172	1.752999	14.47	<.0001***
HDD	-3.67962	2.438961	-1.51	0.133
Stage 1 Watering Restrictions	-0.03583	0.013792	-2.6	0.0101**
May 2011 Dummy	129.7193	146.9338	0.88	0.3784