

MINUTES

REGULAR MEETING OF THE BOARD OF WATER SUPPLY

April 27, 2015

At 2:00 PM on April 27, 2015 in the Board Room of the Public Service Building at 630 South Beretania Street, Honolulu, Hawaii, Board Chair Miyashiro called to order the Regular Meeting.

Present: Duane R. Miyashiro, Chair
David C. Hulihee
Ross S. Sasamura
Kapua Sproat

Also Present: Ernest Lau, Manager and Chief Engineer
Alex Ubiadas
Shawn Nakamoto
Barry Usagawa
Daryl Hiromoto
Mike Fuke
Erwin Kawata
Joe Cooper
Karen Tom
Robert Morita
Henderson Nuuhiwa
Keoni Mattos
Nolan Chang

Others Present: Jennifer Waihee, Deputy Corporation Counsel
Dan Lawrence, Deputy Corporation Counsel
Stephen Anthony, U.S. Geological Survey
Delwyn Oki, U.S. Geological Survey
Aaron Meilleur, HDR Engineering, Inc.
Jeff Hansen, HDR Engineering, Inc.
Eric Habermeyer, HDR Engineering, Inc.
Emi Tanitomi, HDR Engineering, Inc.
Chris Harris, CDM Smith
Craig Von Bargaen, CDM Smith
David Ebersold, CDM Smith
Cliff Lum, SSFM International
Chris Cleveland, Brown and Caldwell

Absent: Adam C. Wong, Vice Chair
Theresa C. McMurdo
Ford N. Fuchigami

"April 27, 2015

APPOINTMENT
OF NEW BOARD
MEMBER -
KAPUA SPROAT

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawaii 96843

Chair and Members:

Subject: Appointment of New Board Member – Kapua Sproat

Ms. Kapua Sproat has been appointed to the Board of Water Supply by Mayor Kirk Caldwell to succeed Ms. Mahealani Cypher who resigned on December 31, 2014.

On April 22, 2015, the City Council confirmed Ms. Sproat's appointment for a term expiring on June 30, 2019.

We extend congratulations to Kapua Sproat on her appointment and welcome her as a Member of the Board.

Respectfully submitted,

/s/ ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer"

The foregoing was for information only.

DISCUSSION:

Manager Lau presented Ms. Sproat with a lei as he introduced and welcomed her as the newest member of the Board. He stated that Ms. Sproat has a long history of water issues, including water rights and environmental issues. Ms. Sproat thanked Mr. Lau and the rest of the staff for being incredibly supportive and welcoming. She stated that she looks forward to this opportunity to kokua the Board and the Department in moving things forward. Ms. Sproat added that she's excited to be on the Board because she is impressed with the way BWS sets the standard for the way things should be done. She looks forward to learning and contributing. Chair Miyashiro also welcomed Ms. Sproat to the Board. Mr. Miyashiro shared that one thing he really enjoys about this Board is the diversity of it, and he appreciates that Ms. Sproat brings her experience, expertise in water issues, Native Hawaiian rights and public trust.

APPROVAL
OF MINUTES

Approval of the Minutes of the Regular Meeting held on March 23, 2015

MOTION
TO APPROVE

Ross Sasamura and David Hulihee motioned and seconded, respectively, to approve the Minutes of the Regular Session Meeting of March 23, 2015. The motion was unanimously carried.

"April 27, 2015

AUTHORIZING
A PUBLIC
HEARING

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawaii 96834

Chair and Members:

Subject: Authorizing a Public Hearing to Consider the Proposed
Fiscal Year 2015-2016 Operating and Capital Improvement
Program Budget

We recommend that the Board authorize a public hearing to be held at 2:00 p.m. on Tuesday, May 26, 2015 to consider the resolution to adopt the proposed Operating and Capital Improvement Program Budget for the fiscal year beginning July 1, 2015 and ending June 30, 2016.

Attached is the draft of the "Notice of Public Hearing" to be published prior to the hearing date.

Respectfully submitted,

/s/ ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Attachment"

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the BOARD OF WATER SUPPLY, CITY AND COUNTY OF HONOLULU, will hold a PUBLIC HEARING in the Board Room, Public Service Building, 630 South Beretania Street, on TUESDAY, MAY 26, 2015, at 2:00 p.m. or soon thereafter, where all interested persons shall be afforded the opportunity of being heard on the adoption of the Proposed Fiscal Year (FY) 2015 - 2016 Operating and Capital Improvement Program Budget of the Board of Water Supply for the fiscal year July 1, 2015 to June 30, 2016.

Information to be discussed at this public hearing is available at Room 201 of the Public Service Building, Board of Water Supply, 630 South Beretania Street. All comments on or suggested changes to the proposed FY 2015 - 2016 Operating and Capital Improvement Program Budget of the Board of Water Supply should be filed in writing before the date of the public hearing or presented in person at the time of the hearing. Persons wishing to speak are requested to register by 1:00 p.m. with Alison Kawata, 748-5100, by providing your name, phone number, and subject matter of testimony. Testimony is limited to three minutes and shall be presented by the registered speaker only. Any questions, please call 748-5100. Any disabled person requiring special assistance who plans to attend the public hearing, may contact Ms. Alison Kawata at 748-5100, no later than May 19, 2015, so that appropriate accommodations can be provided.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

DISCUSSION: Manager Lau gave the report. There were no comments or discussion.

MOTION TO Chair Miyashiro called for a motion to hold a Public Hearing on the Proposed
APPROVE A FY 2015-2016 Operating and Capital Improvement Program Budget.
PUBLIC Ross Sasamura and David Hulihee motioned and seconded, respectively,
HEARING and the motion was unanimously carried.

AUTHORIZING A PUBLIC HEARING TO CONSIDER THE PROPOSED FY 2015-2016 OPERATING AND CAPITAL IMPROVEMENT PROGRAM BUDGET WAS APPROVED ON APRIL 27, 2015			
	AYE	NO	COMMENT
DUANE R. MIYASHIRO	X		
ADAM C. WONG			ABSENT
THERESIA C. MCMURDO			ABSENT
DAVID C. HULIHEE	X		
KAPUA SPROAT	X		
ROSS S. SASAMURA	X		
FORD N. FUCHIGAMI			ABSENT

APPROVAL
OF BWS
STAKEHOLDER
ADVISORY
GROUP

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawaii 96834

Chair and Members:

Subject: Approval of Board of Water Supply Stakeholder Advisory Group

In the November 2014 and January 2015 quarterly updates on the Board of Water Supply (BWS) Water Master Plan, we informed the Board of our efforts to establish a Stakeholder Advisory Group whose purpose is to provide important feedback on the BWS Water Master Plan, proposed rate study and other important initiatives. In February 2015, we requested Board feedback on the potential stakeholder group composition. Since that time, staff has initiated outreach to potential group members and recommends the formation of the BWS Stakeholder Advisory Group. Establishment of this Stakeholder Advisory Group is one of many BWS initiatives that demonstrate our commitment to increase the consistency and transparency of our communications and public engagement. Further, it aligns with and exceeds the recommendations of the City Auditor.

Objectives

BWS's objectives in forming the Stakeholder Advisory Group are to improve the public's understanding of our island's complex water issues and seek stakeholder input to our Water Master Plan, other important initiatives and future rate adjustments. Additionally, the Stakeholder Advisory Group will enable BWS to further develop public trust and confidence and engage public input towards our mission of providing safe, dependable, and affordable water now and into the future.

Composition

The Stakeholder Advisory Group will consist of approximately 28 highly respected local residents and community leaders with expertise in many disciplines and who have an active and ongoing interest in issues relevant to the BWS. The group will represent diverse communities, interests and geographies across O'ahu in the following categories:

Agriculture	Environment
Community Organizations	Every Council District
Developers	Financial
Golf Course	Realtors
Hawaiian Culture	Restaurants
Homeowners Associations	Seniors/Low Income

General Contractors
Large Water Users
Military

Travel/Tourism Industry
Small Businesses
Utilities

Roles and Responsibilities

The Stakeholder Advisory Group will attend a series of BWS workshops, consider a broad range of topics and issues, and communicate openly and collaboratively to advise on what is most important to O'ahu's diverse communities. Members will be encouraged to serve as ambassadors, sharing information with others in their community, organization or area of interest.

The Stakeholder Advisory Group will be asked to provide feedback related to the Water Master Plan, as well as other BWS issues, including but not limited to water conservation, customer services, field services, outreach and education, and future rate adjustments.

The group functions in an advisory capacity and does not have decision-making authority. It will make recommendations to staff and the Board of Directors of the BWS.

Meetings Open to Public

The City Attorney has advised that the Stakeholder Advisory Group is not subject to the Hawaii Sunshine Law. That said, operating protocols will follow the intent of the Sunshine Law in that workshops will be open to the public and announced in advance on the BWS's website. Time for public comment will be made available at each meeting, and meeting notes will be prepared and made available to the public, along with meeting materials, following each meeting.

BWS Commitment

In forming this Stakeholder Advisory Group, the BWS commits to 1) provide the staffing and resources to support the group's meetings, 2) provide accurate and transparent information, and 3) review and consider input and advisement provided by the group.

We recommend that the Board approve the formation of the Stakeholder Advisory Group and require BWS staff to present regular updates to the Board, including a review of input and advisement provided by the group.

Respectfully submitted,

/s/ ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Attachment"

DISCUSSION:

Mr. Lau gave the report and introduced Water Resources Program Administrator Barry Usagawa to give the presentation.

Mr. Usagawa congratulated Ms. Sproat and thanked her for her service. He also introduced the Communications team who is the crux behind the Stakeholder Advisory Group (SAG); Information Officer Shawn Nakamoto and Information Specialist Keoni Mattos, and continued by introducing the consultants who are helping with logistics and strategies; Dave Ebersold and Chris Harris from CDM Smith.

Mr. Usagawa proceeded with the presentation. He talked about the public engagement strategy highlights and the BWS communications strategy.

The SAG will be composed of a diverse and balanced group of stakeholders of approximately 28 members. So far about 20 people have accepted to be members. Some of the different groups the Department has reached out to are: the Hawaii Agriculture Research Council, the Hawaii Community Foundation, Campbell Properties, the Nature Conservancy, Neighborhood Board Chairs, First Hawaiian Bank, Hawaii Kai Golf Course, Kamehameha Schools, Mililani Town Association, the Business Industry Association, Coca Cola, Kaneohe Marine Base, the Hawaii Board of Realtors, the Hawaii Restaurant Association, AARP, the Hawaii Chamber of Commerce, Hawaiian Electric Company, and one of the larger hotels in Waikiki.

Mr. Usagawa continued by explaining the key topics that the SAG would provide and the SAG's meeting structure. He informed the Board that the City Attorney provided an opinion that the SAG is not subject to the Sunshine Law, however to demonstrate BWS's commitment to transparency and openness, all meetings will be open to the public with an opportunity for the public to provide comments. All meeting notices, material and minutes will be posted on the BWS website. The SAG is purely an advisory group, and their recommendations will be provided to the Board for consideration.

Mr. Usagawa concluded by requesting the Board's approval to proceed with the SAG.

Ms. Sproat inquired if social media would be part of the public engagement strategy since it reaches a certain demographic and may be a way to engage the public. Information Officer Shawn Nakamoto responded stating that BWS does have presence on Twitter and Facebook, also on Instagram, which is not used too heavily, but the primary focus has been to post information on water main breaks, etc. However, it is definitely something they can bring up to the SAG and will consider.

MOTION TO
APPROVE
BWS
STAKEHOLDER
ADVISORY
GROUP

Chair Miyashiro called for a motion to approve the Board of Water Supply Stakeholder Advisory Group. Ross Sasamura and David Hulihee motioned and seconded, respectively, and the motion was unanimously carried.

BOARD OF WATER SUPPLY STAKEHOLDER ADVISORY GROUP WAS APPROVED ON APRIL 27, 2015			
	AYE	NO	COMMENT
DUANE R. MIYASHIRO	X		
ADAM C. WONG			ABSENT
THERESIA C. MCMURDO			ABSENT
DAVID C. HULIHEE	X		
KAPUA SPROAT	X		
ROSS S. SASAMURA	X		
FORD N. FUCHIGAMI			ABSENT

WATER FOR LIFE

Safe, dependable, and affordable water now and into the future



Board of Water Supply
City and County of Honolulu

Approval of Board of Water Supply Stakeholder Advisory Group

April 27, 2015





Public Engagement Strategy Highlights

Ratepayers and Residents

- BWS Website
- Neighborhood Board Briefings
- *Water Matters* Newsletter

Employees

- *Ka Waipuna* Newsletter
- Water Master Plan Newsletter
- Manager Briefings

Press and Media

- Editorial Boards
- Proactive Press Releases
- Exclusive Coverage





Public Engagement Strategy Highlights

Ratepayers
and Residents

- **Stakeholder Advisory Group**

Employees

- *Ka Waipuna* Newsletter
- Water Master Plan Newsletter
- Manager Briefings

Press and
Media

- Editorial Boards
- Proactive Press Releases
- Exclusive Coverage



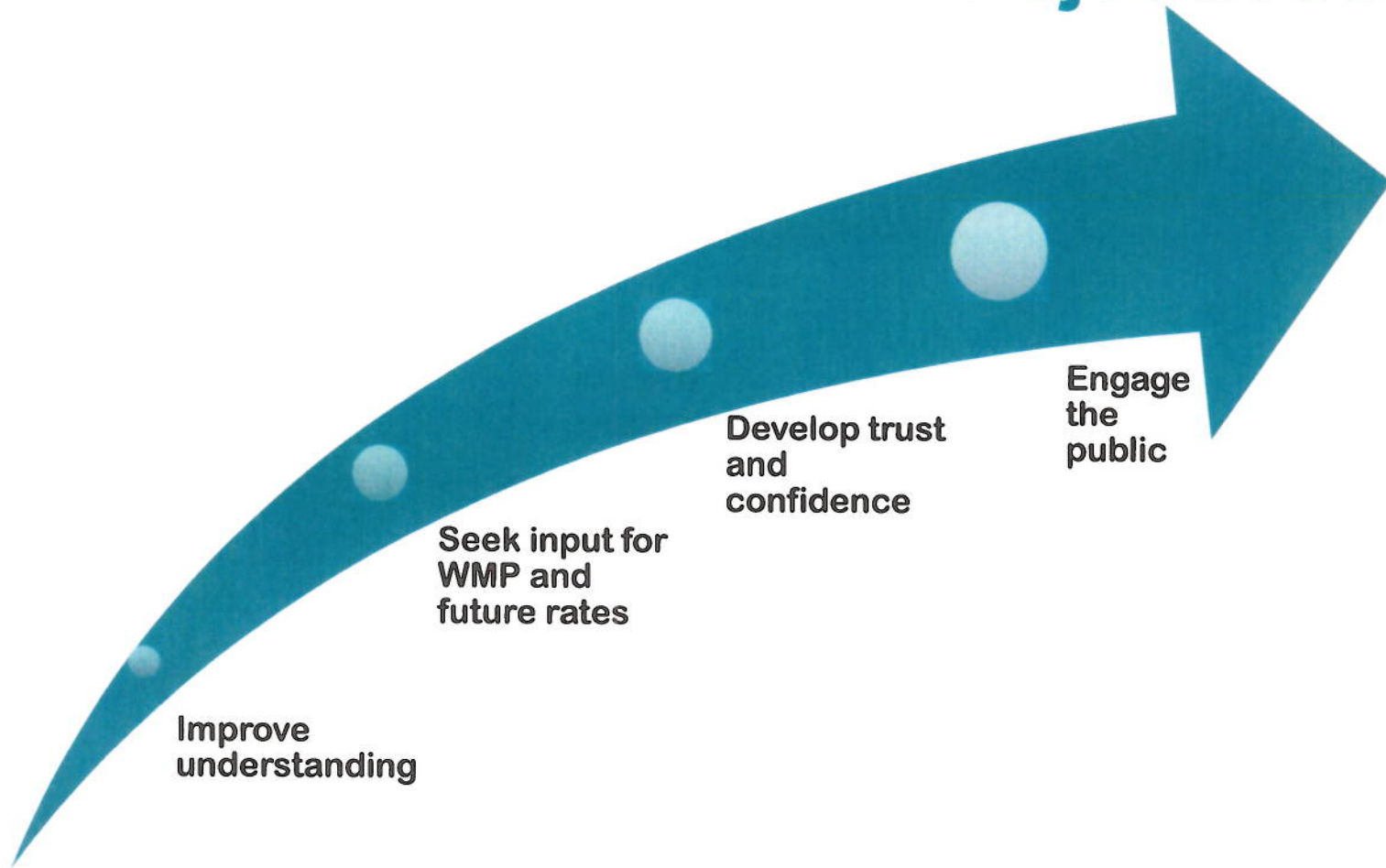
WATER FOR LIFE

Safe, dependable, and affordable water now and into the future



Board of Water Supply
City and County of Honolulu

BWS Communications Objectives



WATER FOR LIFE

Safe, dependable, and affordable water now and into the future



Board of Water Supply
City and County of Honolulu

Diverse and Balanced Composition

Agriculture

Community Organizations

Developers

Environment

Every Council District

Financial

Golf Course

Hawaiian Culture

Homeowners Associations

General Contractors

Large Water Users

Military

Realtors

Restaurants

Seniors/Low Income

Travel/Tourism Industry

Small Businesses

Utilities



WATER FOR LIFE

Safe, dependable, and affordable water now and into the future



Board of Water Supply
City and County of Honolulu

Scope Addresses Key BWS Topics





Meeting Structure

- Initially every other month
- Notices, materials, and minutes on BWS website
- Provide advisement and recommendations to staff and Board





BWS Commitment

- Conduct open public meetings
- Provide staff and resources to support the group's meetings and activities
- Provide accurate and transparent information
- Fully consider recommendations and advisement provided by this advisory group



ITEM FOR INFORMATION NO. 1

"April 27, 2015

AUTOMATIC
METER
READING
STUDY

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawaii 96843

Chair and Members:

Subject: Automatic Meter Reading Study

Jeff Hansen from HDR, Incorporated, will give the presentation on the Automatic Meter Reading Study.

Respectfully submitted,

/s/ ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Attachment"

The foregoing was for information only.

DISCUSSION:

Mr. Lau briefed the Board about the Automatic Meter Reading (AMR) system, which was installed in the early 2000's. He explained that because of the problems with the system, they did a meter reading study to look at the benefits and costs of various options to help with the challenges. Mr. Lau called on Field Operations Program Administrator Daryl Hiromoto, who has taken over the responsibility for the AMR system, to give introductory remarks and introduce the consultants from HDR Engineering, Inc (HDR).

Mr. Hiromoto stated that it's been about 12 years since the initial installation of the AMR system and with the advancement of technology; it's time to revisit the system to look at different options to improve it. He stated that BWS has partnered with HDR to embark on the AMR study. He introduced Mr. Jeff Hansen of HDR to give the presentation.

Mr. Hansen introduced himself and two other key engineers from HDR who worked on the study; Eric Habermeyer and Emi Tanitomi.

Mr. Hansen went over the agenda, study objectives, key definitions, and the current system. He explained that when they assessed the AMR system, one of the biggest challenges was the drive-by no reads. He informed the Board that last fall the BWS did a pilot study to determine if the system performance would improve if they were to simply replace the aging units, the 505B/C and 520RA models, with the current generation units, the 520M model. The study showed that after replacing the old models with the newer models, system performance increased to a 95 percent read rate compared to an 85-90 percent read rate. They also conducted a survey of other utilities that have similar environmental or geographical characteristics or that have installed an AMR

system 10-15 years ago and have had similar challenges. One thing they did identify was that the utilities that implemented a drive-by AMR system did experience an improved read rate as they upgraded the system.

Mr. Hansen described a list of alternatives that were analyzed and explained both the qualitative and quantitative components of the analysis. When explaining the qualitative comparison of meter reading options, Mr. Hansen gave an example of how they derived a score of 5 for the AMI system over the AMR system which scored a 3, based on the criterion of amount and resolution of data. He explained that the reason for this is because in an AMI system, the meters are able to send current information every day about every 4 or 6 hours, compared to an AMR system where the meter reader obtains information only once per month, and typically the information is from the previous month. Ms. Sproat inquired how the carbon footprint was calculated. Mr. Hansen replied that they didn't calculate the carbon footprint, but it is more of a qualitative comparison, about how many trucks are in use. In the manual system, you have the most trucks going out because the meter readers manually read each meter, in the AMR system, you still have some trucks going out for the drive by reads, but in the AMI system, in theory, no trucks go out for reads.

The presentation contained a chart illustrating a 20-year present value cost across various options. The chart showed how operational costs compared to capital costs for each of the different options. Mr. Miyashiro stated that Mr. Hiromoto mentioned the current system was \$80 million and asked if that was just the capital cost. Mr. Lau responded yes, it was just the capital cost and that they haven't tried to accumulate and calculate the total operational cost over the past 12+ years that the current system has been in use.

Mr. Hansen went over the summary of results and concluded with their recommendations to the Board. Board Member Sasamura inquired if the Department had an opportunity to try some of the existing AMI equipment. Mr. Hiromoto replied that they embarked on a pilot and shared the data and information with the Department of Human Resources. The pilot indicates that there is the capability of pursuing the AMI system, but they want to expand the pilot to go through one whole cycle of 8,000 meters before they make a determination.

Ms. Sproat asked for clarification on the recommendation. She stated that in the 20-year chart slide, the recommendation was the delayed AMI, but in the recommendation slide, it was to transition to a hybrid AMR/AMI system over time. Mr. Hansen confirmed that the recommendation is to transition to a hybrid AMR/AMI system over time and that they could have better worded the 20-year chart recommendation to say delayed AMR/AMI hybrid.

Ms. Sproat asked where the current AMI meters are installed. Mr. Hansen replied that they are in the ground in the meter box. Ms. Sproat expressed her concern because in Kauai, the installation of smart meters garnered concern and law suits for the removal. Mr. Hiromoto stated that unlike Hawaiian Electric Company, BWS's meters are not attached to the house.

Mr. Sasamura stated that there could be other opportunities with other firms that use different technologies to transmit data back and forth. He added that there could also be opportunities to use equipment that doesn't necessarily have antennas, but by a chain could communicate through other devices. Mr. Hansen explained that the range of values on the AMI system reflect these types of systems, like the mesh system and cellular based communication systems.

With no other questions, Mr. Lau concluded by informing the Board that unless they hear otherwise from the Board, they will be proceeding with the recommendations of the study and may meet with the City Council members if they would like a briefing on this report. He also stated that they will make this report available on the BWS website and if the Board would like a full report, a copy can be emailed to them.

**BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU**

Automatic Meter Reading Study

Briefing – April 27, 2015

Jeff Hansen – Project Manager
Eric Habermeyer – Cost Analyst
Emi Tanitomi – Project Engineer





AGENDA

01 **Study Objectives**

02 **Assessment of Current
AMR System**

03 **Alternatives Analysis**

04 **Recommendations**

05 **Discussion**

01

Study Objectives



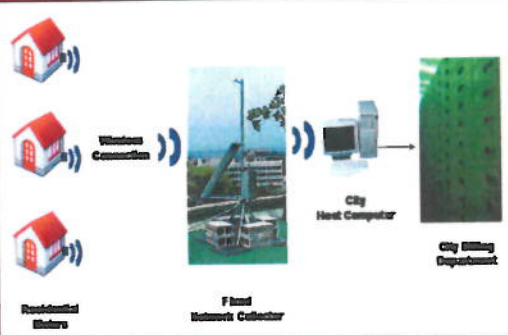


Objectives

- Assess existing meter reading system
- Identify and compare alternatives
- Conduct a cost-benefit analysis
- Provide recommendations for system improvement



Key Definitions

<h2>Manual Meter Reading</h2> 	<h2>Automatic Meter Reading (AMR)</h2> 	<h2>Advanced Metering Infrastructure (AMI)</h2> 
<p>Reader physically visits every meter and reads register</p>	<p>Reader drives a route and obtains readings on a computer in the vehicle</p>	<p>Every meter sends data to a centralized data collection system, accessed remotely</p>
<ul style="list-style-type: none"> • Readers visit each meter • Lowest capital cost • Highest operational cost 	<ul style="list-style-type: none"> • Drivers collect data • Higher capital cost • Lower operational cost • Current BWS approach 	<ul style="list-style-type: none"> • Towers collect data • Highest capital cost • Lowest operational cost

Transmitter Unit (MXU): Battery-powered radio connected to meter register. Sends data to AMR or AMI data collection system.



02 **Assessment of Current AMR System**



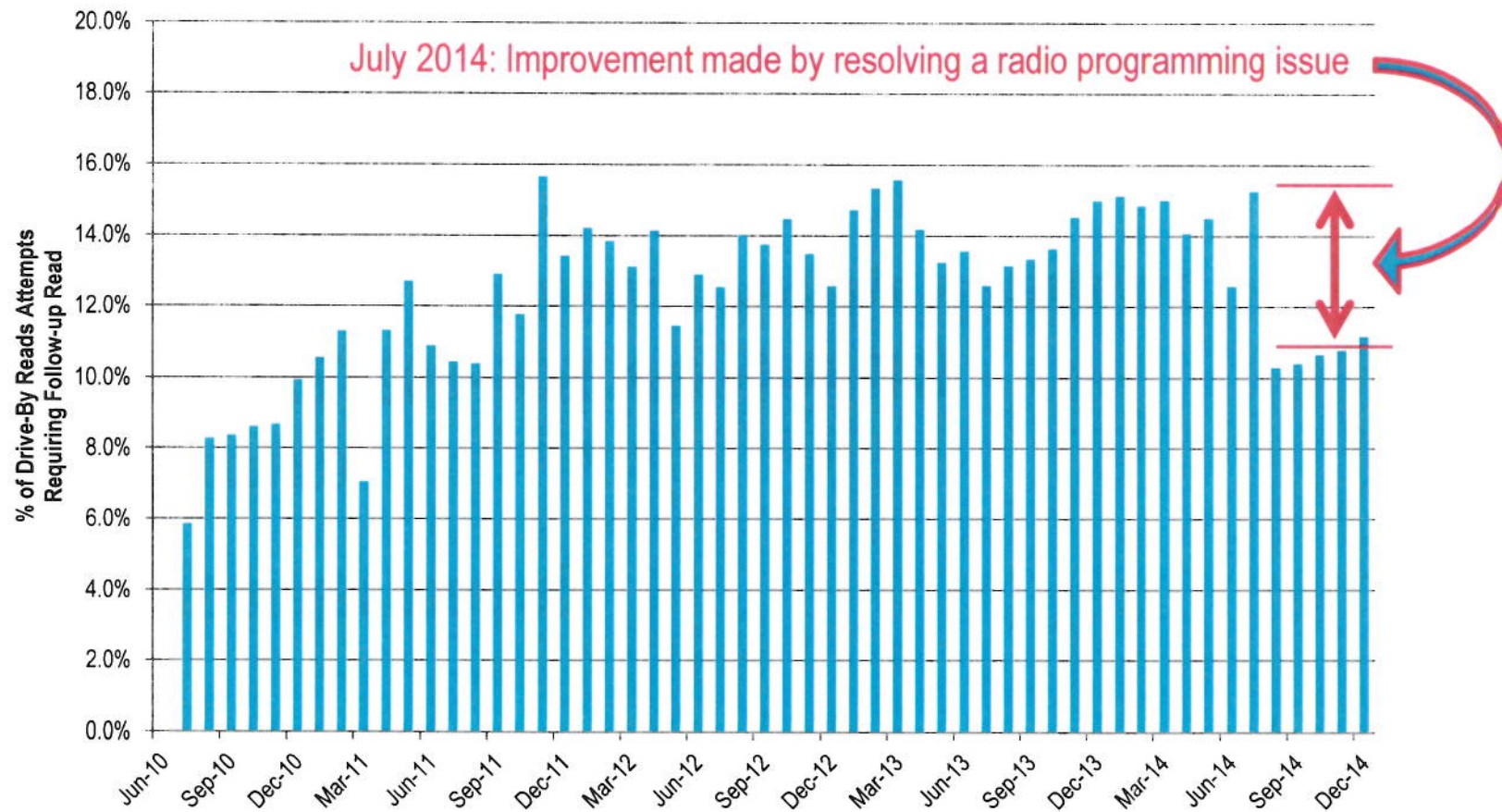
Current System

- Monthly meter reading
- Infrastructure
 - Meters: 172,000 (~90% >10 years old)
 - Majority are AMR (<2,000 manually read large non-residential)
 - MXUs: 123,000 (~75% >10 years old)
 - Sensus Drive-by AMR System
- Personnel
 - Drive-by AMR Meter Readers: 2
 - Manual Meter Readers: 12
 - Re-reads
 - Turn-ons / turn-offs



Drive-By No Reads

- Most significant challenge/issue
- Consistently 10-15% over past 5 years



Current System Upgrades

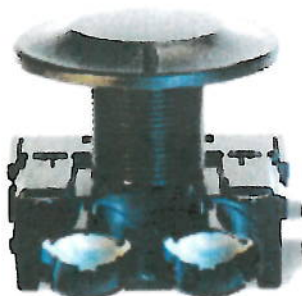
505B/C



Pilot Study

- Replace older MXUs with newer model 520M
- ~400 meters
- >95% read rate

520RA



520M



03 **Alternatives Analysis**



Experiences of Other Utilities



METER READING SYSTEMS

- Manual
- AMR
- ▲ Hybrid
- ✚ AMI

Survey Results:

Wide range of success/challenges

"Typical" read rate of AMR systems = 95-99%



Alternatives Analysis

Technologies considered

- Manual
- AMR
- AMI
- Hybrid

Analysis Approach

- Qualitative: Comparison of features and benefits
- Quantitative: Life-cycle cost model



Qualitative Comparison of Meter Reading Options

Criterion	Manual	AMR	AMI
Reliability & Accuracy of Readings	1	3	5
Amount & Resolution of Data	2	3	5
Meter Access / Reader Safety	1	3	4
Environmental (Carbon Footprint)	1	3	5
Utility "Visibility" to Customers	5	3	1

Scale (relative to current system):
1 = Low (poor)
3 = Neutral (current system)
5 = High (good)



Life-Cycle Cost Model

Capital Costs

- AMR/AMI Components
- Replacement meters
- Vehicles

System Characteristics

- Reads/day/reader
- Re-reads
- Work Orders
- Annual Maintenance Visits

Operational Costs

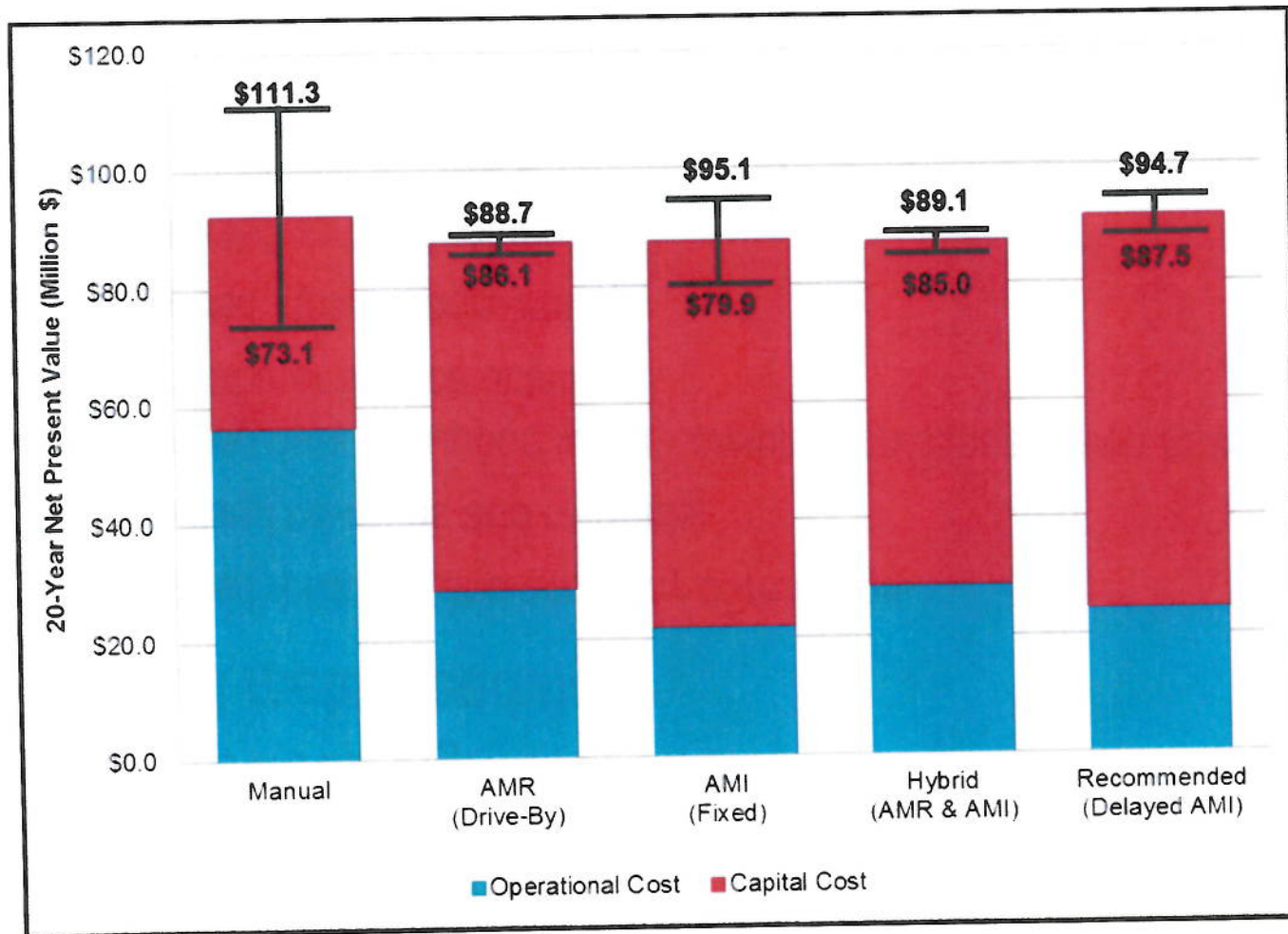
- Staff salaries
- Overhead
- Fuel
- Maintenance

**Cost
Model**

**20-Year Present Value
For Each Option**



20-Year Present Value (PV) Cost



Summary of Results

- AMI provides significant benefits over AMR and Manual meter reading
 - Increased reliability and accuracy of readings
 - Decreased no-reads and re-reads
 - Increased data to support water consumption/conservation analyses and customer service activities
 - Increased meter reader safety
 - Decreased carbon footprint
- Little variance in 20-year costs between options
 - Majority of alternatives ~\$85-90M
- Capital cost breakdown:
 - Meters = 50% (all options, including manual, incur this cost)
 - MXUs = 45% (all AMR and AMI options incur this cost)
 - AMR/AMI Network = 5%



04 Recommendations



Recommendations

- Transition to a hybrid AMR/AMI system over time
- Short-term, 2015-2017 (AMR)
 - Upgrade existing Sensus AMR system
 - Continue installing 520M MXUs (at a rate of ~10% of system per year)
 - Target highest no-read locations
 - Solicit vendor proposals for AMR/AMI systems
- Long-term, 2018 and beyond (hybrid AMR/AMI)
 - AMI where technically and financially feasible
 - AMR where AMI is too challenging



Other Considerations

- If BWS pursues AMR/AMI
 - Keep options open
 - E.g., seek costs for full island-wide AMI as well as a hybrid
- AMI network infrastructure (collectors/repeaters)
 - Cost model assumes BWS owns/operates
 - BWS could lease equipment from vendor
 - For use by BWS solely
 - For use by BWS and other utilities (e.g., gas)
 - Monitor HECO implementation of AMI



Questions/Discussion



ITEM FOR INFORMATION NO. 2

"April 27, 2015

MOANALUA
AND WAIMALU
AQUIFER
SYSTEMS
UPDATE

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawaii 96843

Chair and Members:

Subject: Moanalua and Waimalu Aquifer Systems Update

Erwin Kawata, Program Administrator of our Water Quality Division, and Hydrologist Delwyn Oki of the United States Geological Survey will present updates of our Moanalua and Waimalu Aquifer Systems.

Respectfully submitted,

/s/ ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Attachments"

The foregoing was for information only.

DISCUSSION:

Water Quality Program Administrator Erwin Kawata gave the presentation. He gave the Board a briefing of his trip, with Mr. Lau, to Washington D.C. from March 20-27, to attend the Association of Metropolitan Water Agencies Water Policy Conference and also to meet with the Hawaii congressional delegation to discuss the Red Hill situation. Mr. Kawata stated that their key message to the delegation was that groundwater and its protection is very important, but found the delegates' views on Red Hill to be mixed. Some felt more needs to be done to safeguard groundwater, while others felt the actions being taken to date are adequate. Some delegates struggled to understand the urgency, given that BWS's wells are not currently contaminated. Mr. Kawata and Mr. Lau stressed to the delegation that BWS wants to protect the environment and do things properly to prevent the contamination from getting into BWS's wells. After meeting with the congressional delegation, Mr. Kawata and Mr. Lau went to Long Island New York to meet with officials at the Massapequa Water District, where they are experiencing groundwater contamination from the improper disposal of solvent waste that is threatening their existing wells, and also learned about the impact on neighboring water utilities whose wells have already been contaminated.

Mr. Kawata discussed bills pertaining to Red Hill that are moving through the Legislature and showed diagrams of the Red Hill facility monitor wells and their proximity to BWS water sources and other monitoring wells. He also presented graphs showing the Navy's monitor well data over the past 10 years, showing the types and amounts of contaminants found in the groundwater underneath Red Hill. One graph showed the TPH-diesel level in monitor well 2, exceeding

Department of Health's (DOH) environmental action levels (EAL) from 2005 to date. The next graph showed monitor well 2, also showing periodic exceedances of the EAL for methylnaphthalene and naphthalene concentrations. Another graph illustrated the data from monitor well 1 where TPH diesel concentrations were detected, and the next graph illustrated data from the Navy's Red Hill Shaft drinking water source where low but measurable levels of naphthalene were detected. Each of the graphs showed the amount of contaminant detected spiked on or shortly after the Navy reported the January 13, 2014 fuel leak. Although there were small amounts, they were detections nonetheless.

Mr. Kawata showed the Board the graph that illustrated TPH diesel concentrations in the Commission on Water Resource Management's (CWRM) well. This well is outside of the Red Hill property to the northwest. There were times when the levels in this well also exceeded DOH's EAL. Ms. Sproat inquired if the flow of the contaminants is up gradient. Mr. Kawata replied that it is and stated that this is why they need to do more studies and collect more data.

There were two things that all of the monitoring wells and the Red Hill drinking water source have in common. They all contain measurable contaminant detections and had similar responses that occurred right after the Navy announced the fuel leak.

Mr. Kawata closed his presentation by showing a map that recapped all of the different monitoring wells, and then introduced Mr. Delwyn Oki, Hydrologist from the U.S. Geological Survey (USGS) to give his presentation on groundwater flow near the Red Hill Fuel Storage Facility.

Mr. Oki introduced himself and Mr. Steve Anthony the Director at USGS. Mr. Oki explained that at USGS, they collect basic data on groundwater, surface water, and water quality and they also conduct interpretative studies such as the one he'll be describing in his presentation. He gave some background on the Red Hill situation, showed a geology map of the island of Oahu, showed illustrations of the geology of the Halawa area, and explained that the Red Hill fuel tanks are located in Koolau basalt, but other types of rocks and sedimentary deposits are located toward the coast.

Mr. Oki provided a 3D animation of the study area. It provided different views of Moanalua Valley, Red Hill's fuel tanks, the H3 Freeway, the groundwater table, alluvium and sediments that penetrate below the water table, the Red Hill Shaft, Halawa Shaft, and the valley-fill barriers. The valleys that penetrate below the water table are significant because they form impediments that create compartments in the aquifer that have been evidenced for quite a while. Data from August 1932 illustrates how the valley-fills affect water levels in the area. The gray dash lines in the slide represent the valleys and the different colored dots represent wells. In 1932, the water levels in the wells near the Palolo area ranged from 26-28 feet above sea level. Water levels rose to 31-32 feet above sea level in the Beretania/Punchbowl area, and then dropped down to 30-31 feet above sea level in the Nuuanu area. Groundwater flows from the higher water levels to the lower water levels, so the arrows give a sense of the general direction of the water flow. In the area of interest, there is a general flow from Honolulu towards Moanalua. Mr. Oki showed a diagram of the valley-fill barriers and explained how they control water levels and how they may be affecting the flow of the water.

The next slide showed data collected in 2012 that illustrates a potential valley fill in Halawa that may be affecting flow in the area. The data suggests that the water is flowing from the Moanalua area to the Waimalu area. The depressed water level in the Waimalu area could be due to the

heavy development there, or it could mean that there is some kind of barrier in the area. USGS is collecting data to help them understand this better.

Mr. Oki continued by explaining the four steps of their study approach and informed the Board that they are currently developing an island-wide numerical computer model to give them an idea of how much water is flowing in the area of interest. Ms. Sproat noted that USGS's study tends to show that the water is flowing from Moanalua to Waimalu, given the difference in head levels. She asked if the flow is going from Waipahu-Waiawa to Waimalu as well. Mr. Oki replied that they will define that once they develop the 3D model. The model will help them identify which way the groundwater is flowing. They will also introduce contaminants into the model, near the Red Hill Fuel Storage Facility, to see which way those contaminants move and to see if they could potentially contaminate some of the BWS sources. Mr. Lau added that the contaminants will be introduced into the model and will be traced.

Mr. Oki concluded by informing the Board that USGS was originally hoping to have their study done by the end of 2015, however, they want to wait to be able to include information on the new monitoring wells being drilled by the Navy and possible new wells drilled by BWS. They also want to incorporate the information obtained from the numerical groundwater model. Ms. Sproat asked if they were going to publish the study. Mr. Oki replied that they will publish it as a report and it will be publicly available.

Mr. Lau informed the Board that Councilmembers Fukunaga and Elefante and some of the area legislatures hosted a town hall meeting at Pearlridge Elementary School at 7:00 p.m. on April 16 regarding the Red Hill situation. He stated that it was pretty well attended and that representatives from the Navy, Water Commission, DOH and BWS were there.

Ms. Sproat inquired if there was a signed agreement yet. Mr. Lau responded that the Administrative Order on Consent and statement of work are still pending. The Navy's original schedule of completion was March 2015, then it got pushed back to May, then to June and they are now targeting final signatures around August 2015. There will probably be a 30-day comment period and BWS will be commenting.

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Board of Water Supply
City and County of Honolulu

Waimalu – Moanalua Aquifer Update

Red Hill Bulk Fuel Storage Facility

Board Meeting

April 27, 2015



Today's Update

- Washington D.C. trip report
- Bills and resolutions re: Red Hill
- Monitor well data showing the contaminant levels in the groundwater underneath Red Hill
- USGS presentation:
 - Groundwater Flow Near the Red Hill Fuel Storage Facility



Washington DC Trip

- AMWA Water Policy Conference
 - Water reuse (direct/indirect), drinking water regulatory outlook (lead/copper rule), infrastructure loan programs
- Red Hill
 - Met with Hawaii Congressional delegation
 - Delegates' position on Red Hill is mixed
 - Continue dialogue
 - Congresswoman Michele Lujan Grisham (NM)
 - Meeting with Rep. Grisham's aide



DC Trip – cont.

- Massapequa Water District
 - Grumman facility - Volatile chemical contaminant plume.
 - Plume: 2,000-acre, 3.5 mile long, 700 ft. deep.
 - 1976: VOC detected in on-site Grumman GW wells.
 - 1986: Nassau County DOH conducts investigation.
 - 1986: VOC plume impacts Bethpage WD wells.
- Plume threatens other utilities: South Farmingdale, AQUA of NY and Massapequa



DC Trip – cont.

- Grumman plume – cont.
 - 1990: Grumman starts on-site soils clean up.
 - 2001: NYSDEC – opt wellhead treatment and directs Grumman/Navy to install extraction system.
 - 2009: MWD public campaign for aquifer clean up rather than wellhead treatment & meet with Sen. Schumer.
 - 2010: Sen. Schumer meets with EPA, DEC, Navy.
 - 2011: GW data shows plume spreading and moving faster than predicted.



DC Trip – cont.

- Grumman plume – cont.
 - 2014: Sen. Schumer: Asks EPA to issue unilateral administrative order to Grumman for missing clean up deadlines.
 - 2014: Rep. Peter King sends letter to Ray Mabus, Secretary of the Navy and Gina McCarthy, EPA Administrator asking Navy and EPA work with NYSDEC and local water districts to remediate Grumman plume.
 - 2015: Governor Cuomo signs bill requiring NYSDEC to develop plan to contain and clean up aquifer.



Red Hill: Bills and Resolutions

- **SCR 57**
 - Expand taskforce study to include 26 other USTs owned by the military.
- **City Council Resolution 15-84 and SCR 174 / SR 109**
 - EPA, DOH, Navy, BWS expeditiously implement task force recommendations.
 - Urge Navy to install secondary containment.
 - Install additional monitor wells and increase testing.
 - Complete AOC document (EPA/DOH/Navy).
- **HCR 126/ HR 78**
 - Extend Red Hill Task Force study of January 2014 leak.

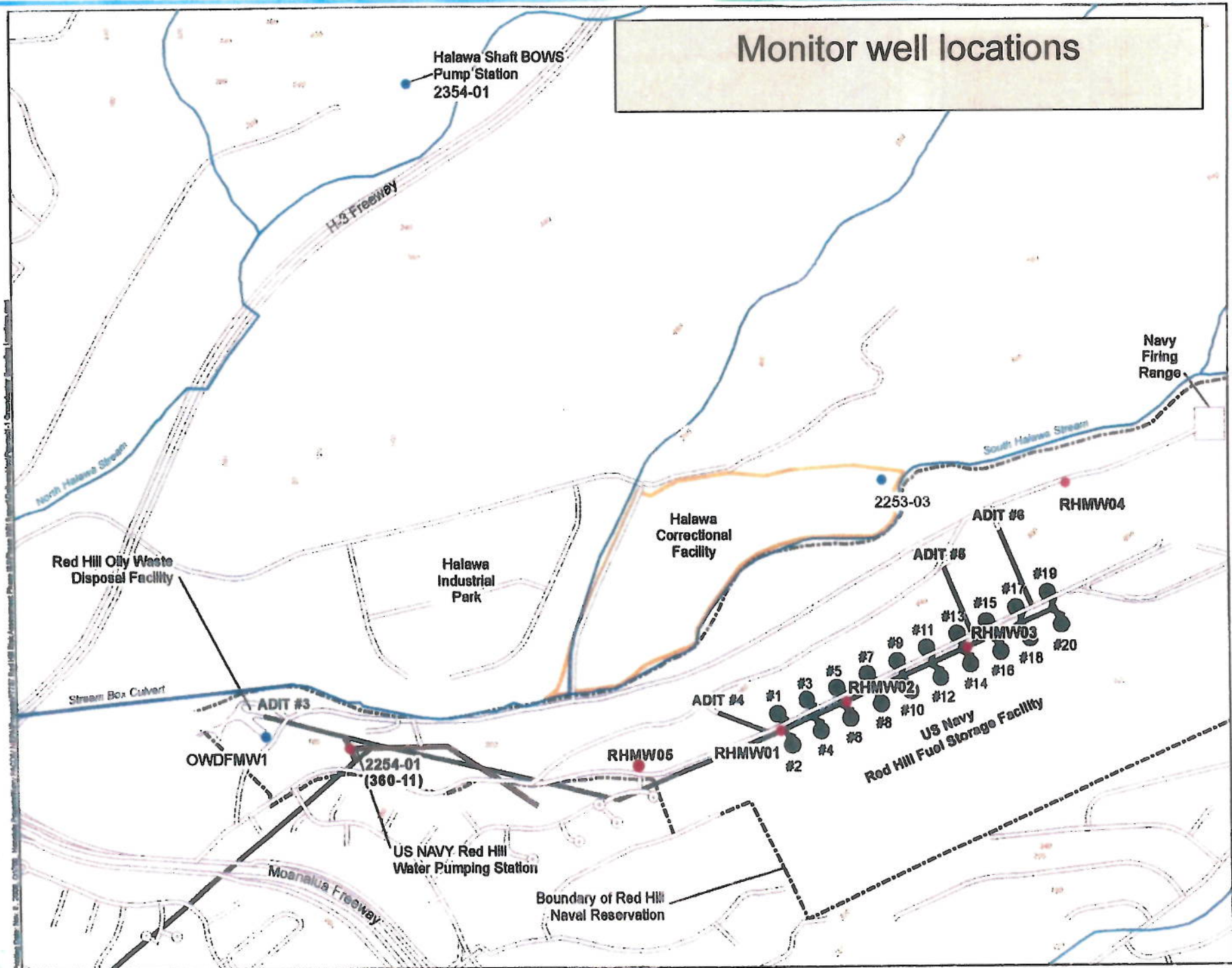


Bills and Resolutions – cont.

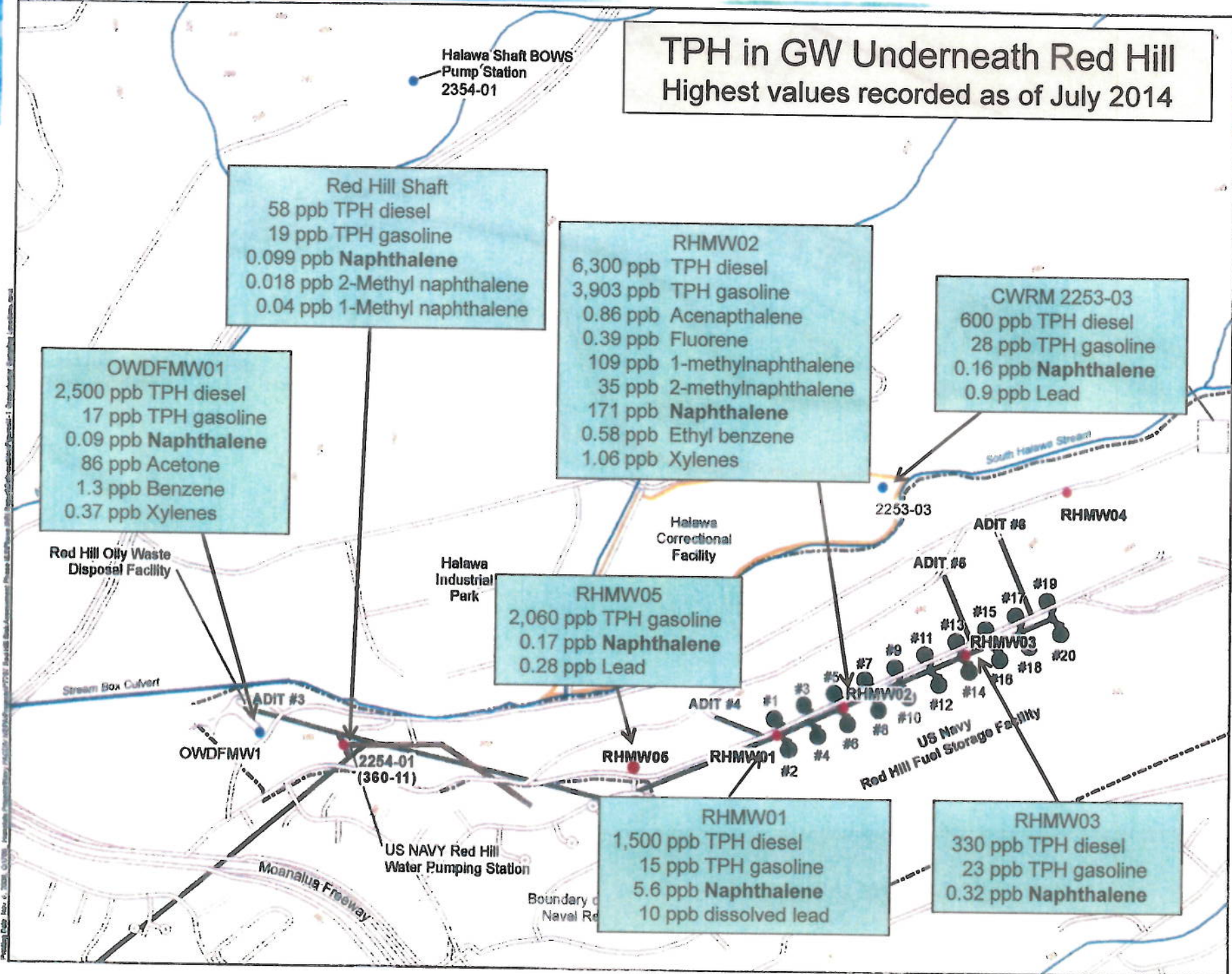
- HCR 66
 - Collaboration, openness and strengthening of relationship between State and Navy.
- SB359 SD 1
 - Increase amount of environmental response, energy, and food security tax deposited into the environmental response revolving fund.
- SB 1168 – deferred
 - Require DOH to amend state UST rules to cancel deferral of Red Hill tanks from the requirements.



Monitor well locations



TPH in GW Underneath Red Hill
Highest values recorded as of July 2014

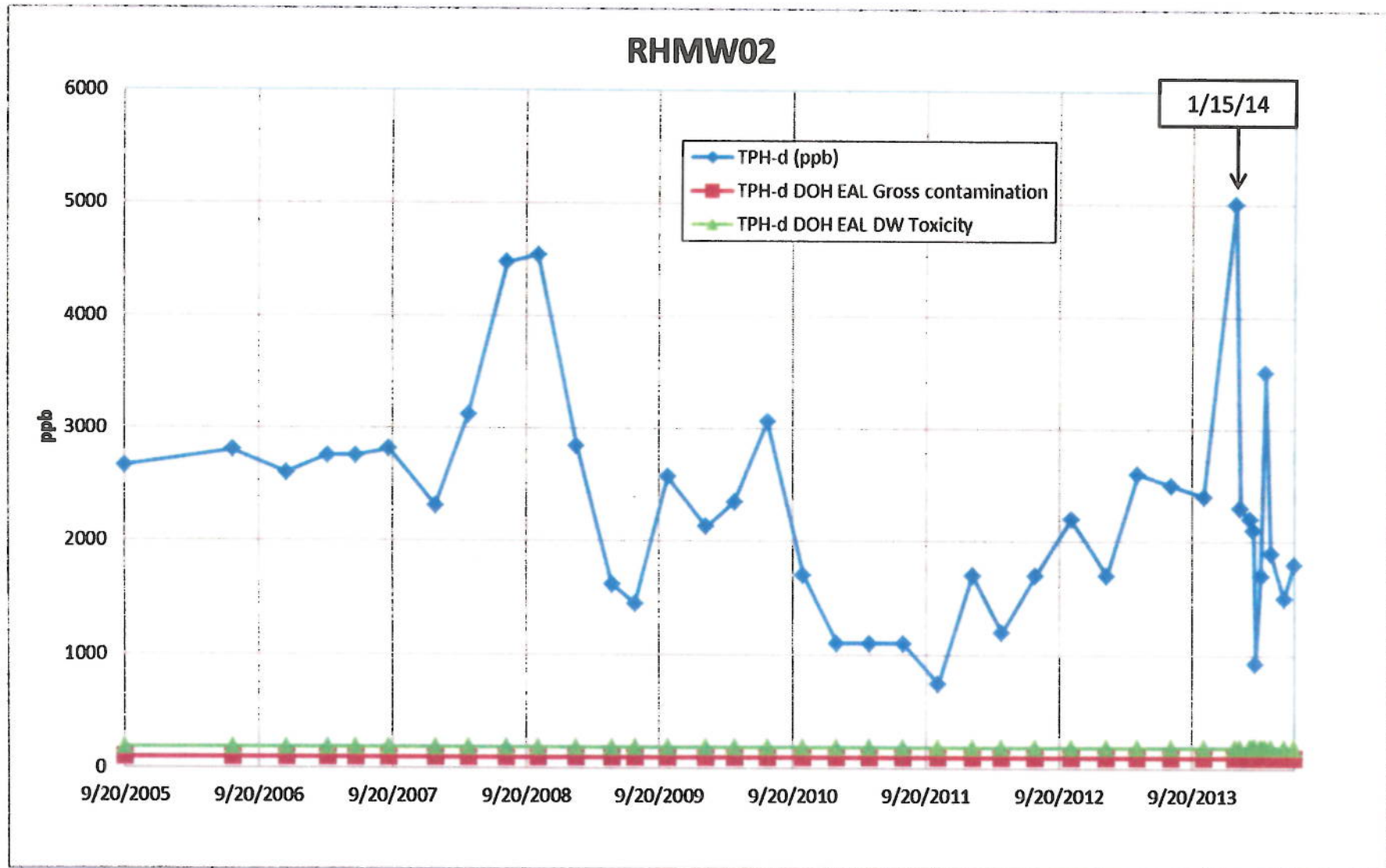


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Board of Water Supply
City and County of Honolulu



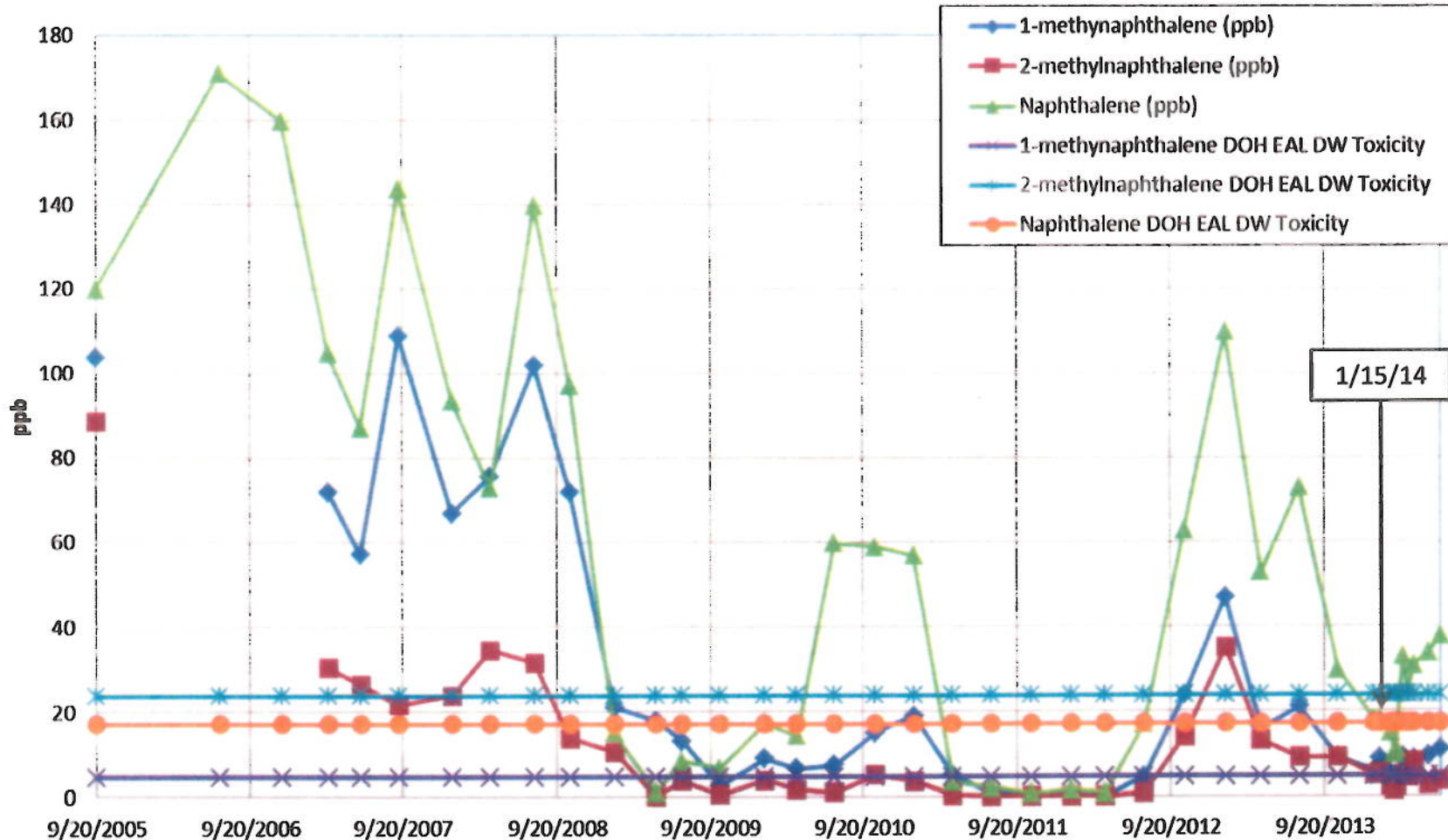
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RHMW02



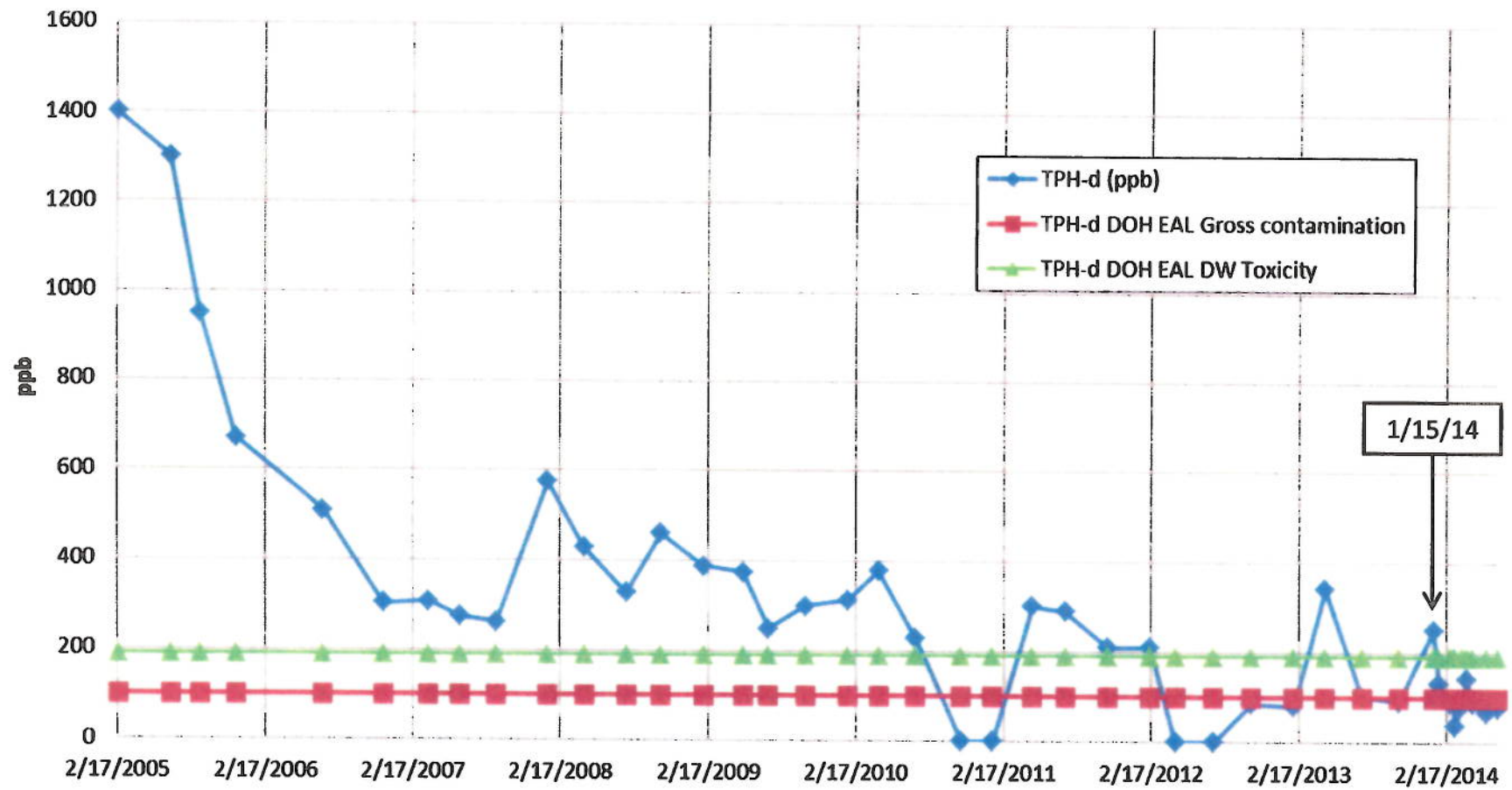
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RHMW01



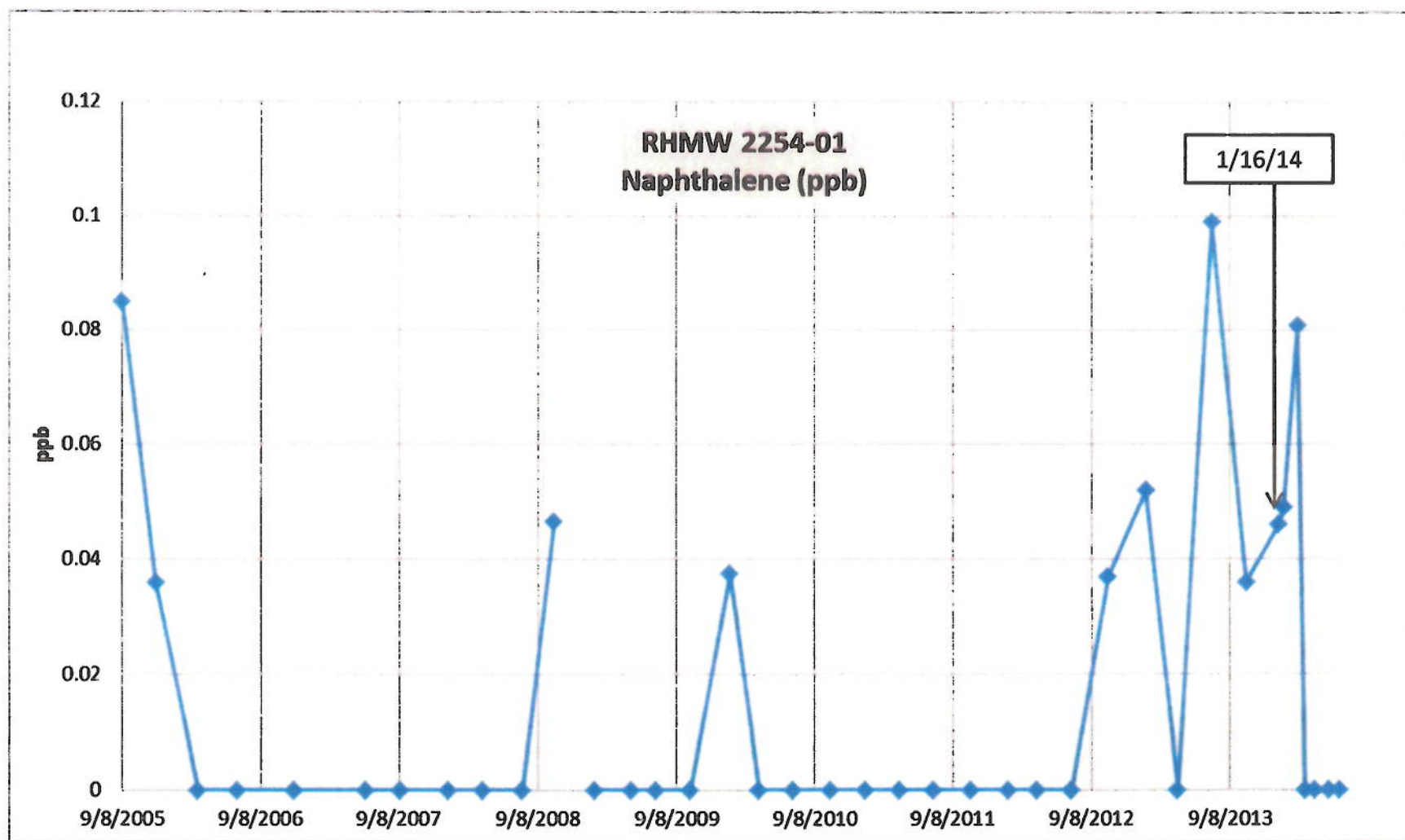
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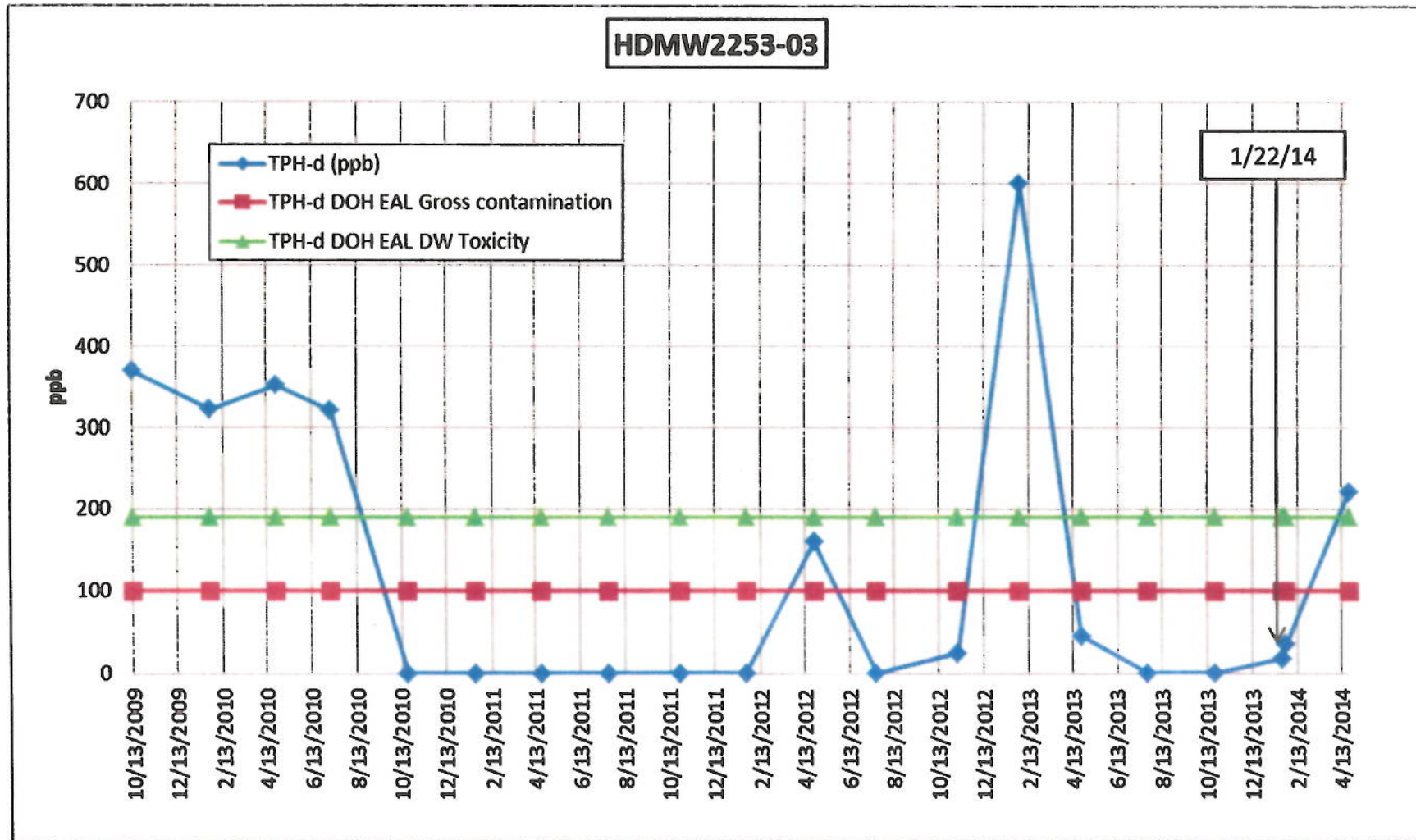
Board of Water Supply
City and County of Honolulu

Navy Red Hill Shaft Drinking Water Source



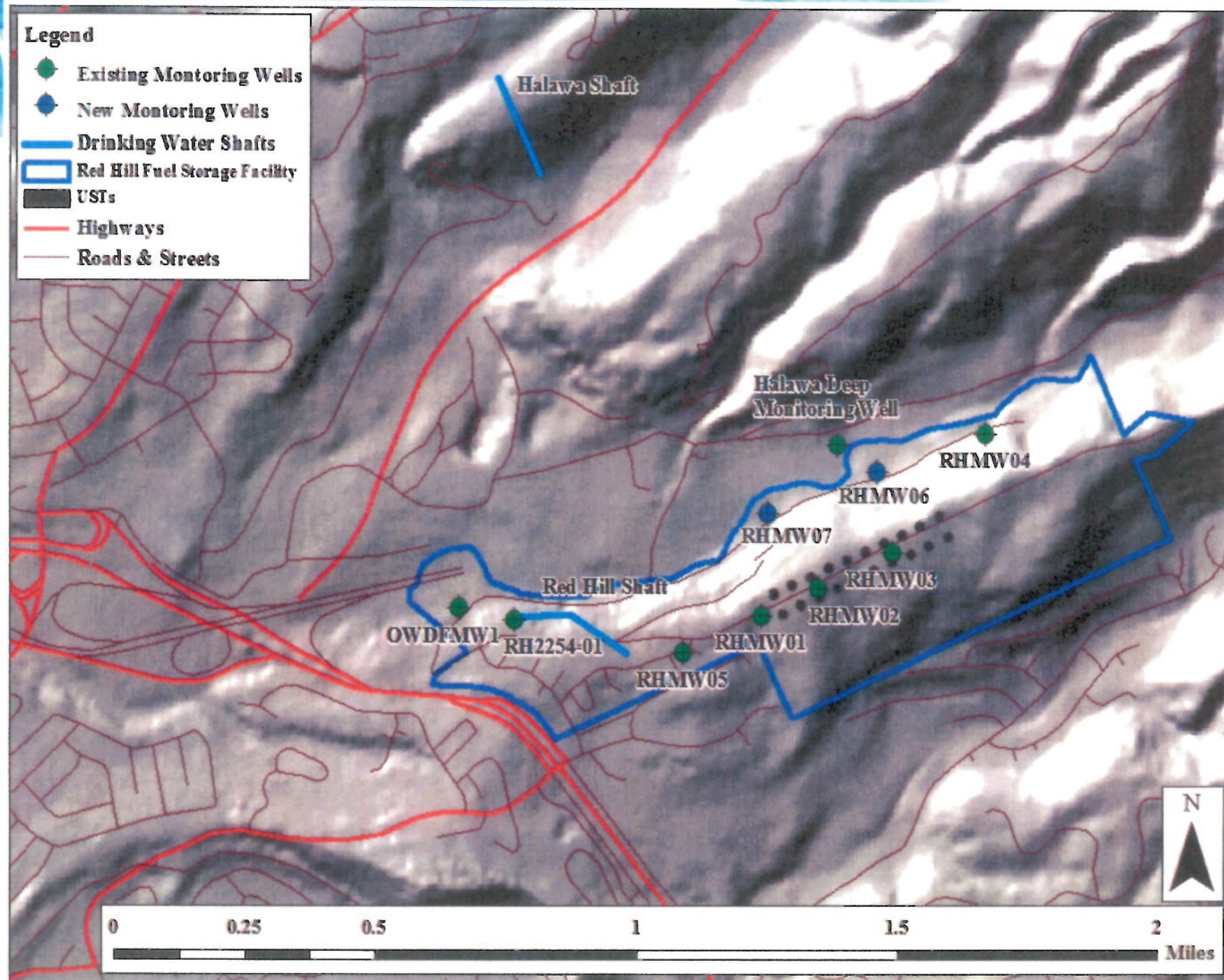


CWRM Well 2253-03



Legend

- Existing Monitoring Wells
- New Monitoring Wells
- Drinking Water Shafts
- Red Hill Fuel Storage Facility
- USTs
- Highways
- Roads & Streets

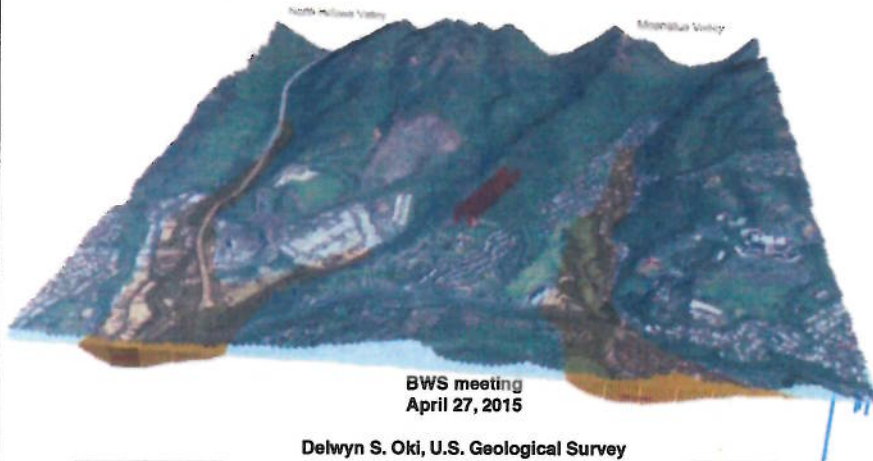




USGS Presentation

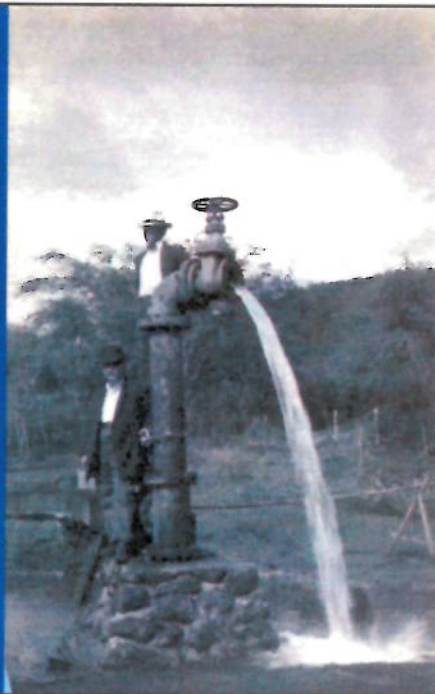
- Groundwater Flow Near the Red Hill Fuel Storage Facility

Groundwater Flow Near the Red Hill Fuel Storage Facility



Outline

- Background/setting
- USGS study objective
- Study approach

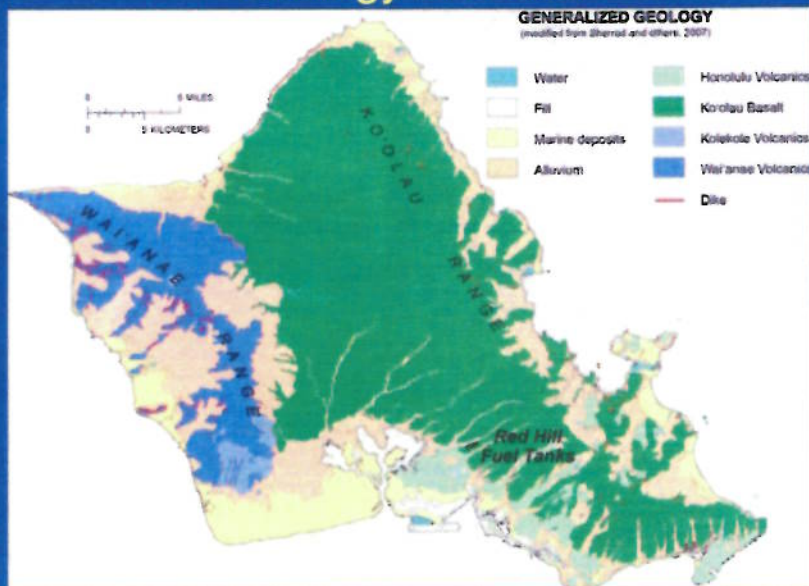


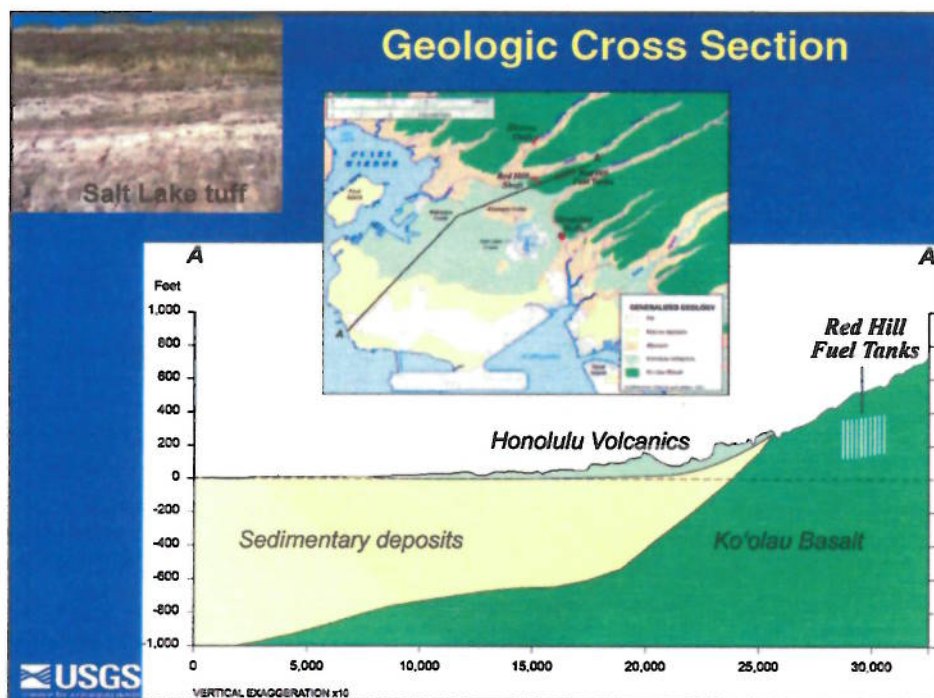
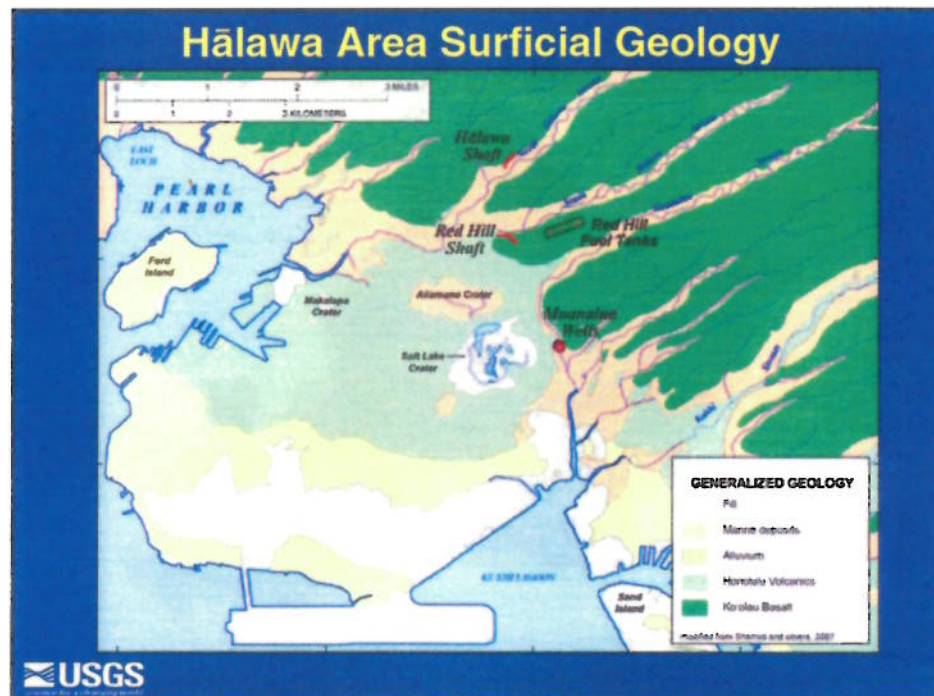
Background

- Fuel leaks at the Red Hill facility have been documented
- Fuel-related contaminants have been detected in groundwater in Red Hill monitoring wells
- Honolulu Board of Water Supply is concerned about nearby production wells
- Study objective: evaluate whether production wells may be vulnerable to contamination from a fuel leak

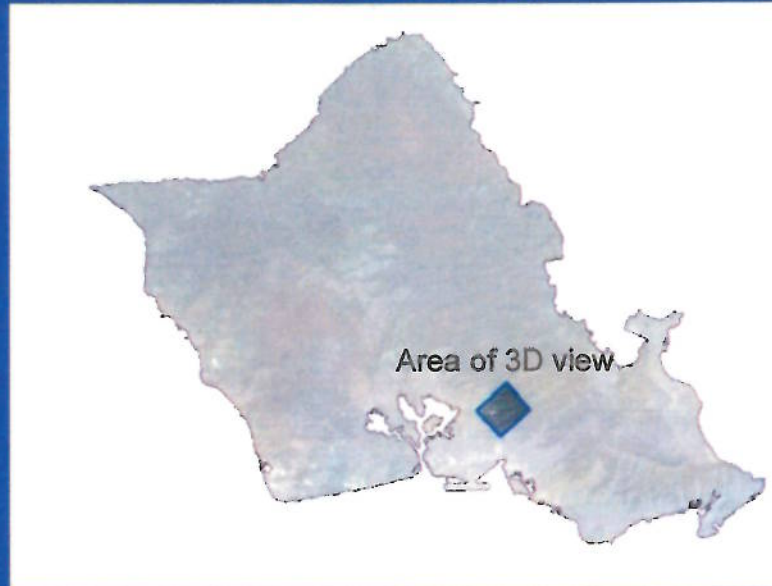


Geology of O'ahu



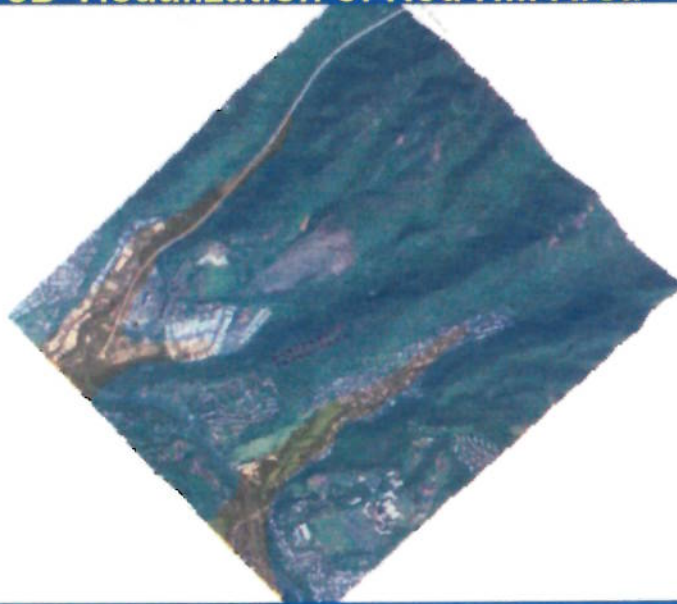


Area of 3D View



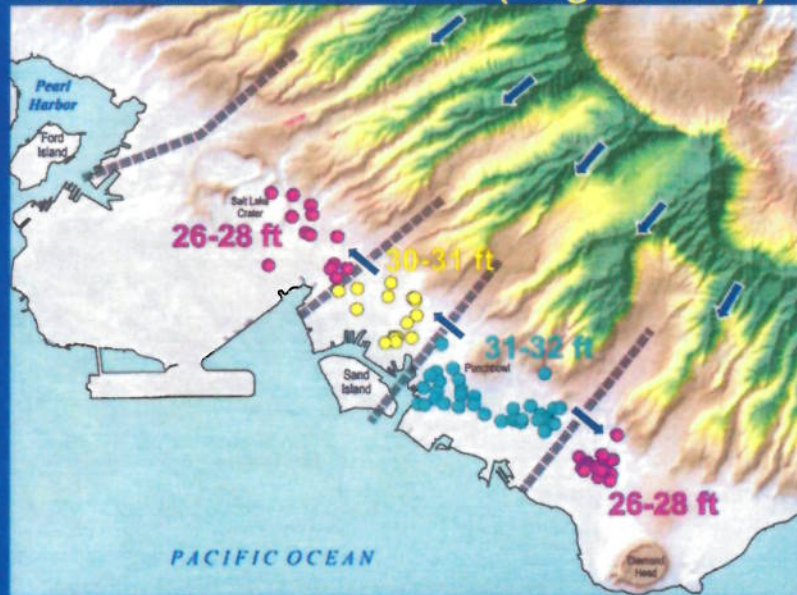
USGS
United States Geological Survey

3D Visualization of Red Hill Area



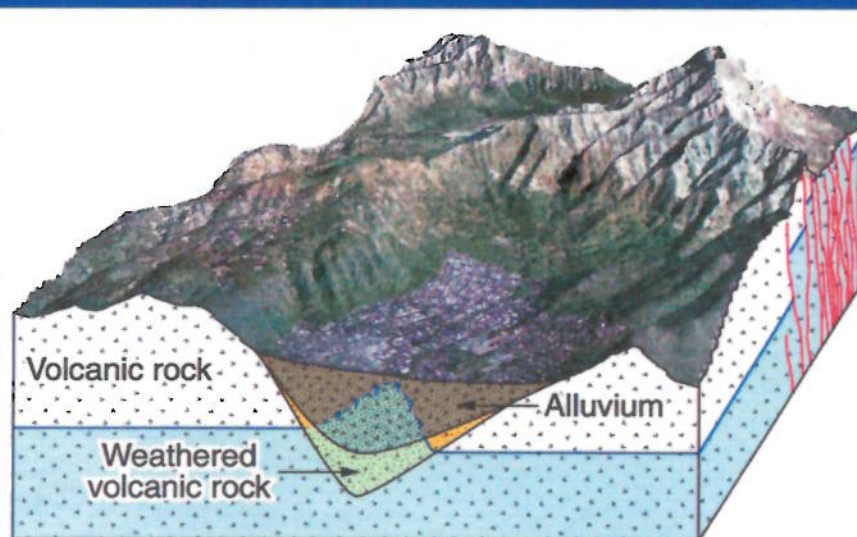
USGS
United States Geological Survey

Honolulu Water Levels (August 1932)



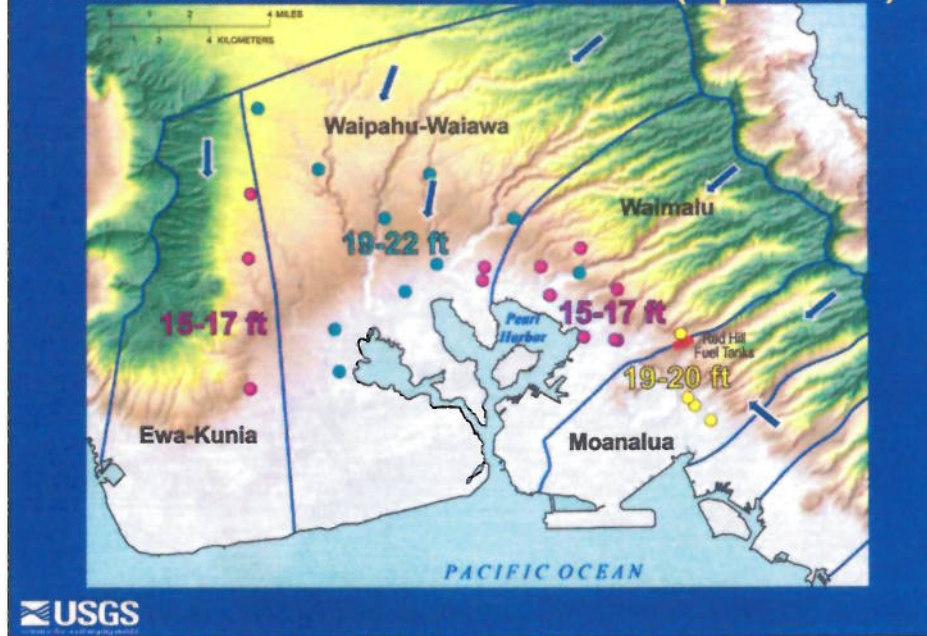
Source: BWS data

Valley-Fill Barriers



USGS

Pearl Harbor Area Water Levels (April 2012)



Study Approach

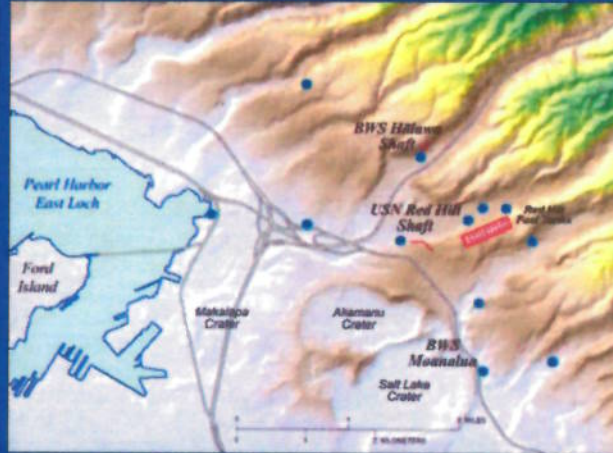
1. Measure water levels near Red Hill area
2. Update recharge estimates
3. Estimate groundwater inflow from adjacent areas
4. Develop 3D numerical model (12/2015 completion)

1. Red Hill Water Levels

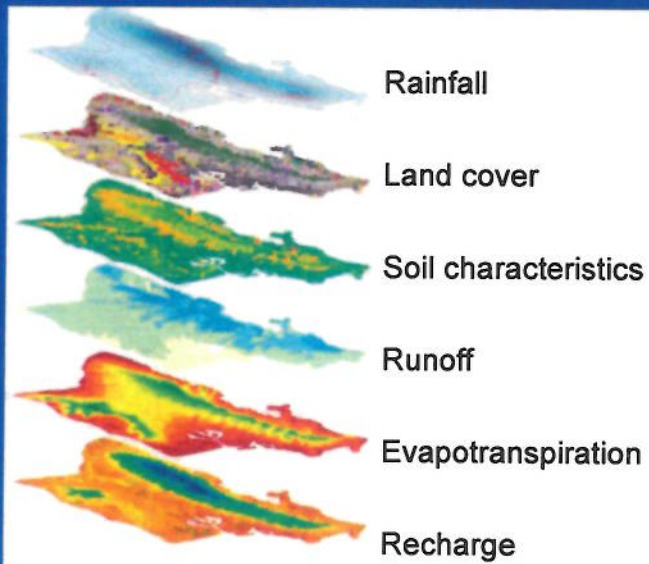
1. Survey well elevations



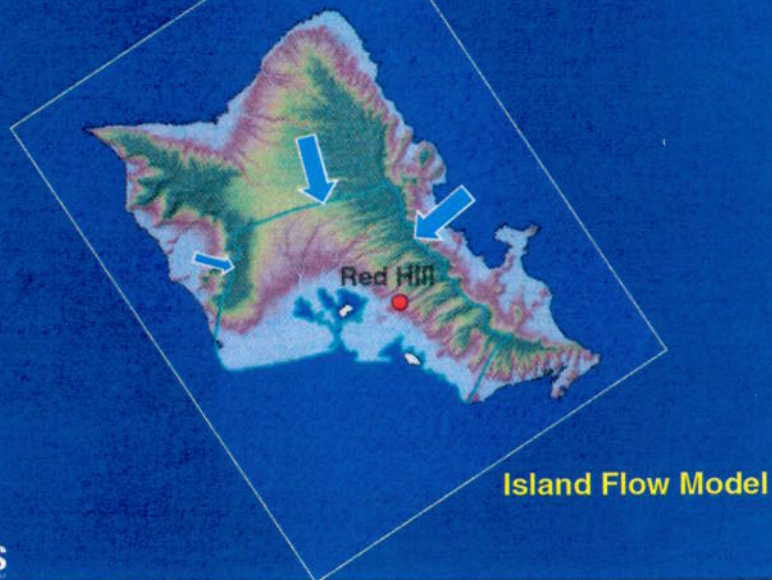
2. Measure groundwater levels using known well elevations



2. Estimate Groundwater Recharge



3. Estimate Inflows and Outflows



4. Develop 3D Model of Area of Interest



Summary

1. Potential impact of fuel leaks from Red Hill facility on nearby production wells is uncertain
2. New information on groundwater recharge and groundwater levels is being generated
3. A numerical groundwater model will be constructed to evaluate a range of leak scenarios
4. Study originally scheduled for completion at the end of 2015



ITEM FOR INFORMATION NO. 3

"April 27, 2015

FINANCIAL
UPDATE

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawaii 96843

Chair and Members:

Subject: Financial Update for the Quarter Ended March 31, 2015

The following Board of Water Supply's financial reports and graphs are attached:

- Budget vs Actual Revenue and Expense Totals
- Statement of Revenues, Expenses and Change in Net Assets
- Balance Sheet
- Budget vs Actual Appropriation Budget – Total BWS Summary
- Graph Representing Operating Expenditures by Category
- Graphs of Total Budgeted Operating Expenditures and Total Budgeted Operating Revenues

Respectfully submitted,

/s/ ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Attachments"

The foregoing was for information only.

DISCUSSION:

Waterworks Controller Joe Cooper gave the report. There were no comments or discussion.

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Board of Water Supply
City and County of Honolulu

Financial Performance

July 2014 – March 2015





Budget to Actual July 2014 – March 2015

- Actual Revenue \$160.7 million vs.
Budgeted Revenue \$163.9 million
- Operating costs are \$108.2 million vs.
Budgeted costs of \$133.1 million
- Actual Net Revenue \$52.4 million vs.
Budgeted Net Revenue \$30.7 million





Cost Drivers

Year to Date March 2015

	Actual (millions)	Budget (millions)
• Personnel	\$25.8	\$32.8
• Services/Supplies	\$17.2	\$24.2
• Repairs & Misc.	\$10.7	\$11.6
• Equipment	\$ 0.8	\$ 3.0
• Utilities	\$20.8	\$24.6

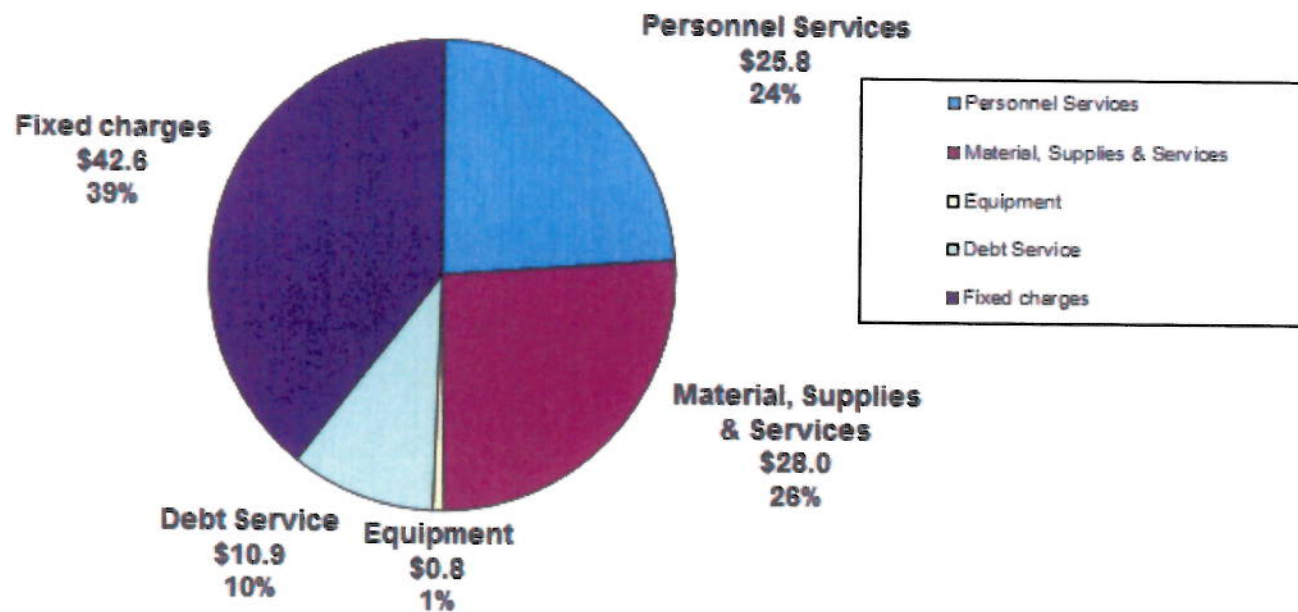
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Board of Water Supply
City and County of Honolulu

Total Operating Expenditures - \$108.2 As of March 31, 2015 (millions of dollars)



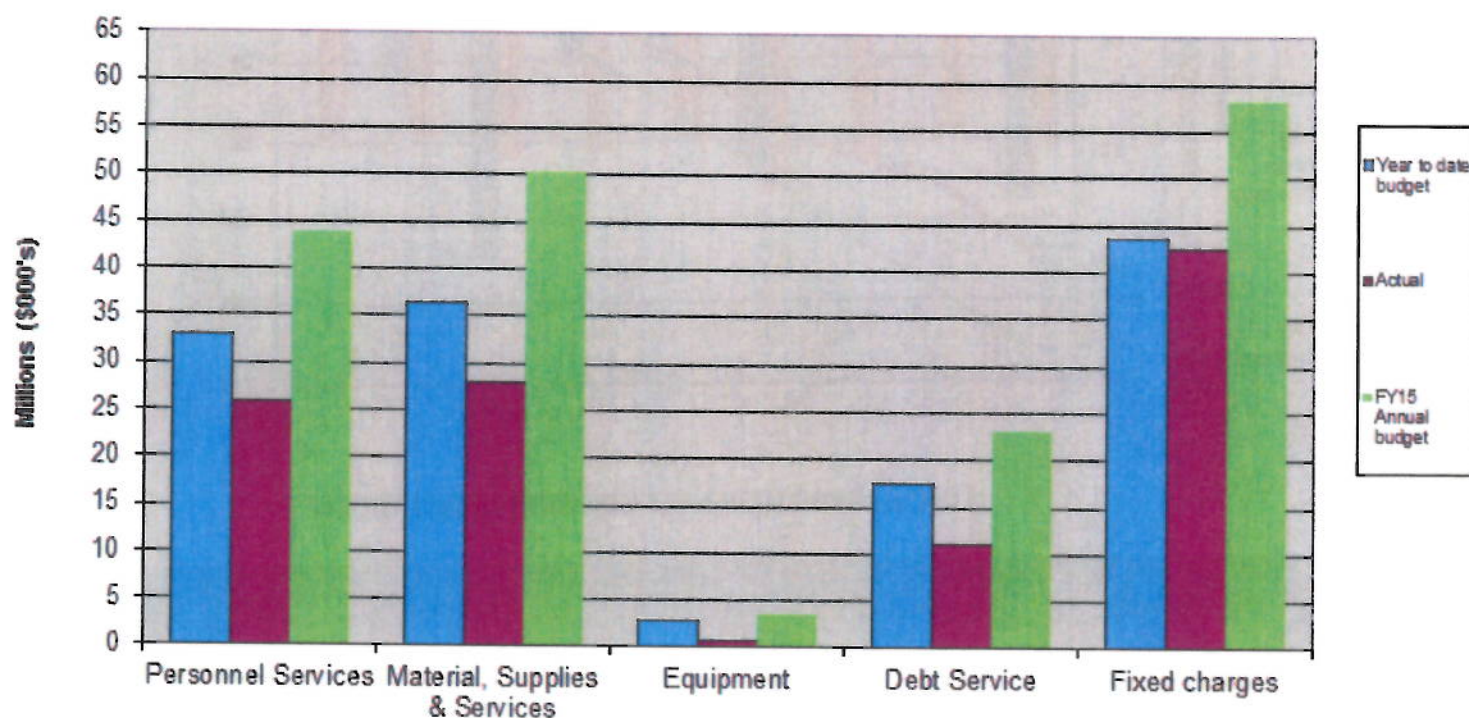
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Board of Water Supply
City and County of Honolulu

Operating Expenditures by Category (Budget vs. Actual Expenditures and Encumbrances)
as of March 31, 2015 (millions of dollars)



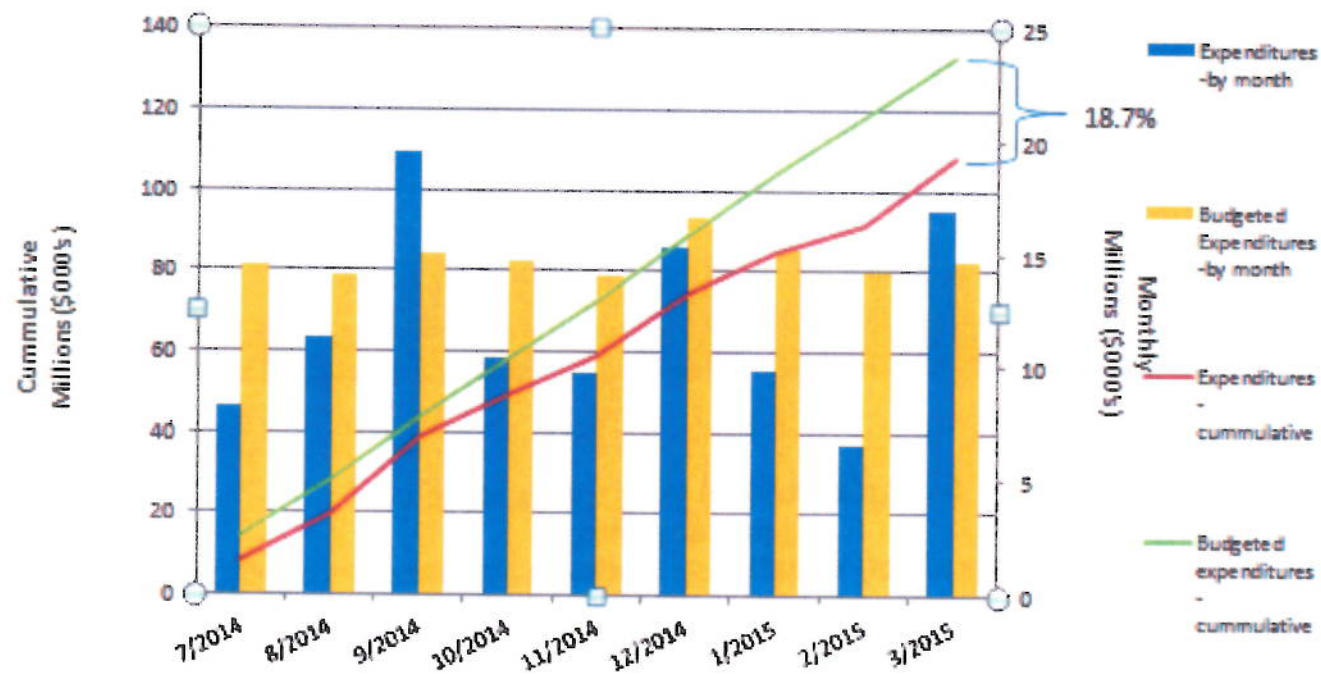
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Board of Water Supply
City and County of Honolulu

BUDGETED OPERATING EXPENDITURES FY 2015



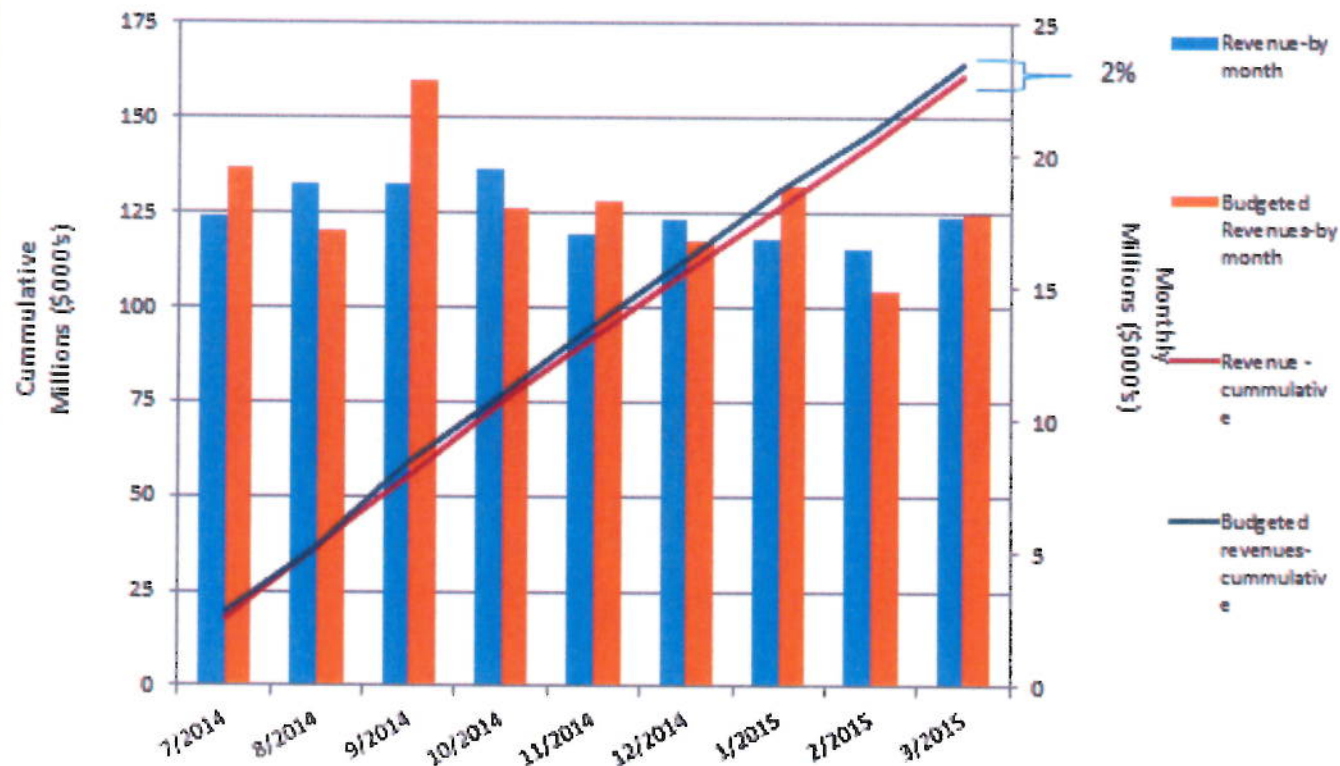
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Board of Water Supply
City and County of Honolulu

BUDGETED OPERATING REVENUES FY 2015



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Board of Water Supply
City and County of Honolulu

Questions
or
Comments



Budget vs. Actual
Revenue and Expense Totals
As of March 31, 2015

	YTD Actuals	YTD Budget	Favorable/ (Unfavorable) Variance
Revenues	160,651,000	163,856,000	(3,205,000)
Operating Expenses	(108,210,000)	(133,148,000)	24,938,000
Net Revenues (expenditures)	<u>52,441,000</u>	<u>30,708,000</u>	<u>21,733,000</u>

Board Of Water Supply
Statement of Revenues, Expenses And Change In Net Assets
As of March 31, 2015

Current Month Actual	% Revenue	Last Year Actual	% Revenue	Description	Year to Date Actual	% Revenue	Last Year to Date Actual	% Revenue	% Change
REVENUE									
17,474,142.63	100.00	14,434,498.16	100.00	OPERATING REVENUE	158,417,391.17	100.00	147,597,980.05	100.00	7.33
17,474,142.63	100.00	14,434,498.16	100.00	REVENUE	158,417,391.17	100.00	147,597,980.05	100.00	7.33
OPERATING EXPENSES									
2,428,215.68-	13.90	2,351,937.26-	16.29	LABOR COSTS	23,908,930.25-	15.09	22,922,041.03-	15.53	4.31
1,082,774.84-	6.20	908,434.78-	6.29	SERVICES	8,259,322.02-	5.21	9,542,111.33-	6.46	13.44-
1,062,794.28-	6.08	268,230.44-	1.86	SUPPLIES	4,303,491.89-	2.72	3,923,963.21-	2.66	9.67
13,296.50-	.08	10,116.97-	.07	EDUCATION & TRAINING	83,790.71-	.05	34,004.63-	.02	146.41
3,936,322.68-	22.53	3,308,480.94-	22.92	UTILITIES	18,891,939.91-	11.93	20,125,247.16-	13.64	6.13-
145,142.51-	.83	212,592.38-	1.47	REPAIR AND MAINTENANCE	1,115,719.53-	.70	1,765,857.96-	1.20	36.82-
1,624,909.18-	9.30	1,518,461.58-	10.52	MISC	13,445,328.85-	8.49	13,081,685.27-	8.86	2.78
3,449,412.79-	19.74	5,290,777.66-	36.65	RETIREMENT SYSTEM CONTRIBUTIO	15,694,551.40-	9.91	14,867,769.91-	10.07	5.56
27,972.32	.16	6,164.68-	.04	MISC EMPLOYEES' BENEFITS	265,101.90	.17	112,050.50	.08	136.59
13,714,896.14-	78.49	13,875,196.69-	96.13	OPERATING EXPENSES	85,437,972.66-	53.93	86,150,630.00-	58.37	.83-
1,440,314.52-	8.24	2,166,191.28-	15.01	NON OPERATING REVENUE AND EXPE	4,004,408.49-	2.53	5,243,321.83-	3.55	23.63-
1,315,953.69	7.53	2,764,805.95	19.15	CONTRIBUTION IN AID	13,378,067.43	8.44	8,162,616.57	5.53	63.89
5,567,655.20-	31.86	5,024,270.47-	34.81	OTHER EXPENSES	37,403,681.85-	23.61	36,654,211.53-	24.83	2.04
1,932,769.54-	11.06	3,866,354.33-	26.79	Change In Net Assets	44,949,395.60	28.37	27,712,433.26	18.78	62.20

Board Of Water Supply
Balance Sheet
As of March 31, 2015

Description	Amounts			Change	
	Current	Last Month End	Last Year End	This Month	This Year
ASSETS					
CURRENT ASSETS	51,246,267.03	52,755,916.48	43,583,832.83	-1,509,649.45	7,662,434.20
RESTRICTED ASSETS	5,522,231.49	4,418,338.96	15,871,669.73	1,103,892.53	-10,349,438.24
INVESTMENTS	261,419,995.41	259,073,379.27	220,305,587.35	2,346,616.14	41,114,408.06
OTHER ASSETS	15,734,605.89	16,578,050.34	8,972,982.66	-843,444.45	6,761,623.23
PROPERTY / PLANT	1,122,394,340.55	1,122,322,812.68	1,120,477,820.67	71,527.87	1,916,519.88
TOTAL ASSETS	<u>1,456,317,440.37</u>	<u>1,455,148,497.73</u>	<u>1,409,211,893.24</u>	<u>1,168,942.64</u>	<u>47,105,547.13</u>
LIABILITIES					
CURRENT LIABILITIES	15,113,159.67	12,932,415.55	31,259,856.70	2,180,744.12	-16,146,697.03
OTHER LIABILITIES	36,597,377.38	36,735,050.55	26,731,427.57	-137,673.17	9,865,949.81
BONDS PAYABLE, NONCURRENT	292,051,944.33	290,993,303.10	283,615,045.58	1,058,641.23	8,436,898.75
LIABILITIES	<u>343,762,481.38</u>	<u>340,660,769.20</u>	<u>341,606,329.85</u>	<u>3,101,712.18</u>	<u>2,156,151.53</u>
NET ASSETS					
RETAINED EARNINGS	338,712,913.42	336,711,024.36	309,146,646.62	2,001,889.06	29,566,266.80
FUND BALANCE	594,633,831.66	594,633,831.66	594,633,831.66	0.00	0.00
RESERVE FOR ENCUMBRANCES	134,258,818.31	136,260,707.37	163,825,085.11	-2,001,889.06	-29,566,266.80
CURRENT YEAR CHANGES TO FU	44,949,395.60	46,882,165.14	0.00	-1,932,769.54	44,949,395.60
NET ASSETS	<u>1,112,554,958.99</u>	<u>1,114,487,728.53</u>	<u>1,067,605,563.39</u>	<u>-1,932,769.54</u>	<u>44,949,395.60</u>
TOTAL LIABILITIES AND NET ASSETS	<u>1,456,317,440.37</u>	<u>1,455,148,497.73</u>	<u>1,409,211,893.24</u>	<u>1,168,942.64</u>	<u>47,105,547.13</u>

Board Of Water Supply
Budget vs Actual Appropriation Budget - Total BWS Summary

4/14/2015

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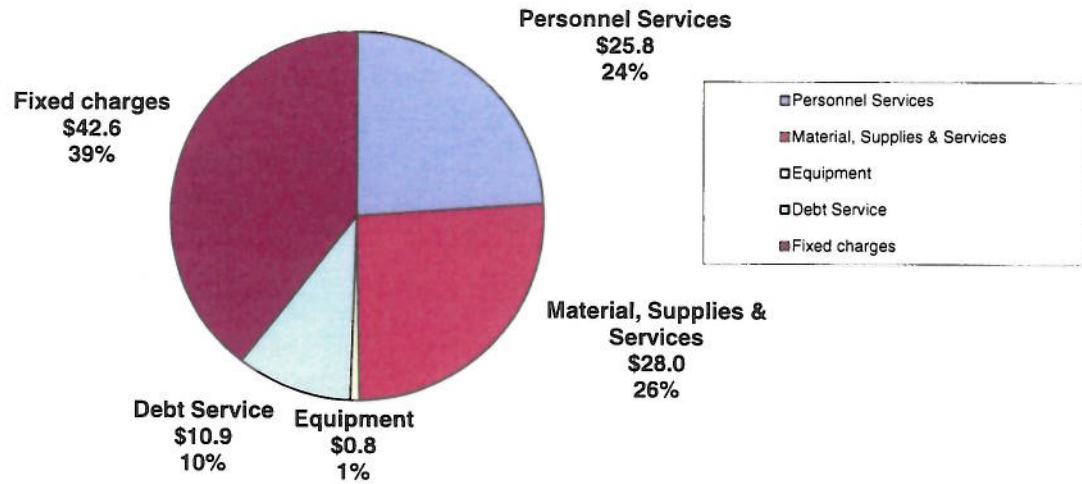
AS OF 3/31/2015

OPER UNIT ALL

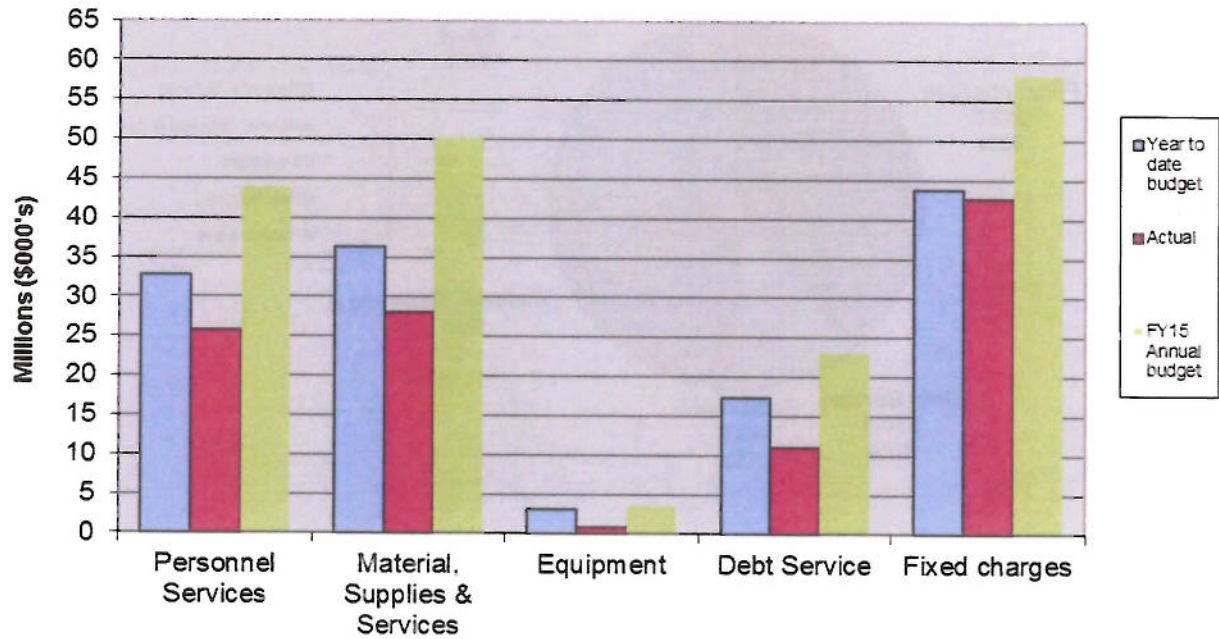
BUSINESS UNIT ALL

YTD-TO-DATE				FOR THE FISCAL YEAR					
YTD Actuals	YTD Budget	Avail/ (Over)	%	Object Description	Revenues/ Expend	Open Encumb	Annual Budget	Avail/ (Over)	%
160,651	163,856	3,205	1.96	REVENUE	160,651		217,633	56,982	26.18
OPERATING EXPENSES:									
25,807	32,801	6,994	21.32	Personnel Services	25,807		43,931	18,124	41.26
MATERIALS AND SUPPLIES									
8,572	14,428	5,856	40.59	Services	5,852	2,720	19,645	11,073	56.37
8,596	9,751	1,155	11.84	Supplies	8,143	453	13,015	4,419	33.95
177	441	264	59.86	Education & Training	166	11	566	389	68.73
	9	9	100.00	Utilities			12	12	100.00
1,245	4,492	3,247	72.28	Repairs & Maint	911	334	5,133	3,888	75.75
9,415	7,116	(2,299)	32.31-	Misc	7,676	1,739	11,921	2,506	21.02
826	2,981	2,155	72.29	Equipment	276	550	3,557	2,731	76.78
10,932	17,404	6,472	37.19	Debt Service	10,932		23,205	12,273	52.89
FIXED CHARGES:									
20,827	24,610	3,783	15.37	Utilities	20,827		32,813	11,986	36.53
2,475	2,475			Case Fees	2,475		3,300	825	25.00
5,928	5,706	(222)	3.89-	Retirement System Contribution	5,928		7,608	1,680	22.08
13,410	10,934	(2,476)	22.64-	Misc Employees' Benefits	13,142	268	14,579	1,169	8.02
108,210	133,148	24,938	18.73	TOTAL OPERATING EXPENDITURES	102,135	6,075	179,285	71,075	39.64
52,441	30,708	(21,733)		NET REVENUES (EXPENDITURES)	58,516	(6,075)	38,348	(14,093)	

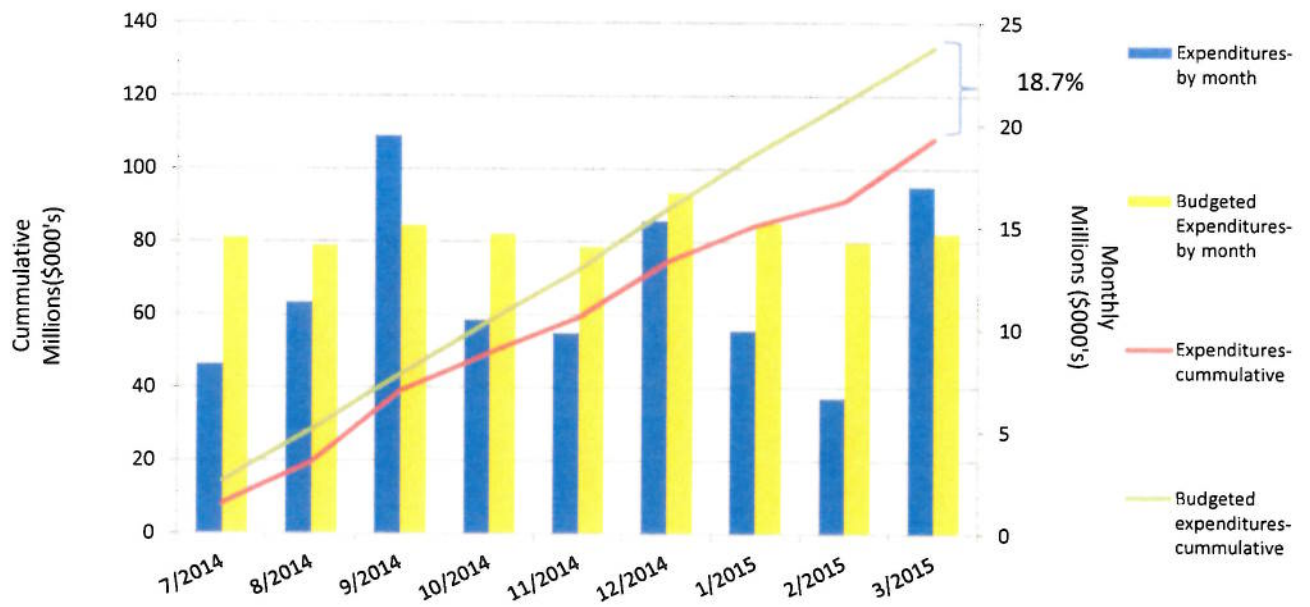
Total Operating Expenditures - \$108.2
As of March 31, 2015
(millions of dollars)



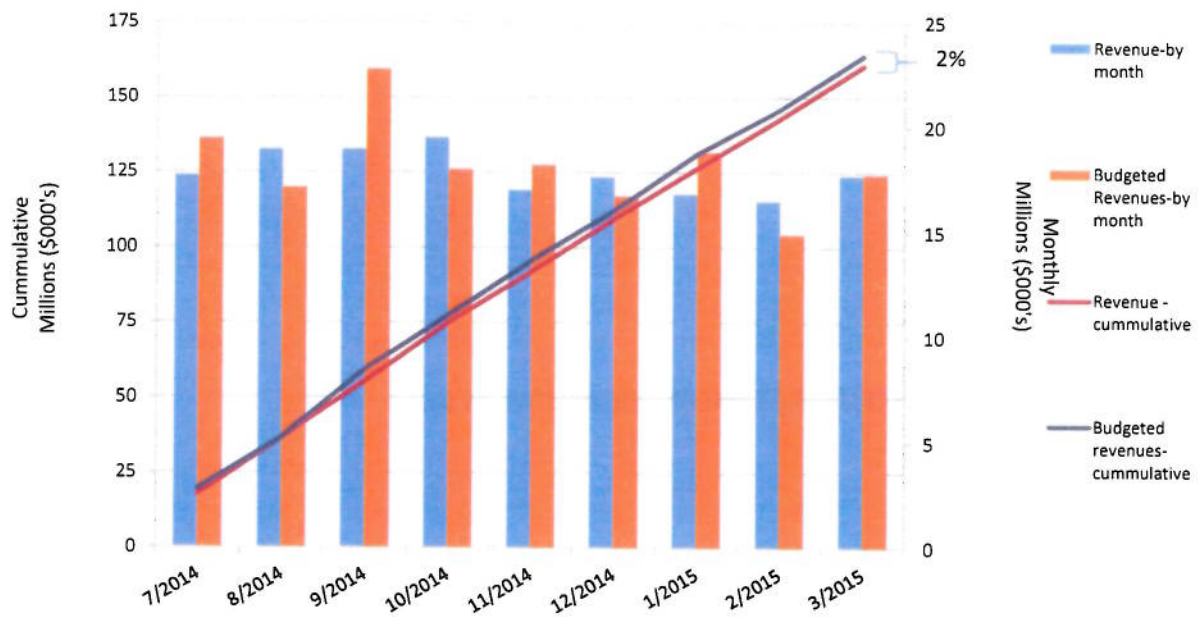
**Operating Expenditures by Category (Budget vs. Actual
Expenditures and Encumbrances)
as of March 31, 2015 (millions of dollars)**



BUDGETED OPERATING EXPENDITURES FY 2015



BUDGETED OPERATING REVENUES FY 2015



ITEM FOR INFORMATION NO. 4

"April 27, 2015

WATER
MASTER PLAN
UPDATE

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawaii 96843

Chair and Members:

Subject: Board of Water Supply Water Master Plan Quarterly Update

Barry Usagawa, Program Administrator of our Water Resources Division, will present an update of the Board of Water Supply Water Master Plan.

Respectfully submitted,

/s/ ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Attachment"

The foregoing was for information only.

DISCUSSION:

Mr. Lau briefed new Board Member Sproat on the BWS Water Master Plan (WMP) and how it is one of the foundational methods to create a long term vision for the Department.

Water Resources Program Administrator Barry Usagawa gave the presentation. He discussed some of the previous WMP updates given and stated that today's topic would be on Echologics leak finder survey. He defined what the WMP is, showed a graphic of the process, discussed the schedule of the WMP - that the WMP is 55 percent complete, and shared a list of the tasks to be performed.

Mr. Usagawa explained how early detection of leaks can reduce costs, showed a picture of and explained the technology that Echologics uses, listed the locations of Echologics large diameter leak detection surveys, explained the leak detection approach, and showed an illustration of the hydrophone setup. He stated that most of the survey work was done during the day, but some of the work was done in the night to improve results in noisy areas. Mr. Usagawa stated that BWS crews did find a leak on Miller Street near Queen's Hospital, and he called on Field Operations Program Administrator Daryl Hiromoto to talk about how they detected the leak and what they found.

Mr. Hiromoto informed the Board that their leak detection (LD) crew shadowed Echologics to learn from them but also to provide to Echologics the BWS crew's experience and to share data with them to help in the work. The BWS LD crew noticed this leak first. They identified the leak and marked the area of the leak. Echologics also detected the leak, did their own analysis and marked

the area of the leak. BWS's and Echologics' marks were very close, inches apart. As the crew dug down in the marked area to the lateral, it was dry, but there was sound coming from the pipe. As the crew dug further, they found the leak 20 feet away. This proves that the technology is valuable because although it may not find the exact area of the leak, it does locate the general area.

Mr. Hiromoto showed a picture of the leak on the lateral that sits between two concrete jackets and also showed a video of the water coming out of the lateral as the crew excavated. The leak may have not been found if leak detection surveys were not done. Mr. Hiromoto stated that this was a successful effort and coordination between BWS and Echologics and a job well done.

Mr. Usagawa concluded by explaining that they estimated it to be about a 15-30 gallons per minute leak. Thirty gallons per minute is sufficient to supply 300 people per day, and if that amount of water was sold at \$5 per thousand gallons, it would come out to \$70,000 for one year. They will find out the exact cost of the repairs after Mr. Hiromoto does his evaluation. Comparing that cost to the water loss estimates will prove that leak detection and repair is a very viable program.

There were no comments or discussion.

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Safe, dependable, and affordable water now and into the future



Board of Water Supply
City and County of Honolulu

Water Master Plan

Board Quarterly Update No. 7



April 27, 2015





Previous Water Master Plan Updates

- Water Master Plan Components
 - Goals and Objectives
 - Schedule
 - Tasks and Status
- Main Break Causal Factors
- Pipeline Condition Assessments
- Pilot Pipeline Condition Assessment Tools
- 3-Year Public Engagement Strategy
- Leak Detection & Special Design Projects
- Echologics Leak Finder Survey: Today's Topic





BWS Water Master Plan

- The Water Master Plan is a comprehensive program that, looking ahead over the next 30 years, evaluates the entire water system, identifies necessary improvements, and balances needs and costs for our customers.
 - A best practice of water utilities seeking to ensure stewardship of water supplies and infrastructure.
 - Provides vital information for policy makers to make decisions about how to balance water service adequacy & dependability with the cost of infrastructure improvements and rate affordability to our customers.

Water Service
Adequacy & Dependability

Infrastructure Costs
Rate Affordability



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Board of Water Supply
City and County of Honolulu

IDENTIFY

needs for increasing existing supplies and improvements to existing facilities

COMPARE

projections of future needs with existing water supplies and infrastructure

PRIORITIZE

improvements over a 30-year period based on risks to the system and providing reliable service to customers

ANALYZE

funding options to pay for improvements, including rates

ASSESS

existing condition of pipes, pumps, reservoirs, wells, treatment plants, and other facilities

DEVELOP

a comprehensive plan to implement improvements, including priorities, schedules, costs, financing, and rates





Water Master Plan Schedule

2013

Phase 1:
Initial
Evaluation,
WMP
Methodology &
Ph. 2&3 Scope

2014

Phase 2: Condition Assessment &
System Analysis

Phase 3: 30-year CIP, Water Master Plan &
Stakeholder Advisory Group

2015

2016-2018

Financial
Plan
&
Rate
Study



We are here





Water Master Plan Tasks

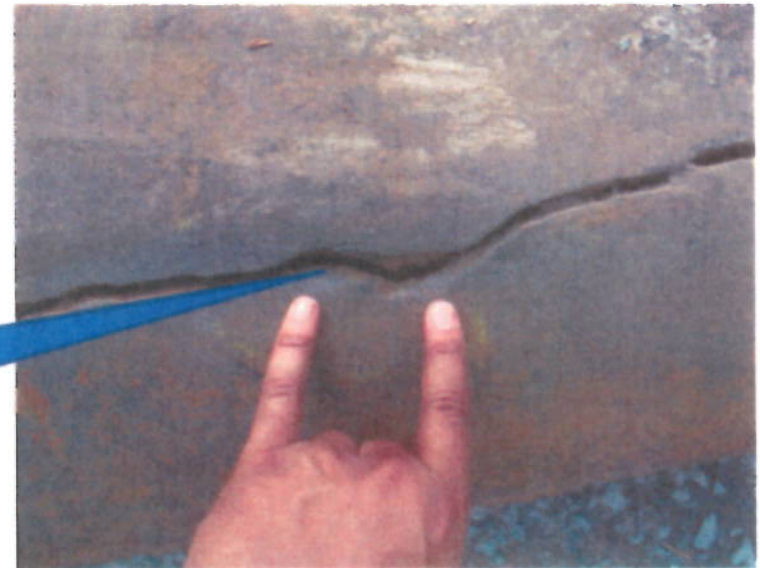
- Task 1: Causal Factors Analysis for Pipelines
- Task 2: Risk Based Pipeline Prioritization Using CapPlan
- Task 3: Implement Pipeline Condition Assessment: Evaluation of CA technologies
- Task 4: Implement Non-Pipeline Condition Assessment
- Task 5: Background Info and Planning Data
- Task 6: Water Source Evaluation
- Task 7: Water Quality Treatment Evaluation
- Task 8: Water System Evaluation
- Task 9: Operation and Maintenance Evaluation
- Task 10: Recommended Capital Improvement Plan
- Task 11: Financial Plan and Rate Study (rescheduled to 2016)
- Task 12: Communications Plan
- Task 13: Project Management
- Task 14: Update Causal Factors
- Task 15: Recommend Transmission Pipeline Rehabilitation and Replacement
- Task 16: Water Master Plan Report
- Task 17: Implementation Plan Coordination
- Task 18: Project Support



Early Detection of Leaks Can Greatly Reduce Costs

- Reduces water loss
- May prevent catastrophic failure because leaks become main breaks
- Eliminates unplanned service disruptions from main breaks
- Provides location for proactive repair
- Can extend pipe life before full replacement is warranted

Scoured, smooth edges indicate long-term leakage preceded failure





Echologics Leak Detection

- Acoustic, hydrophones
- **Non-intrusive**
- Long range (2000' to 3000', Ideal is 800'-1000')
- Low cost/ft
- Not as accurate as intrusive tools but no taps needed
- Logistical support
 - Traffic safety, Clean manhole, night work
- Applications to cross-country pipelines and under freeways, streams and waterways

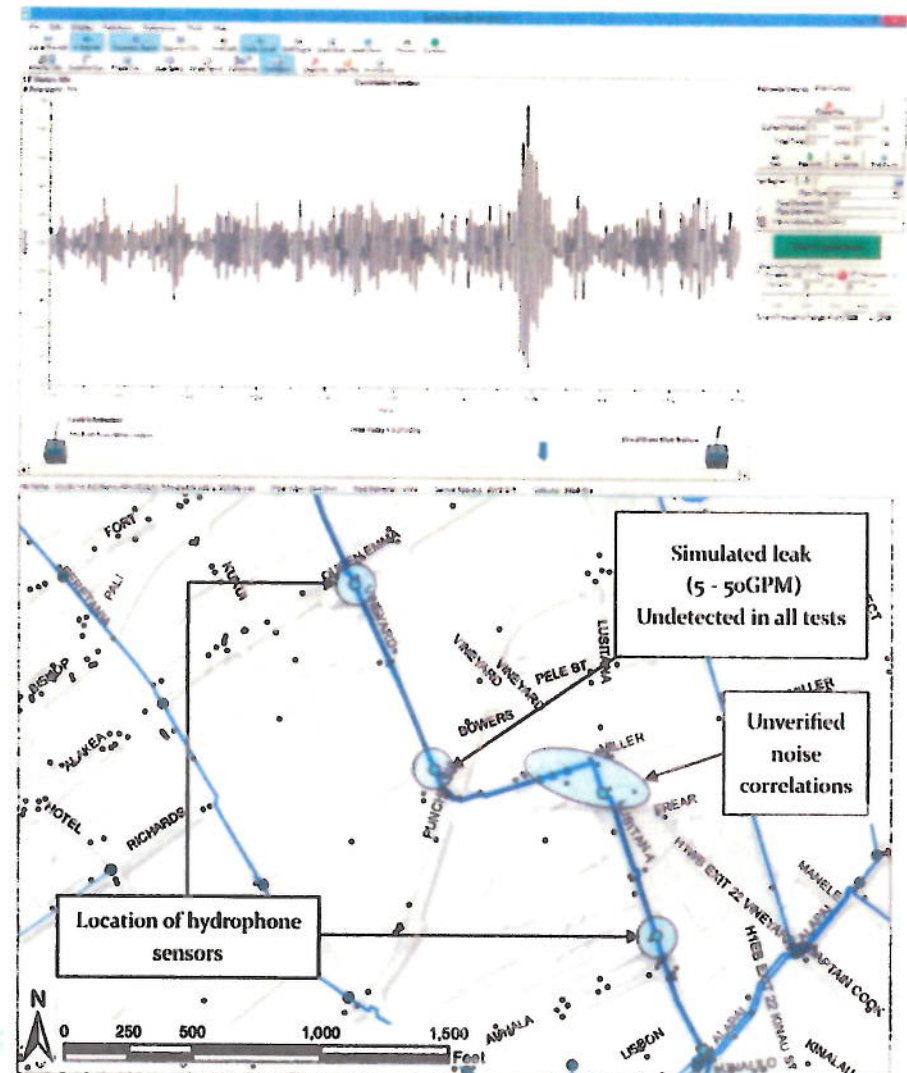


Use: Screening tool for water loss control and detection of some imminent failures



Echologics Large Diameter Leak Detection

- Vineyard 42" Queen Emma St. to Lauhala St.
- Kilihau Dillingham 42" Puuloa Rd. to Laumaka St.
- Punanani 36" wells to Moanalua Rd.
- Alapai St. W20" & W18"
- Nuuanu Ave. W18"



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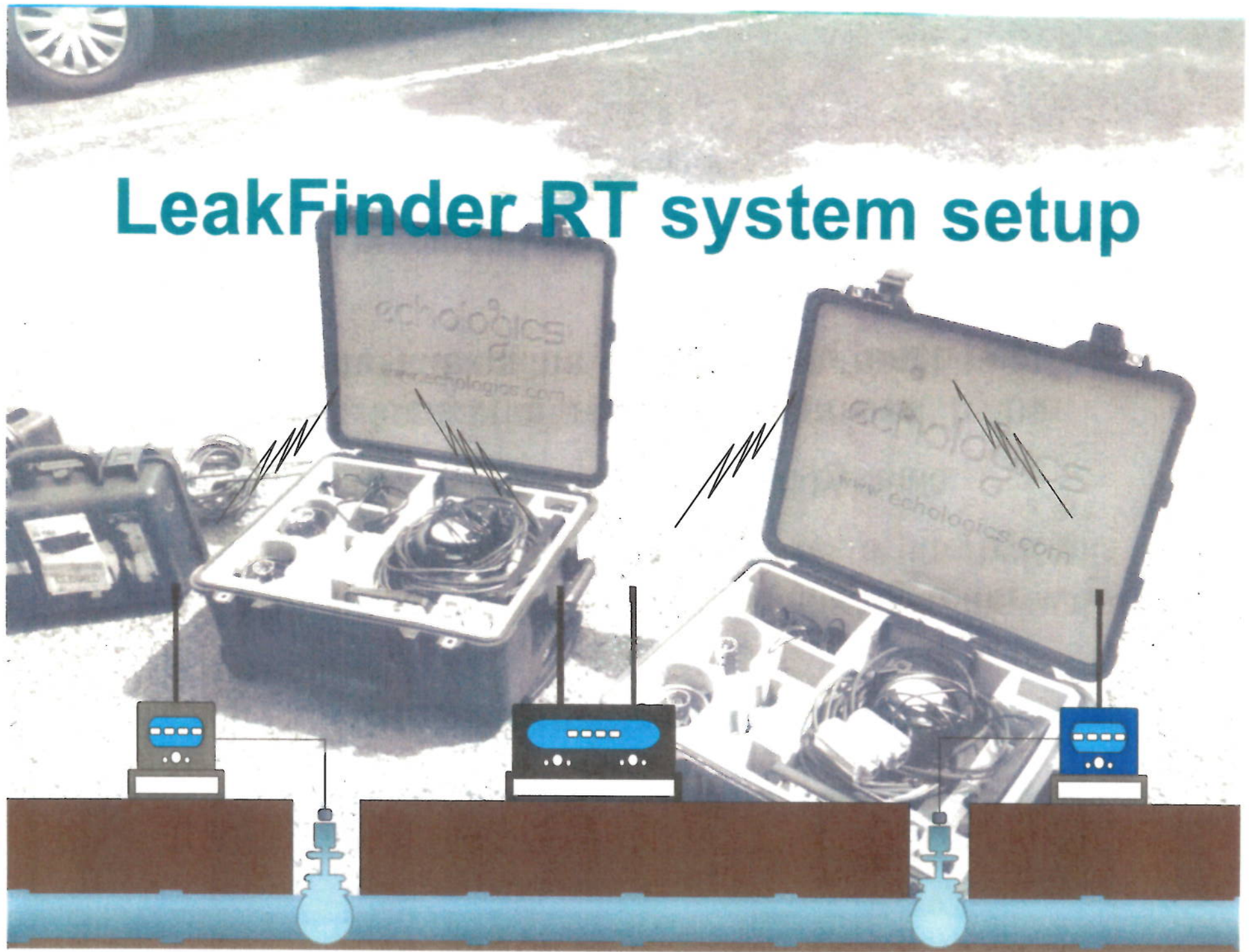
Board of Water Supply
City and County of Honolulu

Test Locations

Site	Site Name	Material	Diameter (inch)	Approx. Length (feet)
1	Kilihau Street - Puuloa to Sand Island	Concrete Cylinder	42	7,400
2	Punanani Wells - Punanani to Moanalua	Concrete Cylinder	36	3,400
3	Alapai under H1	Cast Iron	20	1,300
	Alapai under H1	Cast Iron	18	1,500
4	Nuuanu under H1 (Metro 180)	Cast Iron	18	1,100
5	Kalauao Wells to Moanalua Rd	Concrete Cylinder	36	4,000
6	Beretania- Miller to Lusitana	Cast Iron	42	2,300
Total Pipe Length (feet)				21,000



LeakFinder RT system setup





Leak Detection Approach

- Two hydrophone sensors mounted directly to the water column of a selected pipe on air valves or fire hydrant
- A correlator listens for noise created by leaks
- The specific location of a leak is determined by the length of time it takes the leak noise to reach each sensor.
- Ground mikes can be used to help pinpoint suspected leaks



Example of Hydrophone Setup



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City and County of Honolulu

Most of the work was
done during daytime



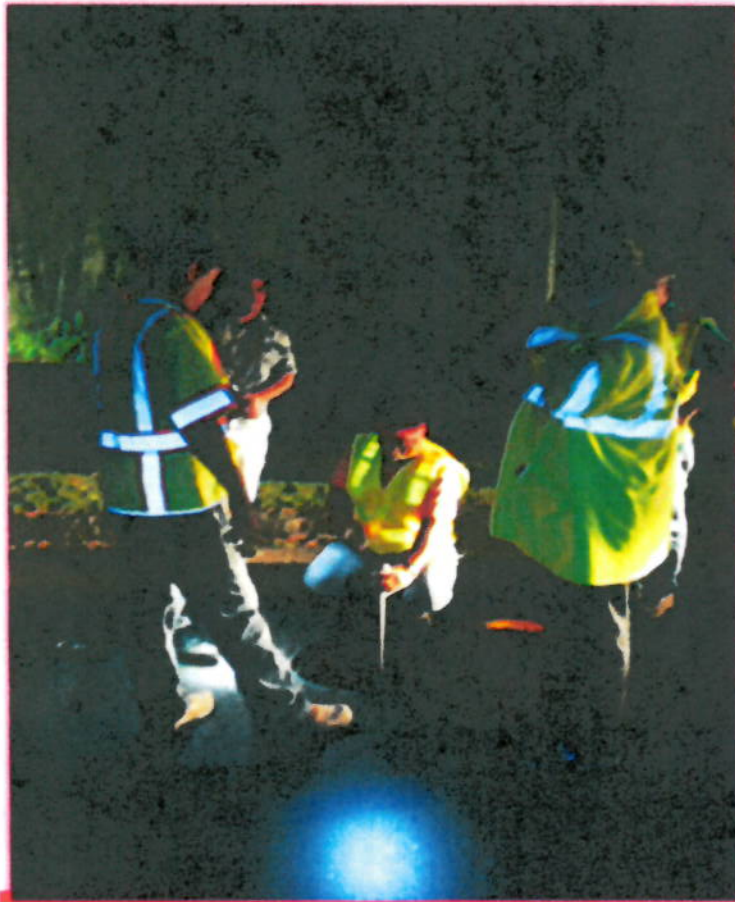
WATER FOR LIFE

Safe, dependable, and affordable water now and into the future



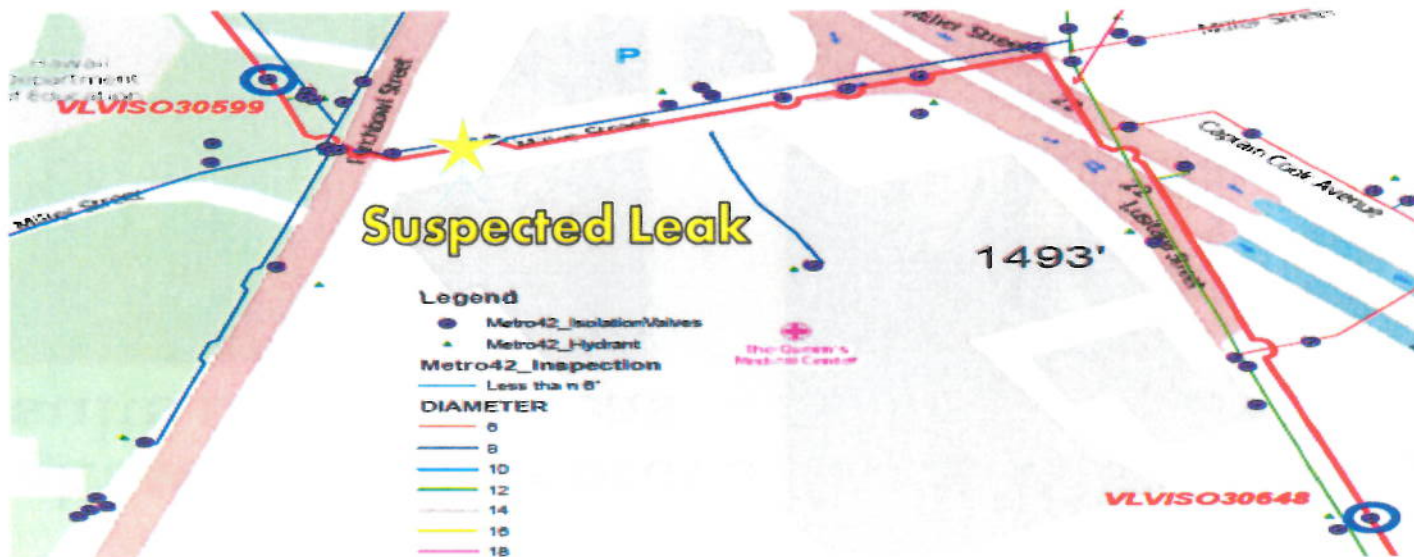
Board of Water Supply
City and County of Honolulu

Night work can improve
results in noisy areas



Miller Street Leak Detection and Repair

Leak detected on Miller Street near Queen's Emergency entrance and marked by BWS crews.



Other tested areas – no leaks; data will be further evaluated in the office

WATER FOR LIFE

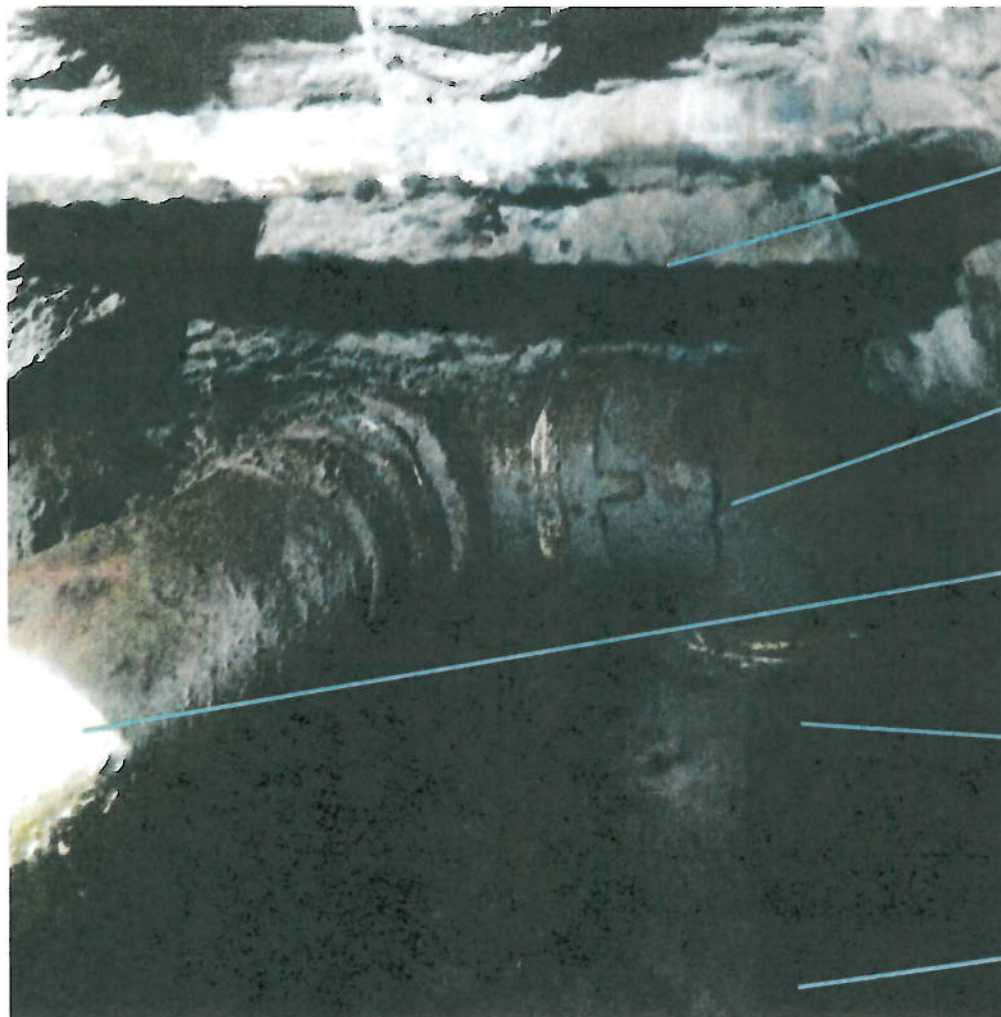
Safe, dependable, and affordable water for all

**Miller Street closure
coordinated with Queen's
Hospital.
Suspected leak excavated
(April 22, 2015)**





Cause of the leak has been determined



Concrete encased sewer was resting on 2-inch piping; contact point chipped away

This caused a crack in the 2-inch elbow on water piping

2-inch copper piping leads to Air Release Valves

Corporation stop was used to isolate cracked fitting

Top of 42-inch BWS water main

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Leak on 2" Air Release Valve piping repaired by BWS



Crack in 2-inch brass elbow



Miller Street Leak by the Numbers

- Estimated flow rate of the leak approximately 15 - 30 gallons per minute (gpm)
- 30 gpm is sufficient to supply water needs of 300 people
- Retail value of one year of lost water ~\$70,000

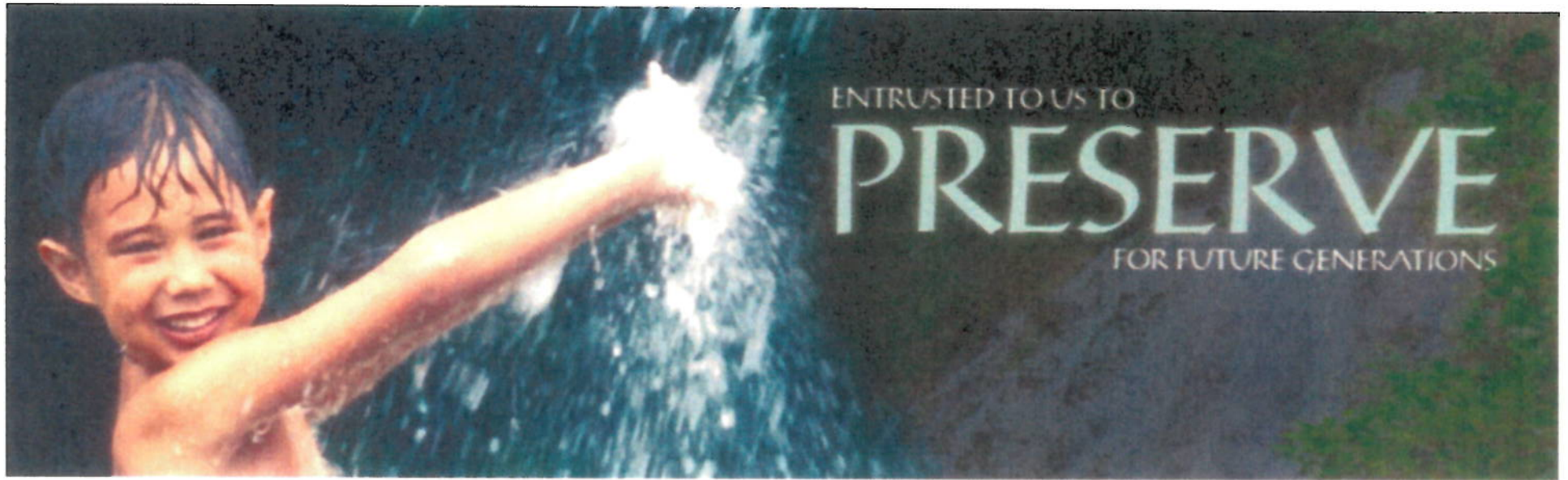


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Board of Water Supply
City and County of Honolulu



ITEM FOR INFORMATION NO. 5

"April 27, 2015

GROUNDWATER
LEVELS

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawaii 96843

Chair and Members:

Subject: Status Update of Groundwater Levels at All Index
Stations

There is one aquifer index well within low groundwater status for the production week that ended on April 11, 2015. Kaimuki is under a caution status. The weekly production average for the period was 143.78 million gallons per day.

The Board of Water Supply rainfall index for the month of March 2015 was 61 percent of normal, with a 5-month moving average of 52 percent. As of April 7, 2015, the Hawaii Drought Monitor shows abnormally dry to moderate drought conditions across north, central, southern and portions of windward Oahu.

The National Weather Service is forecasting below-normal rainfall through May 2015, associated with El Niño. Subsequently, above-normal rainfall is anticipated for July through October 2015.

Most index monitor wells exhibit mildly decreasing trends, reflecting the influences of limited rainfall and the increases in pumpage typical for this time of year.

Respectfully submitted,

/s/ ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Attachments"

The foregoing was for information only.

DISCUSSION: Water Resources Program Administrator Barry Usagawa gave the report. There were no comments or discussion.

PUMPAGE, HEAD, AND RAINFALL REPORT

Week of 4/05/15 to 4/11/15

STATION		HEAD	STATION	MGD	HEAD	STATION	MGD	HEAD		MGD	HEAD
METRO			WINDWARD			EWA-WAIAE (CONT)			PH (CONT)		
KULIOUOU	0.00					MAKAHA IV	0.00		PEARL CITY II	1.01	
WAILUPE	0.00		WAIMANALO II	0.46		MAKAHA V	0.00		PEARL CITY III	0.50	
WAIALAE-IKI	0.00		WAIMANALO III	0.43		MAKAHA VI	0.00		WAIAU	0.97	
AINA KOA	0.48		KUOU I	1.00		MAKAHA SHAFT	0.00	16.44	NEWTOWN	2.12	
AINA KOA II	0.98		KUOU II	0.10		KAMAILE	0.21		KAONOHI I	0.80	
WAIALAE SHAFT	0.00		KUOU III	0.76		WAIAE I	0.12		WAIMALU I	0.43	
MANOA II	1.66		LULUKU	1.02		WAIAE II	0.91		AIEA	0.23	
PALOLO	1.12		HAIKU	0.35		WAIAE III	0.36		AIEA GULCH 497	0.56	
KAIMUKI HIGH	3.23	23.13	IOLEKAA	0.05		MAKAKILO	0.60		AIEA GULCH 550	0.23	
KAIMUKI LOW	1.04		KAHALUU	0.49		HONOULIULI I	4.03		HALAWA 277	0.89	
WILDER	5.92		WAIHEE	0.00		HONOULIULI II	4.89		HALAWA 550	0.00	
BERETANIA HIGH	4.23		KAHANA	0.88		SUBTOTAL:		13.24	KAHUMANU MTR (-)	0.00	
BERETANIA LOW	2.90	22.69	PUNALUU I	0.00	17.35	IMPORT FROM PH			KAAMILO FLO MTR (-)	0.00	
KALIHI HIGH	2.03	22.13	PUNALUU II	0.81		KAPOLEI LINE BSTR	16.24		KUNIA I	6.21	18.62
KALIHI LOW	3.74		PUNALUU III	1.18		HONOULIULI LB FLOW	16.68		KUNIA II	1.92	
KAPALAMA	0.45		KALUANUI	0.63		EWA BEACH FLOW	4.34		KUNIA III	0.88	
KALIHI SHAFT	8.33		MAAKUA	0.21		HONOULIULI I (-)	-4.03		HOAEAE	6.53	
MOANALUA	1.26	19.09	HAUULA	0.00		HONOULIULI II (-)	-4.89		EWA SHAFT	0.00	
SUBTOTAL:		37.36				SUBTOTAL:		28.33	WAIPAHU INTCON. (-)	-4.65	
			KAHUKU	0.00					EWA-WAIAE (-)	-28.33	
IMPORT FROM PH			OPANA	1.02		PEARL HARBOR			PH LOCAL USE:	12.50	
HALAWA SHAFT	6.77	16.64	WAIALEE I	0.99		WAHIAWA	1.47		TOTAL SUBURBAN:		66.72
KAAMILO	0.00		WAIALEE II	0.36		WAHIAWA II	2.19				
KALAUAO	8.59	17.01	SUNSET BEACH	0.00		MILILANI I	3.83		KALAUAO SPRINGS	0.72	
PUNANANI	11.53		SUBTOTAL:		10.74	MILILANI II	0.00		BARBERS POINT (NP)	4.72	
KAONOHI II	0.00					MILILANI III	0.81		GLOVER TUNNEL (NP)	0.47	
WAIMALU II	0.00	15.08	WIND. EXPORT	0.14		MILILANI IV	0.77				
KAHUMANU	0.96					WAPIO HTS.	0.31		HEAD CONDITION		
HECO WAIAU	2.73		HALEIWA-WAIALUA			WAPIO HTS. I	0.24		CAUTION	ALERT	CRITICAL
MANANA	0.45		HALEIWA	0.00		WAPIO HTS. II	0.36		KAIMUKI		
KAHUMANU FLOW MT		0.00	WAIALUA	2.03		WAPIO HTS. III	1.22				
KAAMILO FLOW MTR		0.00	SUBTOTAL:		2.03	WAIPAHU	4.65	18.28			
TOTAL IMP/EXP WAIP. INT:		0.00				WAIPAHU II	1.19				
IMPORT FRM WIND:		0.14	EWA-WAIAE			WAIPAHU III	1.54				
SUBTOTAL:		31.17	MAKAHA I	0.87		WAIPAHU IV	2.22				
			MAKAHA II	0.24		PEARL CITY SHAFT	1.06	14.66			
TOTAL METRO:		68.52	MAKAHA III	1.00		PEARL CITY I	0.34				

CWRM PERMITTED USE FOR BWS POTABLE SOURCES						PUMPAGE	2015	2014	GRAVITY	2015	2014
WATER DISTRICTS	A	B	C	D	E	SUBURB.	66.72	62.64	SUBURB.	8.13	6.89
	PERMITTED		DIFF.	YEAR/	DIFF.	METRO	68.52	62.00	METRO	0.42	0.43
	USE	2015	B-A	DATE	D-A	TOTAL:	135.24	124.64	TOTAL:	8.55	7.32
HONOLULU	45.27	37.78	-7.49						Manoa	0.17	
WINDWARD	25.21	14.93	-10.28			NUUANU #5			Palolo	0.25	
NORTH SHORE	4.08	4.41	0.33			(rainfall)	1.79"	1.27"	Waim. I&II	0.08	
WAHIAWA	4.27	3.67	-0.60						Waim. III&IV	0.19	
WAIAE	4.34	4.28	-0.06						Waihee incl.	0.97	
EWA-KUNIA	15.88	9.52	-6.36						Waihee tun.	1.81	
PEARL HARBOR	92.66	72.85	-19.81						Luluku	0.08	
TOTAL:	191.71	147.44	-44.27						Haiku	0.92	
									Kahaluu	2.53	
									Waia. C&C	1.40	
									Waia plant.	0.16	

DROUGHT STATUS REPORT
DRAFT IN MGD

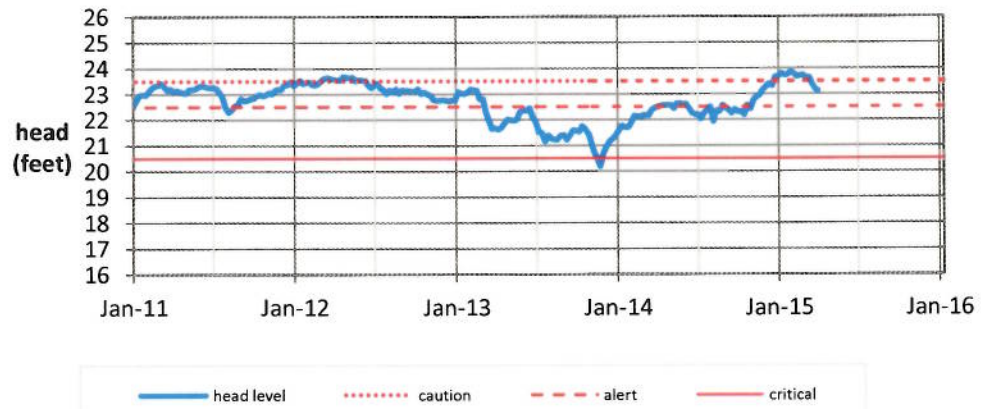
WATER USE DISTRICT	AUTHORIZED USE	2014	3/22-3/28 2015	2014	3/29-4/04 2015	2014	4/05-4/11 2015		
HONOLULU	45.27	34.73	39.05	33.04	36.58	33.66	37.92		
WINDWARD	25.21	12.14	14.53	11.49	13.61	11.95	14.79		
NORTH SHORE	4.08	3.27	4.17	3.27	4.24	3.43	4.41		
WAHIAWA	4.27	3.52	3.75	3.51	3.56	3.54	3.67		
EWA-WAIAANAE	20.22	19.02	42.13	20.28	42.32	20.65	43.13		
PEARL HARBOR	92.66	55.57	36.26	55.53	39.77	58.73	39.86		
TOTAL	191.71	128.26	139.89	127.11	140.08	131.96	143.78		

Accounts for in-district pumpage and transfers

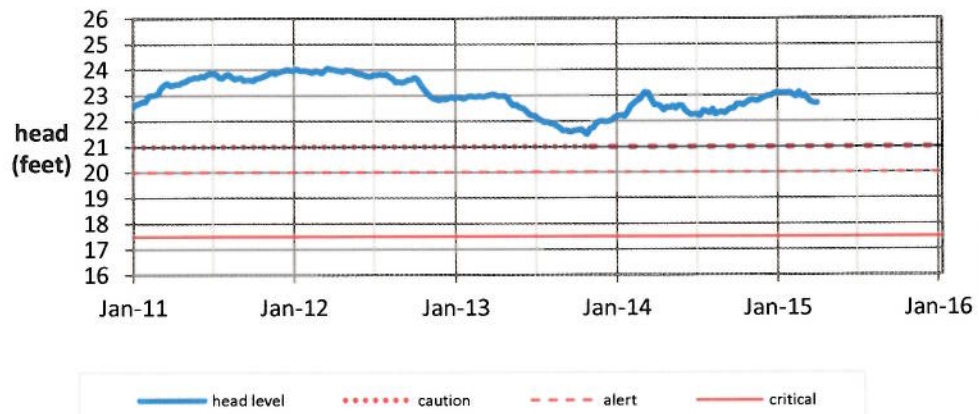
HEAD IN FEET

		2014	3/22-3/28 2015	2014	3/29-4/04 2015	2014	4/05-4/11 2015		
HONOLULU									
KAIMUKI		22.38	23.40	22.47	23.19	22.51	23.13		
BERETANIA		22.88	22.73	22.64	22.69	22.64	22.69		
KALIHI		22.43	22.15	22.37	22.13	22.30	22.13		
MOANALUA		19.23	19.28	19.25	19.20	19.18	19.09		
PEARL HARBOR									
HALAWA		16.87	16.75	16.93	16.71	16.84	16.64		
KALAUAO		17.29	17.20	17.36	17.11	17.28	17.01		
PEARL CITY		15.00	14.80	15.07	14.76	14.98	14.66		
WAIPAHU		18.65	18.37	18.70	18.34	18.60	18.28		
KUNIA		18.95	18.77	19.04	18.69	18.91	18.62		
EWA-WAIAANAE									
MAKAHA		12.39	16.41	12.55	16.42	12.70	16.44		
WINDWARD									
PUNALUU		17.76	17.62	17.88	17.39	17.94	17.35		
KALUANUI		17.66	17.37	17.68	17.24				
NORTH SHORE									
WAIALUA		11.04	11.10	11.10	11.08				

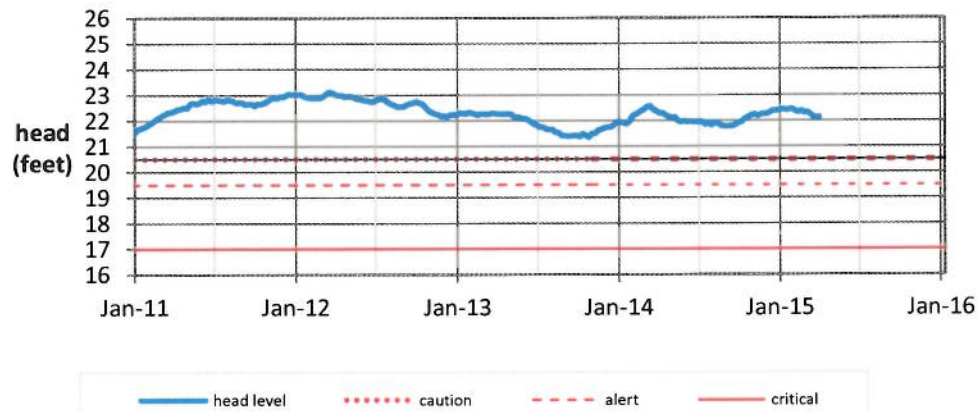
Kaimuki



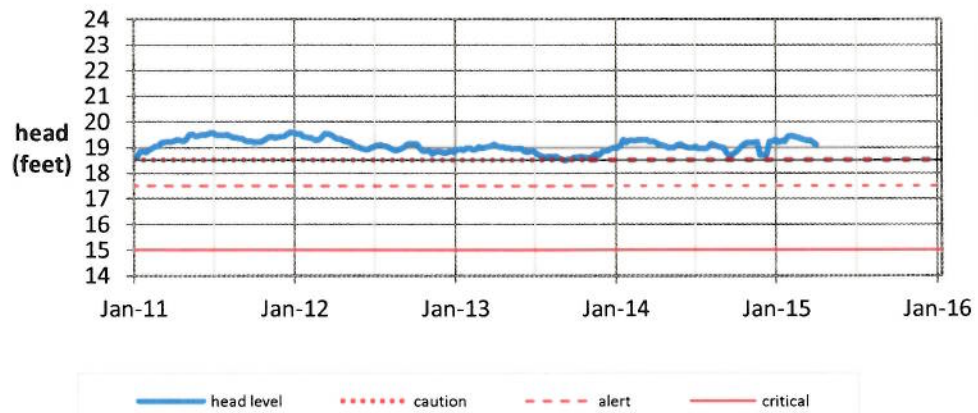
Beretania



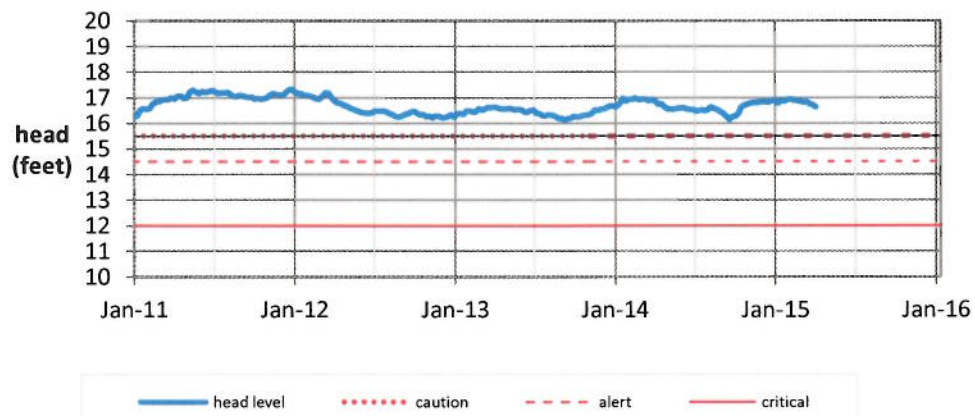
Kalihi



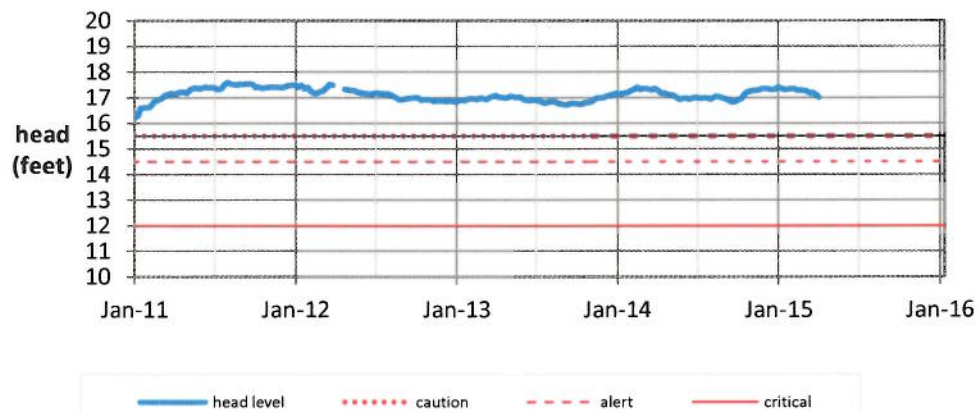
Moanalua



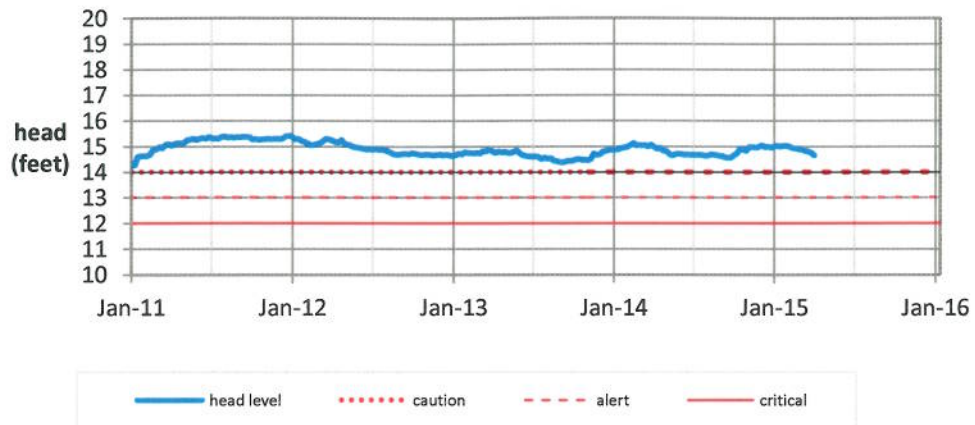
Halawa



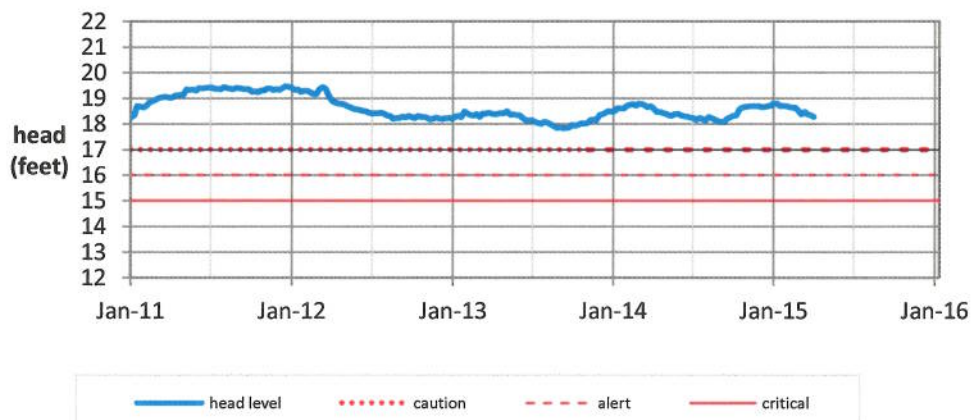
Kalauao



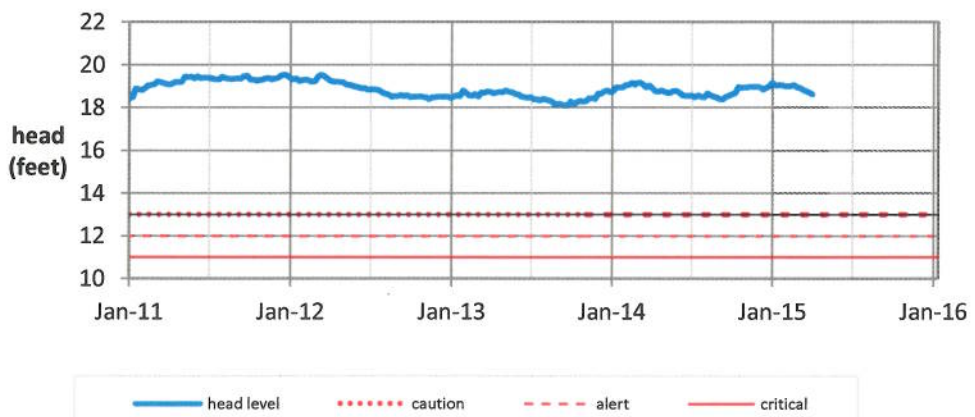
Pearl City



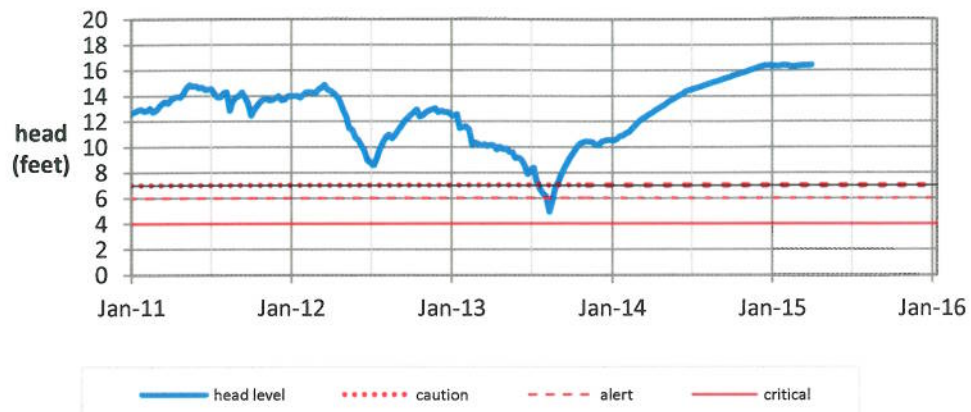
Waipahu



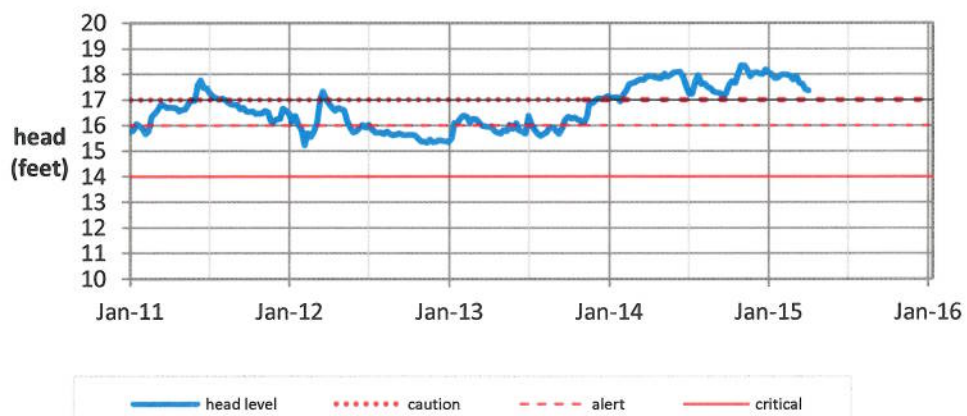
Hoeae-Kunia



Makaha



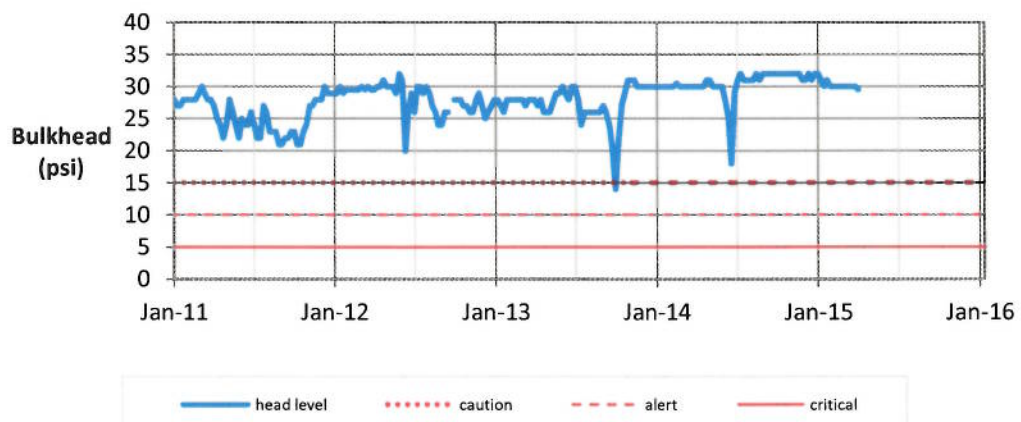
Punaluu



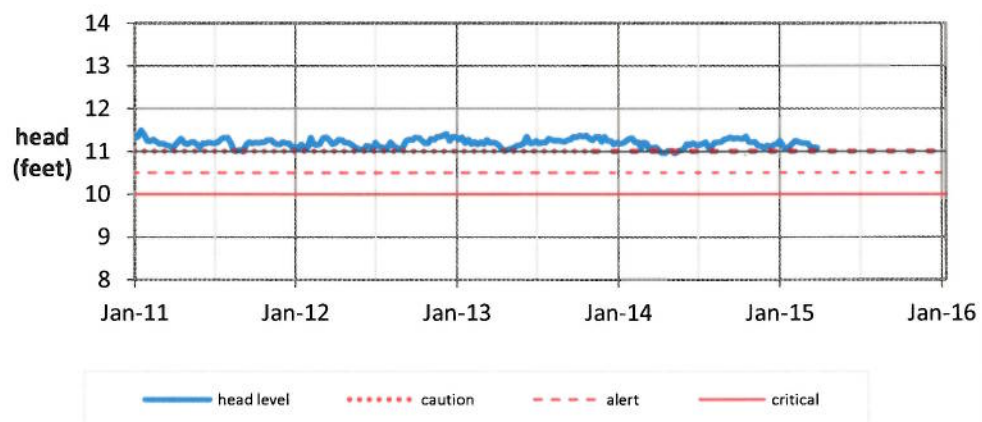
Kaluauui



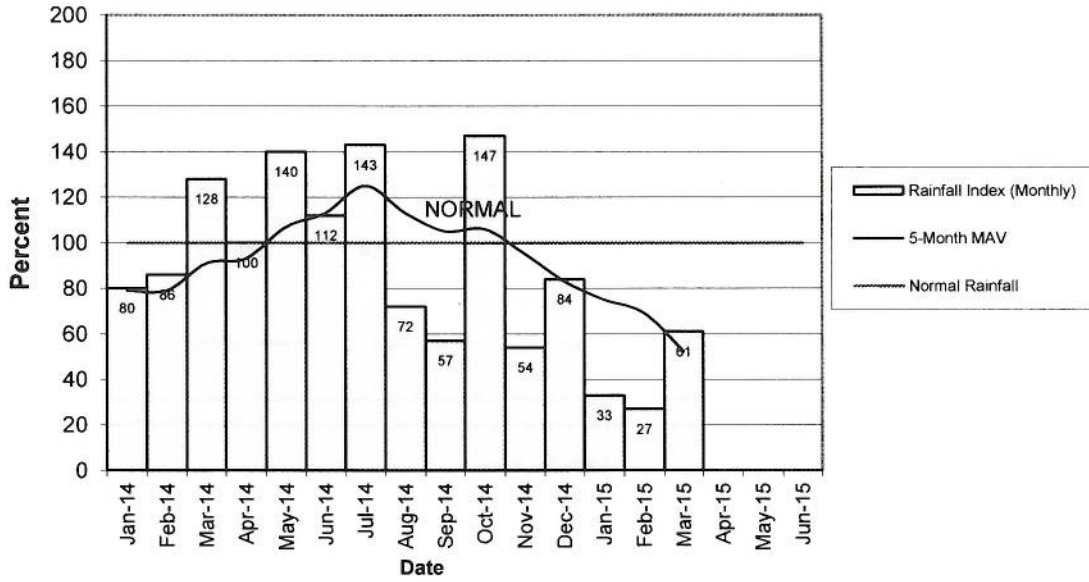
Waihee Tunnel



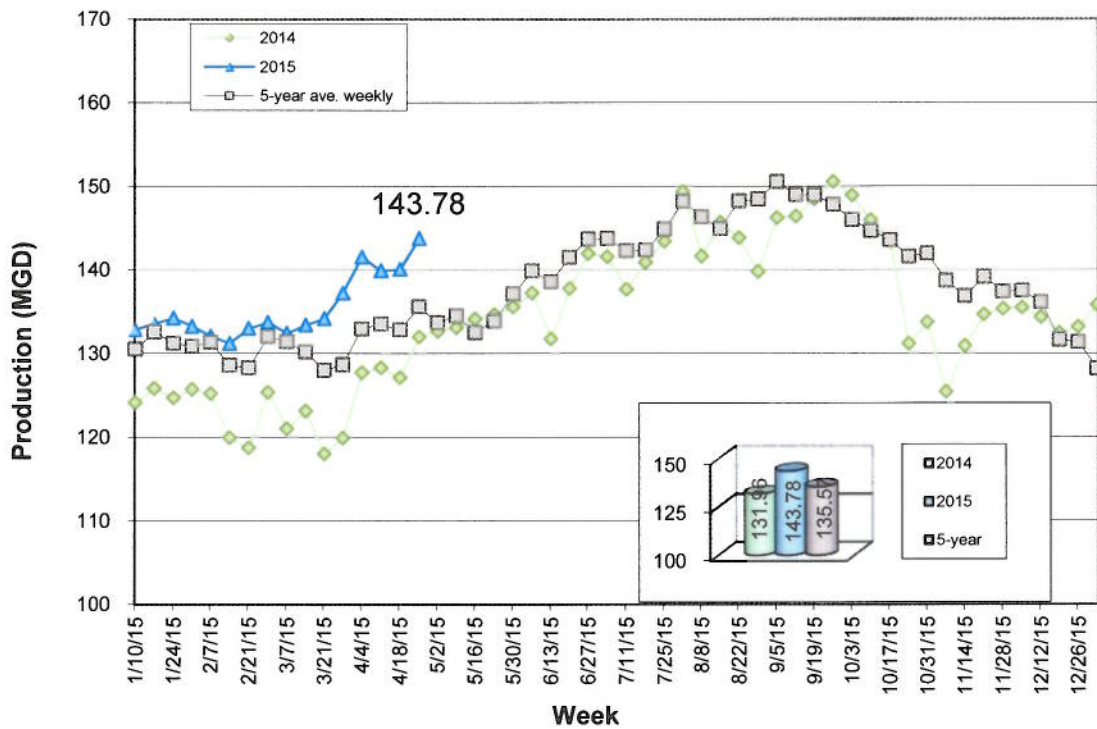
Waialua



HONOLULU WATERSHED AREA Rainfall Intake



Weekly Production



ITEM FOR INFORMATION NO. 6

"April 27, 2015

ENTERPRISE
ORGANIZATIONAL
STUDY
UPDATE

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawaii 96843

Chair and Members:

Subject: Enterprise Organizational Study Update

The Enterprise Organization Study project was advertised in January 2015 and proposals were received on March 23, 2015. The proposals are currently under review by the Selection Committee and a recommendation and selection will be completed by the end of April.

Depending on the selected consultant's status with meeting the Hawaii Compliance Express requirements for doing business in the State of Hawaii, we anticipate executing a contract and beginning work by June of this year.

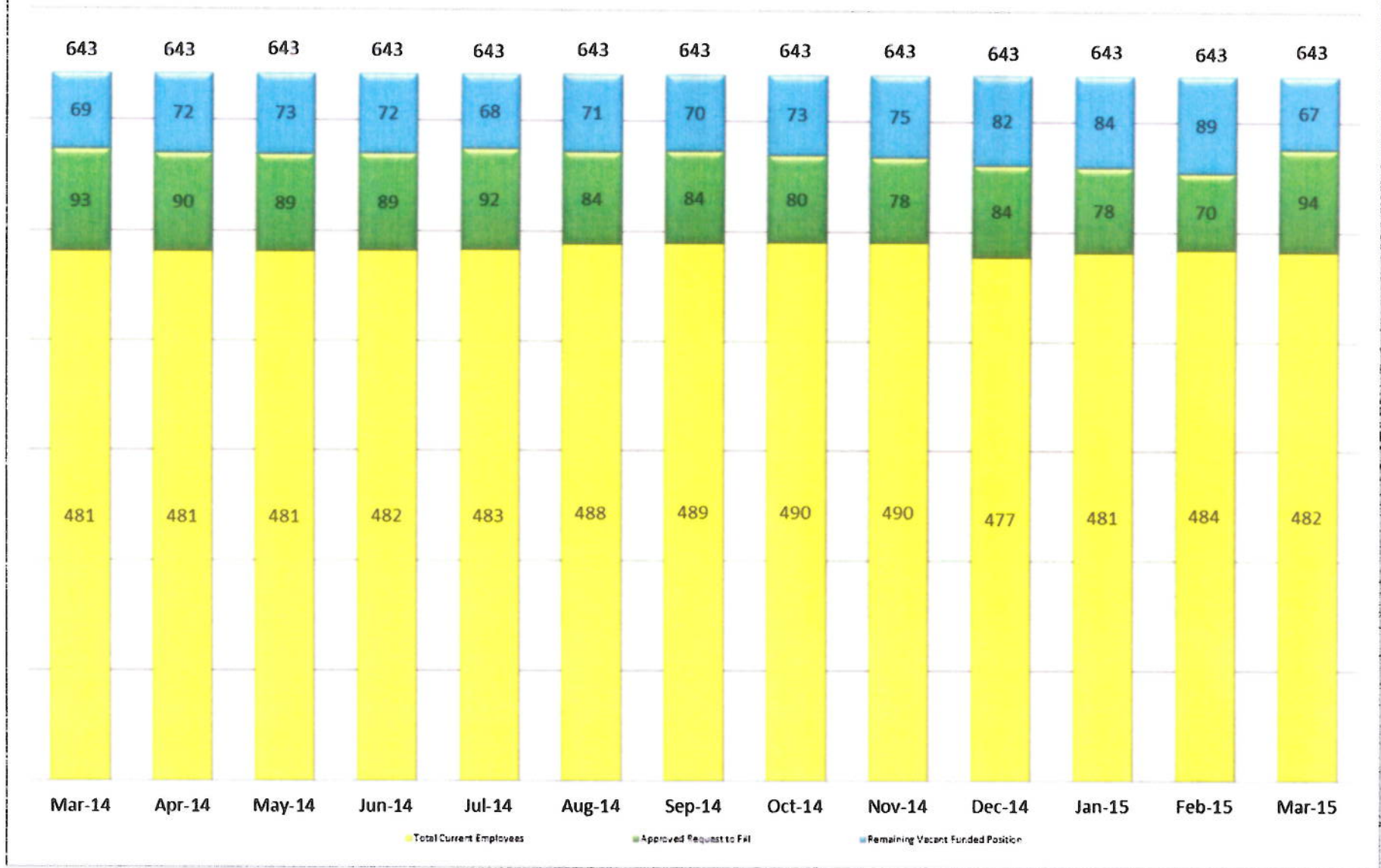
Respectfully submitted,

/s/ ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer"

The foregoing was for information only.

DISCUSSION: Mr. Lau gave the report. There were no comments or discussion.

Positions Filled March 1, 2014 through March 31, 2015



Cumulative Totals March 1, 2014 through March 31, 2015



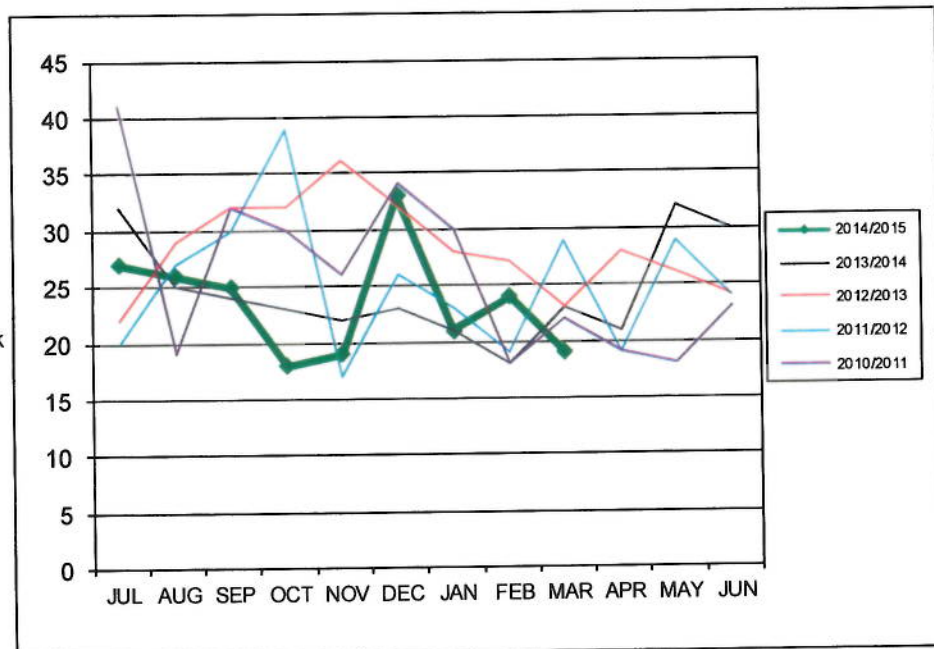
DISCUSSION: Karen Tom of the Human Resources Office gave the report. There were no comments or discussion.

ITEM FOR INFORMATION NO. 8

WATER MAIN REPAIR REPORT for March 2015

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total
2014/2015	27	26	25	18	19	33	21	24	19				212
2013/2014	32	25	24	23	22	23	21	18	23	21	32	30	294
2012/2013	22	29	32	32	36	32	28	27	23	28	26	24	339
2011/2012	20	27	30	39	17	26	23	19	29	19	29	24	302
2010/2011	41	19	32	30	26	34	30	18	22	19	18	23	312

<u>Date</u>	<u>Address</u>	<u>Size</u>	<u>Cause</u>
3/1	200 N. Vineyard Blvd.	12" C.I.	Unknown
3/4	3509 Alani Dr.	8" C.I.	Unknown
3/4	902 Puuomao Pl.	8" C.I.	Corrosion
3/4	46-219 Ahui Nani Pl.	8" C.I.	Unknown
3/5	902 Puuomao Pl.	8" C.I.	Corrosion
3/7	Laakona St. & Launahele St.	8" D.I.	Corrosion
3/7	94-405 Uanii Pl.	4" C.I.	Unknown
3/9	3120 Beaumont Woods Pl.	8" C.I.	Unknown
3/9	3345 Waialae Ave.	12" P.V.C.	Bear on Rock
3/11	3149 Beaumont Woods Pl.	8" C.I.	Corrosion
3/11	91-694 Aikanaka St.	8" A.C.	Clamp
3/11	2039 Kalia Rd.	4" C.I.	Corrosion
3/18	1029 Houghtailing St.	6" C.I.	Unknown
3/18	1527 Pualele Pl.	6" C.I.	Corrosion
3/20	98-1020 Kaonohi St.	8" C.I.	Corrosion
3/21	940 Keolu Dr.	12" A.C.	Pressure
3/25	1101 N. King St.	8" P.V.C.	Joint Failure
3/26	46-334 Kamehameha Hwy.	16" C.I.	Corrosion
3/30	86-279 Kawili St.	8" P.V.C.	Unknown



Bold * - Pro-active Leak Repair

40.16 miles of pipelines were surveyed by the Leak Detection Team in the month of March.

DISCUSSION:

Field Operations Program Administrator Daryl Hiromoto reported that there were 19 main breaks in March and mentioned a 16" break in the Windward side that had a significant impact. Mr. Hiromoto talked about the collaborative efforts of BWS and Echologics when they identified and located a leak on Miller Street. He commended BWS for finding the leak as it identifies the level of skill BWS crews possess, and it gives them confidence of their efforts. Mr. Hiromoto also commended Echologics, as they too brought value to the survey work.

There were no comments or discussion.

MOTION TO
RECESS INTO
EXECUTIVE
SESSION

Upon unanimously approved motion, the Board Recessed into Executive Session Pursuant to [HRS § 92-5] at 3:48 PM to Consult with Legal Counsel and to Consider Issues Pertaining to Matters Posted for Discussion at an Executive Session.

OPEN
SESSION

The Board reconvened in open session at 4:32 PM

MOTION TO
ADJOURN

There being no further business Chair Miyashiro at 4:33 PM called for a motion to adjourn the Open Session. David Hulihee so moved; seconded by Ross Sasamura and unanimously carried.

THE MINUTES OF THE REGULAR SESSION BOARD MEETING ON APRIL 27, 2015 WERE APPROVED AT THE MAY 26, 2015 BOARD MEETING			
	AYE	NO	COMMENT
DUANE R. MIYASHIRO	X		
ADAM C. WONG	X		
THERESIA C. MCMURDO			ABSENT
DAVID C. HULIHEE	X		
KAPUA SPROAT			ABSENT
ROSS S. SASAMURA	X		
FORD N. FUCHIGAMI	X		

Respectfully submitted,



LISA K. KIM

APPROVED:



DUANE R. MIYASHIRO
Chair of the Board

MAY 26 2015

Date