BOARD OF WATER SUPPLY

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POWER, DUTIES AND FUNCTIONS

The Board of Water Supply (BWS) is a Department of the City and County of Honolulu that provides Oahu residents with safe and dependable drinking water service at reasonable cost. Proceeds from water sales fund the Department's operations and projects.

A seven-member Board of Directors presides over the semi-autonomous agency and sets its policies. Five are appointed by the Mayor and approved by City Council. The remaining two serve by benefit of their jobs — the Director of the State Department of Transportation and the Chief Engineer of the City Department of Facility Maintenance.

The Board appoints the BWS Manager and Chief Engineer to supervise the agency's overall operations and the Deputy Manager's office. The Deputy Manager supervises the day-to-day functions and the six BWS Operating Units that constitute the Department – Business Development, Business Services, Customer Care, Maintenance, Operations and Water Resources.

HIGHLIGHTS

The BWS manages Oahu's municipal water resources and distribution system to meet the needs of customers for now and generations to come, despite mounting constraints such as increasingly stricter federal and state drinking water rules as well as Oahu's growing water demand.

In Fiscal Year (FY) 2001, the Department added 29.4 miles of main and removed 10.9 miles so that the overall length of the water distribution system pipeline totals 1,944.3 miles.

Also during FY 2001, the BWS responded to 407 main breaks, a four percent decrease over the average of the last ten years. This decrease can be credited to BWS' main replacement program, which identifies and replaces older mains with high rupture incidence.

In July, the BWS entered a new era of water management by purchasing the Honouliuli Water Recycling Facility from U.S. Filter. The Department is actively marketing and selling recycled wastewater that is treated to levels of industrial and irrigation quality.

This will help to extend our potable water supplies.

Also, during this fiscal year, the BWS helped form the Koolau Mountains Watershed Partnership (KMWP). KMWP has six of the major landholders of 80 percent of the land in this watershed whose common bond is the commitment to protect the watershed and the quality and quantity of its groundwater and streams.

In addition, the BWS joined the City and County of Honolulu and the Mayor's Asian-Pacific Environmental Summit to create the Asia Pacific Urban Technology Institute.

Housed in the City's Kapolei Hale in Leeward Oahu, the Institute will provide a center for technology transfer and knowledge sharing of environmental and infrastructure issues facing many countries in the Asia Pacific area. The Institute will showcase the expertise and abilities of the Board of Water Supply along with various City & County of Honolulu agencies, and private local consulting firms.

The Department underwent major changes as departmental reorganization began. QUEST (Quality Utility Employees Striving Together) program teams were sunsetted, having achieved their goals and objectives; a corporate restructuring plan was created and implemented; and a new management team was formed.

The new corporate structure was presented at the end of August 2000. The Department's eight divisions and three staff offices were reorganized into the six operating units listed in the "Powers, Duties and Functions" section. Similar functions were grouped together by business processes for better efficiency.

In January, operating unit leaders (OULs) were chosen to head the units and participate on a new management team, the Enterprise Leadership Team. The initial phase to rearrange BWS' corporate structure was completed in February.

In March and April, each Unit formed a business planning team. Each team developed initiatives to focus its unit's energies on specific activities that support the overall enterprise business plan.

Employees were informed about QUEST's progress through Department-wide Town Meetings as well as small group meetings and Communication Team updates and handouts.

The BWS continued to install its AkamaiRead automatic meter reading equipment that allows drive-by retrieval of meter consumption data. The new equipment will be installed in meter boxes throughout the island in the next year-and-a-half.

At the Legislature, the BWS submitted testimony to successfully change the start date of pilot programs from July 1, 2002 to July 1, 2001, to allow the multi-skilled worker program to begin at the start of the next fiscal year. Also, a measure to add fluoride to water was a controversial topic of debate for a few weeks, but was ultimately defeated.

Several employees brought honor as well as the spotlight to the Department this year.

In November, Community Relations Specialist II Arthur Aiu and Construction Inspector Dionisio "Junior" Pascual, Jr., were honored with other City department Employees of the Year.

Both men were selected for their strong dedication to the BWS and their first-rate work as well as their positive and confident attitudes. They are exceptionally helpful, willing to learn new things, generously share their knowledge with others, and are well-respected within the Department.

Throughout his six-year career, Arthur has successfully coordinated educational tours for the Fred Ohrt Water Museum, the Halawa Xeriscape Garden and Underground Pumping Station and Waihee Tunnel, resulting in major growth of the tour program and water conservation education.

He simplifies complex water information, adds special touches to make his presentations meaningful to his audience, and cultivates appreciation and a sense of personal responsibility for Oahu's limited water resources, as evidenced by the numerous commendation letters he has received.

He oversees a staff of part-time young adults who help organize BWS participation in various public events and community education activities such as the State Farm Fair, the Orchid Show, and mini-City Hall exhibitions. These events, often requiring extra and weekend hours, are additional opportunities for Arthur to promote water conservation.

He produces a complete, on-time, and well-done result for any task assigned to him. He finds time to assist others in the Department with various programs, such as translating Hawaiian phrases or setting up the Christmas tree in the lobby, and City-sponsored projects such as making floral decorations for an event.

In addition to work, he is an active member of Keali'ika'apunihonua Ke'ena a'o Hula Halau and a member of Kawaiahao Church, participating in many of its activities and programs and serving on the Church's By-Laws Committee where he helps to establish and amend the rules that govern the church and its congregation.

Dionisio Pascual, Jr., an industrial construction inspector in the Maintenance Unit, joined the BWS in April 1981 as an assistant construction inspector.

His strong advocacy of using available technology, especially computers, has optimized access to information and enhanced efficiency in the Construction Section.

He spearheaded the Laptop Computer Pilot program that allows construction inspectors to organize and update their daily reports, construction cost estimates, and other forms at the job site. This has resulted in increased time for the inspector to be out in the field with faster resolution of conflicts that occur in the field.

Pascual supervises, administers, and coordinates various complex projects assigned to him and deals fairly with the public and BWS contractors. He handles complaints in a courteous and exemplary manner fostering the BWS' reputation for good customer service.

Active in his community, he visits Oahu elementary schools and non-profit organizations as part of the Dream, Dare, Do Yo-yo program to promote various activities for children. He also assists with the American Youth Soccer Organization (AYSO), the Central Oahu Youth Baseball League, and the Shobukan Judo Club. In addition, Jr. helps the Special Olympics and the Thanksgiving Luncheon for the Homeless at Blaisdell Park.

Both men represented the BWS in the City's annual search for its outstanding employee in November and attended the American Water Works Association (AWWA) national conference in Washington, D.C., in June.

May 2001, brought Maintenance Unit employees Glenn Ah Yat, Jensen Mimuro, and William Iaela with coach Mark Luberts, a successful attempt at the state pipe tapping title at the annual AWWA Hawaii Section conference.

Their winning time was one minute, 10.37 seconds. The next best time was Hawaii Department of Water Supply's 1:35.60.

In June, a female pipe tapping team composed of employees who were sponsored by Mililani Leak Detection swept the AWWA national women's competition.

The win took place at the annual conference in Washington, D.C., where team members Gaynor (Sousa) Minton, Danielle Ornellas, and Anna Tanaka, together with coach Mark Luberts, posted a best time of two minutes 0.47 seconds against female pipe tappers country-wide.

The trio outdid the next best time of 2:10.90 by Kentucky's Louisville Pure Water Tappers to assume the coveted title.

BUSINESS DEVELOPMENT. The Business Development Unit explores and pursues new business opportunities to benefit the BWS' current and future customers by developing a full complement of innovative, contemporary and competitive products and services that customers need and want.

In July 2000, the Department purchased the Honouliuli Water Reclamation Facility (HWRF) and began a long-term program to increase the use and availability of recycled water on Oahu. The facility is designed to generate 12 million gallons (mg) of recycled water each day and is currently the only one in Hawaii that produces two grades of recycled water - one for irrigation called R-1 water; and the other for industrial uses called RO or reverse osmosis water.

Since September 2000, the facility has been delivering a total of four mg of R-1 water per day to the City's Ewa Villages and Westloch Golf Courses and to the Honouliuli Wastewater Treatment Plant for in-plant use. At the time the Board purchased the facility, there were no other commitments for recycled water use.

Since then Coral Creek, Hawaii Prince and Kapolei Golf Courses have committed to use a total of three mg of R-1 per day. In addition, Kalaeloa Cogeneration, AES, Tesoro and Citizen's Gas have signed up to use a total of one mg of RO water per day.

In February 2001, the Business Development began formal operations. Since then the Unit has been working on several initiatives including bottled water, expansion of BWS water utility services, continuing development of the recycled water program and working with the City to start up the Asia Pacific Urban Technology Institute at Kapolei Hale.

BUSINESS SERVICES. The Business Services Operating Unit meets the administrative support and information needs of the Department's employees. It provides accurate and timely financial information and analysis, information management tools, and administrative support.

The former Finance and Computer Services Divisions, the Management and Budget Office, and the Personnel Office form this Unit.

This **Finance Section** is responsible for all financial and accounting activities, including fiscal analysis and accounting systems development, management accounting, revenue and customer accounting, and budgetary accounting and control.

The BWS receives no revenue from taxation and depends solely upon revenues derived from its activities to pay for its operations and construction of programs. The BWS may receive funds from the federal, state, or county governments for capital improvement projects.

At the close of the fiscal year, revenue from water sales amounted to $102,412,818, an increase of $3,152,713, or 3.2 percent, from the previous year. Water sales include $1,661,504 from the operation of the Honouliuli Water Reclamation Facility that opened in September 2001. Water consumption increased 3.5 per cent for the year. There were no rate increases during the fiscal year.

Expenses, including depreciation, totaled $93,005,672, a net increase of $4,892,214, or 5.6 percent over last year. Increases totaling $8,150,473 in depreciation, water reclamation costs, electricity, maintenance of mains and administrative general expenses were offset by a decrease of $3,627,140 in the Central Administrative Services Expense (CASE).

The opening of the Honouliuli Water Reclamation facility resulted in additional operating and maintenance costs of $1,542,279. The decrease in the CASE fee was due to the inclusion of a retroactive CASE fee in fiscal year 1999.

The Department's interest income totaled $11,055,047, a decrease of $3,337,720, or 23.2 percent from the previous year. This is attributable to lower interest rates and cash balances.

Utility plant in-service, stated at cost, totaled $1,137,216,817. Additions during the year amounted to $132,514,252 and deductions totaled $4,612,341, resulting in a net increase of $127,901,911.

During the year, the Board refunded all of its outstanding general obligation bond principal which amounted to $34,385,000. On May 15, 2001, the Board issued a $66,600,000 Water System Revenue Bond. A portion of the proceeds was used to refund $16,395,000 outstanding revenue bond principal. At year end, total debt outstanding was $66,600,000. All debt service and other requirements of bond issues were met.

Water system facilities charges are levied against all new developments, or existing services requiring additional water supplies from the Department's water system. Such charges amounted to $5,313,114 during the fiscal year, and a total of $23,402,598 was expended to construct new water facilities.

The **Personnel Section** formulates policies and procedures on personnel administration and industrial relations; processes personnel actions; maintains records of control and personnel transactions; maintains liaison with the Department of Human Resources and other agencies dealing with personnel matters; and conducts training, safety, driver improvement and employee-management relations programs.

During the fiscal year, the department had an average of 600 regular, full-time employees. Five new

employees were hired, while nine retired, and 27 resigned. At the end of the year, there were a total of 569 regular, full-time employees in the department.

Industrial accidents totaled 86; total lost time cases were 57. Total workers' compensation expenditures increased 18 percent from the previous fiscal year.

The Personnel Section coordinated the department's programs for the Employees of the Year, Service Awards, Aloha United Way Drive, Blood Bank Drives, Foodbank Drive and the March of Dimes Drive.

During the fiscal year, seven employees received 25-year service awards and two employees received 35-year service awards. By year's end, 128 acquired 25 or more years of government service.

The Fleet Safety Section, under the direction of the Driver Improvement Coordinator, is now an active participant of the National Safety Council's Motor Transportation Division Committee and the Executive Committee for Fleet Administration.

The section is now dealing with changes in the following areas of the **Safety Agenda for the Nation** to include: Airbag and Seat Belt Safety Campaign, Graduated License for Teens, .08 Blood Alcohol Content Laws, Large Truck Safety Symposium, and Pedestrian Safety.

The section's mission is to educate and motivate BWS employees to adopt safety and health practices and follow policies and good driving habits to prevent suffering and losses arising from preventable causes.

Continuation of Defensive Driving Class will continue for our employees as well as the new Professional Truck Driver Defense Driving Class to start in Spring 2002.

Directives and policies were updated to reflect the new laws under the Federal Department of Transportation regulations for Commercial Driver Licensing (CDL) and non-CDL drivers that took place on August 1, 2001.

During the year 2000-2001, the Safety Office conducted training for Field Operations employees in ladder safety, excavation, trenching, shoring, and confined space. All field staff received the new directive on Workplace Violence. Plant Operations training consisted of refresher training in chlorine safety training and ladder safety.

Additionally, a select group of office staff was introduced to Ergonomics training as applied to the office setting.

The Safety Office also did confined space training and excavation, trenching and shoring training at the Kauai Water Department. The safety officer also did site specific risk-to-hazard analysis of Kauai's confined space sites.

The safety officer has also been deeply involved with the re-engineering of the proposed field operations pilot project, offering constructive suggestions on administrative and engineering controls that are anticipated to be implemented in the new design of field operations work.

Training classes, workshops, conferences and seminars continue to be well-attended in, among others, areas of job-related skills and supervision; retirement and financial planning; drug, violence, and sexual harassment awareness.

Under the Apprentice Program, one new apprentice was indentured, two apprentices completed the program and one resigned. Seven apprentices remain in the program at the end of the fiscal year.

The **Computer Services Section** provides the department with complete data processing services, including the analysis and development of computer software and hardware systems; maintaining standards for control of computer operations; training and educating departmental personnel in the use of computers; and providing full automated processing for all software.

As an extension of its services, the Division provides billing and customer information services through the Customer Accounting System (CAS) to three outside agencies: the Department of Environmental Services, City and County of Honolulu; the Department of Water Supply, County of Maui; and the Department of Water, County of Kauai.

The BWS began offering its consumers the ability to receive, and the option to pay their water/sewer bill online via the Internet. This E-Bill program went into effect on February 20, 2001. As of June 30, 2001, 154 accounts have signed up for this program. A one-time incentive credit of $5 was applied to each account.

Since January 2000, the start of the Automatic Meter Reading (AMR) project, the section has worked closely with both the Finance Section and the AMR Project Team to address and resolve new strategies and procedures. In August 2000, the Computer Services staff assisted in the configuration of the AMR vehicle read notebook computers (VXU), AMR PC workstation, and the associated procedures for AMR vehicle reading.

The electronic document management system (EDMS) project that converted the BWS microfiche, paper project files, and as-built construction drawings into electronic images through scanning is near completion.

Both the thick and thin-client (web-based) software have been installed on the desktop of the building permit technicians and plan review and support staff to provide easy access to the electronic images.

The Computer Services staff will continue to install the thin-client applications on other BWS personnel's desktop in the next fiscal year.

The GIS Team continued the development of the GIS Website prototype using the "out-of-the-box" tools contained in the ESRI's ArcIMS software and the maintenance and data capture of BWS service data to update the GIS ArcInfo database as well as provide online view and creation of maps and service data through the BWS Employee InfoNet.

The Section continues to provide the necessary technology and support to keep up with the Department's need. This fiscal year, we installed an additional 49 desktop PCs for a total of 341; 13 Thinkpad laptops for a total of 56; and 46 new Internet users for a total of 150.

The RightFax software was also installed to provide a means of easily sending and receiving faxes via the PC. In addition, 12 HP Digital Senders with faxing, copying, and scanning capabilities to PCs were installed. The BWS purchased 11 BlackBerry two-way wireless remote email units for the Executive Leadership Team and the PC Support staff to provide continuous communication away from the office.

To accommodate the increasing need for dial-in lines, an Access Server with eight additional telephone lines was installed.

Finally, the network connections to Kalihi, Manana, and Heeia yards were upgraded from Frame Relay to ADSL circuits. Fiber optic network connection was installed between the three buildings in the Beretania Complex to provide faster response and reliability.

CUSTOMER CARE. The Customer Care Unit (formerly the Customer Service Division) shapes and presents the "face" of the BWS. It handles the majority of contacts with consumers.

Land Division became a part of the Unit in September. With the February reorganization, the Unit added the Community Relations Office; the Revenue and Customer Accounting section from the former Finance Division; and the Environmental and Plans Review Units and the Project Review Section from the former Planning and Engineering Division.

Community Relations Office (CRO) educates BWS customers about Oahu's water supply by personalizing the need to conserve this limited resource. CRO also works with the Department and the Board to ensure positive contacts with the public regarding BWS operations.

The Unit channels information flow between the BWS and the public. In FY 2000-2001, CRO took in and handled 22,705 phone calls involving community concerns, complaints, and inquiries; and gave out information about BWS activities and programs.

Community Relations staff issued 34 news releases, prepared five speeches for BWS personnel, gave six speeches, and composed 393 letters. They distributed 223,099 publications, including materials on conservation and the water supply, annual reports, and other resource material.

Year-round tours remained in high demand. The Fred Ohrt Museum hosted 2,978 people; 3,786 persons viewed water-saving landscape techniques and methods in use at the Halawa Xeriscape Garden's (HXG); 1,889 took the Halawa Tour although it was closed from July 1 to December 31; and 4,515 visited the Waihee Tunnel in Kahaluu. In addition, 613 people went to see the Honouliuli Water Recycling Facility.

Community Relations participated in 31 community events, including special tours, exhibition booths and speakers' requests. HXG-based classes taught 93 people about xeriscaping, lei- and wreath-making with unthirsty plants, native plant propagation, groundcovers, and tillandsia plant craft.

The 12th Annual Unthirsty Plant Sale in August promoted water-efficient landscaping, offered water-saving plants for purchase and gave out rare, native Hawaiian plant seeds propagated by the Department.

The plant sale, co-sponsored by the BWS and the Friends of Halawa Xeriscape Garden, also included booths featuring plant crafts, xeriscape classes, and tours of the garden and Halawa Shaft. Proceeds benefit the garden's water education program.

In August, the BWS printed and distributed 8,000 Teacher's Water Conservation Calendars. Each month displays a winning entry from the 2000 Annual Water Conservation Week Poster Contest with a photo of the student artist and the teacher. Artwork illustrated the theme, "Among the Treasures of Our Island is Water. Use it Wisely."

The 11th Annual Detect-A-Leak Week program prompted water users to check for property leaks from March 4 to 10. The Community Relations coordinated program, co-sponsored by Sheraton Waikiki Hotel, the Oahu Chapter of the Hawaii Sierra Club, the Chamber of Commerce of Hawaii and Royal Hawaiian Shopping Center, generated about 200 phone requests for free home leak checks. Kaumakapili Church in Palama hosted the media leak detection demonstration.

The 23rd Annual Water Conservation Week Poster Contest drew more than 2,700 entries from school students island-wide in grades Kindergarten through Six. This year's theme was "A Calabash Full of Water Holds the Wealth of Life." Winning and honorable mention entries were displayed at City Hall's Lane Gallery from May 1 to 15.

CRO staff remained involved with the QUEST reengineering project to create a more efficient agency, committing substantial work time to the effort.

Also, CRO continued to administer the Neighborhood Board Liaison program to foster ties to grass roots level of the public. Employees volunteer as BWS representatives for the 30-plus Neighborhood Boards, sharing BWS information and bringing back community concerns and inquiries for response.

The **Customer Services Section** prepares applications and contracts for water services; reviews and approves building permit applications; reviews construction plans; inputs and maintains water service information in the Geographic Information System (GIS); generates GIS-based maps; maintains all consumer accounts and service records; designs service connections; collects bills; investigates consumers' service problems; administers water system facilities charges; and administers the rules and regulations governing water service to consumers.

The BWS added 1,419 services during the year, for a total of 157,429 active services in the system. There are 155,598 domestic services and 1,831 fire services.

Water service investigators handled various assignments, together with 6,864 abnormally high water bills, 1,133 leaks and 2,609 general jobs, including requests to locate water mains.

Customer service representatives received an average of 4,472 calls each month from customers requesting various services and information. Service Engineering Section's personnel reviewed 9,013 building permits, processed 1,404 water service applications, reviewed 395 construction plans, and input 2,050 water services for the GIS project.

The Collection and Credit Section visited 25,925 delinquent customers. The Cashiering Unit collected $110,754,777.07 in water bill payments and $103,797,141.33 in sewer payments for the year.

As of June 30, 2001, the BWS had 36,496 customers on Automatic Bill Payment, which represents 23.4 percent of our customers.

The **Environmental Section** advises the Department on all environmental matters, such as the coordination of Environmental Impact Statements (EIS), Conservation District Use Applications (CDUA), Special Management Area (SMA) Permits, Stream Channel Alteration Permits, Department of Army Permits (which include the Coastal Zone Management Consistency Concurrence and the Department of Health (DOH) Section 401 Water Quality Certification), National Pollutant Discharge Elimination System (NPDES) Permits, Archaeological Services and Hazardous Materials.

It prepares and submits environmental documents for BWS projects, reviews environmental documents from applicants and government agencies, and manages and implements the BWS' Cross-Connection Control and Backflow Prevention Assembly Testing Program, which includes 6,142 backflow prevention assemblies island-wide.

During the past year, the Section processed 758 building permit applications requiring the installation of 121 backflow prevention assemblies. Also, multiple field inspections addressed consumer concerns about Cross-Connection Control and Backflow Prevention Annual Testing requirements.

The Section assists various City and State agencies to comply with the annual testing requirement. It contracted a certified tester to check the assemblies for the government agency and then bill the respective agency through their water bills.

Currently, there are 382 privately owned and government-owned backflow prevention assemblies and 171 agricultural assemblies that are to be inspected in the coming year for installation according to BWS Standards.

The Annual Testing Program mailed out 3,851 first-notice test forms and 1,352 second notices, averaging 267 test forms being mailed out per month for FY 2000-2001.

The staff continued contract work for environmental assessments and conceptual designs of the Malaekahana Production Facility and the Waimanalo Well III Production Facility; and environmental assessments for Nuuanu Pali 12-inch mountain line, Wahiawa-Whitmore Village 16-inch water main interconnection, Kalanianaole Highway (Olomana to Waimanalo) 36-inch water main, Nuuanu Upper Reservoir, and Kalawahine Reservoir.

Work was completed for the Waihee 265' Reservoir Slope and Drainage Improvements environmental assessment. The SMA Permit Application, Stream Channel Alteration Permit Application, Flood Hazard District Certification, Shoreline Setback Certification and Army Corps General Permit Application were obtained for the Kamehameha Highway 36-inch waterline crossing of Punaluu Bridge No. 9 and No. 10.

Work continued on archaeological surveys and construction monitoring contracts for the Kalakaua Avenue 16-inch waterline project, Kamehameha Highway 36-inch transmission main project from Punaluu to Kahana, Farrington Highway 24-inch transmission main project from Makaha to Nanakuli, Pupukea 16-inch waterline project, King Street 16-inch waterline project and many other waterline projects in sensitive areas.

An archaeological on-call contract was initiated to handle any unforeseen archaeological remains during BWS construction activities. Cultural monitoring work was initiated for the Punaluu 36-inch transmission main project and the Makaha Water Systems Improvements project, Phase II.

The Environmental Section also coordinates the Department's NPDES permitting requirements for water main, reservoir, and water treatment facility projects of the Capital Improvement Program (CIP).

The staff worked on obtaining permit coverage for discharges into State receiving waters, and State and City drainage for storm water discharges associated with the Kamehameha Highway 36-inch main from Kaaawa to Punaluu, Dillingham Boulevard 42-inch transmission main and Kahekili Highway 42-inch transmission main.

Approval was obtained for blanket NPDES permit coverage for commonplace BWS activities that result in discharges. The Section obtained DOH and Department of Environmental Services permit applications for dewatering the Kamehameha Highway 36-inch main from Kaaawa to Punaluu.

The Section also coordinates the handling of hazardous materials inadvertently discovered in BWS construction projects. An on-call hazardous materials contract was initiated to address hazardous materials inadvertently discovered during BWS construction activities.

The **Land Section** acquires water rights, land, and land interests by purchase, condemnation, lease, easement, executive order, etc. This Section also disposes surplus real property and manages approximately 13,185.747 acres of land under the control of the Department.

During this fiscal year BWS acquired 0.459 acre from the State of Hawaii, by Governor's Executive Order No. 3746, for the Waianae Corporation Yard expansion; 0.004 acre and 0.004 acre from K. Hironaga, et al. and Randall K. Kajikawa, et al., respectively, by land exchange for the Booth Springs Line Booster Station site; 20.029 acres from the United States of America Department of Health and Human Services for the Barbers Point Desalination Plant site; and purchased 0.059 acre from The Evangelical Lutheran Good Samaritan Society for the Booth Springs Line Booster Station site for $52,000.

The BWS also transferred ownership of 0.005 acre and 0.013 acre of the Booth Springs Line Booster Station site to K. Hironaga, et al. and Randall K. Kajikawa, et al., respectively, by land exchange.

The Section also acquired 29 water pipeline and water meter easements and processed 133 miscellaneous documents.

The **Plans Review Section** reviews all development construction plans, specifications, and reports for all city, state, federal and private water system improvements for conformity with BWS standards; performs hydraulic calculations to verify adequacy of fire protection for proposed projects; prepares and administers agreements and Memorandums of Understanding with public agencies and private developers; reviews and processes agreements and bonds for subdivision water system improvements; and coordinates the review of plans with other units within the Department and the City Department of Planning and Permitting.

This year, the Unit reviewed and approved various water system improvements for large subdivisions such as developments for Ewa by Gentry, Mililani Mauka, Ocean Pointe and AMFAC industrial subdivisions in the Ewa area, large meter installations for commercial and industrial developments throughout the island and various road improvements from City, State and private utility companies.

The **Project Review Section** evaluates requests for water availability, maintains records of water commitments and responds to requests for hydraulic data (flow and pressure). The Section coordinates departmental reviews of submittals from other public agencies, such as the Department of Planning and Permitting (DPP) Subdivision Committee, and monitors water allocations from new and future well projects at Maakua, Makaha, Honouliuli, Waipahu III, Mililani Wells IV, Royal Kunia, and HECO-Waiau.

This year, the Section reviewed water master plans for Mililani Mauka, Ocean Pointe, and the reclaimed water system in the Ewa Plain.

The **Revenue and Customer Accounting Section** conducts the department's water billing operations and its related functions, which include meter reading, pre-auditing water billing data and maintaining accounts receivable records. The Section also reviews financial and statistical reports, is responsible for mailing department correspondence, and maintains the City Department of Environmental Services' sewer accounts-receivable records.

This year the Section continues its conversion from manual meter readings to electronic meter readings captured by computer in a drive-by vehicle. As of June 30, 2001 a total of 55,000 meters, or over one-third of the total residential water meters in the BWS system have been converted to these electronically read water meters.

MAINTENANCE. The Maintenance Operating Unit is responsible for ensuring the continued operational integrity of the underground infrastructure, planning and executing water system repair and replacement and improvement projects.

Restructuring of the BWS combined the former Field Operations Division with most of the Sections and Units of the former Engineering Branch.

Maintenance Unit – Engineering ensures that all improvements to Oahu's municipal water system are designed and constructed in compliance with the Department's standards.

Engineering personnel reviewed the plans and specifications of all water system improvements projects submitted to the BWS by consultants, private developers, utility companies, and other government agencies. Construction of these projects was supervised to insure the improvements conform to water system standards.

One of the major functions of Maintenance Unit – Engineering is the implementation of the Department's Capital Improvement Program (CIP) and Research and Facility Improvement Program (RFIP). Through Engineering, the department awarded a total of $46 million in construction contracts and over $17 million in consultant contracts as of June 30, 2001. The following highlights the major projects of the past fiscal year:

- Contracts were awarded to drill monitor wells in Moanalua and Wahiawa. These deep monitor wells are intended to monitor the condition of the fresh water lens. The data from these wells helps the BWS in the management of groundwater resources.
- Contracts were awarded for exploratory well drilling in the Kalaeloa area, site of the former Barbers Point Naval Air Station, to evaluate groundwater resources for future conversion to potable water. A contract for the design of the desalination plant was also awarded. When constructed, the plant will convert salt water from the lower caprock aquifer into potable water, providing an alternative source of drinking water to meet the demands of the Leeward area.
- A new control station was completed for Kapalama Wells. The new facility provides an estimated maximum yield of 2.0 million gallons per day (mgd) to the Honolulu area.
- Reservoirs are situated at strategic locations to ensure a reliable supply of water and maintain adequate pressures within the water distribution system. Construction is nearing completion for the Makaha 242' Reservoir No. 2, a new 2.0 mg reservoir in the Makaha area. Work continues on the Kunia 228' Reservoir No. 2 and Kailua 272' Reservoir. Upon completion, these new reservoirs will increase the storage capacity of the leeward and windward water systems.
- A construction contract was awarded for the construction of a granular activated carbon (GAC) water treatment facility at Hoaeae Wells in Waipahu. This project will ensure that the well station's water quality complies with the State of Hawaii, Department of Health standards.
- New water mains were added to the municipal water system island wide to improve system reliability, ensure sufficient pressure during periods of peak demand, and provide adequate fire protection. Water main construction projects were completed in Aiea, Barbers Point, Enchanted Lakes, Hawaii Kai, Kaaawa, Kailua, Kakaako, Kalihi, Kamehameha Heights, Kaneohe, Kuliouou, Maili, Manoa, Maunawili, Moiliili, Niu Valley, Nuuanu, Waialae, Waianae, Waiau, Waimanalo and Waipahu.
- Construction contracts were awarded for water main replacements in Ala Moana, Hawaii Kai, Kahe, Kaneohe, Manoa, Sunset Beach, and Waiau. Design contracts were awarded for projects in Aiea, Halawa Heights, Hawaii Kai, Kahaluu, Kailua, Kaimuki, Kalihi, Kapahulu, Kapolei, Liliha, Makaha, Nuuanu, Pauoa Valley, Waianae, Waimanalo, and Waipahu.
- Construction contracts were awarded to renovate the mechanical and/or electrical systems for Barbers Point Non-Potable Wells, Hoaeae Wells, Mauna Olu Non-Potable Reservoir, Palolo Well, Punaluu Wells II, Waipahu Wells IV, and Waipio Heights Wells II. Renovations were completed for the Kalihi Corporation Yard. Modifications and upgrades were also completed for the GAC treatment systems at Mililani Wells III and Waipahu Wells II. These projects help to ensure the dependable service and operational efficiency of the Department's facilities.
- Maintenance Unit – Engineering continued its program to identify and improve the appearance of water facilities showing signs of deterioration. Construction contracts were awarded to repair, re-roof and/or improve landscaping and irrigation systems at Kamiloiki 170' Reservoir, Niu Valley 170' Reservoir, Waialae Iki 180' Reservoir, Waialae Iki 640' Reservoir, Waialae Iki Booster No. 2, Waialae Iki Booster No. 3 and Waihee Line Booster.

Maintenance Unit – Field is responsible for ensuring continuous water service to the Department's 155,000 customers. Unit personnel repair pipeline and service line leaks; install, replace, and enlarge water service lines; perform scheduled preventive maintenance of large meters, fire hydrants, waterline valves, and facility grounds and buildings; and

respond to trouble calls and service requests including investigations of leaks, water service closures for repairs, and turn-ons.

Other support services provided to the Department are masonry, carpentry, and welding work.

There were 406 main breaks, four percent lower than the average of the past ten years. Some of the past year's significant main breaks were:

- On August 1, a failure at a 12-inch PVC elbow on a main at the intersection of McCully Street and Kapiolani Boulevard forced the closure of the intersection for over 24 hours as our crews replaced the elbow and a ten-foot section of pipe. A contractor was called to resurface a major portion of that intersection.
- On September 7, a major leak on the 24-inch cast iron main on Kamehameha IV Road caused major damage to the roadway and flooded the surrounding area until water could be shut off. Repairs, which took 39 hours to complete, consisted of replacing a 30-foot section of pipe.

To resolve a long standing problem by 6th Avenue in Kaimuki, Construction and Service and Meters crews installed approximately 200 linear feet of an eight-inch main on Lincoln Avenue; and over 700 linear feet of a two-inch main on Pahoa Avenue to provide high-pressure service to customers in the area. A total of 69 services were converted to the high service system.

Manana crews assisted the BWS contractor in converting the old 16-inch main on Fort Weaver Road to non-potable use by cutting and plugging two interconnections, and installing 475 linear feet of two-inch and 2+ inch copper mains.

The Department was well-represented in the National AWWA Pipe Tapping Contest held in Washington, D.C. Unfortunately, the Hawaii Section Champions, who won again in this year's local Hawaii AWWA Section competition held at the Ilikai Hotel, did not fare as well nationally with a time of 1:10.31. Although they failed to qualify for the finals in Washington, D.C., they made a very respectable showing with a time of 1:40.09, which placed them 11th out of 21 teams competing during the preliminary round. The team was comprised of pipeman Jensen Mimuro, tappers Glenn Ah Yat and William Iaela, and coach Mark Luberts.

There was an unusual twist to this year's national contest as the first women's division competed for a National Championship. The Mililani Leak Detection team made up of Board of Water Supply employees, pipe person Anna Tanaka, tappers Gaynor Minton and Danielle Ornellas, and coach Mark Luberts, represented the Hawaii Section. They took top honors with a winning time of 2:00.47 to become the first Women's National Champions.

The work force was kept busy maintaining Oahu water system components to ensure continuous water service to our consumers.

Maintenance Section crews repaired 13 main breaks on mountain pipelines and fire hydrant laterals. The welder completed 433 general welding projects.

Valve crews inspected and maintained 8,309 valves and 1,097 air valves, repaired or replaced 27 main valves and two air valves, and raised 81 manhole frames and covers to street grade.

In conjunction with work done by contractors, the valve crews conducted 85 valve checks and water closure surveys and made five live taps: one 24-inch tap on 24-inch main, three six-inch taps on 30-inch mains, and one 16-inch on a 16-inch main in Kaanapali, Maui.

Hydrant crews inspected and maintained 5,279 hydrants, repainted 5,660 hydrants, repaired 674 hydrants of which 30 were damaged by motorists, plotted 77 new or relocated hydrants and replaced 33 hydrants in the Metropolitan Honolulu area. The Hydrant Unit exceeded their maintenance goal of 4,932 hydrants by 347.

Metropolitan grounds keeping crews continue to provide excellent care to the 102 BWS facilities in the metropolitan area.

In keeping with the Department's grounds maintenance program to use water wisely and judiciously, crews spent considerable time upgrading and maintaining landscaped areas by employing xeric concepts at Halawa Xeriscape Garden and Kalihi Pumping Station.

Overall improvements to landscaped areas included work to upgrade the appearance of these sites and to demonstrate the use of water-conserving plants and methods to the public. These improvements also minimize the hours required to maintain the facilities. In addition, crews supported two events to promote xeriscape concepts — the Hawaii State Farm Fair and the Thirteenth Annual Plant Sale.

Construction Section crews repaired 188 main breaks on pipelines 4- inches and larger in diameter and 734 service leaks. The number of both main breaks and service leaks are expected to decline over time as the BWS continues programs to replace old galvanized services and cast iron mains.

Crews renewed 224 galvanized services with copper, cut 52 services at the main, turned on/off 1,557 services, installed 16 bypasses, and replaced 97 defective meters.

Masonry crews maintained and repaired BWS facilities and provided masonry support to other field units, made 380 road cuts for service renewals and main break road patches, repaired sections of 420 sidewalks, 81 gutters, and 95 driveways.

Carpenters repaired vent screens, booster housing screens, and windows, doors and roofs at various sites throughout the island in conjunction with the Department of Health's Sanitary Survey. They also performed other regular duties involving the repair, upgrade and maintenance of BWS facilities, and installed shoring in conjunction with main break repairs.

Significant pipe repairs completed by the Construction Section included:

- A horizontal split on a 16-inch cast iron main on 10th Avenue that was repaired by replacing a ten-foot section of pipe;
- A blown elbow on a 12-inch PVC main at the intersection of McCully Street and Kapiolani Boulevard that closed the intersection for over 24 hours as our crews replaced the elbow and a ten-foot section of pipe;
- A horizontal split on a 12-inch cast iron main on Pakui Street between Mokuna Street and 10th Avenue in Palolo Valley that was repaired by replacing a 16-foot section of pipe;
- A horizontal split on an eight-inch cast iron main on Keeaumoku Street near Kapiolani Boulevard that closed Keeaumoku Street in both directions from the early morning hours until midnight as our crews replaced a 12-foot section of pipe;
- A horizontal split on a 12-inch cast iron main on University Avenue and Maile Way that was repaired by replacing an 18-foot section of pipe;
- A horizontal split on a 24-inch cast iron main on Kamehameha IV Road that was repaired by replacing with a 30-foot section of pipe;
- A horizontal split on a 16-inch cast iron main on Claudine Street that was repaired by replacing a 22-foot section of pipe; and
- A horizontal split on a 16-inch cast iron main on Kuhio Avenue in Waikiki near the Fernandez Fun Factory was repaired by replacing a five-foot section of pipe.

Service and Meters Section crews compose the Service Connections, Meter Maintenance and Building Maintenance Units. Service Connections Unit crews installed 190 new services, repaired 31 service leaks, renewed 11 galvanized services with copper, cut 18 services at the main, relocated 43, resized 39 services, and replaced 416 defective meters.

The Meter Maintenance Unit tested 6,412 meters in FY 2001 as part of the island wide contract to install new automatic meters with electronic reading capability to replace all displacement type meters.

The unit's field crews maintained, repaired, and tested 916 large meters, including the 190 largest water users.

The unit's Meter Shop personnel repaired and tested 1,488 displacement type meters, repaired 146 register dials and tested 749 meters from the meter contract purchases and 6,908 meters for the island-wide automatic meter reading replacement program. They also evaluated and tested sample meters submitted by manufacturers for approval and acceptance for use in our water system.

The crews of both the Service Connections and Meter Maintenance Units combined their efforts to complete 3,928 field service reports to verify and repair leaks, adjust and replace meter boxes, remove dirt and roots from meter boxes, and obtain follow-up meter readings.

The Building Maintenance Unit performed custodial and building maintenance services for the Beretania Complex, Kalihi Corporation Yard, and Fred Ohrt Museum. The unit's building maintenance repairer fixed various plumbing fixtures island-wide, painted over graffiti in the metropolitan area, and made miscellaneous repairs to facilities.

Suburban Field Services (SFS) Section pipefitting crews, operating from corporation yards at Manana, Waianae, and Wahiawa, repaired 156 main breaks, 645 service leaks and five air relief valves; installed 1,164 new services and seven meter bypasses; renewed 405 feet of service main, and 145 old and leaking galvanized services with copper pipe; and placed 135 additional fire hydrants in service.

They also cut off one abandoned service at the main; relocated 78 services/meters; enlarged 21 services/meters; ordered on/off 664 and turned on/off 1,381 services; inspected 6,272 fire hydrants, 7,669 gate valves and 1,237 air relief valves; and raised 126 manhole frames and covers to grade.

Crews responded to 7,696 trouble calls, and followed up on 2,141 meter/meter box and service related problems (field service reports), and replaced 545 defective meters.

Main breaks increased by 7.6 percent; service leaks decreased by 0.5 percent; installation of new services increased by 11.0 percent; service renewals decreased by 12.6 percent; and replacement of defective meters decreased by 19.6 percent. Significant pipe repairs completed by SFS personnel included:

- Corrosion of the 24-inch concrete cylinder main on old Farrington Highway near the Barbers

Point 215' Reservoir resulted in some low pressure problems when BWS made closures to perform temporary repairs on two occasions. The crew made permanent repairs by splicing over 30 feet and spent a total of over 300 man-hours on the job. Traffic was not affected as the break was on a section of roadway that is not used by the public.

- Corrosion/blowout of a hydrant tee on the 16-inch concrete cylinder main at Kili Drive resulted in the closure of Kili Drive to temporarily repair the main by welding patches. Although the road was closed as a result of this repair work, traffic was not adversely affected because residents had an alternate access from Makaha Valley Road and water service was not affected.
- Corrosion/blowout of 12-inch concrete cylinder main on Kamehameha Highway across from Iroquois Point Road resulted in traffic congestion until we were able to complete repairs. Repair was suspended during morning and afternoon hours to minimize the effect on traffic; therefore, it took 20 hours to complete.

Other significant work done by SFS personnel included:

- Repaired PVC water mains for Makalena Golf Course on seven occasions.
- Provided assistance with the conversion of the 16-inch cast iron main on Fort Weaver Road to a non-potable main. Cut and plugged two connections and installed 300 feet of a 2-inch and 175 feet of 2-1/2-inch copper mains.
- Installed 250 feet of 2-1/2-inch PVC service mains to provide temporary water for irrigation of Coral Creek Golf Course until installation of connections to recycled water system.
- Installed by-pass for temporary irrigation of park until problems with recycled water system at Ewa Villages Golf Course could be resolved.
- Assisted Operations with the cleaning of the Kawela 228' Reservoir.
- Inspected and performed corrective work including clearing overgrowth, trimming trees and correcting other deficiencies noted in preparation for and as a result of Department of Health Sanitary Surveys.
- Corrected deficiencies, installed hardware for services, and repaired meter and service lateral leaks related to the Automatic Meter Reading program.
- Provided water wagons for Waiawa Correctional and Dole Food Company water emergencies and several functions such as the Farm Fair and the opening of the City's soccer complex in Waipahu (tower light unit also provided).
- Started constructing roadway to provide access for equipment and material used for sealing of the Waikele Tunnel.

The Suburban Field Services (SFS) grounds keeping crews continued to maintain the 117 BWS facilities in the SFS area.

They also performed the following work:

- As a cooperative effort with the City, crews spent 320 man-hours installing drought tolerant plant material to complete the landscaping and irrigation system at the Waipahu Wells III. This facility adjoins the recently completed section of the City's Central Oahu Regional Park.
- Crews spent 90 man-hours installing irrigation systems and some trees to landscape the Waikele 395' Reservoir site that adjoins the Central Oahu Regional Park.
- Crews spent much time maintaining upgraded landscaping at our Halawa 277', Kaonohi 277', Punanani Wells, Waiau 550', Pearl City 385' and Wahiawa 1180' facilities. They also repaired and upgraded irrigation systems at our Halawa 277' and 533', Haleiwa 225', Kaonohi 277', Kunia 440', Makakilo Wells I, Mililani 685', Newtown 285' and 550', Pearl City 640' and 865', Pupukea 170', Wahiawa 1180', and Waiau 285' and 550' facilities.

Windward Section crews repaired 43 main breaks on pipelines four inches and larger in diameter and 35 service lateral leaks as compared to 64 main breaks and 54 lateral leaks last year. Main breaks were 14 percent higher than the past 10-year moving average while lateral leaks were 56 percent lower. The Windward district normally has about 56 main breaks, and 122 service lateral leaks per year.

The section continued work on its service renewal program and replaced 33 galvanized laterals with corrosion-resistant copper pipe. Pipe crews also enlarged 46 copper services; installed 56 new services; replaced 194 malfunctioning meters and responded to 2,017 trouble calls and 809 meter-related field service reports.

Valve and hydrant maintenance crews met or exceeded their goals servicing 4,172 valves and 3,361 hydrants to ensure the reliability of the system for isolating mains during emergencies and fire fighting capability.

Grounds crews kept pace with the work in the Windward area and maintained all facilities as scheduled.

OPERATIONS UNIT. The Operations Unit supports the Department's core mission to provide Oahu residents with safe and dependable water service at a reasonable cost through operating Oahu's diverse water system. It provides island residents with 169 mgd of water while maintaining all of its pumping and water treatment equipment.

The major components of the Operations Unit are Plant Operations Division, Water Quality Section (from the former Planning and Engineering Division), Automotive Division, and the Mechanical/Electrical Engineering Section (from the former Planning & Engineering Division). Each of these core and support functions uses innovative practices to ensure effective, efficient and quality services.

The Plant Operations Section consists of the Pumps and Telecommunications Section. The two sections operate and properly maintain all the department's pumping and treatment plants, including its telemetry and communication systems.

The Pumps Section continued its various preventive maintenance and equipment replacement programs. This included servicing and inspecting 27 motor control centers, rewinding five motors and reconditioning 30 motors of various types and horsepower. The section also overhauled six horizontal centrifugal pumps and four altitude valves.

To work more efficiently, Pumps Section initiated a pilot program at Waiau Wells and Booster to utilize solid-state equipment in place of standard electromechanical devices.

In-house personnel designed, assembled, installed, and operated the new equipment, which increases efficiency while minimizing maintenance and repair costs. The knowledge and skills acquired by this group are being disseminated to the rest of the section, preparing everyone for the world-class organization to come.

The Telecommunications Section continued to maintain the telemetry system in support of our SCADA system, as well as the Board's mobile radio system. This fiscal year, the section is continuing a consultant study that encompasses our telemetry, radio, telephone, and wide-area-network requirements with recommendations on how to provide for our current and future needs.

The Mechanical/Electrical Engineering Section implements construction projects whose major scope of work involves the mechanical and electrical equipment. The section also provides mechanical and electrical engineering support to other engineering design sections. They ensure that the equipment is designed, installed, and tested in compliance with the department's standards. This section was placed in this Unit to be more closely associated with the personnel that operate and maintain the equipment they are specifying.

Construction projects that were completed this fiscal year include Aiea Gulch Wells Renovation, Kaamilo Booster Renovation, Waihee Line Booster Control Valves; Punanani Wells: Replacement of Pump No. 6, Kaamilo Wells: Replacement of Pump No. 1; Honouliuli Line Booster: Replacement of Valves; Aiea Booster No. 3: Indoor MCC Installation, and Maunawili Booster PRV. Only one consultant project, Punaluu Wells II, was awarded this fiscal year. These projects totaled $1.8 million.

The Water Quality Section, consisting of the Chemical and Microbiological Laboratories, monitors the integrity and quality of the Department's water sources and system in conformance with all applicable Federal and State drinking water laws, rules and regulations. The Section also monitors regulatory changes and provides consultative services to the Department on Environmental Health issues related to water quality and the design of water treatment facilities.

The Chemical Laboratory analyzed 4,779 samples requiring more than 14,600 tests during the fiscal year. This includes responding to 303 water quality complaints and analyzing 133 seepage investigation samples. The laboratory fields an average of 2.5 calls each workday from customers requesting information or registering complaints. This summer, laboratory personnel were busy collecting and analyzing tap water from 266 homes to complete another round of EPA's Lead and Copper Survey. BWS chemists also processed samples from 124 different sources for the Federal Phase II/V and UCMR programs.

The Microbiological Laboratory continues to maintain its State Department of Health and EPA certification. The laboratory routinely monitors well stations, reservoirs and points in the distribution system to insure that the Department's drinking water meets Federal and State regulations.

During the fiscal year, BWS microbiologists examined 10,653 water samples for coliform bacteria. Of this total, 6,673 were for regulatory compliance; 1,745 were for new main disinfection; 103 were in response to water quality complaints; and 2,132 were special investigation and project samples.

The **Automotive Section** administers and operates the fleet management functions for the Department. It is responsible for the procurement, maintenance, repair, replacement, and disposition of all BWS vehicles and equipment.

During the fiscal year, Automotive maintained and repaired 293 motor vehicles, 66 field construc-

tion equipment, and 28 trailers at its Manana Corporation Yard repair facility in Pearl City. In addition, plans and specifications were prepared for the purchase of 15 vehicles of various types, two portable air compressors, a concrete saw, a concrete mixer, a light/generator/welder unit, and a flatbed trailer.

To further develop the repair staff's skills and knowledge, and to keep abreast with technological advancements in the automotive industry, supervisors coordinated numerous technical training sessions led by various equipment manufacturers, industry professionals, and government inspectors. These sessions provided methods to maximize vehicle and equipment longevity and ensure safe operation.

In May of this year, the staff implemented a new computerized fleet management system. This will provide online real-time data to track fleet history, performance, warranties, and inventories.

Vehicle and equipment longevity continues to be a priority for the division. Now in its fourth year of use, the continued use of an electronic rust inhibitor module has been successful in the battle to control rust.

The Automotive Division completed its fourth year of operations from the repair facility at Manana Corporation Yard. This central location has proven to be ideal for island-wide fleet maintenance and repair operations.

The Operations Unit has been very active in the Board's QUEST program, participating in teams that will define its business plan, streamline its processes, and re-engineer its organizational structure. The continued implementation of state-of-the-art equipment and technology will allow the Operations Unit to function more efficiently with a smaller, well-trained staff.

WATER RESOURCES. The Water Resources Operating Unit conducts the planning and outreach needed to provide current and future customers with high quality service at reasonable costs, while protecting the long-term viability of Oahu's water resources and enhancing the environment.

Its staff consists of most of the Planning Branch of the former Planning and Engineering Division.

The **Long-Range Planning Section** prepares the Department's Six-Year CIP and long-range plans for projected water system requirements, and coordinates proposed Development Plan Map Amendments with the City Planning Department.

It continued to update the Oahu Water Plan, the Department's master plan for the development of water resources and facilities needed to meet future water demands.

The Section also worked on the Integrated Resource Plan (IRP) to prepare a comprehensive County water use and development plan. The IRP is based on an extensive public participation program to formulate issues, scenarios, and options. The plan will be adopted into ordinance by the City Council as part of the statewide Hawaii Water Plan to assist the State Commission on Water Resource Management in regulating and managing the State's water resources as mandated by the State Water Code.

In conjunction with the IRP, work was done on Watershed Management Partnerships with public, private, and government entities. The goal of this program is to restore and protect water resources and the environmental quality of Waianae and Koolau watershed areas through cooperative partnerships.

Testimony was provided for proposed legislation in the areas of water resource management, State land use planning, and environmental protection. Proposed legislation for revising the State Water Code was evaluated for impacts to the BWS.

Studies worked on during the year included: population and water demand projections; Waialua-Mokuleia-Kawailoa Water Development and Transmission Feasibility Study; Honolulu Desalination Study; Honolulu 42- and 24-Inch Transmission Main Environmental Assessment; various CIP project feasibility and water availability studies; and Ewa Reclaimed Water planning.

Population and water demand projections were analyzed for future CIP facilities development requirements to coincide with the 1990 Federal Census, State DBEDT M-K projections, and the City Planning Department's projected distribution of population up to the year 2020.

The on-going Waialua-Mokuleia-Kawailoa Water Development and Transmission Feasibility Study will assess water availability and source development in the Waialua-Kahuku water district for possible transmission to either Waianae, Ewa, or Windward districts. Capital and operating costs will be evaluated for development feasibility compared to groundwater development in Pearl Harbor and Windward districts, desalination, and wastewater reuse costs.

The completed Honolulu Desalination Study will provide a conceptual design for a 5 mgd desalination plant at Barbers Point. Other alternative sites in Honolulu were evaluated for feasibility. Reverse osmosis was recommended as the best processing technology.

Proposals were prepared to acquire federal land at Kalaeloa for the desalination plant and a proposed Deep Ocean Water Facility (DOWAF). The DOWAF will use cold deep ocean water for high technology processes such as electricity production with a potable water by-product; chilled water for air conditioning,

irrigation and enhanced crop growth for diversified agriculture; and ocean water for aquaculture farming.

The on-going Honolulu 42- and 24-Inch Transmission Main Environmental Assessment will evaluate impacts from construction activities for a recommended route corridor from Liliha to Waahila 180' Reservoir.

CIP project feasibility studies assessed costs, water system benefits and integration, and development parameters. The studies are used to identify the need and priority for scheduling projects.

Water availability studies assessed surplus water in existing systems for the entire island. Average day and max day demands for each source were compared with design capacities, permitted use, sustainable yield, and operating capacities.

Ewa reclaimed water planning efforts are assessing potential customers and nonpotable water system installation in the Ewa district for using the U.S. Filters Honouliuli reclaimed water plant that was purchased by the BWS. The initial phase will use 13 mgd of nonpotable reclaimed water. Future phasing will plan for additional nonpotable use of wastewater from Honouliuli and other brackish sources from Ewa and Pearl Harbor districts.

The **Water Systems Planning Section** is responsible for the following tasks: (1) Developing and maintaining computer hydraulic models of the various water systems; (2) Updating the water use zone codes and maps, which provide geographical consumption data for use by various Operating Units; (3) Reviewing and evaluating hydraulic calculations and assumptions for various planning studies; (4) Evaluating the hydraulic feasibility and extent of water system facilities improvements proposed in the department's Research and Facilities Improvement Program (RFIP) and Capital Improvement Program (CIP); (5) Collecting real-time water system operational data (flow rate, pressure, etc.) from the field for the development and calibration of the water system hydraulic models, and to assist the work of other Operating Units; and (6) Periodically updating the Water System Schematics which depicts the major water system facilities and transmission mains.

During the fiscal year, the section completed the Honouliuli 228' Reservoir No. 3 Feasibility Study and Environmental Assessment, Phase I Environmental Site Assessment for Ewa Shaft and the Honouliuli 228' Reservoir No. 3, the Honolulu Regional 180' Reservoir Site Study (that identified potential sites for additional reservoirs in the Honolulu 180-foot water system to decrease the Honolulu Metropolitan area's existing storage deficit), and the GIS Pipe Updating Project (that updated pipeline attribute data in the department's Geographic Information System database); assisted with the Community Planning phase of the Honolulu 42-inch and 24-inch Transmission Main project (that involved coordinating and making presentations on the project to impacted Neighborhood Boards and community groups); redesigned the Water System Schematic; calibrated the Mililani and Nuuanu Upper Water System models and completed various pre-calibration tasks for the Waianae area, Ewa area and Honolulu Metropolitan 180' water system models; and provided hydraulic evaluations of various RFIP and CIP projects.

Ongoing projects administered by the Section include the calibration of the computer hydraulic models, and the conversion of the existing Water Use Zone coding and maps to the new Geographical Consumption coding system; the Waiau 850' Reservoir Easement Pipeline Feasibility Study (to identify and evaluate alternatives to a cross-country pipeline that provides water service to the Waiau, Newtown and Royal Summit communities); assisting with the hydraulic analysis for the installation of a new reservoir for the Waianae 242' water system; the acquisition of the Waimano Training School and Hospital water system from the State, the Kalaeloa water system (portions of the water system that served the former Barbers Point Naval Air Station) from the Navy and other various water systems from the Navy, Army and Air Force; and performing hydraulic analyses for reservoirs of various sizes in the Diamond Head and Punchbowl areas (the sites for these reservoirs were identified in the completed Honolulu Regional 180' Reservoir Site Study), as well as for various RFIP and CIP projects.

In addition to working on the projects mentioned above, Water Systems Planning staff continue to participate in the department's QUEST (Competitive Assessment) Program by volunteering to serve on the program's various design and work teams. These teams are helping the QUEST program investigate and evaluate issues and current practices in an effort to help redefine and improve the department's ability to perform the best services possible for its customers.

The **Hydrology-Geology** section provides technical support to develop, monitor, and manage municipal groundwater sources on Oahu. It collects, evaluates, and interprets data on rainfall, water levels, water quality, geophysical logs, and pumpage. In addition to BWS sources, the staff also collects data from private, government, and military sources.

Island-wide collection of water level data, meter readings and water samples are conducted regularly from 16 raingages, 30 observation wells and piezometers, 28 artesian wells, ten springs, one streamgage,

and three weirs/flumes. Quarterly salinity profile logging of 19 deep monitor wells track changes within the freshwater lens. Weekly, monthly, and annual reports are prepared for internal agency use, regulatory requirements and those used within this Annual Report and Statistical Summary.

The section also assists, reviews and comments on a variety of water and environment-related correspondence, locates water sources, prepares contract and well specifications, handles well permit applications, conducts hydrologic studies, and furnishes resource information and advice to intradepartmental units, private individuals, organizations, and agencies.

Section staff carry out the project management of BWS research and production well construction. Six deep monitor wells (Kalihi Station, Kunia T-41, Newtown, Kaamilo, Hauula, and Poliwai Gulch) were newly constructed.

Work began on two additional deep monitor wells (Punchbowl and Lower Waiawa) and two production wells (Kalaeloa desalination plant caprock and basalt exploratory wells). Contract documents and specifications were prepared for Iwaena deep monitor well and Moanalua Mauka deep monitor well. Repair work on the Waipahu Well II Addition was done to stabilize a formation zone.

Geophysical logging of 71 wells was conducted (67 specific conductance and temperature logs, three neutron logs, and one fluid sampling log). The license renewal application for the BWS' neutron source was still under review as of June 2001 by the Nuclear Regulatory Agency (NRC). BWS utilizes a three-curie Americium Beryllium neutron generating radioactive source in its neutron logging operation. Section staff oversees the radiation protection program of its well-logging operations in compliance with NRC regulations.

Staff provided assistance to the USGS for the geophysical logging of various BWS deep monitor wells in conjunction with a geophysical logging class and study of wellbore fluid movement.

In another cooperative effort, modifications to the BWS fluid sampling tool were completed for use by the USGS in the groundwater interval sampling of deep monitor wells in the Pearl Harbor aquifer for age-dating research. Section staff also assisted and advised Navy personnel in the sealing of a well in upper Kunia.

Other section highlights were as follows:

- Section staff planned and carried out a three-day pumping test of Kaaawa Shaft to determine its hydraulic parameters and feasibility for reactivation.
- The Waimanalo Tunnel III system was investigated and a report made recommending the nature of repairs to the tunnel.
- Preparations are underway for the sealing of the Waikele Tunnel in Waipahu located on former Oahu Sugar land owned by the City and County.
- Participation in two watershed partnership programs is on-going. The first is with the Koolau Watershed Partnership and the second, with the Mohala I Ka Wai group (Waianae and Makaha watersheds), resulted in the installation of raingages in Makaha Valley.
- Technical advice and training in hydrologic data gathering were provided to the participants. Available artesian wells were also identified for head measurement collection as part of a study to be done by the Mohala I Ka Wai participants.
- Two staff members traveled to Colorado in March for a USGS class on the SUTRA groundwater model. SUTRA represents the current USGS direction as it pertains to groundwater modeling code. A contract for a three-dimensional model based on the Feflow code was issued. The model is being developed by Todd Engineering.
- The applicability of a three-dimension model in simulating Honolulu's groundwater conditions will be pursued. Staff also participated in neighborhood board meetings and held an assistant coordinator position for the Civil Defense, in both cases as the BWS representative.
- The section also welcomed a visiting geologist, Gi Won Ko of Cheju Island, Korea, for a six-month internship to learn about the hydrology and geology of Oahu. A staff member accompanied other Korean geologists to the neighbor islands to assist them in learning more about the Hawaiian volcanic and hydrologic processes.

The **Water Conservation Unit** continues to manage the Automatic Meter Reading (AMR) Project. The Water Conservation Unit coordinates and assists with conservation projects and activities, conducts water conservation and consumption studies and analyses, and researches and investigates water conservation appliances and devices for use in single- and multi-family dwellings and in business and industry.

The AMR Project Staff coordinates the installation of automatic meter reading devices. The department is replacing or retrofitting approximately 150,000 meters so that they no longer need to be manually read. Through an electronic device in-

stalled on the meter, the data is transmitted to a computer in a vehicle driving past the meter. The project began in January 2000, and should take about three years to complete. As of June 30, 2001, a total of 76,870 meters have been installed or retrofitted.

The Board of Water Supply, in conjunction with the City, offers $100 rebates for the installation of ultra-low flush toilets. The program was approved June 10, 1998, by the Mayor and will apply only to residential retrofits.

As part of the summer conservation effort, the unit sends letters to the department's 100 largest users of water to ask for their help in reducing waste within their operations. The staff participates in the Board's Speakers' Bureau, addressing various groups such as trade associations, business groups, schools, and community associations with presentations on water conservation. They also provide information at booths that the Board of Water Supply sponsors at various functions such as vision group meetings and the Hawaii Farm Fair.