

*Water and Sewerage Authority
Water Gain and Control Strategies
Leak Reduction
Point Lisas Industrial Estate*

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2003 September,18

THE OPERATION - WATER

Population served:

➤ Water	1,161,376
➤ Water Customers	356,201

Average pop. per water conn. 4.2

Length of water mains 5,800 km

Number of water treatment plants:

➤ Surface water facilities	23
➤ Groundwater facilities	53

The Operations – Water cont'd

Number of booster pump stations **118**

Reservoir Capacity:

➤ Arena	53,011,600 m³
➤ Hollis	8,395,300 m³
➤ Navet	17,001,600 m³
➤ Hillsborough	1,499,960 m³

The Operations – Water cont'd

Daily Production:

➤ Arena	318Mld
➤ Hollis	38Mld
➤ Navet	85Mld
➤ Hillsborough	6Mld

The Operations – Water cont'd

Total Daily water production supplied:	950Mld
➤ Trinidad	914Mld
➤ Tobago	36Mld
Total number of employees	2547
Number of production wells	200
Current wells production	236Mld
No. of Tank Reservoir	99

THE OPERATION - WASTEWATER

Population served	290,344
Wastewater customers	45,938
Ave. population per w/water conn.	4.2
Length of sewers maintained	401 km
Number of WWTP's	12
Number of Lift Stations	18
Volume of sewerage collected	104,227m³d

INCOME & EXPENDITURE

In 2002 revenues were \$402 million.

The major cost centers for WASA were:

✓ Wages and Salaries	\$270 M	32%
✓ Supplies and Services	\$115 M	14%
✓ Power	\$ 40 M	5%
✓ Desalination	\$180 M	21%
✓ Financing Costs	\$186 M	22%
✓ Provision for Doubtful Debt	\$ 30 M	4%
✓ Other Cost	<u>\$ 21 M</u>	2%
Total	<u>\$842 M</u>	

WATER LOSSES/NON REVENUE WATER/UFW

- Losses of water in the Authority's Transmission and Distribution System impact on revenues and levels of service.**
- In Europe regulators of the water industry set targets for water utilities in keeping water loss or unaccounted for water (u.f.w.) between 15-30%.**
- Reduction of losses protect customers from paying high costs that can be attributed to wastage.**

Water Losses/Non Revenue Water/u.f.w. cont'd

**There are four (4) main methods to deal
with u.f.w. –**

- Passive leak detection**
- Regular sounding**
- Waste Metering**
- District metering**

Water Losses/Non Revenue Water/u.f.w. cont'd

How is WASA dealing with losses or u.f.w. ?

- ✓ **Unaccounted for water (u.f.w.) in Trinidad and Tobago is estimated to be 40-50%.**
- ✓ **WASA has embarked on a Leakage Control Strategy (1998/1999).**
- ✓ **Strategy aimed at establishing processes for the reduction of u.f.w.**

Water Losses/Non Revenue Water/ufw cont'd

- ✓ **Implementation of the District Metered Area (DMA) Concept has remained the primary method used to quantify and reduce u.f.w.**
- ✓ **Forty (40) DMA's have been established.**
- ✓ **Periodic transmission main leakage audits.**
- ✓ **Pressure reduction**

Water Losses/Non Revenue Water/u.f.w. cont'd

- ✓ **Reduction of run time for leaks
(800-LEAK) programme implemented**
- ✓ **Increase in leak repairs
(In 2002 40,000 leaks repaired at a cost of
\$125M)**
- ✓ **Replacement of pipeline
(In 2002, 50km of pipelines replaced)**

THE DMA METHODOLOGY

- ❑ A DMA is a defined zone for which the volume of water supplied and water consumed are measured.**
- ❑ Normal size of a DMA – 2000-5000 properties.**
- ❑ Flow meters are installed at strategic positions within the system.**

The DMA Methodology cont'd

- ❑ The amount of water entering the zone is measured and authorized consumption is determined.**
- ❑ The difference between the volume supplied and authorized consumption is the u.f.w.**
- ❑ In the case where properties are not metered consumption is estimated.**
- ❑ Accuracy can be affected by your method used for estimation.**

The DMA Methodology cont'd

- ❑ To mitigate against inaccuracies, the minimum night line has been adopted.**

NIGHT LINE

- ❑ Includes night usage for flushing toilets and customer side leakage.**
- ❑ Caters for special facilities like hospitals, factories and gas stations.**
- ❑ Leaks**

PROCEDURE ADOPTED

Example: In the Bon Air Area (Trinidad)

- (1) Flow into the area is logged.**
- (2) Minimum night line is established**
- (3) Household night usage is established:**
 - >UK uses 1.77 liters/property/hr**
 - >WASA uses 6 liters/property/hr**

Procedure Adopted cont'd

- (4) Metered usage is determined.**
- (5) U.F.W. is determined by subtracting demand established from minimum night line.**
- (6) Average daily flow established and percentage u.f.w. is calculated.**

District Metered Area-Unaccounted for Water

DMA **Bon Air**

Minimum measured night flow (litres/second)	A	15.83	
Domestic allocation (6 litres/property/hour)*	D	6	lpph
Domestic unmetered properties	D1	1006	
Domestic metered properties	D2	0	
Non-domestic metered properties	D3	0	
Total number of Properties	P	1006	
<u>DEMAND ALLOCATION</u>			
Domestic demand = (D1) x (D) / 3600	1	1.6767	Litres/sec
Domestic Metered Supplies:	2		Litres/sec
Non - Domestic Metered Supplies:	3	0	Litres/sec
TOTAL DEMAND = (1 + 2 + 3)	B	1.6767	Litres/sec
UNACCOUNTED FOR WATER = (A) - (B)	C	14.153	Litres/sec
Rate per property = (C) x 3600 / (P)		50.648	lpph
Average daily Flow	E	22.69	
UFW Percentage = (C) / (E) x 100		62.377	

Date/Time: See Graph

UPDATE ON DMA'S

- ✓ **Forty (40) DMA's have been established in Trinidad and Tobago.**
- ✓ **Most DMA's are in residential areas, as such minimum night line has been used.**
- ✓ **The progressive reduction of the minimum night line is monitored.**
- ✓ **Water loss reductions and cumulative savings are also monitored.**

Update on Dma's cont'd

- ✓ **The Point Lisas has a high degree of meters and therefore considered a special DMA.**
- ✓ **U.F.W. is therefore determined by measuring the flow into the area over a period and determining the metered and unmetered consumption during the same period**

Calculating UFW for DMAs in Trinidad

DMA	Min. Night Flow	Total Night Usage	Previous		Present		Change	
	l/sec	l/sec	Date	UFW l/sec	Date	UFW l/sec	UFW l/sec	UFW m3/day
AROUCA HIGHLIFT	58.33	5.93	30/07/03	84.56	30/08/03	52.4	32.16	2778.62
AROUCA PROPER	14.19	2.3	30/07/03	11.21	30/08/03	11.89	-0.68	58.75
BARATARIA	9.44	5.6	30/07/03	7.26	30/08/03	3.84	3.42	295.49
BON AIR GARDENS	15.83	1.9	30/07/03	10.82	30/08/03	13.93	-3.11	268.70
DIAMOND VALE	38.69	32.61	30/07/03	6.08	30/08/03	6.08	0	0.00
GUAICO/TAMANIA	53.06	3.7	30/07/03	9.08	30/08/03	49.36	-40.28	3480.19
MANZANILLA	9.72	2.94	30/07/03	6.78	30/08/03	6.78	0	0.00
MT. LAMBERT	9.47	0.91	30/07/03	9.33	30/08/03	8.56	0.77	66.53
SANTA MARGARITA	6.25	0.66	30/07/03	4.2	30/08/03	5.59	-1.39	120.10
ST. JOHNS ROAD	48.33	11.63	30/07/03	36.7	30/08/03	36.7	0	0.00
VALSAYN	23.89	17.67	30/07/03	20.24	30/08/03	6.22	14.02	1211.33
WESTMOORINGS	11.94	6.2	30/07/03	5.62	30/08/03	5.74	-0.12	10.37
CENTRAL PARK EAST	2.11	0.33	30/07/03	1.73	30/08/03	1.78	-0.05	4.32
GUAYA/STONEBRITE	9.97	1.13	30/07/03	11.87	30/08/03	8.84	3.03	261.79
GULF VIEW	10.94	1.16	30/07/03	8.13	30/08/03	9.78	-1.65	142.56
LISAS GARDENS	18.72	1.82	30/07/03	12.74	30/08/03	16.9	-4.16	359.42
ORCHARD GARDENS	2.72	0.51	30/07/03	13.62	30/08/03	2.21	11.41	985.82
PALMISTE	0	2.24	30/07/03	14.43	30/08/03	0	14.43	0.00
PERSEVERANCE	8.89	0.82	30/07/03	5.7	30/08/03	8.07	-2.37	204.77
PLEASANTVILLE	0	2.5	30/07/03	16.39	30/08/03	0	0	0.00
SISTER'S ROAD	20	0.47	N/A	N/A	30/08/03	19.53	N/A	0.00
UNION HALL	0.67	0.82	N/A	N/A	30/08/03	-0.15	N/A	0.00

THE POINT LISAS DMA

- ✓ **Located on the west coast of Trinidad.**
- ✓ **Approximately 100 industries.**
- ✓ **Consumption averages 55-58Mld.**
- ✓ **Eight (8) major customers whose combined usage is over 90% of total volume consumed.**
- ✓ **Because industries are metered there is a simple mechanism for deriving total consumption to a high degree of certainty.**

Chart 3.3 Consumption of major users: August 2003

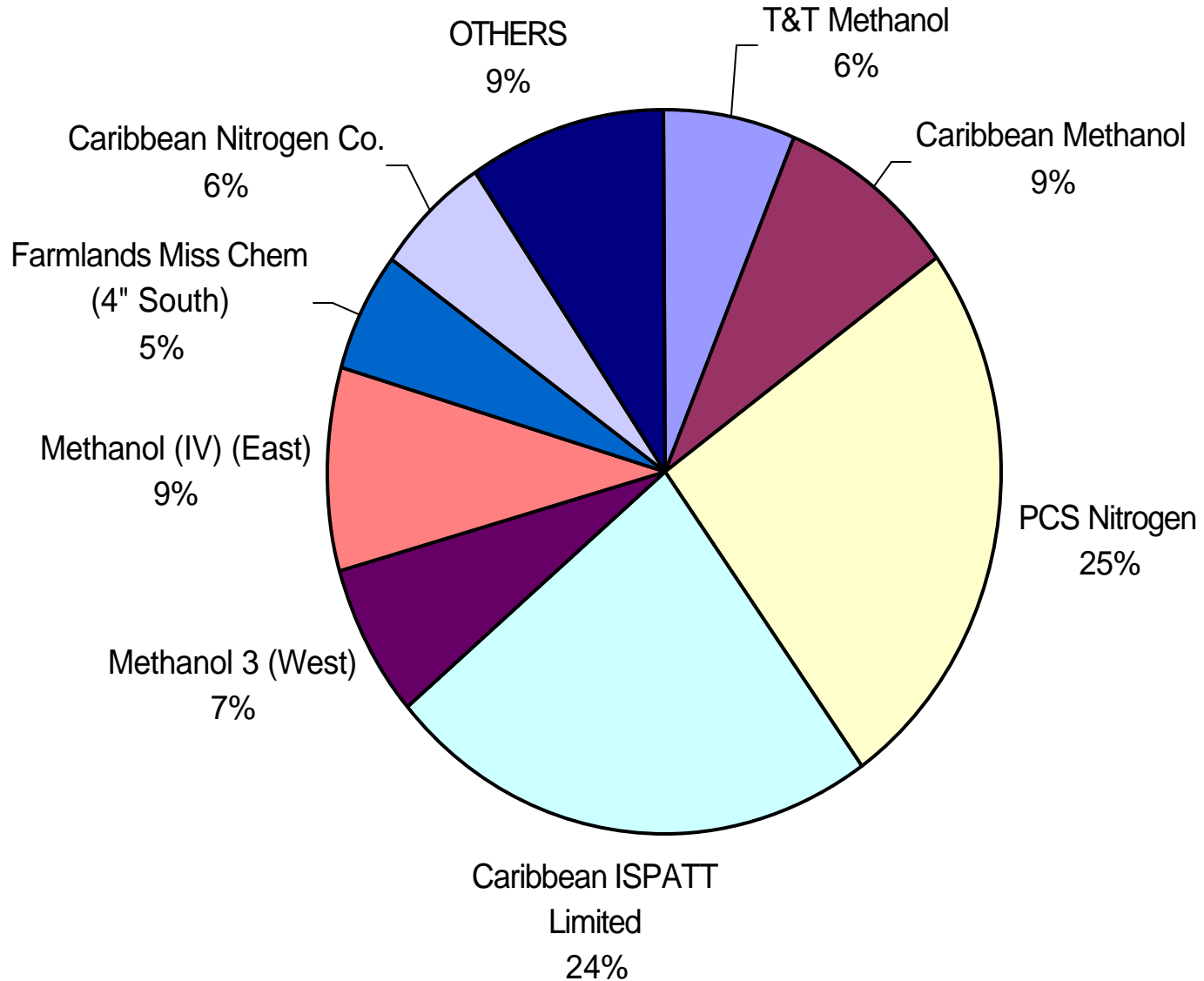
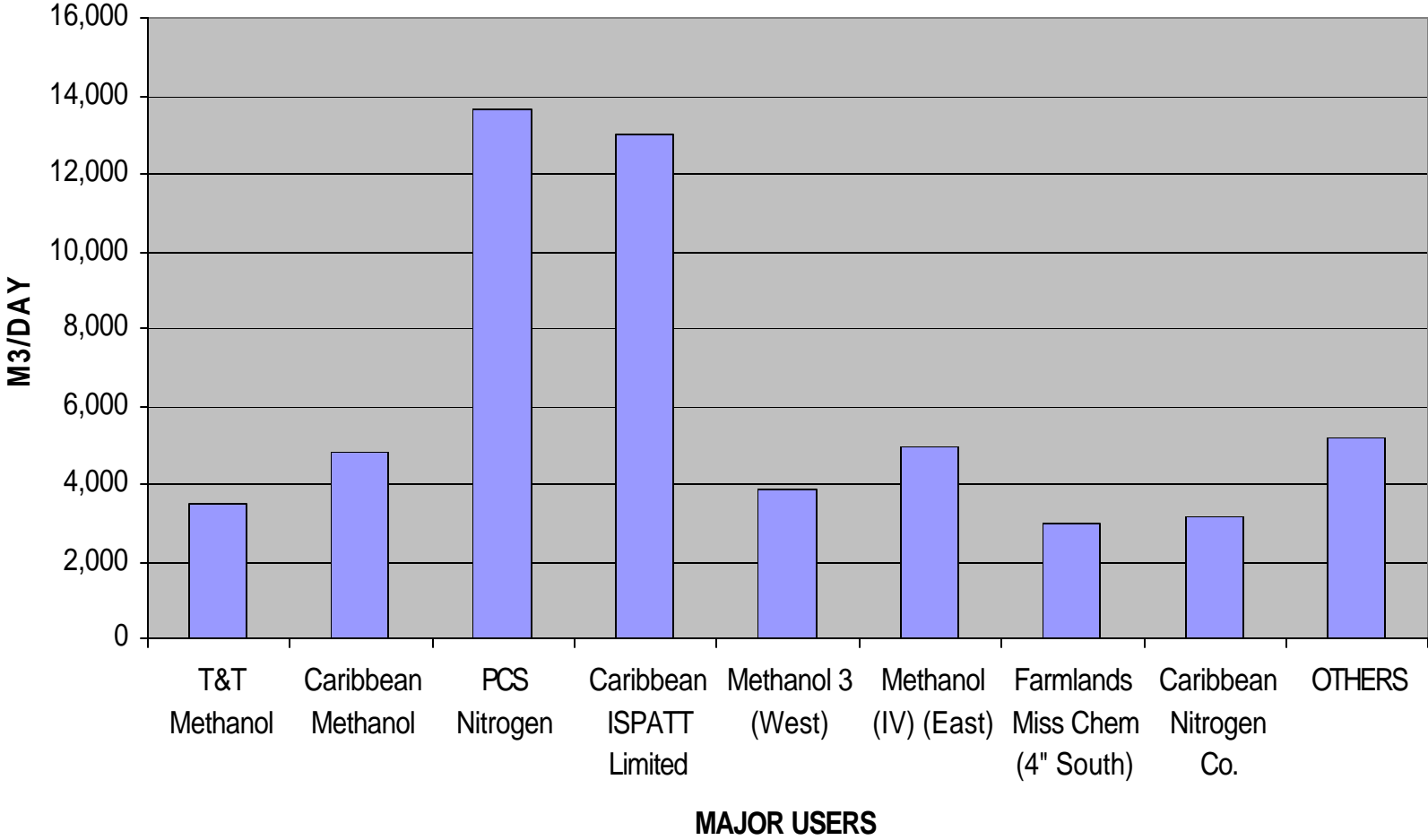


Chart 3.3 Consumption of major Users:August 2003



SOURCE OF SUPPLY

- ✓ **Pt. Lisas was originally supplied by the Caroni Water Treatment Plant up to April 2002.**
- ✓ **Presently Pt. Lisas is supplied by WASA from water purchased from DESALCOTT.**
- ✓ **DESALCOTT produces 100Mld and 55Mld is consumed within the estate.**

Source of Supply cont'd

- ✓ **WASA has the capability of supplying Pt. Lisas from its Caroni Water Treatment Plant anytime there is an interruption.**
- ✓ **WASA upgraded its Caroni Water Treatment Plant from 272Mld to 340Mld to ensure security of supply to the industrial estate.**

FLOW AUDIT OF PT. LISAS

- ✓ **First flow audit was conducted in November 1998.**
- ✓ **U.F.W. in November 1998 was 29%.**
- ✓ **Eight (8) subsequent audits have been conducted since the first.**
- ✓ **When the desalination plant was commissioned the u.f.w. went from 18-35%.**
- ✓ **The last audit records a u.f.w. of 5%.**

DMA	2002	2003	Savings to date
	% UFW	% UFW	at \$1.75/m3
AROUCA HIGHLIFT	47.8%	42.2%	\$483,537.54
AROUCA PROPER	49.0%	38.5%	\$127,144.08
BARATARIA	44.3%	25.9%	\$71,396.52
BON AIR GARDENS	60.0%	61.4%	\$32,749.92
DIAMOND VALE	42.8%	14.7%	\$126,826.56
GUAICO/TAMANIA	62.5%	26.7%	\$351,540.00
MANZANILLA	90.5%	23.0%	\$203,167.44
MT. LAMBERT	61.1%	51.8%	\$103,556.76
SANTA MARGARITA	35.6%	71.4%	\$18,869.76
ST. JOHNS ROAD	N/A	59.3%	\$0.00
VALSAYN	61.5%	24.4%	\$146,694.12
WESTMOORINGS	17.7%	36.5%	\$34,020.00
CENTRAL PARK EAST	35.0%	39.6%	\$62,778.24
GUAYA / STONEBRITE	N/A	45.7%	\$13,744.20
GULF VIEW	45.9%	57.5%	\$47,083.68
LISAS GARDENS	69.9%	58.5%	\$24,312.96
ORCHARD GARDENS	60.0%	40.2%	\$128,414.10
PALMISTE	89.7%	60.6%	\$63,005.04
PERSEVERANCE	43.1%	53.1%	\$6,531.84
PLEASANTVILLE	73.6%	55.5%	\$32,795.28
SISTER'S ROAD	N/A	62.0%	\$0.00
TOTALS	58.00%	42.75%	\$2,078,168.40

N/A DMA WAS NOT YET ESTABLISHED

DMA	2002 %UFW	2003 %UFW	SAVINGS TO DATE @ \$7.50 / m3
PT.LISAS	25.50%	5.20%	\$14,144,112.00

TOTAL SAVINGS	\$16,222,280.40
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Table 3.5 U.F.W. figure for Pt. Lisas

Period	Aug 03	March 03	Dec 03	Oct 02	May 02*	Feb 02	Aug 01
% UFW	5.2	8.2	16.8	25.5	35.8*	18.4	16.1
M³/day	3005	4914	10212	17979	26048*	8048	11480

PLAN OF ACTION

There are a number of activities that will be undertaken in Pt. Lisas to further improve our service to these customers. These activities will include:

- ✓ Permanent Bulk Meters will be installed within the estate.**
- ✓ Telemetrically logging of meters and pressure point with the capacity to alarm predetermined parameters.**

Plan of Action cont'd

- ✓ **Major users will be given the opportunity to have telemetric loggers on their meters for monitoring and billing.**
- ✓ **The existing hydraulic model will be recalibrated.**
- ✓ **Existing meters of major users will be regularly calibrated to ensure accurate billing.**

Plan of Action cont'd

- ✓ **In the longer term they should be replaced by more accurate meters ($\pm 0.2\%$ compared to present $\pm 2\%$)**
- ✓ **Based on the number of pipeline repairs an 18" steel main will be replaced.**

NEW TECHNOLOGY

- ✓ **WASA has embarked on a programme to use Global System for Mobiles (GSM) to remotely monitor elements of operations - flows and pressures.**
- ✓ **Twenty-one (21) telemetric loggers are presently being installed on critical systems.**
- ✓ **A pilot logger is presently in use and can transmit data from any site that has a GSM signal. Presently installed in La Fillette on the North Coast.**

New Technology cont'd

- ✓ **The GSM loggers can also trigger an alarm to cellular phones.**
- ✓ **Of the twenty-one (21) telemetric loggers five (5) would be installed in Pt. Lisas.**

CONCLUSION

- ✓ **Savings of \$14,000,000 to date in Pt. Lisas.**
- ✓ **Savings of \$2,000,000 to date for Domestic DMA's.**
- ✓ **Forty (40) DMA's have been established.**
- ✓ **Reduction of u.f.w. recorded in all forty (40) DMA's established.**
- ✓ **Level of u.f.w. has been substantiated to be 60% in some areas.**

Conclusion cont'd

- ✓ **Technology and Methodology has been tested to allow WASA to establish and maintain an acceptable level of u.f.w.**
- ✓ **Real-time data transfer established for a proactive approach to leak repairs.**
- ✓ **Challenge is to systematically implement a programme that is cost-effective and efficient.**

Conclusion cont'd

- ✓ **Funding is required for the program to be expanded. Priority has to be given to mains replacement.**

Thank You