A large, light blue water splash graphic is centered on the page, serving as a background for the text. The splash consists of a central droplet falling into a pool of water, creating concentric ripples that expand outwards. The overall tone is clean and aquatic.

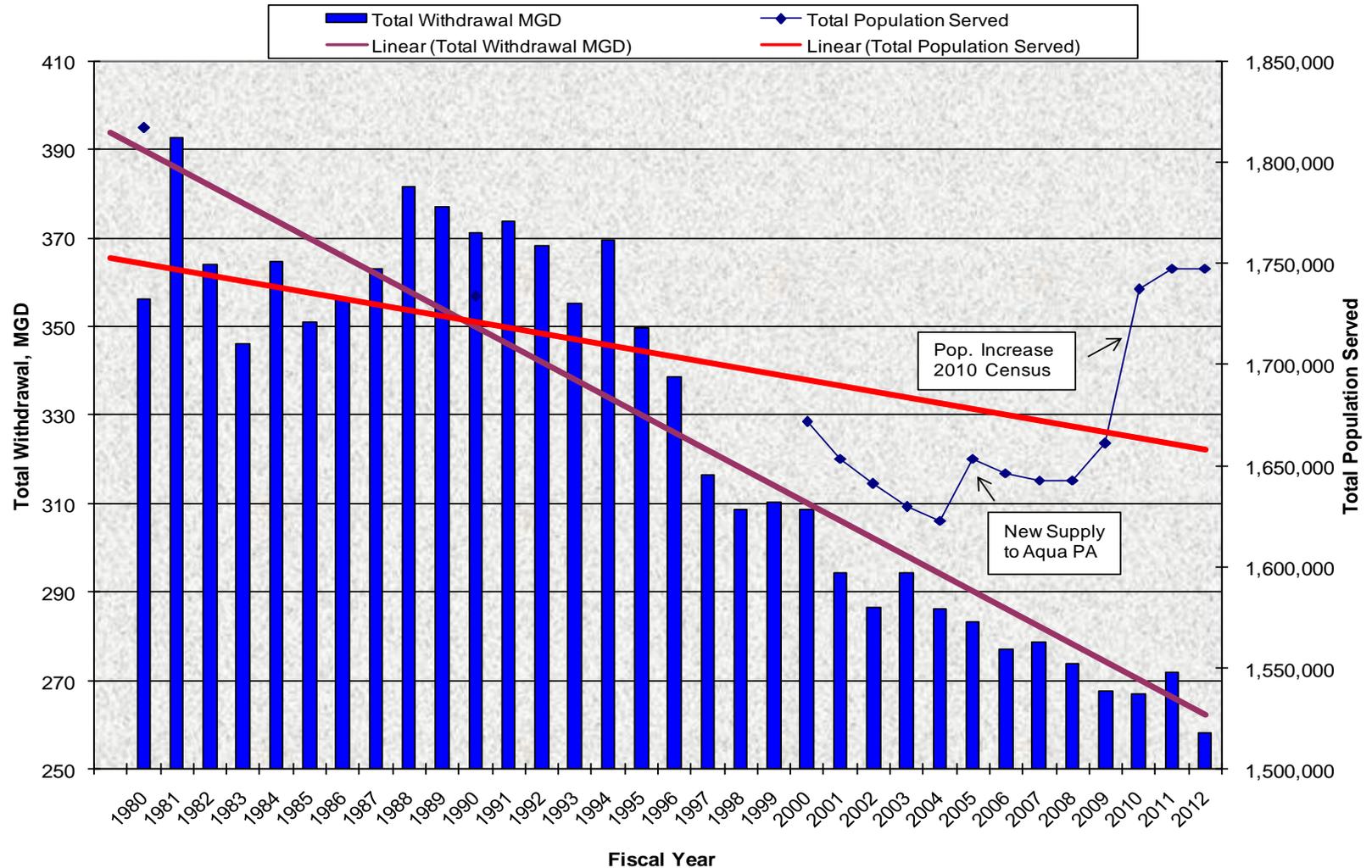
# **City of Philadelphia Water Accountability Committee**

## **Fiscal Year 2012 Water Audit**

Source: George Kunkel, PWD

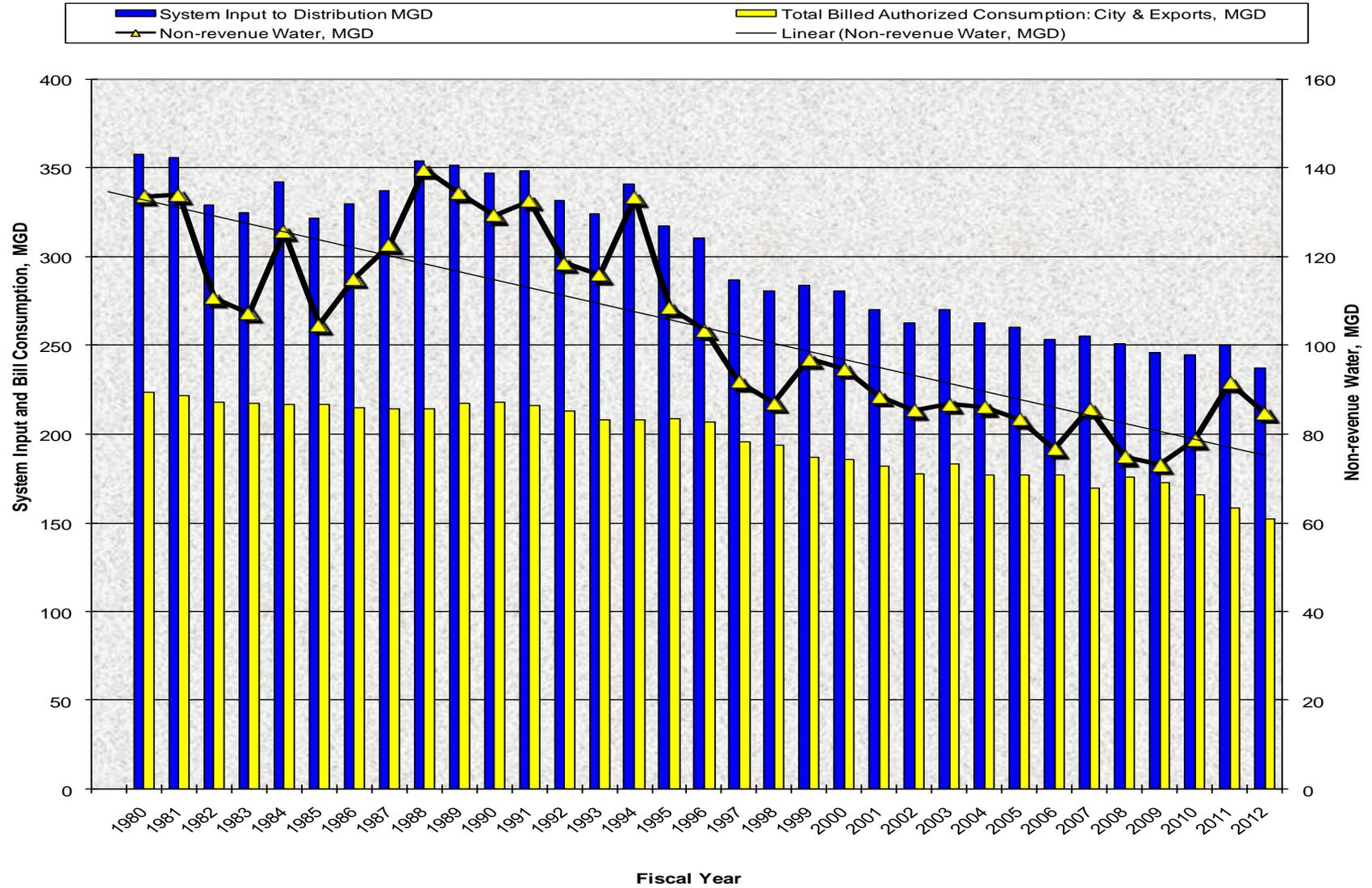
# Water Withdrawn from the Rivers

**Philadelphia Water Department**  
**Water Withdrawals from the Delaware and Schuylkill Rivers vs. Population**  
 (population increase in 2003/2004 due to new suburban supply interconnections)



# Long-term Reduction in Non-revenue Water

Philadelphia Water Department Water System Input, Consumption and Non-Revenue Water



# Philadelphia's Water Audit Summary

Fiscal Year 2012 July 1, 2011 - June 30, 2012

Water into Supply -	237.1 mgd	
Customer Billed Consumption -	<u>152.6</u> mgd	
Non-revenue Water	84.5 mgd	
Unbilled Auth. Consumption	3.2 mgd	\$ 1,102,000
Apparent Losses	21.3 mgd	\$ 43,076,000
Real Losses	<u>60.0</u> mgd	<u>\$ 8,100,000</u>
Non-revenue Water	84.5 mgd	\$ 52,278,000

Apparent Loss indicator = 21.3 mgd / 536,122 connections = **39.8 gallons/connection/day**

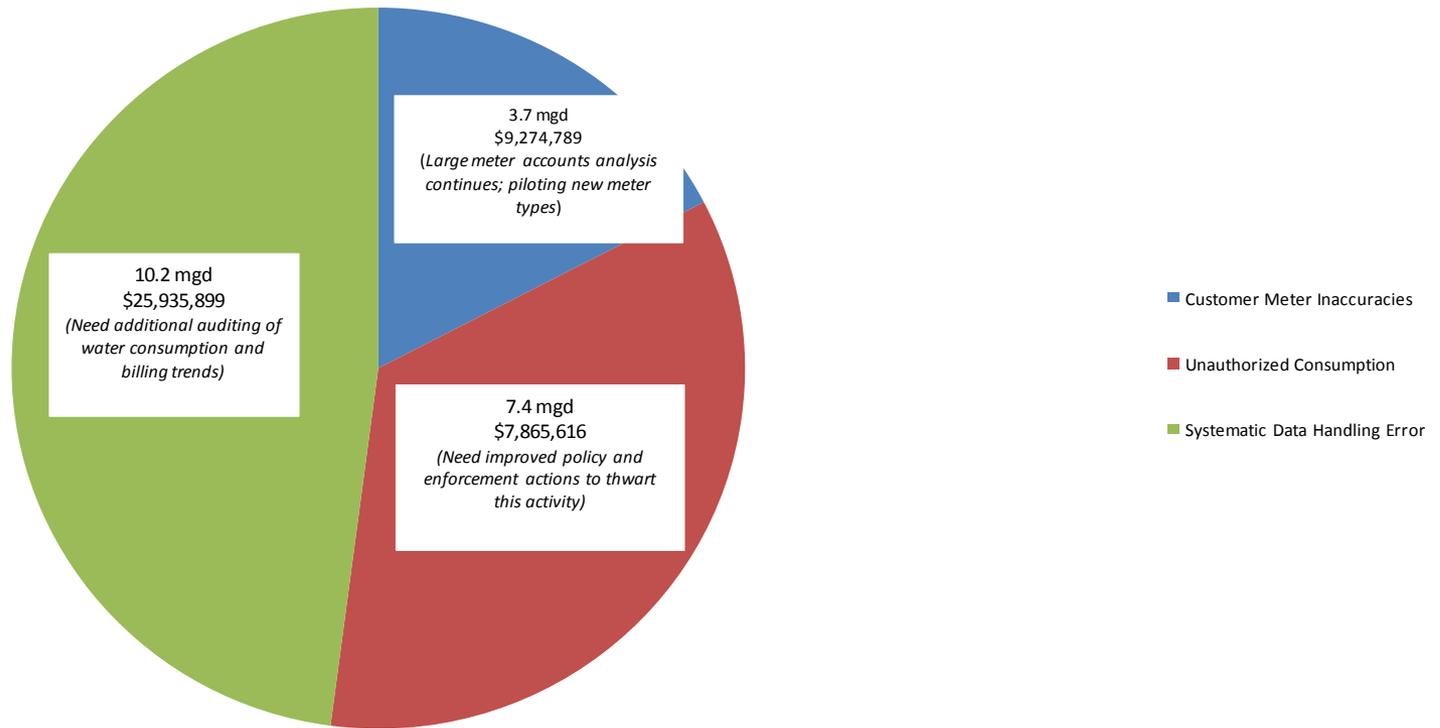
Real Loss indicator = 60.0 mgd / 536,122 connections = **111.9 gallons/connection/day**

NRW by volume = 84.5 mgd / 220.0 mgd = **38.4%**

NRW by cost = \$US 51.1 million / \$US 236 million = **22.2%**

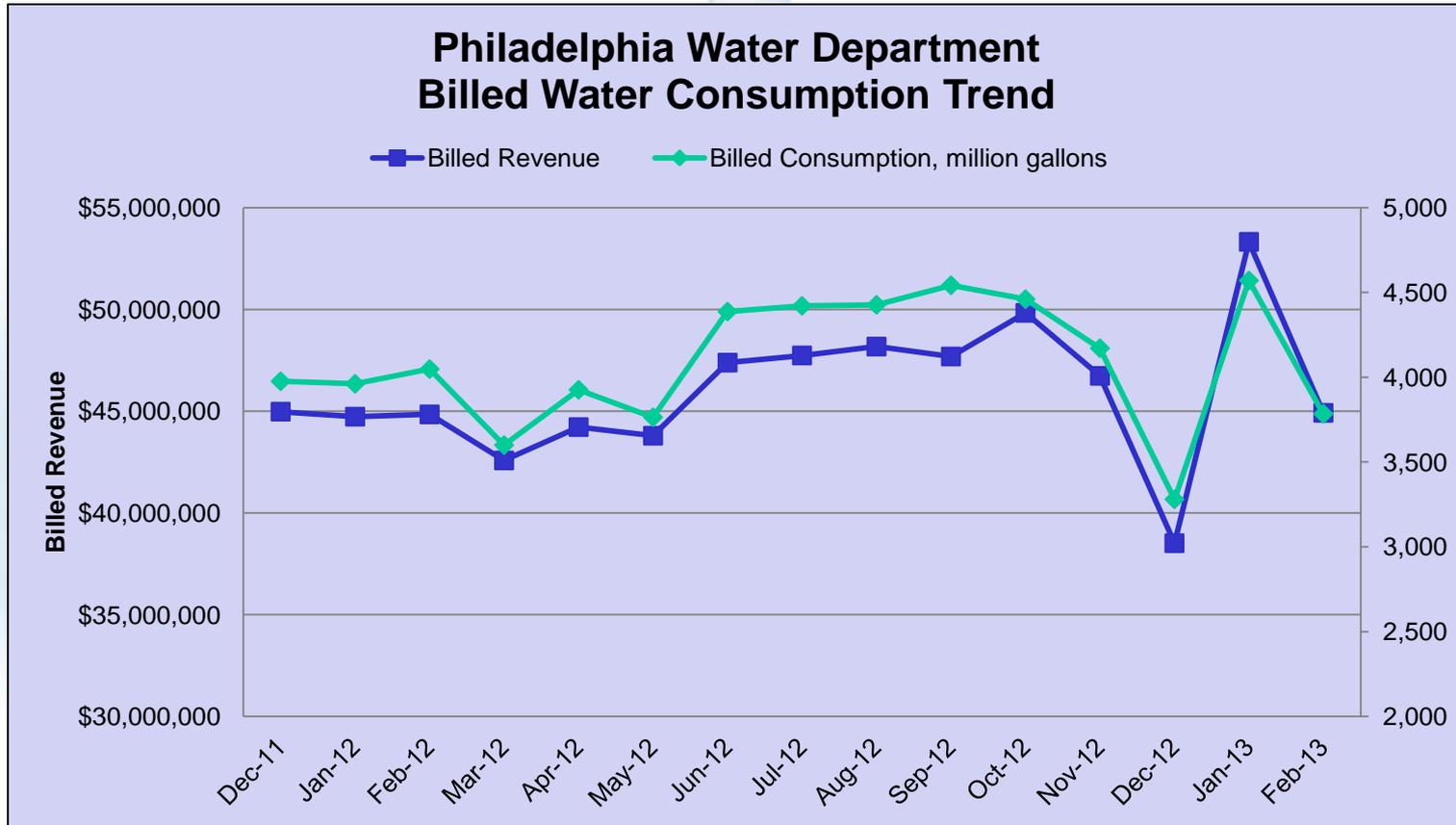
# Apparent Losses by volume & cost

City of Philadelphia - Apparent (commercial) Water Losses Fiscal Year 2012  
(and efforts to address them)



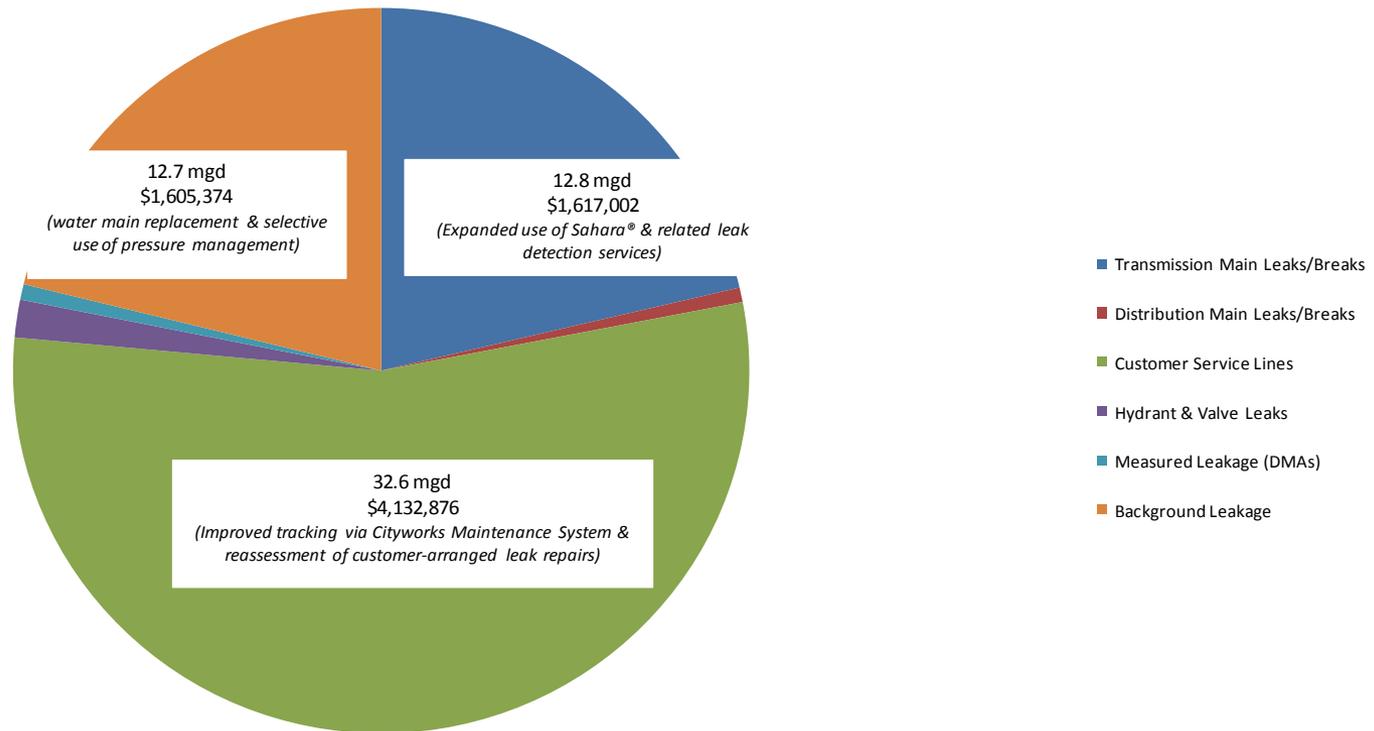
# Significant Billing Fluctuation December 2012 & January 2013

- ◆ Billed water volume and revenue down roughly 17% in December 2012 likely due to “billing reversals” to many large buildings for adjustment on newly implemented stormwater charges



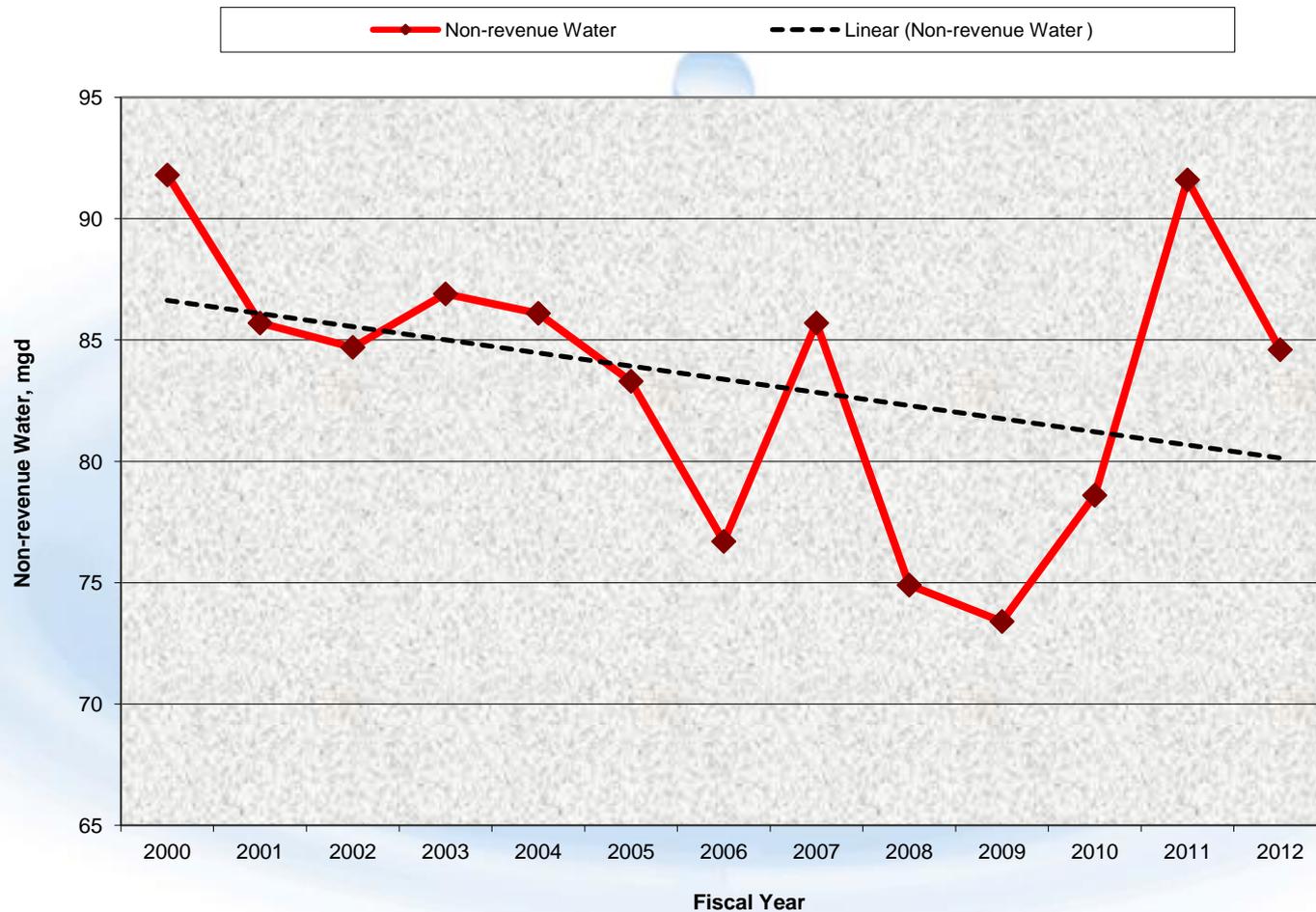
# Real (Leakage) Losses by volume & cost

**City of Philadelphia - Real Water (Leakage) Losses for Fiscal Year 2012**  
*(and efforts underway to address them)*



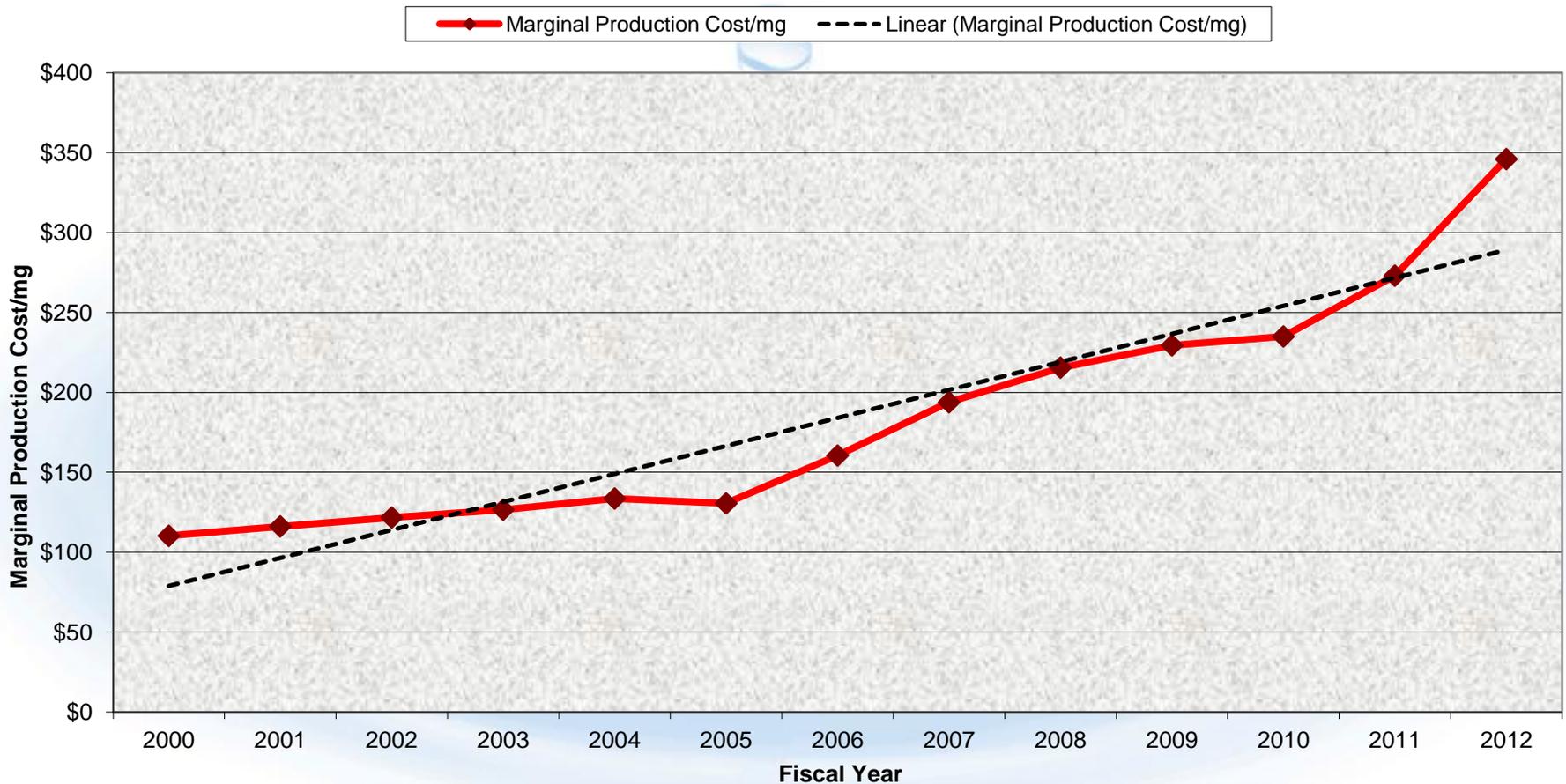
# PWD's Long-term Non-revenue Water Reduction

Philadelphia Water Department Long-term Non-revenue Water Reduction



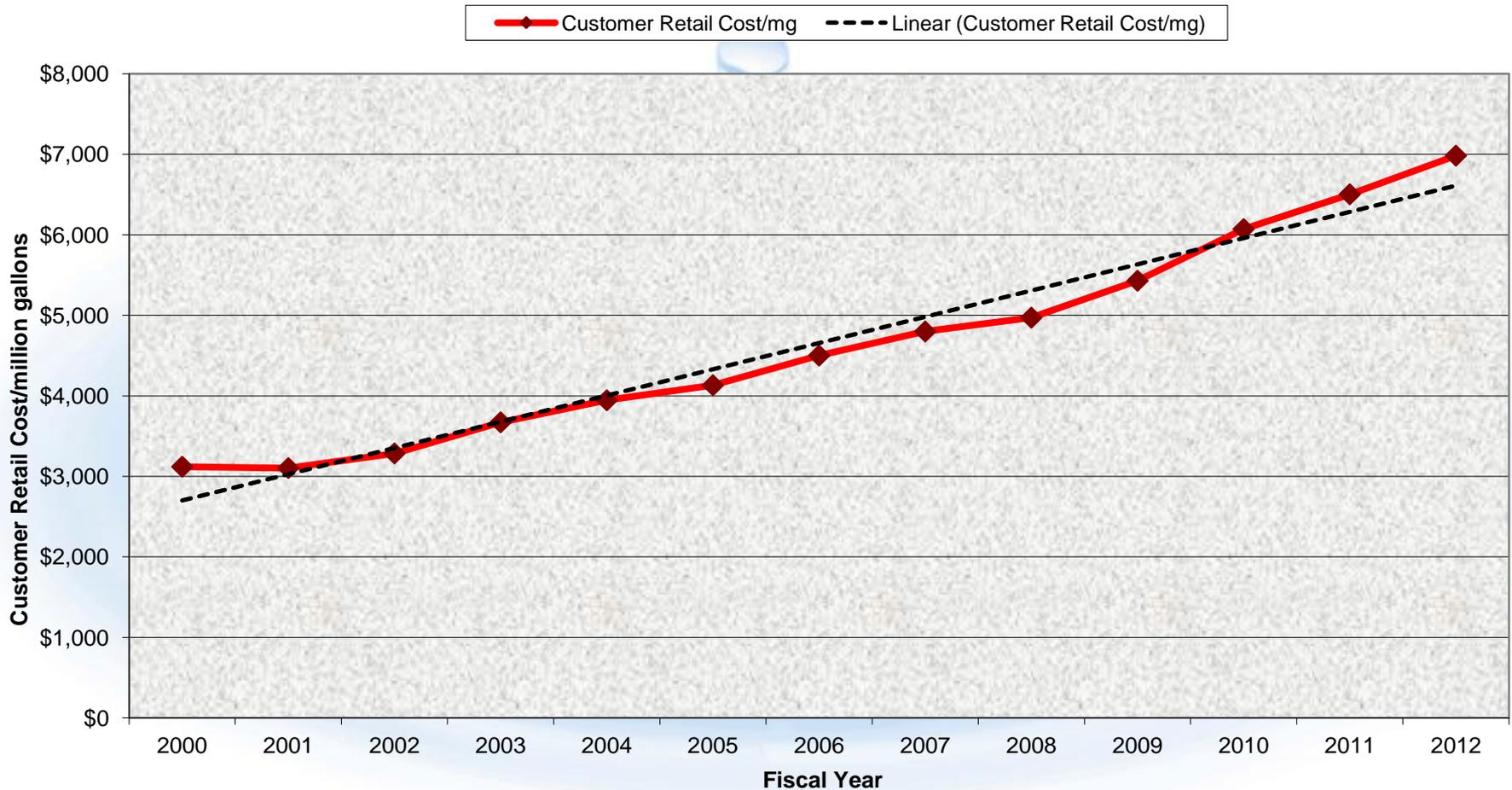
# Increasing Production Costs mean Increasing Cost of Leakage

Philadelphia Water Department - Long-term Increase in Marginal Production Costs



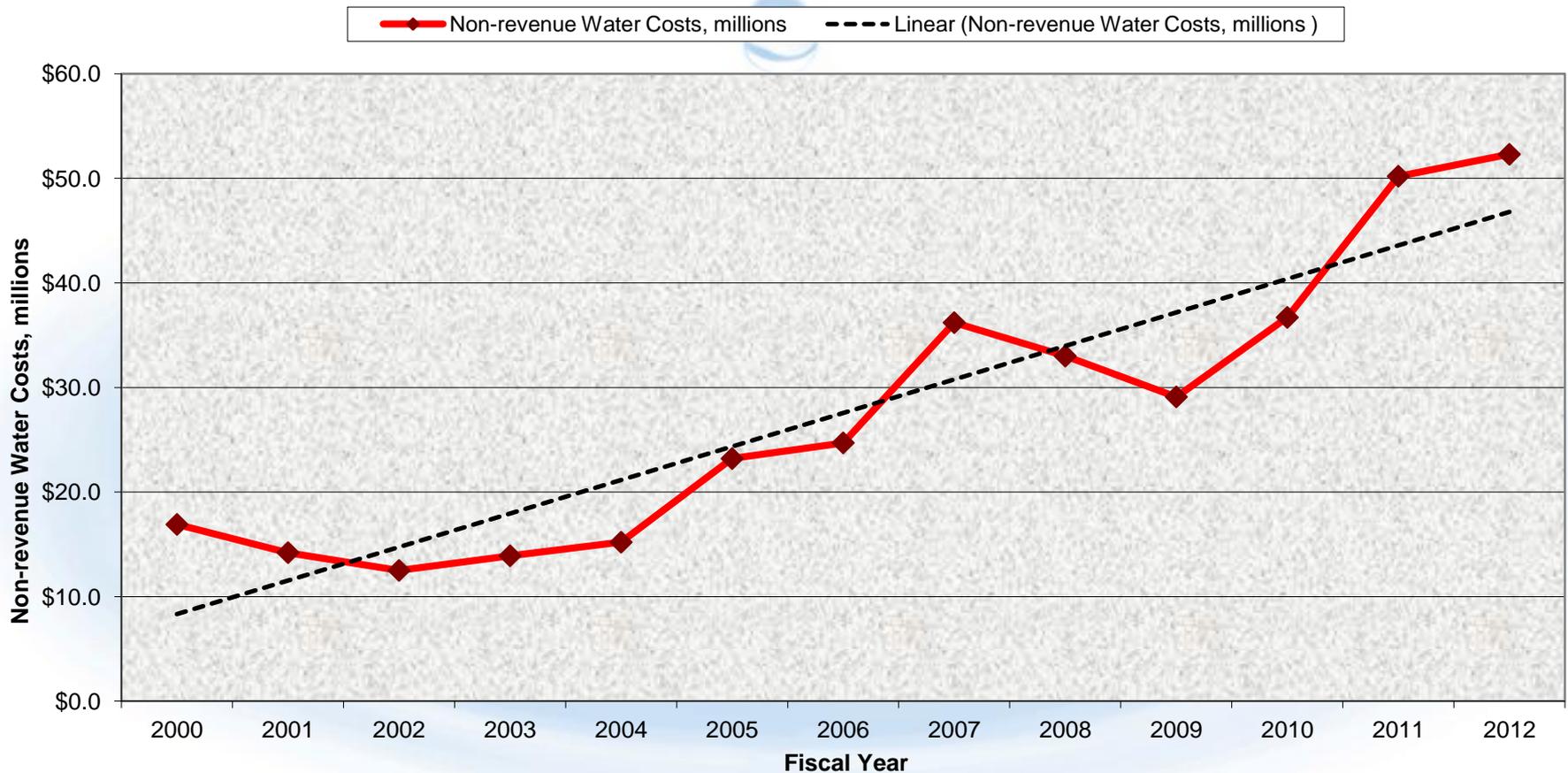
# PWD's Increasing Customer Retail Costs

Philadelphia Water Department - Long-term increase in Customer Retail Costs



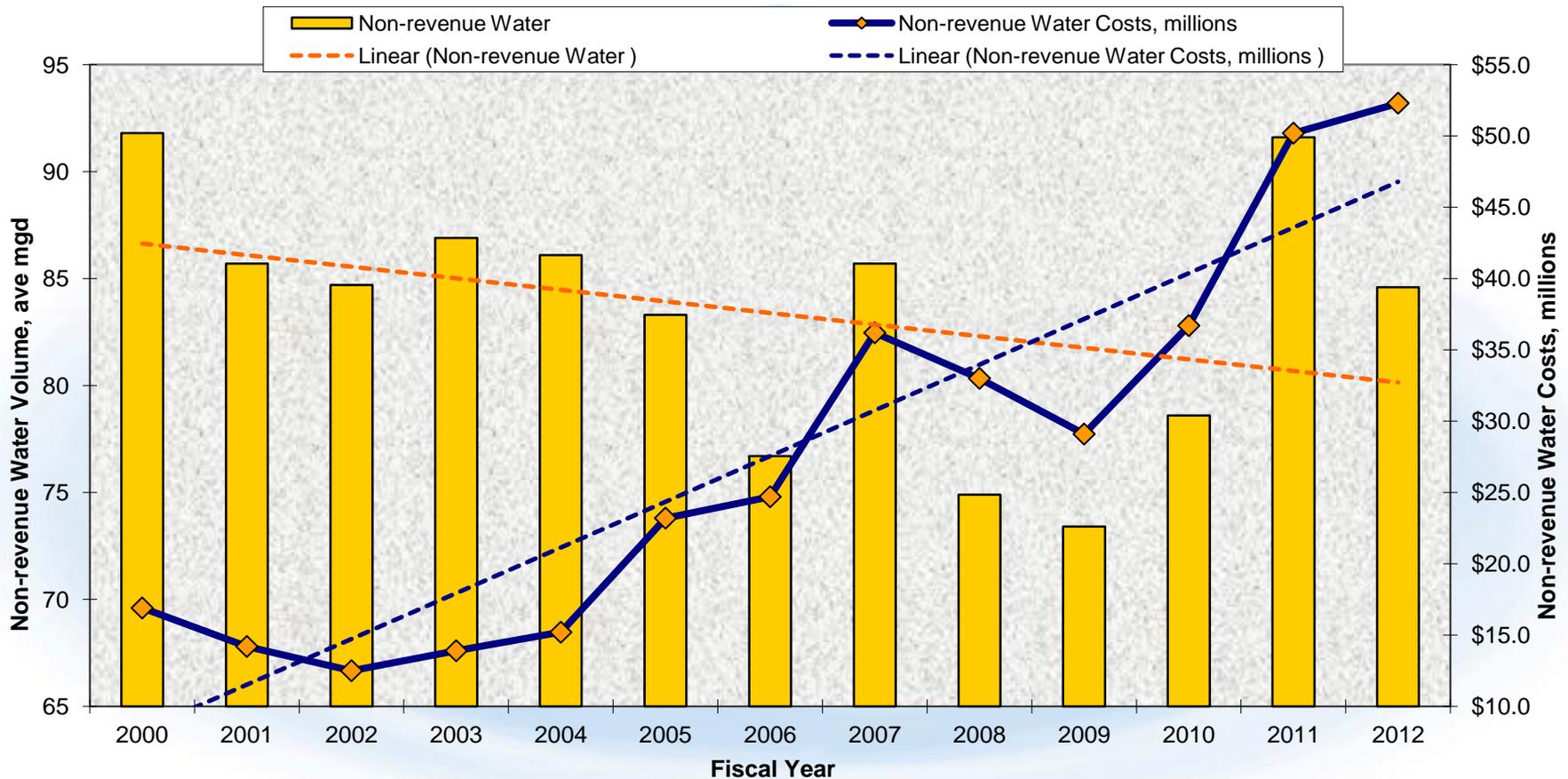
# *PWD: the annual cost of Non-revenue Water*

Philadelphia Water Department - Long-term Increase in Non-revenue Water Costs



# PWD: Declining Losses but Increasing Costs

Philadelphia Water Department - Managing Water Loss Volumes and Costs



# Revenue Protection & Reinspection Programs

## PWD - WRB Revenue Recovery History

PWD Revenue Protection Program					WRB	Total	
Fiscal Year	Accounts Recovered	Water Recovered, mgd	Revenue Recovered	Categories of Greatest Recovery**	Reinspection Recoveries	Reinspections Revenue Recovery	Total Recovered Revenue
2012	4154	2.4	\$3,866,280	Investigation of Zero Consumption	2,040	\$470,212	\$4,336,492
2011	3,973	2.3	\$3,683,600	Investigation of Zero Consumption	1,620	\$206,075	\$3,889,675
2010	2,467	1.49	\$2,384,528	Investigation of Zero Consumption	1,516	\$169,733	\$2,554,261
2009	1,659	1	\$1,603,540	Investigation of Zero Consumption	1,632	\$199,732	\$1,803,272
2008	n/a	0.4	\$636,250	n/a	2,597	\$390,670	\$1,026,920
2007	449	0.36	\$531,400	NB9 (Vacant properties) & NB3	2,984	\$340,380	\$871,780
2006	1,436	1.01	\$1,413,000	Estimated Accounts (#1), Non-	2,513	\$209,768	\$1,622,768
2005	2,397	1.74	\$2,835,000	NB3 & Zero consumption	2,553	\$249,261	\$3,084,261
2004	1,941	1.67	\$2,003,000	Zero consumption accounts 0.74	1,991	\$446,327	\$2,449,327
2003	1,360	1.14	\$1,782,000	Zero Consumption Accounts	2,221	\$604,379	\$2,386,379
2002	932	0.69	\$1,037,000	Zero Consumption Accounts	2,721	\$668,932	\$1,705,932
2001	711	5.81	\$2,900,000	Missing Accounts, Hand	3,261	\$498,952	\$3,398,952
2000	716	1.39	\$2,100,000	NB6 accounts	2,737	\$393,949	\$2,493,949
<b>Total</b>	<b>22,195</b>	<b>21.4</b>	<b>\$26,775,598</b>		<b>30,386</b>	<b>\$4,848,370</b>	<b>\$31,623,968</b>

# Apparent Losses – Notables for FY2012

- ◆ Apparent Loss volume down 1.7 mgd from FY2011; cost impact down slightly, but still high at +\$43 million
- ◆ Activities in FY2012
  - Revenue Protection Program & WRB Reinspections – over \$4.3 million in recovered revenue: highest in 13-year history (following record high in 2011)
  - Unauthorized Consumption – still significant; over 2,000 “missing meters” are identified each year
  - Reinspection Program – up by 400 recoveries in FY2012
  - Customer Meter Accuracy – small apparent loss volume, but good revenue recovery potential in large meter accounts
    - Small Meters: good accuracy, long life expected
    - Large Meters: study continuing to find many large meters are over-sized and likely under-register flow
      - Installed pilot group of 14 single jet meters
      - Will pilot battery powered magnetic meters for large customer accounts

# Controlling Apparent Losses - Recommendations

- 🔥 **Recommendation:** Expand the Revenue Protection Program by:
  - Establishing new water supply auditor positions in PWD to audit water consumption trends, especially for large meter accounts
  - Optimizing staffing in the Meter Shop to conduct investigations
  - Investigating policy/enforcement actions, particularly against missing meters
- 🔥 **Recommendation:** Fully integrate Basis2 Customer Billing System reporting into expanded monitoring and tracking of customer consumption and billing data; particularly large customer accounts (*reports to support new water consumption auditors*).
- 🔥 **Recommendation:** Complete AMR System Battery Change-out Project including fixed network units on large customer meters and all accounts in DMA5 and the former Philadelphia Naval Shipyard, to better profile customer consumption and pilot next-generation AMR System
- 🔥 **Recommendation:** Continue large customer meter study, conduct economic benefit analysis on single jet meters and install magnetic meters

# Real Losses (Leakage) Notables in FY2012

- ◆ Real Loss Quantity down 6.3 mgd from FY2011, to 60.0 mgd
- ◆ Activities in FY2012
  - Cityworks CMMS Phase II launched 6/5/2012; keying on improved business process for leak/break repair tracking
  - Sahara Leak Detection Scans: scanned 6.1 miles of large diameter water mains in FY2012; finding 2 leaks/mile
  - District Metered Area 5: leakage reduction optimized by 2009; installing fixed network AMR units in spring 2013
  - Consistent Leak Detection Program now in place for over 30 years for distribution piping
  - Customer Service Connection Leakage: efforts launching to investigate alternatives to current policy of customer arranged repairs

# *Improving Leakage Management*

- 🔥 **Recommendation:** complete implementation of Cityworks computerized maintenance management system and refine leak/break tracking methodology
- 🔥 **Recommendation:** Continue use of Sahara technology; and pilot additional new leak detection and condition assessment technologies in FY2013 & beyond
- 🔥 **Recommendation:** install District Metered Area technology and Fixed Network AMR capabilities to leverage customer consumption data as part of leakage assessments (DMA5 & former Philadelphia Naval Shipyard)
- 🔥 **Recommendation:** launching investigation of improved approach to leak repairs on customer service lines. Current average customer response: 4-5 weeks. Industry best practice 2-4 days

# Water Industry Activities

- ◆ American Water Works Association
  - PWD is again one of 26 water utilities included in the validated dataset of water audit data for North American water systems
  - G. Kunkel is again editor of next edition of AWWA M36 publication
- ◆ Who's embracing the IWA/AWWA Water Audit Method?
  - Delaware River Basin Commission; now requires reporting of water audit data for 2012 calendar year (due March 31, 2013)
  - Pennsylvania Public Utility Commission: 2-year pilot project for water audits data collection has been completed – considering permanent regulation change
  - Other active states: Georgia, California, Texas, New Mexico
- ◆ AWWA/USEPA Partnership for Safe Water – Distribution System Program: focusing on chlorine, main breaks & pressure
  - Specific information requested on water loss control

# AWWA Free Water Audit Software©

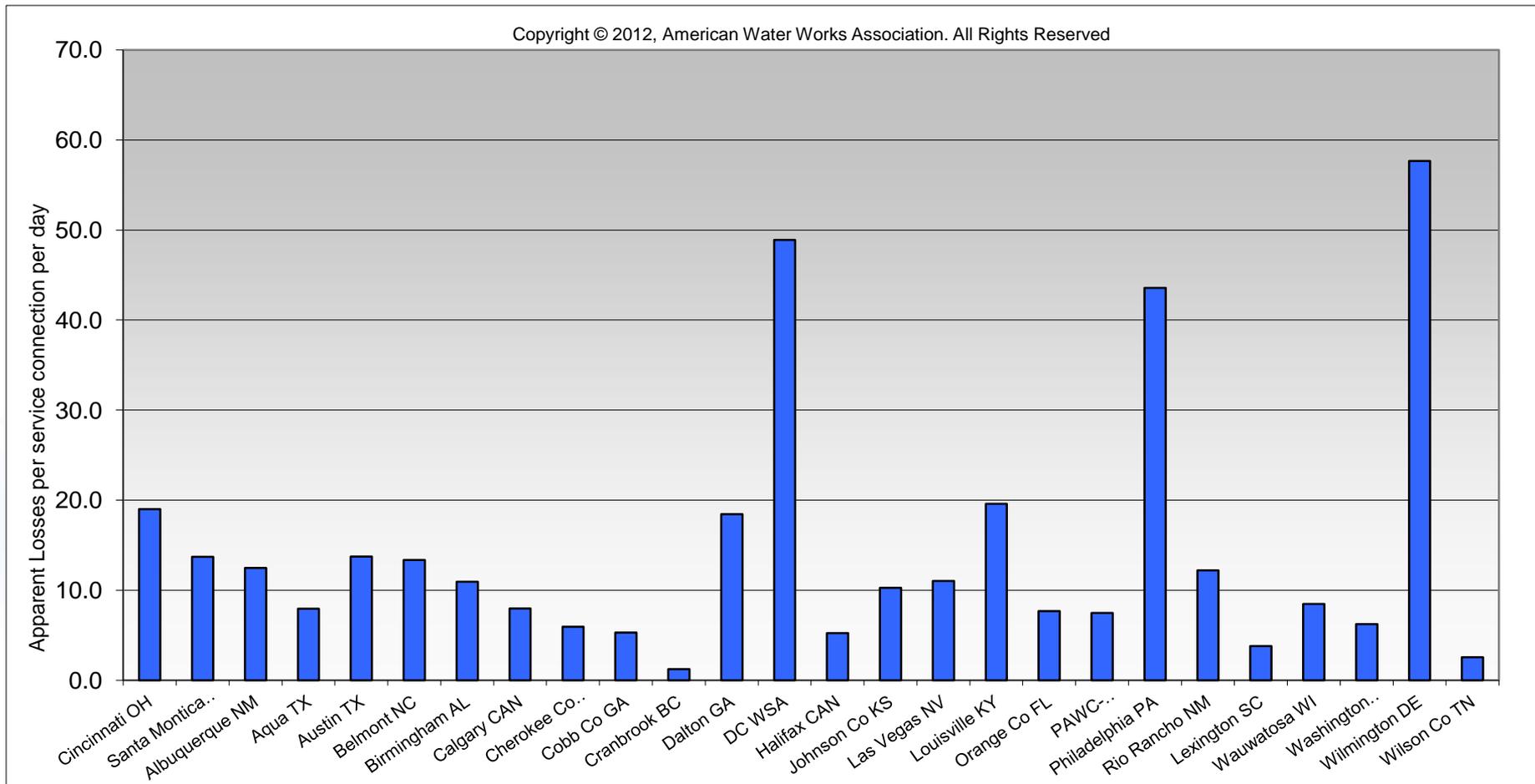
## North American Validated Water Audit Dataset

Administrative		City of Asheboro USA FY08-09	Austin Water Utility United States 2010 FY 09-10	City of Belmont USA FY 09-10	
Name of City or Utility		City of Asheboro USA	Austin Water Utility	City of Belmont USA	
Country		USA	United States	USA	
Reporting Year		FY08-09	2010 FY 09-10	FY 09-10	
Start Date		7/1/2008	10/1/2009	7/1/2009	
End Date		6/1/2009	9/1/2010	6/30/2010	
Name of Contact Person		Michael Rhoney	Dan Strub	Chuck Flowers	
E-Mail		mrhoney@ci.ashebo	dan.strub@ci.austri	cflowers@cityofbel	
Telephone		336-626-1234	512-972-0349	704-825-0512	
Telephone Ext					
Audit Data					
Water Supplied	Volume Units	Million gallons (US)	Million gallons (US)	Million gallons (US)	
	Volume From Own Sources	1,491.690	43,786.936	593.075	
	Master meter error adjustment	138.572	893.611	12.104	
	Water imported	-	-	-	
	Water exported	-	-	-	
<b>WATER SUPPLIED</b>		1,630.262	44,680.547	605.179	
Authorized Consumption	Billed metered	1,311.441	39,367.872	438.054	
	Billed unmetered	-	311.434	-	
	Unbilled metered	35.791	90.417	-	
	Unbilled unmetered	113.521	191.471	45.612	
	Unbilled unmetered (1 = Default; 2 = Value)	2	2	2	
<b>AUTHORIZED CONSUMPTION</b>		1,460.753	39,961.194	483.665	
Water Losses	<b>WATER LOSSES (Water Supplied - Authorized Consumption)</b>		169.509	4,719.353	121.513
	Unauthorized consumption	4.076	125.480	1.513	
	Unauthorized consumption (1 = Default; 2 = Value)	1	2	1	
	Customer metering inaccuracies	41.667	857.613	18.252	
	Systematic data handling errors	-	24.885	-	
	Apparent Losses	45.743	1,007.978	19.765	
	Real Losses = (Water Losses - Apparent Losses)	123.766	3,711.375	101.748	
	<b>WATER LOSSES</b>		169.509	4,719.353	121.513
Non-Revenue Water	<b>NON-REVENUE WATER</b>		318.821	5,001.241	167.125
System Data	Length of mains	237	3,639	95	
	Number of active AND inactive service connections	13,000	210,893	4,600	
	Connection density	54.9	58.0	48.4	
	Average length of customer service line	20	0	20	
	Average operating pressure	75	77.3	66	
Cost Data	Total annual cost of operating water system	\$3,048,480	\$168,249,678	\$1,357,542	
	Customer retail unit cost (applied to Apparent Losses)	\$5.90	\$3.91	\$6.98	
	Customer retail unit cost (units)	\$/100 cubic feet (cc	\$/1000 gallons (US	\$/1000 gallons (US	
	Variable production cost (applied to Real Losses)	\$510.00	\$341.00	\$330.00	
Performance Indicators					
Financial Indicators	Non-revenue water as percent by volume	19.6%	11.2%	27.6%	
	Non-revenue water as percent by cost	16.4%	3.2%	13.7%	
	Annual cost of Apparent Losses	\$360,779	\$3,941,194	\$137,961	
	Annual cost of Real Losses	\$63,121	\$1,265,579	\$33,577	
Operational Efficiency Indicators	Apparent Losses per service connection per day	9.640	13.095	11.772	
	Real Losses per service connection per day*	26.084	48.215	60.600	
	Real Losses per length of main per day*	N/A	N/A	N/A	
	Real Losses per service connection per day per psi pressure	0.348	0.624	0.918	
	Unavoidable Annual Real Losses (UARL)	98.591	1,447.995	32.151	
Infrastructure Leakage Index (ILI) [Real Losses/UARL]	1.255	2.563	3.165		

Available for free download from AWWA website:

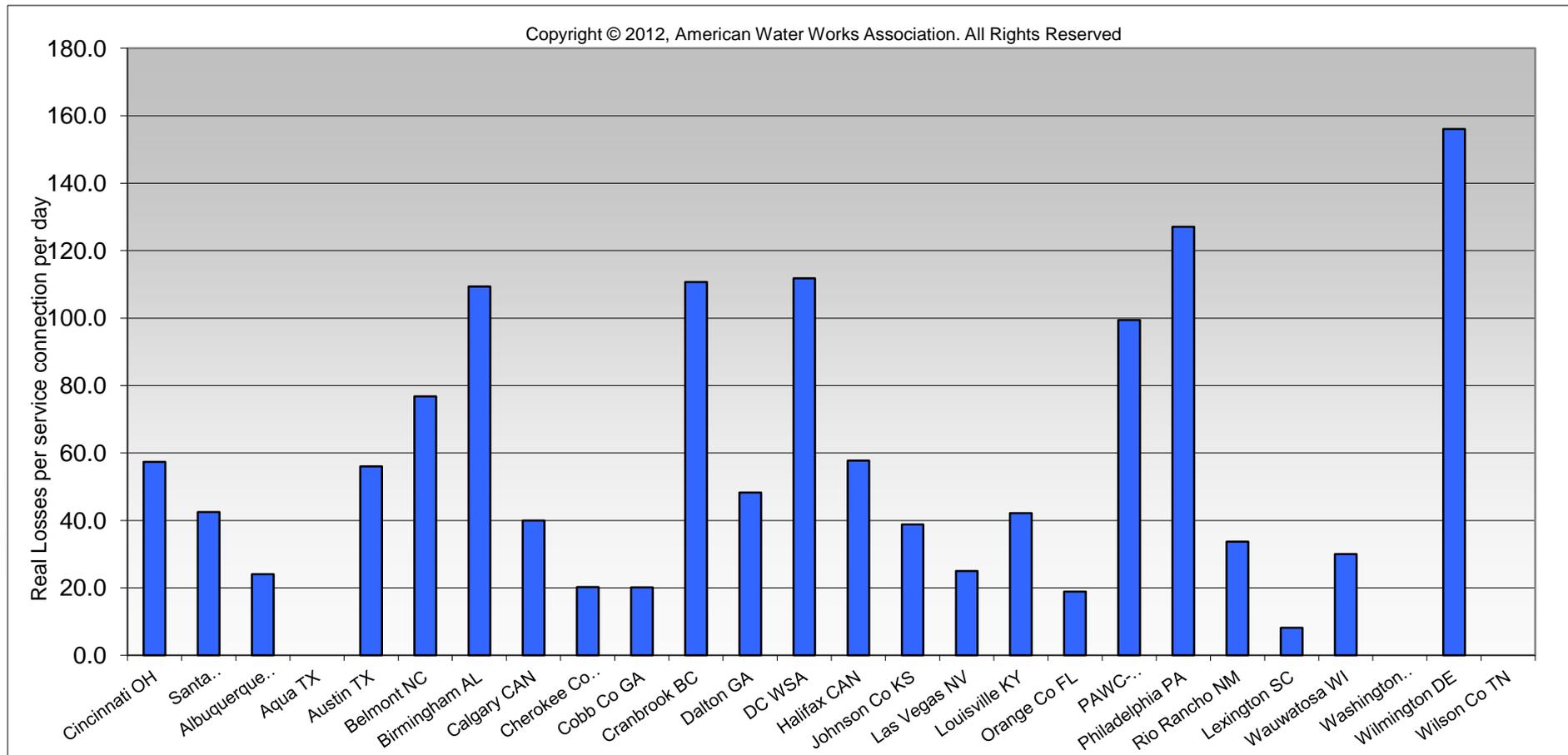
<http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx>

# AWWA Water Audit Compiler© - Apparent Losses



Apparent (non-physical) losses in gal/service connection/day: good for performance tracking

# AWWA Water Audit Compiler© - Real Losses



Real (leakage) losses shown in gal/service connection/day: good for performance tracking

# FY2012 Water Audit Summary

- ◆ Philadelphia continues to be a North American water industry leader in auditing its water supply and controlling losses
- ◆ Water Efficiency and Revenue Recovery are needed more than ever since costs continue to increase and additional revenue capture is needed
- ◆ Need new water consumption auditing capability, particularly for large customers. Need separation of “registered” water consumption and “billed” water consumption in the Basis2 Customer Billing System
- ◆ Full implementation and quality control of Cityworks will create better leak and break repair tracking
- ◆ A new approach to customer service line leakage is needed