



SEVEN SEAS WATER



CBWMP

December 2010

Seven Seas Water Corporation

Bahamas-BVI-Florida-Mexico-Netherlands Antilles-Trinidad & Tobago-TCI-USVI



Seven Seas Water Water Supply BOOT

- Seven Seas Water is known for its BOOT approach to brackish and seawater desalination
- Currently own and operate 19 facilities with a total production of 10 MGD in the Caribbean
- Including facilities on St. Maarten, Curacao, Turks & Caicos, The Bahamas
- Recently awarded 6.5 MGD 10-year contract in Trinidad & a 8 MGD 20-year contract in the USVI



Seven Seas Water

Water Supply BOOT + NRW Reduction

- Seven Seas Water can now offer Non-Revenue Water (NRW) reduction works in conjunction with new or existing reverse-osmosis BOOT contracts
- There is an obvious synergy between water supply & NRW reduction
- NRW reduction works are offered at NO capital cost to the Client
- The capital cost + the annual maintenance costs of the NRW reduction works are recovered via an appropriate increase in the Water Purchase Tariff from the associated BOOT water supply facility



Seven Seas Water

Water Supply BOOT + NRW Reduction

- How can Seven Seas Water now offer Non-Revenue Water (NRW) reduction works?
- Member of the AWWA Water Loss Control Committee
- Chair of the Apparent (Commercial) Loss Subcommittee
- Experience of executing, managing, & directing NRW reduction works in the UK, Africa, Latin America & the Caribbean
- Experience of working within Utilities means that Seven Seas proposals are based on practical experience, not theory
- This is supported by a long-term commitment as opposed to a short-term consultancy service



Seven Seas Water NRW Capabilities

NON-REVENUE WATER REDUCTION



A Critical Component of Water Supply Management

WE HELP DEFINE THE PROBLEM

As a long time municipal partner, Seven Seas Water is well aware of the financial pressures that utilities face, as well as the need to optimize the use of their water supply. Through Non-Revenue Water (NRW) management and reduction services, Seven Seas Water can help you identify revenue losses and define both commercial and technical problem areas that need to be managed. These services are not offered as traditional stand-alone consultation services, but can be combined with new desalination installations, or be provided in locations with existing Seven Seas Water desalination facilities.

RECOVERING REVENUE LOSSES

Seven Seas Water assists utilities in the recovery of revenue losses that stem from non-delivery or non-payment of bills. After careful review of the practices in place, Seven Seas Water will help determine if there is a demonstrated need for rate adjustments and establishment of payment plans, and introduce cost effective strategies to manage water delivery. Seven Seas Water will also identify errors in the address and billing systems by executing a thorough property survey utilizing the latest GPS equipment and updating the existing billing system accordingly, or installing a new one. Seven Seas Water will commission the new systems, complete with appropriate hardware and staff training.

IDENTIFYING IN-DIRECT LOSSES

Unmetered and unauthorized consumption can be difficult to identify and quantify. By executing a property survey and customer census, Seven Seas Water can identify properties that are missing from the utilities database. To identify billing volume errors, we conduct a survey of billed water volumes vs. delivered water volumes. Seven Seas Water also assists clients in reviewing rate structures and capital expenditure budgets to assess the impact that metering inaccuracies may have on their revenue and can assist with the implementation of AMR/AMI systems to ensure significantly and measurably better meter coverage with accurate meter readings.

REDUCING LEAKAGE

The management, reduction, and subsequent maintenance of leakage levels in any system is a long-term undertaking. Seven Seas Water assists our clients by executing the initial design and implementation of discrete zones complete with bulk metering. This allows for system management and leakage detection on a manageable scale. By producing an Active Leakage Control Policy we enable our client to effectively and efficiently execute all components of leak management; i.e. leak detection, localization, and repair. By installing and linking SCADA systems with the zonal metering and storage and distribution systems, clients can access real-time data on production, system flows, storage volumes and leakage levels.

Increasing Revenue by Identifying, Managing and Reducing Water Losses



Learn more: 813-855-8636, ext. 1200
www.sevenseaswater.com



Seven Seas Water

What is NRW?

- Non-Revenue Water is that volume of water produced by a Utility for which the Utility receives no revenue



Seven Seas Water

What is NRW?

- Non-Revenue Water is that volume of water produced by a Utility for which the Utility receives no revenue & which has not been accounted-for within the rates design



Seven Seas Water

What is NRW?

- Non-Revenue Water is that volume of water produced by a Utility for which the Utility receives no revenue & which has not been accounted-for within the rates design
- Use the Water Balance to identify the components of loss
- WB 'officially' published by the IWA (International Water Association)
- WB adopted by the AWWA (American Water Works Association) Water Loss Control Committee & included within the M36 Third Edition



Seven Seas Water NRW – Water Balance

Raw water Intake/ Abstraction	System input volume (vol/year)	Authorized consumption (vol/year)	Billed authorized consumption (vol/year)	Billed metered consumption (including water exported)	Billed volume (vol/year)	Revenue: Billed & Received (vol/year)
				Billed unmetered consumption		Revenue Loss (a): billed & not received (direct)
		Unbilled authorized consumption (vol/year)	(b): unbilled, metered consumption (indirect)	Unbilled volume (vol/year)	Revenue loss (indirect, b-e) (vol/year)	
			(c): unbilled, unmetered consumption (indirect)			
		Apparent losses (vol/year)	(d): Unauthorized consumption (indirect)			
			(e): Metering inaccuracies (indirect)			
		Water losses (vol/year)	Real losses (vol/year)	(f): Transmission & distribution mains	Technical loss (f-h) (vol/year)	
				(g): Storage tanks & overflows		
(h): Service connections to meters						
Diversion & Production losses						



Seven Seas Water NRW – Water Balance

Raw water Intake/ Abstraction	System input volume (vol/year)	Authorized consumption (vol/year)	Billed authorized consumption (vol/year)	Billed metered consumption (including water exported)	Billed volume (vol/year)	Revenue: Billed & Received (vol/year)	Revenue Water
				Billed unmetered consumption		Revenue Loss (a): billed & not received (direct)	
		Unbilled authorized consumption (vol/year)	(b): unbilled, metered consumption (indirect)	Unbilled volume (vol/year)	Revenue loss (other, b-e) (vol/year)	Non-Revenue Water	
			(c): unbilled, unmetered consumption (indirect)				
		Apparent losses (vol/year)	(d): Unauthorized consumption (indirect)				
			(e): Metering inaccuracies (indirect)				
Water losses (vol/year)	Real losses (vol/year)	(f): Transmission & distribution mains	Technical loss (f-h) (vol/year)				
		(g): Storage tanks & overflows					
	(h): Service connections to meters						
Diversion & Production losses							



Seven Seas Water NRW – Water Balance

- Before we commence with the calculating the various components, we must consider the source & robustness of the base data:
 - 1. **Repeatability** of the data being collected & measured;
 - 2. **Reproducibility** of the measurements;
 - 3. **Accuracy** of the measurements;
 - 4. **Stability** of the measurement system.
- Without confidence in the measurements, we cannot make educated management decisions relating to the investment associated with NRW reduction



Seven Seas Water NRW – WB Calculation

Raw water Intake/ Abstraction	System input volume	Authorized consumption	Billed authorized consumption	Billed metered consumption (including water exported)	Billed volume	Revenue: Billed & Received
			770			
1,111	1,000	885				
			Unbilled authorized consumption	(b)	Unbilled volume	Revenue Loss (a): billed & not received (direct)
			115	(c)		Revenue loss (other, b-e)
			Apparent losses 18	(e)	230	133
		Water losses	Real losses	(f)		Technical loss (f-h)
		115	97	(g)		97
				(h)		
Diversion & Production losses						
111						



Seven Seas Water NRW – WB Calculation

Assume Supply = 1,000 units, & each unit has a sale value = 1

Raw Water Intake/Abstraction	1111				
Diversion & Production Losses	111				
System Input Volume	1000				
Authorized Consumption	<u>885</u>				
Billed Authorized Consumption		<u>770</u>			
Billed Metered Consumption			770		
Billed Unmetered Consumption			0		
				<u>770</u>	
					745
					25
Unbilled Authorized Consumption		<u>115</u>			
(b) Unbilled, Metered Consumption			80		
(c) Unbilled, Unmetered Consumption			35		
Water Losses	<u>115</u>				
Apparent Losses		<u>18</u>			
(d) Unauthorized Consumption			0		
(e) Metering inaccuracies			18		
Real Losses		<u>97</u>			
(f) Transmission & distribution mains			30		
(g) Storage tanks & overflows			15		
(h) Service connections			52		
				<u>230</u>	
					133
					97

SIV totals che 1000 1000 1000 1000 1000



Seven Seas Water

NRW – Water Balance errors

- Consider the calculation of the Losses Volume:
- = System Input (Production) Volume – Authorized Consumption
- A **2%** error in the **System Input (Production) Volume** compounded with a **2.7%** error in the **Authorized Consumption** can lead to a **40%** error in the **Losses Volume** & a **45%** error in the **Leakage** value!



Seven Seas Water

NRW – Water Balance errors

- Consider the calculation of the Losses Volume:

	Value	%	Error	Limits	
			Volume	Upper	Lower
System Input Volume	1000	2%	20	1020	980
Billed Authorized Consumption	770	2.3%	17.7	787.7	752.3
Unbilled Authorized Consumption	115	5%	5.8	120.8	109.3
therefore:					
Authorized Consumption	885	2.7%		908.5	861.5
Water Losses	115	37.8%		158.5	71.5
Apparent Losses	18	2.3%	0.4	18.4	17.6
Real Losses	97	45.2%		140.9	53.1



Seven Seas Water

NRW – Water Balance errors

- Consider the calculation of the Losses Volume:
- = System Input (Production) Volume – Authorized Consumption
- A **2%** error in the **System Input (Production) Volume** compounded with a **2.7%** error in the **Authorized Consumption** can lead to a **40%** error in the **Losses Volume** & a **45%** error in the **Leakage** value!
- Therefore it is **critical** to have accurate, valid, reliable numbers for these two principal components of the Water Balance



Seven Seas Water

NRW – System Input (Production)

Raw Water Intake/ Abstraction	Production Volume (Volume Entering the System)	Authorised Water Consumption	Authorised Consumption Billed	Billed Metered	Billed Volume	Billed & Paid
				Billed Unmetered		Billed & Unpaid
			Authorised Consumption Unbilled	Unbilled Metered	Unbilled Volume	Commercial Losses (other)
				Unbilled Unmetered		
		Losses	Apparent Losses	Illegal		Technical Losses
			Real Losses	Meter Inaccuracies		
					Distribution	
				Connections		
Production Losses						

= NRW
MINUS allowed
(regulated) losses



Seven Seas Water NRW – Water Balance errors

- **Production Volume:**

- Production meters full-bore electromagnetic meters



- SCADA

to relay accurate production volume(s) to a central control



- » Seven Seas Water can design, supply, install, and maintain both the production meters and the SCADA system



Seven Seas Water

NRW – Authorized Consumption

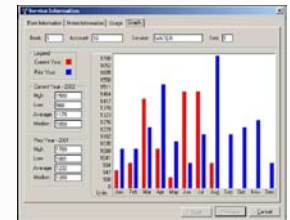
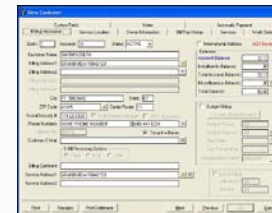
Raw Water Intake/ Abstraction	Production Volume (Volume Entering the System)	Authorised Water Consumption	Authorised Consumption Billed	Billed Metered	Billed Volume	Billed & Paid
				Billed Unmetered		Billed & Unpaid
			Authorised Consumption Unbilled	Unbilled Metered	Unbilled Volume	Commercial Losses (other)
				Unbilled Unmetered		
		Losses	Apparent Losses	Illegal		Technical Losses
			Real Losses	Meter Inaccuracies		
	Distribution					
	Connections					
Production Losses						

= NRW
 MINUS allowed
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Seven Seas Water NRW – Water Balance errors

- **Authorized Consumption:**
- Hydraulically-discrete zones
- AMR/AMI electronically collect delivered volume information from customer meters
- Billing System to accurately bill customers for the service



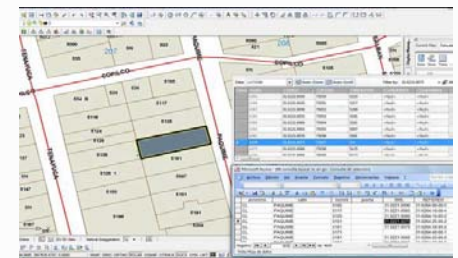
» Seven Seas Water can design, supply, install, and maintain both the AMR/AMI and the Billing system software



Seven Seas Water

NRW – Water Balance errors

- **Authorized Consumption:**
- Billing System to accurately bill customers for the service
- Base data is key to the effectiveness & efficiency of the system
 - Customer & property census
 - Can create new physical address system
 - Use census information as new customer database



- » Seven Seas Water can design & execute the census if the results are to be incorporated with a new Billing System



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NRW – Water Balance errors

- Therefore, having addressed the validity and reliability of:
- **System Input (Production) Volume** &
- **Authorized Consumption**
- We can calculate the **Losses Volume** with confidence



Seven Seas Water NRW – Losses Volume

Raw Water Intake/ Abstraction	Production Volume (Volume Entering the System)	Authorised Water Consumption	Authorised Consumption Billed	Billed Metered	Billed Volume	Billed & Paid
				Billed Unmetered		Billed & Unpaid
		Losses	Authorised Consumption Unbilled	Unbilled Metered	Unbilled Volume	Commercial Losses (other)
				Unbilled Unmetered		
		Apparent Losses	Illegal	Technical Losses		
			Meter Inaccuracies			
Real Losses	Distribution					
	Connections					
Production Losses						

= NRW
 MINUS allowed
 (regulated) losses



Seven Seas Water NRW – Losses Volume

- The **Losses Volume** comprises:
- Apparent Losses &
- Real Losses (leakage)



Seven Seas Water

NRW – Apparent Losses

- **Apparent Losses** comprise:
 - Illegal connections can usually be identified during a customer & property census
 - Meter inaccuracies AMR/AMI allows this volume to be calculated accurately
- » Seven Seas Water can execute the census if linked to a new billing system & can design, supply, install, and maintain both the AMR/AMI and the Billing system software



Seven Seas Water

NRW – Real Losses

- **Real Losses** comprise:
- Leakage
- The Water Balance differentiates between Distribution system leakage & customer Connections leakage
- As the level of leakage in any system reduces, a higher percentage of the remaining leakage occurs on the customer Connections



Seven Seas Water

NRW – Real Losses

- There are three components to reducing leakage:
- 1. Detection
 - Executed by having accurate Production & Zone meters linked to a SCADA system + an accurate Billing system
 - » Seven Seas Water can design, install, and maintain the production & zone meters, the SCADA system, & the Billing system software



Seven Seas Water NRW – Real Losses

- There are three components to reducing leakage:

- 2. Location

Executed by leakage detection team(s) with leak-noise correlators, electronic listening sticks, & ground microphones



- » Leakage localization is better managed & executed by the water utility





Seven Seas Water

NRW – Real Losses

- There are three components to reducing leakage:
- 3. Repair
 - Executed by leakage repair team(s) with standard repair equipment
 - » Leakage repair is better managed & executed by the water utility



Seven Seas Water

NRW – Losses (all components)

Raw Water Intake/ Abstraction	Production Volume (Volume Entering the System)	Authorised Water Consumption	Authorised Consumption Billed	Billed Metered	Billed Volume	Billed & Paid
				Billed Unmetered		Billed & Unpaid
			Authorised Consumption Unbilled	Unbilled Metered	Commercial Losses (other)	
			Unbilled Unmetered			
		Losses	Apparent Losses	Illegal	Unbilled Volume	
				Meter Inaccuracies		
	Real Losses		Distribution	Technical Losses		
			Connections			
	Production Losses					

= NRW
MINUS allowed
(regulated) losses



Seven Seas Water NRW – Summary

- Seven Seas Water can assist the Utility significantly in its NRW reduction works via the design, supply, installation & maintenance of:
 - Production & zone meters
 - SCADA system
 - AMR/AMI
 - Billing system
- All at no Capital cost to the Client; the initial capital cost & continuous maintenance will be recovered via an associated increase in the Water Purchase tariff from the new or existing BOOT water production facility



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