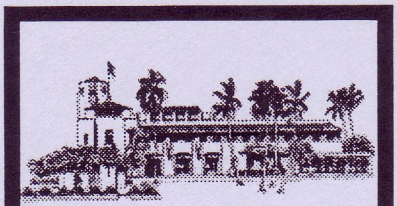


OFFICE OF THE CITY AUDITOR

City and County of Honolulu
State of Hawai'i

Audit of Selected Management Issues at the Honolulu Board of Water Supply

A Report to the
Mayor
and the
City Council of
Honolulu

Report No. 06-07
October 2006

carrollcox.com, Box 4202, Mililani, HI 96789

Audit of Selected Management Issues at the Honolulu Board of Water Supply

A Report to the
Mayor
and the
City Council
of Honolulu

Submitted by

THE CITY AUDITOR
CITY AND COUNTY
OF HONOLULU
STATE OF HAWAI`I

Report No. 06-07
October 2006

Foreword

This is a report of our Audit of Selected Management Issues at the Honolulu Board of Water Supply (BWS). The audit was conducted pursuant to Section 3-502.1(c) of the Revised Charter of Honolulu and the Office of the City Auditor's Annual Work Plan for FY2005-06. The city auditor selected this audit due to significant organizational changes that have occurred over the last seven years at the BWS, including the state-authorized Experimental Modernization Project, and pursuit of business development projects beyond its core mission to supplement revenues and to potentially minimize water rate increases.

We wish to acknowledge the cooperation and assistance of the staff, management and Board of Directors of the Honolulu Board of Water Supply and others who we contacted during this audit.

Leslie I. Tanaka, CPA
City Auditor

EXECUTIVE SUMMARY

Audit of Selected Management Issues at the Honolulu Board of Water Supply

Report No. 06-07, October 2006

This audit was conducted pursuant to the authority of the Office of the City Auditor (OCA) to self-initiate projects, as provided in the Revised Charter of Honolulu (RCH). The city auditor has determined that this audit is warranted, due to significant organization changes that have occurred over the last six years at the Honolulu Board of Water Supply (BWS), including the state-authorized Experimental Modernization Project, and the pursuit of business development projects beyond its core mission to supplement revenues and to potentially minimize water rate increases. Moreover, reports that the BWS has been unable to cover its operational costs and the high number of water main breaks, bring rise to concerns that resources for maintenance and repair of existing drinking water infrastructure may have been compromised by these organization changes.

Background

In 1999, BWS management attempted to respond to emerging trends in the water utility industry and create a more nimble organization that would be prepared as a workplace for the 21st century. In the process, its leaders awakened an organization that, while financially healthy, had fallen behind due to outdated tools such as paper-based information systems for everything from financial ledgers to infrastructure maintenance. Reorganization efforts introduced new technology that, when properly implemented, introduced new efficiencies into the organization. In addition, reorganization introduced its staff to the role of BWS in water conservation and stewardship. However, in its eagerness to see results, BWS management initiated wide-ranging, ambitious projects that strained BWS resources and overwhelmed its workforce, resulting in diminishing support and delayed implementation.

Summary of Findings

We found that human resource initiatives incurred costs without realizing anticipated efficiencies. One of those initiatives was the Experimental Modernization Project (EMP), which was authorized by the state

legislature based on the features of the Multi-Skilled Worker (MSW) pilot project, in which blue-collar workers would be cross-trained in basic skills for multiple trades. While the MSW pilot met and exceeded performance goals, EMP was also used to hire contract EMP chiefs, who were brought into the organization to supervise current executive-management (EM) staff. BWS' reorganization is still ongoing after seven years, despite contracting $10 million for reengineering consultants. In addition, its previous board of directors awarded bonuses and salary increases to the previous manager and deputy manager before efficiencies were realized.

We found that BWS' costly business development projects were implemented with questionable benefits to ratepayers. Among the questionable business dealings was a plan to send BWS employees to the Asia-Pacific region as consultants to other government water utilities. This was accompanied by BWS' $1.1 million investment in a training facility designed to generate new business from locales far from O'ahu. Returns from these investments were never realized, as this line of business was later found to be inconsistent with the BWS' mission. Other questionable deals included utilizing BWS resources for city obligations. This includes the BWS' $48 million purchase of the Honouliuli Recycled Water Facility, which was part of the city's obligation under an Environmental Protection Agency (EPA) consent decree, and completing construction of the water infrastructure for Ewa Villages, which the city had begun. BWS also purchased Ewa Shaft from Campbell Estate, incurring expenses to renovate the contaminated shaft while absorbing any future liability from this project. While business development initiatives sought new revenue sources for the department, they have generated minimal revenue; and revenue projections raise doubt that future revenues will have the desired impact of minimizing water rate increases for ratepayers.

While all these resources were being expended, the BWS' budgets for pipeline maintenance declined precipitously, sufficient only for the most critical repairs. This issue has been further complicated by problems with project management and accounting deficiencies. While BWS has initiated steps to report on available resources, monitor projects and automate infrastructure monitoring, the field operations division tasked with maintaining existing pipelines is still in reactive mode, with insufficient resources and still-developing information systems to convert to a proactive maintenance repair and replacement system.

Change may have been inevitable for BWS, but the impatience of management with its pace caused it to choose what would turn out to be costly shortcuts. BWS' reengineering experience shows that change cannot occur solely on the basis of one manager's vision, but particularly for a semi-autonomous municipal entity like the BWS, must be reinforced with accountability through documented systems of evaluation, monitoring and reporting that will institutionalize desired changes, preserve the strengths of the organization and protect ratepayers' interests.

Finding 1: Human resource reengineering was costly and failed to deliver anticipated efficiencies.

- Consultant costs for human resource reengineering totaled $10 million over a five-year period, but the benefits of human resource pilot programs are still uncertain.

- The benefits of the Multi-Skilled Worker pilot facilitated the passage of Experimental Modernization Project (EMP) legislation. BWS' Multi-Skilled Worker pilot project met and exceeded performance goals. However, the full implementation of the multi-skilled pilot has been stymied by disagreements over pay.

- BWS also used EMP to hire contract employees known as EMP chiefs to supervise existing management-level staff.

- Questions on the future role of EMP officers with respect to existing civil service management-level staff remain.

- Although the previous board of directors rewarded BWS managers with substantial bonuses before the reorganization was completed, the lack of a finalized organization chart shows continuing instability.

Finding 2: Costly business development projects were implemented with questionable benefits to ratepayers.

- The business development office was established to generate revenues, but business projects had limited planning and oversight. Projects outside BWS' traditional core mission included:

  - $1.1 million in architectural improvements to redesign a 5,355-square-foot office space for the Asia-Pacific Urban Institute at

Kapolei Hale in an effort to draw consulting work from the Asia-Pacific region, and a separate BWS consulting project that generated less than $10,000 in revenues;

- $48 million to purchase the Honouliuli Recycled Water Facility, to help the city meet certain requirements of a U.S. Environmental Protection Agency (EPA) consent decree;

- $13.5 million to purchase the Ewa Shaft from the Estate of James Campbell, rehabilitating the contaminated shaft at a cost of $4.5 million, absorbing future liabilities and obligating BWS to provide the Estate with 3 million gallons of water per day more than was officially allocated by the state, rather than condemning the property outright; and

- $11 million to incorporate and construct a district cooling plant to provide air conditioning at the John A. Burns School of Medicine, plus $2.3 million over the next 20 years to fully own equipment within the plant.

- While recycled water and district cooling may pay off over the long run, they have yet to achieve the desired impact of generating sufficient revenues to minimize water rate increases.

Finding 3: BWS' limited budgets for pipeline maintenance have been sufficient only for addressing infrastructure in the most critical condition.

- Proactive maintenance management should aim to minimize costs and maximize infrastructure sustainability. BWS has taken steps toward a more proactive system through its infrastructure replacement program.

- New and expanded information system capabilities (i.e. GIS, HONU, CMMS) have resulted in efficiencies for BWS' maintenance activities.

- However, BWS' budgets for repairing and replacing existing pipelines have declined significantly over the past seven years.

- BWS' maintenance management system is still in transition.

Recommendations and Response

The Board of Directors for the Honolulu Board of Water Supply should:

1. establish policies and guidelines for evaluating the manager and chief engineer's performance and refrain from awarding bonuses to the deputy manager;

2. conduct annual written performance evaluations of the manager based on the board's overall policy objectives;

3. request regular status reports on reengineering efforts, including resources expended, and any process improvements or efficiencies achieved as a result;

4. assess the extent to which the BWS has provided the directors necessary and sufficient information before, during and after such activities to carry out its fiduciary responsibilities to the island's rate payers regarding BWS' business activities;

5. establish overall policies pertaining to business activities, investments, analysis, and oversight of business activities;

6. require the manager and chief engineer to report on its plans to implement sufficient controls to safeguard the agency's resources and ratepayers' interests in future business activities;

7. require the manager and chief engineer to provide status reports on the implementation of the proposed maintenance management system and progress toward proactive repair and replacement of existing water infrastructure; and

8. require the manager and chief engineer to report variances between amounts budgeted for repair and replacement compared to actual expenditures, and the estimated impact on the number of water main breaks.

The Manager and Chief Engineer of the Honolulu Board of Water Supply should:

1. establish a human resources plan that systematically provides continued feedback on efficiencies resulting from human resource initiatives and innovations to stabilize the organization;

2. clarify official position descriptions and responsibilities for EMP chiefs and create specific evaluation criteria to document eligibility for bonuses;

3. address potential duplication of official duties and responsibilities between EMP officers and executive-management-level staff;

4. finalize official organization charts to reflect actual personnel functions;

5. clarify the purpose of the business development office, with respect to the BWS' core responsibilities, develop specific guidelines for evaluating business opportunities and for incorporating feasible business activities into the larger organization;

6. establish and monitor cost centers for business development projects to facilitate reporting on each business development project and report performance to the board of directors on a regular basis;

7. monitor the implementation of the computerized maintenance management system to ensure that it leads to proactive repair and replacement of existing water infrastructure; and

8. assess and annually report whether projects included in the Six-Year (FY2005-06 to FY2010-11) Capital Program Prioritization Plan are progressing in efforts to reduce the number of water main breaks.

In its response, BWS noted that there were significant discrepancies between the information contained in the report and its own records. BWS pointed out that its response only contains what it considers the most egregious discrepancies, while acknowledging that BWS provided raw data to the auditor that may have been mistakenly read, interpreted or applied. Specifically, BWS challenges our conclusion that the department drained its resources on reengineering projects at the expense of pipeline maintenance.

In several instances, BWS disputed our figures based on data that were outside our audit scope, or added figures that were outside our area of focus, leading to inappropriate comparisons. Our audit scope, from FY1998-99 to FY2004-05, was selected to correspond with the department-wide reorganization that occurred during that period. This audit scope served as the anchor by which our office could investigate the intent and outcome of various initiatives within the department.

However, BWS sought to dispute our findings by compiling information for years that exceeded this scope, making the comparisons irrelevant.

For example, despite specifically qualifying our conclusions based on our six-year scope, BWS counters our conclusions on the basis that pipeline budgets increased over a nine-year period, from FY1995-96 to FY2004-05. In addition, BWS counters our assertion that the annual number of water main breaks has not significantly declined by stating that the annual number of water main breaks has declined over a 12-year period, from FY1992-93 to FY2004-05.

In another example, the department's response noted that the pipeline budget was understated by $139 million from FY1998-99 to FY2004-05, and by $36 million for FY2004-05 alone. However, we specifically stated in the text preceding Exhibit 2.9 that our report focuses on budgets to repair and replace existing potable water pipelines. In its response, the department includes budgeted funds for installing new pipelines and non-potable pipelines, which total $100 million for FY1998-99 to FY2004-05. While combining the amounts budgeted for existing and new potable pipelines with non-potable water pipelines can increase the overall dollar amount, we believe that reporting the elements separately provides clarity for ratepayers. The $36 million budgeted for FY2004-05 reported by the department included 15 deferred projects totaling $19.3 million and seven deleted projects totaling $14 million originally budgeted for existing pipelines. As we became aware of the magnitude of these project cancellations, we concluded that reporting only the originally budgeted amount would be misleading as a representation of the resources allotted for this purpose. BWS also stated that our focus only on pipeline replacement is flawed because a water system consists of more than pipelines. However, as we noted in our report, water main breaks present particular, widespread adverse effects to the public, which merits a close examination of the resources allotted to repairing and maintaining those particular assets.

In other instances, BWS disputes in its response the same numbers that it provided to our office during fieldwork. Examples include the actual revenues and expenses reported for the Honouliuli Recycled Water Facility, and the costs associated with the Multi-Skilled Worker (MSW) pilot project. BWS also disputes the figures we used for overall department revenue and expense information, even though these were derived from audited financial reports for the stated period.

The department's response provided some clarifying information, and changes, where appropriate, were made to the final report. However, BWS' response did not address the larger issues of accountability with respect to the results obtained from the resources expended over the past seven years on human resource reengineering, certain business development projects, and the sufficiency of resources allotted to pipelines based on their estimated life. Despite the assertion of many inaccuracies and misrepresentations, none of the comments provided to us in the report changed the substance of our findings.

While BWS did not directly respond to our recommendations pertaining to increased measures of accountability, we acknowledge that the BWS management team was in transition at the time of our audit, with its new manager and chief engineer starting two days before our audit began and the deputy manager and chief engineer departing six months later. We have expressed our hope to BWS officials that this report will serve as a guide for this relatively new management team as they make decisions for the future, to heed lessons from what we have documented as projects that were ambitious, hastily conceived, costly to ratepayers and ultimately difficult to execute. We are encouraged by statements made to our office by several BWS officials and board members during our audit that a new era of increased accountability and transparency lies ahead for its employees and ratepayers. We look forward to the results of those efforts in the future.

Leslie I. Tanaka, CPA
City Auditor
City and County of Honolulu
State of Hawai'i

Office of the City Auditor
1000 Uluohia Street, Suite 120
Kapolei, Hawai'i 96707
(808) 692-5134
FAX (808) 692-5135
www.honolulu.gov/council/auditor

Table of Contents

List of Exhibits

Chapter 1
Introduction

This audit was conducted pursuant to the authority of the Office of the City Auditor (OCA) to self-initiate projects, as provided in the Revised Charter of Honolulu (RCH). The city auditor has determined that this audit is warranted due to significant organizational changes that have occurred over the last seven years at the Honolulu Board of Water Supply (BWS), including the state-authorized Experimental Modernization Project, and pursuit of business development projects beyond its core mission to supplement revenues and to potentially minimize water rate increases. Moreover, reports that the BWS has been unable to cover its operational costs and the high number of water main breaks, bring rise to concerns that resources for maintenance and repair of existing drinking water infrastructure may have been compromised by these organizational changes. This *Audit of Selected Management Issues at the Honolulu Board of Water Supply* provides information that has not been previously disclosed to the Honolulu City Council or the public on costs associated with these three areas: human resources, business development projects, and resources devoted to repair and maintain the existing distribution system. In addition, this audit assessed the impact of those changes on the organization.

Background

The Honolulu Board of Water Supply (BWS), established in 1929, manages, controls and operates the waterworks of the City and County of Honolulu, serving 902,700 residents and generating an average of $101.4 million in annual revenues over the last seven years. The BWS is a semi-autonomous agency governed by a seven-member board of directors. Five directors are appointed by the mayor and approved by the city council and the chief engineer of the city Department of Facility Maintenance and the director of the state Department of Transportation serve as ex-officio members. The board appoints the manager (also known as the chief engineer), who oversees the water utility's day-to-day operations.

BWS core mission

County boards of water supply were established by the state under Chapter 54 of the Hawai'i Revised Statutes (HRS), *Water Systems*. Under Section 15, the board of water supply is given the responsibility to "manage, control, and operate the waterworks of the county and all

property thereof, for the purpose of supplying water to the public in the county."

The Revised Charter of Honolulu (RCH) uses the terms "department" and "board" to distinguish between the governmental unit and the policy-making body consisting of seven members. According to RCH Article VII, Section 7-103, *Powers, Duties and Functions of the Department* include:

1. control over "all water systems of the city, including water rights and water sources, together with all materials, supplies and equipment, and all real and personal property used or useful in connection with such water systems";

2. full and complete authority to manage, control and operate water systems and properties used or useful in connection with such water systems;

3. authority to conduct studies, surveys, investigations and estimates relating to the locations and sources of water within the city, amounts available for current and prospective uses, water sources that may be made available for such uses and maximum productivity of such sources; investigate, inspect, and ascertain the manner and extent of use or other disposition of any water; devise ways for economic distribution and conservation of water; and make contracts necessary or convenient to the execution or performance of its powers, duties and functions; and

4. authority for any member or authorized representative of the department carrying out the powers, duties and functions of the department to enter upon any public or private property at any reasonable time without warrant, while doing no unnecessary harm.

BWS chief engineer's responsibilities

The manager and chief engineer is responsible for day-to-day operations of the department. Specifically, Section 7-106, RCH, *Powers, Duties and Functions of the Manager and Chief Engineer* states that responsibilities for this position include:

(a) administering the affairs of the department, including the rules and regulations adopted by the board;

(b) granting, suspending or revoking permits under conditions prescribed by the rules and regulations of the department for drilling, easing or recasing or reopening of any well or shaft for the development of underground water;

(c) unless otherwise provided by the charter, signing all necessary contracts for the department;

(d) appointing and removing members of the staff;

(e) making recommendations to the board to create or abolish positions;

(f) preparing bills, collecting and, by appropriate means including discontinuance of service and civil action, enforcing the collection of charges for the furnishing of water and for water services;

(g) preparing payrolls and pension rolls;

(h) maintaining proper accounts in such manner to show the true and complete financial status of the department and the results of management and operation thereof;

(i) preparing annual operating and capital budgets;

(j) prescribing rules and regulations as are necessary for the organization and internal management of the department; and

(k) recommending rules and regulations for adoption by the board.

Policy-making board's responsibilities

The BWS is governed by a board of directors. Section 7-104, RCH, states that the board shall consist of seven members. The chief engineer of the city department of facility maintenance and the state director of transportation are ex officio members of the board. Five other members are appointed by the mayor, and approved by the city council, as provided by Section 13-103, RCH. The seven-member board sets overall policy and direction for the department, and is responsible for overseeing the performance of the manager and chief engineer through its authority to hire, fire and fix the compensation for the position. Specific responsibilities, according to Section 7-105, RCH, *Powers, Duties and Functions of the Board of Water Supply*, include the following:

(a) appointing and removing the manager and chief engineer of the department;

(b) fixing the salary of the manager and chief engineer;

(c) creating and abolishing positions;

(d) determining the policy for construction, additions, extensions and improvements to the water systems of the city, which shall include a long-range capital improvement program covering a period of at least six years, which shall be adopted after consultation with the director of planning and permitting, and which may be amended or modified by the board from time to time;

(e) acquiring by eminent domain, purchase, lease or otherwise, in the name of the city, all real property or any interest therein necessary for the construction, maintenance, repair, extension or operation of the water systems of the city;

(f) recommending to the council the sale, exchange or transfer of real property or any interest therein which is under the control of the department;

(g) entering into arrangements and agreements, as it deems necessary, for the joint use of poles, conduits, towers, stations, aqueducts and reservoirs, for the operation of any of the properties under its management and control;

(h) issuing revenue bonds under the name of "board of water supply";

(i) modifying, if necessary, approving and adopting annual operating and capital budgets submitted by the manager and chief engineer;

(j) prescribing and enforcing rules and regulations having the force and effect of law to carry out provisions of the charter; and

(k) hearing appeals from the order of the manager and chief engineer, refusing, suspending, or revoking any permit for the sinking, drilling or reopening of any well or shaft for the development of underground water supply.

The board also has the power to fix and adjust rates and charges for the furnishing of water and water services so that the revenues derived shall

be sufficient to make the water system self-supporting. According to Section 7-109, RCH, *Rates, Revenues and Appropriations*, rates and charges are determined based on the manager's recommendation, subject to approval by the board of directors. Such rates are not regulated by any governmental body or authority; however, public hearings are held to provide an open forum for public discussion.

BWS operations

The BWS provides water averaging 155 million gallons per day (mgd) to meet O'ahu's needs. Potable or drinking water is pumped from 170 groundwater sources and delivered to users through an estimated 2,000 miles of pipeline. In addition, the BWS delivers approximately 8.5 mgd of recycled water to various golf courses, as well as industrial park users in West O'ahu.

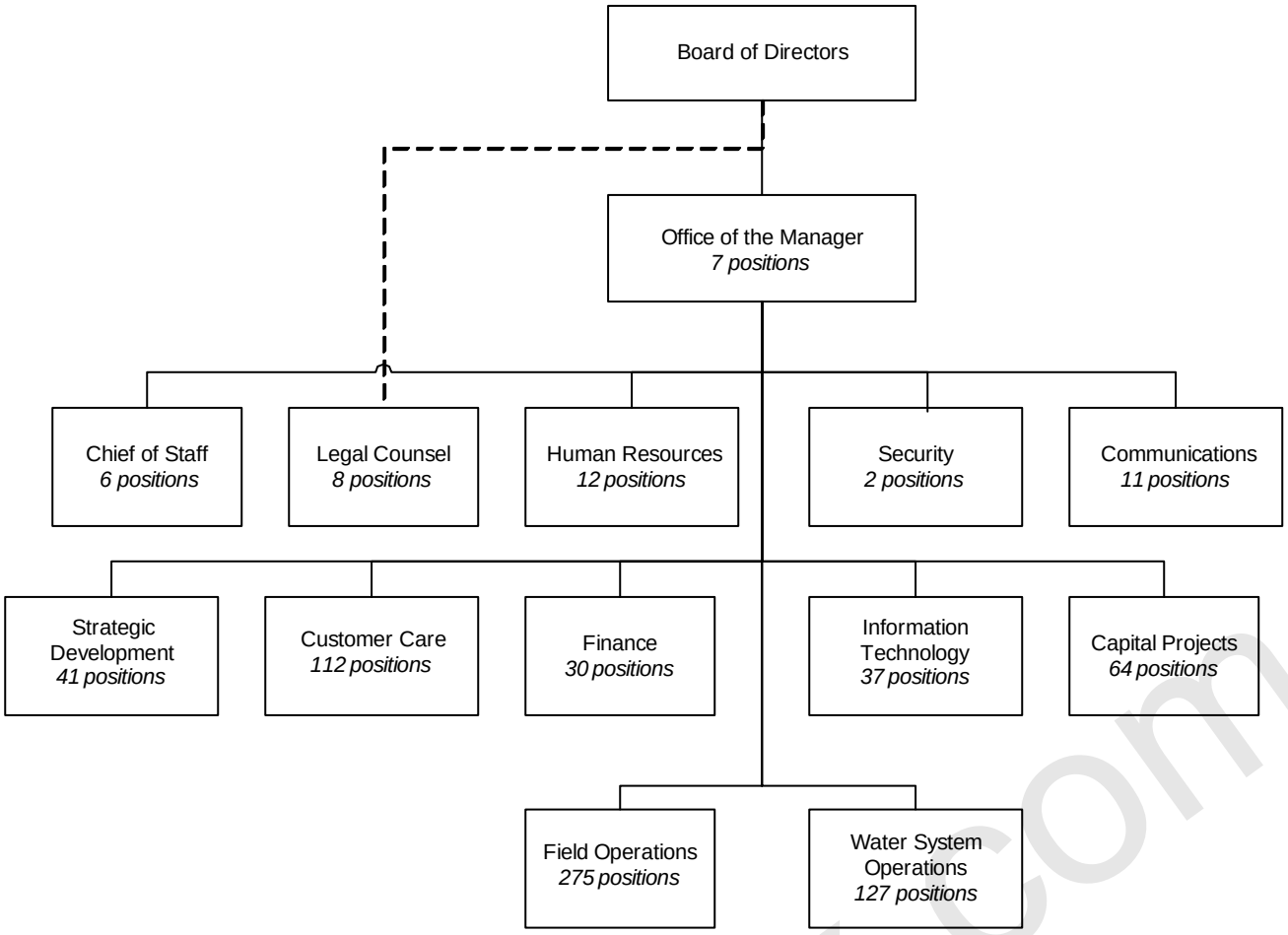
The BWS services 162,886 accounts and a residential population of 902,700. The service area covers approximately 596.7 square miles on the island of O'ahu. The customer base includes the residential population, businesses and industries, and agriculture. Of the total accounts, 151,074 are residential (92.8 percent), representing 60.9 percent of the total revenues received from water sales in FY2004-05; 10,980 are commercial and industrial (6.7 percent) representing 38.2 percent; and 832 are agricultural accounts (0.5 percent), representing 0.9 percent of total revenues.

BWS relies solely on revenues derived from its activities to pay for its operations and liquidation of indebtedness on operating revenues. The BWS receives no revenues from taxation, but may receive funds from the federal, state or county governments for capital improvement projects.

BWS position counts and organization chart

As of February 2006, the BWS had a board-approved ceiling of 714 authorized civil service positions, plus 18 Experimental Modernization Program officers hired under contract, for a total of 732 positions. As of June 30, 2005, the BWS had 12 operating units: Chief of Staff, Capital Projects, Communications, Customer Care, Finance, Human Resources, Information Technology, Legal Counsel, Security, Field Operations, Water Systems Operations and Strategic Development, as shown in Exhibit 1.1. All are under the direction of the manager and deputy manager.

Exhibit 1.1
BWS Organization Chart with Civil Service and Experimental Modernization Program Position Counts by Operating Unit



Note: Organization chart as of June 30, 2005 and position counts as of February 28, 2006

Source: Honolulu Board of Water Supply

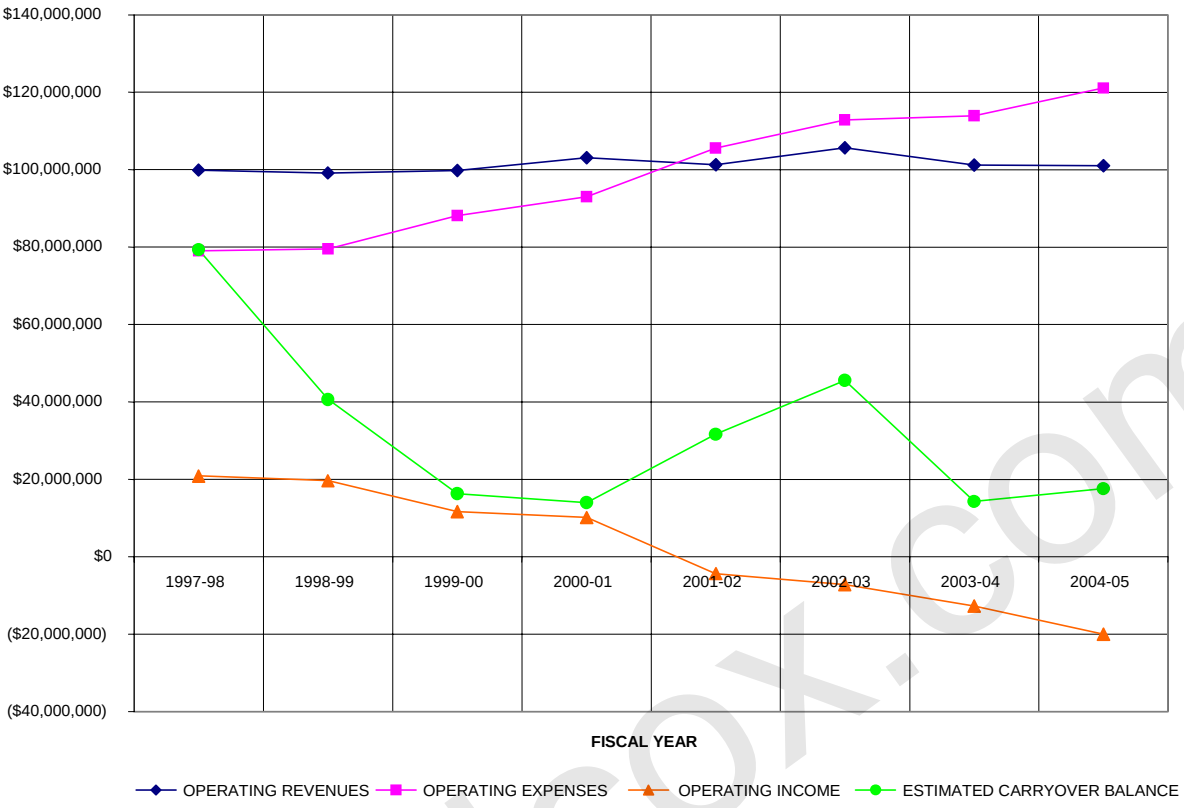
According to its FY2005-06 budget, BWS has 640 budgeted positions, an increase of 53 from the previous year's estimate of 587. The need for additional staff is the result of the department's reportedly "strained capacity" from the recent implementation of several projects to modernize business systems and change work practices, as well as plans for additional developments. Previous reengineering efforts had decreased the number of positions by 17 percent, from 658 to 564, its lowest level, between FY1999-00 and FY2002-03. BWS anticipates additional staff will be needed due to anticipated retirements — an

estimated 48 percent of its staff is eligible for retirement over the next ten years.

Revenues and expenses

Operating revenues have remained largely steady, averaging $101.4 million, and increasing by only $1.1 million over the last seven years.

Exhibit 1.2
BWS Operating Revenues, Expenditures, Income and Carryover Balance FY1997-98 to FY2004-05



Note: Operating expenses include depreciation. Operating income is calculated as revenues minus expenses. Estimated carryover balance comprises revenue carried over to the next fiscal year. BWS defines this as comprising primarily of an unappropriated fund balance

Source: Honolulu Board of Water Supply

While operating revenues have remained steady over the last seven years, operating expenses over the same period, including depreciation, have increased by $42 million (53 percent), from $79 million to $121

million. Depreciation expenses decreased by $23 million (40 percent), from $57 million to $34 million. Without depreciation, operating expenses increased by $65 million (299 percent), from $22 million to $87 million. Administrative and general expenses increased by $13.3 million (68 percent), other operating expenses increased by $12.4 million (33 percent) and recycled water expenses more than doubled, from $1.5 million in FY2000-01 to $3.9 million in FY2004-05.

Factors affecting water rates

Water rates are intended to ensure that revenues are sufficient for the semi-autonomous BWS and the water system to be self-supporting. Section 7-109, RCH, *Rates, Revenues and Appropriations*, states that the revenues derived from water rates shall be sufficient to meet all necessary expenditures, including:

(a) operating and maintenance expenses;

(b) repairs, replacements, additions and extensions;

(c) accident reserve, pension charges and compensation insurance;

(d) payment of principal and interest on all bonds, including reserves therefor, issued for the acquisition or construction of waterworks and extensions thereto; and

(e) reserve funds under Section 7-112 of this charter.

There has been no change in water rates for more than a decade. The board last approved a rate increase in 1995, following a 1993 rate study that showed an average increase of 10.8 percent annually would be required until 1999 to meet operating and maintenance costs, as well as capital costs. Since then, the board kept water rates steady, based on the manager's assurance that the agency had the ability to meet the expenses outlined in the charter.

In 2002, as operating expenses began to outpace operating revenues, BWS commissioned another rate study, which recommended an annual rate increase of 4.2 percent starting in 2005. The current manager, appointed in December 2005, has reported to the city council that BWS has been unable to meet operating expenses over the last four years, resulting in the need to implement a staggered annual increase in rates

totaling 57 percent over the next five years. The proposal was approved by the board in May 15, 2006 and takes effect on October 1, 2006.

Increased water utility privatization nationwide in the 1990s

The previous board's reluctance to increase water rates occurred during a time of increased water utility privatization. According to the Reason Public Policy Institute, a think tank that promotes privatization, nationwide outsourcing of water and wastewater services grew by 84 percent in the 1990s, and grew an additional 13 percent in 2001.

This increased privatization was facilitated by two significant events: a 1996 U.S. Environmental Protection Agency (EPA) report warning of a looming water infrastructure crisis, and a 1997 change in the tax laws that expanded the period that municipalities could contract with private companies without losing their tax-exempt status, from five years to 20 years.

In 1996, the EPA anticipated that communities would need an estimated $300 billion to $1 trillion over the next 20 years to repair, replace, or upgrade aging drinking water and wastewater facilities, to accommodate anticipated population growth, and to ensure compliance with the federal Safe Drinking Water Act. The Water Infrastructure Network—a broad-based coalition of local elected officials, drinking water and wastewater service providers, state environmental and health administrators, engineers and environmentalists—claims spending will need to increase by $23 billion a year for the next 20 years in order to meet the growing water and wastewater treatment needs. Faced with this budgetary crunch, increasing labor costs, and decaying infrastructure, local governments became vulnerable to increased lobbying from private water companies that advocated privatization as the solution.

Another catalyst for increased privatization in terms of operation and maintenance contracts for utility plants was a 1997 change in the tax code, in which the U.S. Internal Revenue Service (IRS) increased the length of time that cities could contract with private companies without losing their tax-exempt status. Previously, the IRS would revoke tax-exempt status for cities that contracted with private companies for more than five years; the 1997 change extended that term to 20 years. The tax-exempt status is crucial to cities' finances because it allows cities to borrow money at significantly lower rates and with tax-free interest payments on the government bond market. The U.S. Conference of Mayors and Washington-based National Association of Water Companies had lobbied the Internal Revenue Service to make this

change after private companies claimed they found it difficult to recover costs with contracts limited to five years.

In response to the increasing privatization that followed, municipally-owned systems began launching benchmarking programs to demonstrate their efficiencies and effectiveness as well as embarking on internal changes to make their organizations more competitive, according to the American Water Works Association. The Honolulu BWS sought to follow the examples of other municipalities who have changed to become more competitive by reducing "controllable" non-capital operating costs, primarily labor-related. Examples included Metro Toronto Works, which reportedly saved 36 percent in controllable costs; as well as Colorado Springs, Colorado; Los Angeles Department of Water and Power; and Phoenix, Arizona, which reported savings of 20 percent each.

BWS manager's vision for transformation

The BWS manager in 1999, a 32-year veteran of the organization, responded to the privatization trend by initiating a five-year program named QUEST (Quality Utility Employees Succeeding Together) Experimental Modernization Project (EMP), to reengineer all of its business processes and apply advanced information and communications technologies to achieve world-class performance. Authorization for BWS to implement EMP eventually became known as Act 40, Session Laws of Hawaii (SLH) 2003.

In a speech to the American Water Works Association, the then-BWS manager stated that the "trigger" for the reorganization effort was "the activity of privatizers in the state of Hawai'i." He stated that, "One of the things I wanted to set right was to insure that the Board would remain an autonomous public entity in perpetuity. We set about to accomplish that end by improving the Board to the point that we will serve the public at such a high level of quality, with such efficiency that there is no room for a privatizer to make significant improvements." In that same speech, while acknowledging the organization's "honorable history," he also noted that the department had become "antiquated" – from its facilities and equipment to its work practices. Reengineering would be a difficult task, he said, because "our employees did not have state-of-the-art training; our systems were in need of an overhaul. So we set about the difficult task of changing everything: Technology, work practices, information technology systems, job classifications, compensation systems, everything."

While management acknowledged in staff meetings that change can be fearsome, privatization was instilled in employees as an even bigger, more justifiable fear. In May 2001, BWS reported that "the threat of privatization is real," with 1,891 water utilities privatized across the nation in 1999, and that the trend was moving upward, threatening employees' jobs due to layoffs, job elimination and centralization of administrative functions. Employees were told that the general public already felt that government services are wasteful and should be privatized to save costs. They reasoned that the best response was to show the public that the department can be as competitive as the private sector. In order to demonstrate this to the public, the goals for QUEST were to:

- meet increased business challenges with little or no increase in water rates;
- initiate business process reengineering and quantum productivity improvement without involuntary termination of staff;
- foster a work environment that encourages and supports life-long learning;
- develop a more highly skilled and better paid workforce; and
- provide a success model for other public service providers in Hawai'i and the Pacific Rim.

By the end of 2004, the manager predicted that the BWS would show the results of the QUEST program by:

- Streamlining into six operating units: Customer Care, Water Resources, Operations, Maintenance, Business Development and Business Services. Each unit would be headed by newly created positions known as "principal executives." Management promised that there would be no abolished positions, involuntary terminations or involuntary reductions in pay as a consequence of the reorganization;
- Saving $18 million from the operating budget and eventually reducing the department's total positions from 714 to approaching a "privatization–proof" level of 350 positions through attrition;

- Creating new revenue streams that would reduce the need to raise water rates and provide funds for BWS water projects and infrastructure updates; and

- Improving infrastructure reliability by maximizing distribution system availability to customers, and maximizing available pumping, storage, and treatment capacity.

In connection with these sweeping changes, this *Audit of Selected Management Issues at the Honolulu Board of Water Supply* provides an assessment of costs and benefits associated with three areas: human resources, business development projects and resources devoted to repair and replace the existing water distribution system, and to assess their impact on the organization.

Objectives of the Audit

The objectives for this audit were to:

1. Review the Honolulu Board of Water Supply's human resource initiatives and practices and determine the impact of personnel changes on the organization.

2. Evaluate planning and outcome of significant business development projects.

3. Determine the adequacy of resources devoted to the program for maintenance, repair and replacement of water distribution facilities.

4. Make recommendations as appropriate.

Scope and Methodology

Our review focused on management issues related to the human resource initiatives and agency reorganizations for the period of FY1998-99 to FY2004-05. We reviewed personnel counts and personnel costs, particularly for the senior staff officers hired on contract under the Experimental Modernization Project. In addition, we assessed the costs and benefits of significant business development projects, and the adequacy of resources allocated to maintenance, repair and replacement of drinking water pipelines.

We reviewed applicable sections of the Hawai'i Revised Statutes (HRS), Revised Charter of Honolulu (RCH), and the Revised Ordinances of Honolulu (ROH). We reviewed policies and procedures pertaining to the BWS board and department, administrative directives, and other applicable departmental documents. We also referred to laws, rules, and requirements pertaining to hiring employees in both civil service and non-civil service positions, including employees hired under the Experimental Modernization Project. We reviewed compensation and benefits among executive-level state and city positions for comparisons with BWS personnel.

We interviewed board members, the manager, deputy manager and other administrators and staff. We conducted site visits to BWS business operations and water distribution system facilities. We examined best practices pertaining to duties and responsibilities of non-profit boards, essential elements of a business plan, and standards for water system infrastructure maintenance and planned replacement. Finally, we conducted Internet, literature, and other searches as appropriate to identify "best practices" regarding the management of municipal water utilities from such organizations as the American Water Works Association, Association of Metropolitan Water Agencies and the Water Infrastructure Network.

Our work was performed in accordance with generally accepted government auditing standards.

This page intentionally left blank.

Chapter 2

Questionable and Costly Reengineering Projects Drained Resources While Budgets for Pipeline Maintenance Limited to Only Critical Infrastructure Repairs

Fearing privatization occurring at water utilities across the nation, the Honolulu Board of Water Supply (BWS) undertook a massive overhaul of the agency's operations, starting in 1998. It sought to create a more streamlined "privatization proof" organization that would be competitive with private utilities. However, we found that human resource initiatives to transform the organization were costly and failed to deliver anticipated efficiencies. BWS' Multi-Skilled Worker pilot project met and exceeded performance goals; however, another project under the Experimental Modernization Project (EMP) was used to establish a new level of management, and significant bonuses were paid even though the reorganization is incomplete. The desire for new revenues led to costly business development activities that have been insufficient in delaying the need to raise rates. Despite reports of an aggressive water main replacement program, there has been no significant and sustained decrease in main breaks annually, averaging 389 for the past six years. Resources for maintaining the city's water main system have been significantly reduced, leaving funding only for water mains in the most critical condition rather than proactive maintenance management of its infrastructure.

Summary of Findings

1. Human resource reengineering was costly and failed to deliver anticipated efficiencies. Consultant costs for human resource reengineering totaled $10 million over a five-year period, but the benefits of human resource pilot programs are still uncertain. The benefits of the Multi-Skilled Worker (MSW) pilot facilitated the passage of legislation allowing broad latitude to hire personnel called Experimental Modernization Project (EMP) chiefs. However, the full implementation of the Multi-Skilled Worker pilot has been stymied by disagreements over pay. In the meantime, contract employees known as EMP chiefs were hired to supervise existing management-level staff. Questions on the future role of EMP chiefs and existing management staff remain. Although the previous board

of directors rewarded BWS managers with substantial bonuses before the reorganization was completed, the lack of a finalized organization chart shows continuing instability.

2. Costly business development projects were implemented with questionable benefits to ratepayers. The business development office was established to generate revenues, but business projects had limited planning and oversight. Projects included consulting in the Asia-Pacific region, the $48 million purchase of a recycled water plant that relieved the city administration of certain Environmental Protection Agency obligations, special exemptions and less-than-favorable agreements with the city and Campbell Estate that cost the board more than $18 million, and a one-sided district cooling agreement favoring the University of Hawai'i.

3. BWS' limited budgets for pipeline maintenance have been sufficient only for infrastructure in the most critical condition. In contrast, proactive maintenance management should aim to minimize costs and maximize infrastructure sustainability. While BWS is progressing toward this goal by starting an infrastructure replacement program, BWS' budgets for repairing and replacing existing pipelines have declined significantly over the past seven years. BWS' maintenance management system is still in transition.

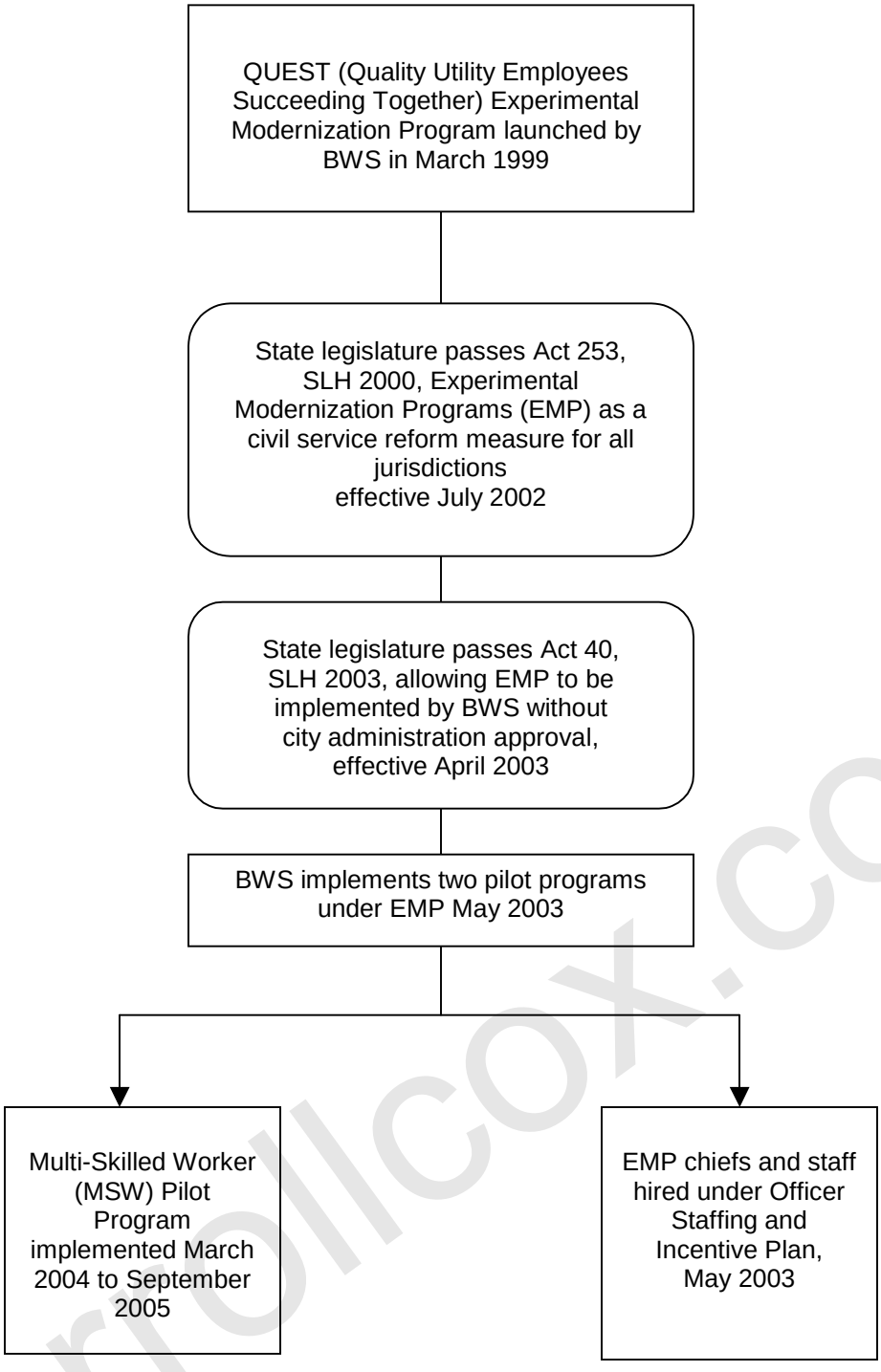
Human Resource Reengineering Was Costly and Failed to Deliver Anticipated Efficiencies

The Honolulu Board of Water Supply (BWS) spent nearly $16 million for its human resource initiatives under a state-authorized civil service reform measure, the Experimental Modernization Project (EMP), consisting of $10 million for consultant services, $2.1 million for contracted executives and staff, and $3.8 million for a Multi-Skilled Worker (MSW) pilot project. In addition, the board of directors awarded performance bonuses of $63,000 and $54,000 to the previous BWS manager and deputy manager, respectively, in FY2003-04, before the reorganization process was completed. After four revisions of its organizational chart in the past six years, BWS currently lacks a stable organizational structure to implement anticipated efficiencies.

To implement his vision for change, the previous BWS manager lobbied as early as 1999 for state approval to reengineer the organization outside of the government civil service personnel system. The legislation that paved the way for BWS was Act 253, SLH 2000, a civil service reform measure that authorized counties to establish and maintain a separate civil

service system based on the merit principle. Subsequently, BWS secured passage of Act 40, SLH 2003, codified in HRS Section 78-3.6, which allowed the organization to implement its own EMP independent of the city. Union officials supported the legislation based on the benefits of the MSW project, whose goal was to enhance efficiencies through cross-training those in specialized trades and awarding bonuses to successfully participating employees. While BWS reported that the 18-month MSW pilot met or exceeded its performance goals, the program's implementation has stalled over pay issues. In the meantime, Act 40 also led the way for management to hire contracted executive staff above existing civil service executive-management (EM)-level employees. This has led to a top-heavy organization at a time when reengineering was supposed to result in greater efficiencies and fewer staff. Exhibit 2.1 shows an overview of significant events pertaining to BWS' human resource reengineering.

Exhibit 2.1
Human Resource Reengineering Program Timelines



Sources: Honolulu Board of Water Supply and Hawaii State Legislature

Despite spending over $10 million on consultant services related to human resource reengineering, and awarding salary increases plus performance bonuses to BWS top management, the water utility still lacks a formal organizational structure. We found that BWS reorganized from eight divisions and three offices in 1998 to six operating units in 2001. By the end of FY2004-05, the organization had expanded to 12 divisions. Over the six-year period from FY1998-99 to FY2004-05, BWS had a total of four different organizational charts. Despite these many changes, we found that the latest organizational chart still did not reflect actual operations. For example, after various reorganizations, one principal executive had been promoted to head a larger division, then another reorganization resulted in this executive heading only part of a smaller division. Another was promoted as a principal executive of one office but continues to perform duties from the executive's former division. This uncertain organizational structure and repeated changes have stymied further progress toward its goals of creating a more efficient organization.

Background and cost of reengineering BWS' human resource program

In 1999, the BWS began a five-year program to reengineer all of its business processes and apply advanced information and communications technologies to achieve world-class performance. This program, QUEST, preceded the enactment of a statewide civil service reform measure codified in HRS Section 78-3.5, *Experimental Modernization Project (EMP).* This legislation encourages state and county jurisdictions to conduct pilot projects to assess potentially beneficial changes to the existing civil service system. The EMP legislation further states that the while the project is in progress, the agency is not limited by state or local personnel laws and rules but should comply with all equal employment opportunity laws and laws prohibiting discrimination. The law requires that prior to the implementation of any EMP project, a plan must be developed, employers must consult with employees involved in the project and with the appropriate union representative to determine if any modifications or waiver of any provision in its collective bargaining agreement are necessary to conduct the project.

Subsequent to the statewide EMP, BWS secured passage of Act 40, SLH 2003, codified in HRS Section 78-3.6, which contains similar provisions to the statewide EMP law, but limited its implementation to any county board of water supply serving a population of 500,000 or more. This new law essentially allowed the BWS to implement EMP independent of the city, with written agreement from union

representatives regarding any potential collective bargaining modification, waiver, or new provision, before the project is implemented.

As of March 2002, BWS management reported that the QUEST program was approximately 60 percent complete, listing the following accomplishments:

- strategic business and technology planning completed,
- macro reorganization completed and new leadership team installed,
- BWS human resources unit business model designed,
- field operations pilot design completed,
- additional pilot projects identified and concept designed,
- learning academy development initiated including BWS contribution to the Asia-Pacific Urban Institute, and
- several revenue enhancement projects identified and pursued.

In the process of reengineering its human resource system, BWS spent over $10 million on consultant contracts, as shown in Exhibit 2.2. These contracted amounts provided workforce analysis and various facilitation and consultation services for planning and facilitation of organizational changes.

Exhibit 2.2
Consultant Costs Associated with Reengineering and Information Technology
FY2000-01 to FY2004-05

Consultant	*Reengineering Service Provided*	*Start/End Date*	*Cost*
EMA, Inc.	Consultation and facilitation services to develop and implement a Utility Optimization Plan.	12/19/00 to 12/13/01	$1,535,000
EMA, Inc.	Consultation and facilitation services to develop and implement a Learning Academy.	12/5/01 to 8/31/03	$1,441,000
EMA, Inc.	Consultation and facilitation services to develop and implement the QUEST program.	12/5/01 to 10/28/02	$1,055,000
EMA, Inc.	Consultation and facilitation services to develop and implement the QUEST program.	11/12/02 to 2/27/04	$1,452,040
Kim Payton, Ph.D	Implementation assistance, training, and support services for process and organizational changes.	8/1/03 to 7/30/04	$283,500
EMA, Inc.	Consultation to Chief of Human Resources on human resource issues and initiatives and provide assistance to recycled water program.	10/24/03 to 1/22/04	$415,770
EMA, Inc.	Provide consultation and facilitation services to develop and implement a Computerized Maintenance Management System (CMMS).	1/9/04 to 7/5/06	$3,545,737
Kim Payton, Ph.D	Implementation assistance, training, and support services for process and organizational changes.	10/25/04 to 12/31/05	$250,000
KPMG,LLP	Consulting services to conduct a compensation study of multi-skilled workers in comparable local, national, public and private organizations and related industries.	11/23/04 to 6/23/05	$28,500
	TOTAL		**$10,006,547**

Source: Honolulu Board of Water Supply

Of the total amount, $5.9 million was awarded to Environmental Management Associates, Inc. (EMA), a Saint Paul, Minnesota-based company, and consisted of various contracts representing various phases of the human resource reengineering. EMA's scope of work included consultation and facilitation services to develop a Learning Academy; implementation of a new business model with written sequences of work and job descriptions, compensation strategies and preliminary cost analysis, and human resource management support, as directed by the chief human resources officer. EMA also obtained an additional $3.5 million to provide information technology assistance for the computerized maintenance management system (CMMS), a significant component of the MSW project. Additional costs for consultant contacts amounted to approximately $620,999: $533,500 for organizational psychologist Kim Payton, PhD, for project planning, career counseling, team building and individual consultations; and $28,500 to KPMG, LLP, to conduct and

prepare a compensation study of multi-skilled workers in other related industries, including interviewing BWS human resources personnel and employees to obtain information on its MSW pilot plan.

In addition to costs for consultant contracts, BWS spent $2.1 million by the end of fiscal year FY2004-05 for EMP contracted employees, a new level of contracted executives and staff. Under EMP, an Officer Staffing and Incentive Plan (OSIP) – approved by the board of directors on May 29, 2003 – was implemented to incorporate a strategic leadership team within the BWS organization. The OSIP provided performance incentives to EMP-contracted chiefs that met specified key business results.

Costs for human resource reengineering also included the MSW project, which was also authorized under EMP. MSW was conceived as a one-year pilot from March 13, 2004 to March 12, 2005, but was extended for an additional six months, from March 2005 to September 2005, costing a total of $3.8 million for the 18-month period.

Experimental Modernization Project legislation passed under the benefits of a multi-skilled worker project

The EMP legislation received strong support from government labor unions, both the Hawai'i Government Employees' Association (HGEA) and United Public Workers (UPW). The labor unions supported the experimental project based on their ability to negotiate contract terms directly with BWS rather than going through the city administration. Union officials we interviewed said that they supported the legislation based on the benefits of the MSW project, which would bring additional efficiencies through cross-training employees in specialized trades, and providing additional compensation for successful participants.

The EMP legislation also specified that BWS could implement this project without approval from the mayor, meaning it did not have to go through scrutiny by the city's Department of Human Resources on issues such as classification and compensation. The city's human resources department opposed this measure, stating that it would limit the mayor's ability to ensure that the best interest of the city is being served by allowing changes in human resources programs that may be beneficial for one department to override the best interest of the city as a whole.

Multi-Skilled Worker pilot project purpose, goals and incentives

According to the BWS Multi-Skilled Worker Pilot Project Plan, dated December 9, 2003, the MSW pilot project was conducted to assess the feasibility of employing more competitive industry best practices relative

to infrastructure maintenance. The plan further states that while BWS maintenance unit work processes are typical of water utilities that have evolved over time, in what has generally been thought of as a non-competitive business environment, initiatives to privatize public water utilities have changed the operational climate. Further, the plan noted, BWS recognizes that changes in work processes are necessary for the good of its customers as well as the organization's business health. For this reason, the BWS embarked on a multi-year reengineering effort to streamline its operations and become more competitive while improving field maintenance operations service levels. The plan noted that on December 9, 2003, two memoranda of agreement were signed by BWS with labor unions representing BWS employees — the Hawai'i Government Employees Association (HGEA) and the United Public Workers (UPW)— as required under the Act 40, SLH 2003, to begin the MSW pilot project.

The MSW initiative was designed as a one-year maintenance unit pilot project conducted in the suburban and metropolitan districts of the BWS customer services area, in an area contiguous to both Manana and Kalihi yards. The boundaries were defined on the western edge — Kamehameha Highway down to and including the campus of the Leeward Community College, and on the eastern edge — Nu'uanu Stream to Wyllie Street, and both sides of Wyllie Street to the BWS Alewa Heights Booster Pump Station Number 1. Each pilot member was required to be multi-skilled in five job classifications: pipefitting, heavy equipment operation, masonry, welding, and carpentry. Each member must complete training classes and requisite work hours to be fully multi-skilled and agree to: 1) work a four-day, ten-hours-per-day ("4-10") work schedule, 2) meet performance behavior expectations, and 3) perform and receive peer reviews. By applying these MSW concepts, the pilot project would be successful if predetermined service levels and project goals were met. The specific goals of the MSW pilot project were:

- To determine the applicability of the multi-skilled worker concept to BWS maintenance unit,

- To demonstrate the productivity and cost advantages of formal work planning in maintenance unit routine (non-emergency) work,

- To provide data for the calculation of future savings the BWS could realize through employment of these demonstrated maintenance work practices,

- To provide a business plan for adoption of these demonstrated best practices on a wider scale throughout BWS maintenance and operations units, and

- To provide data that demonstrates that these new work processes will reduce industrial injuries in the maintenance unit work teams.

The MSW pilot work teams continued to perform all emergency, routine, and preventive system maintenance in the pilot area for one year. Instead of a fixed crew size, daily work requirements would dictate the size of the crew to be utilized for each job based on job requirements.

Prior to the beginning of the pilot project, a set of performance measurements was established based on previous non-pilot crew's execution of similar work by job type. As the pilot project progressed, the performance of the pilot work teams was measured against the established baseline. The pilot project would be considered successful if the proposed 20 percent cost savings and process efficiencies were realized, while achieving better system availability to the customer through the use of multi-skilled work teams, formal work planning, and modern technology such as labor saving equipment and electronic mapping.

In addition, performance evaluations of MSW participants were based on a "peer review" methodology. Participants evaluate other members in the group monthly. To stay in the pilot project, each participant cannot have more than two consecutive average ratings of "less than satisfactory" evaluations. Each participant was also required to maintain at least an average rating of "satisfactory" to receive the performance initiative bonus.

The BWS implemented the MSW pilot from March 13, 2004 to March 12, 2005. With agreement from the labor unions, HGEA and UPW, the pilot project for the 27 MSW participants was extended an additional six months from March 2005 to September 2005. As of July 2006, BWS finance reported that the total cost for the MSW pilot project amounted to $3.8 million.

MSW pilot realized desired efficiencies

In its final report dated October 2005, BWS reported that the MSW pilot project was a success, meeting its performance benchmark of 20 percent cost savings. Documented efficiencies included the following:

- work crews configured according to the needs of each job rather than fixed in size and skill set;
- a four-day/ten-hour ("4-10") work schedule that improved customer service by having workers available seven days a week, resulting in an 18 percent decrease in hours of potential overtime per week;
- empowerment of crew leads to make decisions in the field, streamlining decision-making and resulting in quicker completion of assignments; and
- replacement of paper-based work order and service request system with computerized maintenance management system (CMMS), equipping crew leaders with laptops in the field, which eliminated duplicate data entry for field operations staff and enabled crews to access infrastructure maps, work order, and customer information to assist in on-the-spot decisions.

In addition, the MSW pilot was successful in achieving its goal of 20 percent operational cost savings in financial terms, as well as productivity and service level indices. Further, each participant maintained an average of "satisfactory" ratings and received a performance initiative bonus amounting to $3,000 per participant for the year. This was in addition to a pilot participation differential of 15 percent to 33 percent of each employee's base pay. Productivity was measured by improvements over a baseline, developed by taking the average of FY2000-01 timesheets for the Manana and Metropolitan Field Operations. Exhibit 2.3 presents a comparison of baseline performance and the measured efficiencies at the end of one year.

Exhibit 2.3
Multi-Skilled Worker Pilot Project – Realized Efficiencies
September 16, 2004 to March 11, 2005

Task	*Baseline*	*Realized Efficiencies*	*Increase Over Baseline*
Hydrant Maintenance	1.20 worker hours per fire hydrant	0.91 staff hours per fire hydrant	24%
Valve Maintenance	0.91 workers hours per valve	0.50 staff hours per valve	45%
Service Leak Repair	13.69 worker hours per repair	8.09 staff hours per repair	41%
Main Break Repair			
4”	55.38 worker hours 8.61 workers	29.92 staff hours 5.33 workers	38%
6”	64.67 worker hours 10.19 workers	32.25 staff hours 5.50 workers	46%
8”	101.15 worker hours 11.87 workers	67.78 staff hours 7.20 workers	39%
12”	135.74 worker hours 13.63 workers	69.43 staff hours 6.50 workers	52%
Response Time to Main Break	Dispatch time to crew arrival currently 3.5 hours 68% of the time	Response time within 3.5 hours 93% of the time	27%

Source: Honolulu Board of Water Supply

Full implementation of the multi-skilled worker project stymied by disagreements over pay

Based on successes documented in the October 2005 final report, BWS restarted negotiations with the UPW in March 2006 in an effort to fully implement MSW with 96 participants in the Field Operations Division. This expansion required organizational changes to reclassify employees in specific skilled trades (i.e., pipefitting, welding, masonry, equipment operation, or carpentry), into new EMP Multi-Skilled Worker classifications. However, negotiations stalled, as the levels of compensation agreed to by the previous BWS manager were deemed too high to be sustained for the entire Field Operations Division. On March 15, 2006, the current BWS manager sent all employees an email notifying them that negotiations for the full implementation of the MSW program ended unsuccessfully, based on an inability to agree on pay.

Due to the training they received, former MSW participants are now eligible for a broader range of positions than before they participated in

the pilot. For example, a former groundskeeper was able to transition into an equipment operator position, representing a potential 33 percent salary increase. However, for most participants, the end of the MSW pilot meant returning to their previous, trade-specific position and resuming less efficient ways of working. Some former MSW participants described the inability to implement the project as a step backward for the organization. Thus, while the pilot itself may have achieved and exceeded its performance goals, the inability to implement the same project on a wider scale means that there will be little, if any, returns on the resources invested in this project.

Contract employees hired to supervise existing management-level staff

While MSW formed the foundation for enacting the Experimental Modernization Project (EMP), this legislation also enabled BWS to establish an executive-level staffing plan providing performance incentives to a select group of officers who met specified key business results. The *Officer Staffing and Incentive Plan* (OSIP) established a strategic leadership team eligible for monetary rewards based on the achievement of strategic business goals and pre-determined performance metrics.

The OSIP identified five executive positions that would work directly for the BWS manager: chief information officer, chief financial officer, chief human resources officer, chief security officer, and chief strategic development officer. These contract positions have a base salary between $90,000 and $140,000, and function as executive supervisors above existing civil service operating unit administrators. They were also eligible for bonuses between 20 percent and 35 percent of their base pay. BWS anticipated new revenues or operational cost savings to fund these incentives.

Since the inception of this plan, BWS continues to struggle with the future role of these contract executive-level positions within the organization with respect to existing civil service executive-management staff. By hiring contracted executive employees under the EMP legislation and organizationally placing them above existing executive-management-level staff, BWS effectively diminished responsibilities of existing civil service staff, placing their positions at risk for possible future downgrades. The city's Department of Human Resources' Classification and Pay Division has identified a total of 21 executive-management level civil service positions affected by EMP hires.

These EMP executive positions most directly impact the duties and responsibilities of 10 civil service "principal executive" positions and nine other civil service managerial level positions by reducing their responsibilities for managing and directing their respective organizational divisions, and various administrative duties. These civil service positions, classified as EM08, have an annual salary range of $74,184 to $105,048. If these positions are downgraded due to diminished levels of responsibility, then downgrades may have a domino effect on their subordinates. Indeed, the city Department of Human Resources has identified an additional ten positions lower than EM08 — nine EM07 positions, and one EM05 position — potentially requiring re-description, should EMP chiefs under current contracts become a permanent part of BWS' organization.

In November 2005, the OSIP was superseded by the *EMP Management Staffing Plan* (MSP) after a review and assessment by the then deputy manager. The new plan placed greater emphasis on the role of EMP chiefs as mentors to existing civil service management staff. The management staffing plan justified the extension of the officer plan due to "the inability of many employees who have not been ready or willing to be trained by the officers." Despite the plan's reference to EMP chiefs as being hired primarily to train civil service management staff and confirmation of this purpose by the manager to board members in March 2005, only one of the EMP chiefs we interviewed described a role consistent with this purpose. That is, only one individual expected to provide necessary training to existing staff, and after which this individual would consider the EMP contract ended and leave the organization. The majority of current EMP chiefs, while cognizant of their role as mentors and as at-will employees, did not measure the duration of their employment by their ability to train civil service staff to succeed them.

From July 1, 2002 to June 30, 2005, BWS spent $2.1 million on EMP contracts, with individual EMP chiefs' base salaries ranging from $100,000 to $115,008. EMP hires were not limited to chief positions, though non-executives were ineligible for bonuses. Other contracted EMP staff hired between FY2002-03 and FY2005-06 included various non-executive positions:

- administrative assistants with annual salaries ranging from $53,500 to $90,000;
- a director of risk management with $80,000;

- a deputy legal counsel with $72,000;
- a safety manager with $62,100;
- a community liaison with $42,000; and
- a human resources intern with $31,530.

Based on organization charts provided by BWS, there are 16 positions that come under EMP contracts: 10 chief positions and six non-executive positions – four in the newly created office of the chief legal counsel. Since 2002, approximately 22 employees have been hired under EMP contracts, both as officers and non-officers. Terms of employment for EMP contracts are specified in two forms: either an employment agreement or a personal services contract. As such, although these employees function as at-will employees, documented contract terms have varied from 89-day personal services contracts to five-year EMP contracts.

EMP chiefs wrote up their own accomplishments to justify their bonuses

The original officer plan stated that performance criteria and metrics were to be established and reviewed by the policy-making board annually. Until such business-wide metrics were developed, individual goals and metrics would be utilized. In addition, the OSIP stated that, as BWS ventures into new businesses that generate new revenue, the maximum payout pool of dollars is based on a specified percent of either increased revenue, savings from efficiencies, or budgetary allotment. Our review of EMP contracts and interviews with EMP chiefs revealed that bonus awards were not based on quantified cost savings or new revenues, but on informal discussions with the deputy manager. In order to be eligible for bonuses at the end of each year, EMP chiefs were told to write up their own accomplishments from the previous year based on prior informal discussions, which would form the basis for the bonus award.

Despite the plan's intention of moving to more quantifiable metrics, bonus criteria for individual EMP officers consisted primarily of vague functional goals. For example, a $22,000 bonus was approved for one officer based partially on a goal to "provide positive and effective leadership to resolve compliance issues in legal, human resources, safety and health, certification, etc." The partial justification based on this goal

was documented as "undertaking and resolving ongoing issues that have not been satisfactorily addressed for over 10 years. Work with BWS legal, human resources, etc. to address workplace violence, job abandonment, drug abuse, fighting, lying, stealing, etc., etc." In addition, a $12,500 bonus was approved for an executive-level officer for the first six months of employment, based on goals such as gaining an understanding of how the finance department operates, gaining a basic understanding of the functions of each BWS department and how each department interacts with finance, and completing a water rate and water facilities service charge study, which was contracted to CH2M Hill. Documentation of progress toward these goals consisted of brief narratives stating that the officer understood the required duties, and that issues have been resolved. None of the justifications we reviewed included quantifiable metrics tied to business objectives, as stated in the original officer plan.

As a result of this policy, 11 EMP chiefs were eligible for a total of $400,002 in bonuses from FY2002-03 to FY2004-05, 19 percent of the total $2.1 million allocated for contract salaries. Exhibit 2.4 lists the EMP chief positions, contract salaries and the maximum annual incentive bonus in the officers' contracts.

Exhibit 2.4
Experimental Modernization Project Chiefs' Contract Duration, Salary and Bonus, for Contracts Initiated FY2002-03 to FY2004-05

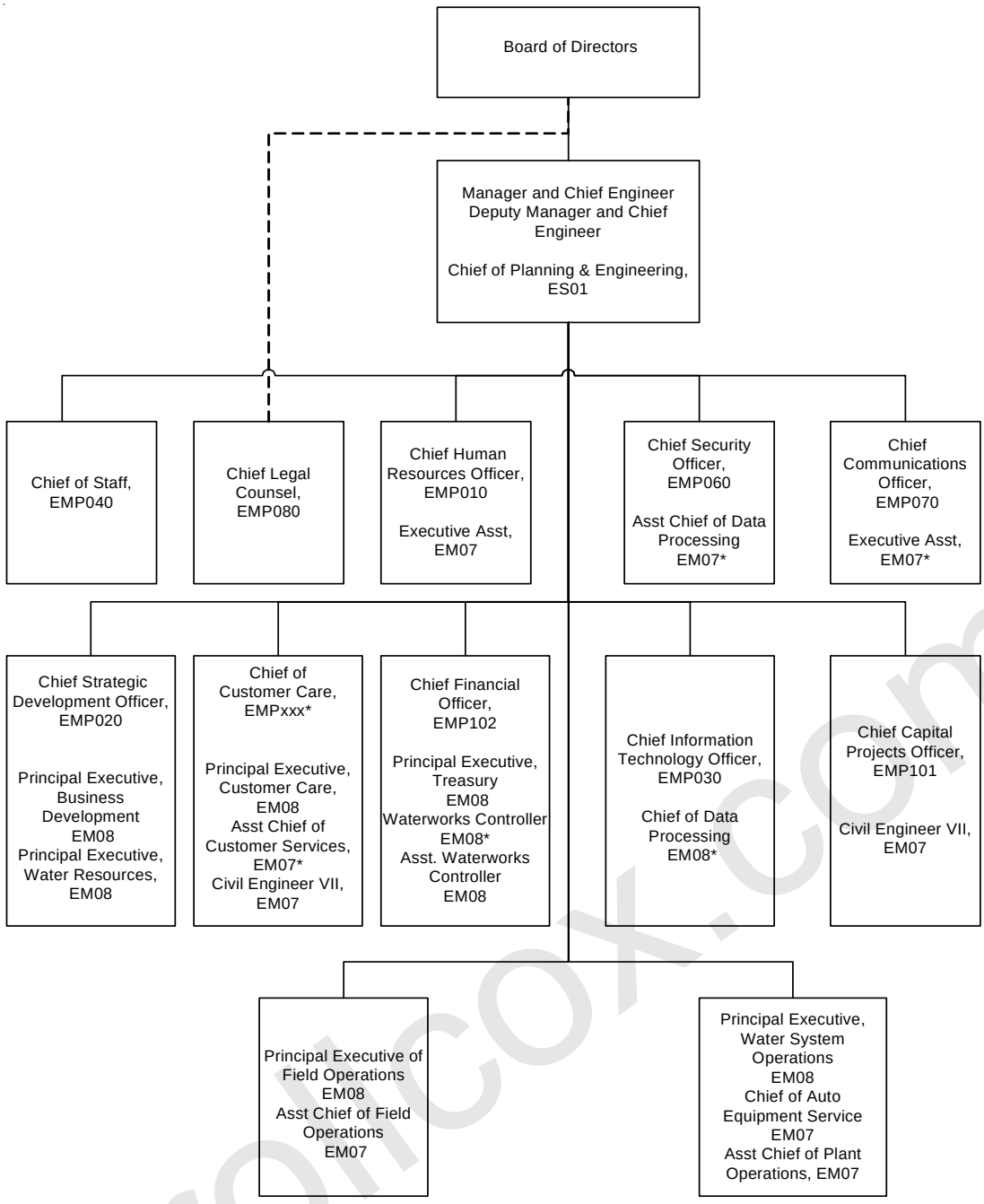
Title	*Contract Duration*	*Contract Salary*	*Contract Maximum Annual Incentive Bonus*	*Actual Incentive Bonus Paid*
Chief Communications Officer	11/15/04 to 11/14/05	$100,000	$20,000	$20,000
Chief Financial Officer (CFO) No. 1	3/8/04 to 3/7/05	$100,000	$25,000	$12,000
Administrative Assistant	5/10/04 to 5/9/05	$90,000	n/a	n/a
Acting Chief Financial Officer	12/1/04 to 5/28/05	$50,004	n/a	n/a
Chief Financial Officer No. 2	5/29/05 to 5/28/06	$100,008	$25,000	$25,000
Chief Human Resources Officer No. 1	7/1/03 to 6/30/04	$100,000	$20,000	$20,000
	7/1/04 to 6/30/05	$100,000	$20,000	$20,000
Chief Information Officer	8/1/03 to 7/31/04	$115,008	$20,000	$11,501
Chief Information Technology Officer	8/1/04 to 7/31/05	$115,008	$23,002	$11,501
Chief Compliance Officer	12/1/03 to 11/30/04	$103,000	$20,000	$10,000
Chief Legal Counsel	12/1/04 to 11/30/05	$105,000	$20,000	$20,000
Chief Operations Officer	9/7/04 to 9/6/05	$110,000	$22,000	$22,000
Executive Assistant	12/2/02 to 12/1/03	$93,384	n/a	--
Chief of Staff	8/1/03 to 7/31/04	$100,000	$20,000	$15,000
	8/1/04 to 7/31/05	$100,000	$25,000	$24,500
Chief Strategic Development Officer	6/16/03 to 6/15/04	$100,000	$20,000	--
	6/16/04 to 6/15/05	$100,000	$20,000	$20,000
	6/16/05 to 6/15/06	$100,008	$20,000	$10,000
Special Projects Executive	1/12/04 to 1/11/05	$100,000	$20,000	--
	1/12/05 to 2/28/05	$13,806	n/a	--
Chief Security Officer	7/16/03 to 10/12/03	$25,000	$20,000	--
	10/14/03 to 1/9/04	$25,000	$20,000	--
	1/13/04 to 4/10/04	$25,000	$20,000	--
	4/13/04 to 7/10/04	$25,000	n/a	n/a
	7/13/04 to 10/9/04	$25,000	n/a	n/a
	10/12/04 to 1/8/05	$30,000	n/a	n/a
	1/11/05 to 4/8/05	$30,000	n/a	n/a
	4/12/05 to 7/8/05	$30,000	n/a	n/a
	TOTAL	**$2,110,226**	**$400,002**	**$241,502**

Source: Honolulu Board of Water Supply

Future role of EMP officers uncertain

Despite the original plan's intent to involve the board of directors in developing evaluation criteria for EMP chiefs, and concerns voiced by current board members over their hiring, board members reported that they have no role in evaluating EMP employees and have only been notified of new hires and departures during board meetings. Thus, the only consistent measure of success for EMP employees is the continuation of their contracts. The organizational positions held by EMP chiefs eligible for bonuses are depicted in Exhibit 2.5.

Exhibit 2.5
BWS Organization Chart with Executive-Level Positions



Note:
1) EMP indicates division chief position created under Experimental Modernization Project, Act 40, SLH 2003
2) EM refers to "executive-management" or civil service executives
3) Asterisk * indicates positions under evaluation

Source: Honolulu Board of Water Supply

One board member supports the concept of hiring EMP chiefs to inject BWS with new perspectives, but believes that it can only work with a good evaluation system with specific goals and targets rather than the current system of hiring what the board member termed "super-employees" with no specific goals and no specific termination date. The board member also advocated a specific performance evaluation system for the BWS management, in line with those for the state Department of Education superintendent and University of Hawai'i president. Thus, despite the current practice, extending contracts should not be the only measure of success for EMP employees.

Benefits of the human resource pilots still uncertain after six years

Despite the $10 million BWS spent for consultant services related to reengineering and performance bonuses of $63,000 and $54,000 awarded in FY2003-04 to the previous BWS manager and deputy manager, the reengineering process is far from complete. The reengineering process has resulted in various changes to the BWS organization over the past six years, from collapsing eight divisions into six, then gradually expanding to 12 operating units. Despite the amount spent and the number of reorganizations, the current draft of its official organizational chart still does not reflect current operations.

Previous board of directors rewarded BWS managers before reorganization was completed

With reorganization yet to be completed, the previous chair of the policy-making board in FY2003-04 awarded bonuses of $63,000 to the BWS manager and $54,000 to the deputy manager, in line with 35 percent and 30 percent bonuses awarded to executives as part of EMP.

In addition to the bonuses, the board approved a 19 percent salary increase for both positions, to bring the salaries in line with a nationwide compensation survey of top water utility executives by the American Water Works Association. The survey showed that the average salary for the top executive of a water utility serving a population over 100,000 was $149,497. Based on this data, during its April 2004 board meeting, the board unanimously approved a salary recommendation of $126,000 for the manager and $120,000 for the deputy manager, both retroactive to July 1, 2003.

These bonuses were problematic for two reasons. During FY2003-04, operating expenses without depreciation exceeded operating income by $22.2 million, a 17 percent drop from FY2002-03, during which income had already decreased by 65 percent. In addition, while the policy-

making board has authority under the city charter to adjust the compensation of the manager, neither the charter nor the board's own administrative policies include the same authority over the deputy manager's compensation.

Current board members we interviewed, the majority of whom are new, confirmed that the policy-making board has no authority to award bonuses to the deputy manager. Current board members who were in place at the time described the circumstances behind the previously awarded bonus as "murky", with evaluations primarily conducted between the previous board chair and retired manager. Acknowledging the questionable practice described above, the current board has offered no bonus incentive to the recently hired BWS manager and chief engineer. However, board members also report that they have not established annual performance evaluation criteria for the current BWS manager.

Lack of a finalized organizational chart shows continuing instability

Despite the contract amounts spent and bonuses awarded to the BWS manager and deputy manager, BWS still does not have a finalized organizational chart. The draft provided to our office still did not reflect current operations, raising questions from the city Department of Human Resources about the status of certain positions. While the full implementation of a new organizational structure could take years, the lack of a stable foundation portrayed by an official organization chart makes progress toward innovation even more difficult.

An organization chart defines specific job specialties, reporting hierarchies and relationships among peers within the organization. A well designed organization chart defines jobs based on accountability for lines of business, or specific products and services. Clear individual accountability for lines of business empowers employees to run internal businesses creatively, with a focus on adding value to the organization.

According to human resource professionals, problems stemming from a faulty organization structure include political in-fighting, poor teamwork, lack of customer focus, weak strategic alignment, slow pace of innovation, a bureaucratic rather than entrepreneurial culture, pressure for decentralization and outsourcing, and poor morale. When structures are built around personalities and politics, restructuring occurs every time anyone changes jobs. This expensive disruption induces cynicism. For management, this translates to difficulties in explaining to staff the

rationale for the structure. For employees, this instability results in confusion, suppressing initiative and making it more likely for employees to be passive and wait for the boss to tell them what to do.

Based on recommendations from its consultants, BWS reorganized from eight divisions and three offices in 1998 to six operating units in 2001. However, by the end of FY2004-05, the organization had expanded its divisions to 12 operating units. Within a six-year period from FY1998-99 to FY2004-05, BWS had a total of four different organization charts. Despite these many changes, we found that the latest organization chart still did not reflect actual operations.

As stated previously, the lack of an official organization chart has raised questions within the city's Department of Human Resources (DHR) regarding the status of various executive-management level staff. While BWS does not require authorization from city DHR for organizational changes under EMP, BWS employees continue to be part of the larger civil service personnel system.

The ultimate aim for the state legislature's authorization of EMP is that any improvements would include recommendations to incorporate or modify the project into the existing personnel system. Keeping city DHR apprised of organizational changes, while not required under Act 40, would serve as a way to ensure that any improvements made by the BWS through EMP would ultimately be applicable, and serve as a benefit to the civil service system as a whole.

Costly Business Development Projects Implemented with Questionable Benefits to Ratepayers

BWS' conservative approach and focus on its core mission allowed the water utility to be financially solvent in economically trying times. Reengineering efforts, driven by the threat of privatization and desire for autonomy "in perpetuity", led the department in a new direction of generating revenues through business development activities. However, in its rush to accomplish this vision, business projects were implemented with insufficient analysis, timely documentation and management oversight. This led to problematic business deals that drained much needed resources from the department, requiring significant expenditures while generating minimal new revenue. As a result of its business deals and expenditures for the city, the BWS incurred $78 million in long-term financial obligations by implementing business projects that were of questionable benefit to its ratepayers. While the business development office was originally established to oversee such projects, its role,

function and purpose within the organization, as reflected by the duties and responsibilities of its staff, remains unclear.

Business development office established to generate revenues for the board

The department intended the business development office to be responsible for the following functions:

- know markets and existing new customer needs;
- sell new products and services;
- optimize asset utilization;
- research and develop new technology and alternative sources;
- acquire new systems and facilities;
- analyze competitors; and
- create, design, and pilot new products and services.

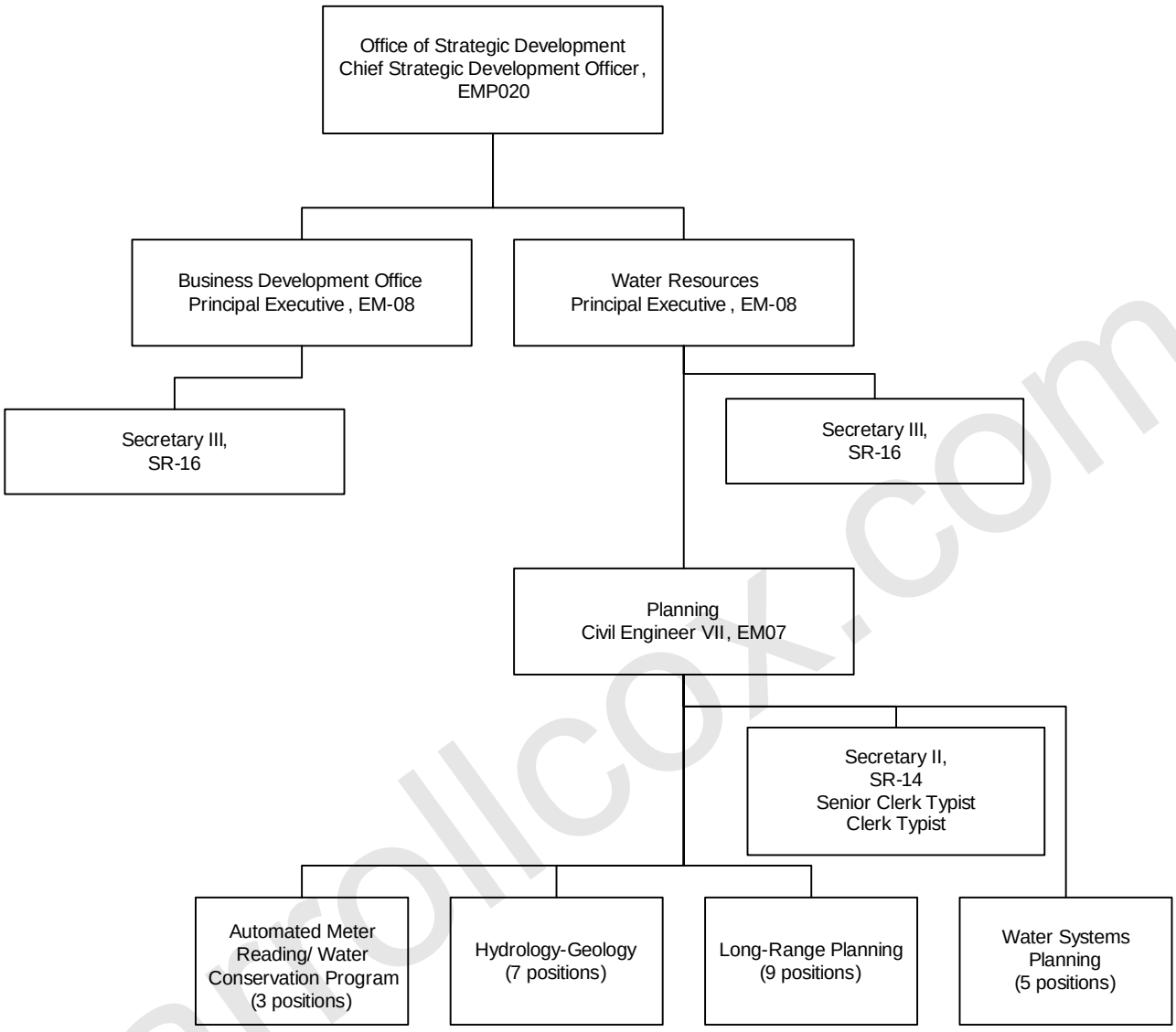
The department promoted an existing administrator to the newly created business development principal executive position in 2001. The vision for the business development office was to market the knowledge and technical expertise that BWS has gained from its experience in operating and maintaining Honolulu's water system, thereby generating new revenue sources, which would offset some of the cost of operations and benefit ratepayers by deferring rate increases.

Business opportunities would also benefit the department by providing advancement opportunities for BWS employees. Moreover, BWS' revenue base would be diversified through projects such as recycled water, and then incorporate successful projects into the larger organization. For example, staff members within the customer care office were trained to take over accounts receivable and billing for recycled water, while field operations staff were trained to fix leaks, as well as other repair and maintenance operations specific to recycled water.

Staffing, responsibilities and reporting

Oversight for the business development office belongs to the Office of Strategic Development, which also oversees the Water Resources Division, as illustrated by the organization chart in Exhibit 2.6. However, the chief strategic development officer, an EMP position, has been vacant since June 2005.

Exhibit 2.6
Strategic Development Organization Chart



Source: Honolulu Board of Water Supply

Since the business development office is officially staffed by only two positions, the principal executive and a secretary, additional personnel needs for projects are met by temporarily assigning employees from other divisions or operating units. The business development principal executive explained that the BWS determined that it would be inefficient to hire new staff who would be dedicated only to special projects. The executive also noted that coordinating with other division heads for employees' time during early phases of a project poses challenges when staff members are needed to perform both their original and business development responsibilities.

For example, the Honouliuli Recycled Water Facility has three BWS employees providing field, customer care and regulatory monitoring services who are officially assigned to the Customer Care Division: one recycled water system coordinator officially occupies a water service investigator position, a second recycled water coordinator is a lead water mechanic, and a third employee – a recycled water program specialist – is a customer relations assistant. The recycled water program specialist still performs customer relations assistant duties from time to time, and the water service investigator is sometimes called upon to do short-term water leak investigations in the Ewa area.

While these employees have been supervised by the business development principal executive, effective July 1, 2006, the Water Resource Management Division assumed responsibilities for overseeing these employees. As a result, the sole business development responsibility remaining for the principal executive will be administering the department's contract with Veolia, formerly U.S. Filter, to operate and maintain the Honouliuli Recycled Water Facility. However, the executive expects to oversee the upcoming U.S. Army water systems privatization and future desalination projects. In addition, the business development principal executive has since been unofficially assigned additional duties from his previous position, supervising the water quality laboratory and ensuring compliance with environmental regulations. This executive expects to continue performing responsibilities for both positions.

Business projects rushed with limited planning and oversight

Over the past six fiscal years, BWS has invested $78 million of its resources to start up business development projects of questionable value to ratepayers, increasing its financial obligations while justifying these ventures as potential sources of new revenues to defer the need for rate increases. Such expenses include the following projects:

- $1.1 million in architectural improvements to redesign a 5,355 square-foot office space for the Asia-Pacific Urban Institute at Kapolei Hale in an effort to draw consulting work from the Asia-Pacific region, and a separate BWS consulting project that generated less than $10,000 in revenues;

- $48 million to purchase the Honouliuli Recycled Water Facility, which had been built by U.S. Filter, now called Veolia, to help the city meet the requirements of a U.S. Environmental Protection Agency (EPA) consent decree;

- $13.5 million to purchase the Ewa Shaft from the Estate of James Campbell, and rehabilitating the contaminated shaft at a cost of $4.5 million, rather than condemning the property outright; and

- $11 million to incorporate and construct a district cooling plant to provide air conditioning at the John A. Burns School of Medicine, plus $2.3 million over the next 20 years to fully own equipment within the plant, and a $300,000 operating agreement with Southland Industries.

While recycled water and district cooling appear to be technologically viable and may pay off over the long run, they have yet to achieve the desired impact of generating new revenue in amounts sufficient to minimize water rate increases for ratepayers. As a result, ratepayers are now faced with a cumulative 57 percent increase in water rates over the next five years.

Asia-Pacific consulting projects pursued without a business plan

One of the first projects pursued under business development or revenue enhancement was to provide technical expertise through consulting contracts with nations in the Asia-Pacific region. While discussions about this potential business opportunity had occurred as early as 2002, a business plan was never finalized, and was still in draft form by January 2004. The pursuit of these projects stopped that same year, as EMP chiefs questioned whether they were consistent with BWS' statutory purpose.

Near the beginning of these BWS reengineering efforts, the previous mayor expressed his vision of Honolulu as a gateway for knowledge-based industries and professional services seeking to do business in Asia. To fulfill this vision, the mayor's plan was to bring various conferences to

Honolulu: the China-America Conference of Mayors and Business Leaders, the Japan-American Conference of Mayors and Chamber of Commerce Presidents, and the Mayor's Asia-Pacific Environmental Summit Conference. In December 2000, the mayor said that he wanted to establish an urban institute in Honolulu designed to attract new Asian mayors and public works directors to come to Honolulu to learn about municipal finance and technology. The mayor believed that this institute, in turn, would provide the nexus for Hawai'i businesses with technical expertise to meet with officials from Pacific Rim nations. In a 2001 speech made to the Consulting Engineers Association, the BWS manager said that the impetus for pursuing consulting work in Asia was to address the needs of the "many people from other places" who had sought technical expertise from BWS in the past, but had been turned away.

Related to its plans for Asia-Pacific consulting, BWS funded $1.1 million in architectural improvements to enhance approximately 5,355 square feet of existing office space at Kapolei Hale to showcase the Asia-Pacific Urban Institute/Kapolei Learning Center to support the former mayor's initiative to export BWS' technical knowledge and expertise through consulting contracts in the Pacific Rim.

Marketable services mismatched with BWS' ability to execute

After drawing up contracts with governments in Samoa, the Philippines, the Northern Marianas Islands and Pohnpei, BWS determined that potential clients favored long-term operating contracts typical of private-sector consultancies, which would have required public-sector employees to spend extended time overseas. However, this was not deemed to be feasible, and BWS focused instead on shorter-term projects. As a result, BWS files showed only $6,000 in revenues from water condition assessments for the American Samoa Power Authority. Such projects have not been pursued since 2004.

In December 2001, BWS signed a three-year, exclusive teaming agreement "in the public interest" with Hawai'i-based engineering firm SSFM International, Inc. to help identify opportunities throughout the Pacific Rim and Asia. Documents stated that SSFM provided a "Congressionally authorized advantage" because of its designation as a minority-owned firm. According to the principal executive for business development, there was no request for proposal (RFP) issued for this agreement, but SSFM was selected after BWS issued a notice for services related to exploring the concept of conducting business in Asia. To its credit, the principal executive for business development said that

BWS resisted pressure to pursue larger projects with SSFM in the region, which would have required BWS staff to spend extended periods overseas.

As part of a joint project with the Office of the Mayor, the BWS funded a total of $1.1 million in improvements for the Asia-Pacific Urban Institute (APUI), in time for a conference held from April 3-6, 2002 on the first floor of Kapolei Hale. Architectural improvements and water-themed design features included displays relating the "Story of Water", a technology display and a consultants' display offering solution packages from BWS and Hawai'i consultants; a lounge with sofas, chairs and a coffee table; a study and library, and an 18-seat conference table with a 60-inch plasma screen and video conference facilities. Partners in the conference included funding agencies such as the Asian Development Bank and the U.S. Agency for International Development. The conference was reportedly attended by representatives from 15 countries, including China, Thailand and India.

Despite remaining mostly unused after the conference, the BWS entered into a five-year, $1-a-year lease with the city from December 1, 2004 to December 1, 2009 "or whenever the Board makes a determination that the use of the APUI premises is no longer necessary or desirable whichever occurs first." This agreement was executed on December 30, 2004, three days before the previous mayor's term in office ended. A portion of this space has been occupied by the Office of the City Auditor since April 2005.

Consulting contracts with Pacific Rim yielded only $6,000 in revenues

Between 2002 and 2005, BWS signed service agreements with public water utilities in the Philippines, the American Samoa Power Authority, and the Pohnpei Utilities Corporation. However, the principal executive said that the resulting projects were small, ranging from $5,000 to $10,000. Project files indicate that these agreements resulted in revenues only from the Samoan utility: $4,115 for a two-day training and $2,000 for analyzing water samples for compliance with U.S. Environmental Protection Agency-approved test methods. Project files also indicated that the BWS conducted a three-day assessment of the chlorination equipment and practices of the Commonwealth of the Northern Marianas Islands, but revenues were not documented. Thus, BWS spent $1.1 million on a training facility and pursued travel to Asia and Pacific regions for a business venture that did not match the

organization's mission and ability to execute. Furthermore, the business did not generate sufficient revenue for the investment made.

Purchase of a $48 million recycled water plant relieved the city of certain Environmental Protection Agency obligations

BWS purchased the Honouliuli Recycled Water Facility for $48 million from U.S. Filter in 2000, reversing the previous manager and board's management decision in 1997 refusing the city's offer to take over the plant. The plant had originally been designed, built, financed, owned and operated by U.S. Filter under a 20-year, $140-million agreement with the City and County of Honolulu, to help the city comply with certain conditions under a 1995 U.S. Environmental Protection Agency consent decree.

Background on recycled water and Honouliuli purchase

On May 15, 1995, the U.S. Environmental Protection Agency (EPA) filed a consent decree alleging that the City and County of Honolulu violated the Clean Water Act due to chronic sewage overflows and spills, which discharged raw sewage or partially treated wastewater from its collection system. In addition to agreeing to address sewage infrastructure problems, the city also agreed to commit at least $20 million to wastewater reuse as a supplemental environmental project. The city agreed "to beneficially reuse wastewater" under a specific schedule beginning with at least 5 million gallons per day (mgd) of municipal wastewater by June 30, 1999; and increasing to at least 10 mgd by July 1, 2001.

In March 1998, the former mayor proposed plans to strip the BWS of its semi-autonomous status and merge it with the sewer system, in what would later be called the Department of Environmental Services. Such a reorganization required city council approval and a voter-approved charter amendment. The city council objected to the merger proposal, along with BWS board members and employees. That same month, the BWS manager resigned, citing disagreements with the city administration. The mayor reintroduced the proposal in May 1998, but the city council postponed action, pending a study on the merger's potential financial impact.

On December 24, 1998, the city contracted with U.S. Filter to develop, plan, design, finance, own, construct, operate and maintain a recycled water facility adjacent to the city's wastewater treatment plant, with an ultimate capacity to produce 10 million gallons per day of recycled water. The contract stated that U.S. Filter would be willing to market recycled water, identify and pursue other recycled water customers.

The BWS deputy manager said that the city had approached BWS in 1997 to take over the planned water recycling plant, but management had refused. In contrast, the subsequent manager viewed recycled water as a water conservation measure, and started talks in 1999 with the city and U.S. Filter to have BWS purchase and operate the facility. On July 20, 2000, all three parties signed agreements for U.S. Filter to sell the plant to BWS for $48 million, contingent upon the satisfaction of certain performance standards. BWS, in turn, retained the company to continue operating and maintaining the plant after the sale, for a service fee consisting of a fixed rate plus variable rates based on the volume of recycled water produced.

Recycled wastewater was formerly used in the United States mainly for purposes that did not require high-quality water, such as irrigating pastures or nonfood crops. Today, highly treated wastewater is used for urban irrigation, toilet flushing, industrial needs, and indirect potable reuse, such as recharging local underground aquifers. Additionally, industrial users purchase recycled water to use in cooling towers, boiler feed, and other manufacturing processes. The United States produces an average of 2.6 billion gallons of recycled wastewater daily.

The Honouliuli Recycled Water Facility is able to produce 12 million gallons per day of recycled water from wastewater discharged from the neighboring city-owned wastewater treatment plant. The recycling facility produces two grades of recycled water: R-1, which is used for irrigating crops and landscaping, and Reverse Osmosis (RO) water, which is used for industrial purposes at refineries and power plants. Neither grade is suitable for drinking, but according to the state's Department of Health standards, the R-1 process produces water that is 99.9 percent pathogen-free and is deemed safe for human contact.

During the R-1 process, wastewater passes through rapid mix tanks, flocculators that aggregate particles, filters, ultra-violet (UV) light disinfection and a transfer pump station for eventual use in landscaping, and on nonfood crops and greenbelts. This comprises the majority, up to 10 mgd, of water produced by the plant. R-1 water is delivered mostly through pipes to man-made "lakes" in golf courses. The golf courses then use their in-house irrigation systems to distribute the water for irrigation. Demand for this type of water can vary based on weather conditions. For example, during this year's six-week spell of rain, a BWS recycled water staff reported that demand was virtually zero. The principal executive for business development said that, on average, BWS charges 55 cents per 1,000 gallons of R-1 water.

The rest of the recycled water produced by the Honouliuli facility, an estimated 2 mgd, consists of RO water used by industrial customers. RO water is essentially treated by forcing water through an ultra-fine membrane, allowing only water to pass through. Demand for RO water is steadier than R-1 water because the customers are manufacturing facilities whose operational demand is not as affected by rainfall levels as R-1 water customers.

The principal executive for business development said that RO water costs more to produce, and uses more electrical power than R-1 water. BWS charges $5 per 1,000 gallons for RO water. This constitutes significant savings for private sector industrial clients, who previously purchased potable water at $1.98 per 1,000 gallons, but incurred added costs to staff, operate and maintain pumps to demineralize the water at an additional cost of $4 to $5 per 1,000 gallons.

Purchase prompted an additional $2.8 million in consultant contracts

After the BWS purchased the recycled water facility, it entered into an additional $2.7 million in consultant contracts to market recycled water and related services. Exhibit 2.7 lists BWS' consultant contracts to date for the Honouliuli Recycled Water Facility, subsequent to its purchase in 2000.

Exhibit 2.7
Consultant Contracts Related to the Honouliuli Recycled Water Facility

Contractor	*Contract Term*	*Description of Services*	*Amount*
CH2M Hill	Nov. 2001 to Nov. 2003	Water services expansion for water reclamation facility	$1,000,000
Pacific Management Consultants	Aug. 2002 to Aug. 2003	Marketing services to identify new recycled water customers	$125,000
Kobayashi, Sugita and Goda	March 1, 2001, as necessary to execute contract amendments or litigation as required	Legal services to represent BWS with regard to the operating agreement for the reclamation facility	$600,000
Brown & Caldwell	Jan. 2002 to Jan. 2003	Media and information materials for public outreach	$325,000
CH2M Hill	July 2003 to July 2005	Continuing technical evaluation work to transfer Honouliuli Recycled Water Facility from U.S. Filter to BWS	$450,000
Horwath Kam & Co.	Sept. 2003 to Sept. 2005	Auditing operating and maintenance costs since commercial operations and transfer dates	$225,000
	Total		**$2,725,000**

Source: Honolulu Board of Water Supply

CH2M Hill's first contract pertaining to water recycling was bundled with BWS' attempt to acquire the U.S. Army's water system. The original contract amount for portions specific to recycled water totaled $775,000 plus $100,000 for program management. An additional $125,000 was added to contract amounts to include technical analysis such as flow monitoring, as well as business analysis such as due diligence audit of the existing facility, operations and sales of recycled water. CH2M Hill's second contract pertaining to recycled water entailed continuing technical evaluation work required to transfer the water recycling facility from U.S. Filter to BWS, and implement its first year of operations following its March 31, 2003 purchase.

The transfer from U.S. Filter to BWS required additional services of the legal firm Kobayashi Sugita & Goda to deliver a formal operating agreement and formalize a common interpretation of performance standards. In addition, CPA firm Horwath Kam & Co. was contracted to audit all costs associated with operating and maintaining the facility during the three year-gap between the start of commercial operations and official transfer of ownership from U.S. Filter to BWS.

Two of the contracts for recycled water comprised marketing activities, one for marketing firm Pacific Management Consultants and another for environmental engineering firm Brown & Caldwell. Pacific Management Consultants' scope of work included marketing activities related to identifying new recycled water customers, initiating and coordinating meetings with potential customers, promoting the use of recycled water to the public, assisting elected officials in writing incentive programs, and assisting the board in developing legally binding agreements with potential buyers. There was no documentation of specific reporting requirements.

Brown & Caldwell's scope of work also included marketing activities, specifically delivering media and information materials for public outreach. This included producing informational brochures, fact sheets, a five-minute water recycling video, and an interactive CD, and providing scripts for BWS employees to use for visitors' tours of the recycled water plant.

Revenues did not exceed operating expenses for the first three years

The principal executive for business development said that the plans to acquire two other wastewater treatment plants, in Waianae and Wahiawa, were dropped after due diligence showed that they would not be financially feasible. According to a financial model developed by contractor RBC Dain Rauscher in 2001 to evaluate the acquisition of the city wastewater treatment plants, the outcome of the analysis results in a shortfall of stand-alone revenues to meet debt service and expenses for every scenario and will require supplemental BWS' water revenues, anticipated to come from capital improvement bond issues.

Exhibit 2.8 shows anticipated revenues and expenses for the Honouliuli Recycled Water Facility based on the due diligence reports, compared to actual revenues and expenses, as recorded by the BWS Finance Division.

Exhibit 2.8
Honouliuli Recycled Water Facility Due Diligence Projected vs. Actual Revenues and Expenses for Recycled Water Sales, FY2001-02 to FY2004-05

Fiscal Year	*Projected Revenues*	*Projected Expenses*	*Projected Income (Loss) (Revenues minus Expenses)*
FY2001-02	$2,348,950	$2,097,290	$251,660
FY2002-03	$2,620,700	$2,626,732	($6,032)
FY2003-04	$4,175,600	$3,018,356	$1,157,244
FY2004-05	$5,478,460	$3,294,278	$2,184,182

Fiscal Year	*Actual Revenues*	*Actual Expenses*	*Actual Income (Loss) (Revenues minus Expenses)*
FY2001-02	$3,028,787	$3,826,218	($797,431)
FY2002-03	$3,405,958	$4,320,848	($914,890)
FY2003-04	$3,641,686	$4,446,429	($804,743)
FY2004-05	$4,172,324	$4,048,182	$124,142

Source: Honolulu Board of Water Supply

First-year revenues from recycled water sales were 29 percent higher than projected, but actual expenses were 82 percent higher the first year. Over the past four years, annual revenues have averaged 6 percent higher than their consultant anticipated and annual expenses have been 54 percent higher. The principal executive for business development said that revenues have been sufficient to cover operating expenses, but BWS will need to subsidize capital expenses with potable water revenues.

Special exemptions and less than favorable agreements with the city and Campbell Estate have cost the BWS over $18 million

Section 7-105(e), RCH, gives BWS the authority to acquire by eminent domain, purchase, lease or otherwise, in the name of the city, all real property or any interest therein necessary for the construction, maintenance, repair, extension or operation of water systems of the city. In connection with this authority, BWS levies water system facilities charges on all new developments requiring water supplies from the water utility's system or additional water supplies from existing water services. Developers are exempt from this charge when they install, at their own cost, a complete water system including source and transmission, and daily storage facilities. BWS requires developers to pay this charge before water services are made available to the developments. We

found that the BWS deviated from this practice in two instances: first, when BWS finished construction begun by the city on its Ewa Villages project, and second, when BWS purchased Ewa Shaft from Campbell Estate.

Completing the city's Ewa Villages water system cost ratepayers $1.3 million

Based upon negotiations with the city, the BWS agreed in FY1999-00 to deviate from its standard policies regarding a developer's responsibility to construct the related water infrastructure for the city's low-income housing development known as Ewa Villages. The size of the development required the city to build a specified water system and convey it to the BWS. The city began construction of the water system infrastructure, but BWS subsequently agreed to complete the unfinished phases of the work before finalizing the city's portion of total infrastructure costs that directly benefited the Ewa Villages project. As a result of this tentative arrangement, BWS' financial audit for FY1999-00 reported a dispute between the two parties with regard to the city's share of costs. This issue was resolved in FY2005-06, resulting in BWS recording $1.6 million in uncollectible water service facilities charges. BWS management stated that the amount recorded, net of its reserves, would not have a material adverse effect on the financial statements. Nevertheless, this is a significant amount of anticipated revenue that was not collected.

Ewa Shaft purchase agreement favored estate at ratepayers' expense

BWS also deviated from this same practice when it purchased the Ewa Shaft from Campbell Estate for $13.5 million in March 2001. The property was officially condemned for BWS' public use in November 2001, eight months after BWS acquired the property. Instead of its standard practice of placing responsibility for the water source on developers, BWS plans to spend another $4.5 million in bond proceeds to rehabilitate the contaminated well and shaft facilities, and construct water infrastructure without any reimbursement from the estate. In addition, BWS agreed to provide 15 million gallons per day (mgd) for use by landowners in the Ewa plain. However, the State Commission on Water Resources Management eventually gave BWS an allocation of only 12 million gallons. This places responsibility on BWS to supply the remaining 3 mgd to Campbell Estate from other areas. In addition, even though the BWS knew that the water from the shaft was contaminated at

the time of purchase, BWS agreed to release Campbell Estate from any liabilities pertaining to hazardous materials or groundwater chemicals.

BWS' capital projects branch chief said that BWS purchased the shaft because it was large enough to service more than one development project. By purchasing the shaft, BWS can manage the water source, Pu'uloa aquifer, as one entity rather than having several different development companies managing this large resource. Once the rehabilitation of the Ewa Shaft is completed, the BWS will control allocations to the different developers that will use the water within the BWS system. In 2004, BWS required Gentry Investment Properties to install water system improvements to serve its project in the Ewa Makai area, which the developer estimated would require 1 million gallons of water per day. While BWS may eventually recoup costs by controlling allocations to future developers using water from the Ewa Shaft, deviating from its standard practice of placing this responsibility on developers and releasing the estate from liabilities could result in unknown additional future costs.

District cooling agreement with the University of Hawai'i costly to the board

While district cooling is primarily an electricity cost-saving measure, BWS absorbed capital costs for a redesign of the University of Hawai'i John A. Burns School of Medicine building in Kakaako to incorporate a district cooling plant into its facility. Because this was a new business venture and new technology for BWS, the manager gave the EMP chief of strategic development broad latitude in establishing the business and managing associated contracts. As a result, inadequate management oversight over BWS' consultant placed in charge of the district cooling plant at the John A. Burns School of Medicine (JABSOM) in Kakaako resulted in $11 million in capital expenditures and costly contract terms requiring additional expenditures of $2.35 million over 20 years ($188,570 annually) to own the district cooling equipment; $158,556 in annual lease rent and annual credits of $400,000 to fulfill a guarantee that the facility would save $100,000 annually in electricity costs.

Background on BWS' involvement in district cooling

District cooling is a system that distributes water from one or more sources to multiple buildings for air conditioning or other uses. One type of district cooling is called deep water source cooling (DWSC). The basic concept is to use naturally occurring cold water to produce chilled water that can be used for cooling buildings as an alternative to traditional on-site, energy intensive air conditioning equipment. Ideally, naturally occurring water at a constant temperature – 40°F to 50°F or

less – is withdrawn from deep areas within lakes, oceans, aquifers and rivers and is pumped through the primary side of a heat exchanger for air conditioning purposes.

The BWS' participation in district cooling is the result of two events that convinced BWS to implement this technology at Kakaako: (1) the BWS' discovery of 60°F water off Kalaeloa – and the potential for cooler water at lower depths – while digging a test well for a future desalination plant, and (2) a presentation on the implementation of district cooling at the Natural Energy Laboratory of Hawai'i at Keahole Point on Hawai'i Island at an alternate energy workshop sponsored by the state Department of Business, Economic Development and Tourism in March 2003. At the workshop, BWS' then-chief of strategic development met with two individuals who would later form Honolulu Cooling Networks (HCN): the chief executive officer of FVB Energy, who spoke about the technology of district cooling systems, and the president of Norventus Group, who spoke about project financing for district cooling systems.

Deficient oversight by BWS management resulted in a one-sided agreement

The John A. Burns School of Medicine (JABSOM) building was under construction in Kakaako when HCN convinced BWS to develop a district cooling system. BWS determined that having the plant in that structure was preferable to building pipelines, which was estimated to cost $30 million upfront. Although the medical complex was under construction, the BWS manager agreed to incur the additional cost of stopping JABSOM construction to redesign its original cooling structure and house the district cooling plant, in order to launch the business.

In January 2004, BWS contracted with HCN for $850,000 to develop everything from preliminary financial and market analysis, to designing the plant and the business plan, to hiring an operator, to providing customer support. BWS' involvement was limited to contract oversight by the chief strategic development officer and technical assistance by the principal executive of the water resource management office. Even though HCN had conducted feasibility studies as early as October 2003, the contract was not officially executed until April 2004. By December 2004, change orders more than doubled HCN's compensation to $1.8 million, with the addition of plant construction-related activities such as progress reports, verification of construction work, construction coordination minutes, providing owner's representation for district cooling plant testing and start-up oversight, punch-list services, including

code compliance review and walk-thru on behalf of BWS. The contract term was also extended to August 31, 2005.

By the time the project was completed in September 2005, BWS spent a total of $11 million in capital expenditures, the BWS manager who approved the project had retired, and the chief strategic officer resigned, leaving no supporting documentation for the district cooling negotiations and agreements to guide BWS' remaining managers.

Guaranteed $100,000 annual savings for JABSOM costs BWS $400,000 a year

The BWS' former chief of strategic development guaranteed the University of Hawai'i an annual savings of $100,000 in electricity costs over JABSOM's originally designed cooling tower. However, after the chief of strategic development resigned, BWS management was unable to find prior calculations of how much BWS would need to charge to recoup its investment and cover this guarantee. Subsequent analysis showed that, in order to generate the savings promised, BWS would have to credit JABSOM a total of $400,000 a year. For example, if JABSOM's annual charge for cooling is $1 million, BWS would only collect $600,000.

BWS also agreed to contribute $5.5 million to fund installation of the cooling system, which included source and injection wells, piping structures, equipment, and necessary fixtures. Despite this investment, the sales agreement states that JABSOM retains $2.35 million interest in the plant over 20 years. BWS thus owes JABSOM $188,570 annually – included in the $400,000 energy savings credit– for the next 20 years in order to own all the district cooling equipment in JABSOM's central services building. In addition, BWS pays JABSOM to lease space for that portion of the cooling plant that stores the district cooling equipment, plus one office space, for $158,556 annually.

As BWS pursues another district cooling project in Kô 'Olina, the organization has learned to reduce its dependence on consultants to formulate cost-benefit scenarios by training one of its engineers to lead the project. However, BWS continues to lack technical expertise in district cooling and will need to develop relevant project evaluation criteria to avoid any future one-sided deals with its consultants and its clients.

Limited Budgets for Pipeline Maintenance Have Been Sufficient Only for the Most Critical Infrastructure

Locally and across the nation, water utilities are faced with aging water mains and significant costs to repair and replace failing systems. In a 2005 study of innovative and sustainable maintenance management system practices, the EPA profiled leading utilities and found that many adopted proactive asset management practices to meet current and future customer, environmental, and service levels at the lowest possible life-cycle cost. Accomplishing the desired outcomes, such as reducing the number of water main breaks, requires accurate information on critical asset conditions, ensuring planned maintenance and replacement activities occur consistently and reliably, and maintaining a deliberate and disciplined capital improvement process.

Due to the widespread adverse effects of water main breaks in particular, our audit focused on the resources allotted to the repair and replacement of a particular asset: water mains, or pipelines. A water main break is the structural failure of the barrel or bell of the pipe. Significant water main breaks can produce a substantial loss of pressure and flow at the point of the break and elsewhere in the system and therefore tend to be readily detectable and require immediate attention. Corrosion is a major cause of pipe strength deterioration, along with damage, traffic loads, manufacturing flaws, installation errors, and soil movement. The cumulative effect of these various conditions over time can also cause main breaks.

New and expanded information system capabilities have resulted in efficiencies for BWS' maintenance activities. These advances, however, are nullified by inadequate budgets that leave funds sufficient only for the most critical water main repairs. Despite the deputy manager's assertion to the contrary, the fact is that repair and replacement has had to compete for funds with other capital projects and has historically come up short of what is sufficient for preventive maintenance.

Contrary to its stated aggressive water main replacement plan, there has been no significant and sustained decrease in the number of main breaks each year. In addition, the department reports that deficient project management practices have reduced the amount of resources available for budgeted repair and replacement projects. Without a significant increase in attention and resources, it is likely that the number of water main breaks will remain at the current average of 389 annually or possibly increase as water mains reach and exceed their useful life spans.

Proactive maintenance of pipelines contributes to infrastructure sustainability

Aging water mains and the significant costs to repair and replace failing systems pose financial challenges to water utilities locally and across the nation. Proactive maintenance refers to one aspect of managing infrastructure-related assets, such as pipelines and equipment, to minimize the total cost of owning and operating them while maintaining adequate service to customers. The goal of proactive maintenance is to maximize water mains' useful life to help minimize costly emergency repairs and disruptions such as interrupted water service and traffic flow. American Water Works Association guidelines indicate that to enhance maintenance activities, water utilities should:

- be proactive;
- establish management programs geared to specific distribution system components; and
- develop progressive information management tools.

Specifically, proactive asset management systems merge what is known about an organization's capital assets with (1) rehabilitation standards and costs, and (2) risk assessments of asset failures to identify critical assets. Utilities characterize the condition of capital assets and quantify an ongoing renewal program to maximize their reliability. This approach provides transparency to mid- and long-term financial requirements for achieving performance objectives. According to the EPA, the ability to prioritize and schedule repair, rehabilitation or replacement based on pipe condition can be especially valuable for systems that have a substantial amount of high-consequence pipes that are approaching the ends of their service lives, but also have insufficient funds to address all the deteriorated pipes at one time. Optimized asset management plans can be used to maximize the use of limited resources, as shown by those utilities identified by the EPA as industry leaders:

- Seattle, Washington, has used its asset management system to identify assets that could be most efficiently run until failure or breakdown, based partially on life-cycle cost, rather than performing preventive maintenance. During the same period that the management system was implemented, Seattle reported saving $150 million in three years due to avoided capital replacement requirements.

- Orange County, California, saved over $30 million after developing its asset management strategic plan and reorganizing capital improvement priorities.

- Eugene, Oregon's targets for increasing planned maintenance on their pump stations is anticipated to decrease need for more costly corrective maintenance.

The consequence of not having such a system and deferring major or minor capital improvements can ultimately result in higher costs to the utilities, according to the Government Accountability Office. In addition to the costs to repair the damaged pipeline, water main breaks can pose logistical, economic and health and safety problems for the public and businesses ranging from drinking water service disruptions and contamination, traffic congestion, lost revenues for businesses, property damage, and water loss for fire fighting; to lost drinking water revenue, costs for emergency response, treating drinking water for contaminants, and damage claim payments from inconvenienced members of the public.

BWS' reengineering efforts helped the department recognize the limitations of its paper-based, reactive maintenance program. As a result, BWS has taken initial steps to determine information and technology needs to create a more proactive maintenance management system. However, resources for fully implementing this system have been hampered by insufficient budgets, and problems with project management and accounting practices. Consequently, BWS' capital program for existing water mains remains primarily reactive, in response to known problems, rather than proactive, in which planned maintenance and replacement projects are initiated before breaks occur.

Budgets for pipeline projects have declined significantly over the past seven years

Providing adequate resources is crucial to maintaining a deliberate and disciplined capital improvement process, and to ensuring that planned maintenance and replacement activities occur consistently and reliably. BWS' adopted criteria ranking and scheduling, and expanded information system capabilities have resulted in efficiencies for BWS' current and planned maintenance activities. These advances, however, are nullified by inadequate budgets that leave funds sufficient only for the most critical water main repairs. Despite the deputy manager's assertion to the contrary, the fact is that repair and replacement has had to compete for funds with other capital projects and has historically come up short of what is sufficient for preventive maintenance.

Over the past six fiscal years, budgets for projects to repair and replace the existing potable water pipelines declined by 95 percent. While BWS has budgeted an average of $38.5 million for all phases of projects (planning, design and construction) to maintain, repair and replace the existing potable water mains from FY1998-99 to FY2004-05, pipeline budgets have been inconsistent, and have ranged from a high of $59.4 million in FY1998-99, to a low of $3 million in FY2004-05. Exhibit 2.9 compares pipeline budgets with BWS' total capital program over the past six fiscal years.

Exhibit 2.9
BWS Budgets for All Pipeline Projects, FY1998-99 to FY2004-05

	FY1998-99	*FY1999-00*	*FY2000-01*	*FY2001-02*	*FY2002-03*	*FY2003-04*	*FY2004-05*
TOTAL CAPITAL PROGRAM	$164,324,000	$122,855,500	$127,829,000	$130,563,900	$86,793,700	$101,845,800	$103,251,200
ALL PIPELINE PROJECTS	$59,376,000	$48,942,500	$33,715,000	$47,005,000	$40,264,400	$37,326,000	$2,964,000
PIPELINE CONSTRUCTION-ONLY	$24,961,000	$39,121,000	$29,000,000	$42,810,000	$32,320,000	$29,675,000	$2,690,000

Note: Includes repair, replacement and maintenance of existing potable water pipelines
Source: Honolulu Board of Water Supply

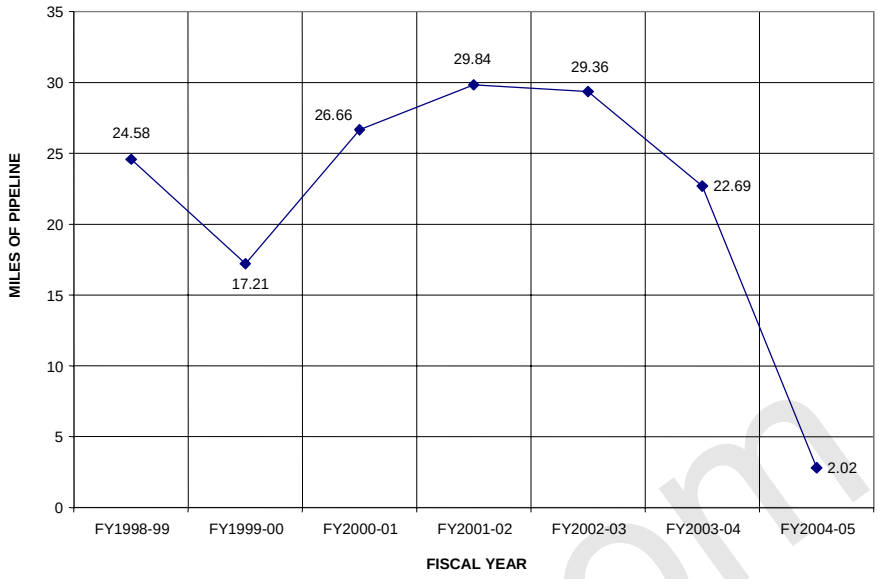
During that same time period, budgets for pipeline construction-only projects have also fluctuated. BWS budgeted an average of $28.7 million for pipeline construction-phase projects on existing water mains, ranging from a high of $42.8 million in FY2001-02, to a low of $2.7 million in FY2004-05.

Annual pipeline replacement far from aggressive

In November 2005, the deputy manager reported to the city council that BWS has an aggressive water main replacement plan that will, over time, result in a reduction in main breaks. According to BWS engineers, with an expected useful life of 50 years for pipelines, BWS should replace approximately 32 to 40 miles of pipeline each year. However, from FY1998-99 to FY2004-05, the department has budgeted enough to replace half of that number, averaging 22 miles per year. We found that over the past six fiscal years, BWS has budgeted construction projects totaling no more than 30 miles, and as few as 2 miles, as presented in

Exhibit 2.10. At current budget levels, BWS is essentially expecting pipelines to stretch their useful lifespan to 100 years, twice as long as the default period recommended by the American Water Works Association.

Exhibit 2.10
Annual Miles of Potable Pipeline Budgeted for Construction, FY1998-99 to FY2004-05



Source: Honolulu Board of Water Supply

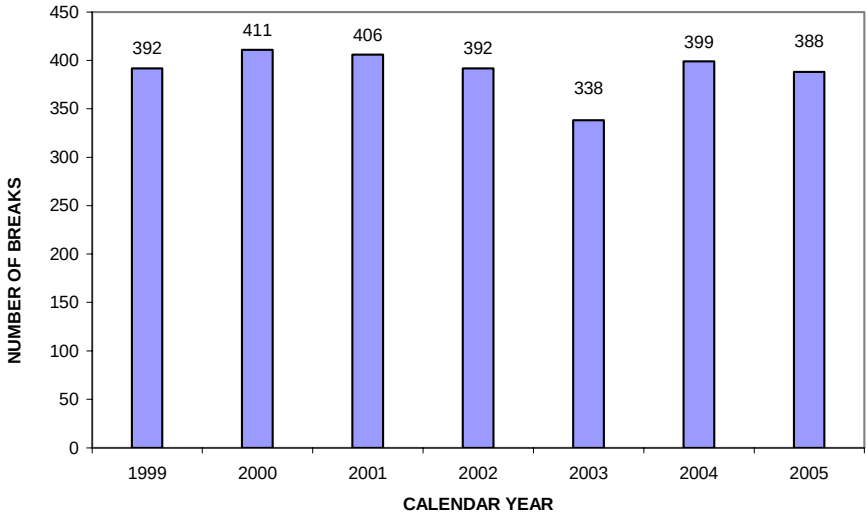
Available funding is a determining factor for pipeline projects

Seeking an explanation for the declining number of miles of existing water mains scheduled for construction, we asked the deputy manager whether this was caused by resources expended for business development projects, debt service, human resource initiatives (e.g. Multi-Skilled Worker pilot), or other priorities from FY1998-99 to FY2004-05. In response, the deputy manager acknowledged the need for scheduling more repair and replacement projects, and that a water rate increase is needed to accomplish that work. However, the deputy manager maintained that none of those items in the board's prior budgets reduced funding for existing potable water main projects. Another BWS administrator reported that the availability of funds has always been a determining factor in scheduling repair and replacement projects.

determining factor in scheduling repair and replacement projects. The deputy manager also noted that programming projects at an annual replacement rate of 40 pipeline miles is impractical, as BWS' engineers cannot manage, administer and review that many projects with their existing workload. In addition, resources had been encumbered year after year for projects that were not ready for construction due to unfinished design or lack of permits. In response to management's review in FY2004-05, BWS engineers identified 16 design-phase potable water main projects with outdated plans, for which $2.6 million has already been spent. Additional funding will be needed to update the plans before proceeding with construction, or risk damaging underground infrastructure that is not reflected in the plans. For example, in 2003, construction crews using plans drawn in 1999 accidentally severed underground wires while replacing water mains along Farrington Highway. BWS had to stop further work on the project until the plans were updated, incurring additional costs. As a result of these experiences, BWS management instructed engineers to discontinue encumbering funds for construction before design is complete and all the necessary permits have been obtained.

Despite what the deputy manager described as aggressive replacement plan projected to decrease water main breaks, the number of water main breaks has not significantly or consistently decreased over the past six fiscal years, as shown in Exhibit 2.11. During calendar years 1999 to 2005, the BWS' field operations crews responded to an average of 389 water main breaks annually—more than one per day, ranging from a low of 338 in 2003 to a high of 411 in 2000. When asked about the consistent number of water main breaks annually, one BWS engineer stated that more resources for repair and replacement are needed to significantly and consistently reduce the number of water main breaks annually, since funding is sufficient only to address the most critical water mains.

Exhibit 2.11
Annual Number of Water Main Breaks, 1999 to 2005



Source: Honolulu Board of Water Supply

While BWS attempts to correct inefficient project management practices, the current limited budget leaves only enough resources to repair and replace the most critical water mains, rather than proactive maintenance management. Without a significant increase in attention and resources, O'ahu's residents and businesses can expect the current rate of water main breaks to continue, and possibly increase, as the pipelines exceed their useful lifespan.

Maintenance management system is still in transition

While pipeline repairs are currently based on a reactive approach, BWS has taken steps toward a more proactive system by developing specific criteria for prioritizing which water mains need to be replaced, and replacing its paper-based system of maintenance-related records and maps with those same documents in electronic format, and advanced information systems. Prior to 2000, rehabilitation and replacement projects were scheduled one or two years in advance. In 2001, BWS adopted criteria and priority ranking to classify and prioritize repairs for water mains thereby providing a means to minimize customer impacts and costs, and maximize return on infrastructure investment.

Criteria include (1) history of water main breaks and known conditions that could lead to main breaks or failures; (2) fire protection, ensuring city hydrants are functional and meet regulatory standards; (3) public

impact, with higher priority placed on major traffic routes, and essential services such as schools and hospitals; and (4) project coordination with other planned city and state construction projects.

Since 2001, BWS has entered asset information, as-built drawings and other records into electronic format and implemented Internet-based information systems. BWS also upgraded to a geographic information system (GIS), an electronic mapping system linked to an intelligent database, along with Honolulu Online Utilities (HONU), a Web-based application that links GIS with customer accounting and electronic document management. Through these systems, field operations can readily access maps, as well as asset, maintenance, and customer information for current repair and replacement work. As of 2004, the water utility's GIS system has been used to access information to help predict water main breaks. While these systems comprise the components of a computerized maintenance management system (CMMS), a systematic plan to proactively repair and replace existing water mains based on this information is not yet available.

Field Operations is still in reactive mode

Even with the information and data system advancements, BWS acknowledges that the water utility is still in reactive mode when it comes to water main breaks. The history of main breaks, known deficiencies of infrastructure components, and soil conditions are used to monitor maintenance, repair and replacement needs. However, BWS still does not have comprehensive data on what is getting maintained, how much is being spent on parts and materials, or how much money and effort it takes to fix a particular component. Instead, current information is limited to knowing that a crew went to a particular location and charged their expenses to a generic category like hydrant maintenance.

Pending full implementation of the computerized maintenance management system (CMMS), maintenance-related records are manually completed in paper form, preventative maintenance scheduling is done manually, and usually not based on usage or maintenance history. This means information is not readily available for trend analyses that can identify causative factors. Full implementation of the CMMS began in May 2006, and BWS anticipates the process to be completed in 18 months.

The CMMS will give BWS access to detailed asset and maintenance information enhancing analysis and decision-making to proactively replace pipes before they burst, and maintain valves before they become

immobilized and have to be replaced. Each asset will have an assigned work plan identifying installation, repair and replacement work on that asset, and a parts list of materials used from inventory when that work plan is executed. Moreover, when the asset reaches the end of its useful life, the CMMS will generate a work order for replacement rather than preventive maintenance. The department expects this proactive approach will be more cost-effective than emergency repairs. However, the effectiveness of these tools is diminished unless the information contained within these data systems is matched with appropriate resources to maintain a deliberate and disciplined capital improvement program of recommended repairs and replacement.

Project management and accounting deficiencies hampered available resources

In addition to declining budgets, resources available for projects to repair and replace existing water mains have been further reduced by deficient project management practices that tied up resources for projects that were not ready for construction. In some cases, such projects languished for years. The result was fewer resources for capital projects overall, and even less resources available for repair, replacement and maintenance.

In its FY2004-05 capital program, we found that the department deleted or deferred 22 out of 26 budgeted water main construction projects. The deputy manager attributed the drastic cancellation and deferrals of 84 percent of its budgeted water main projects to problems in accounting methods oversight and longstanding project management problems, including prematurely encumbering construction funds. In FY2004-05, BWS undertook a project-by-project review and cancelled those projects that had not started and needed updates to plans or permits.

Project management and monitoring continues to be a challenge, according to BWS board members, impacting the availability of resources. As of June 30, 2005, BWS reported $2.6 million in expenditures for outdated design-phase pipeline projects yet to be constructed, the oldest of which was budgeted in FY1998-99. Also in FY2004-05, management discovered that its accounting practices were deficient. Generally Accepted Accounting Principles (GAAP) requires state and local governments to use governmental funds to account for "governmental-type activity," which includes services largely funded through non-exchange revenues, like taxes, and enterprise funds to account for "business-type activities" such as services primarily funded

through user charges. Government funds use the modified accrual basis of accounting, which recognizes encumbrances, while enterprise funds use the accrual basis of accounting, which does not recognize encumbrances.

BWS management discovered that, by enterprise fund standards, BWS appeared to be flush with cash and solvent on a cash flow basis. In reality, on the basis of government fund accounting, BWS had over-encumbered contract funds for projects that had languished on the books year after year. The deputy manager reported that financial information is now provided on both government and enterprise fund bases. BWS finance staff reported that the budgeting function for NALU, BWS' automated financial system, is used offline because the software – created by private firm J.D. Edwards – was not set up for government accounting.

While these issues are currently being addressed, the lack of resources has resulted in the deferral of water main repair and replacement projects. Although the BWS has used project prioritization criteria it adopted in 2001 for the department's capital program, one administrator noted that water main projects in the annual budget has been driven by the availability of funds, not the number of pipeline miles.

BWS' engineering and field operations branches provide input to management regarding their priorities based on their observations and experiences responding to water main breaks. However, these requests are evaluated along with other capital projects. Thus, despite the deputy manager's assertions to the contrary, funding for repair and replacement projects was considered within the larger context of other capital projects, such as business development projects. Until adequate resources are provided consistently and sufficient to carry out a proactive water main repair and replacement system and the CMMS is fully implemented so that funding decisions are based on the condition and estimated useful life of its pipelines, BWS will continue its pattern of costly reactive maintenance and repairs.

While BWS has made significant progress in converting its paper-based infrastructure asset and maintenance-related documents to electronic format, and implemented advanced information technology systems, its maintenance management system is in transition. The BWS reports that it has ensured oversight over accounting methods and revised engineers' encumbrance practices that reduced resources for projects, including projects to maintain, repair and replace existing water mains. At the

same time, budgets for water main repair and replacement have declined significantly over the last six fiscal years, and nullify progress toward a proactive system.

Conclusion

BWS management attempted to respond to emerging trends in the water utility industry and create a more streamlined, "privatization proof" organization. In the process, its leaders awakened an organization that, while financially healthy, had fallen behind due to outdated tools such as paper-based information systems for everything from financial ledgers to infrastructure maintenance. Reengineering efforts introduced new technology that, when properly implemented, introduced new efficiencies into the organization. In addition, reorganization introduced its staff to the role of BWS in water conservation and stewardship. However, in its eagerness to see results, BWS management initiated wide-ranging, ambitious projects that strained BWS resources and overwhelmed its workforce, resulting in diminishing support and delayed implementation.

We found that human resource initiatives incurred costs without realizing anticipated efficiencies. One of those initiatives was the Experimental Modernization Project (EMP), which was authorized by the state legislature as a program in which blue-collar workers would be cross-trained in basic skills for multiple trades. However, the project also facilitated the hiring of EMP chiefs, who were brought into the organization to supervise current executive-management staff. BWS' reorganization is still ongoing after seven years, despite contracting over $10 million for reengineering consultants. In addition, its previous board of directors awarded bonuses and salary increases to the prior manager and deputy manager before efficiencies were realized.

We found that BWS' costly business development projects were implemented with questionable benefits to ratepayers. Among the questionable business dealings was a plan to send BWS employees to the Asia-Pacific region as consultants to other government water utilities. This was accompanied by BWS' $1.1 million investment in a training facility designed to generate new business from locales far from O'ahu. Returns from these investments were never realized, as this line of business was later found to be inconsistent with the BWS' mission. Other questionable deals included utilizing BWS resources for city obligations. This includes the BWS' $48 million purchase of the Honouliuli Recycled Water Facility, which was part of the city's obligation under an Environmental Protection Agency (EPA) consent

decree, and completing construction of the water infrastructure for Ewa Villages, which the city had begun. BWS also purchased Ewa Shaft from Campbell Estate, incurring expenses to renovate the contaminated shaft while absorbing any future liability from this project. While business development initiatives sought new revenue sources for the department, they have generated minimal revenue and raise doubt that future revenues will have the desired impact of minimizing water rate increases for ratepayers.

As all these resources were being expended, the BWS budget for pipeline maintenance declined precipitously, sufficient only for the most critical repairs. This issue has been further complicated by problems with project management and accounting deficiencies. BWS has initiated steps to report on available resources, monitor projects and automate infrastructure monitoring, but the field operations division tasked with maintaining existing pipelines is still in reactive mode, with insufficient resources and still-developing information systems to convert to a proactive maintenance repair and replacement system.

Change may have been inevitable for BWS, but the impatience of management with its pace caused it to choose what would turn out to be costly shortcuts. BWS' reengineering experience shows that change cannot occur solely on the basis of one manager's vision, but particularly for a semi-autonomous municipal entity like the BWS, must be reinforced with accountability through documented systems of evaluation, monitoring and reporting that will institutionalize desired changes, preserve the strengths of the organization and protect ratepayers' interests.

Recommendations

1. The Board of Directors for the Honolulu Board of Water Supply should:

   a. establish policies and guidelines for evaluating the manager and chief engineer's performance and refrain from awarding bonuses to the deputy manager;

   b. conduct annual written performance evaluations of the manager and chief engineer based on the board's overall policy objectives;

c. request regular status reports on reengineering efforts, including resources expended and any process improvements or efficiencies achieved as a result;

d. assess the extent to which the BWS has provided the directors necessary and sufficient information before, during and after such activities to carry out its fiduciary responsibilities to the island's ratepayers regarding BWS' business activities;

e. establish overall policies pertaining to business activities, investments, analysis, and oversight of business activities;

f. require the manager and chief engineer to report on its plans to implement sufficient controls to safeguard the agency's resources and ratepayers' interests in future business activities;

g. require the manager and chief engineer to provide status reports on the implementation of the proposed maintenance management system and progress toward proactive repair and replacement of existing water infrastructure; and

h. require the manager and chief engineer to report variances between amounts budgeted for repair and replacement compared with actual expenditures, and the estimated impact on the number of water main breaks.

2. The Manager and Chief Engineer of the Honolulu Board of Water Supply should:

a. establish a human resources plan that systematically provides continued feedback on efficiencies resulting from human resource initiatives and innovations to stabilize the organization;

b. clarify official position descriptions and responsibilities for EMP chiefs and create specific evaluation criteria to document eligibility for bonuses;

c. address potential duplication of official duties and responsibilities between EMP chiefs and executive-management-level staff;

d. finalize official organization charts to reflect actual personnel functions;

e. clarify the purpose of the business development office, with respect to the BWS' core responsibilities, develop specific guidelines for evaluating business opportunities, and for incorporating feasible business activities into the larger organization;

f. establish and monitor cost centers for business development projects to facilitate reporting on each business development project and report performance to the board of directors on a regular basis;

g. monitor the implementation of the computerized maintenance management system to ensure that it leads to proactive repair and replacement of existing water infrastructure; and

h. assess and annually report whether projects included in the Six-Year (FY2005-06 to FY2010-11) Capital Program Prioritization Plan are progressing in efforts to reduce the number of water main breaks.

Response of Affected Agency

Comments on Agency Response

We delivered copies of our confidential draft of this report to the Honolulu Board of Water Supply (BWS) on September 15, 2006. A copy of the transmittal letter is included as Attachment 1. At our exit conference the previous day, we informed BWS management that they would have ten working days to prepare the agency's written response to the draft report. On September 26, BWS requested an extension from the original due date of September 29 to October 13, 2006. The auditor granted this extension.

In its response, the Board of Water Supply indicated that the draft contains significant discrepancies between the information contained in the audit report and BWS records. BWS also pointed out that its response only contains what it considers the most egregious discrepancies, while acknowledging that BWS provided raw data to the auditor that may have been mistakenly read, interpreted or applied. Specifically, BWS challenges our conclusion that the department drained its resources on reengineering projects at the expense of pipeline maintenance. However, BWS' response did not address the larger issues of accountability with respect to the results obtained from the resources expended on human resource reengineering, certain business development projects, and the sufficiency of resources allotted to pipelines based on their estimated life. Despite the assertion of many inaccuracies and misrepresentations, none of the comments provided to us in the report changed the substance of our findings.

In several cases, BWS disputed our figures based on data that were outside our audit scope, or added figures that were outside our area of focus, leading to inappropriate comparisons. Our audit scope, from FY1998-99 to FY2004-05, was selected to correspond with department-wide reorganization that occurred during that time. However, BWS sought to dispute our findings by including information for years that exceeded this scope, making their comparisons irrelevant. For example, despite our six-year scope, Exhibit 1 of BWS' response illustrating that pipeline budgets had increased over a ten-year period (FY1995-96 to FY2004-05). In addition, BWS notes through Figure 1 of its response that the annual number of water main breaks has declined over a 12-year period, from FY1992-93 to FY2004-05.

In another example, the department's response noted that the pipeline budget was understated by $139 million from FY1998-99 to FY2004-05, and by $36 million for FY2004-05 alone. However, we specifically stated in the text preceding Exhibit 2.9 that our report focuses on budgets to repair and replace existing potable water pipelines. In its response, the department includes budgeted funds for installing new pipelines and non-potable pipelines, which total $100 million for FY1998-99 to FY2004-05. While combining the amounts budgeted for existing and new potable pipelines as well as non-potable water pipelines can increase the overall dollar amount, we believe that reporting the elements separately provides clarity for ratepayers.

The $36 million budgeted for FY2004-05, noted in the department's response, includes 15 deferred projects totaling $19.3 million and seven deleted projects totaling $14 million that was originally budgeted for existing pipelines. As we became aware of the magnitude of these project cancellations, we concluded that reporting only the originally budgeted amount would be misleading as a representation of the resources allotted for this purpose. BWS also stated that our focus only on pipeline replacement is flawed because a water system consists of more than pipelines. However, as we noted in our report, water main breaks present specific adverse effects to the public, which merits a close examination of the resources allotted to repairing and maintaining those particular assets.

In addition, BWS reported in its response that, at 20 breaks per 100 miles of pipe per year, the department is exceeding industry standards. During our fieldwork, we requested information from BWS on the types of standards it follows with respect to such areas as maintaining existing pipeline infrastructure. This water main break standard was not included in response to any of our information requests. Our conclusion regarding the insufficiency of resources allotted to pipelines based on an estimated life of 50 years was based on concerns voiced by a number of BWS engineers, and supported by subsequent reports we obtained through independent research. We also noted that the department has testified to the city council that its aggressive water main replacement plan that would reduce water main breaks over time. Thus, our analysis focused on whether reductions in the annual number of water main breaks actually occurred. We found no significant reductions in the annual number of water main breaks within our audit scope.

BWS disputes the revenues and expenses from the Honouliuli Recycled Water Facility. However, these figures were provided to us based on

our request for revenues and expenses for the recycled water plant. While finalizing our comments to BWS' response, we were told that the revenue and expense figures we received should have contained a note indicating that certain expenses were unrelated to recycled water. However, the source documents we received from BWS did not contain this information. Thus, we stand by the figures we originally received. Exhibit 2.8 was amended from the draft version to properly line up the originally provided revenue and expense figures with the appropriate fiscal year. The paragraph following this exhibit was also amended to update the analysis accordingly.

While BWS disputes the figures we used for overall expense and revenue information, these were derived from audited financial reports for the stated period. We included an analysis of depreciation to follow up on a comment from BWS staff that the increase in expenses could be attributable to depreciation. However, the figures derived from the financial audits showed otherwise.

Regarding the $18 million spent to purchase Ewa Shaft from Campbell Estate, BWS counters that the purchase actually saved ratepayers $54 million compared to what it would have cost to develop this source on its own. BWS also states that condemnation would have required BWS to pay fair market value for the shaft. However, condemnation would have also allowed BWS to obtain the water it needs for municipal purposes without being obligated to provide a specified amount of water to Campbell Estate. As stated in the report, in line with the purchase, BWS committed to provide Campbell Estate with 15 million gallons of water per day prior to receiving an allocation for that area from the State Commission on Water Resources. The allocation turned out to be 12 million gallons per day, giving BWS the responsibility to find an additional 3 million gallons per day from other sources. In addition, the purchase absolved Campbell Estate of any future liabilities arising from the contamination of the shaft, resulting in unknown future costs to be borne by BWS ratepayers.

BWS disputes the inclusion of $3.5 million in contract costs for the Computerized Maintenance Management System (CMMS) within human resource re-engineering, and names several other information technology initiatives. However, this response does not address how the organization has benefited from the millions of dollars that were spent for human resource reengineering, six years after this initiative began. While we were aware of the information technology initiatives mentioned in the response, we considered CMMS as integral to the efficiency goals

sought by Multi-Skilled Worker pilot project, which in turn is a significant component of human resource reengineering. More than merely replacing paper-based work order and service request work systems, CMMS also assisted crews in making on-the-spot decisions through their access to specific data. CMMS also electronically collected and tracked data used as the basis for analyzing the performance of the MSW pilot project. Thus, while other information technology initiatives were pursued, we considered CMMS as integral to human resource reengineering and thus included this among consultant costs.

BWS also noted that the $3.8 million MSW project total cost includes normal operational costs that would have been incurred regardless of the implementation of the MSW program. However, this figure was provided to our office pursuant to our requests for total MSW pilot program costs. This amount was confirmed by department officials in a recap of the "MSW Annual Expenditures for Fiscal Years 2004 through 2006," corresponding to specific business unit codes within the BWS finance system. During our fieldwork, BWS officials clarified that these expenditures – under business unit 5535, identified as "Multi-Skilled Pilot Program" and business unit 5500 documenting additional expenses for incentive pay identified as "Services" – included training, salaries and other related expenditures. We amended the draft on page 26 to indicate that negotiations restarted in March 2006. Finally, the department's response provided some clarifying information, and changes, where appropriate, were made to the final report.

OFFICE OF THE CITY AUDITOR
CITY AND COUNTY OF HONOLULU
1000 ULUOHIA STREET, SUITE 120, KAPOLEI, HAWAII 96707 / PHONE: (808) 692-5134 / FAX: (808) 692-5135

LESLIE I. TANAKA, CPA
CITY AUDITOR

September 15, 2006

COPY

Mr. Clifford Lum, Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Lum:

Enclosed for your review are two copies (numbers 14 and 15) of our confidential draft audit report, *Audit of Selected Management Issues at the Honolulu Board of Water Supply.* This was a self-initiated audit by my office and was included in our Annual Work Plan for FY2005-06. If you choose to submit a written response to our draft report, your comments will generally be included in the final report. However, we ask that you submit your response to us no later than 12:00 noon on Friday, September 29, 2006.

For your information, the mayor, managing director, each councilmember, and the chair of the Board of Directors for the Honolulu Board of Water Supply have also been provided copies of this **confidential** draft report.

Finally, since this report is still in draft form and changes may be made to it, access to this draft report should be restricted. Public release of the final report will be made by my office after the report is published in its final form.

Sincerely,

Leslie I. Tanaka, CPA
City Auditor

Enclosure

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

October 13, 2006

'06 OCT 13 A10:16

C & C OF HONOLULU
CITY AUDITOR

Leslie I. Tanaka, CPA
City Auditor
1000 Uluohia Street, Suite 120
Kapolei, Hawaii 96707

Dear Mr. Tanaka:

Thank you for the opportunity to comment on the confidential draft audit report ("audit report") of the Board of Water Supply ("BWS") received on September 15, 2006 and for providing an extension to respond by October 13, 2006.

We'd like to begin by pointing out some significant discrepancies between the information contained in the audit report and our records. In that regard, we specifically challenge the audit report's primary conclusion – that the BWS drained its resources on reengineering projects at the expense of pipeline maintenance. With correct information, as provided in this response, we will establish that the BWS **has** proactively managed its infrastructure, ahead of industry benchmarks.

Please note that the audit report contained additional inaccurate information, however, due to time constraints and in the interest of brevity, our response will focus only on the most egregious discrepancies. Although we acknowledge that BWS provided raw data to the auditor, we believe such data was in many instances mistakenly read, mistakenly interpreted, and/or mistakenly applied.

We would, however, like to acknowledge your staff for the time and effort they invested in conducting this audit. The audit process began with an entrance conference on January 5, 2006 followed by the audit planning phase and fieldwork culminating in the audit report. Your staff spent a total of eight months reviewing copious documents and conducting numerous interviews in an effort to understand the BWS and its operations. As one of the ten largest water utilities in the country, the BWS is an extremely complex agency with many different moving parts. It is therefore understandable that the auditor's office, in the time spent with the BWS, did not fully appreciate the intricacies of its multifaceted operations.

BWS PIPELINE REPLACEMENT BUDGET INCREASED OVER 10 YEARS WITH NO RATE INCREASES

On pages 55-59, the auditor's conclusion that the BWS did not adequately budget for pipeline projects is based upon limited and erroneous information. Specifically, the audit report understates the total pipeline budget for FY 1999 to FY 2005 by a total of more than $139 million, and by more than $36 million in FY 2005 alone. Furthermore, a more comprehensive and appropriate evaluation of the last ten years between FY 1996 and FY 2005, shows the BWS **increased** its budget for pipeline projects by ten percent (10%), with no rate increases. Additionally, BWS financial records demonstrate that nearly all of the data contained in Exhibits 2.9 and 2.10 is incorrect. Corrected information is attached as **Exhibit 1**.

By labeling the BWS asset management program as "reactive," the audit report suggests that the BWS should increase its budget for pipeline replacement projects. However, the American Water Works Association (AWWA), in addressing industry best practices and standards, states:

> "As pipe assets age, they tend to break more frequently. But it is not cost-effective to replace most pipes before, or even after, the first break. Like the old family car, it is cost efficient for utilities to endure some number of breaks before funding complete replacement of their pipes."[1]

Thus, it is wholly appropriate for the BWS to experience some level of main breaks. In that regard, information contained in the next section will clearly demonstrate that the BWS is ahead of industry standards for appropriate number of main breaks.

Finally, the auditor's focus on **only** pipeline replacement is flawed. This may be attributable to a fundamental lack of understanding of basic water system operations. Although the audit team may be experienced in conducting performance audits, they understandably have limited experience in water systems. The delivery of water requires three fundamental components, all of which require capital investment: source (wells), storage (reservoirs), and transmission (pipelines). Fortunately, the BWS does not simply focus on pipelines, but instead we appropriately balance the three capital priorities. All of these are critical to providing our customers with safe and dependable water service.

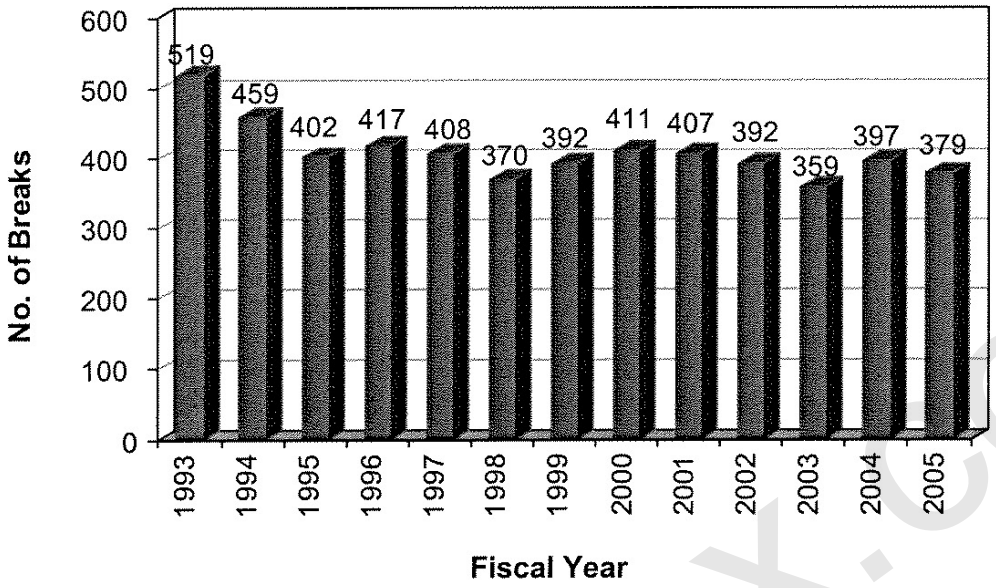
---

[1] March 28, 2001 Testimony presented by Howard Neukrug, Vice Chair of the American Water Works Association Water Utility Council, before the Environment and Hazardous Materials Subcommittee, Committee on Energy and Commerce, U.S. House of Representatives (See **Exhibit 2**).

NUMBER OF BWS MAIN BREAKS DECLINED BETWEEN FY 1993 AND FY 2005, AHEAD OF INDUSTRY STANDARDS

According to AWWA, "Considering the huge wave of aging pipe infrastructure created in the last century, we can expect to see significant **increases** in break rates and therefore repair costs over the coming decades." (**Exhibit 2**) Contrary to this forecast, as illustrated in Figure 1 below, the BWS, in the last thirteen (13) years, has experienced an overall **decline** in main breaks from a high of 529 breaks in FY 1993 to 379 in FY 2005.

Figure 1
Summary of Main Breaks per Year



Additionally, water industry experts, the Association of Metropolitan Water Agencies (AMWA) and AWWA state that, a reasonable goal for water systems in North America is 25 to 30 breaks per 100 miles of pipe per year.[2] BWS is responsible for more than 2,000 miles of pipeline. Using an estimate of roughly 400 main breaks per year, BWS is experiencing approximately 20 breaks per 100 miles of pipe per year. Based on this benchmark, BWS is clearly exceeding industry standards.

---

[2] April 28, 2004 Testimony presented by AWWA, the Association of Metropolitan Water Agencies (AMWA), the National Rural Water Association, and the U.S. Conference of Mayors' Urban Water Council, before the Subcommittee on Water Resources and Environment, Transportation and Infrastructure Committee, U.S. House of Representatives (See **Exhibit 3**).

BWS ENGAGES IN PROACTIVE ASSET MANAGEMENT

On page 60, the audit report states, "Field Operations is still in a reactive mode." This statement fails to take into account information provided to the auditor regarding BWS' proactive infrastructure programs aimed at reducing water loss and increasing the longevity of the BWS water system, specifically our Internal Conservation (IC) and **Qu**ality **In**frastructure **C**onservation **I**nitiative (QUINCI) programs. These programs involve a cross-section of BWS employees working to conduct systematic and early leak detection in addition to determining the causes and developing solutions for the premature failure of pipelines. Leak detection efforts in the Windward district have resulted in an estimated savings of more than one million gallons of water per day. In just one year, BWS' survey teams and field crews proactively identified and repaired a total of 40 leaks, thereby preventing main breaks and saving an estimated 400 million gallons of water.

UNCONTROLLABLE COSTS DRIVE WATER RATES

On page 8, there is an entire section devoted to "Factors affecting water rates." Uncontrollable operating and construction cost escalations, however, are not addressed. Such uncontrollable costs are the primary driver behind the BWS' recent rate increase.

Uncontrollable costs include:

- **Construction:** In FY 2006, BWS spent $3.5 million for emergency road repaving – more than *eleven times* the repaving dollars spent in FY 1995 ($315,000). Nationwide, in the past year, the cost of ductile iron pipe is up 18% and polyvinylchloride (PVC) pipe rose 29%.

- **Electrical power:** Electrical expenses increased 34% from FY 1995 to FY 2005. Our FY 2005 electric bill totaled more than $13.6 million.

- **Fuel:** From FY 1996 to FY 2005, BWS' fuel expenses jumped up by 94%.

- **Personnel:** In FY 2004, BWS personnel costs totaled $26.2 million for 584 employees; in comparison the projection for FY 2006 is $31 million for 583 employees. That's an 18% increase in just two years. These personnel cost increases consist of collective bargaining increases that are negotiated or arbitrated statewide. BWS faces additional personnel cost escalations including increases in our contribution to the retirement fund, medical insurance, and other employee benefits.

BWS EXPENSES INCORRECTLY REPORTED

At the top of page 8, the audit report erroneously describes various expenses, as illustrated below in Figure 2. It is important to note that the increase in depreciation expense is due primarily to the aggressive pipeline replacement program of the BWS, while the 52% increase in operating expense is due primarily to the uncontrollable cost escalations previously identified.

Figure 2
BWS Expenses

Description of Expenses	Audit Report FY 1998 – FY 2005	BWS Financial Records FY 1998 – FY2005
Depreciation Expense	Decreased by $23 M (40%)	**Increased** by $12.3 M (57%)
Operating Expenses Excluding Depreciation	Increased by $65 M (299%)	Increased by $29.6M (52%)
Operating Expenses *	Increased by $12.4M (33%)	Increased by $16.3M (43%)

* There are no "Other" Operating Expenses as this category is already included in the "Operating Expenses Excluding Depreciation" category.

EWA SHAFT PURCHASE SAVED RATEPAYERS $54 MILLION

On page 49, the audit report states that the "Ewa Shaft purchase agreement favored [Campbell Estates] at ratepayers' expense." The basis for this conclusion is unclear because: (1) the laws of condemnation would have required the BWS to pay fair market value for Ewa Shaft; and (2) the BWS policy referenced in the audit report did not apply in this particular instance because Campbell Estates originally developed Ewa Shaft as part of its private water system that was not connected to the BWS system.

Finally, the audit report does not take into account the cost for BWS to have developed a new source instead of purchasing the Ewa Shaft. As stated in the audit report, BWS spent $13.5 million for the purchase of Ewa Shaft and another $4.5 million on improvements for a total investment of $18 million for 12 mgd (million gallons per day) of water. This equates to a source development cost of $1.50 per gallon of water. On average, it costs the BWS $6 per gallon of water to design and construct a new source. In effect, the BWS saved ratepayers approximately $54 million with the purchase of this significant water source.

carrollcox.com, Box 4202, Mililani, HI 96789

MISCATEGORIZED CONSULTANT COSTS

On page 20, the audit report states that the BWS spent over $10 million on consultant contracts for human resources reengineering, as shown in Exhibit 2.2. However, more than $3.5 million of the $10 million is attributed to the development and implementation of a Computerized Maintenance Management System (CMMS), which is an information technology investment. We agree with the audit report, as stated on page 59, that our CMMS system is a step toward a more proactive system of pipeline repairs by "replacing its paper-based system of maintenance-related records and maps with those same documents in electronic format, and advanced information systems."

In addition to CMMS, the BWS rolled out the following IT initiatives since 2000:

- **KRONOS** – Automated Time and Attendance System
- **NALU** – State-of-the-Art Financial Accounting System which provides timely, accurate financial information to allow better analysis and forecasting for management decisions
- **GIS Program Development** – A new geospatial database was built to house the BWS' water system asset information. Global Positioning System (GPS) technology was used to accurately capture information.
    - **HONU** – Honolulu Online Utilities – program which makes GIS data available and easily accessible to all employees
    - Pilot testing – **MANO** – Mobile Asset Notebook – program which makes data available to field personnel including investigators, inspectors, and maintenance crews via mobile devices
    - **Electronic Data Management System** – project which scanned over 2 million microfiche customer records and 40,000 paper as-built construction drawings and made these records available via our network

MULTI-SKILLED WORKER PROGRAM SUCCESSFUL

The Multi-Skilled Worker (MSW) program realized desired efficiencies, as stated on page 25 of the audit report. We would like to clarify, however, that the BWS began negotiating full implementation of the program with the UPW in March of 2005, not March 2006, as stated on page 26 in the audit report. Furthermore, the audit report did not state that the Deputy Manager sent an email on October 4, 2005 to all employees notifying them that negotiations for the full implementation of the MSW program had ended unsuccessfully. Negotiations restarted and again ended unsuccessfully in March of 2006.

We would also like to note that, as referenced on page 24, the $3.8 million MSW pilot project total cost includes normal operational costs that would have been incurred regardless of the implementation of the MSW program. Examples of these costs include base personnel costs, repaving and pipe repair materials, tools, construction equipment and fuel.

REVENUES FROM HONOULIULI RECYCLED WATER FACILITY EXCEEDED EXPENSES

On page 43, the audit report states in bold that, "Purchase of a $48 million recycled water plant relieved the city of Environmental Protection Agency (EPA) obligations." Unequivocally, the BWS purchase of the Honouliuli Recycled Water Facility does **not** relieve the city of EPA obligations.

Moreover, contrary to page 47 of the audit report, revenues from the recycled water program **exceeded** operating expenses for all but one of the years covering the first five years of operation, from FY2000-01 to FY2004-05. A table with corrected information is included with this response as **Exhibit 4**.

Finally, the primary reason the BWS invested in the Honouliuli Recycled Water Facility was to preserve the drinking water supply. This is a wise investment because by providing large water users such as golf courses and refineries with recycled water, they no longer use drinking water for their irrigation and refinery needs. Equally important, recycled water is a drought-proof and renewable supply of water, and is a safe and smart way to extend the life of our water supply. This falls in line with our mission of resource sustainability, "Water for Life – Ka Wai Ola."

carrollcox.com, Box 4202, Mililani, HI 96789

CONCLUSION

In closing, we reiterate that the audit report contains significant, factual inaccuracies. Therefore, we question the conclusions and the basis from which they were drawn.

The Board of Water Supply is committed to actively and continuously working on improving and reengineering its operations so that we are best able to meet the needs of our customers, our community and our watersheds now and into the future.

Again, thank you for the opportunity to review and comment on the audit report.

Please feel free to contact me with any questions or concerns.

Very truly yours,

CLIFFORD P. LUM
Manager and Chief Engineer

Enclosures (Exhibits 1-4)

cc: Mayor Mufi Hannemann
Donovan M. Dela Cruz, Council Chair
Ann H. Kobayashi, Council Vice Chair
Romy M. Cachola, Council Floor Leader
Todd K. Apo, Councilmember
Charles K. Djou, Councilmember
Nestor R. Garcia, Councilmember
Barbara Marshall, Councilmember
Gary H. Okino, Councilmember
Rod Tam, Councilmember

EXHIBIT 1

Exhibit 1
BWS Comparison of Budgets for BWS' Total Capital Program vs. All Pipeline Projects and Pipeline Construction-Only, FY1995-96 to FY2004-05

	FY 1995-96		FY 1996-97		FY 1997-98		FY 1998-99	
	Audit Report	BWS Records	Audit Report	BWS Records	Audit Report	BWS Records	Audit Report	BWS Records
Total Capital Program	not shown in audit	$86,450,000	not shown in audit	$118,550,000	not shown in audit	$167,651,000	$164,324,000	$155,824,000
All Pipeline Projects	not shown in audit	$35,870,000	not shown in audit	$27,685,000	not shown in audit	$49,657,000	$59,376,000	$84,911,000
Pipeline Construction-Only	not shown in audit	$33,524,000	not shown in audit	$25,700,000	not shown in audit	$46,370,000	$24,961,000	$79,753,000

	FY 1999-00		FY 2000-01		FY 2001-02		FY 2002-03	
	Audit Report	BWS Records	Audit Report	BWS Records	Audit Report	BWS Records	Audit Report	BWS Records
Total Capital Program	$122,855,500	$122,855,500	$127,829,000	$127,829,000	$130,563,900	$130,503,900	$86,793,700	$86,793,700
All Pipeline Projects	$48,942,500	$78,477,500	$33,715,000	$45,535,000	$47,005,000	$69,585,000	$40,264,000	$53,271,400
Pipeline Construction-Only	$39,121,000	$65,080,000	$29,000,000	$40,690,000	$42,810,000	$64,340,000	$32,320,000	$45,957,000

	FY 2003-04		FY 2004-05	
	Audit Report	BWS Records	Audit Report	BWS Records
Total Capital Program	$101,845,800	$101,845,800	$103,251,200	$103,251,200
All Pipeline Projects	$37,326,000	$37,691,000	$2,964,000	$39,499,000
Pipeline Construction-Only	$29,675,000	$29,775,000	$2,690,000	$39,075,000

EXHIBIT 2

Howard Neukrug Testimony

AMERICAN WATER WORKS ASSOCIATION
BEFORE THE
ENVIRONMENT AND HAZARDOUS MATERIALS SUBCOMMITTEE
COMMITTEE ON ENERGY AND COMMERCE
U.S. HOUSE OF REPRESENTATIVES
STATEMENT ON
DRINKING WATER NEEDS AND INFRASTRUCTURE
MARCH 28, 2001
PRESENTED BY
HOWARD NEUKRUG, DIRECTOR
OFFICE OF WATERSHEDS
PHILADELPHIA WATER DEPARTMENT
PHILADELPHIA, PENNSYLVANIA

Newswatch
Legislative Activity
WIN Reports

Still Living without the Basics in the 21st Century: An Analysis of Gaps in Infrastructure Accessibility and Other Challenges for the New Millennium.

ALL DRIED UP: How Clean Water is Threatened by Budget Cuts

Water I Now

Clean & for the

Dawn c Replac Reinve Drinkin Infrastr

INTRODUCTION

Good morning Mr. Chairman. I am Howard Neukrug, Director of the Office of Watersheds for the Philadelphia Water Department in Pennsylvania. The Philadelphia Water Department is a municipal water, wastewater and stormwater utility serving over two million people in the Philadelphia metropolitan area. I serve as the Vice Chair of the American Water Works Association (AWWA) Water Utility Council and am here today on behalf of AWWA. AWWA appreciates the opportunity to present its views on drinking water needs and infrastructure.

Founded in 1881, AWWA is the world's largest and oldest scientific and educational association representing drinking water supply professionals. The association's 57,000 members are comprised of administrators, utility operators, professional engineers, contractors, manufacturers, scientists, professors and health professionals. The association's membership includes over 4,2000 utilities that provide over 80 percent of the nation's drinking water. AWWA and its members are dedicated to providing safe, reliable drinking water to the American people. AWWA utility members are regulated under the Safe Drinking Water Act (SDWA) and other statutes. AWWA believes few environmental activities are more important to the health of this country than assuring the protection of water supply sources, and the treatment, distribution and consumption of a safe, healthful and adequate supply of drinking water.

AWWA is also a member of the Water Infrastructure Network (WIN) - a broad-based coalition of drinking water, wastewater, municipal and state government, engineering and environmental groups, dedicated to preserving and protecting the

hard-won public health, environmental and economic gains that America's water and wastewater infrastructure provides.

AWWA and its members thank you for holding this hearing concerning the infrastructure needs of the Nation's drinking water utilities. AWWA looks forward to working with the subcommittee in its efforts to address the growing infrastructure costs facing drinking water utilities and consumers.

The Drinking Water Infrastructure Need

Last fall WIN released Clean & Safe Water for the 21st Century, which summarized infrastructure needs and the funding shortfall facing drinking water and wastewater systems. That report estimates that the total drinking water and waste water infrastructure needs over a twenty-year period approaches one trillion dollars. According to report estimates, drinking water utilities across the nation collectively need to spend about $24 billion per year for the next 20 years, for a total of $480 billion. The report identified an $11 billion annual gap between current spending and overall need.

A separate needs estimate was released in February by the U.S. Environmental Protection Agency (EPA), based on a survey of water systems. The survey results suggest water systems will need $150 billion during the next twenty years. However, the EPA estimate is limited to identifying eligible Safe Drinking Water Act compliance needs for the Drinking Water State Revolving Fund (DWSRF) and does not include many needs, such as the replacement of treatment facilities and distribution systems due to age. These needs are not eligible for funding from the DWSRF yet they are the largest infrastructure expense facing the nation's water suppliers. EPA also relied on five-year capital improvement plans (CIPs) by utilities and included them in the 20-year period, leaving the remaining out-years compliance needs undocumented.
None-the-less, both estimates suggest an emerging large cost for drinking water infrastructure.

Why is the need emerging now?

Water is by far the most capital intensive of all utility services, mostly due to the cost of pipes - water infrastructure that is buried out of sight. Most of drinking water pipes were originally installed and paid-for by previous generations. They were laid down during the economic booms that characterized the last century's periods of growth and expansion. Pipes last a long time (some more than a century) before they cost very much in maintenance expense near the end of their useful life, or ultimately need replacement. For the most part, then, the huge capital expense of pipes is a cost that today's customers have never had to bear. However, replacement of pipes installed from the late 1800s to the 1950s is now hard upon us at the beginning of the 21st Century and replacement of pipes installed in the latter half of the 20th Century will dominate the remainder of the 21st Century. This is a significant change that ushers in a completely new era in water utility financing.

Recognizing that we are at the doorstep of a new era in the economics of water supply, the replacement era, the American Water Works Association (AWWA) has undertaken an analysis of 20 utilities throughout the nation to understand the nature

and scope of the emerging infrastructure challenge. The project involved correlating the estimated life of pipes with actual operations experience in the sample of 20 utilities. Projecting future investment needs for pipe replacement in those utilities yields a forecast of the annual replacement needs for a particular utility, based on the age of the pipes and how long they are expected to last in that utility. By modeling the demographic pattern of installation and knowing the life expectancy of the pipes, we can estimate the timing and magnitude of that obligation. This analysis graphically portrays the nature of the challenge ahead of us. We will summarize the highlights of the analysis in this statement and AWWA will provide the subcommittee with a copy of the report when it is completed shortly.

Pipe Replacement Value

The original pattern of water main installation from 1870 to 2000 in 20 utilities throughout the nation analyzed by AWWA is a reflection of the overall pattern of population growth in large cities across the country. There was an 1890s boom, a World War I boom, a roaring '20s boom, and the massive post-World War II baby boom.
The oldest cast iron pipes - dating to the late 1800s - have an average useful life of about 120 years. This means that as a group these pipes will last anywhere from 90 to 150 years before they need to be replaced, but on average they need to be replaced after they have been in the ground about 120 years. Because manufacturing techniques and materials changed, the roaring '20s vintage of cast iron pipes has an average life of about 100 years. And because techniques and materials continued to evolve, pipes laid down in the post World War II boom have an average life of 75 years, more or less. Using these average life estimates and counting the years since the original installations, it's clear that water utilities will face significant needs for pipe replacement in the next couple of decades.

The cumulative replacement cost value (the cost of replacement in constant year 2000 dollars) of water main assets has increased steadily over the last century in our sample of 20 utilities. In aggregate across our sample of utilities, the replacement value of water mains in today's dollars is about $2,400 per person. This is more than three times what it was in 1930 in constant year 2000 dollar terms. The difference is not due to inflation; rather, there is simply more than three times as much of this infrastructure today as there was in 1930, in order to support improved service standards and the changing nature of urban development. In older cities the per capita replacement cost value of mains today is as high as nine times the 1930 level (in constant year 2000 dollars) due to loss of center city population.

Reflecting the pattern of population growth in large cities over the last 120 years, the AWWA analysis forecasts investment needs that will rise steadily like a ramp, extending throughout the 21st Century. By 2030, the average utility in our sample of 20 will have to spend about three and half times as much on pipe replacement as it spends today.

Many water systems all across America have seen this day coming and have already begun to ramp-up their expenditures on pipe rehabilitation and replacement. But it is clear that for most utilities this problem is just emerging and is enormous in scope.

Pipe Repair Costs

As pipe assets age, they tend to break more frequently. But it is not cost-effective to replace most pipes before, or even after, the first break. Like the old family car, it is cost efficient for utilities to endure some number of breaks before funding complete replacement of their pipes.

Considering the huge wave of aging pipe infrastructure created in the last century, we can expect to see significant increases in break rates and therefore repair costs over the coming decades. This will occur even when utilities are making efficient levels of investment in replacement that may be several times today's levels. In the utilities studied by AWWA, there will be a three-fold increase in repair costs by the year 2030 despite a concurrent increase of three and one- half times in annual investments to replace pipes.

Water Treatment Plant Costs.

Replacement of water treatment assets presents a different picture from that of the pipes, but greatly complicates infrastructure funding for utilities. Major investments in water and wastewater treatment plants were made in several waves following the growing understanding of public health and sanitary engineering that evolved during the 20th Century. Of course, the installation pattern of treatment assets also reflects major population growth trends. But whereas pipes can be expanded incrementally to serve growth, treatment must be built in larger blocks. Investments in treatment thus present a more concentrated financing demand than investments in pipes.

Treatment assets are also much more short-lived than pipes. Concrete structures within a treatment plant may be the longest lasting elements in the plant, and may be good for 50 to 70 years. However, most of the treatment components themselves typically need to be replaced after 25 to 40 years or less. Replacement of treatment assets is therefore within the historical experience of today's utility managers. Even so, many treatment plants built or overhauled to meet EPA standards over the last 25 years are too young to have been through a replacement cycle. Many are about due for their first replacement in the next decade or so. The concurrent need to finance replacement of pipes and of treatment plants greatly increases the challenge facing utilities. While spending for the replacement of pipes rises like a ramp over the first part of the 21st Century, spending for treatment plant replacement will occur at intervals causing "humps" in capital needs on top of the infrastructure replacement capital needs. This is graphically illustrated in the attached "Relative Asset Replacement Projections" graph of the BHC Company water utility in Bridgeport, Connecticut, from the forthcoming AWWA report. This pattern has been found to be common in many water utilities and has been nicknamed "The Nessie Curve" because of its resemblance to depictions of the Loch Ness Monster.

Demographic Changes.

Water utilities are the last natural monopolies. The large investment required in pipe networks makes it impossible to have more than a single provider of water service

within a given area. These large investments are also a major source of financial vulnerability for water utilities due to the very fixed nature of the assets and the very mobile nature of the customers. When populations grow, the infrastructure is expanded, but when people move away, the pipe assets and the liability for repair and replacement remain behind, creating a financial burden on the remaining customers. This problem, known as "stranded capacity" (essentially, capital facilities that are not matched by rate revenue from current customers), is typical of the demographics of older cities and adds considerably to the challenge of funding replacement in these cities.

In Philadelphia, over the one hundred years from 1850 to 1950, the population grew from 100,000 to 2 million people. But from 1950 to the end of the century, Philadelphia lost 25 percent of its population, dropping to 1,500,000. This situated was replicated again and again throughout the older cities of the Northeast and Midwest. The effect is to increase the burden of replacement funding on the remaining residents of the city.

As previously mentioned, the average per capita value of water main assets in place today across our sample of 20 utilities is estimated to be three times the amount that was present in 1930. In Philadelphia, however, that ratio is almost eight times the average per capita value of water main assets in 1930 due to population declines since about 1950.
Demographic change, then, places financial strain on all public water systems and has a direct impact on affordability of the investment required.

Affordability of Rates

A central question for policy makers and utilities, then, is whether the increased rate of infrastructure spending that utilities now face over the next 30 years can be financed by the utilities themselves at rates customers can afford.

WIN estimates that total water and wastewater infrastructure bills will have to double or triple in most communities to meet these needs, if consumers are forced to bear the entire infrastructure cost. The cost of compliance with storm water regulations alone may dwarf domestic drinking water and wastewater expenditures. Therefore, the impact on household affordability and rates of projected drinking water infrastructure expenditures must be viewed in the context of the total water and wastewater utility infrastructure bill to be paid by the consumer.

In the sample of 20 utilities studied by AWWA, the analysis showed an aggregate increase in needed utility expenditures above current spending levels of $3 billion by 2020 and $6 billion by 2030. This implies the need for collection of an additional $1,575 per household for infrastructure repair and replacement over 30 years. The estimated $1,575 per household is an average of the individual results. The individual utilities in the survey present wide-ranging needs for increased expenditure (from $550 per household over 30 years to $2,290 per household over 30 years) and "lumpy" patterns of increased expenditure needs that are unique to each set of circumstances.

The sample of 20 utilities represents relatively large utilities that are on the "cutting-edge" of utility management. The household expenditure increase will be much

higher in small systems that do not have a large rate-base over which to spread the costs. Extrapolating from EPA's estimated 20-year capital need for small systems, the AWWA analysis projects the total 30-year expenditure for infrastructure repair and replacement in small systems might be in a range of $1,490 per household to $6,200 per household.
Moreover, there is no guarantee that the projected expenditures per household can be spread evenly or taken on gradually over the 30-year period. There are "humps" for treatment plant replacement throughout the period. Additionally, expenditure "humps" for compliance with a dozen or more new regulations is not included in this analysis.

Conclusion

How we address our emerging drinking water infrastructure needs is a critical question facing the Nation and this Congress. To help reduce the burden on consumers, many water utilities have made great strides in efficiencies, with some utilities achieving a 20 percent savings in operations and maintenance. Water utilities will continue to reduce costs, seek cost-effective financing and employ innovative management strategies. Regardless, there will be significantly increased costs for needed infrastructure investment.

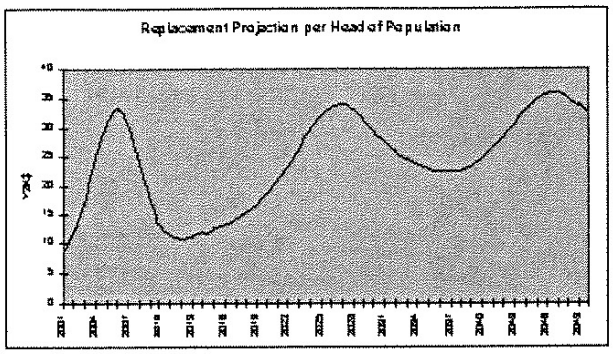
AWWA does not expect that federal funds will be available for 100 percent of the increase in infrastructure needs facing the nation's water utilities. However, AWWA does believe that due to concurrent needs for investment in water and wastewater infrastructure, replacement of treatment plants, new drinking water standards, and demographics, many utilities will be very hard pressed to meet their capital needs without some form of federal assistance. Over the next twenty years, it is clear that Safe Drinking Water Act (SDWA) and Clean Water Act (CWA) compliance requirements and infrastructure needs will compete for limited capital resources. Customers are likely to be very hard pressed in many areas of the country. Compliance and infrastructure needs under the SDWA and CWA can no longer be approached as separate issues. Solutions need to be developed in the context of the total drinking water and wastewater compliance and infrastructure needs.

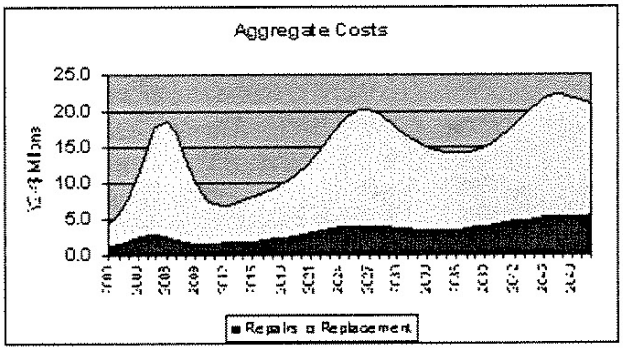
AWWA pledges to work with Congress to develop a responsible and fair solution to the Nation's growing drinking water infrastructure challenge. As a start, AWWA will provide a copy of the forthcoming AWWA report to members of the subcommittee to assist the subcommittee deliberations on this issue. We thank you for your consideration of our views.

This concludes the AWWA statement on drinking water needs and infrastructure. I would be pleased to answer any questions or provide additional material for the committee.

Attachment:
BHC Water Utility, Bridgeport, Connecticut

Asset Sets Modeled: Water Mains & Water Supply Plant - Estimated Replacement Value $1,663 M





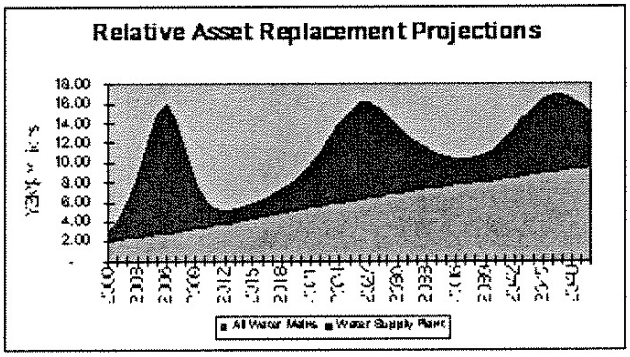


EXHIBIT 3

The Subcommittee on Water Resources and Environment

Hearing on

Aging Water Supply Infrastructure

TABLE OF CONTENTS(*Click on Section*)

PURPOSE

On Wednesday, April 28, 2004, at 2:00 p.m., in Room 2167, Rayburn House Office Building, the Subcommittee on Water Resources and Environment will hold a hearing on the state of our nation's aging water supply infrastructure. Concern has been heightened recently over the condition of the nation's water supply infrastructure as a result of the presence of lead pipes in the District of Columbia's drinking water system. The Subcommittee will receive testimony from representatives of the American Water Works Association (AWWA), the Association of Metropolitan Water Agencies (AMWA), the National Rural Water Association, and the U.S. Conference of Mayors' Urban Water Council.

BACKGROUND

Jurisdiction

The Transportation and Infrastructure Committee has jurisdiction over water supply infrastructure. The Committee does not have jurisdiction over Safe Drinking Water Act regulatory requirements. Safe Drinking Water Act regulations fall under the purview of the Energy and Commerce Committee as public health regulations. In addition, the Energy and Commerce Committee has jurisdiction over assistance, including infrastructure assistance, that is for the purpose of meeting the regulatory

requirements of the Safe Drinking Water Act.

The Transportation and Infrastructure Committee has reported legislation authorizing grants and a revolving loan fund for water supply infrastructure, namely H.R. 1865 during the 103rd Congress and H.R. 2747 in the 104th Congress. Both bills were referred solely to our Committee, without sequential or additional referral to the Commerce Committee.

In the 1996 Safe Drinking Water Act Amendments, the Energy and Commerce Committee received sole jurisdiction over the revolving loan fund established in that legislation because the purpose of the fund was to provide assistance in meeting regulatory requirements. The Transportation and Infrastructure Committee received sole jurisdiction over the grant assistance programs established under that Act for water supply systems generally, as well as for Alaska Native Villages and the colonias along the U.S.-Mexico border.

Water Supply Infrastructure

Our nation has over 54,000 community water systems. These systems consist of a substantial amount of infrastructure, including collection devices, drinking water treatment plants, wells, pumps, storage facilities, transmission and distribution water mains, service lines, and other equipment to deliver water. They provide about 90 percent of Americans with their tap water. Approximately 3,000 of these community systems provide more than 75 percent of the nation's water. Our nation's drinking water infrastructure is an asset that all Americans rely on every day. It is a cornerstone of both our nation's economic well-being and our public health. Largely buried underground and invisible to the average American, it is also an asset many have taken for granted.

The greatest challenge facing community water systems today is aging pipes and other water infrastructure. It is not uncommon in older systems to find pipes that were laid in the 19th century. Due to patterns of investment made to serve population growth beginning well over a century ago, water utilities are experiencing an urgent and increasing need to repair and replace this aging infrastructure. As many communities are finding, failure to repair and replace aging infrastructure can result in a loss of valuable water resources, significant economic impacts, and increased risks to public health.

PROBLEMS AND IMPACTS OF AGING INFRASTRUCTURE

In many cities and towns, water infrastructure has been in place for many decades. Quite often, particularly in the larger cities, components of these systems (such as the water mains) are more than a century old. The oldest cast iron pipes, dating to the latter 1800s, have an average life expectancy of 100-120 years. Because of changing materials and manufacturing techniques, pipes laid in the 1920s have an average life expectancy of nearly 100 years, and those laid in the post-World War II boom are expected to last about 75 years. At this point, these life expectancies are being approached or exceeded in many cities and towns. As the water infrastructure outlives its useful life, it can corrode and deteriorate, resulting in an epidemic of water leakage, burst water mains, unreliable pumps and collection equipment, and aging treatment plants that fail to remove important contaminants. With age and increased demands due to population growth, drinking water infrastructure problems in many cities are growing.

Water Leakage and Water Main Breaks

One of the most common problems is water loss from water distribution systems. In most water systems, a large percentage of the water is lost in transit from treatment plants to consumers. The amount of water

that is lost is typically 20-30 percent of production. Some systems, especially older ones, may lose as much as 50 percent.

Leakage is usually the major cause of water loss. There are many possible causes of leaks, and often a combination of factors leads to their occurrence. Leakage occurs in various components of the distribution system, including transmission pipes, main distribution pipes, service connection pipes, joints, valves, and fire hydrants. The material, composition, age, and joining methods of the distribution system components can influence leak occurrence. Causes of leaks include corrosion, cracks, material defects or failure due to deterioration over time, faulty installation, inadequate corrosion protection, ground movement over time due to drought or freezing, and repeated excessive loads and vibration from road traffic. Old pipes often leak substantial amounts of water through corroded areas, cracks, and loose joints.

Leaks waste both money and a precious natural resource. The primary economic loss is the cost of the lost raw water, its treatment, and its transportation. Leakage leads to additional economic loss in the form of damage to the pipe network itself. Such damage may include erosion of pipe bedding and pipe breaks, and damage to the foundations of roads and buildings. Leaks also waste substantial amounts of water resources. This is particularly critical in areas where the demand for water is outstripping available supplies. The City of Detroit illustrates the potential cost of water as a lost commodity. In Detroit, citizens endure annual mid-summer water rationing and pressure problems, yet they pay an estimated $23 million per year for water that never reaches their homes and businesses, because over 35 billion gallons of water leak from the Detroit water system each year. The lost water is reflected in bills paid by every household whose water comes from the Detroit system. This is on top of the $1 million the water utility has been spending annually on leak detection and repair, and an ongoing $7 billion capital improvement program.

The problems associated with gradual leakage are compounded when old water mains and other pipes in the water distribution system burst, resulting in the sudden loss of water pressure, flooding, and the loss of even more water. It is common for cities to have scores, hundreds, and even more than a thousand water main breaks each year. For example, last year, there were 1,190 reported breaks along the City of Baltimore's 3,400 miles of water mains, which deliver drinking water to taps across the city and surrounding counties. This is more than three times per day on average. There were 1,140 breaks in 2002. Philadelphia, with a similar amount of pipe, reportedly has an average of 788 ruptures per year, and New York, which has 6,000 miles of mains, has an average of 550 annual breaks. Boston, which has 1,023 miles of pipe, averages 35 breaks per year.

A "reasonable goal" for water systems in North America is 25 to 30 breaks per 100 miles of pipe per year, according to a 1995 American Water Works Association Research Foundation report, Distribution System Performance Evaluation. Baltimore is somewhat above that mark, with an average of 34 breaks per 100 miles over the past two years. Not far behind is the Washington Suburban Sanitary Commission, with 33 breaks per 100 miles. Detroit is worse off, with an average of 45 breaks. Several other cities met the goal, some of them relatively young, affluent communities with moderate weather, but also some of them old, less economically vibrant, and in harsh climates. For every 100 miles of pipe, Phoenix had 29 breaks per year, Pittsburgh had 23, and Hartford 20. Chicago and Providence each had 9. San Diego had 5.

In addition to the substantial direct costs of repairing and replacing burst water pipes, millions of dollars in economic losses are incurred nationally each year as a result of businesses and schools forced to close, flooding and other property damage, closed roads, snarled traffic, and the like. For example, a 36-inch water main which burst in New York City a couple of years ago resulted in severe physical damage because of the ensuing flooding to 14 businesses and business disruptions to an additional 120

businesses, resulting in several hundred thousand dollars in gross revenue loss from the one incident. Small business disaster assistance was made available for the impacted businesses. In Cleveland, a major, 87-year-old water main broke four years ago, flooding downtown streets with some 25 million gallons of water, stranding cars in the flood, closing many businesses and all schools, including Cleveland State University, and leaving 100,000 people without water for a few days. Downtown Cleveland had a second major water-main break about eight months later.

Measures are available to water utilities for reducing water main breaks and other losses of water from their systems. Fundamentally, they involve improved management of a water system's assets. Asset management approaches aim to minimize the total cost of buying, operating, maintaining, replacing, and disposing of capital assets during their life cycles, while achieving service goals. Measures include the systematic collection of key data about the water system; the application of life-cycle cost analysis and risk assessment to set goals and priorities; a systematic program of inspections, monitoring, and leak detection and repair; system maintenance, rehabilitation, and replacement of old pipes and other equipment found to be in need of repair; and corrosion control to reduce the effect of corrosive water on the system.

The General Accounting Office (GAO) issued a report, dated March 2004, in which GAO found that comprehensive asset management has the potential to help utilities better identify needs and plan future investments. Water utilities that GAO reviewed reported that comprehensive asset management provided them with a better understanding of their maintenance, rehabilitation, and replacement needs and thus helped utility managers make better system management and investment decisions. GAO also found that, although smaller utilities face more obstacles to implementing asset management, largely as a result of limited resources, such utilities can also benefit from applying asset management concepts. GAO concluded that EPA can play a stronger role in encouraging water utilities to use asset management by leveraging ongoing efforts within and outside the Agency. Some utilities already are implementing asset management approaches.

Public Health Issues

The loss of water pressure from water main breaks or other equipment breakdowns also can result in serious contamination of the water supply, thereby creating a public health risk. Additionally, old or poorly maintained pipes may harbor bacteria and other pathogens that can make people sick. Water distribution systems depend on pressure inside the pipes to keep out contamination. If the water pressure drops due to pipe breaks, significant leakage, or pump failures, the possibility increases of bacteria and other contaminants infiltrating into the pipes through leak openings, such as corroded areas, cracks, and loose joints, and contaminating the water. Water utilities typically issue boil-water advisories to customers once water pressure is restored.

Moreover, many older water distribution systems used lead pipes to distribute tap water. Municipalities first installed lead pipes during the late 19th Century. In 1897, about half of all American municipalities used at least some lead water pipes. Lead had two features that made it attractive to the engineers who designed public water systems: it was both malleable and durable. Malleability reduced labor costs by making it easier to bend the service main around existing infrastructure and obstructions, and compared to iron, lead was a soft and pliable metal. As for durability, the life of the typical lead service pipe was considerably longer than plain iron or steel, galvanized, or cement lined pipe. Based solely on engineering concerns, these characteristics made lead an ideal material for service lines. From a narrow engineering stand point, it is clear that lead worked well, when one examines how popular lead service lines were. At the turn of the 20th Century, the use of lead pipes was widespread, particularly in medium and large cities.

However, the use of lead pipes has had public health implications. Studies show that ingested lead can have adverse neurological, toxicological, and developmental effects on humans, particularly children. In cities that used lead water pipes, it appears there were some people who were affected by lead, although the effects of lead water lines varied across cities, and depended on the age of the pipe and the corrosiveness of the associated water supplies. The age of pipe influenced lead content because, over time, oxidation formed a protective coating on the interior of pipes. As for corrosiveness, acidic water leached more lead from the interior of pipes than did non-acidic water.

Over time, the public health implications of lead pipes became better understood, and other materials were used in place of lead pipes. Today, most lead pipes have been replaced with more modern and safer materials, although some cities still have some areas with lead service lines to older buildings and lead-containing packing materials used to seal joints between some pipes. The City of Chicago is reported to have the highest concentration of lead pipes in the nation. Lead service lines remain in some areas in the District of Columbia. The presence of lead materials in water systems is significant because the water passing through lead service lines and joint packing materials could be corrosive, thereby leaching lead from the lines and packing materials and increasing lead levels in the drinking water.

Measures that can be taken by water utilities to reduce lead levels in drinking water include locating and replacing the remaining lead service lines, and reducing the corrosiveness of the water. Many cities that have lead service lines have adjusted their water treatment processes to minimize corrosion. Some, such as Chicago and Philadelphia, add phosphates to the water at their treatment plants. The phosphates, in combination with the natural calcium and magnesium minerals in the water, coat the pipes internally to prevent lead from leaching into the water. The water supplier for the District of Columbia has not adjusted its water treatment to minimize corrosion, and hence, elevated lead levels have been reported in drinking water at some locations. In response to the elevated lead levels that were found, the District's water supplier now is considering adjusting its water treatment processes to add phosphates to the water. It is unclear whether the addition of phosphates to the District's water will ultimately result in any undesirable increases in phosphorus loadings to the Chesapeake Bay from the District's wastewater discharges.

INVESTMENTS AND NEEDS

Historically, there had been little Federal assistance for drinking water systems. Local communities and private companies built most of the municipal water systems around the country. Before 1996, the primary source of Federal funding was the U.S. Department of Agriculture (USDA). Through its Rural Utilities Service, USDA has provided both municipal water supply and wastewater treatment assistance of over $600 million a year to communities with populations of less than 10,000.

Following enactment of the 1996 Safe Drinking Water Act Amendments, Congress began providing grants to states to capitalize Drinking Water State Revolving Loan Funds, modeled after the Clean Water State Revolving Loan Funds. Through fiscal year 2004, Congress has provided approximately $7 billion for the Drinking Water State Revolving Loan Funds. Approximately 40 percent of that assistance has been provided for projects to meet treatment needs, and around 30 percent has been for projects to meet transmission and distribution needs. The remaining 30 percent has been provided for water storage, developing sources, technical assistance, and other drinking water needs.

The U.S. Environmental Protection Agency (EPA) submitted a 1999 Drinking Water Needs Survey to Congress in February 2001, pursuant to the Safe Drinking Water Act. The 1999 Needs Survey estimated drinking water infrastructure needs at approximately $150 billion over the next 20 years. Over half of the total drinking water infrastructure needs (56 percent) are for transmission and distribution systems (pipes). Twenty-one percent of the needs are for infrastructure to meet regulatory requirements. The

remaining 19 percent of needs are for storage facilities, developing sources, and other needs. EPA acknowledges that its survey likely underestimates needs for transmission and distribution systems because many systems do not have a plan in place for replacing pipes. The Drinking Water Needs Survey is based on documented needs, which only provide an estimate of needs over 5 to 10 years.

In May 2001, the American Water Works Association (AWWA) released a report entitled, "Reinvesting in Drinking Water Infrastructure-- Dawn of the Replacement Era." In that report, AWWA projected that expenditures on the order of $250 billion over 30 years might be needed nationwide for the replacement of worn-out drinking water pipes and associated structures (valves, fittings, etc). This figure does not include wastewater infrastructure or the cost associated with complying with new drinking water standards. A September 2002 EPA report projected that expenditures of $120 billion over the next 20 years might be needed for the replacement of drinking water transmission lines and distribution mains, and another $97.6 billion might be needed for non-pipe (treatment, source, and storage) needs.

WITNESSES

PANEL I

U.S. Conference of Mayors' Urban Water Council
Honorable David G. Wallace
Mayor
Sugar Land, Texas

Association of Metropolitan Water Agencies
Mr. Jerry N. Johnson
General Manager
District of Columbia Water and Sewer Authority
Washington, D.C.

American Water Works Association
Mr. Howard Neukrug
Director, Office of Watersheds
Philadelphia Water Department
Philadelphia, Pennsylvania

National Rural Water Association
Mr. Ralph McCarter, P.E.
General Manager
First Utility District of Knox County
Knoxville, Tennessee

EXHIBIT 4

Exhibit 4
Honouliuli Recycled Water Facility Due Diligence Actual Revenues and Expenses for Recycled Water Sales, FY2000-01 to FY2004-05

Fiscal Year	Actual Revenues	Actual Expenses	Profit / Loss
FY 2000-01	$1,713,055	$1,604,166	$108,889
FY 2001-02	$3,028,787	$2,576,195	$452,592
FY 2002-03	$3,546,358	$3,431,427	$114,931
FY 2003-04	$3,940,464	$4,102,746	-$162,282
FY 2004-05	$4,172,324	$3,111,665	$1,060,659