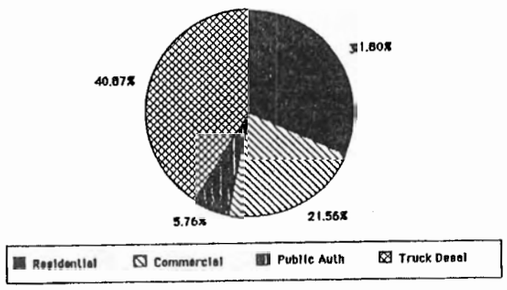
THE WATER AUTHORITY

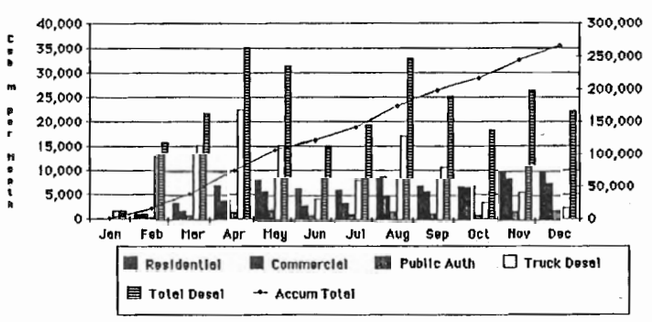
1988 ANNUAL REPORT

1988 AVERAGE MONTHLY DESAL SALES SPLIT



INDEX

1988 DESAL WATER SALES QUANTITY



THE WATER AUTHORITY

1988 ANNUAL REPORT

1. General

1988 was an extremely busy year for the Water Authority with the continuing construction, commissioning and operation of both the West Bay Beach sewerage project and the George Town water supply project.

The West Bay Beach sewerage project received completion certificates for the majority of the work under the contract, but a final completion certificate was not issued as the contractor had not carried out all the final reinstatement of the roads. The property connections commenced in February and were complete by September, by January all the eleven sewage pumping stations were commissioned, the sewage treatment works having been commissioned in December 1987. Sewage was flowing into the treatment works immediately after the first connection in February. In March the Contractor submitted a very large claim for what he considers to be additional cost incurred and payable to him under the contract. The claim was rejected by the Engineer and the matter has been put in the hands of Hon Attorney General who has in turn instructed Counsel in the UK to advise on the matter.

A salinity problem occurred with the incoming sewage, which was aggrevated by the inundation of seawater during hurricane Gilbert, this hasbadly affected the treatment process. Measures are being taken to rectify this problem and in turn produce effluent suitable for irrigation.

The George Town water supply became operational in February after the commissioning of the reservoir in January and the Central DeSal desalination plant in early February. The truckers received their first water in late January and the first customers on the pipeline in early February.

During the year the scope of the project was drastically increased from an initial total pipe length of 23 Kilometres to over 62 Kilometres, the number of connection being increased from 900 to 2000.

The result of the extension of the contract has increased the contract period from eleven months to some twenty one months, completion is now due in April 1989.

Towards the middle of the year Central DeSal began to experience problems with their desalination operation which resulted in a reduction in output. The problems centred on the feed water temperature rising caused by the brine disposal. CDS have carried out major modifications to their works and it is anticipated that the plant will be operating within its specification in the early part of 1989. This reduced production was most disappointing and severely affected the Water Authority's ability to meet its total demand, notably that of the truckers. At no time was the pipeline demand not satisfied.

Both the Lower Valley and East End wellfields have been greatly utilized during the year, particularly the latter part to make up for the shortage of trucked water available from the George Town facility.

The reverse osmosis desalination plants operated by the Hyatt and Treasure Island hotels continue to operate with the former increasing its capacity. The total nameplate desalination capacity operating on the island of Grand Cayman is approximately 1.5 Million US Gallons per day. Two smaller reverse osmosis plants operate in Cayman Brac with a combined capacity of approximately 20,000 US Gallons.

During the year the Water Authority held only three full meetings, considerable difficulty was experienced on a number of occasions in assembling a quorum. The members of the Authority at the 31st December 1988 were:

Chairman:	Member, Communication Works and Natural Resources Hon. Linford Pierson CPA JP
Members:	Deputy Financial Secretary Mr George McCarthy CPA
	Chief Engineer Mr Donovan Ebanks M Sc C. Eng MICE
	Chief Environmental Health Officer Mr Walling Whittaker BSc
	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 MIWEM MASCE

With the new Government in November came the following changes to the Board:-

The previous Chairman, Mr Vassell Johnson CBE JP, retired after serving as Chairman for four years

Capt C Kirkconnell left the Board

Mr V Jackson JP left the Board

2.0 Administration.

2.1 Staffing

The Staff complement as at 31st December 1988 was as follows:-

a.	Director	Mr R Beswick CEng MICE MIWES MASCE	SS 6
b.	Project Manager	Mr T van Zanten MSc CEng	AP3-4
c.	Operations Engineer	Mr F McTaggart BSc	AP1-2
d.	Water Supply Engineer	Mr A Jones CEng MICE MIWES	AP3-4
e.	Accountant	Vacant	AP3-4
f.	Senior Superintendant	Mr T Hill Master Plumber	T9
g.	Senior Draughtsman	Mr G Page HND	T7-8
h.	Junior Draughtsman	Vacant	T3-4
i.	Junior Draughtsman	Mr G Welcome	T3-4
j.	Operations Scientist	Ms Gelia Frederick	T6-7
k.	Laboratory Technician	Vacant	T3-4
l.	Technician	Mr D Powery	T3-4
m.	Graduate Research Assistant	Vacant	T1
n.	Executive Officer	Ms J Nicholas	E1-2
o.	Accounts Receivable Clerk	Mrs Francine Perryman	E1-3
p.	Clerical Officer	Ms K Syms	C1-4
q.	Associate Expert UN	Mr Henrik van Genderen	No cost
r.	Associate Expert UN	Vacant	
s.	Operator	Mr Elvet Connolly	T6-7
t.	Operator	Mr Loy Tivy	T6-7
u.	Foreman	Mr C Morgan	
v.	Asst Operator	Mr Calvin Ramoon	

w.	Asst Operator	Mr Vincent Grant
x.	Labourer	Mr Samuel Campbell
y.	Customer relations	Mr Clement Reid
z.	Meter reader	Mr Steve Reid

The following staff movements took place during the year:-
Clement Reid joined the Authority in January as the Customer Relations Officer

Gelia Frederick transferred from Environmental Health Department to the Authority as the Operations Scientist.

Calvin Ramoon joined the Authority in March as an Assistant Operator.

Henrik van Genderen joined the Authority in March as the United Nations Associate Expert.

Loy Tivy was promoted in April from Assistant Operator to Operator .

Elvet Connolly joined the Authority in April as an Operator.

Tony Reid , Draughting Technician, left the Authority in May to take up a full time Associate Degree course in Engineering at WACO college Texas, funded by the UNDP.

Vincent Grant joined the Authority in May as an Operator.

Samuel Campbell joined the Authority in June as a Labourer.

Robert Thompson joined the Authority in July and left in September to continue his engineering studies in Jamacia.

Samuel Ng completed his contract as Graduate Research Assistant and left the Authority in August.

Bunyan Whittaker, draughting technician, left the Authority in August to take up a full time Associate Degree course in Engineering at WACO college Texas, funded by the UNDP.

Steve Reid joined the Authority in September as a meter reader.

Sharon Solomon, Laboratory Technician, left the Authority in November to take up further education.

Francine Perryman joined the Authority in November as Accounts Receivable Clerk.

John Paterson, Accountant, left the Authority in December.

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-pulmanory Resuscitation
b. Operations, maintenance and record keeping for water and sewage utilities
c. Presentation of World Health Organizations training modules, 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 1988, Mr Tony Reid and Mr Bunyan Whittaker, engineering draughting technicians, commenced their studies at the Technical College of WACO, Texas. They join Ms Cathy Seymour who commenced the same course in 1987. 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 1988. The following participated in the following seminars and workshops:-

Mr F McTaggart, Operations Engineer	Supervisory Management Course held in St Kitts
Mr T Hill, Senior Superintendent	Stores Management Workshop held in Grenada
Mr E Connolly, Operator	Six week Workshop on water works and sewage treatment plant operations and maintenance held at CAST, Jamacia
Ms Gelia Frederick, Operations Scientists	Protection of water sources for quality control, St Lucia
" "	Sewage Treatment and Disposal, Barbados
" "	Training Coordinators for Water Utilities, Grenada

In addition arrangements were made for Mr Walling Whittaker, Chief Environmetal Health Officer to attend the Sewage Treatment Workshop in Barbados and Mr Leonard Whittaker, Assistant Storekeeper PWD to attend the Stores Management Workshop in Grenada.

Ms Gelia Frederick also attended a PAHO Disaster Management for Water Utilities Workshop held in Jamacia. She also visited at her own expense the CEPIS establishment in Peru to carry out research for her proposed Doctorate on the operation of waste stabilization ponds for the treatment of sewage.

2.3 Finance

Funding for the 1987 recurrent budget was provided by the Government from local recurrent funds and the budget and actual expenditure is shown below:-

EXPENDITURE

Recurrent Expenditure

	HEAD	Allocation 1988	Expenditure 1988	Expenditure 1987
01	Personnel Emolument	421,747	440,546.42	327,586.07
02	Travelling and Subsistence	2,950	1,016.37	3,462.88
03	Supplies and Materials	24,950	22,750.67	18,972.84
04	Rent of Property	5,000	5,000.00	5,000.00
06	Utilities	755,385	671,746.32	19,611.53
07	Other Operating Expenses	16,500	14,480.20	13,569.26
08	Grants, Contributions	8,000	7,095.75	7,000.00
12	Interdepartmental Purchases	50,000	50,106.02	39,594.40
14	Equipment	5,750	5,399.43	14,190.49
	Total Recurrent	**1,325,282**	**1,218,159.18**	**448,987.47**

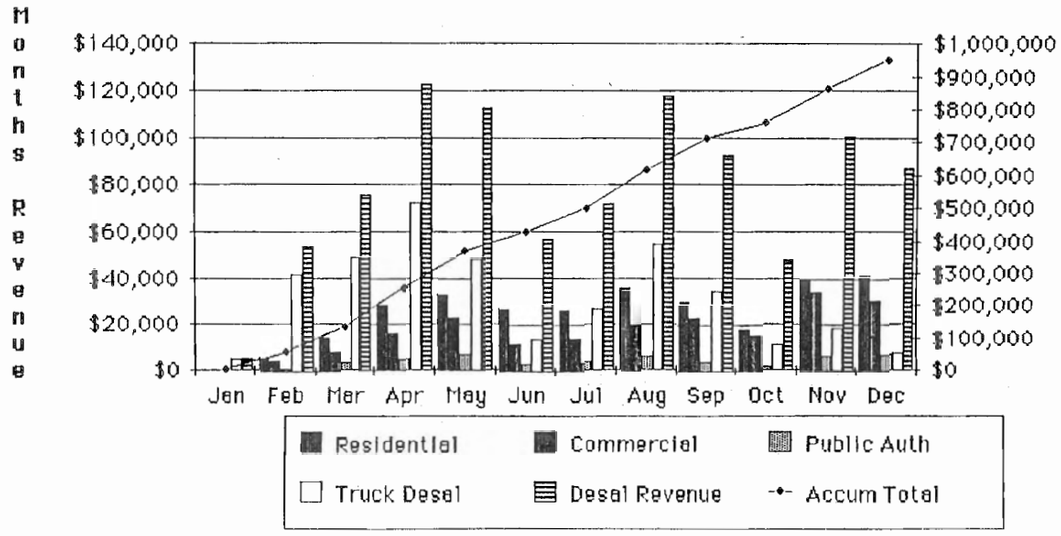
Capital Expenditure

In 1988 there was no allocation from local capital funding and the two Caribbean Development Bank loans taken out for the West Bay Beach Sewerage Project and the George Town Water Supply Project were expended by the end of 1987. Both capital projects were funded from 42-004, no local capital monies were made available from 41-024.

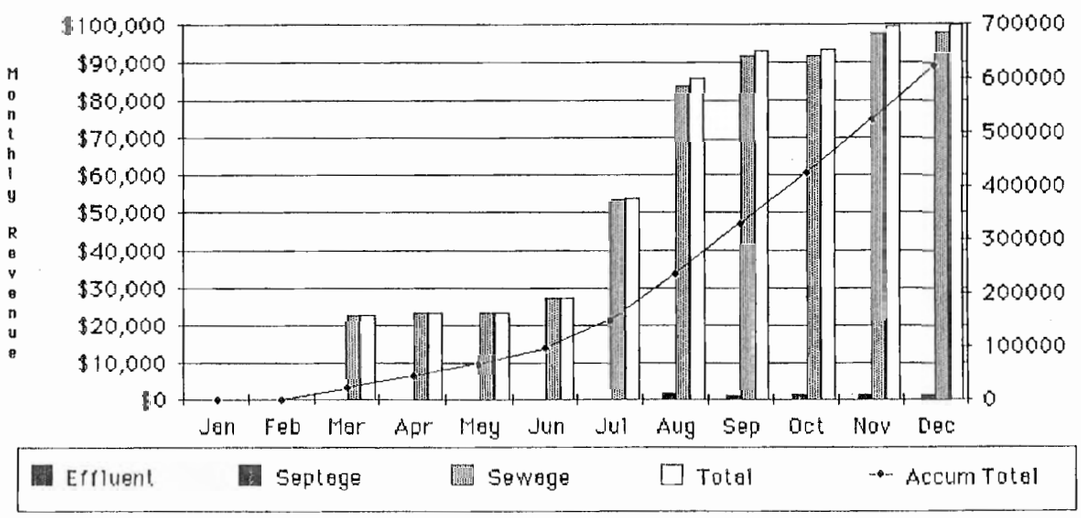
Source of 42-004 Capital Funding

An additional loan of **CI$3,913,964** to cover the local input for the two projects was taken out in January with Barclay's Bank International.

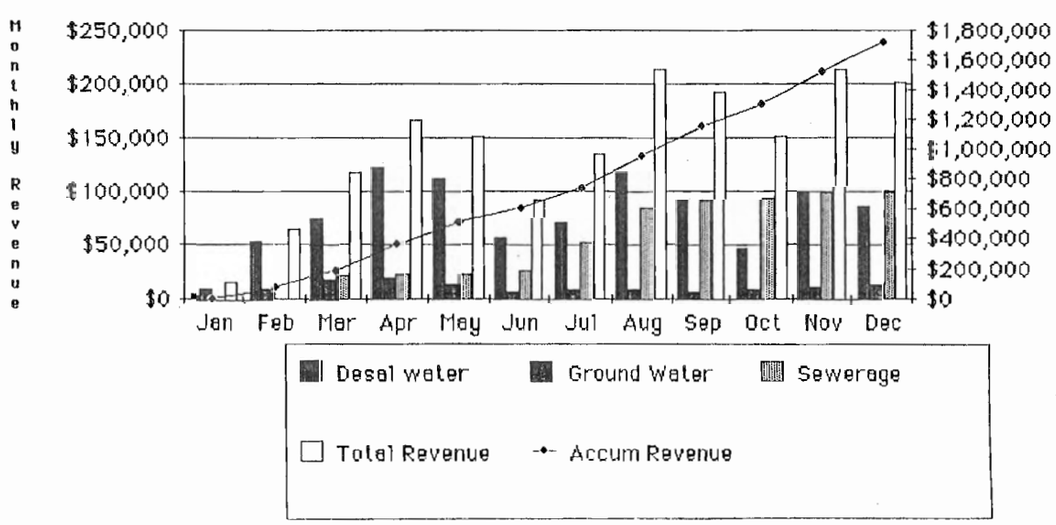
1988 DESAL WATER SALES REVENUE



1988 SEWERAGE REVENUE



1988 WATER AND SEWERAGE REVENUE SUMMARY



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

George Town Water Supply	221,966.22
West Bay Beach Sewerage	439,662.21
Total	**661,658.43**
Amount capitalized during construction	370,496.66
Amount carried to recurrent expenditure	291,161.77

Revenue

		Estimate	Actual	1987 Revenue
63-005	Licence Fees-Water Resources	6,000	7,671.12	9,687.23
63-011	Licence Fees- Water Industry	5,000	2,240.00	3,015.00
64-040	Sale of Water	880,400	1,027,975.01	106,887.28
64-010	Sewerage charge	1,166,468	474,548.61	0.00
64-013	Sludge Charge	21,300	5,820.00	0.00
64-014	Effluent Sales	1,050	0.00	0.00
64-015	Sewerage Connections	40,000	0.00	0.00
70-001	Other Receipts	1,000	4,449.84	4,575.25
	Total	**2,121,218**	**1,522,704.58**	**144,745.76**
67-008	Royalty-water	275,000	175,410.25	181,731.00

December revenue carried over to January 1989 for collection

64-040	Sale of water	105,872
64-010	Sewerage Charges	99,991
	Total	**205,863**

Accounts receivable at year end **61,318.27**

The shortfall in revenue was mainly due to the fact that the completion of the West Bay Beach Sewerage project was delayed by eight months and therefore revenue was not collected for the total period of the estimate. The shortfall in the Royalty-Water was due in part by the Cayman Water Company's reluctance to submit payments in a timely manner and also due to their reduction in output.

Cash position

Actual recurrent expenditure	1,218,141.18
Revenue	1,522,704.58
Cash surplus	304,563.40
Statutory expenditure to recurrent expenditure	291,161.77
Net Surplus	**13,401.63**

Depreciation
It is not normal practice to apply depreciation to works under construction therefore it is not intended to depreciate the capital works until they are substantially complete. It is therefore likely that depreciation of the capital works will commence in January 1989.

Accounting and billing sytem.
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. Towards the end of the year it was possible to retain the services of the software designer to maintain the system on a monthly basis to ensure that it performs properly during the period when modifications are found neccesary. He is also to commission the accounting software which he has designed and will be available each month until such time as it operates without problems and local staff are trained in its operation.

2.4 Conferences and Seminars
Caribbean Basin Water Management Project; see Section 2.2 concerning seminars and workshops attended in connection with this project.

The Graduate Research Assistant, Mr S Ng, attended the second workshop on the Hydrogeological Atlas for the Caribbean Islands held in Venezuela.

The Graduate Research Assistant also attended the PAHO (CEPIS) Symposium on the Protection of Ground Water in Latin America and the Caribbean held in San Juan.

The Director attended the annual management meeting of the Caribbean Basin Water Management Project in Montserrat.

2.5 Papers and Reports

The following papers and reports have been prepared during the year:-

a. Hydrogeological Atlas of the Cayman Islands to be incorporated in the Hydrogeological Atlas for the Caribbean, a UNESCO Project
b. Hydrogeological and ground water control policy of the Cayman Islands, report prepared for the PAHO (CEPIS) symposium on Protection of Ground Water in Latin America and the Caribbean held in Puerto Rico
c. 1988 Cayman Islands - Case Study, Guide to Hydrology and Water Resources Development of Small Islands - UNESCO IHP-III Project 4.6
d. Training manuals for the in-house training of Water Authority staff.

The following papers have been co-authored with researchers from the University of Alberta:-

e. The structure and diagenesis of rhizoliths from Cayman Brac, BWI - Published in the Journal of Sedimentary Petrology
f. Anatomy and diagenesis of a pleistocene carbonate breccia formed by the collapse of a seacliff, Cayman Brac BWI - Published in the Bulletin of Canadian Petroleum Geology

3.0 Water Resources

3.1 Monitoring

The comprehensive ground water monitoring programmes established in 1985 remained operational through out the year. There has been no indication of any general deterioration trend of the water resource in either Lower Valley or East End.

During the year routine domestic well monitoring was carried out in Lower Valley, West Bay and Cayman Brac.

The graduate research assistant who was responsible for the ground water monitoring and management left towards the end of the year, his functions were taken over by the water resources supervisor, Mr Vernel Rankine.

3.2 Laboratory

The commissioning of the George Town Water Supply and the West Bay Beach Sewerage saw the upgrading of the laboratory. A new and larger laboratory has been provided at the George Town reservoir site, under the control of the new Operations Scientist, Ms Gelia Frederick. The laboratory has also upgraded its functions to maintain quality control on the water production from George Town and the two wellfields. It continued to carry out routine water testing to ensure the integrity of the water resources associated with the two wellfields. It has also continued to provide a water testing service to the general public. Routine testing is carried out for several operators of reverse osmosis plants.

Routine testing of sewage and treated effluent is carried out on a regular basis to monitor the efficiency and operation of the sewage treatment works and the sewerage. In addition testing is carried out on ground water samples taken from piezometers located near the sewage effluent disposal wells to monitor the environmental affects of the disposal.

3.3 Research

Mr Sam Ng, the Graduate Research Assistant, has completed his field work in Cayman and has returned to the University of Alberta to write up his Doctorate thesis which relates to the diagenesis of the Tertiary Bluff Formation of the Cayman Islands. He will be defending his thesis in early 1989 and it is anticipated that he will be awarded the degree of Doctor of Philosophy in 1989.

Ms Gelia Frederick, the Operations Scientist, has formulated a research proposal relating to the operation of the waste stabilization ponds in respect to the production of effluent for irrigation. Her proposal was submitted to the University of Surrey and subject to funding she has been accepted for a Master of Philosophy programme.

3.4 Water Resource Licencing

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

Discharge Permits	333 No
Ground water abstraction Licences	3 No
Canal Permits	0 No
Quarry Permits	10 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.

3.5 Rainfall distribution

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

Station	Annual Average		Annual Total		
	period	mm	1986 mm	1987 mm	1988 mm
Driftwood Village	84-88	1021	982	1050	1632
Tortuga Club	67-88	1102	934	938	1078
Furtherland Farms	84-88	963	969	827	894
East End Village	85-88	807	803	913	1459
Frank Sound	84-88	1151	838	888	1565
Bodden Town	67-86	1115	1062	1159	1600
Lower Valley	84-88	1145	1038	1261	1648
Savannah	84-88	1174	1026	1392	1668
Prospect Park	84-88	1177	963	1444	1550
South Sound	84-88	1242	1054	1698	1556
Airport	67-86	1472	933	1541	1468
West Bay	73-88	1290	638	1039	1556
Island Wide Average		**1138**	**937**	**1179**	**1473**

The island wide average in Grand Cayman was 1473mm (57.99 inches), significantly higher than 1987 and above the average for the record periods. The distribution throughout the island was somewhat irregular, the Eastern Districts being slightly drier than the Western Districts. The passage of hurricane Gilbert may have increased the rainfall and given a more even island distribution than 1987.

4.0 Water Supply

4.1 Lower Valley wellfield facility

The Lower Valley wellfield has completed its fifth full year of production. The wellfield has been pumping for 96% of the year, the pumps only stopping for routine maintenance and for short periods during the wet season.

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 year. There has been a 19% reduction in production over the previous year at this facility. The production of the wellfield has been reduced to compensate for the reduction in rainfall (recharge) over the preceding years.

Lower Valley wellfield performance

Year	Hours Run	Average Pumping Rate Cub m/hour	Quantity Produced Cub m	Power KWH per Cub m	%age Loss	Month Production		Total Sold Cub m
						Max Cub m	Min Cub m	
1986	6,810.1	8.68	59,146.24	2.03	7.94	7,033.1	2,385.8	55,716
1987	8,420.6	7.15	60,158.74	2.28	4.94	5,459.3	3,964.8	57,744
1988	7,884.0	6.16	48,564.38	2.35	5.60	4,770.0	2,692.4	45,989

The water quality remains within the World Health Organization's standards, with a total dissolved solids ranging between 1000 ppm to 1400ppm, 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 279,810.3 Cub m (73,869,914 Gallons).

4.2 East End Wellfield facility.

The East End wellfield has completed its third 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.

East End wellfield performance

Year	Hours Run	Average Pumping Rate Cub m/hour	Quantity Produced Cub m	Power KWH per Cub m	%age Loss	Month Production		Total Sold Cub m
						Max Cub m	Min Cub m	
1986	602.9	14.72	8,877.28	0.46	1.03	1,759.5	339.2	4,191
1987	2,712.3	14.00	37,972.64	0.47	1.37	6,400.6	1,243.8	29,263
1988	3,134.2	14.00	43,879.47	0.45	1.36	7,183.1	529.1	33,815

The water remains within the World Health Organization's standards, with a total dissolved solids ranging between 650 ppm to 700 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 106.23 Cub m (28,045 US Gallons).

The total quantity of water produced since commencement of the wellfield operation is 99,166 Cub m (26,179,824 Gallons).

4.3 Cayman Water Company.

The Cayman Water Company experienced what must be considered a most disappointing year. They were plagued with plant problems which reduced their production and water sales to below that of the previous year. Throughout the year they have been unable to provide any significant quantity of water to the trucking companies and on a number of ocassions have found it necessary to rely on the Water Authority for a back up supply.

The following table indicates various of their operating parameters and compares them to 1987.

The table indicates a 16% drop in production with the plant only managing to operate at an average of 58% of its nameplate capacity. It would seem likely that the present plant is

struggling to meet the existing distribution demand, it is obvious that the Company will require additional plant, not only to satisfactorily service its present demand, but also to meet the future demand.

A further indicator of poor performance is the reduction in the fuel to water conversion rate which has dropped 9% from the 1987 value and the plant is now only producing on average 235.15 US Gallons of water for each Imperial Gallon of fuel; this is 110.85 US Gallons less than required by the Franchise agreement. The cost associated with this reduction of efficiency is passed onto the consumer by way of the fuel adjustment factor and in 1988 amounted to $73,420.18.

	1988	1987	Variance 1988 to 1987
Water Produced (US Gall)	141,969,660	169,245,798	-16%
Production as %age of capacity	58%	69%	-11%
Water supplied by WA (US Galls)	5,079,096	0	
Total Water Sold(US Galls)	134,584,786	154,243,033	-13%
Pipeline Sales(US Galls)	132,345,373	127,464,319	+4%
Truckers Sales(US Galls)	2,239,413	26,779,714	-92%
Pipeline share	98%	83%	+15%
Truckers share	2%	17%	-15%
Average Month Sales(US Galls)	11,215,399	12,853,669	-13%
Fuel Adjustment Factor Av	$1.44	$1.29	+12%
Fuel to water conversion(US Galls)	235.15	257.22	-9%
Average water price pipeline	$18.89	$18.74	+1%
Average water price trucker	$16.44	$16.29	+1%
Total Royalty Payment	$175,726	$196,946	-11%
Gross Sales revenue	$2,343,018	$2,625,948	-11%
Fuel Adjustment Value	$193,802	$198,973	-3%
Unaccounted for water	8%	8%	0%

4.4 Water Truckers

The water truckers continued to provide a much needed and good service. 1988 saw one trucker cease to operate and a new one start up in business.

The following companies are providing a trucking service:-

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

The total quantity of water drawn by the truckers was as follows:-

	1987	1988
Water Company	26,779,714	2,275,603
Lower Valley	15,244,416	12,133,150
East End	7,725,432	8,927,212
George Town Reservoir	0	32,000,000
Walkers Road	1,632,485	2,190,000
Total	**51,382,047**	**57,527,965**

This equates to an average daily trucked demand of 157,611 US Gallons, representing a 12% increase over 1987. The sales of desalinated water shows an increase of 28% over 1987, this increase would be far greater if it had been possible to supply the total demand of the truckers.

4.5 George Town Water Supply

The construction of the reservoir and distribution continued through the year, at the same time sections of the distribution continued to be commissoned as construction proceeded. The one Million gallon reservoir which was assembled in late 1987 was commissioned in

January as was the Cayman DeSal desalination plant. The trucking companies received their first water on 26th January. The pumping station and a part of the distribution was commissioned in February and the first pipeline customers received water on 10th February. In the same month an extension of the scheme along Smith Road, Crewe Road and Tropical Gardens was approved, extending the contract completion date from May to September 1988. The Store and Laboratory building was completed in April. Further extensions, approved in May and July, extended the completion date to November. In November an extension along South Sound and Old Crewe Road was approved on the understanding that funding would be made available from property owners within the extension area, this further extension extended the completion date to March 1989.

At the end of the year 1292 meter boxes had been installed, 18,962 metres of large diameter pipe (150mm to 225 mm) and 23,294 metres of small diameter pipe (25mm to 100mm) were laid.

Project expenditure

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

	Expenditure in 1988	Total Expend to 31st Dec. 1988
Land acquistion	0.00	160,000
Civil Works, Procurement	380,333.33	1,120,017.33
Civil Works, Construction	1,507,814.69	2,547,660.69
Mechanical Plant, Procurement	150,882.69	379,046.69
Mechanical Plant, Installation	1,472.95	1,472.95
Engineering Services and Project Management	30,530.94	93,225.94
Interest and Committment	110,324.84	146,272.84
Appraisal Fee	0.00	17,396.30
Total	**2,181,359.94**	**4,465,095.74**

OPERATIONS

The first year of operation was not without its problems, the major problem was caused by Central Desal's inability to produce sufficient water. Unfortunately Central DeSal had a series of problems which affected the ability of their desalination plant to produce anything like its rated capacity. The major problem was the temperature rise in the plant feed water, which seriously reduced the efficiency of the plant, caused it to be run at higher temperatures which in turn caused a scaling problem, reducing the efficiency even further. This problem was eventually solved by changing the brine disposal arrangements, from disposal into the ground by constructing a pipeline to the North Sound. A further problem which affected the operation of the plant was the ingress of large quantities of debris from the supply wells, causing serious blockages within the plant. And finally the fluctuations and low levels of available steam, which was caused by generator engines breakdowns and spinning reserve requirements, further affected the water making capacity of the plant. Central DeSal have taken action to remedy the various problems, but at year end the plant was still unable to provide sufficient water to meet the total demand.

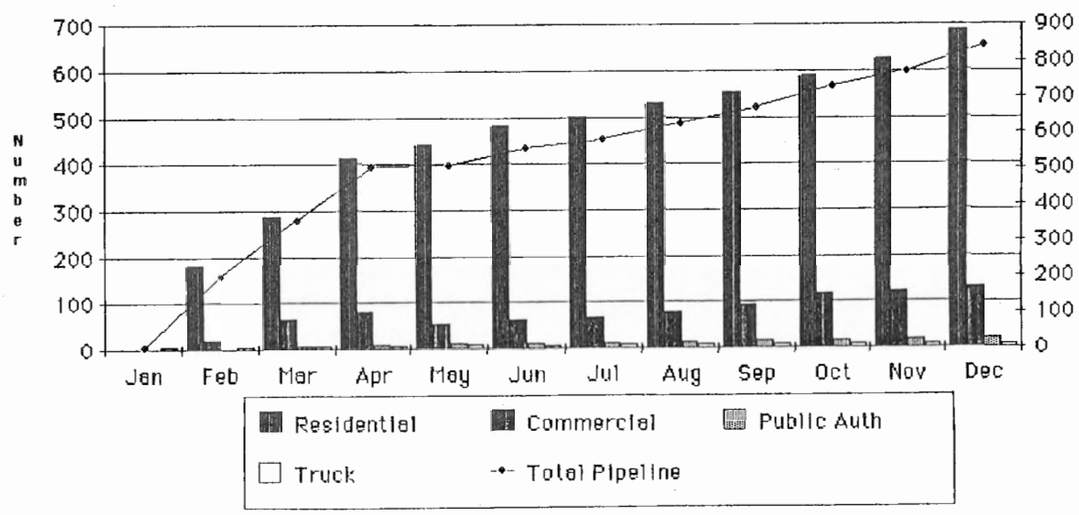
The shortage of water made it necessary to ration and on occasion to stop supply to the trucking companies. This was most unfortunate and seriously affected the revenue position both for the Authority and the truckers. Despite the water shortage it was unnecessary to ration water to the pipeline customers and with the exception of three short stoppages due to power failure and once to conserve water immediately prior to the strike of hurricane Gilbert the pipeline has continued to operate from the commissioning date.

Hurricane Gilbert, which occurred in October, caused very little damage to the Works. The only recorded damage being caused by the roots of trees interfering with a number of small diameter connection pipe work.

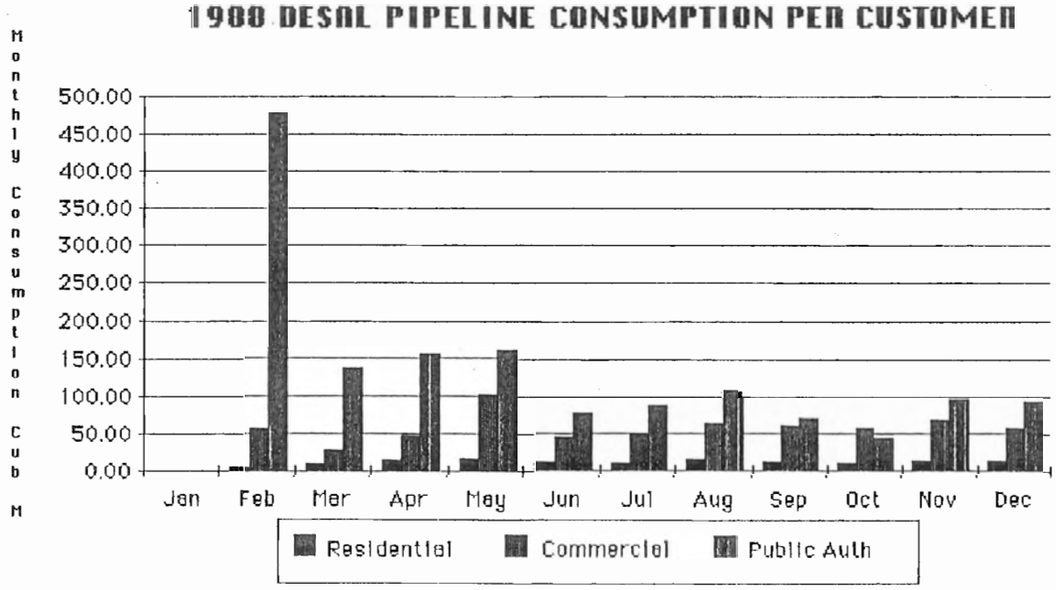
A standby diesel generator set was purchased to to be used to power the distribution pumps during times of power failure. This had not been commissioned by year end, arrangements were being made to have the plant operation by the the first part of 1989.

The Stores was fully commissioned towards the end of the year and all materials purchased for the capital project were incorporated into the computerized inventory control system.

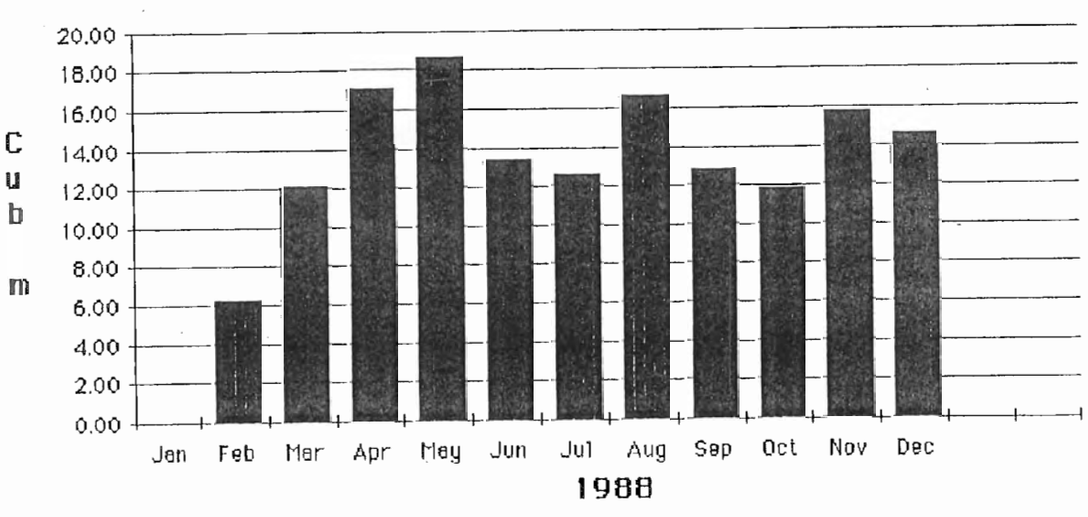
1988 DESAL PIPELINE CUSTOMERS



1988 DESAL PIPELINE CONSUMPTION PER CUSTOMER



RESIDENTIAL CONSUMPTION PER CONNECTION



The following data is provided to give an indication of the growth of the distribution during the year and numbers relate to the position as at the 31st December 1988.

Distribution Customers:

Residential	687
Commercial	132
Public Authority	23
Truckers	10
Total	**842**

Average Daily demand

Month	Pipeline Cub m	Trucker Cub m	
Feb	138.2	486.4	
Mar	281.4	536.3	
Apr	410.6	729.8	
May	544.3	437.2	*1 Not representative of demand as water was rationed to truckers
Jun	468.8	108.8	
Jul	639.7	216.3	
Aug	776.5	217.4	
Sept	573.6	237.0	
Oct	578.6	93.9	
Nov	694.0	198.4	
Dec	783.6	97.9	
Average total	**528.3**	**298.8**	*1

Water Sales:

Residential	75,653 Cub m
Commercial	54,117 Cub m
Public Authority	15,798 Cub m
Truckers	120,807 Cub m
Total	**266,374 Cub m**

Average monthly consumption per type of customer:

	Quantity Cub m	AnnualPercentage of total sales
Residential	14	31.8%
Commercial	59	21.56%
Public Authority	137	5.76%
Truckers	1,121	40.87%

Unaccounted for water

The average monthly unaccounted for water was **6.57%** of the gross production, with a high of **13.58%** in December and a low of **4.08%** in April. This loss is considered acceptable, especially as large quantities of water were used for flushing and testing newly constructed lines.

Water Prices

The following prices were in effect during the year:

Ground Water	$2.00 per Cub m	($7.58 per 1000 US Galls)
Desalinated Water		
Residential, first 12 Cub m per month	$3.45 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	$3.75 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 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.

5.0 Sewerage

West Bay Beach Sewerage Project

In the early part of the March the main gravity sewer was completed, the final completed length was north of Government House (Pumping Station 9) to the northern limit of the project, the Public Beach. The construction of the lateral sewers continued until they were completed in August. Connection of properties commenced in January. The first property to be connected was GrapeTree Condominium. The final property connection was made to Caribbean Club in October.

The main pumping station, at the southern end of the drainage area on the corner of Marbel Drive was commissioned in January. The other eight lift stations along the West Bay Road and the one pumping staion in Watlers Road were commissioned as subsequent sections of the main and lateral sewers were tested and approved.

Delay to the completion of the project was caused by the contractor's unwillingness to carry out remedial work to a number of lateral lines which the Engineer could not accept. During this debacle the project manager visted the manufacturer of the pipes in the UK and the Severn Trent Water Authority to obtain their advise. The contractor engaged two of their own experts to visit and inspect the condemned work and give their opinion. Eventually the contractor did carry out remedial work and connection work recommenced after a period of approximately two months delay.

Project expenditure

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

	Expenditure in 1988	Total Expenditure upto 31Dec 1988
Land Acquisition	0.00	240,000
Civil Works, Procurement	81,679.64	1,011,129.64
Civil Works, Construction	1,407,612.65	6,671,422,65
Mechanical Plant, Procurement	91,344.15	249,674.15
Mechanical Plant, Installation	16,320.28	17,892.28
Engineering Services	110,809.71	295,109.71
Project Management	91,171.98	485,281.98
Loan Costs	277,552.70	574,092.70
Total	**2,076,493.11**	**9,544,603.11**

OPERATION

The contractor has submitted a considerable claim (>CI$7.) Million) for what he considers to be due him for alleged additional costs as a result of his understanding of the contract. The Engineer does not support their claim and has sought expert legal advice from the Hon. Attorney General, who in turn has instructed a leading UK Queens Counsel. Measures have been taken to resolve the dispute.

The sewage flows in the system are greater than 1985 estimate predicted for 1988. The peak daily flow is approximately 2,300 Cub m (600,000 Galls per day) and is in fact close to the estimated 1996 flow. It appears that several large developments which came on stream after the estimate was carried out are the main contributors to the flow. The pumping staions and sewer lines are more than adequate to accommodate the flow. At peak flow the main sewer is seldom running at more than 1/3 full. The lift stations have operated well with a small number of failures due to the electro-mechanical control system.

Sewage treatment works

The first flow arrived at the treatment works on 30th January. The ponds performed well upto the end of August , the effluent at that time had less than 10 mg/l BOD and less than 50 FC/100ml.

The sewers were inundated with sea water during the passage of hurricane Gilbert, this inundation into the treatment works appeared to completely destroy the algae present in the ponds. This resulted in the ponds becoming basically anaerobic and caused an immediate odour problem.

Natural recuperation of the ponds was impaired by the increased salinity of the incoming sewage, due in a large part to the seawater flushing carried out by the Holiday Inn and other smaller properties. This increase in salinity caused an increase in the sulphate concentration. This favoured the growth of photosynthetic sulphur bacteria, which created turbid conditions which in turn impaired the growth of the required oxygen producing algae.

It is proposed that in 1989 action is taken to mechanically aerate the ponds and to reduce the salinity of the incoming sewage by providing the Holiday Inn with a supply of treated effluent for toilet flushing.

The total quantity of sewage treated during the year was 458,900 Cub m (121,149,600 US Galls) or a daily average of 1,370 Cub m (361,641 US Galls).

The highest daily flow during the year was 3,720 Cub m (982,080 US Galls).

The condition of the effluent averaged 40 mg/l Biochemical Oxygen Demand(BOD), 75 mg/l Suspended Solids(SS) and less than 100 Fecal Coliform per 100mm. However the effluent quality is deteriorating and at year end the BOD had risen to 70 mg/l, the SS in excess of 200 mg/l and the fecal coliform in excess of 7,000 per 100 mm.

6.0 Water and Sanitation Operators

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

	1988 Licences issued	**Total number Issued to 31st Dec 88**
Apprentice	0 No	19 No
Journeyman	6 No	82 No
Master	3 No	19 No

The year saw the introduction of the first written and practical examinations for plumbers to become licenced. During the year a total of 5 Examinations were held.

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 8 occasions and comprises:-

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

7.0 United Nations.

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

Both Mr Tony Reid and Mr Bunyan Whittaker, Engineering Technician, received UN Fellowship to attend a two year Engineering Technicians Associate Degree Course at the WACO Technical College, Texas. they commenced their studies in the summer.

The computerized billing system and accounting system being designed by a UN short term consultant, funded out of project funds. The billing system has been completed and operational during the latter part of the year. The accounting system is virtually complete and will be operational in mid 1989.

The Authority continues to be provided with the services of Associate Experts, Mr Tjeerd Dykstra, completed his contract with the UN in early 1988. Mr Henrik van Genderen joined the Authority as an Associate Expert in March and commenced working on the George Town Water Supply Project. At the end of the year no replacement had been found for Mr Dykstra.

A Project terminal report was completed and it is understood that a new Project Document was to be written to extend the Project in a different form for a further two years. A draft Document was drawn up early in the year by the Special Technical Advisor UNTCDC in New York and the local project manager in Cayman. It is understood that this Document was found unacceptable by UNDP Jamacia, who after consultation agreed to rewrite the document in a form which they would find acceptable. At the end of the year no Document was forthcoming.

The local Government contributed CI$5,000 to the cost of the project in 1988.