

BARBADOS AUDIT OFFICE



Special Audit

of the

Barbados Water Authority

July 2012

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THE GOAL

The goal of the Audit Office is to promote staff development, ensure achievement and maintenance of a high standard of auditing and accounting in the public sector, and contribute to the general efficiency and effectiveness of public service financial management.



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July 25, 2012

His Honour Mr. Michael Carrington, M.P.
Speaker of the House
Parliament Building
BRIDGETOWN

Sir,

I have the honour of submitting to you for laying before the House of Assembly in accordance with Section 38 (2) and 38 (5) of the Financial Management and Audit Act, 2007 – 11, a Special Report on the Barbados Water Authority.

Yours faithfully,

Leigh E. Trotman
Auditor General

Acknowledgement and Appreciation

1. The Auditor General gratefully acknowledges the kind assistance and cooperation given to personnel of the Auditor General's Office during the conduct of this Audit by:-

- The General Manager and staff of the Barbados Water Authority

2. Sincere appreciation is also extended to the officers of the Audit Office whose efforts contributed to the successful completion of this assignment.

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Special Audit of the Barbados Water Authority

Executive Summary

The Barbados Water Authority (BWA/the Authority) is a Statutory Body established by the Barbados Water Authority Act, Cap. 274 A. It took over the functions, rights and liabilities of the former Waterworks Department and commenced operations on April 1, 1981. Its mandate is to supply the island with potable water and provide wastewater treatment and disposal services. The Authority is also responsible for the monitoring, assessment, control and protection of the water resources in the public's interest.

2. The Barbados Audit Office was requested by the Ministry of Finance to conduct a Special Audit of the Barbados Water Authority. This audit covered areas such as procurement, mains replacement, recruitment, and the Desalination Plant.

3. The BWA is a large and complex operation with a staff complement of over eight hundred (800) and an annual budget of over \$90 million. The facilities of the Authority are situated in a number of locations in the country and these include pumping stations, reservoirs and major storage centers at Bowmanston, St John and the Belle, St Michael. The administrative headquarters are currently located at Green Hill, St Michael.

Desalination Plant

4. The Audit revealed a number of issues that need to be addressed by the Authority. After twelve (12) years of the Desalination Plant's operations, the Authority does not have the capacity to receive all of the water contracted from the company which owns and operates the Plant. Provisions should have been made to receive all of the contracted water. It should also be noted that the Authority has paid over \$19 million

in standby charges for water contracted but for which it did not have the capacity to receive.

The Comments of the BWA

The plan was not to receive all the water from inception, but to provide a reserve capacity that would be utilised as demand arose out of the many projects that had been submitted for approval to the Town and Country Development Planning Office and to reduce the level of over pumping that was occurring at the Belle Pumping Station which could have resulted in loss of supply due to saltwater intrusion.

5. It was envisaged that the plant would have been providing potable water from water with a higher salt content. However, the water supplied is mainly from water with a low salt content. To derive potable water from this source is less costly. There was no evidence that relevant investigations were conducted to determine the salinity of the water to be processed. This would have resulted in a lower price being paid for the water supplied.

6. The amount of Total Dissolved Solids (TDS) found in the water and a related electricity factor are components in determining the costs of water to the Authority. It would appear that both of these factors were overstated when the formula for the price of water was determined. This resulted in the Authority paying significantly more for water than was necessary. In July 2008 Ionics unilaterally reduced the electricity factor used to compute production cost resulting in cost savings of \$70,966.00 for that single month.

7. No evidence was provided that the Authority undertook any analysis of the financial arrangement surrounding this project (such as the reasonableness of the rate of return paid to Ionics), or explored other financial models for the construction of the plant. These steps should have been pursued given the novelty of the Public- private partnership agreement and the high rate of return (**18%**) paid to the company.

8. The introduction of desalinated water appears to be good for the Country with the Plant producing the amount of water the BWA can accommodate and at an acceptable quality. The Authority's personnel however need to be familiar with the operations of the Plant in case the option to acquire it is exercised. It also needs to ensure that the capacity is there to receive and distribute all of the water supplied. If the aim is to reduce over-pumping at the Belle as stated by the BWA then utilizing more of the Plant's capacity would assist in reaching this goal.

Procurement

9. Information on the procurement activities of the Authority was not adequately documented as no Contracts Register was kept.

10. Non-adherence to its procurement policies resulted in substantial losses to the Authority. This was evidenced in contracts awarded to two (2) United States based firms. Orders for substantial amounts were placed with these companies without the performance of adequate due diligence. As a result goods and services costing over \$700,000.00 were paid for but not delivered.

11. There was poor inventory management as evidenced by inadequate record keeping, long delays in receiving requested items, and unfavourable conditions under which materials were stored. This has led to stock-outs, delays in repairs and low productivity of workers.

Mains Replacement

12. The replacement of mains on a timely basis has been a major challenge for the Authority. Some of the mains are in excess of one hundred (100) years old and there are frequent bursts and high loss of water due to undetected leaks. This water loss has been estimated between 26.6% and 60% by some studies.

13. Mains are usually replaced based on the frequency of bursts in a particular area, discolouration of the water and their age. A more proactive approach

needs to be taken to tackle this problem and this would include increased use of leak detection equipment and the systematic replacement of the oldest and most problematic mains. Funding has been sourced to assist with the replacement of mains and it is hoped that this long standing issue can be addressed more efficiently.

14. In an effort to increase the volume of water supplied to the north of the island a new main was laid along the west coast. This project commenced in January 2005 but the main has not been commissioned because a number of leaks were detected after it was installed.

15. The BWA and the contractor responsible have been performing some remedial work in order to render this main fit for use. This project was not properly managed and there was no evidence that various sections of the main were tested at the required times. A review of the contract document suggests that there was some ambiguity around the responsibility for testing. The absence of this main has thwarted the Authority's ability to increase the supply of water to the north of the country.

Projects

16. The Authority is currently engaged in a number of capital projects and these include the West Coast Sewerage Project, New Barbados Water Authority Office Complex, Water and Sanitation Systems Upgrade, Ground Water Protection Zoning Policy and System, Belle Water Quality Improvements (Reverse Osmosis) Project and the Septage Handling Facility.

17. One of these projects, the West Coast Sewerage Project has been in the planning stages for over fifteen (15) years, and the estimated costs are rising to levels that will be difficult for the BWA to finance in the future. This project commenced in 1995 and at March 2011 was estimated to cost \$600 million.

18. The Water and Sanitation Systems Upgrade Project had been approved and financing was available, but the Authority was unable to fulfill the conditions set by the lending agencies in a timely manner.

19. Generally the lack of funding has plagued the implementation of some projects.

Recruitment

20. The Authority currently employs around eight hundred (800) workers with an annual payroll of approximately \$38 million. An area of concern was the absence of transparency within certain aspects of the recruitment process. There was evidence that some posts were advertised. However, it wasn't clear which posts should have been advertised, nor was any documentary evidence provided as proof that interviews were conducted.

21. The new recruits were given a specific period of employment; however, some of these officers continued to be paid beyond the specified periods, without the issuing of letters extending their employment.

Customer Service Issues

22. The Authority has a Customer Service Centre which receives over two thousand (2,000) calls a month. The majority of these calls are related to accounts balances but a significant number is in respect of burst mains. Complaints are either addressed by the officers in the Customer Service Centre or referred to other Departments.

23. Our audit examined a sample of one hundred and sixty-five (165) records to ascertain whether the complaints for burst mains were resolved within the time frame of two (2) days, the target set by the Authority. Of the sample examined, information on ninety-one (91) records was entered in the computerized system after the mains were repaired. Entering the information after the fact limits BWA's ability to monitor the outstanding reports and assess the efficiency of this aspect of its operations. Our audit found that the target set was not always achieved.

CHAPTER 1

Introduction

The Primary Objectives of the Authority

The Barbados Water Authority is a Statutory Body established by the Barbados Water Authority Act, Cap. 274 A. It took over the functions, rights and liabilities of the Waterworks Department and commenced operations on April 1, 1981. The BWA's mandate is to supply the island with potable water and provide wastewater treatment and disposal services. The BWA is also responsible for the monitoring, control and protection of the water resources in the public's interest.

Audit Objectives

1.2 Our audit assessed the effectiveness of a number of aspects of the BWA's operations, including the procurement of goods and services, mains replacement, recruitment and the financial and administrative arrangements relating to the Desalination Plant.

Audit Scope

1.3 The audit covered the period from April 1, 2008 to March 31, 2011. In addition, historical data from 1998 was analyzed. The operations of the Desalination Plant, which is not managed by the Authority, were not reviewed.

Reasons for the Audit

1.4 The audit was conducted as a result of a request from the Ministry of Finance for a Special Audit of the Authority.

Methodology

1.5 Interviews were conducted with the General Manager and section heads of the Authority. Applicable files, reports and accounting information were reviewed and a site visit was carried out at the Desalination Plant.

1.6 The audit was conducted in accordance with Section 113 (2A) of the Constitution of Barbados, which empowers the Auditor General to carry out examinations into how Statutory Authorities and Government controlled entities use their resources in discharging their functions as regards the efficiency and effectiveness of the use of those resources.

CHAPTER 2

The Reverse Osmosis Desalination Facility



Background Information

In 1998, the Barbados Water Authority entered into a Build-Own-Operate (BOO) Agreement with Ionics Incorporated, a United States based company with an affiliate in Barbados, Ionics Freshwater Ltd. The agreement was for the construction of a Reverse Osmosis Desalination Facility at Spring Garden, St. Michael to:

- help augment the ground water reserves;
- prevent water shortage;

- reduce pumping from the Belle and other sources which have been systematically over-pumped;
- reduce the pace of the deteriorating water quality; and
- ensure that consumers are supplied with enough water to at least satisfy their basic needs

2.2 The Authority was required to supply the land on which the plant is sited, along with ancillary works for the distribution of the desalinated water. Ionics Incorporated was required to construct, operate and maintain the plant, and guarantee to the Authority a supply of 27,000 cubic meters of desalinated water daily over a fifteen (15) year period. The plant was also built with a reserve capacity of 3,000 cubic meters.

2.3 The Desalination Plant was constructed at a cost of \$24,180,888. In addition, funds were expended on external system modifications for the effective introduction of desalinated water into the distribution system. The Plant was commissioned on February 15, 2000.

2.4 The Desalination Plant extracts brackish water from wells and processes it using the Reverse Osmosis process. Brackish water contains a low salt content and the Reverse Osmosis process produces fresh water from the brackish water. This water is transferred to a BWA reservoir for distribution.

AUDIT FINDINGS

Production and Standby Charges

2.5 Since inception, the Desalination Plant has not supplied the 27,000 cubic meters of water per day as stated in the Agreement. One of the reasons is that the Authority does not have the capacity to receive this contracted amount.

2.6 This impacts on the payments the Authority makes to Ionics for water since the Authority not only pays for the water supplied, it also pays a standby charge

for the water not delivered under the contract. The charge for production is computed on the basis of a production cost for each cubic meter of water supplied. This cost, which fluctuates in response to a number of factors, was approximately \$1.50 per cubic meter at the time of the audit, while the rate for the standby charge was approximately seventy-five cents (\$0.75) per cubic meter. In 2008, the average output of the Plant was increased to 20,000, a shortfall of 7,000 cubic meters of the contracted amount. Using this production rate of 20,000 cubic meters, the projected standby charges over the past ten (10) years would be approximately \$19 million (\$1.9 million a year).

- 2.7 The Plant was never run at full capacity. Therefore, it is not known whether the facility can be sustained over the long term or under drought conditions.

The Comments of the BWA

In these sections the Audit report states that the BWA's infrastructural capacity was insufficient to accept the total volume of the desalination plant output. This is only partially true in that the additional demand needed to utilize the total plant capacity was not there. The desalination plant was put into production, (half capacity of 13,500 cu-m per day), on the 15 February, 2000 at a time when the BWA was just about meeting all of the demands placed on it by its customers. This extra production into our distribution system was absorbed by the matching reduction in output from the Belle P.S. [Pumping Station] which had been producing above its recommended level for a considerable period of time. This level was determined by recognizing the following:

- (a) There was the need to reduce the output of the Belle P.S. to its safe yield limit of approximately 9.0 mgd.*
- (b) There was also an economic consideration since accepting more desalinated water than was necessary, drove up the overall cost of production. (The unit cost of desalinated water*

is more expensive than the unit cost of water from conventional sources.)

In addition, the balance point of these two considerations was determined when it was realized that the cost of production from the Belle P.S., plus the penalty for not taking all of the desalination production, was less than the overall cost of production from the desalination plant. This consideration and demand determined the level of production of the desalination plant and not the infrastructure as is suggested by the audit report. The BWA could have lost much more than the \$1.9M per year had the decision been taken to accept the full plant production while shutting down the less expensive conventional sources. Granted the additional infrastructure (installation of west coast main) should have been completed and ready to deliver water ahead of the new demands.

Audit Comment

2.8 The BWA was requested to provide information on the cost of producing water at the Belle but this information was not provided. As a result, the Audit Office could not verify that the cost of production from the Belle P.S., plus the penalty for not taking all of the desalination production, was less than the overall cost of production from the desalination plant.

Feed Water Analysis

2.9 The Total Dissolved Solids (TDS) are the total amount of all solids that are dissolved in a given volume of water. The TDS level in the water supply influences the cost of producing potable water, with higher TDS levels resulting in higher costs and vice versa. For Reverse Osmosis Plants, a TDS level below 10,000 milligrams per litre (mg/L) or parts per million is an attractive medium and is less costly to treat.

2.10 In the Agreement with Ionics, the feed water TDS was estimated between 1,000 and 10,000 mg/L. However, in our review of data for the period April 1, 2008 to March 31, 2011 the average TDS exceeded 1,000 mg/L on only one occasion.

2.11 This brings into question whether adequate testing of the TDS in the supplying wells was conducted prior to entering the Agreement with Ionics. No documentation was presented for audit inspection indicating that a thorough analysis was done on the TDS in the feed water used by the Desalination Plant. Such analysis could have resulted in the Authority paying considerably less for the water supplied, as more favourable terms could have been negotiated.

Electricity Costs

2.12 Included in the production cost is a unit cost for electricity usage which includes an electricity factor. This approach is used instead of simply passing on the price charged by the Barbados Light and Power Co. Ltd (BL&P). Electricity usage depends on the quantity of TDS in the water being processed, in that, higher levels require greater electricity usage, and vice versa. The electricity factor was previously estimated at 1.111 kilowatt hour per cubic metre (kwh/m³) of water produced.

2.13 In July 2008, Ionics reduced the electricity factor to 0.94kwh/m³ through the introduction of a sliding scale, resulting in substantial savings for the Authority. See Table 1 below.

Table 1: Sliding Scale Electricity Factor

Feed Water TDS (mg/l)	Electricity Factor kwh/m ³ Product Water Produced
4000-5000	1.111
3000-4000	1.04
2000-3000	0.099
Under 2000	0.94

Source: Barbados Water Authority

2.14 The example below, which relates only to July 2008, highlights the type of savings accruing to the Authority as a consequence of the reduction of the electricity factor.

Table 2: Savings at July 2008 using the lower electricity factor proposed by Ionics

Water charges for the month of July 2008:

Electricity Factor	Amount Charged
1.111 kWh/m ³	\$1,187,968.04
0.94 kWh/m ³	\$1,117,001.87
Savings at July 2008	\$70,966.17

Source: Barbados Water Authority

2.15 Notwithstanding this reduction in costs, evidence from the March 2010 invoice indicates that it is still possible for the Authority to pay more to Ionics for electricity than what is charged by BL&P. The electricity component of this invoice was \$290,404.55, whereas the amount on the electricity bill used to calculate the cost per kilowatt hour was \$172,041.85 (VAT exclusive), a difference of \$118,362.70.

Audit Comment

2.16 The amount of TDS found in the water and the electricity factor are components in determining the costs of water to the Authority. It would appear that both of these factors were overstated when the formula for the price of water was determined. This resulted in the Authority paying significantly more for water than was necessary. It also indicates that a more equitable pricing structure for the reimbursement of electricity charges should be arranged.

It should be noted that it was Ionics who volunteered to reduce the electricity factor and hence the amount charged for the supply of water. If the rates were reduced earlier, savings would have been considerable.

Desalination Plant Financial Arrangements

2.17 No evidence was provided that the Authority either undertook any analysis of the financial arrangement surrounding this project (such as the reasonableness of the rate of return paid to Ionics), or explored other financial models for the construction of the plant. These steps should have been pursued given the novelty of the Build–Own–Operate Agreement and the **18%** rate of return paid to the company.

The Desalination Plant Administrative Arrangements

2.18 In accordance with the Agreement, an Engineer from the BWA was stationed at the Desalination Plant from March to September 2000 to monitor and observe operations. However, no officer from the BWA has been stationed there since. Currently, Ionics provides the BWA with monthly maintenance and production reports.

Audit Comment

2.19 In light of the foregoing, officers of the BWA are not gaining enough knowledge about the procedures required for the operations and maintenance of the Plant. This would be a cause of significant problems if the Authority exercised its option to acquire the Plant since it would not have officers who are familiar with its operations.

Infrastructure

2.20 At the inception of the Plant, St. Stephens, Grand View, Cave Hill-Hanson, Lodge Hill, Shop Hill-Warleigh, Orange Hill and Apes Hill areas were earmarked to receive the desalinated water.

2.21 The BWA also recognized that an increase demand for water in the north was imminent due to economic development as well as the need to improve the level of

service to its existing customers. Hence, in 2004, the 16 inch West Coast Main Project was commenced for the purpose of taking desalinated water to the north of the island. This main is not functioning due to the failure of pressure tests. This problem has hindered the Authority's ability to distribute the contracted capacity of desalinated water.

The comments of the BWA

The Audit report states that the non-functioning of the West Coast Main "hindered the Authority's ability to distribute the contracted capacity of desalinated water". As stated above this would have been true if the additional projected water demands in the north had arisen. The major demands anticipated from the Apes Hill, Lancaster, Lakes, and Bucassa Development projects have taken a considerable time to materialize. These projects which were together grouped under the Northern Upgrades Limited (NUL), a company formed to look after the interests of these four (4) large developers, left the BWA "literally holding the bag". The Bucassa and Lancaster Developments projects have ground to a halt or are very slow in coming.

Water Tariff Meter

2.22 Ionics and the Authority both maintain water meters at the Plant. However, it is the Authority's meter which is used as the Water Tariff Meter. The Water Supply Agreement stipulates that the Water Tariff Meter shall be calibrated no less than once every six months or as often as is necessary to maintain its accuracy. These meters are not being calibrated.

2.23 In October 2009, Ionics' water meter's average deviation was recorded as 14.6% higher than that of the BWA's meter. At March 31, 2010 the Ionics meter deviation recordings were (17%) percent higher than those of the BWA water meter. These differences highlight the need for BWA's meter to be calibrated as this would ensure accurate readings.

2.24 The possibility therefore exists that the Authority's calculations could be based on inaccurate figures.

The comments of the BWA

The frequency of calibration mentioned in the contract did not take into account the type of meter to be used. The six month interval is necessary for meters with moving parts. The meters installed are electromagnetic meters with no moving parts which tend to retain their accuracy over their lifespan.

The BWA will seek to have both meters replaced and checked for accuracy as soon as possible.

Water Quality

2.25 Prior to May 2010, there were no inspections of the Plant. Currently, the BWA is in the process of developing a protocol to address inspections. Nevertheless, from commencement of the Plant's operations, the quality of the desalinated water has been monitored by a Water Quality Technologist. The Government Analytical Services Laboratory tested the water to ensure the water is in compliance with the World Health Organization (WHO) Water Quality Standards. The water quality is in compliance with WHO standards which is commendable.

Attempt to Purchase the Plant

2.26 The Water Supply Agreement stipulates the price at which the Authority could purchase the plant at any time during the fifteen (15) year life of the Agreement.

2.27 In 2005, the option to purchase the Plant and take possession of the facility was considered. At the point of option to purchase, the Authority discovered that the Plant could only be purchased in the event Ionics or the Authority is placed in the following situations:

- Provisional or final liquidation or under judicial management;
- Material default;

- Ionics failure to deliver satisfactory desalinated water for a period of thirty (30) consecutive days;
- Ionics failure to provide at least two million four hundred and thirty thousand (2,430,000) cubic meters during any period of one hundred and eighty (180) consecutive days; and
- Ionics failure to meet the guaranteed quantity for a total of ninety (90) days in any period of one hundred and eighty (180) consecutive days inter alia.

None of these conditions existed and, as a result, the BWA was unable to purchase the facility.

Future of the Plant

2.28 Plans are in place to put in additional mains to distribute water from the Desalination Plant. The Authority has indicated that the water will be distributed to areas currently fed from the Belle Pumping Station as well as the Christ Church dome and the St. Philip area.

2.29 The Authority is currently reviewing three (3) options for the management of the Desalination Plant at the end of the agreement:

- BWA takeover of the ownership, operation and maintenance of the Plant;
- BWA takeover of ownership of the Plant and contracting out its operation and maintenance to Ionics or any other interested and capable party; and
- Negotiation of a new contract with Ionics.

2.30 The most advantageous option has not been worked out to date. Amendments to the Agreement can only be varied by mutual agreement between Ionics

and the Authority. This is a stipulation of the present agreement that is legally binding until February 2015 when the Plant will become the property of the Authority.

Conclusion

2.31 Considerable amounts have been paid for water under the agreement without the BWA having the capacity to receive it. This is in part due to the absence of the necessary infrastructure for distribution of the desalinated water.

2.32 No evidence was provided that the Authority conducted the necessary financial analysis to determine whether the **18%** rate of return received by Ionics was good value for money. This is an unusually high rate.

2.33 It is recommended that:-

- **The West Coast Main is made functional to allow the desalinated water to be distributed to the north;**
- **The Desalination Plant is run at its full capacity during the dry season to verify its sustainability over the long haul; and**
- **BWA develops a protocol for inspections that describes each party's responsibilities and provides a format to demonstrate compliance.**

The comments of the BWA

The BWA concurs with the recommendations and are making the necessary arrangements to fulfill them.

CHAPTER 3

Contracting and Procurement Activities

Background

The procurement function at the Barbados Water Authority covers all the business associated with purchasing. This process is accomplished in four basic steps, namely, Requisitioning, Sourcing, Issuing of Purchase Orders and Receipting of goods.

Audit Objectives

3.2 The audit objectives for reviewing procurement were to assess:

- Whether the system of controls over the procurement activities and processes are being administered with due diligence and are compliant with pertinent policies and procedures; and
- Whether goods are recorded when received and issued, and balances on inventory are maintained.

3.3 An audit of the procurement documents and contracts issued for the period April 1, 2008 to March 31, 2011 revealed that the BWA made over five thousand (5,000) purchases during this period.

Procurement Practices

3.4 The Procurement Unit coordinates the purchasing of supplies, materials, equipment and services for all departments. These responsibilities are carried out in accordance with the Financial Administration and Audit Rules, 1971 and Financial Directives of the Authority.

3.5 The Procurement Unit administers all formal contracts and acts as the Authority's liaison with vendors, and provides oversight and assurance that all projects are tendered, awarded and completed by applying the best contract methods and procedures.

AUDIT FINDINGS

Monitoring of Contracting, Administration and Reporting Procedures

3.6 Processes should be in place to ensure that purchasing/contracting practices comply with policy requirements. The following deficiencies were however observed:-

- The AS400 computerized inventory management system has the ability to set minimum and maximum stock levels and reorder points. The stock levels and reorder points were however not established;
- The Authority does not maintain a Contract Register as required.

The comments of the BWA

Bullet 1: The minimum, maximum and reorder points have been set in the AS400, However, because the inventory levels are not current, these reorder points cannot be relied on.

Bullet 2: The Authority will implement the use of a contract Register with immediate effect.

In view of the great difficulties experienced in this Section, the Authority has advertised for a position of Director of Procurement who will be required to review the procedures, guidelines and controls currently in place and make recommendations for improving them.

Audit Comment

3.7 It is apparent that aspects of the procurement functions are not being effectively discharged. Considerable expenditure is incurred in the purchasing process and the Authority needs to ensure that adequate systems are in place and are adhered to.

The comments of the BWA

It is agreed that some of the procurement functions are not being effectively discharged and to this end a proposal has been put forward to strengthen the department with additional purchasing officers, and automation. This will allow the Procurement Manager to fully assume the management responsibilities.

Payments for Study Tour

3.8 Approval was granted for BWA personnel to participate in a Utilities Best Practice United Kingdom Study Tour from July 10 - 17, 2010. A company was paid a total of \$31,500 for coordinating and facilitating the Tour. Tickets valued at \$10,708.03 were also purchased from a travel agency. At the time of the review there was no evidence provided to show that the tour took place or that these funds were ever recovered.

The comments of the BWA

With immediate effect, the Human Resources Department will follow-up on this matter.

Anomalies in the Issuing of Contracts

3.9 There were a number of anomalies in relation to the issuance of contracts as follows:-

- (i) Payments for compressor and PVC pipes

3.10 In April 2009, a directive was issued requiring that all contracts totaling \$20,000 or more should be submitted to the Ministry for approval. This directive was not adhered in an order made by the then Procurement Consultant from a United States based firm. The goods were subsequently authorized by the Executive Chairman. It should be noted that these goods ordered were paid for but not delivered. These goods are outlined in **Table 3** below:

Table 3: Goods Ordered from firm

Purchase Order No.	Purchase Order Date	Amount US \$	Date Payment Approved	Goods Purchased	Goods Received to Date
11-09770	June 3, 2010	45,000.90	August 5, 2010	10 Hazmat Suits	None
11-10032	August 6, 2010	26,320.00	August 11, 2010	3/4 & 1/2 Poly Blue	None
11-09936	May 31, 2010	16,415.00	August 5, 2010	140 PVC Pipe	None
11-09773	Not seen	61,200.00	June 16, 2010	400 PVC Pipe	None
04-03649	July 13, 2010	49,000.00	August 11, 2010	Compressor	None
11-09867	June 23, 2010	5,629.20	August 11, 2010	Computer/Projector	None
04-03611	May 11, 2010	23,430.00	June 10, 2010	Pneumatic Hammer	None
	Total (U.S.)	226,995.10			
	Total (Bds.)	462,786.26			

Created by: Barbados Audit Office

The comments of the BWA

The two companies were engaged by the Executive Chairman. The Procurement Department, in some instances did not have the opportunity to follow the procurement procedures to the letter and felt duty bound to follow the instructions given.

3.11 It is the policy of the Authority that prepayment of one hundred (100%) percent for goods is prohibited. However, this firm was prepaid US\$226,995.10, the full payment for the goods ordered.

3.12 No due diligence was conducted on this firm which is based in the USA. The Authority made several payments over the period June to August 2010 even though

there were no deliveries for previous orders. At the time of audit none of the goods purchased were received.

3.13 Other anomalies in respect of orders made to this company were as follows:-

- a. On quotation 1027916 dated June 11, 2010 the company quoted for the supply of goods at a cost of BDS\$61,200. However, the payment was made for US\$61,200.
- b. A sum of \$2,327.08 was paid for brokerage services with respect to goods ordered from this company. No Receiving Report was seen supporting the delivery neither did the invoice state that the goods were cleared.

The comments of the BWA

It is the practice for companies established in countries outside of Barbados to invoice the Authority in the currency of the country. [This company] was established in the United States. It was erroneously assumed that they had invoiced the BWA in US dollars and the system was set up to convert their invoices to the US equivalent. When it was found that [the company] had invoiced the BWA in Barbados dollars instead of US dollars, the BWA immediately sought to correct the problem and contacted the [company] to obtain a refund.

(ii) Payments for Ball Valves and Bulk Meters

3.14 A company was introduced to BWA's General Manager via an Internal Memorandum dated May 10, 2010 by the Executive Chairman. Goods and materials were ordered from this firm. These goods were authorized by the Executive Chairman and ordered by the Procurement Consultant. The majority of the goods paid for were not received.

3.15 Goods ordered from this company included the following:

Table 4:

Purchase Order No.	Purchase Order Date	Amount (US) \$	Date Payment Approved	Goods Purchased	Goods Received to Date
11-09762	May 31, 2010	36,150.00	June 9, 2010	1,500 3/4 Ball Valves	None
11-09763	May 31, 2010	7,550.00	June 9, 2010	500 1/2 Ball Valves	100
11-09870	June 23, 2010	28,275.00	July 15, 2010	2,500 3/4 Brass Adaptors	100
11-09634	April 19, 2010	100,231.79	May 3, 2010	Bulk Meters	None
	Total (U.S.)	172,206.79			
	Total (Bds.)	351,086.59			

Created by: Barbados Audit Office

Audit Comment

3.16 Multiple payments to the two firms resulted in significant wastage of Government funds. Those responsible for the breaches of the established procurement policy should be held accountable.

(iii) Contract for water meters

3.17 A company was awarded the Water Meter contract totaling \$899,171.60. No written contract was presented for audit inspection as requested.

The comments of the BWA

It is the practice of the BWA to prepare a contract after the awarding of a tender.

Other Procurement Issues

3.18 Among the Authority's core business functions are the installation of services, and domestic and commercial plumbing repairs.

3.19 The data for purchases showed that one hundred (100) half inch ($\frac{1}{2}$ ") and one hundred (100) three quarter inch ($\frac{3}{4}$ ") brass stopcocks were bought for the period April 1st. 2010 to March 31st. 2011. These small fittings are used mainly in conducting the core business function. Amounts bought are out of line with activity since approximately fifteen hundred (1,500) services are required annually. This action would have contributed to material shortages and delays in completing tasks.

3.20 The following deficiencies were observed in respect of inventory management:-

- (i) Contract files were not documented in such a way that all decisions, approvals and justifications are clearly evidenced.
- (ii) Potable water pipes are sourced and stored at the Belle without protective end cap plugs or wrappings in the open environment. When these pipes are exposed to the elements, they lose their colour and the interior becomes brittle and disintegrates.
- (iii) Adequate levels of materials were not always kept in stock for the daily functioning of work crews.
- (iv) Purchase Requisitions and Local Purchase Orders in a number of instances were not prepared prior to the placing of orders.
- (v) There is no stores ledger showing continuous balances for each item in stock. No proper records on the issuance of materials are documented by the storekeeper.
- (vi) The two inch and four inch water meters currently in stock carry an extra lip and do not meet specification. The extra lip has to be cut off to facilitate meter installation. These meters are transported to BWA's Workshop at Bowmanston for the extra lip to be cut off. This is an additional cost to the Authority that could be avoided by the purchase of meters without the lip.

- (vii) Materials are ordered when stocks are depleted resulting in long waiting times.
- (viii) Pricing errors were acknowledged in the inventory system. The pricing errors were so prevalent that no reliance could be placed on the unit cost information. For the financial year 2011 inventory valuations could not be verified by the Authority's auditors.
- (ix) At Bowmanston, the storekeeper is not connected to the AS400 system and the inventory record is not up-to-date.
- (x) Containers used at the Belle for storage are not properly maintained. They have no ventilation and are extremely hot and stuffy. Material was stored in an unorganized manner; that is, stacked on the floor, placed loose on shelves, and stored in opened areas.
- (xi) Plumbing materials issued from the main warehouse are recorded as a transfer of stock. Materials are recorded as deductions when the plumber submits the job card showing materials used. These cards are not submitted on a timely basis. As a result, the inventory management system was not capturing inventory levels on a real time basis, making it impossible to determine stock levels. Job cards from 2009 were reaching the inventory section for processing in 2011.
- (xii) Generally, at the Belle, inventory is not adequately safeguarded, and access to stores is not restricted. There is a security guard stationed at the Belle. However, the vast area of the Belle cannot be adequately policed by one guard.

Audit Comment

3.21 The inability of the Authority to provide materials for the operational staff on a timely basis has led to stock-outs, loss of productivity and revenue, delays in completion of jobs and poor customer service.

3.22 When purchase orders are consistently done after the fact, the controls over this process are circumvented. Additionally, the monthly budget reports may not be accurate because all obligations are not accounted for.

3.23 The fact that the bulk of the materials are often bought during the second half of the year raises the question about the appropriateness of the timing of these purchases. This impacted negatively on the BWA's operational efficiency.

3.24 Materials procured that do not meet the BWA specifications are often sent to Bowmanston for machining. This impacts on efficiency of operations since this is a waste of time and money.

The comments of the BWA

Inventory management has suffered significantly from the unavailability of the knowledge and experience of a senior staff member who was with the Authority in excess 20 years. The dislocation of the procurement staff negatively impacted their morale and productivity. Further, other factors have compounded the inefficiencies such as:

- Lack of computerization at the warehouses.*
- Poor warehouse facilities.*

3.25 It is recommended that:-

- Management takes the necessary steps to ensure it is getting the best value for money in respect of its purchases. This includes**

having an effective Tenders Committee and ensuring rules and guidelines are adhered to.

- Adequate records are kept of procurement activity and adequate due diligence is performed on suppliers, especially those from overseas. This would reduce the risk of loss or misappropriation of stock.
- The Authority stores its materials in a facility to adequately protect materials from the elements. At the same time, arrange the pipes according to size to facilitate quick and easy count and accessibility.
- The materials for meter installations are standardized.

The comments of the BWA

The Authority agrees with the recommendations. There are documented policies and procedures in place that govern procurement and inventory management. The Authority will put systems in place to reinforce compliance with the procedures through annual refresher courses and orientation sessions.

CHAPTER 4

Replacement of Mains

Introduction

Central to the Barbados Water Authority's objective of supplying water to the residents of Barbados, is its ability to transport water from the various reservoirs and springs to the users. This is carried out through numerous mains/pipes laid across the country. It is estimated that approximately 1600 miles (2500 km) of pipes are to be found within the system. Some of these mains have been in existence for many years. The main from the springs in Newcastle, St. John was laid in the 1850s and it is still in operation.

4.2 BWA personnel indicated that mains have deteriorated because of a number of factors including age and the type of soil in which they were laid, and that some were eroded from within by the water because they were not lined.

4.3 Studies over the last twenty (20) years have indicated that a high percentage of water is lost within the mains system before reaching the customers. The "Water Resources Management and Water Loss Study" conducted by Klohn-Crippen Consultants Ltd estimated leakage to be 60%. This study was conducted in the late 1990s and was issued in January 2000. Another study conducted in 2000 by W S Atkins estimated the level of water loss to be 26.6%.

The comments of the BWA

For completeness, it should be noted that Management was of the view that the UFW in the Klohn-Crippen Study of 60% was too high because it had in a high level of error since close to 70% of domestic consumption estimated was still on fixed rates and unmetered. It should also be noted that UFW includes that water which is lost by way of leaks on the customers' premises, that due to under-registration of the metering devices as well as stolen and is not just

leakage from the mains. WS Atkins employed a different methodology for UFW from that used by Klohn-Crippen which partially accounts for the difference in the levels of UFW determined.

4.4 In 2004, BWA stated that there was significant leakage in the existing network. It was also stated that the mains are old and losing as much as 40 to 50% of the water that is injected into them. The result of these studies and BWA's own admission showed the importance of replacing those mains that are contributing to the loss of water.

4.5 It has been stated that desalinated water causes degradation to the existing cast iron mains resulting in discolouration of the water. This is another reason why the replacement of mains is important if this water is to be fully utilized.

The comments of the BWA

Desalinated water when it does not meet certain water quality requirements (such as Langrier's Index) has been said to have the potential to have negative impacts on unlined iron pipes which can result in water discolouration, but there is no evidence to suggest that the water coming from the desalination facility is in breach of the water quality requirements which form a part of the Water Sales Agreement. Much of the noted discolouration comes from unlined pipes and stagnation at dead ends.

4.6 The Distribution Department is responsible for maintaining the mains and executing repairs to these mains. However, mains replacement is the responsibility of the Capital Works Unit (CWU). These departments working together prioritise the mains to be replaced, determine their exact location and the lengths to be replaced.

4.7 Between the period April 2007 to March 2010, expenditure incurred by BWA for replacing and installing new mains varied from \$7.5 million to \$9 million annually.

AUDIT FINDINGS

Policy for Replacing Mains

4.8 There are standards for the manufacture of pipes to be used in potable water systems. The life expectancy based on the standard used by the manufacturer is a criterion that could be used to determine the replacement of mains. The BWA however, selects mains for replacement based on the frequency of bursts, discolouration of the water and age.

Audit Comment

4.9 There is a policy for replacing mains which relies on there being problems with the main before it is replaced. The other option would be replacing the main at the end of its life expectancy which would be a more proactive policy to follow. The Authority is not in a position to follow this policy at this time but it has to strategise on the best way forward.

Constraints to Replacing Mains

4.10 BWA was unable to replace all of the mains listed for replacement in the budgets for the years 2007 to 2010. BWA's personnel identified three (3) factors as constraints to the execution of its mains replacement programme. These were finances, late arrival of material and the methods of excavation.

4.11 BWA indicated that finances were a major constraint in the past. However, this is likely to be alleviated since there is provision for mains replacement under a US\$50 million loan from the Inter-American Development Bank (IDB). The Authority has also been seeking finances to execute a BDS\$60 million mains replacement programme. In this regard, the negotiations with a financial institution are now being finalized. It should be noted that some of the funds from this loan are being earmarked for activities other than mains replacement.

4.12 Personnel complained that although the material budget is submitted at the beginning of the financial year, materials arrive in the middle of the year, thus delaying the replacement of mains. Our audit found that at October 31, 2011, BWA had not placed the order for the materials for the financial year which commenced in April 2011.

4.13 Jackhammers and compressors are the main method used for excavation by the BWA. Personnel within BWA indicated that this method was slow and time consuming. A better method would be to use excavators.

4.14 In a document prepared for the Board it was recommended that the authority acquire two (2) excavators and a trencher. This paper provided a comparison between the excavation rates of private contractors and the BWA. The comparison showed that the private contractors were achieving excavation rates of twice or three times those of the Authority. BWA is currently evaluating tenders to acquire excavating equipment.

4.15 The General Manager stated that in past years there has been an emphasis on expansion of services and, as a result, mains rehabilitation would have suffered.

Audit Comment

4.16 Although funds are being acquired for mains replacement, some of it has already been earmarked for other activities. The potential for replacing a larger segment of mains could be affected.

4.17 Efforts should be made to acquire materials in a timely manner and utilize equipment that provides greater efficiency in excavation. BWA has commenced the process for acquiring equipment that would improve its excavation rates. This can have a beneficial impact on the efficiency of its operations, including reducing water loss through leaking mains.

The comments of the BWA

It is clearly understood that mains replacement has to be a major component of the BWA's programme. However, it cannot be done in isolation. To this end some of the funds sourced will be used to improve other areas such as restructuring of the organization, improving customer, procurement and training. The mains replacement programme is however earmarked to benefit from several sources of funding (IDB, CDB, and CITICORP).

Detecting Leaks

4.18 There is available specialized equipment for the detection of leaks in water mains. BWA has some of this equipment but its personnel indicated that the quantity available was insufficient given the size of the mains network. This specialized equipment is valuable in detecting leaks that do not surface. Currently, BWA is alerted to leaks on its mains mainly from information provided by the public. This happens when the water from the leaking main comes to the surface.

4.19 BWA personnel indicated that leak detection activity is only conducted when there are problems such as low water levels and complaints by the public of low water pressure. The reason given for this is the lack of equipment and manpower. Personnel are of the view that the equipment should be permanently attached to the mains. However, because BWA is not in possession of sufficient quantities of this specialized equipment, it has to be moved to various locations when necessary.

4.20 BWA relies mainly on the public to alert it of leaks when the evidence of the leak comes to the surface. This method is not the most effective means of detecting leaks, since some leaks may not surface in a timely manner and others may not surface at all.

4.21 BWA conducts leak detection on a limited scale and there is no programme for conducting continuous leak detection. The importance of active leak detection or control has been highlighted in two (2) studies conducted in the late 1990s.

One of these reports prepared by WS Atkins states: “The porous nature of the geology of Barbados means that many leaks and bursts will never be visible on the surface, therefore active leakage control is essential to reduce leakage levels in Barbados”. BWA needs to be proactive in its leak detection activity especially in view of the age of its mains infrastructure.

Plans for Replacing Mains

4.22 The Government of Barbados has signed a loan with the IDB for US \$50 million for a “Water and Sanitation Systems Upgrade Project”. Its general objective is to improve water resources management in Barbados. Included in the Project is the first phase of a multi-phased mains replacement project.

4.23 In addition, a five (5) year mains replacement programme was developed in 2008. This programme envisaged replacing approximately 500,000 feet of mains of various sizes. BWA sought financing to execute this programme and is currently finalising a BDS \$60 million loan from a financial institution.

4.24 A letter received from the Ministry of Agriculture, Food, Fisheries and Water Resource Management outlined the Ministry’s intentions for the use of this loan. The replacement of mains, however, is not listed among the focus areas for the use of the proceeds of the loan.

The comments of the BWA

Subsequent to the letter received from the Ministry of Agriculture, Food, Fisheries and Water Resources Management, approval has been granted to use some of the loan financing on mains replacement.

Unaccounted-for Water

4.25 A major impact of the leaks is unaccounted-for water/non-revenue water. This is water that is pumped by the BWA but which cannot be accounted for as being used by customers. There is a cost for this water that is lost, such as the pumping costs

for which no revenue is obtained. In addition, for an Island that is deemed water scarce, water that is lost after it has been extracted by the BWA should be reduced to a minimum. There are also material and labour costs for repairing the leaks and flushing the mains in the case of water discolouration. It is important, therefore, for BWA to reduce the level of unaccounted-for water.

Conclusions

4.26 Replacing mains that have deteriorated is important to the supply of water and the efficient operations of the BWA. Based on studies conducted and BWA's own estimation of the level of water lost before reaching the customer, it is clear that this issue needs to be resolved.

4.27 Although BWA includes funds in its yearly budget for replacing mains, its efforts have been constrained. This is mainly because of the late provision of materials. In addition, the utilization of equipment that would increase productivity should have been implemented, thus increasing operational efficiencies.

4.28 It is recommended that:-

- **BWA seeks to remove the constraints that prevent it from replacing mains in a timely manner .**
- **BWA puts measures in place to achieve greater efficiencies in the execution of mains replacement.**
- **BWA improves its leak detection capabilities.**
- **The quantity of unaccounted-for water is reduced to acceptable levels.**

West Coast Main

4.29 The first phase of a new 16 inch diameter west coast main was laid by BWA's personnel. Phases 2 to 5, from the Spring Garden Highway, St. Michael to South Road, St. James, and phase 6 at Cemetery Lane, St. James, were laid by private contractors.

4.30 This main was laid to provide additional capacity to transfer desalinated water along the west coast to the north of the island. Water was to be transferred from the St. Stephen's Reservoir to the Ashton Hall Reservoir. The Authority projected the length of the main to be 6,567 metres.

4.31 In October 2004, two (2) contractors were offered contracts for specific phases of the project, which they accepted. They had tendered to provide complete services for the additional five (5) phases of the 16" diameter main. Complete services comprised the procurement of pipes and fittings, trenching, installation and backfilling, and reinstatement. Subsequent to the award of the contracts, it was agreed between the parties that BWA would pay the supplier of the pipes and fittings directly.

4.32 The project commenced in January 2005 and was scheduled to be completed in August 2005. BWA records show that the net value of the executed works on the main was \$3.1 million (VAT inclusive) excluding the major supply of the pipes and fittings.

Contract Process

4.33 Our review of the procurement for this project indicated that the requirements of the procurement process of the BWA were generally followed. However, BWA did not provide documentary evidence to verify that the tenders were evaluated by a committee and that the Performance Bonds existed.

Pressure Tests

4.34 Although work on this main commenced over six (6) years ago the full main has not been commissioned. This is because some sections of the main failed the pressure tests. As a result, work had to be carried out to locate the leaks. This work, along with the subsequent rectification of the problems, is being done by the BWA and the contractor responsible for that section of the pipe.

4.35 Personnel from BWA indicated that there has been success in resolving some of the problems on the main. To date, some sections of the main have passed the pressure tests. One section, between the Lazaretto Road and Vaughn Road, passed the tests after seven (7) leaks were found and repaired.

4.36 No documentary evidence of testing carried out before September 2006 was seen. Evidence was seen of testing of sections of the main in 2008, 2009, 2010 and as recently as June 2011.

4.37 The work to identify why other sections are failing the pressure tests has been disrupted because the machine used in the testing is out of order. So far, 3,630 metres of the main has been commissioned.

The Comments of the BWA

This Section of the Audit Report seems to suggest that the only reason for the delay in putting this main into service was that sections of the main failed pressure tests. There were other causes for the delays encountered in having this main put into operation and they were:

- The preferred route at Coach House was blocked and Management took the decision to await the "planning approval" of the Coach House Developers in order to lay the final fifty meters of the main.*

- *Housing development encroachments on original design route requiring many attempts to seek permission from landowners for adjustments to the route.*

Monitoring of Works

4.38 BWA personnel indicated that an officer was assigned to monitor the Project. It was stated that this officer would have verified the correct depths of the trench and confirmed that the materials used were in accordance with BWA specifications. It was indicated that the officer did not produce reports of the inspections and that the only documentary evidence would be the officer's signing of the invoice submitted by the contractor.

The comments of the BWA

It is agreed that some deficiencies existed with respect to the monitoring of works on this project. It is against this background that a proposal was submitted from the Capital Works Department for strengthening the mains inspection section.

Going forward, the officers conducting inspections will be required to produce documentary evidence of their inspections and sign off on the contractors work.

4.39 Valuation certificates were prepared by BWA and signed by the Project Manager. These certificates were used as the basis for payments to the contractors and a percentage of the amount payable was retained by the Authority. The amount retained from the payments to the contractor who installed the problematic sections of the main was \$128,940.39 at the end of October 2011.

Audit Comment

4.40 Reliance was placed on the officer's signature on the invoice as evidence that the work was satisfactorily carried out. As the BWA's representative on site, it

would have been appropriate for this officer to prepare reports confirming that the work carried out was in agreement with the specifications. The leaks subsequently observed on this main indicate that there was inadequate monitoring of this project. The sums withheld by BWA provides a limited avenue through which BWA can recover some of its costs for work carried out in fixing this main.

Responsibility for Testing

4.41 Review of the contract documents reveals ambiguity around the responsibility for testing. The document states that: “Required testing of pipelines and valves shall be done under the direct supervision of the Barbados Water Authority (BWA) and must be conducted in accordance with their standard test”. However, the Tender Document states: “The BWA will be responsible for inspecting and testing the installation before connecting it to the public mains”.

4.42 In addition, it was indicated that the mains should have been tested at shorter intervals.

The comments of the BWA

It is agreed that this main should have been tested at shorter intervals.

In light of this the testing of mains is now done in accordance with the requirements of the BWA specifications, at shorter intervals.

Fixing the Main

4.43 Our audit sought to determine whether the cost to fix the main was quantified. BWA has not quantified the work carried out to locate the leaks and effect repairs to the main. Labour and materials costs, in addition to the water used in the pressure tests, are costs incurred in fixing this main.

Audit Comment

4.44 The issues with the leaks encountered raises questions about the quality of work of the contractor. Clarity over who should conduct pressure tests was also necessary. In any event, BWA should have ensured that the tests were carried out in accordance with the specifications before payments were made.

4.45 It is important that the cost associated with the fixing of the leaks on this main be quantified. This is necessary if the BWA negotiates with the contractor for recovery of the costs incurred in fixing the main.

Impact of not having the Main

4.46 In 2001, BWA stated that the 16" main was to provide additional capacity to move desalinated water along the West Coast in a northward direction. This became even more important when a number of private and public sector projects were proposed for the north of the Island. Some of the large projects have halted but, once there is resumption, additional capacity will be required.

Booster Station

4.47 BWA has to install pumping facilities (Booster Station) in order to transfer the water from the St. Stephen's Reservoir northwards. There is no indication that such facilities were contemplated in the original design of the main. The Booster Station is currently under construction. However, even if the entire main was commissioned, the flow of water would not have reached its intended destination without the booster station.

Audit Comment

4.48 The lack of adequate pumping facilities adds to the issues experienced by the BWA in making this main operational. The need for this critical element of the installation should have been recognized when the main was being conceptualized.

Conclusion

4.49 The problems encountered after the main was laid imply that the monitoring was inadequate and needs to be strengthened for such projects. This would ensure that resources are not diverted to fix works unnecessarily. The leaks observed and the ongoing problems reflect on the quality of work carried out by the contractor. BWA is planning to execute a major mains replacement programme in the near future. It is imperative that adequate monitoring and inspection are in place when the contract is being executed. Contracts should be awarded to firms whose work has been of an acceptable quality.

4.50 It is recommended that:-

- BWA ensures that contracted works are adequately monitored and the relevant pressure tests conducted in accordance with specifications.
- BWA quantifies its costs for work carried out in fixing the main.
- BWA seeks to recover costs incurred in fixing the main.

The comments of the BWA

The Authority agrees with the recommendations and will ensure that appropriate systems are established to avoid reoccurrences of the issues highlighted.

CHAPTER 5

Recruitment of Staff

Introduction

In order to carry out its mandate of supplying potable water to the Island, BWA employs approximately eight hundred (800) persons. These workers are based at a number of locations, including Manor Lodge, Spring Garden, the Pine and various pumping stations. The hiring of workers is carried out by the Human Resource Department (HRD) which also has responsibility for training.

5.2 The HRD is headed by a Manager and comprises of other support personnel, including personnel officers and clerks. In total ten (10) persons work within the HRD.

Staff Complement

5.3 Information provided by the BWA indicated that the total complement of staff at the BWA was eight hundred and twenty-one (821) at November 17, 2011. This amount comprises many categories, from the lowest grade of Gas Attendant to the highest, the General Manager.

5.4 The table below shows the payroll expenditure for the BWA for the years 2007 to 2011.

Total Payroll Expenditure

Year	Amount
2007-2008	\$37,703,680.37
2008-2009	\$37,912,153.71
2009-2010	\$38,265,980.36
2010-2011	\$38,732,868.27

Source: Barbados Water Authority

Audit Objective

5.5 The objectives were to ascertain whether BWA was complying with its policies and procedures for recruitment of employees.

AUDIT FINDINGS

Recruitment Policy

5.6 As an employer of approximately eight hundred (800) persons, which is a significant amount, BWA should have a documented recruitment process that guides its hiring practices. This process would detail the various activities necessary for recruiting employees. When asked about a documented recruitment process, personnel in HRD stated that the process is not documented but follows customs developed over time.

Audit Comment

5.7 The absence of a written recruitment process is of some concern. A documented recruitment process aids transparency and provides guidance to personnel responsible for recruiting.

Advertisement of Posts

5.8 BWA personnel indicated that certain posts are advertised internally and others externally. Information was requested on which positions filled in the period reviewed should have been advertised internally or externally.

5.9 Discussions with HR personnel did not provide sufficient clarity on which posts should be advertised. Files for seventy-two (72) persons hired during the period April 2008 to December 2010 were reviewed. These persons were employed in twenty (20) different posts. BWA provided evidence of vacancies being advertised for only four (4) of these posts.

Audit Comment

5.10 There should be clarity on which positions need to be advertised. Its absence prevented a determination of BWA's total compliance with its "unwritten" policy/procedures for advertising posts. The lack of clarity is a symptom of what can happen when unwritten procedures are used.

The comments of the BWA

BWA places advertisements for technical and managerial positions. Advertisements are not normally sent out for General Workers or Clerical Officers as these can be obtained through searches from our own application files.

As part of a restructuring process, the BWA will in the future, embark on a policy where all jobs will be advertised.

Hiring of Employees

5.11 Before hiring an employee, the entity obtains information on the prospective candidate(s) in order to determine their suitability for employment within the organization. Some information is provided by the candidates in their response to the organization's request for applicants. However, this information is usually inadequate and interviews are used to obtain more detailed information about the candidates.

5.12 Personnel in the HRD at BWA stated that interviews are conducted in the selection of all employees. The Manager, Human Resources, explained that reports on interviews conducted are only prepared in cases where the positions are advertised. BWA did not provide documentary evidence of such interviews.

Audit Comment

5.13 In the interest of transparency, it is ideal for reports to be produced of all interviews showing why the candidate was suitable for employment. These reports should be readily available.

The comments of the BWA

In any process where interviews were conducted for jobs, reports are provided on the applicants and Board Papers are prepared and submitted for Board approval.

The necessary system will be put in place to rectify this situation as the seriousness of the matter is clearly understood.

Status of Employee

5.14 Using the same sample outlined above, we found that twenty one (21) employees were working beyond the end date on their employment letters on file. These workers were still being paid at the time of the audit although there was no authority seen for payment.

5.15 When these matters were drawn to the attention of personnel in HRD, they provided extension letters that were prepared for twelve (12) of those persons. These letters were not signed as at October 4, 2011 by the relevant authority.

5.16 HRD personnel explained that there was no official notification to HRD from the Departments/Units on whether the workers' employment should be extended. It was assumed in HRD that if no adverse reports were received that the workers employment would continue.

Audit Comment

5.17 The fact that workers can be paid without the necessary authorization indicates a weakness in the system. There appears not to be adequate follow up on the status of temporary workers by the personnel section.

The comments of the BWA

BWA has recently put in place a continuous assessment form for Managers to advise the Human Resources Department on the performance of these new recruits, to determine whether they are suitable for continued employment with the BWA and if they are, their employment status is extended.

It is also envisaged that the implementation of the Human Resources Information System (HRIS) will assist in signaling when time for renewal is due.

BWA is presently documenting its recruitment policy and will also be reviewing its organizational structure to make this organization compliant with modern Human Resources practices.

Conclusion

5.18 BWA had difficulties in providing the necessary evidence to support adherence to its unwritten recruitment policies. For an entity with such a large number of employees, the recruitment process should be documented and transparent.

5.19 It is recommended that:-

- **BWA documents its recruitment policies.**
- **BWA ensures that it follows its stated recruitment practices at all times.**

CHAPTER 6

Other Matters

CUSTOMER SERVICE

Introduction

The Customer Service Centre is set up primarily to receive customer calls. Where the customer's concern cannot be resolved by the Centre, it is forwarded to the departments (Distribution, Commercial or the Recoveries Unit) responsible for resolving customer service issues.

6.2 The Distribution Department addresses issues relating to the maintenance of the water network system such as burst mains or pipes, and water outages. These issues are recorded in an information system called the Distribution Management System (DMS). This system is also used by the department to assign jobs (issues) to crews for resolution.

6.3 The Recoveries Unit deals with the reconnection and disconnection of water services while the Commercial Department handles issues relating to billings, meter reading, and adjustments to customer accounts.

Performance Targets

6.4 At BWA, customer service targets were set for three (3) activities. These were: (i) to repair burst mains within forty-eight (48) hours after receiving the report; (ii) carry out reconnections within twenty-four (24) hours of payment; and (iii) installing new water services within ninety (90) days after submission of the application.

6.5 It should be noted that of the three (3) targets mentioned, only one (1) was formally stated, that is, the one dealing with new service installations (which is stated in

the BWA's Customer Service Operating Manual). The other two (2) targets were identified by the managers of the sections responsible for the particular activities.

6.6 A test was carried out to determine whether officers were aware of the targets. Interviews held with personnel of the Distribution Department revealed that these officers were not aware of the target set for burst mains even though they are responsible for ensuring that the repairs are carried out.

Audit Comment

6.7 Given that BWA is offering a service to its customers, it is important that the relevant measures are in place to evaluate performance as well as to ensure consistency. When measures are not established, it becomes difficult for the organization to identify deficiencies and promote improvements in the weak areas, with the result that the quality of service is impacted.

Recording of Customer Service Issues

6.8 Customer service issues received by the BWA are recorded in its computer systems. One of these systems, the DMS, enables the tracking of particular customer issues from receipt to resolution. For this tracking facility to function effectively, customer issues are to be entered when received, jobs assigned via job cards generated from the system, and resolved issues updated and closed.

6.9 A sample of one hundred and sixty-five (165) entries for burst mains for the period April 1st 2008 to March 31st 2010 was reviewed. Of this sample, it was observed that ninety-one (91) burst main entries were inputted into the system after the issues were resolved.

6.10 When issues are processed without first being entered in the system, the ability to trace the follow-up action taken is diminished. This is because the system does not capture the date the issue was received, only the date the entry was made. Entries

made in this manner also prevent management from measuring BWA's response time to customer service issues.

6.11 Such situations occurred when issues were reported directly to the Superintendent, who then assigned them to a Plumber for resolution via telephone or a written job card. After the work was completed, the information on the job card was entered in the computerized system.

BWA's Response to Burst Mains

6.12 Information provided by the BWA indicated that burst mains are responsible for the second highest number of calls into the Customer Service Centre. BWA personnel indicated that the target used for repairing burst mains is that the problem be fixed within two (2) days of being reported.

6.13 To investigate BWA's achievement of this target, the sample of one hundred sixty-five (165) entries used for testing the tracking facility was retained (see paragraph 6.9). Of these only thirty-two (32) had captured the data required to measure the achievement of the target. Twenty (22) of these cases were resolved more than two (2) days after being received by the Distribution Department, while only two (2) of the entries had information recorded on why the targets were not met.

6.14 BWA personnel indicated that the lack of materials and shortage of equipment were the main factors that prevented the organization from repairing burst mains in a timely manner.

Audit Comment

6.15 It is essential that the BWA has systems in place to facilitate the recording and tracking of customer service issues. This would allow the organization to monitor such things as when cases are received, investigated and resolved; provide responses to customers; and identify trends or reoccurring problem areas.

6.16 The lack of information impacted on our ability to determine the reason(s) why the target set was not achieved in the cases reviewed.

Conclusion

6.17 BWA's response to customer service issues is hampered by poor information management and the inadequacy of performance targets. Given the magnitude of customer issues received by the BWA, it is essential that the relevant information systems are in place to ensure that the organization can handle them consistently and quickly. In essence, offering quality customer service is a challenging task and requires careful and strategic planning to ensure it is delivered properly.

The Comments of the BWA

We are in general agreement with the comments made and conclusions drawn. In this regard it should be noted the BWA have taken measures to ensure that appropriate and integrated management information systems are acquired and put into place to address required improvements in the customer information and billing systems, work order and customer complaints management and control. These were recently put out to tender under the IDB funded project.

6.18 It is recommended that:-

- **BWA develops targeted timeframes to facilitate the assessment of its performance.**
- **The features offered by the DMS are fully utilized to facilitate good record keeping as well as to monitor the achievement of targets set.**

- BWA ensures that the data captured in the system is accurate and reliable.

BWA PROJECTS

6.19 BWA is engaged in seven (7) major capital projects and some of these projects have experienced long delays in their planning and execution. At least one (1) of these projects has been in progress since 1995. The estimated costs of the projects reviewed are shown in the following **Table 5**.

Table 5: Estimated Costs of Projects

Project Title	Estimated Cost	Date Cost was Estimated
West Coast Sewerage Project	\$600 million	March 2011
New Barbados Water Authority Office Complex	\$38 million	March 2011
Water and Sanitation Systems Upgrade Project	\$106 million	March 2010
Comprehensive Review and Overhaul of the Barbados' Groundwater Protection Zoning Policy and System	\$2.6 million	February 2011
The Belle Water Quality Programme (Reverse Osmosis) Project	\$50 million	November 2010
Mains Replacement Programme	\$60 million	November 2009
Total Projects Estimate	\$857 million	

Created by: Barbados Audit Office

Audit Comment

6.20 Inadequate finances are a thread that runs through the majority of these projects as a cause of the delays. Other causes include: Changes to previous decisions relating to designs and the method of financing, as with projects such as the West Coast Sewerage Project; and delays experienced in obtaining feedback from Government agencies on the recommendations of the consultants.

6.21 These issues highlight the challenges facing Government/BWA execution of these projects. Considering the level of financing needed to execute these projects, BWA should ensure that it has the resources to service financial obligations associated with loans required for their execution.

FINANCES

6.22 BWA derives its revenue from the sale of water, installation of new services, repairs and connections, and the laying of mains for private developers. The Authority also receives funds from Government. The funds available to the BWA are used to meet operational expenses such as salaries, wages and electricity, with salaries being one of the largest expenses of the Authority.

6.23 The audited financial statements for the years ended March 2005 to March 2007 and the unaudited statements for the financial years ended March 2008 to March 2010 were examined.

Profit/Losses

6.24 The financial statements reviewed show that the Authority endured large net losses in the financial years March 2005, 2007 and 2008. However, its unaudited financial statements for the year ended March 2010 shows that the Authority ended the year with a profit. This is due mainly to the 60% increase in the rates for use of water in July 2009. In addition, BWA ended the March 2010 financial year with a favorable cash balance.

Expenses

6.25 The total operating expenses of the Authority increased during the period reviewed. There was a major increase of 20% in the financial year ended March 2007, reductions of less than 3% for the following two (2) years and an increase by 5% in the

financial year ended March 2010. The total operating expenses of the Authority are close to the \$100 million mark.

Deficits

6.26 With the net losses over the years, BWA has accumulated significant deficits on its retained earnings. The accumulated deficit at March 2006 was \$123 million.

Financing

6.27 As at January 2012, BWA has secured three (3) loans, a BDS\$150 million in 2005, a US\$50 million in 2010 and a BDS\$14.5 million in 2011. The influx of loan receipts assists the BWA in its operations, but they have to be repaid.

6.28 In addition, BWA is negotiating a number of projects which will need financing and, in some cases, Public Private Partnerships (PPP) are being contemplated. Usually in PPPs, the sourcing of financing is the responsibility of the contractor. Although BWA would not be required to source financing for these projects, the contractor will still have to be repaid.

Pension Plan

6.29 Pension contributions on behalf of its employees are financed by the Authority. At March 2010 the pension fund liability was \$58.5 million.

Audit Comment

6.30 Based on the Financial Statements examined, the finances of the BWA seem to be improving. However, in our opinion the BWA should seek to restrict or even reduce its operating expenses. The BWA is a very labour intensive organization that

should be able to benefit from the increased use of more efficient equipment than that which is currently employed.

6.31 In addition, there will be increased debts resulting from the loans for the various projects when they come on stream. BWA should carefully analyze its financial situation to ensure it has the ability to meet these commitments.

The Comments of the BWA on Finances

The Authority agrees with the comments.