

THE WATER AUTHORITY  
P.O. BOX 1104  
GRAND CAYMAN, B.W.I

# THE WATER AUTHORITY

## ANNUAL REPORT

### 1989

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## THE PORTFOLIO OF COMMUNICATION WORKS AND NATURAL RESOURCES

### THE WATER AUTHORITY

#### 1989 ANNUAL REPORT

##### 1. GENERAL

1989 was yet again an extremely busy year for the Water Authority with the emphasis being placed on expanding the George Town water supply and the provision of additional desalinated water. Approval was given to expand the water supply eastward to Spotts-Newlands and the provision of an additional 1,000,000 gallon reservoir. Petroservicios was contracted to carry out the civil works as a part of their existing contract and commenced work on the extension towards the end of the year.

Central DeSal continued to experience problems with their desalination plant and were unable to meet the full demand of the Authority. On a number of occasions the Authority had to buy water from the Cayman Water Company and on one occasion trucked water from the Hyatt hotel in order to maintain a supply when the Central DeSal plant was experiencing operational difficulties.

In the middle of the year the Water Authority let tenders for the provision of an additional source of water, of the four tenderers, Reliable Water of Boston was successful and have contracted to provide an additional 1,300 cub m per day utilizing seawater reverse osmosis by January 1990. A temporary 230 cub m per day reverse osmosis plant was provided by Reliable Water in November. It is intended that this small plant will be relocated in Cayman Brac later in 1990 as the first phase of a water supply for that island.

The Government created a National Water Development Committee under the Chairmanship of Mr Joel Walton, the Committee met on one occasion and is presently establishing its terms of reference to ensure that it will have maximum benefit to the Country and the sector.

Negotiations are in hand with the Cayman Water Company for them to extend their franchise to include the whole of the district of West Bay. It is anticipated that the negotiations will reach a satisfactory conclusion in early 1990 and that work on providing the supply will commence in 1990.

A Final Completion Certificate was issued to Hadsphatic International in respect of the West Bay Beach sewerage civil engineering contract. The claim which the contractor submitted in March 1988 is yet to be resolved and a number of meetings were held to discuss the matter. Aerators were purchased and placed to the sewage treatment works in order to improve the treatment process and eliminate the odour problem that became apparent after hurricane Gilbert in 1988.

Mr Derek Wight accepted the invitation to be the Chairman early in the year and under his leadership the Authority was able to meet on eight occasions. Mr Wight also acted as Chairman of the various meetings held with Hadsphatic International to negotiate their claim and also Chairman of the meetings held to negotiate the extension to the Cayman Water Company Licence. He also accompanied the Director on a fact finding mission to various locations in the United States and other Caribbean Islands to obtain first hand information on the operations of the tenderers for the additional desalination capacity. Finally he accompanied the Director to Cayman Brac to establish the ground work for the provision of a water supply to that island.

Arrangements have been made for the Water Authority to operate as a full statutory body as from the 1st January 1990. Late in the year tenders were let to establish bank accounts and a valuation of

assets and liabilities was carried out. Government has decreed that the difference between the Assets and Liabilities will become a debt due to Government, payable over a period of twenty years after a moratorium of three years.

The members of the Authority at the 31st December 1989 were:

Chairman	Mr Derek B Wight
Members:	Deputy Financial Secretary Mr Woodward Terry
	Chief Engineer Mr Donovan Ebanks M Sc C. Eng MICE
	Chief Environmental Health Officer Mr Walling Whittaker B.Sc
	Mr McKeeva Bush MLA
	Mr Harry Chisholm
	Mr Richard Flowers
	Mr Brainard Watler
	Mr Otto Watler
Secretary:	Director, Water Authority Mr R Beswick C Eng MICE FIWEM MASCE

## 2.0 ADMINISTRATION AND FINANCE

### 2.1 Staffing

The Staff complement as at 31st December 1989 was as follows:-

a.	Director	Mr R Beswick CEng MICE FIWEM MASCE	SS 6
b.	Project Manager	Mr T van Zanten MSc	AP3-4
c.	Operations Engineer	Mr F McTaggart BSc	AP1-2
d.	Water Supply Engineer	Vacant	AP3-4
e.	Accountant	Vacant	AP3-4
f.	Senior Superintendent	Mr T Hill Master Plumber	T9
g.	Senior Draughtsman	Ms Cathy Seymour AAS	T7-8
h.	Engineering Technician	Mr C Reid	T3-4
i.	Draughtsman	Mr G Welcome	T3-4
j.	Operations Scientist	Ms G Frederick BSc	T8
k.	Laboratory Technician	Mrs YThompson	T3-4
l.	Water resources supervisor	Mr V Rankine	T6-7
m.	Technician	Mr D Powery	T3-4
n.	Graduate Research Assistant	Mr P Roderigues BSc MSc	T1
o.	Executive Officer	Ms J Nicholas	E1-2
p.	Accounts Receivable Clerk	Mrs F Perryman	E1
q.	Clerical Officer	Mrs K Lazzari	C1-4
r.	Associate Expert UN	Mr H van Genderen MSc	No cost
s.	Associate Expert UN	Vacant	
t.	Operator	Mr E Connolly	T6-7
u.	Operator	Mr L Tivy	T6-7

v.	Operator	Mr B Martinez	T6-7
v.	Foreman	Mr C Morgan	Wage
w.	Asst Operator	Mr C Ramoon	Wage
x.	Asst Operator	Mr V Grant	Wage
y.	Labourer	Mr S Campbell	Wage
z.	Customer relations	Vacant	
aa.	Meter reader	vacant	
bb	Connection Officer	vacant	
cc.	Cashier	Ms M Pessoa	C1-4

**The following staff movements took place during the year:-**

Paulino Rodrigues joined the Authority in February as the graduate research assistant.

Brian Martinez joined the Authority in June as an operator.

Alan Jones left the Authority at the end of his contract in June.

Cathy Seymour returned from her studies in June and took up the draughtsman position under probation for the post of senior draughtsman.

Geof Page left the Authority at the end of his contract in August.

Mr Steve Reid left the Authority in September

Anne Marie Powell joined the Authority in February as the cashier and left in November

Michelle Pessoa joined the Authority as the cashier in November

Clement Reid the Customer Relations Officer was transferred to Engineering Technician in November.

## **2.2 Training**

The Authority continues to promote the training of its local staff, both in-house and by encouraging overseas full time education and attendance of regional seminars and workshops.

Local training consisted of the following workshops:

- a. Cardio-pulmonary Resuscitation
- b. Operations, maintenance and record keeping of monitoring equipment for water and sewage utilities
- c. Presentation of World Health Organizations training modules, Water, Waste and Health and Waste Stabilization Ponds.
- d. Familiarization and use of water and sewerage safety equipment
- e. Familiarization and use of sewerage maintenance equipment
- f. Chlorination of drinking water.

During 1989, Mr Tony Reid and Mr Bunyan Whittaker, engineering technicians, continued their studies at the Technical College of WACO, Texas. Ms Cathy Seymour who commenced the same course in 1987 completed her studies in June and returned to take up full time employment with the Authority. The course they are attending is a two year Engineering Technicians Associate Degree and it is fully funded by UNDP under a Fellowship provided by the Regional Project, 'Water Resources and Management for Smaller Islands.'

The Authority completed its second year membership of the Caribbean Basin Water Management Project, a training project funded by CDB and CIDA with each participating utility contributing a sum which is dependent on the size of the utility. The Authority contributed CI\$2,300 in 1989. The following participated in the following seminars and workshops:-

Mr L Tivy, Operator	Maintenance management in Water Utilities, Grenada
Ms J Nicholas, Executive Officer	Public Relations and Customer Service in Water Utilities, British Virgin Islands
Mr C Reid, Technical Assistant	Supervisory Management in Water Utilities, St Kitts

In addition arrangements were made for Mr Mark Ebanks, postal assistant to attend the "Public Relations and Customer Service in Water Utilities", held in British Virgin Islands. and Mr Vetel Wright of the PWD to attend the Supervisory Management Workshop held in St Kitts.

Cathy Seymour and Yvette Thompson are attending a part time Numeracy and Statistics course run by the Government Training Unit

Juliette Nicholas is attending a part time course executed by the Government Training Unit in association with the UK Association of Accounting Technicians and it leads to a formal accounting technicians qualification.

Rick McTaggart and Thomas Hill attended the UNDP/ Government Training Unit's Senior Management workshops.

Yvette Thompson received extensive on-the-job training in laboratory techniques and methods.

### **2.3 Finance**

Funding for the 1989 recurrent budget was provided by the Government from local recurrent funds and a summary of the budget and actual expenditure is shown below. See the appendix to the report for the balance sheet, statement of profit and depreciation calculation. The data for these appended financial reports have been abstracted from the financial records although the 1989 accounts have not been kept as proper commercial accounts.

#### **Recurrent Expenditure**

	Head	Allocation 1989	Expenditure 1989	Expenditure 1988
01	Personnel Emoluments	537,511	528,275.83	440,546.42
02	Travelling and Subsistence	2,400	1,773.68	1,016.37
03	Supplies and Materials	31,100	31,807.32	22,750.67
04	Rent of Property	6,250	6,250	5,000
06	Utilities	1,474,500	953,681.19	671,746.32
07	Other Operating Expenses	20,500	19,132.79	14,480.20
08	Grants, Contributions	10,473	10,472.75	7,095.75
12	Interdepartmental Purchases	60,000	54,527.16	50,106.02
14	Equipment	10,750	10,209.99	5,399.43
27	Other Equipment	165,200	164,746.23	0.00
40	Vehicles	26,000	26,000.00	0.00
	<b>Total</b>	<b>2,361,042</b>	<b>1,806,926.94</b>	<b>1,218,140</b>

#### **Capital Expenditure**

During 1989 capital funding was obtained from local resources 41-024 and from an additional loan taken out with Barclays Bank and costed to 42-004

**42-004 Capital Funding**

An additional loan of **CI\$2,500,000** to cover mainly the cost of the additional water supply works was taken out with Barclays Bank International of this amount **CI\$2,000,000** was drawn down during the year.

**41-024 Capital Funding**

The Government initially provided a sum of **CI\$554,520** for the completion of the Water supply development, later on in the year a further sum of **CI\$300,000** was made available by a virement from the allocation to utilities, giving a total allocation of **CI\$854,520**.

**Statutory Expenditure**

The actual statutory expenditure incurred on the CDB loans and the Barclay's Bank Loan during the year was as follows;

Source	Interest	Principle
Caribbean Development Bank Sewerage Loan	458,183.79	0.00
Caribbean Development Bank Water Supply Loan	199,730.91	0.00
Barclays Bank	377,845.77	390,000.00
<b>Total</b>	<b>1,035,760.47</b>	<b>390,000.00</b>

**Revenue**

	Estimate	Actual	1988 Revenue
63-005 Licence Fees-Water Resources	7,000	14,263.03	7,671
63-011 Licence Fees- Water Industry	3,000	2,465.00	2,240
64-040 Sale of Water	2,697,600	1,590,943.02	1,027,975
64-010 Sewerage charge	1,354,600	1,181,929.48	474,549
64-013 Sludge Charge	72,000	20,283.80	5,820
64-014 Effluent Sales	164,300	0.00	0.00
64-015 Sewerage Connections	18,000	0.00	0.00
70-001 Other Receipts	2,000	8,704.09	4,450
<b>Total</b>	<b>4,568,500</b>	<b>2,818,588.42</b>	<b>1,698,115</b>
67-008 Royalty-water	250,000	228,228.68	175,410

The shortfall in revenue was mainly due to the fact that Central DeSal were unable to produce sufficient water to satisfy the demand, due mainly to continuing problems with their desalination plant and the availability of steam.

**Depreciation**

The calculation of depreciation is shown in the appendix, during 1989 the amount is **CI\$371,293**.

**2.4 Accounting and billing system.**

The computerized billing system operated for the whole of the year and performed well with the increase in the number of customers. Various modifications were made to the system. The services of the software designer were retained during the year to maintain the system on a monthly basis to ensure that it performs properly during the period when modifications were found necessary. He also completed the accounting software which he has designed and which will be available and operational in 1990.

The system has been modified to operate at a faster speed and to incorporate meter reading routes.

## **2.5 Customer Relations Section**

The customer relations section was established at the beginning of the year when it became obvious that a separate section was required to deal with all customer inquiries and complaints.

The section also took over the responsibility for allocation of account numbers, meter reading and updating of the billing system. A data base programme was written by the Operations Engineer to manage all the applications for connections, disconnections, security deposits and issuing of daily work orders for customer related matters. A young Caymanian, Clement Reid, was put in charge of this section and he performed admirably and established a section that now operates most satisfactorily.

## **2.6 Drawing Office**

The senior draughtsman left towards the middle of the year and Ms Cathy Seymour who had recently returned from her studies in Texas took over the position on a probationary appointment. Up until the end of the year she has managed the drawing office most satisfactorily.

The drawing office now consists of only two persons and it has been mainly involved in preparing as-built drawings of the West Bay Beach Sewerage project and the George Town Water Supply project. It has carried out various topographic and level surveys, particularly to determine information for the as-built drawings and for final measurement of the West Bay Beach Sewerage project.

During the summer the two engineering technicians who are studying in Texas were employed to provide them with work experience and to assist the drawing office with its work load.

The office continues to be responsible for the photographic record of all contract works and in this respect it has compiled a most comprehensive and indexed record of all preconstruction conditions.

The United Nations have provided a computer aided draughting system which is being utilized to complete all new construction drawings. Existing site plans and other works that can be shown on survey maps will be computerized at the time the Lands and Survey department digitize all there Ordinance maps. The senior draughtswoman has experience of the CAD system as has the Operations Engineer and both are training the draughtsman. The system provided is described in the next section.

The drawing office has completed the draft and coloured drawings for the Cayman Islands contribution to the UNESCO Caribbean Hydrogeological Atlas, the plans are to be printed professionally in 1990.

## **2.7 Computerization**

The Authority made progress on the computerization of its various functions. The following computer systems were made available during the year, (all computers are IBM compatible and operate on DOS):

1 No. Compaq 386 with 110mB hard drive and 2mB Ram together with AutoCad release 10 software, a digitizer and plotter to be used by the drawing office for the preparation of drawings.

2 No. Compaq 286 with 40mB hard drives and 2mB Ram and three printers to be used for the billing and accounting systems.

2 No. Acer 915 computers with 20mB hard drives and 1mB Ram one for the use of the GRA for his research and the other for the use of the Operations Engineer for his management programmes, which include a complete water supply and sewerage operations management system and a stores

inventory. The Operations Engineer has developed and written these programmes together with the customer data base programme and all provide the Authority with invaluable management tools.

I No Apple Mac II which the Director utilizes for his work and with which he utilizes standard software.

### 3.0 WATER RESOURCES

#### 3.1 Monitoring

The comprehensive ground water monitoring programmes established in 1985 remained operational throughout the year. There has been no indication of any general deterioration trend of the water resource in either Lower Valley or East End. Indeed the higher seasonal rainfall experienced during 1988 and 1989 combined with the Authority's measures taken to reduce the abstraction from the wellfields has shown a significant improvement in the quality of the ground water being abstracted.

The new GRA developed a comprehensive data base management system utilizing dBase 4 which is utilized for the storage, retrieval and production of statistics of the analytical results produced by the laboratory. The system also included the ground water monitoring data and is used as a tool to enhance the management of the ground water resources and operation of the wellfields. A second computer programme using Lotus 123 was designed specifically for the management of the wellfields. It is an improvement on the previous programme and produces monthly evaluation reports of the wellfield operation

#### **Lower Valley and East End domestic well monitoring**

32 domestic wells in the Lower Valley area and a number of monitoring wells in East End were monitored for bacteria and total dissolved solids contamination, once during the dry season and again during the wet season. The following are the results of this monitoring:

	<b>Dry Season - March 1989</b>	<b>Wet Season - July 1989</b>
<b>Lower Valley</b>		
Total Coliform	31% of samples > 10 colonies/100ml	22% of samples >10 colonies/100ml
Faecal Coliform	12.5% of sample > 0 colonies/100ml	15.6% of sample >0 colonies/ 100ml
TDS	12.5% of sample TDS > 1000mg/l	0% sample with TDS > 1000 mg/l
<b>East End</b>		
Total Coliform	33% of samples > 10 colonies/100ml	17% of samples >10 colonies/100ml
Faecal Coliform	17% of sample > 0 colonies/100ml	0% of sample >0 colonies/ 100ml
TDS	50% of sample TDS > 1000mg/l	17% sample with TDS > 1000 mg/l

#### 3.2 Water Resource Licencing

In compliance with its statutory obligation the Water Authority has approved and granted the following licences and permits:-

Discharge Permits	222 No
Ground water abstraction Licences	11 No
Canal Permits	0 No
Quarry Permits	6 No

The collection of revenue from this licencing and permitting continues to be handled by the Building Control Section of the Planning Department, who coordinate with the Authority for the issuance of the permits.

Control continued to be exercised on the construction of deep wells and monitoring was carried out on commercial abstraction licences which had been issued for large abstractions.



### 3.3 Rainfall distribution

The following summarizes the rainfall figures for 1986, 1987, 1988 and 1989 and annual averages over the indicated period.

Station	Annual Average		Annual Total			
	period	mm	1986	1987	1988	1989
Driftwood Village	84-89	988	982	1050	1632	823
Tortuga Club	67-89	1092	934	938	1078	880
Furtherland Farms	84-89	978	969	827	894	1052
East End Village	85-89	850	803	913	1459	1022
Frank Sound	84-89	1117	838	888	1565	945
Bodden Town	67-89	1109	1062	1159	1600	984
Lower Valley	84-89	1152	1038	1261	1648	1186
Savannah	84-89	1190	1026	1392	1668	1269
Prospect Park	84-89	1192	963	1444	1550	1265
South Sound	84-89	1264	1054	1698	1556	1371
Airport	67-89	1465	933	1541	1468	1301
West Bay	73-89	1270	638	1039	1556	949
<b>Island Wide Average</b>		<b>1139</b>	<b>937</b>	<b>1179</b>	<b>1473</b>	<b>1087</b>

The island wide average in Grand Cayman was 1087mm (42.80 inches), less than the average for the record periods, although most parts of the country experienced a wetter than normal dry season. The distribution throughout the island was somewhat irregular, the Eastern Districts being slightly drier than the Western Districts.

## 4.0 QUALITY CONTROL AND RELATED MATTERS

### 4.1 Laboratory

The laboratory completed its first full year in its upgraded form under the management of the Operations Scientist, Gelia Frederick. Throughout the year additional funds were made available to further upgrade the facility to enhance its capability. The following new equipment was purchased:

- Bauch and Lomb Sterezoom microscope
- Hach chemical oxygen demand reactor
- Ainsworth Electronic analytical balance
- Vacuum pump
- Conductivity and TDS meters

The laboratory is now capable of analysing water and waste water for the following parameters:

Total and Faecal Coliform bacteria	Calcium
Fungi-yeast and molds	Alkalinity
Faecal Streptococcus bacteria	Ammonia
Chlorine, total and free	Bicarbonates
Chemical Oxygen Demand	Biochemical Oxygen Demand - 5 day
Conductivity	Chloride
Copper	Dissolved Oxygen

Over the year the following routine samples were taken and analysed:

Sewage Treatment Works	942	
George Town Water Supply	441	
Lower Valley reservoir	217	
East End reservoir	161	
Private testing	154	
<b>Total</b>	<b>1915</b>	an increase of 159% over 1988

## **4.2 Research**

Mr Sam Ng, the former Graduate Research Assistant, who left in 1988 successfully defended his thesis and was awarded his PhD late in 1989 on research that he carried out whilst employed by the Water Authority.

Ms Gelia Frederick, the Operations Scientist, registered with the University of Surrey to carry out a collaborative M. Phil. Funding has been provided by the Government and she attended the University of Surrey early in the year for a period of two months to carry out an initial literature search and to establish the basis of her research. Her supervisor Dr B Lloyd visited towards the beginning of the year to establish the ground work for and viability of the research. Her project is designed to monitor the operation of the sewage treatment works, to evaluate the performance and suggest modifications of the operations in order to improve performance or reduce costs.

Mr Paulino Rodrigues, the graduate research assistant has registered at Loughborough University to carry out research leading to a PhD degree. His research will centre on the operation and computer modelling of the waste stabilization ponds. His supervisor, Mr K V Ellis visited in the middle of the year to establish the ground work for the research and Mr Rodrigues made his initial visit to Loughborough for three months at the end of the year. During this period he carried out a literature review of 250 scientific papers and finalized the scope of his research. Mr Rodrigues is providing his own funding to cover the cost of registration and other university and overseas expenses.

## **4.4 Conferences and Seminars**

The Operations Scientist has been invited to present a paper to a water and sanitation conference being held in Germany next year and sponsored by the International Water Pollution Control Institution

The Project Manager and GRA have had an abstract for a paper on the design and operation of waste stabilization ponds accepted by the International Symposium on Tropical Hydrology and Fourth Caribbean Islands Water Resources Congress to be held in Puerto Rico in 1990.

## **4.5 Papers and Reports**

The major work of the year has been the preparation of the plans for the UNESCO Hydrogeological Atlas of the Caribbean. This work has been carried out by the former GRA, Mr Sam Ng and the Senior Draughtswoman, Ms Cathy Seymour.

The following papers and thesis have been prepared by researchers from the University of Alberta with the assistance of the Water Authority:

- a. Chemical and stable isotopic characteristics of ground water on Grand Cayman.
- b. Borings of various faunal elements in the Oligocene-Miocene Bluff formations of Grand Cayman
- c. Biogenic structure and micrite in stalactites from Grand Cayman
- d. Experimental formation of spiky calcite through organically mediated dissolution
- e. The role of fungi in the diagenetic alteration of spar calcite
- f. PhD Thesis, An assessment of the use of image analysis in carbonate sedimentology
- g. MSc Thesis, Paleocology of Pleistocene mollusca from ironshore formations, Grand Cayman.

## 5.0 WATER SUPPLY

### **5.1 Lower Valley wellfield facility**

The Lower Valley wellfield has completed its sixth full year of production. The wellfield has been pumping for 79% of the year.

Rationing of the supply has been necessary on various occasions during the year, most notably during the dry season, although the demand has not fluctuated greatly from season to season.

The following table indicates various performance criteria of the wellfield and compares them to the previous years. There has been a 5% increase in production over the previous year at this facility. The increased rainfall during 1988 and 1989 has allowed the wellfield to produce slightly more water than 1988 and the improvement in quality is very apparent.

Year	Hours Run	Average Pumping Rate Cub m/hour	Quantity Produced Cub m	Power Kwh per Cub m	%age Loss	Month Max Cub m	Production Min Cub m	Total Sold Cub m
1986	6,810	8.68	59,146	2.03	7.94	7,033	2,386	55,716
1987	8,421	7.15	60,159	2.28	4.94	5,459	3,965	57,744
1988	7,884	6.16	48,564	2.35	5.60	4,770	2,692	45,989
1989	6,945	7.08	49,177	2.33	4.00	5,054	2,146	48,256

#### **Lower Valley wellfield performance**

The water quality remains within the World Health Organization's standards, with a total dissolved solids ranging between 773 ppm to 1137ppm, depending on the time of the year and position of the tide.

The total quantity of water produced since commencement of the wellfield operation is 328,987 Cub m (86,852,647 Gallons).

#### **5.2 East End Wellfield facility.**

The East End wellfield has completed its fourth full year of production. The wellfield has been pumping for 60% of the year. The increase demand on the wellfield reflects the large increase in water demand of the country. The demand has also resulted from the Cayman Water Company's inability to supply water to the truckers and the Water Authority's shortage of water in George Town to meet the full trucked demand.

The following table indicates the various performance criteria of the wellfield and compares them to the previous year.

Year	Hours Run	Average Pumping Rate Cub m/hour	Quantity Produced Cub m	Power Kwh per Cub m	%age Loss	Month Max Cub m	Production Min Cub m	Total Sold Cub m
1986	603	14.72	8,877	0.46	1.03	1,760	339	4,191
1987	2,712	14.00	37,973	0.47	1.37	6,401	1,244	29,263
1988	3,134	14.00	43,879	0.45	1.36	7,183	529	33,815
1989	3,564	17.50	62,359	0.40	7.00	11,293	954	57,973

#### **East End wellfield performance**

The water remains within the World Health Organization's standards, with a total dissolved solids ranging between 425 ppm to 694 ppm, the water being higher quality than Lower Valley because of the larger lens.

The quantity of water used from the public stand pipe was 225 Cub m (59,400 US Gallons).

The total quantity of water produced since commencement of the wellfield operation is 153,088 Cub m (40,415,232 US Gallons).

### 5.3 Cayman Water Company.

The Cayman Water Company experienced a better year than 1988 and took measures to increase its production capacity by 650,000 US gallons per day with the commissioning of a seawater reverse osmosis plant in December. The name plate capacity at the end of 1989 was 1,325,000 US Gallons per day. The company intends to retire some of its smaller and older vapour compression plant early in 1990.

The following table indicates various of their operating parameters and compares them to 1988. The items marked with \*1 are estimates only as the company purchased water from the Hyatt Hotel for some months towards the end of the year. The company now has a direct connection between their main pipeline and the Hyatt's reverse osmosis plant which is able to pressurize the pipeline.

	1989	1988	Variance 1989 to 1988
Water Produced (US Gall)	168,414,980	141,969,660	+19%
Production as %age of capacity	69%	58%	+11%
Water supplied by WA (US Galls)	280,632	5,079,096	-94%
Total Water Sold(US Galls)	153,701,610	134,584,786	+14%
Pipeline Sales(US Galls)*1	150,244,396	132,345,373	+14%
Truckers Sales(US Galls)	3,457,214	2,239,413	+54%
Pipeline share	98%	98%	nil
Truckers share	2%	2%	nil
Average Month Sales(US Galls)*1	12,808,467	11,215,399	+14%
Fuel Adjustment Factor Av	\$2.35	\$1.44	+63%
Fuel to water conversion(US Galls)	205.93	235.15	-12%
Average water price pipeline	\$19.80	\$18.89	+5%
Average water price trucker	\$17.35	\$16.44	+6%
Total Royalty Payment	\$195,869	\$175,726	+11%
Fuel Adjustment Value	\$342,320	\$193,802	+77%
Unaccounted for water	10%	8%	+2%

### 5.4 Water Truckers

The following companies continue to provide a trucking service:-

H.A. Bodden  
Eden's Water Service  
C.L. Flowers and Sons  
Wilford Ryan  
Thompson Water Service  
Brasely McLean

Five of the companies drew water from East End, five from Lower Valley, all six from the George Town reservoir and one from two private wells situated on Walkers Road. For a part of the year water was also drawn from the Treasure Island and Hyatt Hotels when other sources were insufficient to meet the need and an estimate of the quantities from these sources is included in the table below.

The total quantity of water drawn by the truckers expressed in US gallons was as follows:-

	1987	1988	1989
Water Company	26,779,714	2,275,603	3,457,214
Lower Valley	15,244,416	12,133,150	12,861,024
East End	7,725,432	8,927,212	15,304,872
George Town Reservoir	0	32,000,000	7,802,362
Walkers Road	1,632,485	2,190,000	2,790,162
Other Sources			12,000,000
<b>Total</b>	<b>51,382,047</b>	<b>57,527,965</b>	<b>54,215,634</b>

This equates to an average daily trucked demand of 148,536 US Gallons, representing a 6% reduction over 1988. Whilst it is likely that an actual reduction in demand was caused by the increased number of connections to the George Town distribution system it could also have been affected by the heavy and unseasonal rainfall late in the year. However there is no doubt that the truckers sales also suffered due to insufficient water being available.

### **5.5 George Town Water Supply**

The George Town water supply and distribution completed its second year of operation but not without facing and overcoming some considerable problems associated with meeting the demand in the dry season, particularly that of the truckers. Central DeSal continued to experience problems with their plant and at no time were they able to produce the rated capacity of the plant. On several occasions they experienced a problem of brine contamination of the product water which increased the salinity to a level which was detectable to taste, although still remaining within the maximum recommended limit of the World Health Organization. However this problem did cause consumers to register many complaints.

On one occasion Central DeSal shut down their plant for a period of 4 days and in order to maintain a supply to our customers during that period, desalinated water was trucked from the Hyatt Hotel to the reservoir for distribution through the pipeline. Unfortunately the Cayman Water Company was unable to provide any water during this period.

At the year end Central DeSal production was significantly lower than the minimum they are contracted to supply to the Water Authority. They have purchased a make-up steam boiler to provide the plant with more steam during periods when the steam supply is reduced because of generators with waste heat boilers being off line. Central DeSal have suffered from this problem during the second half of the year when two of their generators suffered major failures and have been permanently retired.

The total penalty charged to Central DeSal because of failure to supply the minimum quantity and low quality of supplied water was US\$43,411.42

To improve the supply situation and to also provide additional quantities of water to meet the demand of the distribution expansion, steps were taken early in the year to obtain a second source of water. Bids were solicited from four sources and the most favourable was Reliable Water, a company out of Boston, USA. The Government entered into a contract for them to supply an additional 1,330 cub m/day (351,000 US Gallons) by January 1990. The additional water is to be produced by seawater reverse osmosis. At year end it was apparent that this deadline would be met. In addition to the large reverse osmosis plant the company also provided a 230 cub m/day (60,000 US Gallons) plant to provide water whilst the large plant was being installed and commissioned. This smaller plant operated from early December and proved to be a valuable contribution to the supply. However despite this additional water it was also necessary to purchase water from the Cayman Water Company during the latter part of the year, a quantity of 7,365 cub m (1,944,360 US Gallons) was purchased from the CWC during 1989.

There is a proposal to relocate the small Reverse Osmosis plant in Cayman Brac to provide a piped supply to a limited area of the island and to provide water for truckers to distribute. The building which housed the plant in Grand Cayman is to be used as a workshop and operations office.

#### **George Town Customers:**

	<b>1989</b>	<b>1988</b>
Residential	1263	687
Commercial	203	132
Public Authority	36	23
Truckers	8	10
<b>Total</b>	<b>1510</b>	<b>842</b>

**1989 Average monthly sales per customer (cub m)**

Month	Residential	Commercial	Public Authority	Trucker
Jan	18.28	51.94	126.26	445.0
Feb	14.61	47.68	91.83	144.22
Mar	11.96	43.12	79.00	231.56
Apr	17.39	70.78	112.90	40.76
May	16.76	52.20	100.96	40.76
Jun	15.55	62.28	105.96	72.38
Jul	15.52	53.37	103.71	251.84
Aug	15.12	60.62	105.03	251.84
Sept	12.98	48.05	79.09	438.26
Oct	16.69	55.27	101.55	747.03
Nov	15.08	43.10	96.29	497.28
Dec	12.61	47.23	56.16	237.93

**Annual Average monthly consumption per type of customer:**

	Quantity Cub m	Percentage of total sales
Residential	15.21	54.09%
Commercial	53.39	32.57%
Public Authority	96.54	6.87%
Truckers	287.30	6.47%

**Average monthly revenue per customer**

Residential	\$61.68
Commercial	\$212.83
Public Authority	\$340.91
Truckers	\$939.02

**Total water Sales (Cub m)**

	1989	1988
Residential	183,054	75,653
Commercial	109,570	54,117
Public Authority	33,446	15,798
Truckers	29,553	120,807
<b>Total</b>	<b>355,625</b>	<b>266,374</b>

**Unaccounted for water**

The average monthly unaccounted for water was 6.52% of the gross production, a reduction of 0.05% over 1988, with a high of 15.05% in March and a low of 1.54% in August. This loss is considered acceptable, especially as large quantities of water were used for flushing and testing newly constructed lines.

**Water Prices**

The prices of water remained as established in 1988 and were as follows:

**Ground Water** \$2.00 per Cub m (\$7.58 per 1000 US Galls)

**Desalinated Water**

Residential	first 12 Cub m per month	\$3.85 per Cub m	(\$13.07 per 1000 US Galls)
	over 12 Cub m per month	\$3.75 per Cub m	(\$14.20 per 1000 US Galls)
Public Authority		\$3.45 per Cub m	
Commercial		\$3.85 per Cub m	

Meter rental Charge payable monthly and varies from \$3.50 to \$40.00 depending on the size of meter.

Minimum monthly charge is payable and is made up of the meter rental charge plus the cost of 4 Cub m of water and therefore varies for the type of customer and the meter size.

It is proposed that a rate increase will be applied from the 1st January 1990 and the overall affect is expected to increase the cost of a water bill by approximately 12%. Although it has been designed to keep a low minimum charge to protect the low income consumer.

## 6.0 SEWERAGE

### 6.1 West Bay Beach Sewerage

The sewerage system completed its second full year of operation. A number of problems occurred which required remedial work to be carried out by the civil engineering contractor who built the works and others that were not his responsibility.

The major problem that was solved was that of the occasional septicity and resultant odour of the sewage treatment works. This problem was solved by equipping the two facultative ponds with aspirators to provide additional oxygen to enhance the treatment. A total number of 16 aspirators, 8 on each pond, were commissioned toward the middle of the year. These aspirators have been used on and off since commissioning, generally at time when the observation of the ponds indicate that a septicity problem might occur. It is been determined that to keep the treatment operating efficiently it is necessary to have two aspirators on each pond working between the hours of 5.00pm and 9.00am, which is the time when there is least natural oxygen transfer occurring. There have been occasions when all 16 aspirators have been required to remedy serious deterioration of the treatment. The overall cause of the problem has not yet been determined but the latest theory is that on occasion the ponds may be overloaded by the dumping of septage high in BOD and containing chemicals that may be killing off the pond bacteria. Obviously the cost of operating the aspirators is relatively high and a later table compares the electricity consumption of various parts of the system.

The problem of odour at a number of the pumping stations has not yet been solved. Attempts have been made to improve the ventilation and vent off the gases at a higher level in order that they will be dispersed higher in the atmosphere and not affect the lower levels. This action has only been partially successful and additional work of replacing the covers with a more gas tight type is planned for 1990.

Late in the year it was observed that on a number of pumping stations quite serious concrete corrosion is occurring, due to the highly acid environment caused by the high humidity and high concentration of sulphides. This problem was envisaged at design stage and the concrete manhole rings were specified as sulphate resisting and were treated with a protective layer of epoxy tar. In any event this has proven not to be adequate and remedial works will be necessary in 1990.

Towards the end of the year the system was extended to include the new Kirk Supermarket, the cost of the additional pumping station and connecting pipework was met by the owners of Kirk Supermarket. The operational cost is met by the Water Authority and a normal sewerage fee paid by Kirk. Similar arrangements have been made to connect in 1990 the new Thompson shipping compound and to replace the existing Governor's Sound pumping station that is in a state of poor repair.

The sewage treatment works is producing good quality effluent, albeit that the salinity remains too high for it to be utilized for irrigation. The suspended solids of the effluent has increased as a direct result of the utilization of the aspirators.

## 6.2 Sewerage Statistics

Total sewage treated	509,769 cub m	134,579,000 Gallons
Average Daily Flow	1,397 cub m	368,710 Gallons
Number of Septage loads	760	
Pumping Stations' electricity	103,012 kWh	0.20kWh per Cub m
Treatment Works electricity	67,920 kWh	0.13 kWh per Cub m
Aspirators' electricity	66,300 kWh	0.13 kWh per Cub m
<b>Total</b>		<b>0.46 kWh per Cub m</b>
Total number of connections	189	Increase of 28 over 1988
Total Sewerage Fee charged	\$1,207,848	
Average cost per connection	\$533	per month
Total number of septage customers	4	Increase of 1 over 1988
Total Septage Fee charged	\$22,800	
Average cost per customer	\$475	per month

## 7.0 NEW WORKS

### 7.1 West Bay Beach Sewerage Project

This project was virtually completed in 1988 and in 1989 some minor reinstatement work was completed and some remedial works was carried out.

The major expenditure during the year was on legal advice, project management and reinstatement. No retention was released as the final measurement indicates that none is due.

The question of the contractor's claim still remains unresolved, although a number of meetings were held between the Contractor, the Employer, Legal Advisors and the Engineer. The Contractor's claim has escalated to over C\$8.0 Million and it is being strongly resisted by both the Employer his Legal Advisor and the Engineer. At the end of the year the contractor was persuaded to submit a reduced claim which probably more accurately reflected his actual additional costs, this sum was in the region of C\$2.3 Million. At the year end this claim was under analysis pending a report and recommendation to the Employer. It is hoped that early in 1990 the Employer will know whether a settlement is possible or whether the matter will be referred to arbitration.

At the end of the year the following expenditure had been incurred on the construction of the project:

	<b>Expenditure in 1989</b>	<b>Total Expenditure upto 31st Dec 1989</b>
Land Acquisition	0.00	240,000
Civil Works Procurement	0.00	1,011,129.64
Civil Works Construction	101,701.96	6,773,124.61
Mechanical Plant Procurement	18,745.29	268,419.44
Mechanical Plant Installation	2,337.00	20,229.28
Engineering Services	0.00	295,109.71
Project Management	52,023.06	537,305.04
Loan Costs	0.00	574,092.70
<b>Total</b>	<b>174,807.31</b>	<b>9,719,410.42</b>

### 7.2 George Town Sewerage

The problem of sewage treatment and disposal in Central George Town and North Church Street is of major concern to both the Water Authority and the Environmental Health department. Initial steps



have been taken to identify the problem and during next year it is hoped that an in depth investigation can be carried out to look into the feasibility of sewerage the offending area.

### **7.3 George Town Water Supply**

The Water supply to George Town was completed early in the year with the exception of a number of connections that were required by late applicants. However the Government approved a proposal to extend the main pipe line and distribution to Spotts Newlands (Marl Pits) connecting all the properties on route. The extension also included the provision of a second one million gallon reservoir to be located adjacent to the existing site on Red Gate lane. Materials for the extension were ordered early in the year and deliveries commenced in October. Civil work on the extension commenced in October and on the reservoir in November. Land to accommodate the new reservoir was provided by Government from land that it had earlier purchased to accommodate the extension to the Central Funding Scheme.

To accommodate the extension and to facilitate the more efficient treatment of water the existing treatment facility was upgraded by extending the building and replacing the existing dosing equipment with more sophisticated and flow controlled pumps. In addition the construction of the building to house the small reverse osmosis plant, and later offices and workshop, interfered with the truckers facility, consequently steps were taken to re-arrange this facility to make it more convenient for the truckers to use.

A major problem is caused by late applications for connections, especially once the contractor has moved out of an area where the late connection is required. The contractor has suffered considerable disruption to his programme because of this reason and it also interferes with the timely reinstatement of trenches in the roads. The wet weather conditions during the year have also affected the contractors ability to reinstate the roads.

Under the Conditions of the Contract the contractor is eligible for a rates reviewed at the time the contract value exceeds the original tender sum by 15%, this occurred in February and consequently a rate review was carried out. The contractor was able to show that inflation and other price increases had adversely affected his original rates and that accordingly he was given a rate increase. The increase was not across the board but different increases were given to various rates. On average an increase of approximately 12% was allowed.

The following work was completed during the year.

Under the original contract pipes were laid and completed in the following locations:

- Central George Town including Fort Street, Edward Street, Jennett Street and Albert Panton Street
- South Sound area, including Old Crewe Road, Casuarina Estates, Bel-Aire Gardens, Anne-Bonny Crescent, Mary Reid Crescent.
- Red Bay Road upto and including Selkirk Drive.
- Watler's Road area
- Half Way Pond Road.
- Middle School area, including all sub-divisions west and east off the southern part of Walkers Road
- Rock Hole area.

In addition to the above the contractor completed the concrete base for the second reservoir.

A total of 9,240 metres of large diameter pipe and 12,580 metres of small diameter pipe were laid and a total of 683 meter boxes were installed.

At the end of the year the following expenditure had been incurred on the construction of the project:

	Expenditure in 1989	Total Expenditure upto 31st Dec 1989
Land Acquisition	0.00	160,000
Civil Works Procurement	1,054,268.68	2,174,286.01
Civil Works Construction	1,758,954.86	4,306,615.55
Mechanical Plant Procurement	(107,701.26) •1	271,345.43
Mechanical Plant Installation	4,122	5,594.95
Project Management	36,730.97	129,956.81
Loan Costs	(17,396.30) •1	128,876.54
Appraisal Fee	0.00	17,396.30
<b>Total</b>	<b>2,728,978.95</b>	<b>7,194,071.59</b>

•1 indicates a correction made to the 1988 figures under these heads.

#### 7.4 Cayman Brac Water Supply

Preparatory work was carried out to determine the feasibility and practicality of providing Cayman Brac with the first phase of a piped water supply. At the end of the year plans were underway to carry out a survey to determine the best route of and design for a pipeline at the west end of the island.

The proposal is to provide a limited piped water supply to the south west shore line and hotels and to also head north across to the airport, connecting all properties on route should they require a supply. The water will be desalinated utilizing the 60,000 gallon per day plant that is presently located in George Town. The plans also included for a 500,000 gallon reservoir and a trucking facility.

The feasibility of the proposal is not good and it might well be that in the first instance some form of subsidy will be necessary, failing which the price of water will be prohibitively high. The financial position of the Water Authority is not yet sufficiently stable to assume this level of liability without some form of assistance.

#### 7.4 West Bay Water Supply

Agreement in principle has been reached with the Cayman Water Company for them to provide a piped water supply to the district of West Bay. At the end of the year agreement was reached between the Water Authority and the Water Company on the wording of the agreement and this will be submitted to Government at the time it has returned from the various legal advisors.

The important aspect of the agreement is that the Water Company will not be allowed to sell water in West Bay at a higher price than the Water Authority charge in George Town.

### 8.0 WATER AND SEWERAGE OPERATORS

During the year the following new Licences were approved by the Plumber's Examination Board:-

	1989 Licences Issued	Total number Issued to 31st Dec 89
Apprentice	14No	33No
Journeyman	4No	86No
Master	4No	23No

The Chairman of the Board compiled a series of teaching aids for plumbers and these were made available to the trade to assist with examinations and to generally upgrade the standard of plumbing on the Island.

The Plumber's Examination Board met on four occasions to assess applications and this year practical and theoretical examinations were held on six occasions to determine applicants' ability.

The Board consists of the following members:

Chairman	Senior Superintendent Water Authority (Mr Thomas Hill)
Members	Chief Environmental Health Officer (Mr Walling Whittaker) Mr Nigel Miller Plumbing Inspector (Mr Arthur Arch)
Secretary and Member	Chief Building Control Officer Mr Roger Gough

## 9.0 UNITED NATIONS

The Authority continues to benefit from being a part of the United Nations Smaller Islands Water Resources and Management Project which is based in Barbados.

Both Mr Tony Reid and Mr Bunyan Whittaker, Engineering Technician, continued with their UN Fellowship to attend a two year Engineering Technicians Associate Degree Course at the WACO Technical College, Texas.

The Authority continues to be provided with the services of Associate Mr Henrik van Genderen who continues to work on the George Town Water Supply Project. At the end of the year no replacement had been found for Mr Dykstra who had left in early 1988, although UNDCCTC had promised that they would replace him and at one point in time indicated that they had located a suitable replacement.

No agreement was forthcoming on the new Project Document which was expected to be finalized in 1988 and because of this UNDP agreed to extend the Project in its existing form until the Barbados Project comes to an end which it is understood will be early in 1990. Quite what will happen after that time is not known nor does it seem possible to determine.

The local Government contributed US\$10,000 to the cost of the project in 1989.

## APPENDICES

- a. **Balance Sheet**
- b. **Statement of Profit**
- c. **Depreciation Calculation**

# WATER AUTHORITY

## Balance Sheet as at 31st December 1989

### Assets

#### Fixed Assets

Land	\$500,000
Sewerage	\$9,240,957
Water Supply	\$7,224,346
Equipment and tools	\$120,000
Vehicles	\$150,000
Furniture and Computers	\$150,000
	<hr/>
	\$17,385,303

#### Current Assets

Inventories	\$50,000
Accounts Receivable	\$120,407
Fixed deposits	\$129,206
Call Account	\$163,713
Current Account	\$1,111
	<hr/>
	\$464,437
	<hr/>
	\$17,849,740

### Liabilities and Current Liabilities

Current portion of long term debt	\$390,000
Accounts Payable	\$4,746
Customer's deposits	\$147,147
Customer's advance contributions	\$138,750
	<hr/>
	\$680,643

### Long Term Debt

CDB- Water	\$2,312,500
CDB- Sewerage	\$5,893,586
Barclays	\$5,510,000
CIG Loan	\$3,453,011
	<hr/>
	\$17,169,097
	<hr/>
	\$17,849,740

# WATER AUTHORITY

## Statement of Profit For the Year Ending 31st Dec 1989

<b>Operating Revenue</b>	\$2,818,588
<b>Operating Expenses</b>	
Personal Emoluments	\$528,276
Travelling and Subsistence	\$1,774
Supplies and Materials	\$31,807
Rent of Property	\$6,250
Utilities	\$953,682
Other Operating and Maintenance Services	\$19,133
Grants, Contributions and Subscriptions	\$10,473
Interdepartmental Purchases and Services	\$54,527
Equipment	\$10,210
	<u>\$1,615,264</u>
<b>Operating Income</b>	\$1,203,324
<b>Other (Expenses)/Income</b>	
Interest expense and bank charges	(\$1,035,398)
Interest Income on deposit accounts	\$14,958
None operating income	\$228,229
Depreciation	(\$371,293)
	<u>(\$1,163,504)</u>
<b>Profit for Year</b>	<b>\$39,820</b>

**Water Authority**

Rates of Depreciation	
Civil Works	2.00%
E and M	6.67%

**Depreciation Calculation for 1989**

	Value at 31/12/88	Value at 31/12/89	1989 Investment Costs	1989 cost of Depreciation
<b>West Bay Beach Sewerage Project</b>				
Land	\$240,000	\$240,000	\$0	\$0
Civil Works	\$7,682,560	\$7,784,255	\$101,695	\$154,668
Mechanical & Electrical	\$267,570	\$288,648	\$21,078	\$18,541
Project management	\$780,380	\$832,414	\$52,034	
Capitalized loan expense	\$574,090	\$574,090	\$0	\$11,482
<b>Total</b>	<b>\$9,544,600</b>	<b>\$9,719,407</b>	<b>\$174,807</b>	
Project Management split to	\$780,380	\$832,414	\$52,034	
Civil Works	\$754,115	\$802,651	\$48,535	\$51,892
Electrical And Mechanical	\$26,265	\$29,763	\$3,499	\$1,868
				<b>\$238,450</b>
<b>George Town Water Supply</b>				
Land	\$160,000	\$260,000	\$100,000	\$0
Civil Works	\$3,815,183	\$6,480,902	\$2,665,719	\$102,961
Mechanical & Electrical	\$233,014	\$276,940	\$43,926	\$16,998
Project management	\$93,226	\$129,957	\$36,731	
Capitalized loan expense	\$146,273	\$146,273	\$0	\$2,925
<b>Sub-total Water supply</b>	<b>\$4,447,696</b>	<b>\$7,294,072</b>	<b>\$2,846,376</b>	
Project Management split to	\$93,226	\$129,957	\$36,731	
Civil Works	\$87,860	\$124,631	\$36,771	\$2,125
Electrical And Mechanical	\$5,366	\$5,366	\$0	\$358
<b>Lower Valley</b>	Completed Nov 1983			
Cost CI\$	\$156,820	\$137,218	\$133,297	\$0
<b>East End</b>	Completed March 1985			
Cost CI\$	\$216,937	\$195,243	\$189,820	\$0
<b>Total Water Supply</b>	<b>\$4,780,157</b>	<b>\$7,617,189</b>	<b>\$2,846,376</b>	<b>\$132,843</b>
<b>Total</b>				<b>\$371,293</b>