This presentation premiered at WaterSmart Innovations

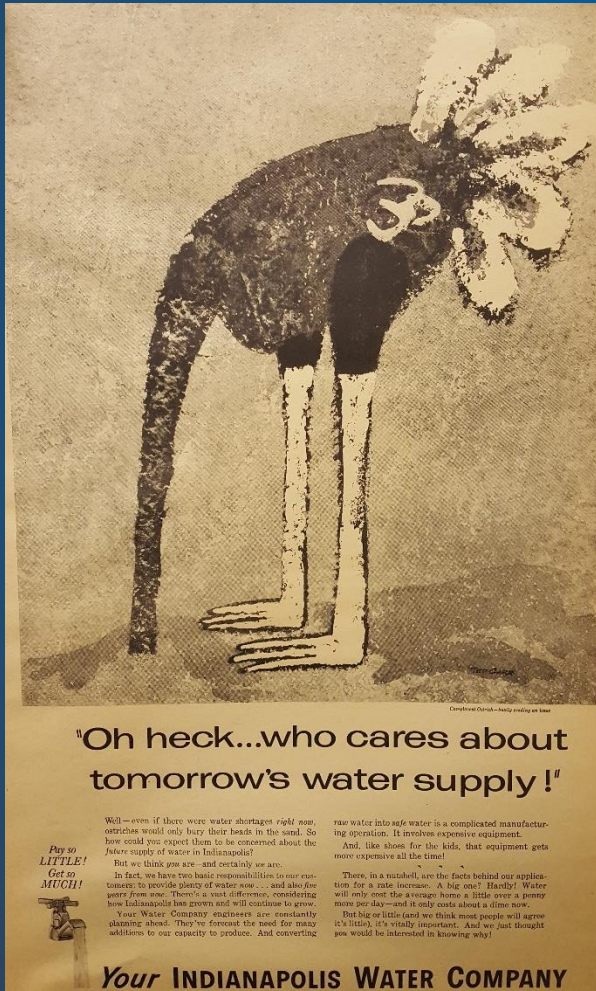watersmartinnovations.com

NRW in the Fast Lane: The Citizens Energy Group Non-Revenue Water Initiative

Credit to Thomas Kinkade

Presented by:
Dan Moran, Citizens Energy Group
Tory N. Wagoner, Cavanaugh

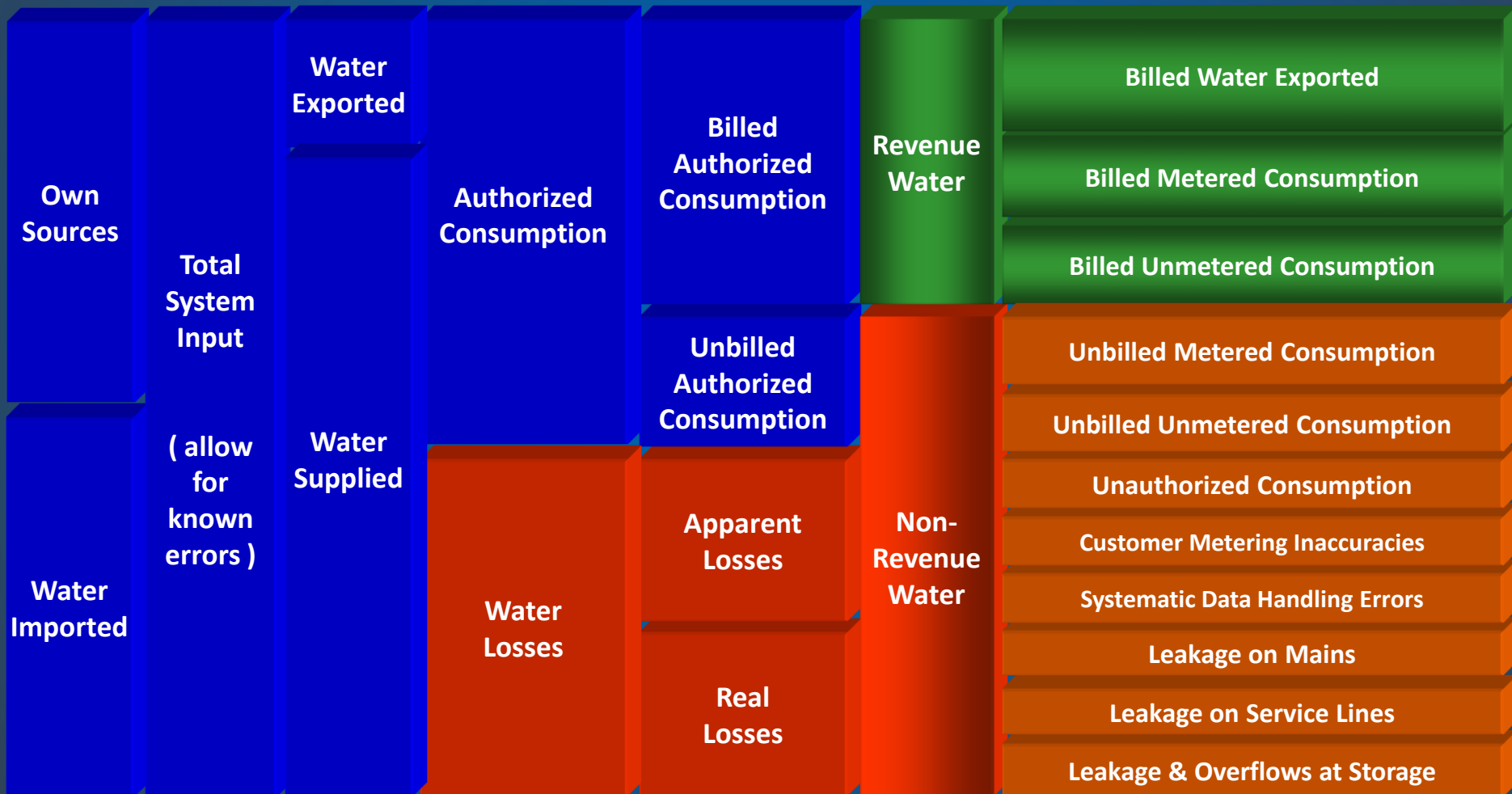# A quick history of Water Service for the City of Indianapolis
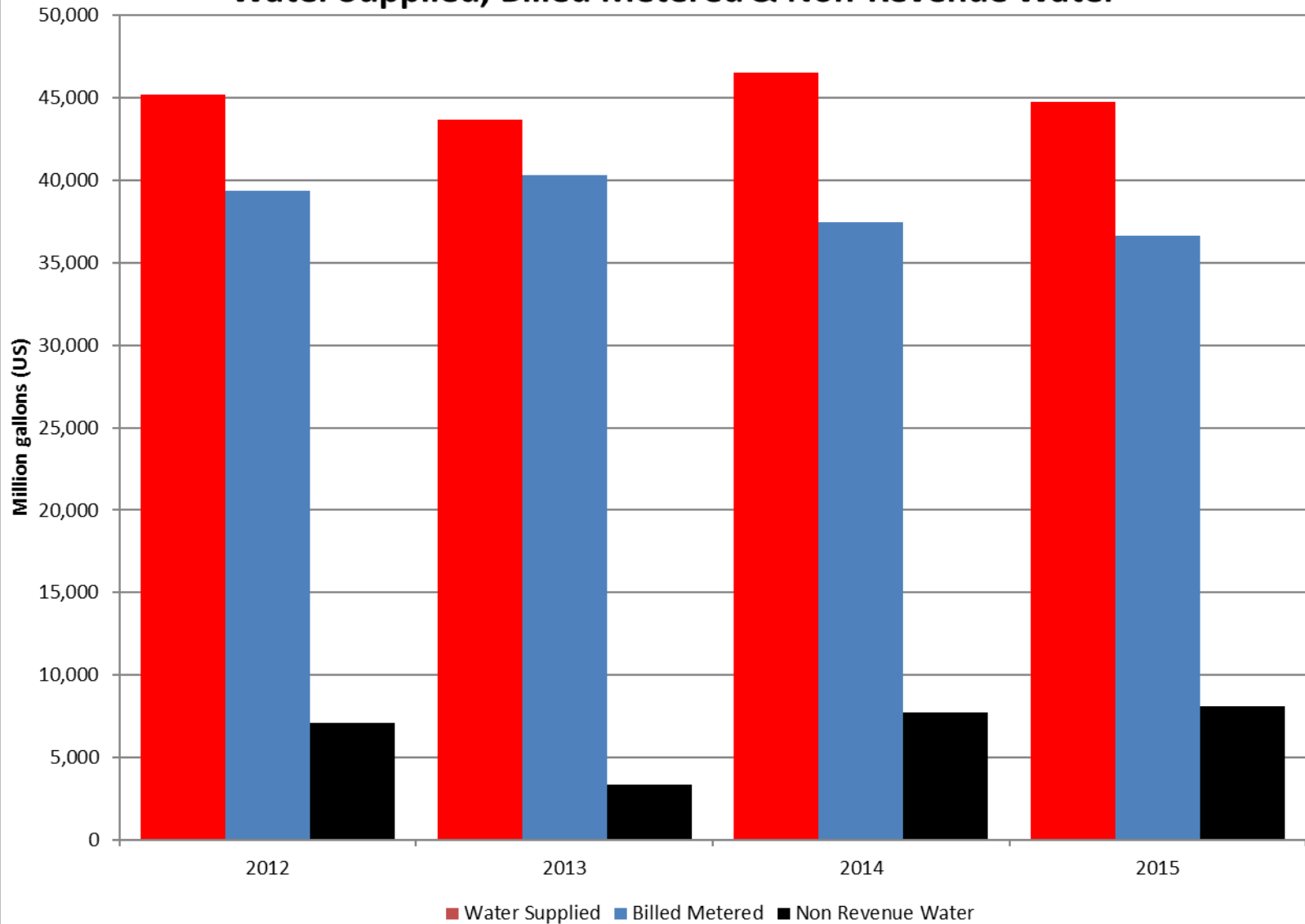
Indianapolis Water Company
1881 - 2002

City of Indianapolis/Veolia
2002 - 2011
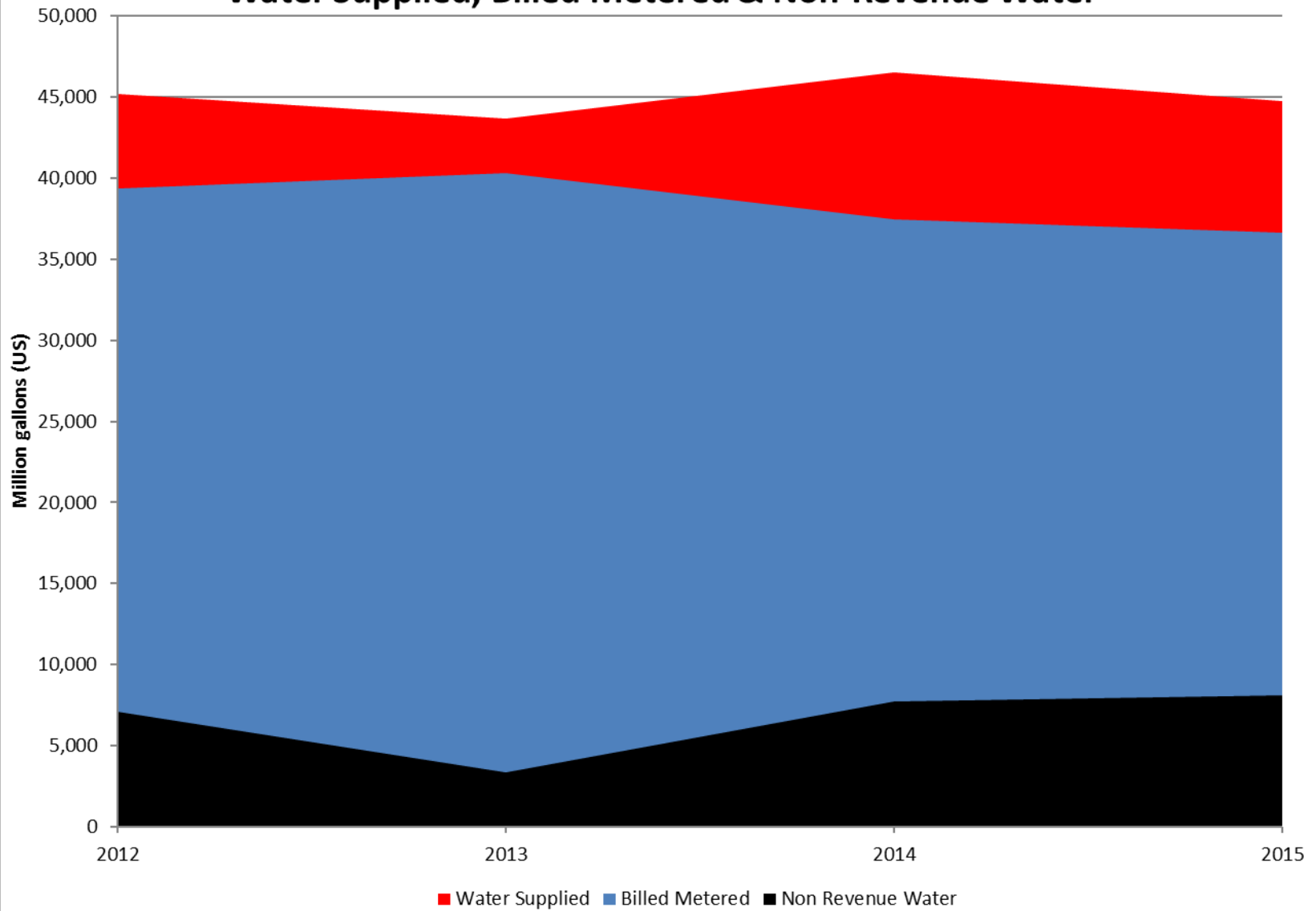
Citizens Energy Group
2011 - present

IWA/AWWA Standard Water Balance

Own Sources	Total System Input	Water Supplied	Authorized Consumption	Billed Authorized Consumption	Revenue Water	Billed Water Exported
						Billed Metered Consumption
						Billed Unmetered Consumption
				Unbilled Authorized Consumption	Non-Revenue Water	Unbilled Metered Consumption
Water Imported	(allow for known errors)		Water Losses	Apparent Losses		Unbilled Unmetered Consumption
						Unauthorized Consumption
						Customer Metering Inaccuracies
						Systematic Data Handling Errors
				Real Losses		Leakage on Mains
						Leakage on Service Lines
						Leakage & Overflows at Storage

Water Exported

Water Supplied, Billed Metered & Non-Revenue Water

Non-Revenue Water Initiative

Objectives:

- Improve Citizens Water Operating Income by reducing non-revenue water (i.e. increased revenue and reduce O&M expense)
- Prioritize non-revenue water initiatives and investments based on economic impact
- Reduce non-revenue water percentage in most cost effective manner possible
- Improve documentation of non-revenue water as needed to support economic decision-makin

Process:

- Review the current M-36 Water Audit Process to develop common understanding of economic impacts of each non-revenue water component.
- Review water audit history and trends
- Identify data gaps/uncertainties in water audit data that limit sound economic decision makin
- Develop or compile reports, analyses or estimates as needed to fill data gaps.
- Prioritize water balance component based on financial impact
  - Benefits (revenue or savings)/Cost (capital or resource) = payback
- Develop detailed action plans:
  - High impact water balance components (include payback analysis)
  - Address data gaps in Water Audit and Water Balance processes
  - General process improvements
- Implement action plans and process improvements
- Monitor results

Team Structure:

Sponsors: Jeff Willman, Curtis Popp & Ed Malone

Lead: Dan Moran

Members:

Finance – Tom Price

Revenue Assurance – Leon Broughton

Customer Relationships- Jeff Sinclair

Billing systems – Dennis Claffey

Water Distribution – Mike Elliot

Standards- Dan McBride

System Hydraulics –Elena

Water Production – Steve

Meter Reading – Christina

IT – Lisa Sellers or designe
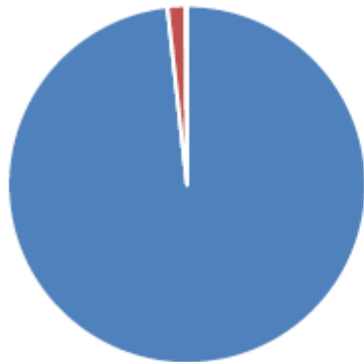
From: Dan Moran (Non-Revenue Water Team Lead)

To: Jeff Willman, Curtis Popp, Ed Malone (Non-Revenue Team Sponsors)

Cc: Non-Revenue Water Team Members

Date: March 27, 2015

Re:

The
coo
pro

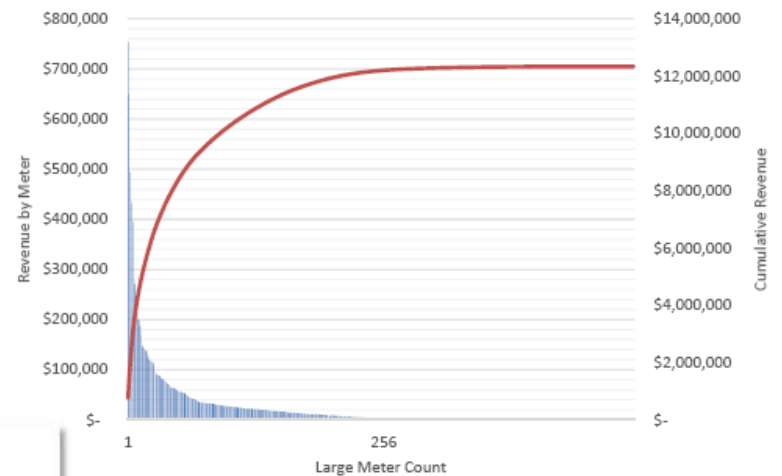|	Issue	Description	Cost	Actions	Status
	Billing	Incorrect water bills issued to Brownsburg and Lake of Lanterns following rate change in June 2014.	$110k/yr	1. Billing determinants have been corrected 2. Customers will be back billed for correct amount 3. Create new dynamic bill review process by May that will identify any future similar issues.	New dynamic bill review process under development. New process will ensure all rates being billed are included in daily review.
	Metering	Questionable accuracy of large and small meters (failed meters always low readings).	$2-4 M/yr	1. Large meter analysis is being completed by Neptune to refine loss estimates and prioritize meter replacement plan 2. Small meter testing and replacement program will be implemented. Approx. 32,000 older meters are targeted for replacement **New (3/26/15):** 3. Track volume and revenue changes for accounts following large meter replacements.	Refer to memo from Dan McBride on meter accuracy evaluations for details: Average accuracy of functioning small meters >98%; however, percent of non-functioning meters in system unknown. Analysis of large meters by Neptune complete; but comparisons with Vanguard test data vary widely.

NRW Components - By Volume (MG)
Level 3
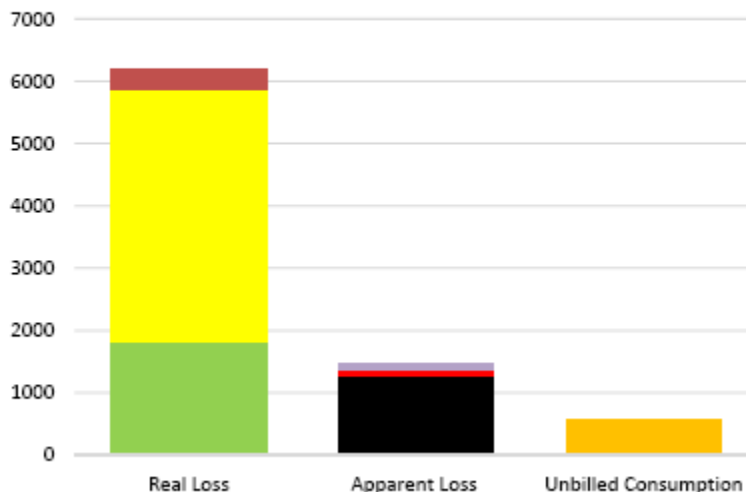
NRW Components - By Value
Level 3
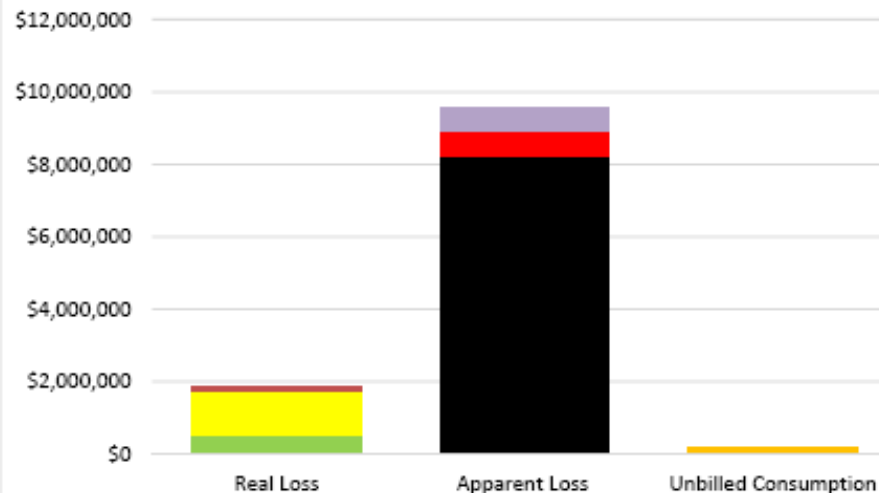
Overall metrics are presented below with discussion.

Water Audit Data Validity Score:	74	out of 100			
			95% Confidence Limits (+/-)		
Economic Metrics	Volume		Low	High	%
Non-Revenue Water	24,744	gal/conn/yr	21,230	28,257	14.2%
Non-Revenue Water	8,235	MG/yr	7,074	9,397	14.1%
Target NRW Recovery (prel)	4,177	MG/yr	3,133	5,221	25.0%
	Value - Water Only				
Non-Revenue Water	$22	$/conn/yr	$18	$25	16.6%
Non-Revenue Water	$ 7,166,110	$/yr	$ 5,976,536	$ 8,355,684	16.6%
Target NRW Recovery (prel)	$ 4,707,445	$/yr	$ 3,530,584	$ 5,884,306	25.0%
NRW Economic Index	2.9	ratio of current vs optimum NRW cost			
Technical Metrics					
Unbilled Consumption	5	gal/conn/day	2	7	50.0%
Apparent Loss	12	gal/conn/day	9	15	21.7%
Real Loss	51	gal/conn/day	43	59	16.1%
Infrastructure Leakage Index	3		2.8	4.0	16.5%

Legend:
- Background Leakage
- Unreported Leakage
- Reported Leakage
- Meter Inaccuracy
- Theft
- Data Handling
- Unbilled Unmetered
- Unbilled Metered

NRW Volume (MG/year)

- Current: 8235
- Prel. Economic Target: 4198

NRW Value ($/year)

- Current: $7,166,110
- Prel. Economic Target: $2,458,665
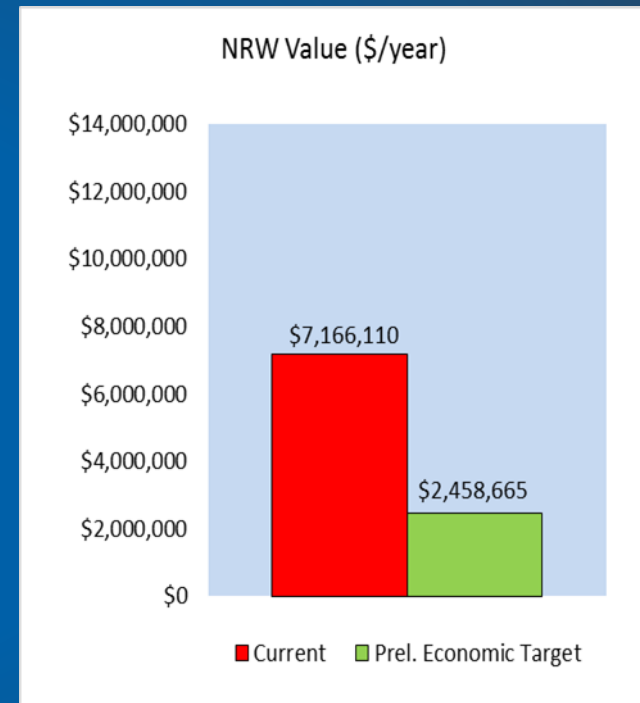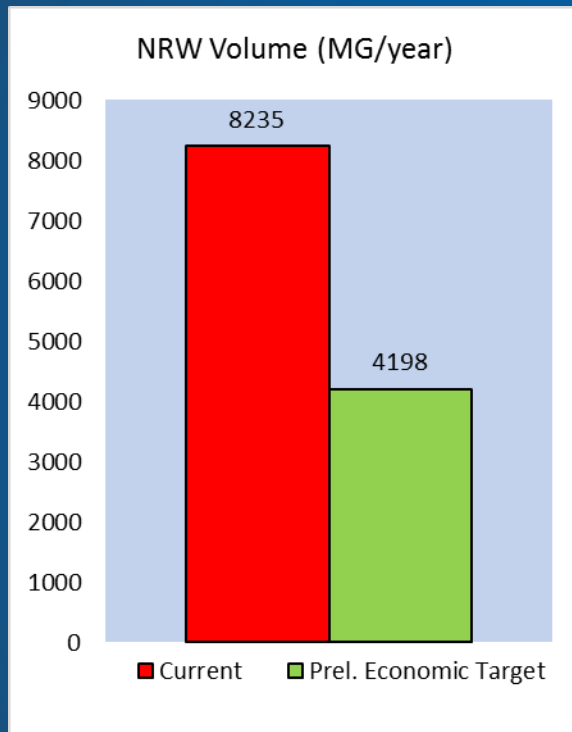
Non-Revenue Water – Program Development

Water Balance Validation

- AWWA Water Audit Software
  - Validation of inputs
  - Data grading

- 95% Confidence Limits Approach
  - Validation of inputs
  - Statistical approach to recommended focus areas

AWWA Water Audit Software – Validated Benchmark Audit

Water Supplied

Click to access definition
Click to add a comment

Water Audit Report for: Citizens Water
Reporting Year: 2015   10/2014 - 9/2015

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

Master Meter and Supply Error Adjustments

WATER SUPPLIED   <---------- Enter grading in column 'E' and 'J' ---------->   Pcnt: Value:

	grade	Volume		grade	Pcnt		Value	
Volume from own sources:	8	45,107.538 MG/Yr		8	0.00%	◉ ○		MG/Yr
Water imported:	5	297.310 MG/Yr		3		◉ ○		MG/Yr
Water exported:	5	643.290 MG/Yr		3		◉ ○		MG/Yr

Enter negative % or value for under-registration

WATER SUPPLIED: 44,761.558 MG/Yr   Enter positive % or value for over-registration

Authorized Consumption

AUTHORIZED CONSUMPTION   Click here: [?]
                                                                      for help using option
                                                                      buttons below

	grade	Value			Pcnt	Value	
Billed metered:	9	36,664.750 MG/Yr					
Billed unmetered:	n/a	0.000 MG/Yr					
Unbilled metered:	n/a	0.000 MG/Yr			Pcnt:	Value:	
Unbilled unmetered:	5	559.519 MG/Yr			1.25%	◉ ○	MG/Yr

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

AUTHORIZED CONSUMPTION: 37,224.269 MG/Yr

Use buttons to select percentage of water supplied

AWWA Water Audit Software – Validated Benchmark Audit Performance Indicators

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0
American Water Works Association.
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Water Audit Report for: **Citizens Water**
Reporting Year: **2015** | **10/2014 - 9/2015**

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 76 out of 100 ***

System Attributes:

	Apparent Losses:	1,529.439	MG/Yr
+	Real Losses:	6,007.850	MG/Yr
=	**Water Losses:**	**7,537.289**	MG/Yr
?	Unavoidable Annual Real Losses (UARL):	2,063.85	MG/Yr
	Annual cost of Apparent Losses:	$6,910,619	
	Annual cost of Real Losses:	$1,644,709	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:	18.1%
Non-revenue water as percent by cost of operating system:	0.6% Real Losses valued at Variable Production Cost

Operational Efficiency:

Apparent Losses per service connection per day:	12.59	gallons/connection/day
Real Losses per service connection per day:	49.45	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	0.68	gallons/connection/day/psi
From Above, Real Losses = Current Annual Real Losses (CARL):	6,007.85	million gallons/year
? Infrastructure Leakage Index (ILI) [CARL/UARL]:	2.91	

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

Range: 1 to 40, median 5

Range: 20 to 200, median 40

Water Balance – 95% Confidence Limits
Ability to disaggregate components and put focus on
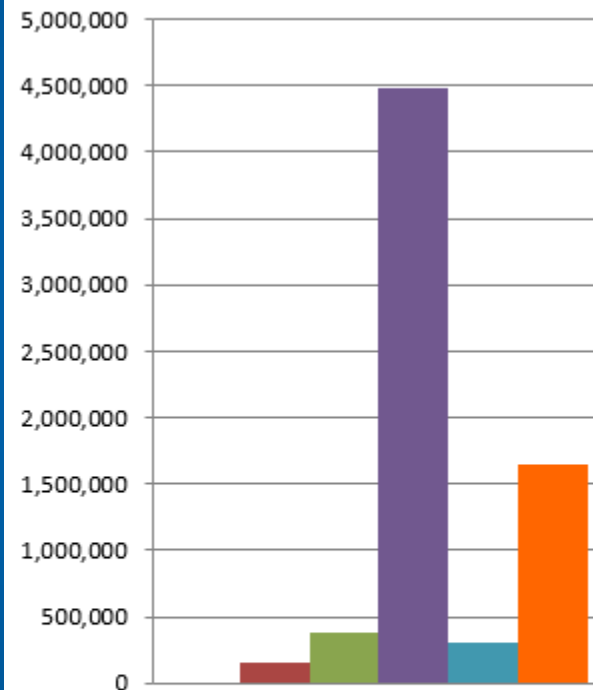
Existing Water Balance Information		Citizens Indianapolis		10/2014-09/2015		
Component (input, output)	%	Volume MG/Yr	Value $	95% Confidence Limits	Std. Deviation	Variance
Water Produced						
White River (MG/Yr)		17,898.651		2.0%	179.0	32036
Riverside (MG/Yr)		7,330.770		2.0%	73.3	5374
Fall Creek (MG/Yr)		5,298.257		2.0%	53.0	2807
TW Moses (MG/Yr)		3,162.527		2.0%	31.6	1000
White River North (MG/Yr)		5,907.123		2.0%	59.1	3489
Geist (MG/Yr)		804.524		2.0%	8.0	65
Harding (MG/Yr)		418.232		2.0%	4.2	17
Ford Road (MG/Yr)		89.687		2.0%	0.9	1
South Wellfield (MG/Yr)		4,106.898		2.0%	41.1	1687
Harbour (MG/Yr)		90.869		2.0%	0.9	1
Water Imported (MG/Yr)		297.310		2.0%	2.97	9
Water Exported						
Brown County Water Company		32.980		3.0%	0.49	0
City of Lawrence		0.000		3.0%	0.00	0
Lake of The Lanterns Mhp		17.834		3.0%	0.27	0
Lawrence Water Co		0.000		3.0%	0.00	0
Lawrence Water Company		0.000		3.0%	0.00	0
Morgan County Rural Water Corp		3.947		3.0%	0.06	0
Morgan Cty Rural Water Corp		29.488		3.0%	0.44	0
Town of Brownsburg		82.920		3.0%	1.24	2
Town of Danville		1.233		3.0%	0.02	0
Town of Pittsboro		78.798		3.0%	1.18	1
Tri-County Conserve Distr		51.936		3.0%	0.78	1
Whitestown Utility		215.153		3.0%	3.23	10
Carmel Adjustment		129.001		3.0%	1.94	4
Corrected Total Water Supplied (MG/Yr)		44,761.558		1.0%	215.6	46504

Water Balance – 95% Confidence Limits

Existing Water Balance Information		Citizens Indianapolis		10/2014-09/2015	
Billed Metered (MG/Yr) 5/8"		17,526.920	3.0%	17,001.112	18,052.727
Billed Metered (MG/Yr) 3/4"		2,255.118	3.0%	2,187.464	2,322.771
Billed Metered (MG/Yr) 1"		2,476.144	3.0%	2,401.860	2,550.428
Billed Metered (MG/Yr) 1 1/2"		5,000.801	3.0%	4,850.777	5,150.825
Billed Metered (MG/Yr) 2"		5,807.108	3.0%	5,632.895	5,981.321
Billed Metered (MG/Yr) 3"		677.609	2.0%	664.057	691.162
Billed Metered (MG/Yr) 4"		1,013.598	2.0%	993.326	1,033.870
Billed Metered (MG/Yr) 6"		1,425.233	2.0%	1,396.728	1,453.737
Billed Metered (MG/Yr) 8"		482.210	2.0%	472.566	491.855
Billed Unmetered (MG/Yr)		0.000	0.0%	0.000	0.000
Billed Authorized Consumption		36,664.741	1.6%	36,080.852	37,248.630
Non Revenue Water (MG/Yr)		8,096.817	9.0%	7,370.908	8,822.727
Unbilled metered (Mg/Yr)		0.000	0.0%	0.000	0.000
Unbilled Unmetered (Mg/Yr)		559.519	25.0%	419.640	699.399
Unbilled Authorized Consumption		559.519	25.0%	419.640	699.399
Water Losses (MG/Yr)		7,537.298	6.0%	7,083.884	7,990.712
Unauthorized Consumption (MG/Yr)		111.904	25.0%	83.928	139.880
Customer Metering Inaccuracies (MG/Yr) 5/8" +/-	-4.4%	808.931	5.0%	768.485	849.378
Customer Metering Inaccuracies (MG/Yr) 3/4" +/-	-3.5%	82.657	5.0%	78.524	86.790
Customer Metering Inaccuracies (MG/Yr) 1" +/-	-3.9%	101.404	5.0%	96.334	106.474
Customer Metering Inaccuracies (MG/Yr) 1 1/2" +/-	-2.2%	113.482	5.0%	107.808	119.156
Customer Metering Inaccuracies (MG/Yr) 2" +/-	-2.0%	120.277	5.0%	114.263	126.291
Customer Metering Inaccuracies (MG/Yr) 3" +/-	-4.3%	30.537	22.2%	23.773	37.301
Customer Metering Inaccuracies (MG/Yr) 4" +/-	-2.7%	27.892	20.0%	22.328	33.457
Customer Metering Inaccuracies (MG/Yr) 6" +/-	-3.2%	46.612	22.5%	36.120	57.104
Customer Metering Inaccuracies (MG/Yr) 8" +/-	0.6%	-2.638	42.0%	-1.530	-3.745
Systematic Data Handling Errors (MG/Yr)		91.662	25.0%	68.746	114.577
Apparent Losses (MG/Yr)		1,532.722	3.7%	1,475.776	1,589.668
Current Annual Real Losses (MG/Yr)		6,004.576	7.6%	5,547.600	6,461.552

Water Balance – 95% Confidence Limits

Performance Indicators and 95% confidence intervals				
Component	**Best estimate**	**95% Conf. Int.**	**Lower Range**	**Upper Range**
Non-Revenue Water (gal/conn/yr)	24,327	9.2%	22,093	26,562
Unbilled Consumption (gal/conn/day)	5	25.1%	3	6
Apparent Loss (gal/conn/day)	13	4.2%	12	13
Real Loss (gal/conn/day)	49	7.9%	46	53
Infrastructure Leakage Index	3.1	8.5%	2.8	3.3
Summary	Further work is required on validation before building a solid NRW reduction Strategy			
Component values $				
Component	**Best estimate**	**95% Conf. Int.**	**Lower Range**	**Upper Range**
Real Loss Value (annual $)	$ 1,643,813	9.1%	$ 1,494,127	$ 1,793,498
Apparent Loss Value (annual $)	$ 6,925,478	6.2%	$ 6,494,071	$ 7,356,886
Unbilled Value (annual $)	$ 153,174	25.5%	$ 114,122	$ 192,226
NRW Value (annual $)	$ 8,722,465	5.3%	$ 8,264,160	$ 9,180,770
NRW Value ($/conn/yr)	$ 26.21	5.6%	$ 25	$ 28

Water Balance – 95% Confidence Limits

Input Component Ranking for Output Improvement	Volume MG/Yr	Rank
Billed Metered (MG/Yr) 5/8"	17,526.920	1
White River (MG/Yr)	17,898.651	2
Billed Metered (MG/Yr) 2"	5,807.108	3
Billed Metered (MG/Yr) 1 1/2"	5,000.801	4
Riverside (MG/Yr)	7,330.770	5
Unbilled Unmetered (Mg/Yr)	559.519	6
White River North (MG/Yr)	5,907.123	7
Fall Creek (MG/Yr)	5,298.257	8
South Wellfield (MG/Yr)	4,106.898	9
Billed Metered (MG/Yr) 1"	2,476.144	10
Billed Metered (MG/Yr) 3/4"	2,255.118	11
TW Moses (MG/Yr)	3,162.527	12
Customer Metering Inaccuracies (MG/Yr) 5/8" +/-	808.931	13
Billed Metered (MG/Yr) 6"	1,425.233	14
Unauthorized Consumption (MG/Yr)	111.904	15
Systematic Data Handling Errors (MG/Yr)	91.662	16
Billed Metered (MG/Yr) 4"	1,013.598	17
Geist (MG/Yr)	804.524	18
Billed Metered (MG/Yr) 3"	677.609	19

Summary of Recommendations

1. Meter Testing confirmation
   a) Continued evaluation of existing data
   b) Targeted Sample testing of 5/8", 1-1/2" & 2"
   c) Will guide program towards real loss or apparent loss focus

2. Meter Replacement Plan/Strategy
   a) Using the results of 1., what is the optimum replacement strategy for existing population?

3. Meter Management Practices
   a) Optimized metering practices including inventory, testing, replacement, etc.

Customer Meter Inaccuracy – Composite Calculation

Size	Count (from inventory)	Volume (MG)	Best Case	Weighting	Worst Case	Weighting	Chosen	Weighting	Test Population	% of Total	Comments
5/8"	301,258	17,526.920	0.00%	0.00%	-17.67%	-8.45%	-4.42%	-2.11%	20,889	6.93%	Represents 65% weighting to best base, ~1,500 stuck meters, decent percentage of total population tested, ~65% pulled for meter failure, most controlled testing group size
3/4"	13,859	2,255.118	0.10%	0.01%	-14.40%	-0.89%	-3.54%	-0.22%	537	3.87%	Represents 65% weighting to best base, , ~50 stuck meters, low percentage of total population tested,~ 65% pulled for meter failure
1"	7,072	2,476.144	-0.11%	-0.01%	-15.46%	-1.04%	-3.94%	-0.27%	467	6.60%	Represents 70% weighting to best base, ~50 stuck meters, decent percentage of total population tested, ~70% pulled for meter failure
1 1/2"	3,466	5,000.801	-0.24%	-0.03%	-4.20%	-0.57%	-2.22%	-0.30%	585	16.88%	Comfortable with average of best/worst based on review of test results, high percentage of total population tested, ~16 stuck meters, only 1 pulled for meter failure
2"	3,984	5,807.108	0.12%	0.02%	-4.18%	-0.66%	-2.03%	-0.32%	820	20.58%	Comfortable with average of best/worst based on review of test results, high percentage of total population tested, ~22 stuck meters, only 2 pulled for meter failure
3"	440	677.609	-0.92%	-0.02%	-7.72%	-0.14%	-4.32%	-0.08%	84	19.09%	Comfortable with average of best/worst based on review of test results, post repair composite accuracy is 93.51% and testing/repaired occurred throughout year, numerous meters unrepairable and noted to be replaced
4"	178	1,013.598	-1.38%	-0.04%	-3.98%	-0.11%	-2.68%	-0.07%	75	42.13%	Comfortable with average of best/worst based on review of test results, post repair composite accuracy is 99.54% and testing/repaired occurred throughout year
6"	445	1,425.233	-1.98%	-0.08%	-4.36%	-0.17%	-3.17%	-0.12%	303	68.09%	Comfortable with average of best/worst based on review of test results, post repair composite accuracy is 99.83% and testing/repaired occurred throughout year
8"	6	482.210	0.55%	0.01%	-29.46%	-0.39%	0.55%	0.01%	4	66.67%	Meter with poor results is 8x2 fire meter, consumption is being captured under 2" size, so used only the two "true" 8" meter tests
	330,708	36,664.741		-0.14%		-12.42%		-3.49%	23,764	7.19%	

Composite Customer Metering Inaccuracy

Zero Flow Meters by Size & by Year

5/8" Meters by Original Install Date
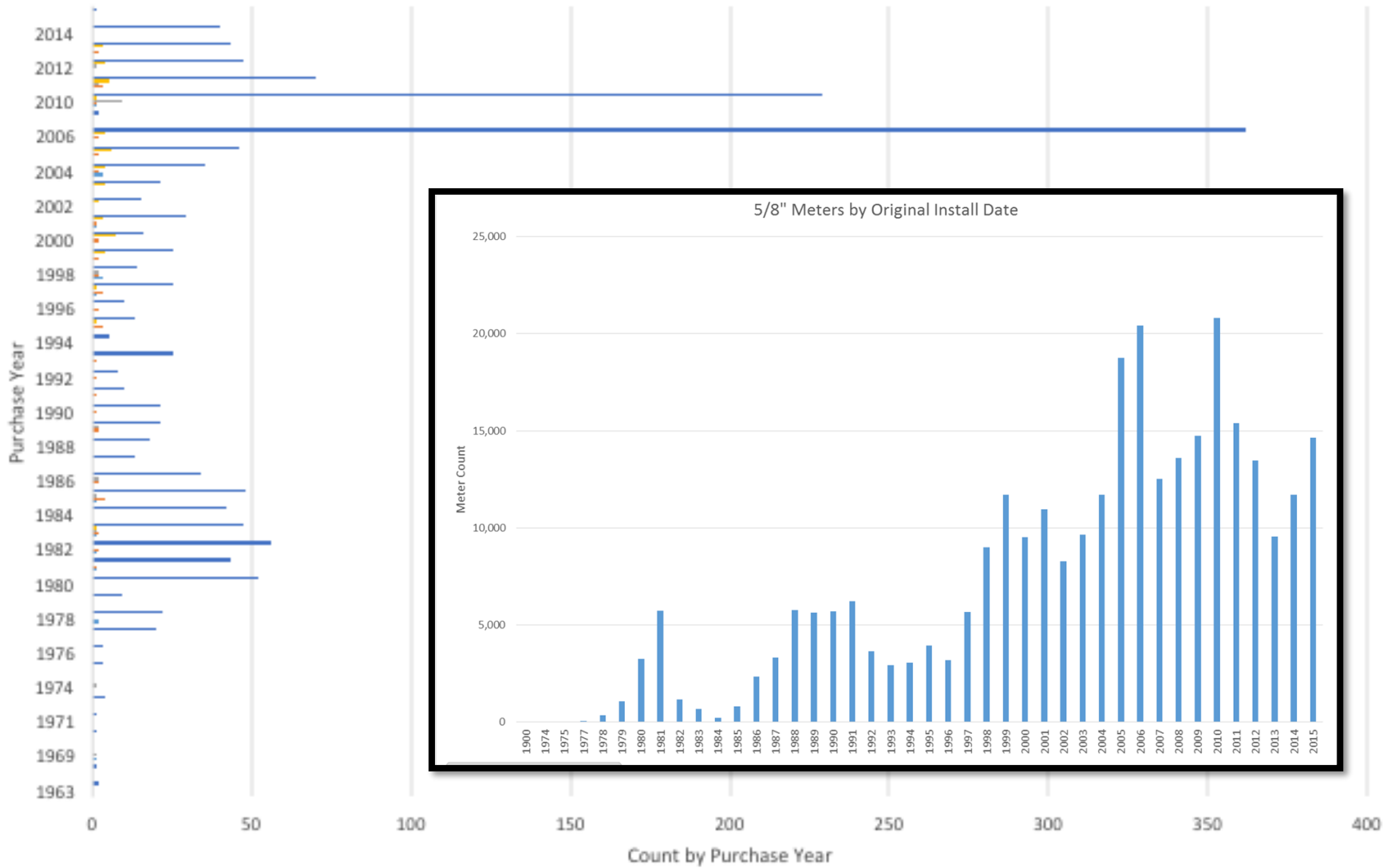
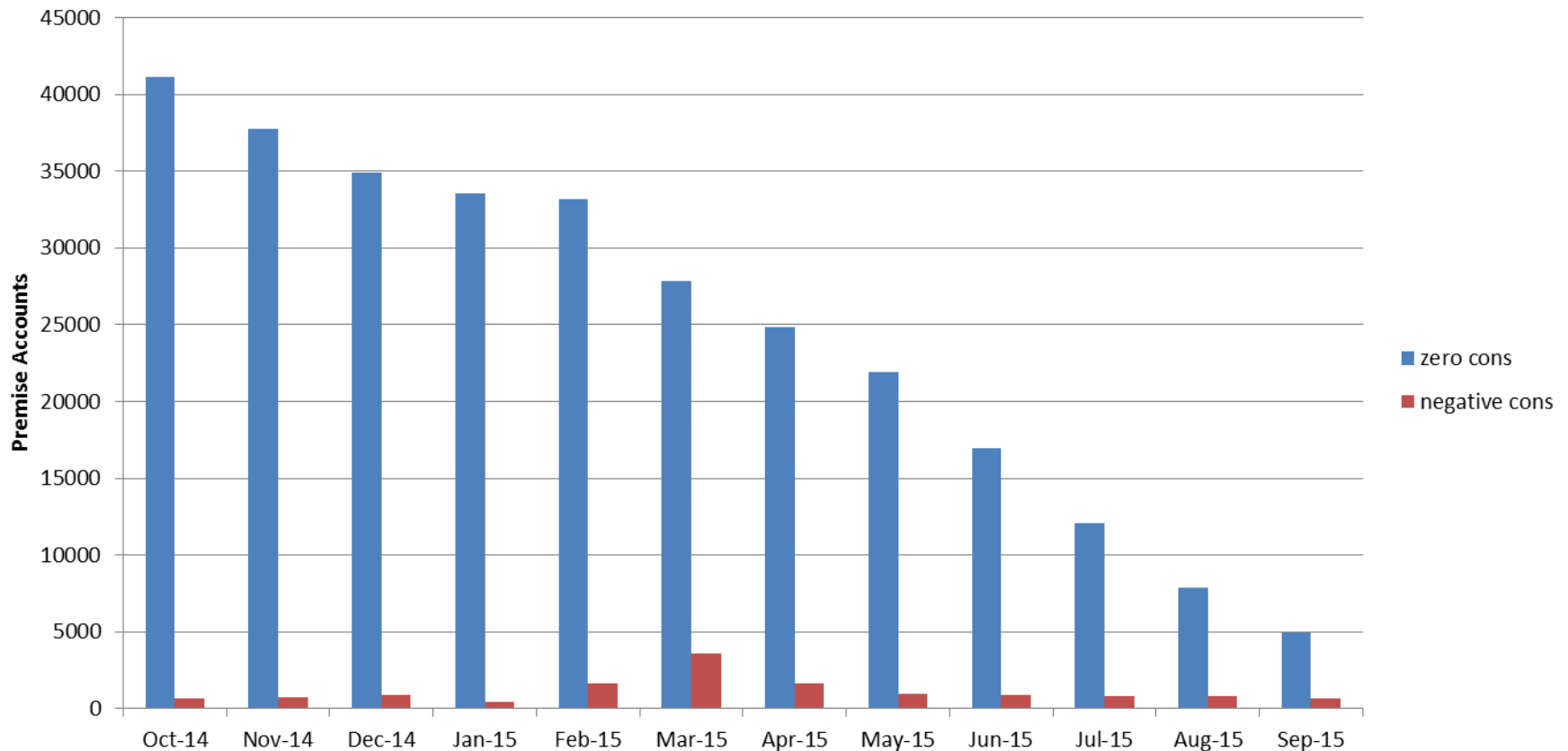## Summary of Recommendations

4. Data Tracking & Archiving
    a) Unbilled metered & unmetered uses
    b) Billing anomalies tracking and archiving
    c) Service connection leaks
5. Unmetered Firelines Audit
    a) Identification of total population
    b) Random testing of sample population for potential impact

Zero & Negative Consumption Analysis

Summary of Recommendations

6. Real Loss Component Analysis
   a) Evaluation of District Metered Areas
   b) Identify recoverable leakage by pressure zone

Background Leakage
Unreported and un-detectable using traditional acoustic equipment.

Tools
- Pressure Reduction
- Main and service replacement
- Reduction in the number of joints and fittings

Unreported Leakage
Often does not surface but is detectable using traditional acoustic equipment.

Tools
- Pressure Reduction
- Main and service replacement
- Reduction in the number of joints and fittings
- Proactive Leak Detection

Reported Leakage
Often surfaces and is reported by public or utility workers.

Tools
- Pressure Reduction
- Main and service replacement
- Optimized repair time

Figure 3. Three kinds of leakage

REAL LOSS COMPONENT ANALYSIS RESULTS				
System Component	Background Leakage	Reported Failures	Unreported Failures	Total
	(MG)	(MG)	(MG)	(MG)
Reservoirs	3.45	-	-	3.45
Mains and Appurtenances	511.77	250.13	-	761.90
Service Connections	1,527.71	34.33	-	1,562.05
Total Annual Real Loss	2,042.93	284.47	-	2,327.40
Real Losses as Calculated by Water Audit				6,353.83
Hidden Losses/Unreported Leakage Currently Running Undetected				4,026.43

Break Frequency by Pressure Zone

	Main Line Break Count								Total Main Length (feet)	Total Main Length (mi)	Break Frequency per 100 miles						
	2010	2011	2012	2013	2014	2015	2016	Grand Total			2010	2011	2012	2013	2014	2015	Average
Avon	12	17	14	13	11	6	2	75	1,419,602	268.9	4.5	6.3	5.2	4.8	4.1	2.2	4.5
Ben Davis	47	38	64	60	46	33	5	293	1,293,833	245.0	17.5	14.1	23.8	22.3	17.1	12.3	17.9
Castleton	68	49	63	42	63	50	3	338	3,052,830	578.2	25.3	18.2	23.4	15.6	23.4	18.6	20.8
Central	36	38	39	49	54	34	14	264	1,772,474	335.7	13.4	14.1	14.5	18.2	20.1	12.6	15.5
Cumberland	68	85	89	65	78	49	13	447	2,317,684	439.0	25.3	31.6	33.1	24.2	29.0	18.2	26.9
Fairwood	1	1	13	2	2	1		20	63,816	12.1	0.4	0.4	4.8	0.7	0.7	0.4	1.2
Flackville	41	56	56	54	41	31	2	281	886,203	167.8	15.2	20.8	20.8	20.1	15.2	11.5	17.3
Harbour	8	14	11	6	8	19		66	501,180	94.9	3.0	5.2	4.1	2.2	3.0	7.1	4.1
Harding		1		1				2	60,063	11.4	0.0	0.4	0.0	0.4	0.0	0.0	0.1
Lafayette	57	67	64	43	34	34	7	306	1,896,745	359.2	21.2	24.9	23.8	16.0	12.6	12.6	18.5
Manual	1		2	2	2	1		8	38,587	7.3	0.4	0.0	0.7	0.7	0.7	0.4	0.5
McCordsville	1	1	1					3	54,577	10.3	0.4	0.4	0.4	0.0	0.0	0.0	0.2
Meridian Hills	30	27	26	25	21	16	4	149	810,570	153.5	11.2	10.0	9.7	9.3	7.8	6.0	9.0
Morgan		2	1	3	3	1		10	651,093	123.3	0.0	0.7	0.4	1.1	1.1	0.4	0.6
New Clermont	1				3			4		0.0	0.4	0.0	0.0	0.0	1.1	0.0	0.2
Nora	3		2	1	1	1		8	231,246	43.8	1.1	0.0	0.7	0.4	0.4	0.4	0.5
Northeast	183	158	159	134	206	122	14	976	3,639,371	689.3	68.1	58.8	59.1	49.8	76.6	45.4	59.6
Northwest			1	1				2	93,982	17.8	0.0	0.0	0.4	0.4	0.0	0.0	0.1
Reed Rd	4	6	6	8	4	9		37	201,543	38.2	1.5	2.2	2.2	3.0	1.5	3.3	2.3
Southeast	8	8	1	5	2	1		25	1,066,914	202.1	3.0	3.0	0.4	1.9	0.7	0.4	1.5
Southport	95	85	106	91	118	65	13	573	1,592,596	301.6	35.3	31.6	39.4	33.8	43.9	24.2	34.7
Southwest	21	18	18	27	20	16	3	123	1,228,338	232.6	7.8	6.7	6.7	10.0	7.4	6.0	7.4
Zionsville	5	6	5	3	3	4		26	81,508	15.4	1.9	2.2	1.9	1.1	1.1	1.5	1.6
(blank)	1	1		1		3		6	19,842	3.8	0.4	0.4	0.0	0.4	0.0	1.1	0.4
Grand Total	691	678	741	636	720	496	80	4,042		4,351.2							

NRW in the Fast Lane: The Citizens Energy Group Non-Revenue Water Initiative

Credit to Thomas Kinkade

Presented by:
Dan Moran, Citizens Energy Group
Tory N. Wagoner, Cavanaugh

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Stewardship Through Innovation