

# AWU Water Loss Calculation

for: October 1, 2009 to September 30, 2010

				Assessment Values	
Line #	Field Description (from TWDB Water Audit Reporting Form)	Value	Score	Max Points	
<b>A. WATER UTILITY GENERAL INFORMATION</b>					
1	Water Utility Name:	Austin Water Utility			
2	Contact:				
		Dan Strub      AWU			
	Name	Pipeline Operations			
	Telephone #	(512) 972-0349			
	Email Address	dan.strub@ci.austin.tx.us			
3	Reporting Period:	October 1, 2009 to September 30, 2010			
4	Source Water Utilization, percentage:				
	Surface Water %	100%			
	Groundwater %	0%			
5	Population Served:				
	a. Retail Population Served	842,055			
	b. Wholesale Population Served	44,713			
				System Data Points	
6	Utility's Length of Main Lines, miles	3,639	5		5
7	Number of Wholesale Connections Served	47			
8	Number of Retail Service Connections Served	210,846			
9	Service Connection Density (Number of retail service connections/Miles of main lines)	57.94	conn/ mile		
10	Average Yearly System Operating Pressure (psi)	77.3	psi	5	5
11	Volume Units of Measure (check one): acre-ft   million gallons   thousand gallons   gallons	Gallons			
<b>B. SYSTEM INPUT VOLUME</b>					
				Water Supplied Points	
12	Water Volume from own Sources	43,786,936,000.0	gals	4.5	5
13	Production Meter Accuracy (%)	98.00%	pct.	4.5	5
14	Corrected Input Volume	44,680,546,938.8	gals		
15	Wholesale Water Imported	0.0	gals	5	5
16	Wholesale Water Exported	0.0	gals	5	5
17	System Input Volume	44,680,546,938.8	gals	100.00%	
<b>C. AUTHORIZED CONSUMPTION</b>					
				Authorized Consumption Points	

18	Billed Metered	39,367,872,000.0	gals	88.11%	3.5	5
19	Billed Unmetered	311,433,912.1	gals	0.70%	3	5
20	Unbilled Metered (amount used at AWU buildings/facilities)	90,416,900.0	gals	0.20%	2	5
21	Unbilled Unmetered (amount used by other city Departments) **	191,471,429.0	gals	0.43%	3	5
22	<b>Total Authorized Consumption</b>	<b>39,961,194,241.1</b>	gals	<b>89.44%</b>		

**NOTES:**

\*\* Most of the water used by other City Departments is included in line 18.

**D. WATER LOSSES**

23	<b>Water Losses</b> (Line 17 minus Line 22)	<b>4,719,352,697.6</b>	gals	<b>10.56%</b>		
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**E. APPARENT LOSSES**

24	Average Customer Meter Accuracy %	97.87%	pct.		3	5
25	Customer Meter Accuracy Loss	857,613,420.9	gals	1.92%		
26	Systematic Data Handling Discrepancy	24,885,166.2	gals	0.06%	4	5
27	Unauthorized Consumption	125,479,610.3	gals	0.28%	2	5
28	<b>Total Apparent Losses</b>	<b>1,007,978,197.5</b>	gals	<b>2.26%</b>		

**F. REAL LOSSES**

29	Reported Breaks and Leaks (Estimated volume of leaks and breaks repaired during the audit period)	52,394,294.0	gals	0.12%	5	5
30	Unreported Loss (Includes all unknown water loss) (Calculated as Water Losses - Total Apparent Losses - Reported Breaks & Leaks)	3,658,980,206.1	gals	8.19%	2.5	5
31	<b>Total Real Losses</b> (Line 29, plus Line 30)	3,711,374,500.1	gals	8.31%		
32	<b>Water Losses (Apparent + Real)</b> (Line 28 plus Line 31) should = Line 23	4,719,352,697.6	gals	10.56%		
33	<b>Non-revenue Water (Water Losses + Unbilled Authorized Consumption)</b> (Line 32, plus Line 20, plus Line 21)	5,001,241,026.6	gals	11.19%		

**G. TECHNICAL PERFORMANCE INDICATOR FOR APPARENT LOSS**

34	Apparent Losses Normalized (Apparent Loss Volume/# of Retail Service Connections/365)	13.098	gals/conn/day			
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**H. TECHNICAL PERFORMANCE INDICATORS FOR REAL LOSS**

35	Real Loss Volume (Line 31) (shown as total gallons/year)	3,711,374,500.1	gals	8.31%		
36	<b>Unavoidable Annual Real Losses, volume (calculated) in MGD</b>	3,967,108.7	MGD	3.24%		
37	<b>Infrastructure Leakage Index (calculated)</b> (Equals real loss volume (div by 365) divided by unavoidable annual real	2.563				
38	Real Losses Normalized (Real Loss Volume/# of Service Connections/365) (This indicator applies if service connection density is greater than 32/mile)	48.215	gals/conn/day			Austin's Serv Conn Density > 32/mile so this calc is used
39	Real Losses Normalized (Real Loss Volume/Miles of Main Lines/365) (This indicator applies if service connection density is less than 32/mile)	10,168,149.315	gals/mile/day			This one not used

**I. FINANCIAL PERFORMANCE INDICATORS**

40	Total Apparent Losses (Line 28)	1,007,978,197.5	gals			
41	Retail Price of Water	\$3.91	Per 1,000 Gals		5	5

42	<b>Cost of Apparent Losses</b>				
43	(Apparent loss volume multiplied by retail cost of water - Line 40/1000 x Total Real Losses (Line 31)	\$3,941,194.75	3,711,374,500.1 gals		
44	Variable Production Cost of Water* (*Note: In case of water shortage, real losses might be valued at the retail price of water instead of the variable production cost.)	\$0.34 Per 1,000 Gals		4	5
45	(Real loss multiplied by variable production cost of water - Line 43/1000 x Line 44)	\$1,265,578.70			
46	<b>Total Assessment Score</b>			66.0	85.0
47	<b>Total Cost Impact of Apparent and Real Losses</b>	\$5,206,773.46			

**LEGEND:**

- = calculated item
- = reliability assessment required
- = Update Needed

77.65%  
Percentage of points available

**ASSESSMENT VALUE SCORING:**

Data considered Preliminary; Do not benchmark to other Utilities or use for planning

< 40

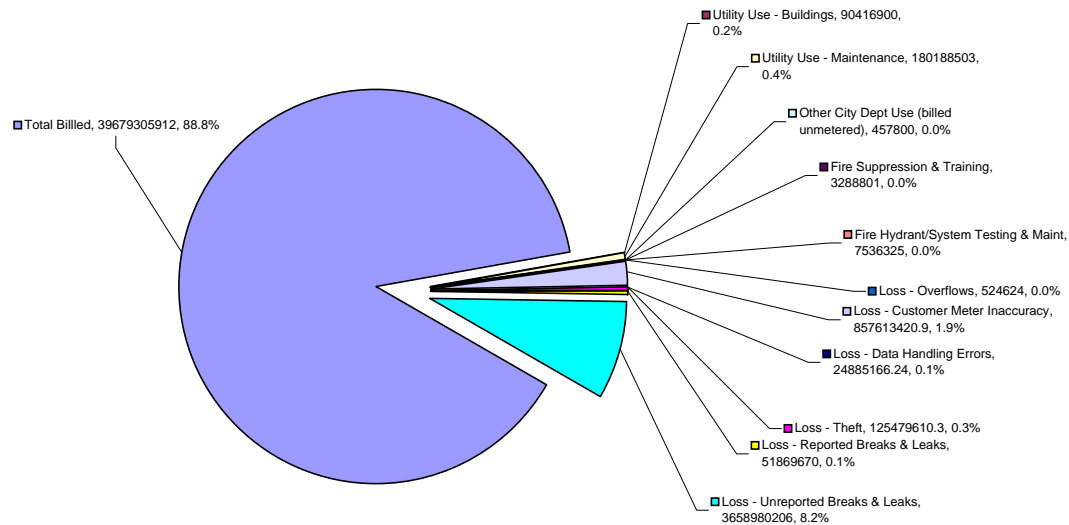
Progressively greater validity of data; use for planning & developing targeted loss control efforts; sufficient validity to compare to similarly assessed data from other utilities.

40 to 70

Mature programs of "auditing" & loss control; data is reliable in guiding and tracking advanced programs in apparent and real loss control; performance tracking and benchmarking to other utilities can be carried out in a reliable manner.

70 to 85

## AWU Water Use/Loss Breakdown



AWU  
for:

CALCULATED VALUES	TWDB Report Line Number	TWDB Water Loss Calculation Component Name	AWU Line Item Description	DATA INPUT COLUMN (if cell is highlighted in yellow, orange indicates prior year data)	Units	Primary Source Identified
Austin Water Utility	1	Water Utility Name	Same	Austin Water Utility	N/A	Dan Strub, Pipeline Operations
Dan Strub AWU Pipeline Operations	2	Contact Name & Info	Same	Dan Strub      AWU Pipeline Operations	N/A	Dan Strub, Pipeline Operations
October 1, 2009 to September 30, 2010	3	Reporting Period	Same	October 1, 2009 to September 30, 2010	N/A	Dan Strub, Pipeline Operations
100.00%	4	Source Water Utilization	Same	100% Surface Water	Percent	Dan Strub, Pipeline Operations
842,055	5a	Retail Population Served	Same	842,055	POP	Randy Alexis, Systems Planning
44,713	5b	Wholesale Population Served	Same	44,713	POP	Randy Alexis, Systems Planning
3,639	6	Utility's Length of Main Lines, miles		Column A summarizes the following 2 lines.		
			Transmission (16" or greater diameter)	626	Miles	Systems Planning
			Distribution (less than 16" diameter)	3013	Miles	Systems Planning
47	7	Number of Wholesale Connections Served	Same	47	Conn.	Denise McDonald, Finance
210,846	8	Number of Retail Connections Served	Same	210,846	Conn.	Denise McDonald, Finance
57.94064303	9	Service Connection Density		Calculated (Line 8 div by Line 6)		
77	10	Average Yearly System Operating Pressure	Same	77.3	PSI	Pumping and Distribution (Rick Coronado)
Gallons	11	Volume Units of Measure	Same	Gallons	N/A	
43,786,936,000.0	12	Water Volume from own Sources	Annual Usage from Distribution System	43,786,936,000.0	Gals	AWU Intranet

0.9800	13	Production Meter Accuracy (enter percentage)	Calculated Production Meter Accuracy	0.9800	Percent	Pumping and Distribution (Rick Coronado)
44,680,546,938.8	14	Corrected Input Volume		Calculated (Line 12 div by Line 13)		
0	15	Wholesale Water Imported	Same	0	N/A	N/A
0	16	Wholesale Water Exported	Same	0	N/A	Financial Management (Darryl Culberson)
44,680,546,938.8	17	System Input Volume		Calculated (Line 14 + Line 15 - Line 16)		
39,367,872,000.0	18	Billed Metered		Column A summarizes the following 6 lines.		
		Billed Consumption - Wholesale		2,758,885,800.0	Gals	Financial Management (Darryl Culberson)
		Billed Consumption - Large Volume		2,541,883,300.0	Gals	*
		Billed Consumption - Commercial		10,020,053,500.0	Gals	*
		Billed Consumption - Multifamily		8,727,334,700.0	Gals	*
		Billed Consumption - Residential		15,290,504,600.0	Gals	*
		Billed Consumption - Other		29,210,100.0	Gals	*
311,433,912.1	19	Billed Unmetered		Column A summarizes the following 2 lines.		
		Billing Adjustments		308,822,184.1	Gals	
		SWS - Unmetered		2,104,528.0	Gals	Solid Waste Services (Melissa Prescott)
		WPDR - Unmetered		507,200.0	Gals	WPDRD Field Operations (Pete Reyes)
90,416,900.0	20	Unbilled Metered		Column A summarizes the following 2 lines.		

			Billed Consumption - Utility	90,416,900.0	Gals	Financial Management (Darryl Culberson)
191,471,429.0	21	Unbilled / Unmetered		Column A summarizes the following 11 lines		
			AWU - Pumping Maintenance	6,050,000.0	Gals	
			AWU - Distrib System Maintenance	See Below	Gals	
			Intentional - SRs	12,669,190.0		
			Intentional - WOs	149,134,492.0		
			Line Flushing	12,334,821.0		
			AWU - Private Hydrant Testing	3,475,575.0	Gals	
			AFD - Fire Suppression	2,518,341.0	Gals	Austin Fire Department (Bat Chief Don Smith)
			AFD - Fire Training	770,460.0	Gals	*
			AFD - City Hydrant Maint	3,247,500.0	Gals	*
			AFD - Hydrant Flow Testing	218,050.0	Gals	*
			AFD - Standpipe Flow Test	595,200.0		*
			PWD - Street Bridge Unmetered	457,800.0	Gals	PWD - Street and Bridge (David Magana)
39,961,194,241.1	22	Total Authorized Consumption		Calculated (Line 18 + Line 19 + Line 20 + Line 21)		
4,719,352,697.6	23	Water Losses		Calculated (Line 17 - Line 22)		
0.9787	24	Average Customer Meter Accuracy	Calculated Average Customer Meter Accuracy	Input into Column A (Cell A48) comes from Weighted Average Customer Meter Accuracy calculation spreadsheet.	Percent	
857,613,420.9	25	Customer Meter Accuracy Loss		Calculated ((Line 18 div by Line 24) - Line 18)		

24,885,166.2	26	Systematic Data Handling Discrepancy	CIS Data Handling Errors	24,885,166.2	Gals	
125,479,610.3	27	Unauthorized Consumption		Column A summarizes the following 2 lines.		
		Unauthorized Consumption was figured as the estimate of water loss due to theft (incl hydrants and at customer connections incl tampering with meters, illegal taps, etc.) PLUS actual theft thru meter tampering.	Estimated Theft	111,701,367.3	Gals	WAG Member
			Billing Adjustments for Open Meter Bypass & Direct Hookups	13,778,243.0	Gals	
1,007,978,197.5	28	Total Apparent Losses		Calculated (Line 25 + Line 26 + Line 27)		
52,394,294.0	29	Reported Breaks and Leaks		Column A summarizes the following 3 lines.		
			Water Loss from Hansen SRs	8,491,930.0	Gals	Asset Management (Donn Lorbieski)
			Water Loss from Hansen WOs	43,377,740.0	Gals	
			Reservoir System Overflows	524,624.0	Gals	
3,658,980,206.1	30	Unreported Loss		Column A "back calculates" this value by deducting Reported Breaks & Leaks (Line 29) and Total Apparent Losses (Line 28) from Water Losses (Line 23)		
3,711,374,500.1	31	Total Real Losses		Calculated (Line 29 + Line 30)		
4,719,352,697.6	32	Water Losses (Apparent + Real)		Calculated (Line 28 + Line 31) = Line 23		
5,001,241,026.6	33	Non-revenue Water (Water Losses + Unbilled Authorized Consumption)		Calculated (Line 32 + Line 20 + Line 21)		
13.09763573	34	Apparent Losses Normalized (Apparent Loss Volume / # of Retail Service Connections / 365)		Calculated (Line 28 / Line 8 / 365)		
3,711,374,500.1	35	Real Loss Volume		Same as Line 31	Gals	
3,967,108.7	36	Unavoidable Annual Real Losses (UARL)		Calculated from Table 3-2	GPD	
2.563	37	Infrastructure Leakage Index		Calculated (Line 35 / Line 36)		
48.21473124	38	Real Losses Normalized (Real Loss Volume / # of Service Connections / 365)		IF LINE 9 > 32, then Calculated (Line 35 / (Line 7 + Line 8) / 365)		
10,168,149.3	39	Real Losses Normalized (Real Loss Volume / Miles of Main Lines / 365)		THIS DOES NOT APPLY TO AUSTIN IF LINE 9 < 32, then Calculated (Line 35 / Line 6 / 365)		
1,007,978,197.5	40	Total Apparent Losses		Same as Line 28		

\$3.91	41	Retail Price of Water	Calculated Average Retail Price	\$3.91	Per 1000 Gals	???
\$3,941,194.75	42	Cost of Apparent Losses		Calculated (Line 28 x Line 41)		
3,711,374,500.1	43	Total Real Losses		Same as Line 31		
\$0.34	44	Variable Production Cost of Water	Calculated Production Costs	\$0.34	Per 1000 Gals	
\$1,265,578.70	45	Cost of Real Losses		Calculated (Line 43 x Line 44)		
66	46	Total Assessment Score		Calculated (Adds Assessment Scale Scores at right)		
\$5,206,773.46	47	Total Cost Impact of Apparent and Real Losses		Calculated (Line 42 + Line 45)		

TOTALS BELOW COME FROM THE CALCULATION ABOVE AND FEED THE GRAPH SHOWN AT THE BOTTOM OF THE REPORT FORMAT (on last spreadsheet)

44,680,546,938.8	Total Pumpage	
Broken down as follows		
39,679,305,912.1	88.81% Total Billed	
90,416,900.0	0.20% Utility Use - Buildings	
180,188,503.0	0.40% Utility Use - Maintenance	
457,800.0	0.00% Other City Dept Use (billed unmetered)	Authorized Usage
3,288,801.0	0.01% Fire Suppression & Training	39,961,194,241.1
7,536,325.0	0.02% Fire Hydrant/System Testing & Maint	
524,624.0	0.00% Loss - Overflows	
857,613,420.9	1.92% Loss - Customer Meter Inaccuracy	
24,885,166.2	0.06% Loss - Data Handling Errors	4,719,352,697.6 Water Loss
125,479,610.3	0.28% Loss - Theft	
51,869,670.0	0.12% Loss - Reported Breaks & Leaks	
3,658,980,206.1	8.19% Loss - Unreported Breaks & Leaks	
44,680,546,938.8	100.00% Total	44,680,546,938.8 Total

0.0 Diff from Column A Totals



# Water Loss Calculation Status Sheet

October 1, 2009 to September 30, 2010

Source	Document(s)	Additional Information
Known	N/A	
Known	N/A	
Known	N/A	
Known	N/A	
Randy Alexis, Systems Planning	Estimated area population spreadsheet	Systems planning population projections based on census data and projected growth rates
Randy Alexis, Systems Planning	Estimated area population spreadsheet	
Tracy Busby, GIS	GIS Water Statistics Report	Use # of miles of transmission lines for September of the reported fiscal year
Tracy Busby, GIS		Use # of miles of distribution lines for September of the reported fiscal year
Denise McDonald, Finance	Water Revenue Forecast Model	Numbers of customers served kept on monthly basis, used fiscal year average
Denise McDonald, Finance	Water Revenue Forecast Model	Numbers of customers served kept on monthly basis, used fiscal year average
Tracy Busby, GIS	received 5/28/09	GIS based algorithm within the AWU hydraulic model is used to calculate avg pressure throughout the system.
Known		<b>All measurements converted to gallons by OCA</b>
Rick Coronado - AWU Pumping and Distribution	Daily/Monthly Pumpage data spreadsheets	Used "usage" number as this includes amount pumped in from lakes AND the amount used from reservoirs. If you use the "pumpage" figure, you must account for beginning and ending reservoir storage. If intake from lake is used, will need to account for water lost within the treatment process (i.e., to wash out sediment tanks, etc.) because this figure would be greater than "pumpage" figure.

Reliability Rating (Input into yellow highlighted)	Data used for Reliability Matrix judgement	Audit Year when Score Achieved	Source
5	GIS system used to track system length along with components. (Not sure about reconciliation to asset management system.)	FY07	Steve Hutton & Trasy Busby - AWU Systems Planning / GIS
5	GIS based algorithm is used to calculate avg pressure throughout the system. Preliminary "district" testing done through SCADA system.	FY07	Joe Smith and Tracy Busby- AWU Systems Planning / GIS
4.5	Fully metered; annual testing or electronic calibration - however, 17 of 27 meters are over 15 years old.	FY07	Pumping and Distribution (Rick Coronado)

Pumping and Distribution (Rick Coronado)		Need to create a regular report to calculate and track average production flow meter accuracy, and run by TWDB for "blessing". OCA used 98% in FY07 audit because meters calibrated to between 98 and 102%. Actual venturi meters are not tested, per Rick Coronado. Investigating methods to test venturi meters in place.
N/A	N/A	There is no treated water that is imported wholesale.
Financial Management (Darryl Culberson)	See #18	Wholesale Water Exported is metered and billed. See Metered Consumption Report from CIS.
Financial Management (Darryl Culberson)	Consumption Per Capita report	Wholesale Consumption History
"	"	Industrial Consumption History
"	"	Used the Inside City - Retail Commercial and the Outside City - Retail Commercial amounts from the report.
"	"	Inside City - Retail MultiFamily +Outside City - Retail MultiFamily
"	"	Inside City - Retail Residential + Outside City - Retail Residential
"	"	Inside City - Retail Golf Course+ Outside City - Retail Golf Course
Customer Services (Lora Schneider)	Billing Adjustments Report	Backbilled charges for Damaged Meter, Slow/Stop Mtr, Stop Meter Report, Sys. Not Billing Codes. Is not data handling error, more appropriately recorded here.
Keith Murray / Lora Schneider	e-mail from Keith Murray	AWU bills based on 2009 MOU with SWS, based on number of fill ups of sweeper and flusher trucks. Although SWS is billed for usage, gallons entered into BAS system not picked up in CIS query of billed, metered water.
Jim Grube, Field Operations, WPD	Quarterly emails from Jim Grube	Estimate based on number of fill-ups of 1,000 gallon trucks (Vactors) from various fire-hydrants (no truck meters) - tracked by truck crews and reported quarterly. Although WPD is billed for usage, gallons entered into BAS system not picked up in CIS query of billed, metered water.

4.5	Systematic testing of all meters on an annual basis; all meters over standards replaced or repaired and retested.	FY07	Pumping and Distribution (Rick Coronado)
5	As per TWDB instructions	FY07	Mark Mathis, TWDB
5	As per TWDB instructions	FY07	Mark Mathis, TWDB
3.5	Manual meter reads with edit checks of data; automated billing but no automated meter reading	FY07	Austin Energy - Jerry Roberts, CIS Manager
	"		"
	"		"
	"		"
	"		"
	"		"
3	Estimates of consumption are done to arrive at these amounts. Testing is done only where problems suspected. There is no systematic testing of all meters at present.	FY07	Lora Schneider
	Estimates using formulae for known events - no estimates using tests data.	FY07	Pete Reyes e-mail

Financial Management (Darryl Culberson)	\$145.01	This is the "Utility" line from consumption report (what AWU uses that is metered but not billed to it) .
Production Losses - Pumping and Distribution (Rick Coronado)	See Note	Reservoir maintenance and overflows spreadsheet kept by Francisco Vincent of Pumping and Distribution.
Donn Lorbieski - Water Loss Report (Maintenance)	Water Loss Report from Hansen	Used the totals for "intentional" use - meaning that water was NOT lost from breaks or leaks, but rather from intentional maintenance of distribution system.
Donn Lorbieski	Hansen	Totals of water loss entered as "additional item" in Hansen. Derived from "water loss - not leaks - service requests" query of Hansen set up by Donn Lorbieski in SharePoint site.
Donn Lorbieski	Hansen	Totals of water loss entered as "additional item" in Hansen. Derived from "water loss - not leaks - work orders" query of Hansen set up by Donn Lorbieski in SharePoint site.
Dan Strub, Eric Langhout, Don Wendell	Spreadsheets kept by Dan Strub and Don Wendell	Line flushing both from newly constructed lines and from automatic flushing devices.
AJ Hamilton - Water Protection	Spreadsheet kept by AJ Hamilton	Improvements in this process underway, with cross connection group working on notifying all private hydrant owners of need to conduct annual tests and report usage.
Austin Fire Department (Bat Chief Joe Limon)	E-mail from AFD	AFD Water Usage is tracked from reports into database. Need further investigation into how all of AFD's estimates are made.
"	See Note	Hydrants at training academy and Pleasant Valley training center are metered so amount used is captured in Billed Consumption Report - Commercial line. Additional training session info provided by Joe Limon.
"	1 pg report from AFD (BC Limon)	No spreadsheet or database backup for this report - Need to ask that they support the totals. Also, they use an estimate of 300 gals per hydrant which AJ and others agree is too low. This needs to be reviewed and updated as for fire suppression note above.
"	1 pg report from AFD (BC Limon)	Same as above (they use estimate of 1,225 gals per test) - Needs to be reviewed and adjusted.
"	1 pg report from AFD (BC Limon)	Use estimate of 12,400 gallons per test, needs to be reviewed and adjusted.
Same	e-mail from David Magana	Estimate of usage based on equipment activity. MOU in process to base usage on logs kept by equipment operators
amount of water used by meter size, Darrel Culberson; accuracy of meters by size, meter accuracy study	Calc by OCA with input on consumption by meter size from Darrel Culberson	OCA calculated average meter accuracy, but AWU study underway to better quantify meter accuracy.

2	Manual meter reads with edit checks of data; automated billing but no automated meter reading	FY07	Austin Energy - Jerry Roberts, CIS Manager
	Estimates using formulae for known events - no estimates using test data.	FY07	Rick Coronado Interview
	Estimates using formulae for known events - no estimates using test data.	FY07	Donn Lorbieski
	Estimates using formulae for known events - no estimates using test data.		
	Estimates using formulae for known events - no estimates using test data.		
3	Estimates using formulae for known events - no estimates using test data.	FY07	A.J. Hamilton, AWU
	Estimates using formulae for known events - no estimates using test data.	FY07	Bat. Chief Smith Interview
	Training academy has meters for whole complex.	FY07	Bat. Chief Smith e-mail
	Estimates using formulae for known events - no estimates using test data.	FY07	Bat. Chief Smith Interview
	Estimates using formulae for known events - no estimates using test data.	FY07	Bat. Chief Smith Interview
	Estimates using formulae for known events - no estimates using test data.	FY07	
3	Meter testing program exists thru 3" meters, but no current meter replacement program in place for small meters. Analysis of data in place except for small meters, but meter shop is keeping data in Hansen W/Os about age to calculate actual replacement age.	FY07	Nowell Mojica interview

Customer Services (Lora Schneider)	Billing Adjustments Report	No audit or analysis of systematic data handling errors has been undertaken. For FY10, including debits for Billing Error, Incorrect Usage accountability codes
Customer Services (Lora Schneider)	See Note	Theft from hydrants is not calculable due to lack of data - using the default of 0.25% of input volume as allowed by TWDB. Research underway by theft prevention in Customer Service division.
Customer Services (Lora Schneider)	Billing Adjustments Report	Billing Adjustments by Accountability Code Report (Off Meter Cons, Open Bypass, Tampering Codes)
Donn Lorbieski	Water Loss Report from Hansen	Derived from "water loss - leaks only - service requests" query of Hansen set up by Donn Lorbieski in SharePoint site.
Donn Lorbieski	Hansen	Derived from "water loss - leaks only - work orders" query of Hansen set up by Donn Lorbieski in SharePoint site.
Production Losses - Pumping and Distribution (Rick Coronado)	See Note	From new detailed tracking methodology.
		Equal to [(5.41 x length of main lines in miles) + (0.15 x number of service connections)] x average pressure in system

[illegible]

Michael Castillo	COS model	Comes from Table I-17 of COS model for FY09-10, systemwide volumetric rate
Ron Bedinghaus	Water O&M Requirments spreadsheet	Variable production cost methodology as reviewed by internal auditors as part of FY10 VPCW audit.

5	Weighted average residential rate using volumes in each rate block	FY07	Michael Castillo - AWU Finance
4	Internally audited wholesale, electric, and chemical costs	FY07	Michael Castillo - AWU Finance
66	TOTAL POINTS		

Assessment table				
1	2	3	4	5
Estimates only	Paper records in poor condition (no totals from year to year)	Good annual paper records	Electronic records and asset management system in good condition; includes system backup	GIS data and asset management database in agreement; random field checks validate database
Estimates only	Random pressure testing and averaging	Pressure testing through system standardized on annual basis	Combine pressure testing to calibrate hydraulic model to develop average system pressure	District testing and averaging matching data from hydraulic model
No meters; volume quantified by estimates only	Partially metered; several supply sources metered but not all	Fully metered; no regular testing or calibration of meters	Fully metered; partial testing or electronic calibration; no meters greater than 15 years old	Fully metered; annual electronic calibration and flow testing; no meters greater than 15 years old

No testing of production meters; estimated adjustment used only as needed	Testing of production meters only where problems suspected	Systematic testing of meters; underperforming meters not always replaced	Systematic testing of all meters within at least a five-year cycle; all meters over standards replaced or repaired and retested	Testing of all production meters conducted in year of audit; replacement of all meters outside standard accuracy range
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
No consumption data gathered; flat or fixed rate in use only	Manual meter reads and billings; no regular audits of customer billing data	Automated billing system; no annual checks of data	Automated meter reading and billing system; internally checked or checked by third party on less than annual basis	Automated meter reading and billing system audited by third party on annual basis
Estimates of consumption used	Production meters used to determine consumption; all areas not monitored	Production meters used to determine consumption; all areas monitored	District meters (each 3,000 or fewer connections) used to determine consumption; no total coverage; rest use production meters	District meters (each covers 3,000 connections or less) throughout system used to determine consumption

No testing; estimates only	Testing only where problems suspected	Systematic testing of all meters; underperforming meters not always replaced	Systematic testing of all meters within at least a five-year cycle; all meters over standards replaced or repaired and replaced	Testing of all production meters conducted in year of audit; replacement of all meters outside standard accuracy range
Overall estimates throughout system	Partial estimates for some of variables; basic estimates for others	Estimates using formulae (for example, time x gallons per flush) for known events	Partial estimates using test data; other estimates using formulae for known number of events	Estimates using previous metered testing to determine overall estimated values
No testing or replacement; estimates only	Testing or replacement of 1 to 5% of meters in year or audit	Analysis of test data finds meters meeting specs, or testing and replacement of 5 to 10% of meters per year	Previous test data analyzed nad all meters in specifications, or testing or replacement of 10 to 50% of all meters in year of audit	Previous test data analyzed nad all meters in specifications, or testing or replacement of over 50% of all meters in year of audit



No review of billing system.	Automated system but no checks of data validity.	Automated system; less than annual checks of data.	Automated system; internally checked on at least annual basis.	Assessment of data handling errors conducted internally and audited by third party on annual basis.
Arbitrary volume estimates	Default of 0.25% of input volume	Number of events of each type evaluated; multiply by estimated gallons lost per event	Number of occurrences evaluated; monitoring and enforcement program started	Monitoring and enforcement program well established with analyzed losses less than 0.25% and declining from previous years
Arbitrary estimates; repairs of reported leaks and breaks not documented	Only visual leaks and breaks from customer calls fixed; no known duration before fixing cursory records	Visual leaks and breaks reported by customers and city staff; call-to-repair times known (greater than one week average); good records	Visual leaks and breaks reported by customers and city staff; call-to-repair times less than one week; computerized maintenance management system used to document leak repair trends	Visual leaks and breaks reported by customers and city staff; call-to-repair times less than two days; outstanding computer maintenance records track system deficiencies and repair crew performance
If no active leakage control activities exist, unreported leaks are undetected and quantity is zero	Limited leak detection using basic sounding performed for a portion of the distribution system; no detailed records/database	Proactive leak detection using basic sounding, correlation and detailed leak detection records; one or more District Metered Areas in use	Proactive leak detection using basic sounding, correlation and detailed leak detection and asset condition records; detailed component analysis results	Fully integrated flow monitoring and leak detection program with continuous reporting and analysis of system leakage; integration with asset management, GIS and economic level of leakage

Estimates only	Residential rate only	Weighted average residential rate using volumes in each rate block	Weighted average combinatino usage rate (includes residential commercial and industrial)	Thirrd-party reviewed; weighted average combination usage rate (includes residential, commercial and industrial)
Estimates only	Extrapolated from evaluation of partial system electric and chemicals costs	Non-audited evaluation of total systeme electric and chemical costs	Internally audited wholesale, electric and chemical costs	Third-party audited wholesale, electric, chemical and detailed support costs annually

# AWU Water Loss Calculation

## WATER UTILITY GENERAL INFORMATION

	FY 07	FY 08	FY 09	FY 10	
1 Water Utility Name:	Austin Water Utility	Austin Water Utility	Austin Water Utility	Austin Water Utility	
3 Reporting Period:	October 1, 2006 to September 30, 2007	October 1, 2007 to September 30, 2008	October 1, 2008 to September 30, 2009	October 1, 2009 to September 30, 2010	
4 Source Water Utilization, percentage:					
Surface Water %	100%	100%	100%	100%	
5 Population Served:					
a. Retail Population Served	780,647	799,844	828,628	842,055	
b. Wholesale Population Served	54,000	54,000	44,000	44,713	
6 Utility's Length of Main Lines, miles	3,516	3,606	3,631	3,639	
7 Number of Wholesale Connections Served	45	48	48	47	
8 Number of Retail Service Connections Served	198,895	203,368	208,439	210,846	
Service Connection Density (Number of retail service connections/Miles of main lines)	56.57	56.40	57.41	57.94	conn/mile
10 Average Yearly System Operating Pressure (psi)	77.0	77.3	77.3	77.3	psi
11 Volume Units of Measure	Gallons	Gallons	Gallons	Gallons	

## SYSTEM INPUT VOLUME

12 Water Volume from own Sources	45,881,625,000	53,070,779,000	53,328,130,000	43,786,936,000	gals
13 Production Meter Accuracy (%)	98.00%	98.00%	98.00%	98.00%	pct.
14 Corrected System Input Volume	46,817,984,694	54,153,856,122	54,416,459,184	44,680,546,939	gals

## AUTHORIZED CONSUMPTION

18 Billed Metered	41,254,300,900	88.12%	46,992,258,000	86.78%	48,184,480,800	88.55%	39,367,872,000	88.11%	gals
19 Billed Unmetered	0	0.00%	248,297,495	0.46%	143,796,498	0.26%	311,433,912	0.70%	gals
20 Unbilled Metered (amount used at AWU buildings/facilities)	105,645,200	0.23%	174,946,000	0.32%	70,089,600	0.13%	90,416,900	0.20%	gals
21 Unbilled Unmetered (amount used by other city Departments) **	129,779,642	0.28%	120,495,964	0.22%	135,436,830	0.25%	191,471,429	0.43%	gals
22 Total Authorized Consumption	41,489,725,742	88.62%	47,535,997,459	87.78%	48,533,803,728	89.19%	39,961,194,241	89.44%	gals

### Water Losses

23 (System input volume minus authorized consumption)	5,328,258,952	11.38%	6,617,858,663	12.22%	5,882,655,456	10.81%	4,719,352,698	10.56%	gals
28 Total Apparent Losses	1,733,040,216	3.70%	2,013,538,512	3.72%	1,212,885,736	2.23%	1,007,978,198	2.26%	gals
31 Total Real Losses	3,595,218,736	7.68%	4,604,320,151	8.50%	4,669,769,719	8.58%	3,711,374,500	8.31%	gals
36 Unavoidable Real Losses, in MGD	3,762,417	2.93%	3,866,612	2.61%	3,935,866	2.64%	3,967,109	3.24%	Million Gallons/Day
(Equals real loss volume (div by 365) divided by unavoidable real losses)	2.618		3.262		3.251		2.563		
37 Real Losses Normalized (Real Loss Volume/# of Service Connections/365) (This indicator applies if service connection density is greater than 32/mile)	49.512		62.014		61.365		48.215		gals/conn/day

## FINANCIAL PERFORMANCE INDICATORS

40 Total Apparent Losses (Line 28)	1,733,040,216		2,013,538,512		1,212,885,736		1,007,978,198		gals
41 Retail Price of Water	\$2.99		\$3.38		\$3.38		\$3.91		Per 1,000 Gals
42 Cost of Apparent Losses	\$5,181,790.25		\$6,805,760.17		\$4,099,553.79		\$3,941,194.75		
43 Total Real Losses	3,595,218,736		4,604,320,151		4,669,769,719		3,711,374,500		gals
Variable Production Cost of Water* (*Note: In case of water shortage, real losses might be valued at the retail price of water instead of the variable production cost.)	\$0.55		\$0.35		\$0.38		\$0.34		Per 1,000 Gals
44 Cost of Real Losses	\$1,959,645.88		\$1,611,512.05		\$1,774,512.49		\$1,265,578.70		
47 Total Cost Impact of Apparent and Real Losses	\$7,141,436.12		\$8,417,272.22		\$5,874,066.28		\$5,206,773.46		