Rockland County Task Force on Water Resources Management

Project Findings:
Phase 1–Water Data Analysis to Support a Water Conservation Feasibility Study

June 27, 2015

Amy Vickers
President, Amy Vickers & Associates, Inc.
Amherst, MA

Acknowledgements

- Rockland County Task Force on Water Resources Management
- Rockland Water Coalition
- Scenic Hudson
- Hudson Riverkeeper Organization
- Sierra Club
- Rockland County EMC
- NY Public Service Commission
- United Water New York

Overview

1. Project Approach
2. Key Findings
3. Recommendations
4. Q&A, Discussion

Project Approach
Phase 1 and Phase 2

Phase 1: Water Data Analysis

Task 1 Project Kick-off

Task 2 Data Collection

Task 3 Profiles of Customer and System Water Use

Phase 2: Water Conservation Feasibility Study

Task 4 Identify Conservation Opportunities (based on Phase 1 project findings)

Task 5 Feasibility Analysis (potential water savings, program costs and benefits)

Task 6 Forecast Future Water Demand Scenarios

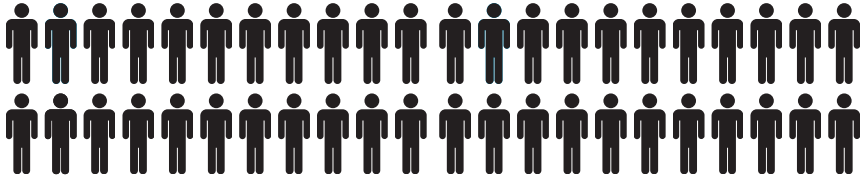
Task 7 Program Implementation Strategy

Task 8 Draft and Final Reports (Water Conservation Feasibility Study)

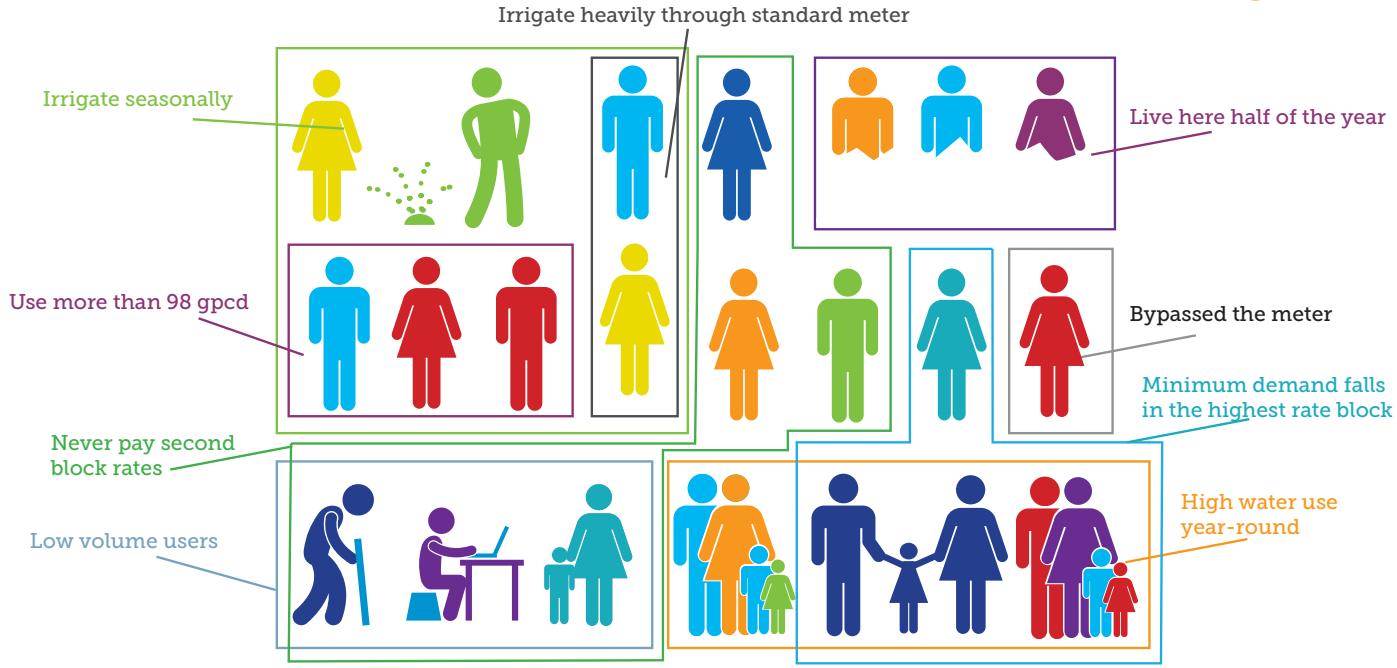
Project Approach
Scope of Work: Phase 1

- **Task 1: Project Kick-off (March 28, 2015)**
- **Task 2: Data & Information Collection**
  - UWNY production and customer use data
  - Rockland County planning and demographic information
- **Task 3: Profiles of Customer and System Water Use**
  - Sorting and analysis of customer and system demands
    - Residential, nonresidential, and system/utility
    - Metrics/Indicators: Per capita, rank, percentile, in/outdoor, NRW/UFW
  - Identify significant or high indoor and outdoor water uses
    - Compare to efficiency benchmarks, e.g., homes and leaks/losses
    - Start to identify the types of water-saving measures and program strategies to evaluate in Phase 2–Water Conservation Plan development

Do You Think of Your Residential Customers Like This?



Your Customers Are Not (all) Average



Use our nine indicators to segment your customers for more efficient programming, planning and rate-setting.

American Water Works Association

Dedicated to the World's Most Important Resource™

A Guide to Customer Water-Use Indicators for Conservation and Financial Planning

By Amy Vickers, Mary Wyatt Tiger & Shadi Eskaf

www.awwa.org/wateruseindicators

<table>
<tr><th colspan="6">The IWA/AWWA Water Balance</th></tr>
<tr><td rowspan="13">Volume From Own Sources (corrected for known errors)

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<tr><td>Unauthorized Consumption</td></tr>
<tr><td>Systematic Data Handling Errors</td></tr>
<tr><td rowspan="5">Real Losses</td><td>Leakage on Transmission and Distribution Mains</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks</td></tr>
<tr><td>Leakage on Service Connections up to the Point of Customer Metering</td></tr>
<tr><td colspan="6">NOTE: All data in volume for the period of reference, typically one year.</td></tr>
</table>

Non-revenue Water (NRW) – Unaccounted-for Water (UFW)

American Water Works Association

Project Approach
Standards & Methodologies

- **American Water Works Association (AWWA)**
  - IWA/AWWA Water Audit Methodology
  - AWWA Water Audit Software v5.0 (2014)
  - Manual: *M36–Water Audits and Loss Control Programs (3rd ed.)*
  - Manual: *M6–Water Meters: Selection, Installation, Testing, and Maintenance (5th ed.)*
  - Manual: M52–*Water Conservation Programs–A Planning Manual (1st ed.)*
  - Partnership for Safe Water Distribution System Optimization Program, June 2014.
  - Vickers, Amy, et al. *"A Guide to Customer Water-Use Indicators for Conservation and Financial Planning"* (American Water Works Association, Denver, CO, 2013).
  - "Water Loss Control: Apparent and Real Losses" (2012)
- **Water Research Foundation (formerly AWWA Research Foundation)**
  - Residential End Uses of Water Study Update (final report pending, 2015)
  - Residential End Uses of Water (AWWA Research Foundation, Denver, CO, 1999)
- **Water Research Foundation and the Environmental Protection Agency.**
  - *Real Loss Component Analysis: A Tool for Economic Water Loss Control*, Report #4372a (2014).

Project Approach

Primary Source Materials

- **United Water New York (UWNY)**
  - System production, water loss, and customer meter data
  - Numerous background studies and reports
- **New York State Public Service Commission (PSC)**
  - Annual Reports of United Water New York
  - Non-revenue Water reports of UWNY
- **New York State Department of Environmental Conservation (DEC)**
  - Water Withdrawal Reports submitted by UWNY
  - Water Conservation Program Report submitted by UWNY, 2010 (most recent).
- **Rockland County**
  - Planning reports, maps, and demographic data

KEY FINDINGS

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1. **UWNY water demand largely flat** since 2000 despite a growing population
2. **High system water losses have persisted for decades**
3. **Data inconsistencies, errors, and missing data in UWNY's records and reports make it difficult if not impossible to know the true volumes of water supplied, consumed by customers, and lost to non-revenue water** for at least the last three years (2012-2014).
4. **Errors found in UWNY's AWWA Water Audit Reports underestimated leakage recovery potential, overestimated apparent losses (2012-2014)**
   - **Corrected reports prepared by Task Force consultant**

KEY FINDINGS

5. **The snail's pace of UWNY's main replacement put it on an astounding 704-year schedule in 2014**, on top of being more than a decade behind the state's recommended timetable for surveying leaks in system mains.
6. **Preliminary estimated 4.4 MGD to 7.0 MGD of potential water savings, about 15% to 25% untapped capacity in UWNY system**
   - **2.5 MGD to 3.3 MGD of recoverable leakage**
     - Corrected UWNY AWWA Water Audit reports
   - **1.9 MGD to 3.6 MGD from customer-oriented conservation**
     - Based on analysis of customer water use/efficiency
7. **Need for additional water supplies doubtful at this time**
   - **Leakage reduction, conservation, water reuse, rainwater harvesting, and green infrastructure = future water independence for Rockland County**

KEY FINDING #1

Water demand in United Water New York's service area has been largely flat since 2000 despite a growing service area population, a trend that may continue for the foreseeable future

Figure 1-1. United Water New York: Annual Average Day Production, Maximum Day Demand and Population Served, 2000-2014

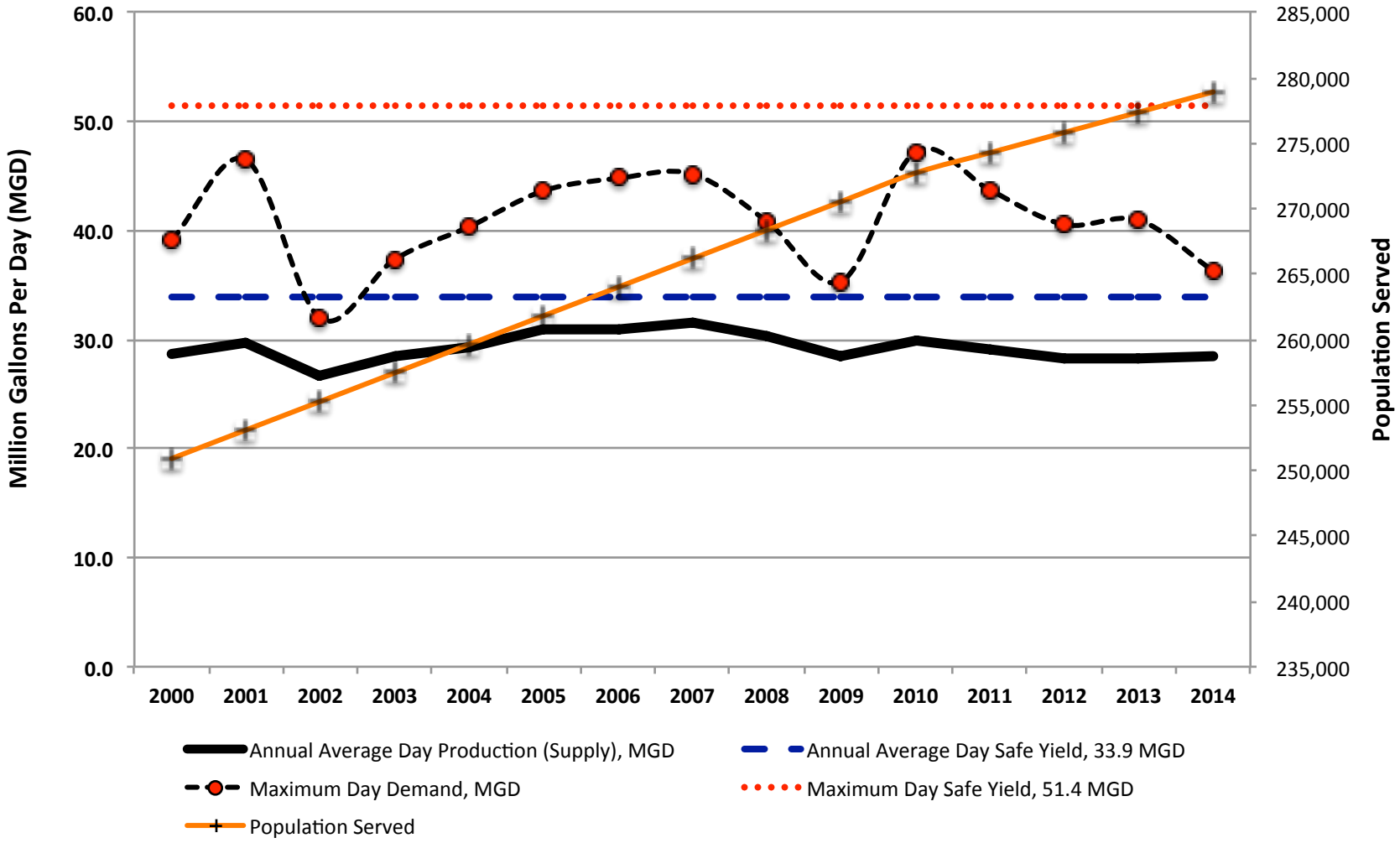


Figure 3-1. UWNY Retail Customer And Export/Wholesale Water Demands, Average Million Gallons Per Day (MGD), 2012-2014

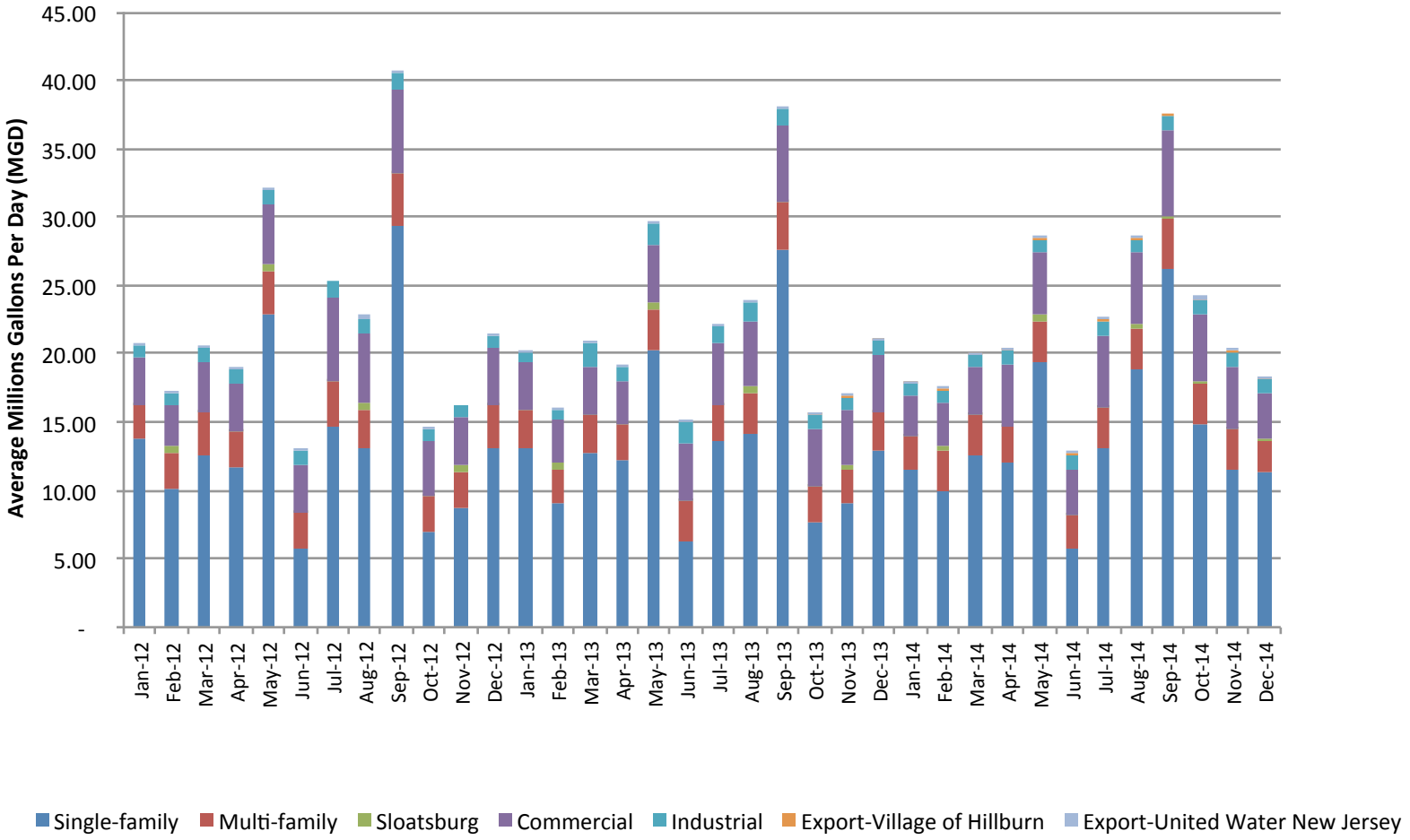
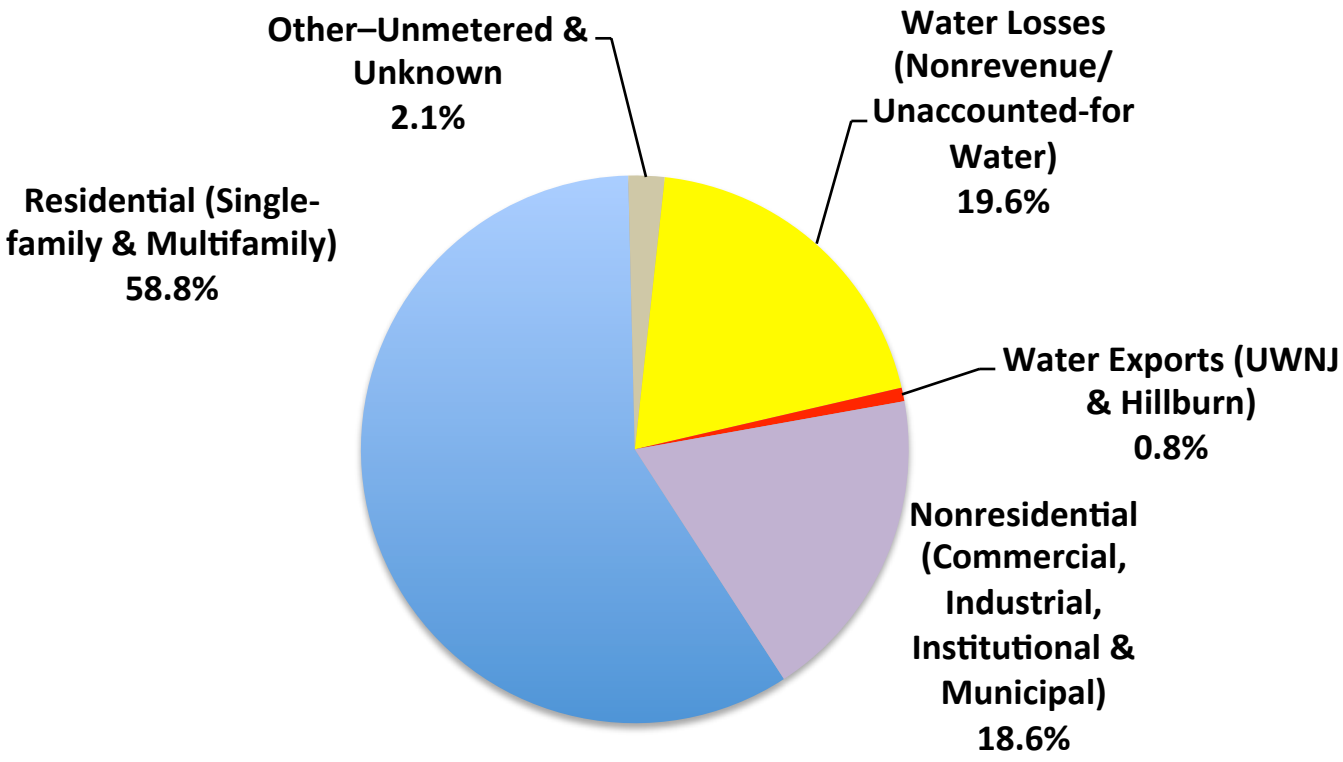


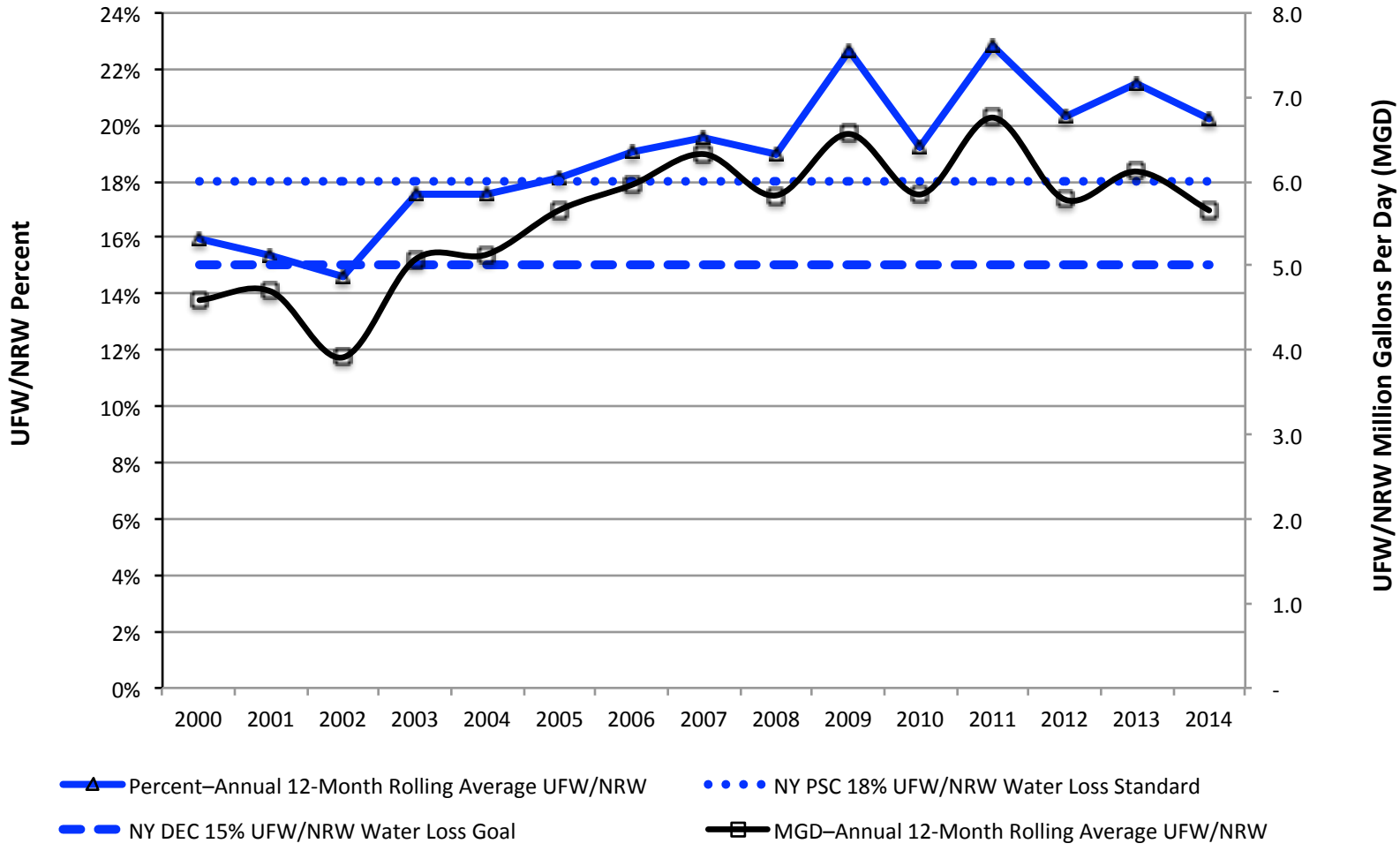
Figure 1-2. UWNY Categorical Water Usages in 2014, Total 10,513.7 Million Gallons

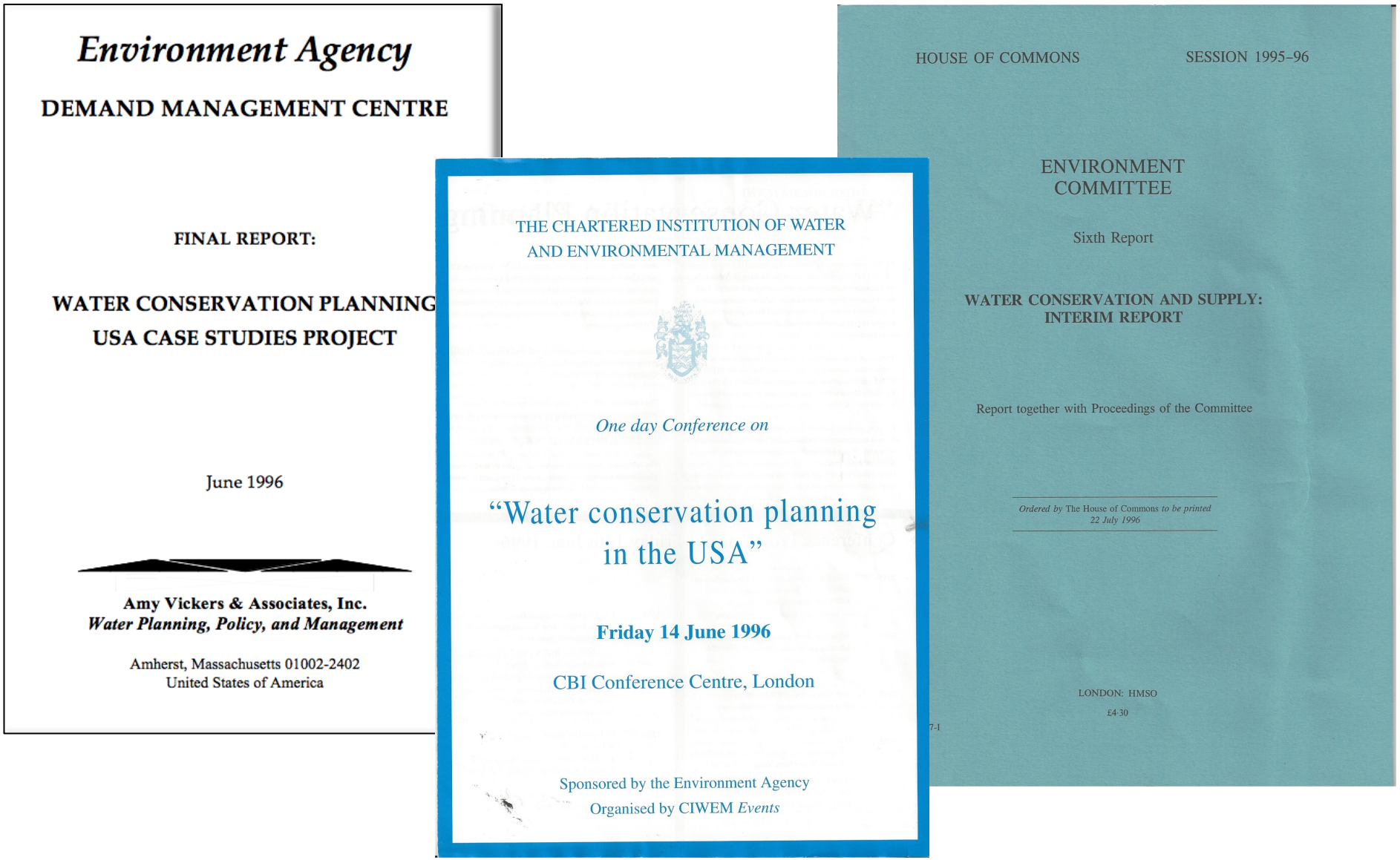


KEY FINDING #2

High system water losses and leakage have been a chronic problem in the UWNY system for decades.

Figure 2-2. UWNY Non-revenue/Unaccounted-for Water (UFW/NRW) Annual 12-month Rolling Average, 2000-2014





Environment Agency

DEMAND MANAGEMENT CENTRE

FINAL REPORT:

WATER CONSERVATION PLANNING
USA CASE STUDIES PROJECT

June 1996

Amy Vickers & Associates, Inc.
Water Planning, Policy, and Management

Amherst, Massachusetts 01002-2402
United States of America

THE CHARTERED INSTITUTION OF WATER
AND ENVIRONMENTAL MANAGEMENT

One day Conference on

"Water conservation planning in the USA"

Friday 14 June 1996

CBI Conference Centre, London

Sponsored by the Environment Agency
Organised by CIWEM *Events*

HOUSE OF COMMONS SESSION 1995–96

ENVIRONMENT
COMMITTEE

Sixth Report

WATER CONSERVATION AND SUPPLY:
INTERIM REPORT

Report together with Proceedings of the Committee

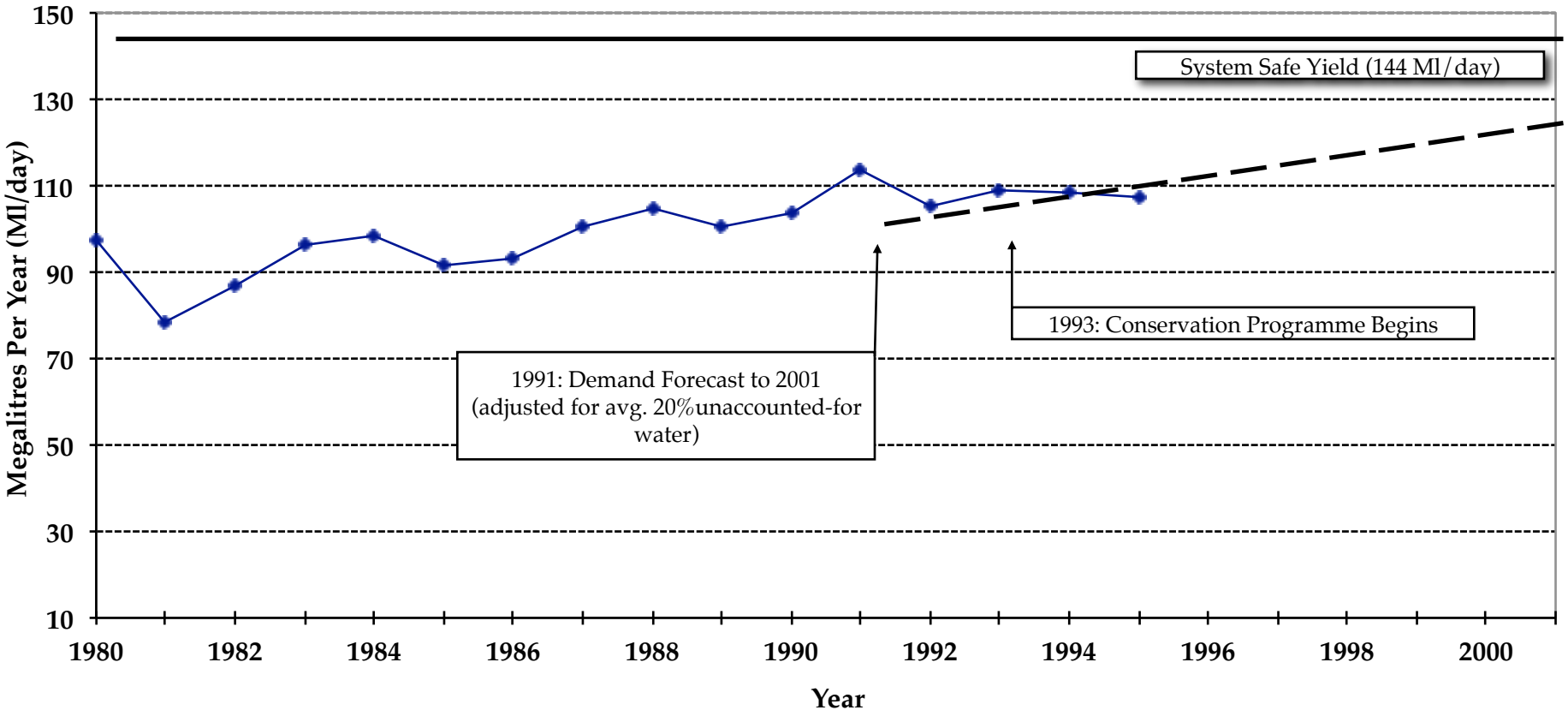
Ordered by The House of Commons *to be printed*
22 July 1996

LONDON: HMSO
£4·30

FIGURE 7-2

UNITED WATER COMPANY/NEW YORK

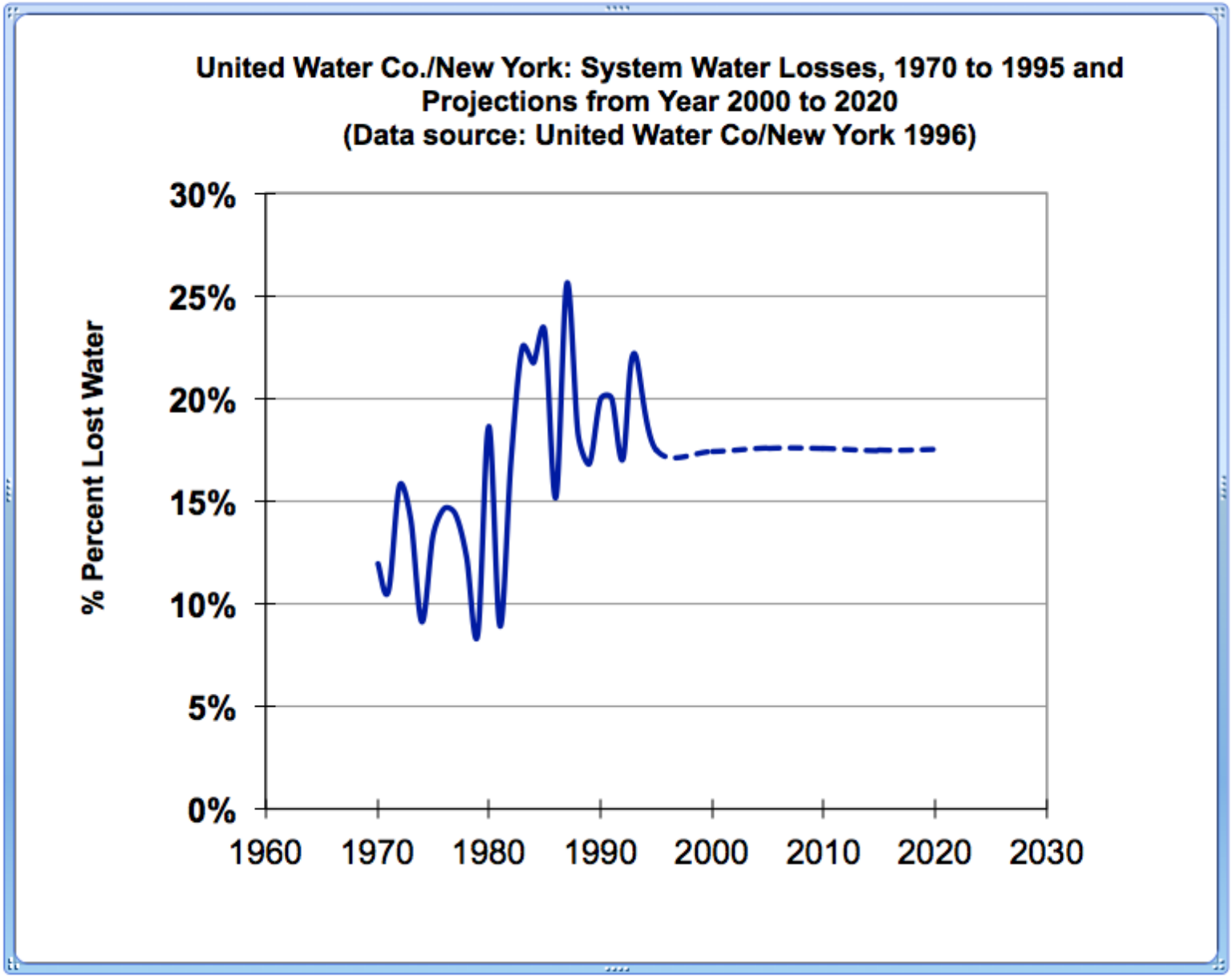
ANNUAL AVERAGE WATER DEMAND, 1980 - 1995, Ml/day



Source: United Water Company/New York (1996)

Source: United Water Co/New York 1996

	Water Loss %
1970	12%
1971	11%
1972	16%
1973	14%
1974	9%
1975	13%
1976	15%
1977	14%
1978	12%
1979	8%
1980	19%
1981	9%
1982	17%
1983	22%
1984	22%
1985	23%
1986	15%
1987	26%
1988	18%
1989	17%
1990	20%
1991	20%
1992	17%
1993	22%
1995	17%
2000	17%
2005	18%
2010	18%
2015	17%
2020	18%



KEY FINDING #3

Data inconsistencies, errors, and missing data found in UWNY's records and reports.

It is difficult if not impossible to know the true volumes of water supplied, consumed by customers, and lost to leakage and other types of non-revenue water for at least the last three years (2012-2014).

Table 2-1. Data Inconsistencies in Volumes of Water Supply, Demand, and Water Losses (UFW/NRW) in UWNY Reports to the PSC, DEC and Task Force Consultant

Total Water Produced (Sources of supply)	*Million Gallons per Year*		
	2012	**2013**	**2014**
PSC Annual Report of UWNY (p. 400):	10,348.87	10,384.00	10,513.68
NY DEC Annual Water Withdrawal (Permit) Report by UWNY, Section 2:	10,330.82	10,384.03	10,513.68
UWNY data sent to Task Force consultant, v4, v5 and v6:	10,322.66	10,357.80	10,402.64
UWNY data sent to Task Force consultant, v7:	10,348.87	10,384.00	10,513.68
Maximum difference among ranges, MG/Y:	**26.20**	**26.20**	**111.04**

Total Water Purchases (Imports)	*Million Gallons per Year*		
	2012	**2013**	**2014**
PSC Annual Report of UWNY (p. 305)	182.50	182.50	182.50
NY DEC Annual Water Withdrawal (Permit) Report by UWNY, Section 2:	0.00	0.00	0.00
UWNY data sent to Task Force consultant, v4, v5, v6 and v7:	0.00	0.00	0.00
Maximum difference among ranges, MG/Y:	**182.50**	**182.50**	**182.50**

Total Water Consumption (Customer demands)	*Million Gallons per Year*		
	2012	**2013**	**2014**
PSC Annual Report of UWNY (p. 300)	8,188.56	8,068.39	8,453.84
PSC Annual Report of UWNY (p. 400):	8,141.95	8,068.39	8,453.84
NY DEC Annual Water Withdrawal (Permit) Report by UWNY, Section 2:	8,192.28	8,124.09	8,447.44
UWNY data sent to Task Force consultant, v4, v5 and v6:	8,142.36	8,068.39	8,221.31
UWNY data sent to Task Force consultant, v7:	8,141.95	8,068.39	8,453.84
UWNY data sent to Task Force consultant, total of customer metered demands*:	7,981.15	7,825.20	8,101.46
Maximum difference among ranges, MG/Y:	**211.13**	**298.89**	**352.38**

(Continued)

(Continued)

Table 2-1. Data Inconsistencies in Volumes of Water Supply, Demand, and Water Losses (UFW/NRW) in UWNY Reports to the PSC, DEC and Task Force Consultant

Total Water Sold (Exports/Resale)	***Million Gallons per Year***		
	2012	**2013**	**2014**
PSC Annual Report of UWNY (pages 300 and 305): United Water New Jersey and	*35.33*	*38.45*	*39.46*
Village of Hillburn	*38.24*	*32.41*	*44.74*
Total Exports reported to PSC:	73.57	70.87	84.20
NY DEC Annual Water Withdrawal (Permit) Report by UWNY, Section 2:	41.54	32.41	44.73
UWNY data sent to Task Force consultant, v4, v5 and v6:	73.75	70.98	80.32
UWNY data sent to Task Force consultant, v7:	73.57	70.87	84.20
Maximum difference among ranges, MG/Y:	**32.21**	**38.57**	**39.47**

Total NRW/UFW: Water Produced/Imported Minus Water Consumed/Exported†	***Million Gallons per Year***		
	2012	**2013**	**2014**
PSC Annual Report of UWNY (p. 400)	2,315.85	2,427.24	2,158.14
NY DEC Annual Water Withdrawal (Permit) Report by UWNY, Section 2:	2,138.55	2,259.94	2,066.25
UWNY data sent to Task Force consultant, v4, v5 and v6:	2,111.10	2,232.30	2,064.40
UWNY data sent to Task Force consultant, v7:	2,206.90	2,315.60	2,059.80
Maximum difference among ranges, MG/Y:	**204.75**	**194.94**	**98.34**

Total NRW/UFW: Water Produced/Imported Minus Water Consumed/Exported†	***Percent***		
	2012	**2013**	**2014**
PSC Annual Report of UWNY (p. 400):	22.0%	23.0%	20.2%
NY DEC Annual Water Withdrawal (Permit) Report by UWNY, Section 2:	20.7%	21.8%	19.7%
UWNY data sent to Task Force consultant, v4, v5 and v6:	20.5%	21.6%	19.8%
UWNY data sent to Task Force consultant, v7:	21.3%	22.3%	19.6%
Maximum difference among ranges, Percent:	**1.5%**	**1.4%**	**0.6%**

Table 2-2. UWNY Population, Production, Consumption, and Nonrevenue Water Data Sets v4 and v7: Revised Data Highlighted in Red

Source: UWNY, v4 (received 10April2015)

				TOTAL VOLUME–PRODUCTION, NRW, & DEMAND, MG/Y			VOLUME of Customer/Account Water Demands, Annual MG/Y			NUMBER of Customer Accounts			
Year	Population Served	Max Month (MG)	Peak Day Draft (mgd)	Total Production (Ground, Surface, & Other Sources), MG/Y	Non-revenue water/ Unaccounted-for Water, MG/Y	Total Customer/ Account Demands, MG/Y	Residential (Apartment, Hi Rise, Single Family, Multifamily)	NonResidential (Commercial, Hospital, Industrial, Municipal, School, Warehouse)	Other (Building Rates, Resale)	TOTAL NUMBER OF CUSTOMER ACCOUNTS	Residential (Apartment, Hi-rise, Single-family, Multifamily)	NonResidential (Commercial, Hospital, Industrial, Municipal, School, Warehouse)	Other (Building Rates, Resale)
2014		1,008.85	36.29	10,402	2,064.4	8,221.3	6,180.36	1,960.62	80.32	77,369	72,039	5,328	2
2013	278,037	1,048.05	40.94	10,358	2,232.3	8,068.4	5,972.60	2,024.92	70.98	77,297	71,766	5,529	2
2012	276,267	1,073.33	40.54	10,323	2,111.1	8,142.4	6,030.91	2,028.43	73.75	76,669	71,141	5,526	2
2011	274,497	1,118.04	43.70	10,650	2,465.4	8,191.5	6,043.16	2,020.90	112.19	Transition to new Customer Service data base system			
2010	272,726	1,166.86	47.23	10,889	2,133.6	8,706.2	6,405.01	2,213.08	88.16	72,615	66,969	5,643	
2009	270,544	955.19	35.33	10,442	2,395.0	8,016.9	5,967.80	2,017.62	31.50	72,705	66,914	5,787	
2008	268,363	1,105.35	40.85	11,055	2,129.2	8,829.7	6,287.57	2,459.03	83.09	71,812	66,086	5,723	
2007	266,181	1,155.76	45.18	11,498	2,307.7	9,130.2	6,484.07	2,562.49	83.66	70,920	65,253	5,664	
2006	263,999	1,148.91	44.78	11,256	2,174.6	9,108.5	6,422.07	2,601.35	85.03	70,379	64,774	5,602	
2005	261,818	1,162.68	43.64	11,291	2,065.8	9,225.5	6,559.96	2,623.62	41.92	69,779	64,242	5,536	
2004	259,636	1,042.80	40.34	10,676	1,874.4	8,815.4	6,189.69	2,589.99	35.75	69,247	63,776	5,470	
2003	257,454	1,032.23	37.35	10,416	1,852.1	8,563.5	6,127.81	2,399.10	36.63	68,667	63,265	5,401	
2002	255,272	928.40	31.94	9,736		8,276.4	5,921.00	2,315.31	40.07	68,031	62,716	5,314	
2001	253,091	1,123.36	46.48	10,841		9,091.2	6,538.10	2,501.13	51.92	67,322	62,073	5,248	
2000	250,909	1,015.19	39.07	10,447		8,756.4	6,208.49	2,498.94	48.97	66,519	61,335	5,183	

MG/Y–Million gallons per year

Source: UWNY, v7 (received 28May2015)

Year	Population Served	Max Month (MG)	Peak Day Draft (mgd)	Total Production (Ground, Surface, & Other Sources), MG/Y	South County Total Production MG/Y	Total Production (Rockland County) MG/Y	NRW Calc (NY Division), MG/Y	NRW Calc (Rockland Production minus Rockland Consumption), MG/Y	Total Customer/ Account metered consumption, MG/Y	South County Consumption, MG/Y	Total Consumption Rockland County, MG/Y	Total Residential	Residential South County	Total Commercial	Commercial South County	Total Industrial	Industrial South County	Resale
2014	278,920	1009.35	36.29	10,514	85	10,429	2,059.8	2,028.4	8,453.8	53	8,401	6,316.50	26.06	1,674.99	27.2	378.153		84.201
2013	277,372	1040.35	40.94	10,384	70	10,314	2,315.6	2,300.7	8,068.4	56	8,013	5,971.75	23.59	1,590.82	32.0	434.951	-0.082	70.866
2012	275,823	1065.08	40.54	10,349	69	10,280	2,206.9	2,183.6	8,141.9	45	8,097	6,014.15	24.22	1,627.96	20.8	426.266	0.402	73.569
2011	274,275	1109.97	43.70	10,650	70	10,580	2,464.2	2,447.7	8,186.2	53	8,133	6,024.39	24.67	1,607.51	26.3	451.277	2.454	103.055
2010	272,726	1158.00	47.23	10,889	73	10,816	2,178.9	2,158.5	8,710.0	53	8,657	6,408.29	27.45	1,691.70	23.3	521.844	2.144	88.159
2009	270,544	947.36	35.33	10,442	70	10,372	2,392.8	2,373.8	8,049.6	51	7,999	5,969.30	26.92	1,511.76	22.1	506.035	2.059	62.517
2008	268,363	1084.26	40.85	10,960	93	10,867	2,093.1	2,058.6	8,867.1	59	8,808	6,299.23	28.75	1,650.38	28.3	837.333	1.776	80.172
2007	266,181	1155.81	45.18	11,591	99	11,491	2,404.0	2,364.8	9,186.9	60	9,127	6,515.33	31.15	1,765.74	26.8	825.85	2.318	79.982
2006	263,999	1127.57	44.78	11,253		11,253	2,147.8	2,147.8	9,105.3		9,105	6,422.07		1,686.66		914.693		81.912
2005	261,818	1162.68	43.64	11,291		11,291	2,027.6	2,027.6	9,263.7		9,264	6,564.74		1,755.38		868.244		75.386
2004	259,636	1042.80	40.34	10,676		10,676	1,846.4	1,846.4	8,829.4		8,829	6,172.78		1,694.63		888.288		73.693
2003	257,454	1032.23	37.35	10,416		10,416	1,828.0	1,828.0	8,587.6		8,588	6,127.81		1,629.78		769.317		60.716
2002	255,272	926.79	31.94	9,735		9,735	1,431.3	1,431.3	8,304.0		8,304	5,921.00		1,628.23		687.054		67.722
2001	253,091	1128.00	46.48	10,841		10,841	1,713.0	1,713.0	9,127.7		9,128	6,538.96		1,766.48		734.503		87.756
2000	250,909	1015.19	39.07	10,447		10,447	1,684.8	1,684.8	8,762.2		8,762	6,195.23		1,722.38		769.738		74.836

Note: "South" County refers to Orange County

KEY FINDING #4

Errors found in UWNY's AWWA Water Audit Reports underestimated leakage recovery potential, overestimated apparent losses (2012-2014).

Corrected reports prepared by Task Force consultant yielded much higher estimate of recoverable leakage.

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<tr><td>Unbilled Unmetered Consumption</td></tr>
<tr><td rowspan="6">Water Losses</td><td rowspan="3">Apparent Losses</td><td>Customer Metering Inaccuracies</td></tr>
<tr><td>Unauthorized Consumption</td></tr>
<tr><td>Systematic Data Handling Errors</td></tr>
<tr><td rowspan="3">Real Losses</td><td>Leakage on Transmission and Distribution Mains</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks</td></tr>
<tr><td>Leakage on Service Connections up to the Point of Customer Metering</td></tr>
<tr><td colspan="6">NOTE: All data in volume for the period of reference, typically one year.</td></tr>
</table>

American Water Works Association

Table 2-3. Reporting Worksheets in UWNY's Annual AWWA Water Audit Report: Data Inconsistencies, Missing Data, and Errors in Reports Prepared By UWNY Compared to Corrected Reports Using Data in UWNY's Annual Reports to the PSC, 2012-2014

REPORTING WORKSHEET (AWWA Water Audit Software*)	"A" Columns: UWNY Water Audit Data & Default Overrides			"B" Columns: Corrected UWNY Water Audit Data Using UWNY's PSC Annual Report Data & No Default Overrides		
	2012	2013	2014	2012	2013	2014
A. WATER SUPPLIED	***Million Gallons per Year***			***Million Gallons per Year***		
Volume from own sources (MG/Y):	10,348.865	10,389.154	10,513.682	10,348.865	10,383.997	10,513.682
Water Imported (MG/Y):	0.0	0.0	0.0	182.500	182.500	182.500
Water Exported (MG/Y):	41.542	27.280	0.0	73.569	70.866	84.201
Total Water Supplied (MG/Y):	**10,307.3**	**10,361.9**	**10,513.7**	**10,457.8**	**10,495.6**	**10,612.0**
B. AUTHORIZED CONSUMPTION	***Million Gallons per Year***			***Million Gallons per Year***		
Billed Metered Consumption (MG/Y):	8,192.276	8,124.086	8,447.437	8,141.947	8,068.390	8,453.843
Billed Unmetered Consumption (estimate) (MG/Y):	0.0	0.0	0.0	43.117	129.600	131.275
Unbilled Metered Consumption (MG/Y):	29.555	65.717	30.250	0.825	4.019	8.250
Unbilled Unmetered Consumption (estimate) (MG/Y):	128.842	129.523	131.421	2.670	5.968	6.385
Total Authorized Consumption:	**8,350.7**	**8,319.3**	**8,609.1**	**8,188.6**	**8,208.0**	**8,599.8**
C. WATER LOSSES	***Million Gallons per Year***			***Million Gallons per Year***		
Total Water Losses (Water Supplied-Authorized Consumption) **(MG/Y):**	**1,956.7**	**2,042.5**	**1,904.6**	**2,269.2**	**2,287.7**	**2,012.2**
C.1 Apparent Losses						
Unauthorized Consumption (estimate) (MG/Y):	497.0	412.9	373.8	26.1	26.2	26.5
Customer Metering Inaccuracies (estimate)(MG/Y):	222.1	221.2	229.0	219.9	218.0	228.6
Systematic Data Handling Errors (estimate)(MG/Y):	80.0	191.7	143.9	20.4	20.2	21.1
Total Apparent Losses (MG/Y):	**799.1**	**825.8**	**746.7**	**266.4**	**264.4**	**276.2**
C.2. Real Losses (Current Annual Real Losses or CARL)						
Total Real Losses (MG/Y):	**1,157.6**	**1,216.8**	**1,157.9**	**2,002.8**	**2,023.2**	**1,736.0**
Total Water Losses (MG/Y):	**1,956.7**	**2,042.5**	**1,904.6**	**2,269.2**	**2,287.7**	**2,012.2**
D. NON-REVENUE WATER	***Million Gallons per Year***			***Million Gallons per Year***		
Total Non-Revenue Water, MG/Y:	**2,115.0**	**2,237.8**	**2,066.2**	**2,272.7**	**2,297.6**	**2,026.9**
Total Non-Revenue Water, Percent of Total Water Supplied:	**20.5%**	**21.6%**	**19.7%**	**21.7%**	**21.9%**	**19.1%**
E. SYSTEM DATA	***System Data***			***System Data***		
Length of mains (miles):	1,049.3	1,050.5	1,056.3	1,049.3	1,050.5	1,056.3
Number of active and inactive service connections:	73,733	74,576	74,973	73,733	74,576	74,973
Service connection density (conn./miles main)	70	71	71	70	71	71
Average length of service line (ft):	75.0	75.0	44.0	44.0	44.0	44.0
Average operation pressure (psi):	107.0	103.30	103.30	107.0	103.30	103.30
F. COST DATA	***Cost Data***			***Cost Data***		
Total annual cost of operating water system ($/year):	$32,332,734	blank	$52,637,304	$28,759,617	$27,442,369	$26,529,066
Customer retail unit cost (applied to Apparent Losses ($/100 ccf)):	$ 5.74	blank	$ 5.11	$ 5.32	$ 5.53	$ 5.78
Variable production cost (applied to Real Losses) ($/MG):	$ 362.00	blank	$ 430.51	$ 362.00	$ 430.51	$ 430.51
G. WATER AUDIT DATA VALIDITY SCORE (maximum 100)†						

Table 2-4. Performance Indicators in UWNY's Annual AWWA Water Audit Report: Results of Data Inconsistencies, Missing Data, and Errors in Reports Prepared By UWNY Compared to Corrected Reports Using Data in UWNY's Annual Reports to the PSC, 2012-2014

PERFORMANCE INDICATORS (AWWA Water Audit Software*)	"A" Columns: UWNY Water Audit Data & Default Overrides			"B" Columns: Corrected UWNY Water Audit Data Using UWNY's PSC Annual Report Data & No Default Overrides		
	2012	2013	2014	2012	2013	2014
H. System Attributes	*Million Gallons per Year*			*Million Gallons per Year*		
Apparent Losses (MG/Y):	799.1	825.8	746.7	266.4	264.4	276.2
+ Real Losses (CARL) (MG/Y):	1,157.6	1,216.8	1,157.9	2,002.8	2,023.2	1,736.0
= Water Losses (MG/Y):	**1,956.7**	**2,042.5**	**1,904.6**	**2,269.2**	**2,287.7**	**2,012.2**
Unavoidable Annual Real Losses (UARL) (MG/Y):	**960.4**	**935.6**	**816.2**	**833.6**	**811.8**	**816.2**
	Cost Data			*Cost Data*		
Annual cost of Apparent Losses:	$ 6,131,511	blank	$ 5,095,668	$ 1,894,860	$ 1,954,947	$ 2,134,347
Annual cost of Real Losses:	$ 419,042	blank	$ 498,483	$ 725,013	$ 871,010	$ 747,365
I. Financial Performance Indicators	*Performance Indicators*			*Performance Indicators*		
Non-revenue water as percent by volume of Water Supplied:	20.5%	21.6%	19.7%	21.7%	21.9%	19.1%
Non-revenue water as percent by cost of operating system:	20.4%	blank	10.8%	9.1%	10.3%	10.9%
J. Operational Efficiency Performance Indicators	*Performance Indicators*			*Performance Indicators*		
Apparent Losses per service connection per day (gal/connection/day):	**29.7**	**30.3**	**27.3**	**9.9**	**9.7**	**10.1**
Real Losses per service connection per day (gal/connection/day):	**43.0**	**44.7**	**42.3**	**74.4**	**74.3**	**63.4**
Real Losses per length of main per day (applies to small systems only):	NA	NA	NA	NA	NA	NA
Real Losses per service connection per day per psi pressure:	0.40	0.43	0.41	0.7	0.72	0.61
Real Losses = Current Annual Real Losses (CARL) (MG/Y):	**1,157.6**	**1,216.8**	**1,157.9**	**2,002.8**	**2,023.2**	**1,736.0**
Infrastructure Leakage Index (ILI)* [CARL/UARL]:	1.21	1.30	1.42	2.40	2.49	2.13

Table 2-5. Summary of UWNY's System Water Losses and Estimated Recoverable Leakage: Comparison of UWNY's Annual AWWA Water Audit Reports to Corrected Reports Using UNWY Data As Submitted in Annual Reports to the PSC, 2012-2014

SYSTEM LOSSES AND RECOVERABLE LEAKAGE	"A" Columns: UWNY Water Audit Data & Default Overrides			"B" Columns: Corrected UWNY Water Audit Data Using UWNY's PSC Annual Report Data & No Default Overrides		
	2012	2013	2014	2012	2013	2014
K. Non-revenue Water Loss Components	*Percent of Total Water Supplied*			*Percent of Total Water Supplied*		
Total Non-revenue Water, Percent of Total Water Supplied:	20.5%	21.6%	19.7%	21.7%	21.9%	19.1%
Total Apparent Losses, Percent of Total Water Supplied:	7.8%	8.0%	7.1%	2.5%	2.5%	2.6%
Total Real Losses, Percent of Total Water Supplied:	11.2%	11.7%	11.0%	19.2%	19.3%	16.4%
Total Recoverable Real Losses, Percent of Total Water Supplied:	1.9%	2.7%	3.3%	11.2%	11.5%	8.7%
L. Recoverable Leakage	*Measurements of Recoverable Leakage*			*Measurements of Recoverable Leakage*		
Current Annual Real Losses-Leakage (CARL) (MG/Y):	1,157.6	1,216.8	1,157.9	2,002.8	2,023.2	1,736.0
Unavoidable Annual Real Losses-Leakage (UARL) (MG/Y):	960.4	935.6	816.2	833.6	811.8	816.2
Est. Net Recoverable Leakage (CARL-UARL), MG/Y:	**197.1**	**281.2**	**341.7**	**1,169.2**	**1,211.4**	**919.8**
Est. Recoverable Leakage/Real Losses, Average MGD:	**0.54**	**0.77**	**0.94**	**3.20**	**3.32**	**2.52**
Est. Net Recoverable Leakage Per Mile of Main, Avg. MG/Y:	**0.19**	**0.27**	**0.32**	**1.11**	**1.15**	**0.87**
Est. Recoverable Leakage, Percent of Total Water Supplied:	**1.9%**	**2.7%**	**3.3%**	**11.2%**	**11.5%**	**8.7%**

Comparison of UWNY and Corrected UWNY AWWA Water Audit Reports for Components of Non-revenue Water, 2012-2014

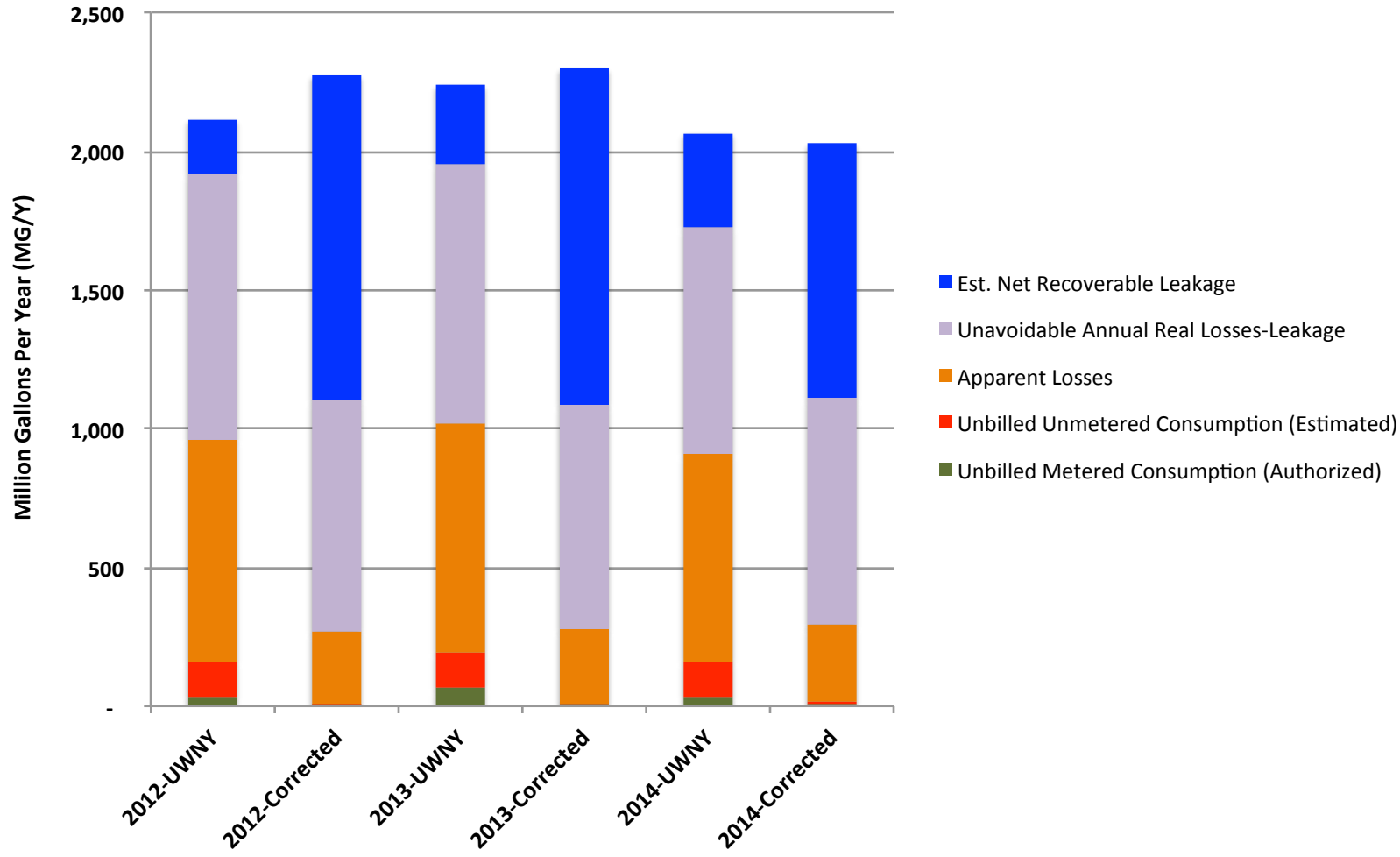

Figure 2-3. AWWA Water Audit "Balance" of UWNY's Consumption and NRW Based on UWNY's 2014 Annual Report Data, Average 29.1 MGD

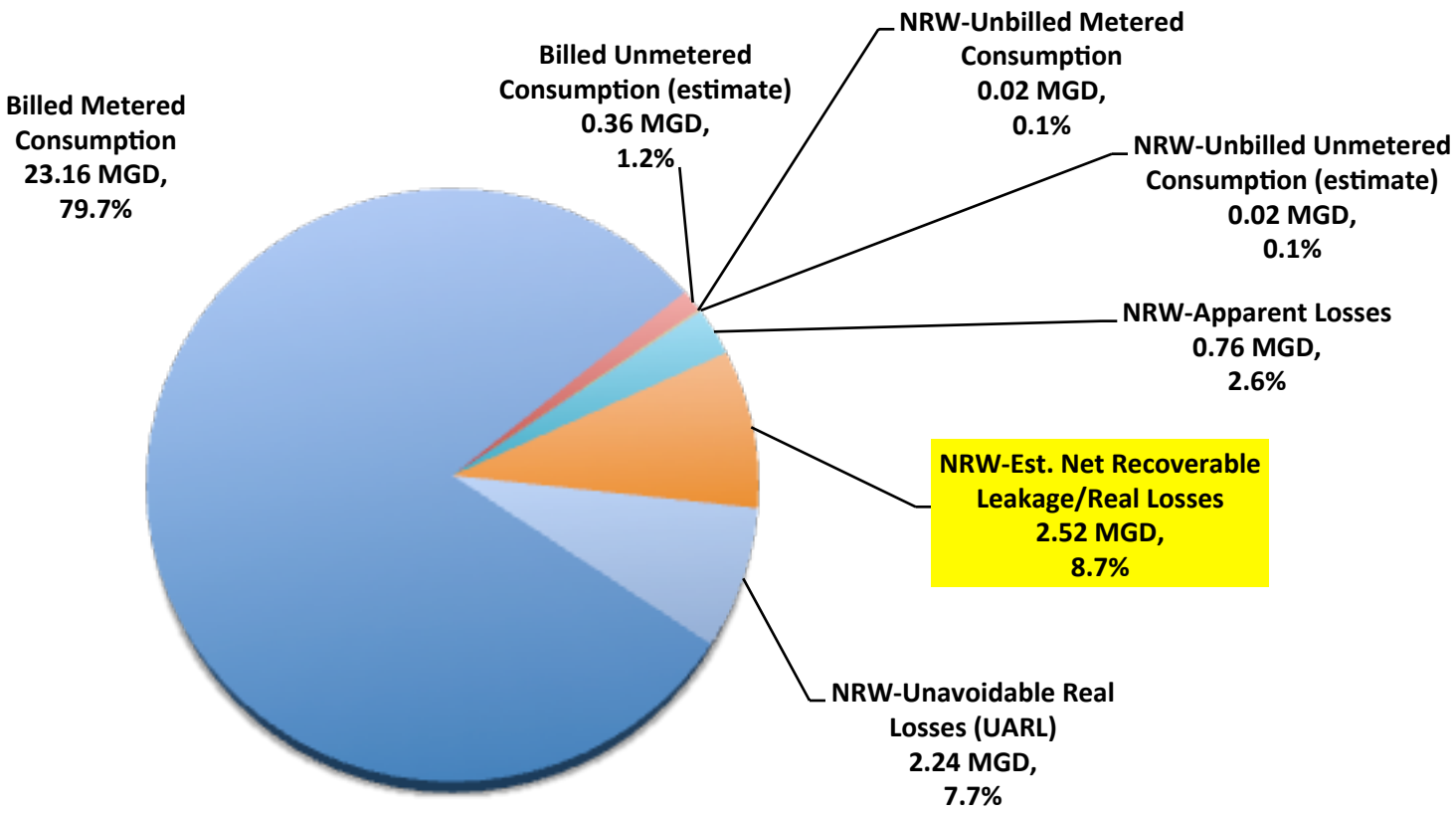

Table 2-2. Survey of System Water Loss Standards and Goals in the Northeast and Great Lakes States

State/Region	Maximum Allowable Water Loss		Terms Used•
	Target	Standard or Goal	
Connecticut	10-15%	Goal	UFW/NRW
Massachusetts	10%	Standard	UAW
New York			
DEC: public/municipal	15%	Goal	UFW/NRW
PSC: investor-owned	18%	Standard	UFW/NRW
New Jersey	15%-20%	Goal/Standard; notification > 18%	UFW
Rhode Island	15% (10% long-term)	Standard	UFW ("Non-account water")
Great Lakes states (55 suppliers surveyed)	10%-20% (most 15%)	Goal (29 states) or Standard (26 states)	UFW (50%), NRW (35%)

PUB, Singapore's national water agency.
Managing the country's water supply, water catchment and used water in an integrated way.

Singapore Government
Integrity • Service • Excellence

PUB
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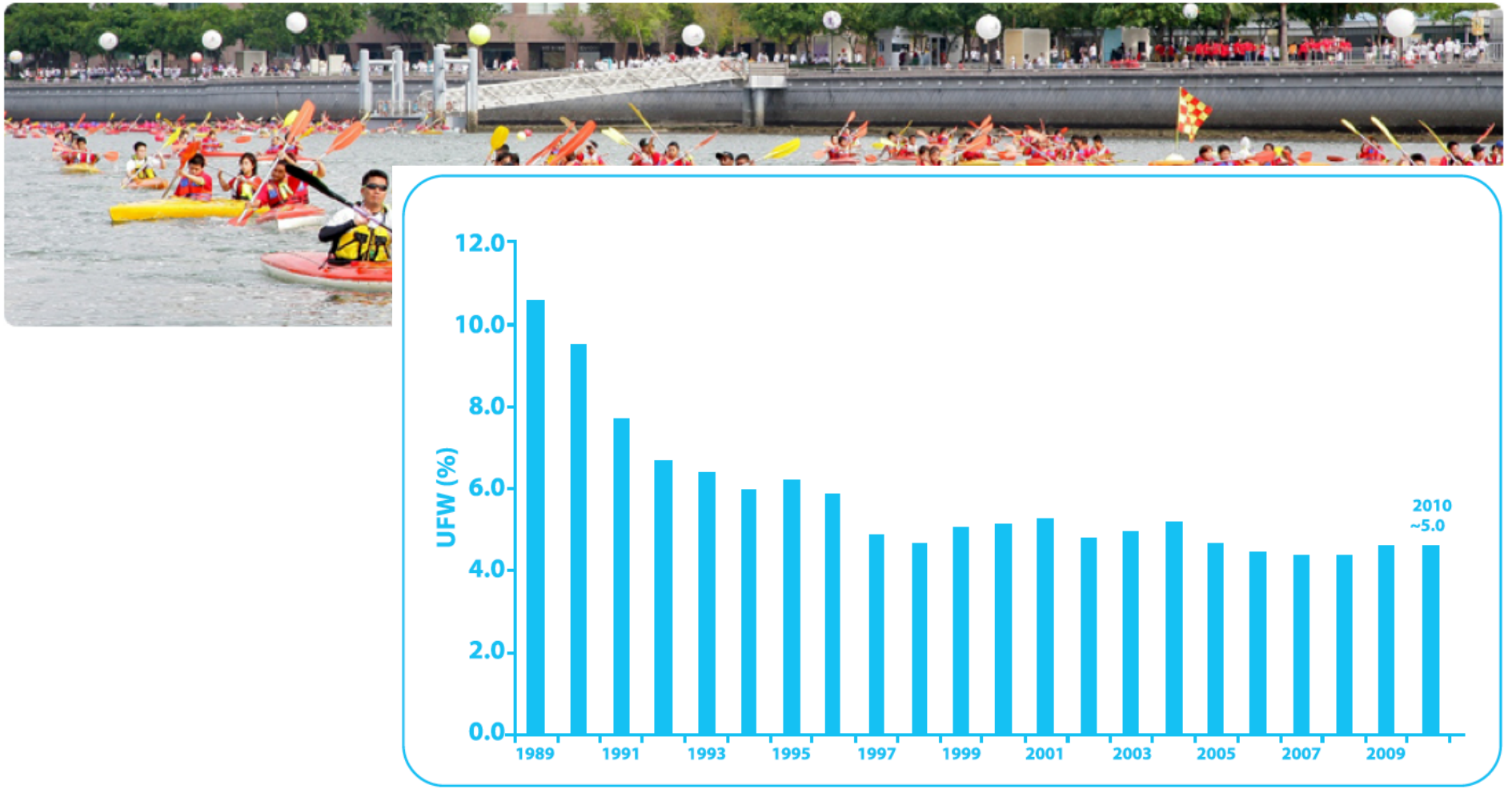


Fig 1.2.1 Unaccounted-for-water (1989 – 2010)

The Four Pillars of Leakage Management – Active Leakage Control

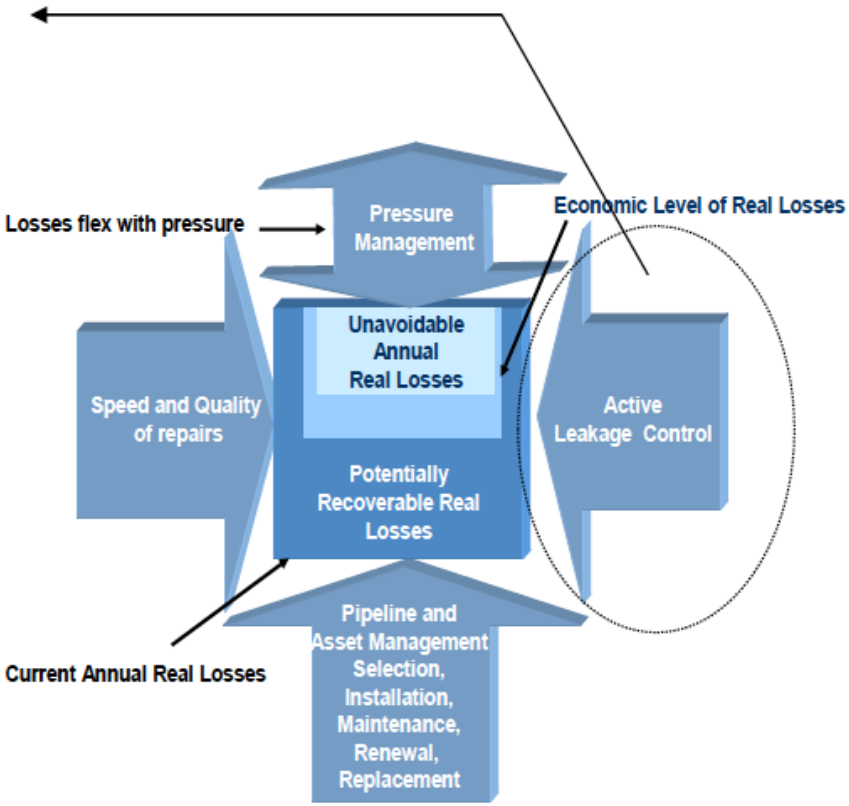
Active Leakage Control in Water Utilities

Most utilities practice <u>reactive</u> leakage control: "wait til it breaks, then fix it"

Many utilities practice proactive, or <u>Active Leakage Control</u>

Periodic acoustic leak detection survey – most common form of leak detection. This is the "find and fix" approach

DMAs and pressure management offer a "predict and prevent" approach



UWNY's High System Water Losses

Summary of Findings and Recommendations

- **High leakage.** Higher real losses and lower apparent losses more accurately describe UWNY's 2012-2014 non-revenue water (NRW) water losses according to the corrected AWWA Water Audit reports that resulted from this study. These findings are the opposite to UWNY's present assumptions about the components of its system water losses.
- **Data errors.** UWNY's future AWWA Water Audit reports should use consistent data that matches other UWNY supply and customer consumption records.
- **Proactive, not passive NRW program**. A proactive, not passive, leak detection and repair program is essential for UWNY to break its long history of high NRW.
- **Infrastructure.** An accelerated main renewal and replacement program that gets ahead of the declining service life of UWNY's mains, if implemented, may have a significant role in reducing the estimated large volume of leakage in Rockland County.
- **Future performance?** Despite the findings from this study, UWNY's long history of high water losses and promises but poor performance in actually reducing their losses is cause for concern.
- **PSC oversight, "carrots and sticks."** Going forward, the PSC needs to actively monitor, at least on a quarterly basis, UWNY's progress in water loss reduction to ensure that it is taking constructive steps toward meeting its required non-revenue goals. And issue penalties when needed.

KEY FINDING #5

The snail's pace of UWNY's main replacement put it on an astounding 704-year schedule in 2014, on top of being more than a decade behind the state's recommended timetable for surveying leaks in system mains.

Table 2-6. UWNY Infrastructure Compared to Water Industry Standards and Performance Indicators, 2012-2014

MAIN REPLACEMENT	2012	2013	2014
Miles of main in UWNY distribution system (excluding customer service line pipes)	1,053	1,051	1,056
Miles of main UWNY renewed/replaced	4.2	2.7	1.5
Percentage of main UWNY renewed/replaced	0.4%	0.3%	0.1%
Est. average service life in years for UWNY's mains (primarily cast iron and ductile iron) when it was installed*†		50-100	
At current rate, approximate number of years it will take UWNY to replace its mains:	**248**	**389**	**704**
MAIN BREAK FREQUENCY	**2012**	**2013**	**2014**
UWNY Main breaks	221	286	384
Average failure frequency in North America‡, number of breaks/100 miles of main/year:	25	25	25
Average failure frequency for optimized distribution systems‡, number of breaks/100 miles of main/year:	15	15	15
UWNY Main breaks, number of breaks/100 miles of main/year:	21	27	36
LEAK DETECTION	**2012**	**2013**	**2014**
Miles of main on which UWNY performed leak detection using sonic listening equipment (primarily noise loggers)	76	156	75
Percentage of main sounded for leaks	7%	15%	7%
DEC Water Conservation Program's recommended maximum number of years to survey an entire system for leaks:	**3 (Minimum one-third annually)**		
At current rate, approximate number of years it will take UWNY to survey its entire systems for leaks:	**14**	**7**	**14**
LEAKS DETECTED/REPORTED	**2012**	**2013**	**2014**
Surfacing (visible) leaks reported in UWNY system, number	271	353	389
Non-surfacing (invisible) leaks reported in UWNY system, number	27	46	102
Total number of leaks detected/reported by UWNY:	**298**	**399**	**491**
Surfacing (visible) leaks detected/reported, percent:	**91%**	**88%**	**79%**
Non-surfacing (invisible) leaks detected/reported, percent:	**9%**	**12%**	**21%**
WATER RECOVERED BY LEAK REPAIRS–POTENTIAL AND ACTUAL	**2012**	**2013**	**2014**
Estimated recoverable leakage in UWNY distribution system (Table 2-6, Corrected UWNY water audits), MG/Y:	1,169.2	1,211.4	919.8
Volume of leakage recovered by UWNY (mains, service lines, and valves), MG/Y:	57.1	64.1	63.1
Volume of leakage recovered by UWNY as percent of total water supplied:	**0.5%**	**0.6%**	**0.6%**
Volume of leakage recovered by UWNY as percent of estimated recoverable leakage (corrected water audits):	**4.9%**	**5.3%**	**6.9%**
At current rate, approximate number of years it will take UWNY to perform repairs on its recoverable leakage:	**20**	**19**	**15**

KEY FINDING #6

Preliminary estimate

4.4 MGD to 7.0 MGD of potential water savings, about 15% to 25%, in UWNY system:

- **2.5 MGD to 3.3 MGD of recoverable leakage**
  - Corrected UWNY AWWA Water Audit reports
- **1.9 MGD to 3.6 MGD from customer-oriented conservation**

Customer Water Use and Conservation Potential

- Residential
  - Single-family
  - Multi-family
- Village of Sloatsburg
- Commercial
- Industrial
- Unmetered customers

Table 3-1. Summary of UWNY Average Customer Water Use Characteristics, 2012-2014*

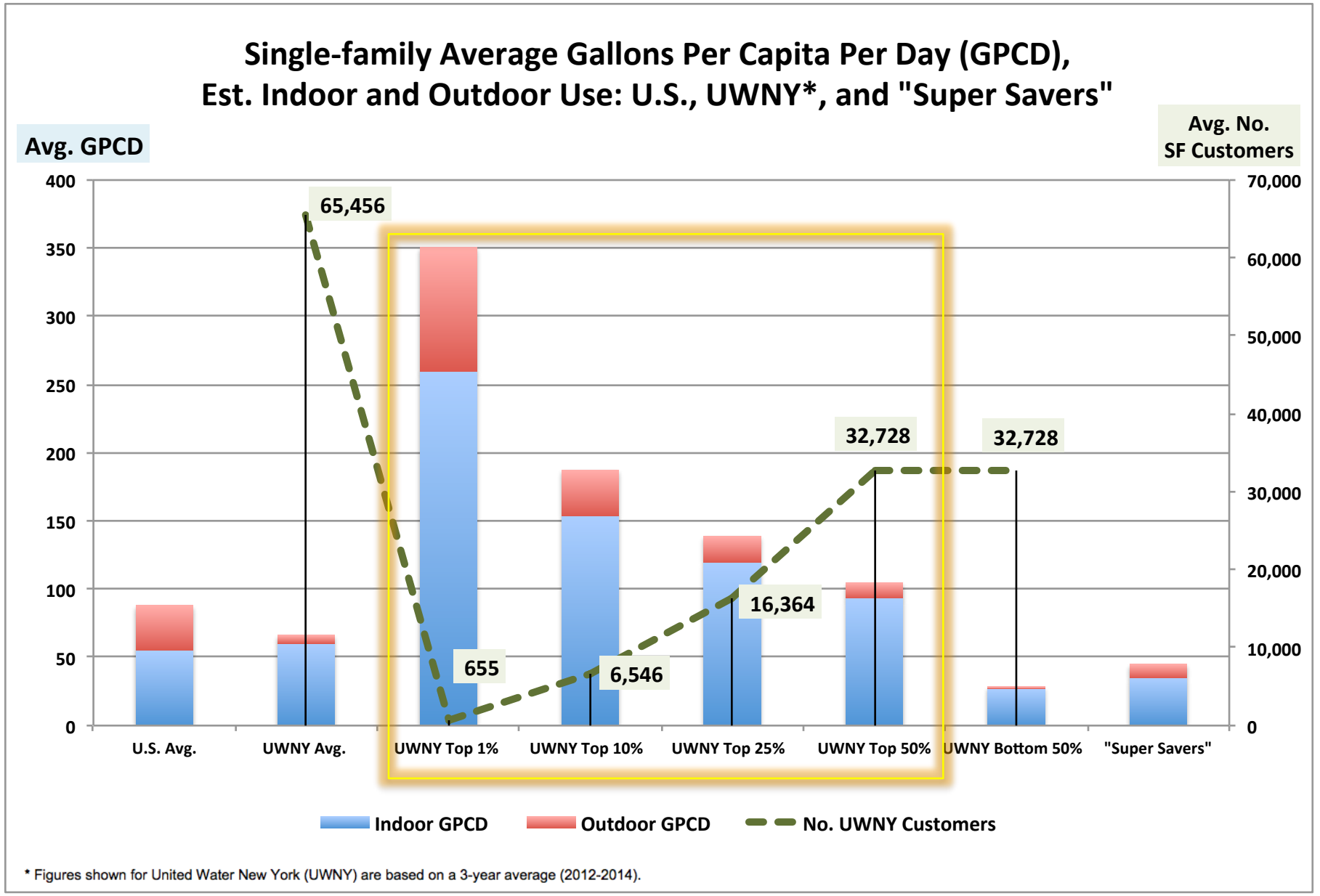
Customer Category	Average No. Accounts†	Percent Water Demand of All Accounts†	Average No. Active Customers†	Average Month Demand, MG	Average Day Demand, MGD	Average Account Demand, GD	Est. Average Account Indoor Demand, GD‡	Est. Average Account Seasonal/ Outdoor Demand, GD§	Est. Average Account Outdoor Water Use, Percent
Residential									
Single-Family (SF)	75,259	62.1%	65,456	412.9	13.6	207	188	19	9%
Multi-Family (MF)	1,839	13.1%	1,725	86.8	2.9	1,552	1,510	42	3%
Total Residential:	**77,098**	**75.2%**	**67,181**	**499.7**	**16.4**	**1,759**	**1,698**	**61**	
Sloatsburg (Village)									
Total Residential/Nonresidential:	**1,124**	**0.7%**	**983**	**4.8**	**0.16**	**141**	**129**	**12**	**9%**
Nonresidential									
Commercial/Public	4,949	19.3%	4,589	127.8	4.2	916	757	158	17%
Industrial	78	4.8%	99	31.8	1.0	13,401	12,803	598	4%
Total Nonresidential:	**5,027**	**24.0%**	**4,688**	**159.6**	**5.2**	**14,317**	**13,560**	**756**	
Service Points without Meters									
Total Unmetered:	**170**	Unknown	**170**	Unknown					
TOTAL:	**83,419**	**100.0%**	**73,022**	**664.2**	**21.8**	**16,217**	**15,387**	**829**	**5%**

Table 3-2. Single-Family Residential Average Customer Water Use Characteristics By Percentile, 2012-2014*

Single-Family Customer Account Percentile	Average No. Active Accounts†	Percent Water Demand of All Accounts†	Average No. Active Customers†	Average Month Demand, MG	Average Day Demand, MGD	Average Customer Demand, GD	Est. Average Customer Indoor Demand, GD‡	Est. Average Customer Seasonal/ Outdoor Demand, GD§	Est. Average Customer Outdoor Water Use, Percent§
Total	**75,259**	**100%**	**65,456**	**413**	**13.6**	**207**	**188**	**19**	**9.2%**
Top 1%	753	5%	655	22	0.7	1,097	812	285	26.0%
Top 10%	7,526	28%	6,546	117	3.8	586	480	106	18.0%
Top 25%	18,815	52%	16,364	216	7.1	435	374	60	13.9%
Top 50%	37,630	79%	32,728	327	10.7	328	292	36	11.0%
Bottom 50%	37,630	21%	32,728	86	2.8	87	85	2	2.4%

Table 3-3. Single-Family Customer Average Gallons Per Capita Per Day, By Percentile, 2012-2014*

Single-Family Customer Account Percentile	Average Total GPCD		Est. Avg. Indoor GPCD		Est. Avg. Outdoor GPCD
	Average GPCD	More (Less) Than The National Average 88 GPCD†	Average Indoor GPCD	More (Less) Than National Indoor Average, 55 GPCD‡	
Total	**66**	**(22)**	**60**	**5**	**6**
Top 1%	350	262	259	204	91
Top 10%	187	99	153	98	34
Top 25%	139	51	120	65	19
Top 50%	105	17	93	38	11
Bottom 50%	28	(60)	27	(28)	1



* Figures shown for United Water New York (UWNY) are based on a 3-year average (2012-2014).

Figure 3-2. Rockland County's Monthly Precipitation and Residential Water Demand Adjusted to Months of Actual Usage, 2012-2014

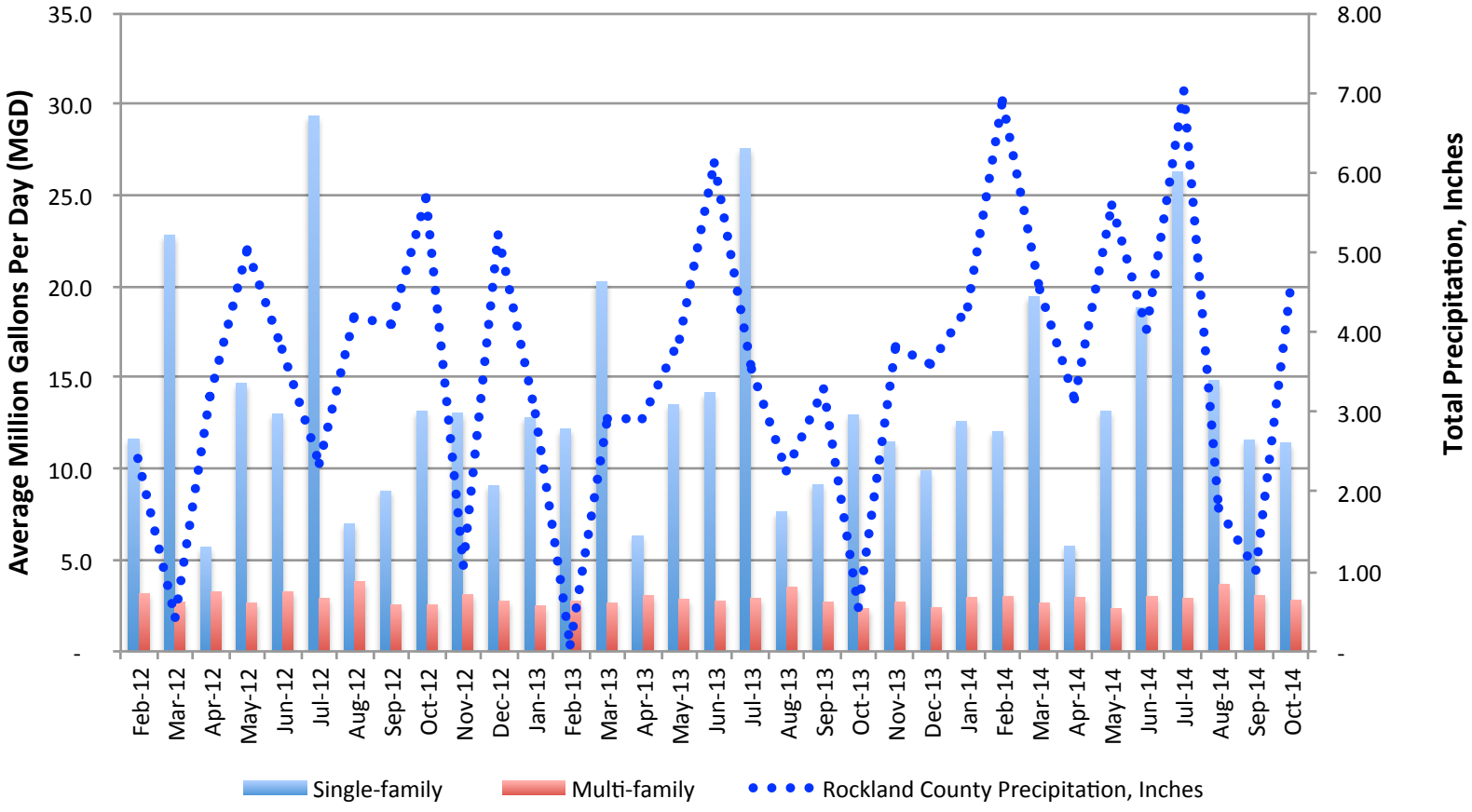


Table 3-4. Multi-Family Residential Average Customer Water Use Characteristics By Percentile, 2012-2014*

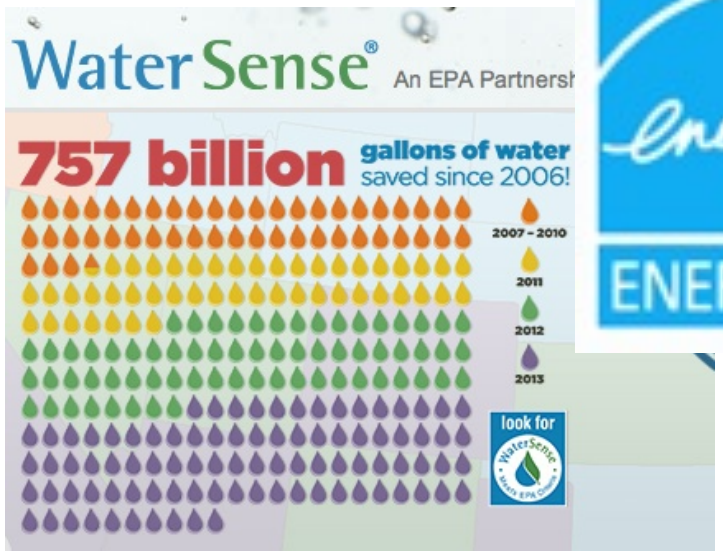
Multi-Family Customer Account Percentile	Average No. Active Accounts†	Percent Water Demand of All Accounts†	Average No. Active Customers†	Average Month Demand, MG	Average Day Demand, MGD	Average Customer Demand, GD	Est. Average Customer Indoor Demand, GD‡	Est. Average Customer Seasonal/ Outdoor Demand, GD§	Est. Average Customer Outdoor Water Use, Percent§
Total	**1,839**	**100%**	**1,725**	**86.8**	**2.9**	**1,552**	**1,510**	**42**	**2.7%**
Top 1%	18	20%	17	17.7	0.6	31,671	36,276	(4,605)	-14.5%
Top 10%	184	59%	173	51.2	1.7	9,155	9,351	(196)	-2.1%
Top 25%	460	80%	431	69.2	2.3	4,949	4,936	13	0.3%
Top 50%	920	93%	863	81.0	2.7	2,895	2,844	51	1.8%
Bottom 50%	920	7%	863	5.8	0.2	208	175	33	15.9%

Table 3-5. Sloatsburg (Village) Average Customer Water Use Characteristics By Percentile, 2012-2014*

Sloatsburg (Village) Customer Account Percentile	Average No. Accounts†	Percent Water Demand of All Accounts†	Average No. Active Customers†	Average Month Demand, MG	Average Day Demand, MGD	Average Account Demand, GD	Est. Average Account Indoor Demand, GD‡	Est. Average Account Seasonal/ Outdoor Demand, GD§	Est. Average Account Outdoor Water Use, Percent§
Total	**1,124**	**100%**	**983**	**4.8**	**0.16**	**141**	**129**	**12**	**9%**
Top 1%	11	8%	10	2.1	0.01	1,111	902	209	19%
Top 10%	112	29%	98	1.4	0.05	406	352	53	13%
Top 25%	281	51%	246	2.5	0.08	288	252	37	13%
Top 50%	562	77%	492	3.7	0.12	218	197	21	10%
Bottom 50%	562	23%	492	1.1	0.04	63	61	3	4%

Residential Indoor:
Water Savings Potential: ~ 15-30 gpcd

- Leaks, < 5 gpcd
- Toilets, ≤1.28 gpf
- Urinals, ≤0.5 gpf
- Showerheads, ≤2.0
- Faucets (lav), ≤1.5 gpm
- Clothes Washers, ≤ 20 gpl
- Dishwashers, ≤ 5 gpl



Landscape-Irrigation: Water Savings Potential ≥ 50%

- Mandatory landscape irrigation **schedules, max 1-2 days/week**
- Water-wise landscape **planning and design**
- Native and low-water-use **turf and plants**
- **Limit turf areas**
- **Efficient irrigation** systems and devices
  - Soil moisture sensors, "Smart" controllers, maintenance

- **Soil** improvements
- **Mulches**
- **Minimized water decorations, fountains and uncovered pools**
- **Green infrastructure–rain and storm water**

Source: Amy Vickers & Associates, Inc.

Table 3-6. Commercial Average Customer Water Use Characteristics By Percentile, 2012-2014*

Commercial Customer Account Percentile	Average No. Active Accounts†	Percent Water Demand of All Accounts†	Average No. Active Customers†	Average Month Demand, MG	Average Day Demand, MGD	Average Customer Demand, GD	Est. Average Customer Indoor Demand, GD‡	Est. Average Customer Seasonal/ Outdoor Demand, GD§	Est. Average Customer Outdoor Water Use, Percent§
Total	**4,949**	**100%**	**4,589**	**128**	**4.2**	**916**	**757**	**158**	**17%**
Top 1%	49	36%	46	46	1.5	33,230	27,512	5,719	17%
Top 10%	495	74%	459	95	3.1	6,807	5,581	1,226	18%
Top 25%	1,237	89%	1,147	114	3.7	3,260	2,674	586	18%
Top 50%	2,475	97%	2,295	124	4.1	1,780	1,467	313	18%
Bottom 50%	2,475	3%	2,295	4	0.1	52	48	4	8%

Table 3-7. Industrial Average Customer Water Use Characteristics By Percentile, 2012-2014*

Industrial Customer Account Percentile	Average No. Active Accounts†	Percent Water Demand of All Accounts†	Average No. Active Customers†	Average Month Demand, MG	Average Day Demand, MGD	Average Customer Demand, GD	Est. Average Customer Indoor Demand, GD‡	Est. Average Customer Seasonal/ Outdoor Demand, GD§	Est. Average Customer Outdoor Water Use, Percent§
Total	**78**	**100%**	**78**	**31.8**	**1.05**	**13,401**	**12,803**	**598**	**4%**
Top 1%	1	42%	1	13.3	0.44	561,543	541,533	20,010	4%
Top 10%	8	93%	8	29.6	0.97	124,835	119,053	5,782	5%
Top 25%	20	98%	20	31.0	1.02	52,286	49,872	2,414	5%
Top 50%	39	99%	39	31.6	1.04	26,631	25,429	1,201	5%
Bottom 50%	39	1%	39	0.2	0.01	172	177	(6)	-3%

Commercial, Industrial, Institutional (CII): Water Savings Potential 15% to 60%

- Metering and submetering
- Leaks and water losses
- Cleaning and sanitation
- Cooling systems
- Heating systems
- Process water uses
- Landscape irrigation
- Commercial kitchens and restaurants
- Laundries and laundromats
- Swimming pools and zoos
- Construction sites
- Mining operations

Source: Amy Vickers & Associates, Inc.

System Leak & Water Loss Solutions

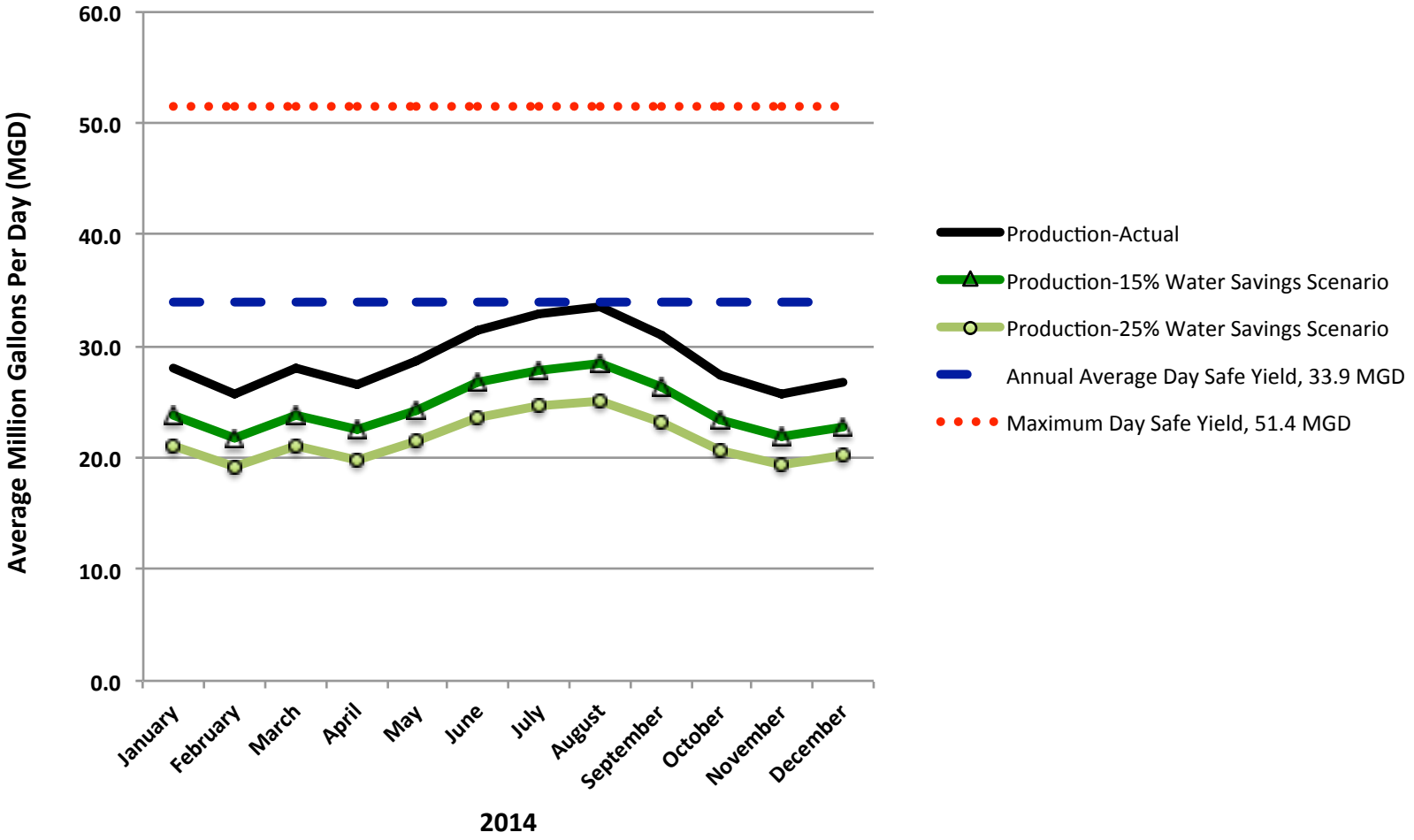
- Water Loss Control Program–Ongoing
  - Monitor: supply/demand performance indicators, AMI
  - Field water audit (leak detection, meter inspection)
  - Data analysis (map leaks, records review, cost analysis)
  - Repair and maintenance (fix leaks, meters, survey)
- Methods to reduce leaks and other losses
  - Fix leaks (mains, service lines, valves)
  - Replace and/or recalibrate meters
  - Correct billing software, records
  - Pressure adjustments
- New York and IWA/AWWA standards

Source: Amy Vickers & Associates, Inc.

Table 4-1. Preliminary Estimates of Potential Water Savings From Conservation Based on System Water Losses and Retail Customer Demands in 2012-2014*

Category of Water Use	Low Savings Estimate, Avg. MGD	High Savings Estimate, Avg. MGD	Average Savings Estimate, Avg. MGD	Average Savings Estimate, Percent of Total
UWNY System Leakage (Recoverable)				
Est. Total System Savings Potential*:	**2.5**	**3.3**	**2.9**	**51.2%**
Customer Water Use				
Single-Family	1.1	2.1	1.6	28.2%
Multi-Family	0.3	0.4	0.3	5.8%
Sloatsburg (Village)	0.0	0.0	0.0	0.3%
Commercial	0.4	0.8	0.6	10.7%
Industrial	0.2	0.3	0.2	3.6%
Service Points without Meters	Unknown			
Est. Total Customer Savings Potential:	**1.9**	**3.6**	**2.8**	**48.8%**
EST. TOTAL POTENTIAL WATER SAVINGS:	**4.4**	**7.0**	**5.70**	**100.0%**

Figure ES-1. UWNY Water Production Scenarios With 15% and 25% Savings From System Leakage & Customer Conservation in 2014



KEY FINDING #7

The need for additional water supply capacity seems doubtful at this time.

Multiple new supply options if you need them:

- Aggressive leakage recovery
  - Singapore's ~ 5% NRW
- Main replacement and rehabilitation
- Customer conservation
  - Water-free fixtures and landscapes, graywater
- Alternative water supply options
  - Waste/water reuse
  - Rainwater harvesting
  - Green infrastructure
- Private wells

RECOMMENDATIONS

Recommendations: NY State & PSC

- **Establish a maximum 10% NRW/UFW allowable standard**
  - Current 18% UFW/NRW is outdated, enables avoidable leakage and losses
- **Establish a 10-year meter residential replacement policy**
  - Improved accuracy, lower apparent losses
- **Effective and equitable conservation rate structures**
  - Baseline year-round rate for "Super savers"
  - Multiple tiers for high water users
- **Staff/training in utility water loss analysis and monitoring**
  - AWWA Water Audit reports, unmetered usages, progress monitoring
- **Transparency: Post online all water company Annual Reports, NRW reports**, and related water efficiency performance documents
- **Assign an independent organization or contractor**–that reports to the PSC and Task Force–to inspect, test, and verify the accuracy of all UWNY master meter connections and customer records.

NY State & PSC

Failure to establish a higher standard for system water losses and water conservation will continue to put the public, ratepayers, and the environment at risk from costly new water supply projects that may not be needed.

Recommendations: Rockland County

- **Establish a mandatory maximum one-day or two-day per week landscape irrigation schedule** to reduce excessive outdoor water use on a permanent basis, applicable to UWNY, other municipal, and private well water users
- **Require high-efficiency water standards** for new plumbing fixtures, appliances, irrigation systems, and certain types of commercial and industrial water-using equipment at the point of unit replacement, property lease, and sale.
- **Coordinate County and local public records for real estate transactions and permits for construction and building renovations** with UWNY to help ensure that all water connections are metered and paid for
- **Clarify the number of private wells in use in Rockland** County to determine their impact on current and future groundwater supplies.

Recommendations: Future Water Conservation Program in Rockland County

- **Water Conservation + Water Independence = "Resilient Cities"**
  - Customer and community water conservation and efficiency
  - High-efficiency system and minimal avoidable water losses
  - Rainwater harvesting, reuse, and green infrastructure
- **A motivated, skilled, and independent team outside of UWNY** is needed to champion successful water conservation and system loss reduction programs and more in Rockland County
- **Responsibility** for implementation of fast-tracked water loss reduction and conservation programs may be more reliably accomplished by an outside, independent organization
- **Program supervision under Rockland County**, state regulators, and a citizens' advisory organization to ensure that conservation plan goals are achieved

Next Steps

- Phase 2: Water Conservation Plan
- Full progress ahead!

Contact:

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Amy Vickers & Associates, Inc.
Amherst Office Park
441 West Street
Amherst, MA 01002
www.amyvickers.com

2nd projector slides

grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

PLEASE CHOOSE REPORTING UNITS FROM THE INSTRUCTIONS SHEET BEFORE ENTERING DATA

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

		Pcnt:	Value:
Volume from own sources:			
Water imported:			
Water exported:			

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 0.000

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

		Pcnt:	Value:
Billed metered:			
Billed unmetered:			
Unbilled metered:			
Unbilled unmetered:	0.000	1.25%	

Use buttons to select percentage of water supplied **OR** value

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION: 0.000

WATER LOSSES (Water Supplied - Authorized Consumption) 0.000

Apparent Losses

		Pcnt:	Value:
Unauthorized consumption:	0.000	0.25%	

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	0.000		
Systematic data handling errors:	0.000	0.25%	

Apparent Losses: 0.000

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 0.000

WATER LOSSES: 0.000

NON-REVENUE WATER

NON-REVENUE WATER: 0.000

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:		
Number of active AND inactive service connections:		
Service connection density:		
Are customer meters typically located at the curbstop or property line?	Select...	
Average length of customer service line:		(length of service line, beyond the property boundary, that is the responsibility of the utility)
Average operating pressure:		

COST DATA

Total annual cost of operating water system:		$/Year
Customer retail unit cost (applied to Apparent Losses):		
Variable production cost (applied to Real Losses):		$/

Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

AWWA WLCC Free Water Audit Software: Reporting Worksheet

WAS v4.0

Back to Instructions

? Click to access definition

Water Audit Report for: UNITED WATER NEW YORK

Reporting Year: 2014 1/2014 - 12/2014

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

WATER SUPPLIED

<< Enter grading in column 'E'

Volume from own sources:	9	10,513.682	Million gallons (US)/yr (MG/Yr)	
Master meter error adjustment (enter positive value):	9	0.000	under-registered	MG/Yr
Water imported:	n/a	0.000	MG/Yr	
Water exported:	9	0.000	MG/Yr	
WATER SUPPLIED:		10,513.682	MG/Yr	

AUTHORISED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:
Billed metered:	9	8,447.437	MG/Yr		
Billed unmetered:	n/a	0.000	MG/Yr		
Unbilled metered:	9	30.250	MG/Yr		
Unbilled unmetered:		131.421	MG/Yr	1.25%	

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied OR value

AUTHORISED CONSUMPTION:		8,609.108	MG/Yr

WATER LOSSES (Water Supplied - Authorised Consumption)

1,904.574 MG/Yr

Apparent Losses

				Pcnt:	Value:
Unauthorised consumption:	8	373.821	MG/Yr		373.821

Unauthorised consumption volume entered is greater than the recommended default value

Customer metering inaccuracies:	9	228.985	MG/Yr	2.63%	
Systematic data handling errors:	7	143.878	MG/Yr		
Apparent Losses:		746.684			

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Real Losses

Real Losses = Water Losses - Apparent Losses:		1,157.889	MG/Yr
WATER LOSSES:		1,904.574	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:		2,066.245	MG/Yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	7	1,056.3	miles	
Number of active AND inactive service connections:	9	74,973		
Connection density:		71	conn./mile main	
Average length of customer service line:	7	44.0	ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	9	103.3	psi	

COST DATA

Total annual cost of operating water system:	9	$52,637,304	$/Year
Customer retail unit cost (applied to Apparent Losses):	8	$5.11	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	9	$430.51	$/Million gallons

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	19.7%
Non-revenue water as percent by cost of operating system:	10.8%
Annual cost of Apparent Losses:	$5,095,668
Annual cost of Real Losses:	$498,483

Operational Efficiency Indicators

Apparent Losses per service connection per day:	27.29	gallons/connection/day
Real Losses per service connection per day*:	42.31	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	0.41	gallons/connection/day/psi
Unavoidable Annual Real Losses (UARL):	816.16	million gallons/year
Infrastructure Leakage Index (ILI) [Real Losses/UARL]:	1.42	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 86 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Systematic data handling errors

3: Customer retail unit cost (applied to Apparent Losses)

For more information, click here to see the Grading Matrix worksheet

AWWA WLCC Free Water Audit Software: Reporting Worksheet

WAS v4.0

Back to Instructions

? Click to access definition

Water Audit Report for: UNITED WATER NEW YORK
Reporting Year: 2012 1/2012 - 12/2012

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

WATER SUPPLIED

<< Enter grading in column 'E'

Volume from own sources:	9	10,348.865	Million gallons (US)/yr (MG/Yr)	
Master meter error adjustment (enter positive value):	9	0.000	under-registered	MG/Yr
Water imported:	n/a	0.000	MG/Yr	
Water exported:	9	41.542	MG/Yr	
WATER SUPPLIED:		10,307.323	MG/Yr	

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:
Billed metered:	9	8,192.276	MG/Yr		
Billed unmetered:	n/a	0.000	MG/Yr		
Unbilled metered:	9	29.555	MG/Yr		
Unbilled unmetered:		128.842	MG/Yr	1.25%	

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION:		8,350.673	MG/Yr

Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorized Consumption)

1,956.650 MG/Yr

Apparent Losses

				Pcnt:	Value:
Unauthorized consumption:	8	497.000	MG/Yr		497.000

Unauthorized consumption volume entered is greater than the recommended default value

Customer metering inaccuracies:	9	222.075	MG/Yr	2.63%	
Systematic data handling errors:	7	80.000	MG/Yr		
Apparent Losses:		799.075			

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Real Losses

Real Losses = Water Losses - Apparent Losses:	1,157.575	MG/Yr
WATER LOSSES:	1,956.650	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:	2,115.047	MG/Yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

AWWA WLCC Free Water Audit Software: Reporting Worksheet

WAS v4.0

Back to Instructions

? Click to access definition

Water Audit Report for: UNITED WATER NEW YORK

Reporting Year: 2013 | 1/2013 - 12/2013

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

WATER SUPPLIED << Enter grading in column 'E'

Volume from own sources:	?	9	10,389.154	Million gallons (US)/yr (MG/Yr)
Master meter error adjustment (enter positive value):	?	9	0.000	under-registered MG/Yr
Water imported:	?	n/a	0.000	MG/Yr
Water exported:	?	9	27.280	MG/Yr
WATER SUPPLIED:			10,361.874	MG/Yr

AUTHORISED CONSUMPTION

Click here: ? for help using option buttons below

					Pcnt:	Value:
Billed metered:	?	9	8,124.086	MG/Yr		
Billed unmetered:	?	n/a	0.000	MG/Yr		
Unbilled metered:	?	9	65.717	MG/Yr		
Unbilled unmetered:	?		129.523	MG/Yr	1.25%	

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied OR value

AUTHORISED CONSUMPTION:	?		8,319.326	MG/Yr

WATER LOSSES (Water Supplied - Authorised Consumption) 2,042.548 MG/Yr

Apparent Losses

					Pcnt:	Value:
Unauthorized consumption:	?	8	412.885	MG/Yr		412.885

Unauthorized consumption volume entered is greater than the recommended default value

Customer metering inaccuracies:	?	9	221.210	MG/Yr	2.63%	
Systematic data handling errors:	?	7	191.675	MG/Yr		
Apparent Losses:	?		825.770			

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Real Losses

Real Losses = Water Losses - Apparent Losses:	?	1,216.778	MG/Yr
WATER LOSSES:		2,042.548	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:	?	2,237.788	MG/Yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

AWWA WLCC Free Water Audit Software: Reporting Worksheet

WAS v4.0

Back to Instructions

? Click to access definition

Water Audit Report for: UNITED WATER NEW YORK

Reporting Year: 2014 1/2014 - 12/2014

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

WATER SUPPLIED << Enter grading in column 'E'

Volume from own sources:	?	9	10,513.682	Million gallons (US)/yr (MG/Yr)
Master meter error adjustment (enter positive value):	?	9	0.000	under-registered MG/Yr
Water imported:	?	n/a	0.000	MG/Yr
Water exported:	?	9	0.000	MG/Yr
WATER SUPPLIED:			10,513.682	MG/Yr

AUTHORISED CONSUMPTION

Click here: ? for help using option buttons below

					Pcnt:	Value:
Billed metered:	?	9	8,447.437	MG/Yr		
Billed unmetered:	?	n/a	0.000	MG/Yr		
Unbilled metered:	?	9	30.250	MG/Yr		
Unbilled unmetered:	?		131.421	MG/Yr	1.25%	

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORISED CONSUMPTION: ? 8,609.108 MG/Yr

Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorised Consumption) 1,904.574 MG/Yr

Apparent Losses

					Pcnt:	Value:
Unauthorised consumption:	?	8	373.821	MG/Yr		373.821

Unauthorised consumption volume entered is greater than the recommended default value

Customer metering inaccuracies:	?	9	228.985	MG/Yr	2.63%	
Systematic data handling errors:	?	7	143.878	MG/Yr		
Apparent Losses:	?		746.684			

? Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Real Losses

Real Losses = Water Losses - Apparent Losses:	?	1,157.889	MG/Yr
WATER LOSSES:		1,904.574	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:	?	2,066.245	MG/Yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: UWNY-CORRECTED WITH UWNY PSC DATA & AWWA DEFAULTS
Reporting Year: 2014 1/2014 - 12/2014

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ----------> Master Meter and Supply Error Adjustments

WATER SUPPLIED

			Pcnt:	Value:	
Volume from own sources:	8	10,513.682 MG/Yr	n/a		MG/Yr
Water imported:	8	182.500 MG/Yr	n/a		MG/Yr
Water exported:	8	84.201 MG/Yr	n/a		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 10,611.981 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

			Pcnt:	Value:	
Billed metered:	8	8,453.843 MG/Yr			
Billed unmetered:	7	131.275 MG/Yr			
Unbilled metered:	9	8.250 MG/Yr			
Unbilled unmetered:	5	6.385 MG/Yr		6.385	MG/Yr

Use buttons to select percentage of water supplied OR value

AUTHORIZED CONSUMPTION: ? 8,599.753 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption)

2,012.228 MG/Yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:		26.530 MG/Yr	0.25%		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	4	228.564 MG/Yr	2.63%		MG/Yr
Systematic data handling errors:		21.135 MG/Yr	0.25%		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 276.229 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 1,735.999 MG/Yr

WATER LOSSES: 2,012.228 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 2,026.863 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	7	1,056.3	miles
Number of active AND inactive service connections:	9	74,973	
Service connection density:		71	conn./mile main
Are customer meters typically located at the curbstop or property line?		No	
Average length of customer service line:	7	44.0	ft
Average operating pressure:	5	103.3	psi

(length of service line, beyond the property boundary, that is the responsibility of the utility)

COST DATA

Total annual cost of operating water system:	3	$26,529,066	$/Year
Customer retail unit cost (applied to Apparent Losses):	3	$5.78	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	3	$430.51	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 63 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Total annual cost of operating water system
3: Customer retail unit cost (applied to Apparent Losses)

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

Water Audit Report for: UWNY-CORRECTED WITH UWNY PSC DATA & AWWA DEFAULTS
Reporting Year: 2014 | 1/2014 - 12/2014

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 63 out of 100 ***

System Attributes:

	Apparent Losses:	276.229	MG/Yr
+	Real Losses:	1,735.999	MG/Yr
=	**Water Losses:**	**2,012.228**	MG/Yr
?	Unavoidable Annual Real Losses (UARL):	816.16	MG/Yr
	Annual cost of Apparent Losses:	$2,134,347	
	Annual cost of Real Losses:	$747,365	Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumption

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	19.1%	
	Non-revenue water as percent by cost of operating system:	10.9%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	10.09	gallons/connection/day
	Real Losses per service connection per day:	63.44	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.61	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	1,736.00	million gallons/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	2.13	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for:	UWNY-CORRECTED WITH UWNY PSC DATA & AWWA DEFAULTS	
Reporting Year:	2014	1/2014 - 12/2014
Data Validity Score:	63	

		Water Exported 84.201		Billed Water Exported		Revenue Water 84.201
Own Sources (Adjusted for known errors) 10,513.682	System Input 10,696.182	Water Supplied 10,611.981	Authorized Consumption 8,599.753	Billed Authorized Consumption 8,585.118	Billed Metered Consumption (water exported is removed) 8,453.843	Revenue Water 8,585.118
					Billed Unmetered Consumption 131.275	
				Unbilled Authorized Consumption 14.635	Unbilled Metered Consumption 8.250	Non-Revenue Water (NRW) 2,026.863
					Unbilled Unmetered Consumption 6.385	
			Water Losses 2,012.228	Apparent Losses 276.229	Unauthorized Consumption 26.530	
					Customer Metering Inaccuracies 228.564	
					Systematic Data Handling Errors 21.135	
Water Imported 182.500				Real Losses 1,735.999	Leakage on Transmission and/or Distribution Mains Not broken down	
					Leakage and Overflows at Utility's Storage Tanks Not broken down	
					Leakage on Service Connections Not broken down	

AWWA WLCC Free Water Audit Software: Water Balance

WAS v4.0

Water Audit Report For:	Report Yr:
UNITED WATER NEW YORK	2014

Own Sources (Adjusted for known errors) 10,513.682	Water Exported 0.000		Billed Water Exported		
	Water Supplied 10,513.682	Authorized Consumption 8,609.108	Billed Authorized Consumption 8,447.437	Billed Metered Consumption (inc. water exported) 8,447.437	Revenue Water 8,447.437
				Billed Unmetered Consumption 0.000	
			Unbilled Authorized Consumption 161.671	Unbilled Metered Consumption 30.250	Non-Revenue Water (NRW) 2,066.245
				Unbilled Unmetered Consumption 131.421	
		Water Losses 1,904.574	Apparent Losses 746.684	Unauthorized Consumption 373.821	
				Customer Metering Inaccuracies 228.985	
				Systematic Data Handling Errors 143.878	
Water Imported 0.000			Real Losses 1,157.889	Leakage on Transmission and/or Distribution Mains Not broken down	
				Leakage and Overflows at Utility's Storage Tanks Not broken down	
				Leakage on Service Connections Not broken down	

SYSTEM DATA

2012

Length of mains:	?	7	1,049.3	miles
Number of active AND inactive service connections:	?	9	73,733	
Connection density:			70	conn./mile main
Average length of customer service line:	?	7	75.0	ft (pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	?	9	107.0	psi

COST DATA

Total annual cost of operating water system:	?	9	$32,332,734	$/Year
Customer retail unit cost (applied to Apparent Losses):	?	8	$5.74	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	?	9	$362.00	$/Million gallons

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	20.5%
Non-revenue water as percent by cost of operating system:	20.4%
Annual cost of Apparent Losses:	$6,131,511
Annual cost of Real Losses:	$419,042

Operational Efficiency Indicators

Apparent Losses per service connection per day:	29.69	gallons/connection/day
Real Losses per service connection per day*:	43.01	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	0.40	gallons/connection/day/psi
? Unavoidable Annual Real Losses (UARL):	960.44	million gallons/year
? Infrastructure Leakage Index (ILI) [Real Losses/UARL]:	1.21	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 87 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Systematic data handling errors

3: Customer retail unit cost (applied to Apparent Losses)

For more information, click here to see the Grading Matrix worksheet

SYSTEM DATA

2013

Length of mains:	?	7	1,050.5	miles	
Number of active AND inactive service connections:	?	9	74,576		
Connection density:			71	conn./mile main	
Average length of customer service line:	?	7	75.0	ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	?	9	103.3	psi	

COST DATA

Total annual cost of operating water system:	?	9		$/Year
Customer retail unit cost (applied to Apparent Losses):	?	8		$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	?	9		$/Million gallons

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	21.6%
Non-revenue water as percent by cost of operating system:	
Annual cost of Apparent Losses:	$0
Annual cost of Real Losses:	

Operational Efficiency Indicators

Apparent Losses per service connection per day:	30.34	gallons/connection/day	
Real Losses per service connection per day*:	44.70	gallons/connection/day	
Real Losses per length of main per day*:	N/A		
Real Losses per service connection per day per psi pressure:	0.43	gallons/connection/day/psi	
? Unavoidable Annual Real Losses (UARL):	935.62	million gallons/year	
? Infrastructure Leakage Index (ILI) [Real Losses/UARL]:	1.30		

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 87 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Systematic data handling errors

3: Customer retail unit cost (applied to Apparent Losses)

For more information, click here to see the Grading Matrix worksheet

2014

SYSTEM DATA

Length of mains:	?	7	1,056.3	miles
Number of active AND inactive service connections:	?	9	74,973	
Connection density:			71	conn./mile main
Average length of customer service line:	?	7	44.0	ft (pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	?	9	103.3	psi

COST DATA

Total annual cost of operating water system:	?	9	$52,637,304	$/Year
Customer retail unit cost (applied to Apparent Losses):	?	8	$5.11	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	?	9	$430.51	$/Million gallons

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	19.7%
Non-revenue water as percent by cost of operating system:	10.8%
Annual cost of Apparent Losses:	$5,095,668
Annual cost of Real Losses:	$498,483

Operational Efficiency Indicators

Apparent Losses per service connection per day:	27.29	gallons/connection/day	
Real Losses per service connection per day*:	42.31	gallons/connection/day	
Real Losses per length of main per day*:	N/A		
Real Losses per service connection per day per psi pressure:	0.41	gallons/connection/day/psi	
? Unavoidable Annual Real Losses (UARL):	816.16	million gallons/year	
? Infrastructure Leakage Index (ILI) [Real Losses/UARL]:	1.42		

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 86 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Systematic data handling errors

3: Customer retail unit cost (applied to Apparent Losses)

For more information, click here to see the Grading Matrix worksheet

AWWA WLCC Free Water Audit Software: Water Balance

 WAS v4.0

Water Audit Report For:	Report Yr:
UNITED WATER NEW YORK	2012

Own Sources (Adjusted for known errors) 10,348.865	Water Exported 41.542		Billed Water Exported		
	Water Supplied 10,307.323	Authorized Consumption 8,350.673	Billed Authorized Consumption 8,192.276	Billed Metered Consumption (inc. water exported) 8,192.276	Revenue Water 8,192.276
				Billed Unmetered Consumption 0.000	
			Unbilled Authorized Consumption 158.397	Unbilled Metered Consumption 29.555	Non-Revenue Water (NRW) 2,115.047
				Unbilled Unmetered Consumption 128.842	
		Water Losses 1,956.650	Apparent Losses 799.075	Unauthorized Consumption 497.000	
				Customer Metering Inaccuracies 222.075	
				Systematic Data Handling Errors 80.000	
Water Imported 0.000			Real Losses 1,157.575	Leakage on Transmission and/or Distribution Mains Not broken down	
				Leakage and Overflows at Utility's Storage Tanks Not broken down	
				Leakage on Service Connections Not broken down	

AWWA WLCC Free Water Audit Software: Water Balance

WAS v4.0

Water Audit Report For:	Report Yr:
UNITED WATER NEW YORK	2013

Own Sources (Adjusted for known errors) 10,389.154	Water Exported 27.280		Billed Water Exported		
		Authorized Consumption 8,319.326	Billed Authorized Consumption 8,124.086	Billed Metered Consumption (inc. water exported) 8,124.086	Revenue Water 8,124.086
				Billed Unmetered Consumption 0.000	
			Unbilled Authorized Consumption 195.240	Unbilled Metered Consumption 65.717	Non-Revenue Water (NRW) 2,237.788
				Unbilled Unmetered Consumption 129.523	
	Water Supplied 10,361.874	Water Losses 2,042.548	Apparent Losses 825.770	Unauthorized Consumption 412.885	
				Customer Metering Inaccuracies 221.210	
				Systematic Data Handling Errors 191.675	
Water Imported 0.000			Real Losses 1,216.778	Leakage on Transmission and/or Distribution Mains Not broken down	
				Leakage and Overflows at Utility's Storage Tanks Not broken down	
				Leakage on Service Connections Not broken down	