

**Honolulu Board of Water Supply
Stakeholder Advisory Group**

Meeting 29 Thursday, January 24, 2019 4:00 – 6:30 pm
Honolulu Club, Hawaiian Electric Training Rooms
932 Ward Avenue, Honolulu, HI

Meeting Notes

PURPOSE AND ORGANIZATION OF MEETING NOTES

The purpose of these notes is to provide an overview of the Board of Water Supply (BWS) Stakeholder Advisory Group meeting. They are not intended as a transcript or as minutes. Major points of the presentations are summarized herein, primarily for context. Copies of presentation materials were provided to all participants and are available on the BWS website. Participants made many comments and asked many questions during the meeting. These are paraphrased to be more concise.

ATTENDEES

There were 18 stakeholders present, in addition to BWS and CDM Smith staff and members of the public. The stakeholders represent diverse interests and communities island-wide.

The following Stakeholders Advisory Group members attended:

- | | |
|---------------------------|--------------------------------|
| Matt Bailey | Bailey Hospitality, LLC |
| Mark Fox | The Nature Conservancy, Hawaii |
| Shari Ishikawa | Hawaiian Electric Co. |
| Will Kane | Mililani Town Association |
| Bob Leinau | Resident of Council District 2 |
| Helen Nakano | Resident of Council District 5 |
| Robbie Nicholas | Resident of Council District 3 |
| Dean Okimoto | Nalo Farms |
| Christine Olah | AARP Hawaii |
| Dick Poirier | Resident of Council District 9 |
| Elizabeth Reilly | Resident of Council District 4 |
| John Reppun | KEY Project |
| Cynthia Rezentes | Resident of Council District 1 |
| Alison (Omura) Richardson | Coca-Cola Bottling Company |
| Walter Thoemmes III | Kamehameha Schools |
| Cruz Vina Jr. | Resident of Council District 8 |
| Guy Yamamoto | YHB Hawaii |
| Suzanne Young | Honolulu Board of Realtors |

WELCOME

Dave Ebersold, meeting facilitator and Vice President of CDM Smith, welcomed the group and outlined the meeting objectives:

- Introduce new stakeholders
- Receive updates regarding the BWS
- Receive informational briefing on Red Hill Bulk Fuel Storage Facility
- Hear an update on the Water Systems Facilities Charge
- Review the Water Master Plan scorecard

Dave introduced Christine Olah, who is replacing Jackie Boland as the representative of AARP Hawaii; and Walter Thoemmes III, who is representing Kamehameha Schools. Both Christine and Walter said they were happy to join the group and represent their constituencies.

PUBLIC COMMENTS

None.

ACCEPTANCE OF NOTES FROM MEETING 28

The group accepted notes from the prior meeting.

BWS UPDATES

Ernie Lau, Manager and Chief Engineer of BWS, welcomed Christine and Walter to the group and said the Stakeholder Advisory Group has provided valuable input to the BWS long term planning efforts as well as input into water rates. He added that the group is currently contributing important insights to the to the Water System Facilities Charge, just one of many areas where stakeholders are helping the BWS plan and make informed decisions.

Ernie reviewed a few of the State legislative bills under consideration and/or in progress that involve or affect BWS:

- The House is considering a bill to create a task force to oversee the Red Hill Administrative Order and Consent.
- Two bills under consideration by the Senate would require the State Department of Health to coordinate with water (e.g. Honolulu BWS) and sewage utilities (e.g., Department of Environmental Services / ENV) in its efforts to bring cesspools into compliance.
- Another bill would pursue State funding for drilling an exploratory well in the Kunia area.

Ernie then introduced Erwin Kawata to talk to the group about the status of investigations and recent actions related to the US Navy Red Hill Administrative Order and Consent (AOC).

UPDATE ON NAVY'S RED HILL BULK FUEL STORAGE FACILITY

Erwin Kawata, BWS Water Quality Division Program Administrator, told the group that he would talk about the condition of the Red Hill Bulk Fuel Storage tanks, and what the US Navy thinks is happening with groundwater flow direction.

Erwin said Oahu's water comes from an aquifer that cannot be replaced and is a resource that needs to be protected. The aquifer is one continuous formation. All of the water exists within

cracks and crevices, underground in underlying rock. The entire aquifer is hydraulically connected; water is always moving through it. The aquifer's water level gives an indication of how good this resource is for providing water now and sustainably into the future.

One of the most important things to BWS is understanding the direction of groundwater flow within the area of the bulk fuel storage tanks. BWS's concern is: *Could that groundwater potentially carry contamination from the tanks to neighboring wells?*

The Red Hill facility tanks are located about 3½ miles east of Pearl Harbor. Erwin showed an aerial photo and pointed out where the tanks are located. He pointed out the Red Hill shaft that is the Navy's water supply, and the Halawa shaft that is so important to the BWS water supply. He also pointed out the location of the Moanalua wells to the south. Together, these wells provide 25 percent of the water served to our metropolitan water systems and all the way to Hawaii Kai – a significant amount of water that is served to a very large population.

Erwin said the ground water table sits about 20 feet above sea level and the distance from the bottom of the tanks to the top of the water table is just 100 feet. That is one of the reasons why the BWS is so concerned. Each tank has 12.5 million gallons of capacity. Fifteen of the 20 tanks are filled with fuel all of the time – 187 million gallons of fuel concentrated in this one place. The volume of fuel stored in this one place is more than the total amount of water that BWS serves daily across the island.

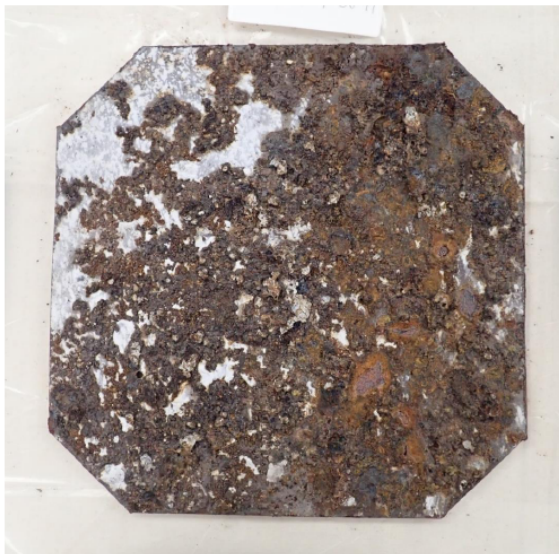
The tanks were built from 1940 to 1943. Each tank is 250 feet high. Inside each tank is a 0.25” steel liner. The outside of the tanks is concrete. The tanks are buried inside of rock. When the tanks were originally built, the steel was installed first, and then concrete was poured behind it. Concrete shrinks over time. The tank can expand and contract from the sheer weight of the fuel it holds, and a separation can form between the steel liner and the concrete. Rainwater can seep into the separation. When water comes in contact with steel, rust can form. Rust develops from the outside and can turn into a hole that penetrates the steel liner and allows fuel to release into the environment. The Navy has recorded petroleum contaminants (chemicals) inside the groundwater and in the rocks underneath the tanks.

In response to the fuel leak that occurred in 2014, regulatory agencies and the Navy came together and developed the Red Hill Administrative Order on Consent (AOC). It is an agreement that directs the Navy to study the tanks in different areas to understand:

- What is the condition of the tanks?
- What happens to fuel that leaks into the environment?
- What direction is the groundwater flowing?
- What is the potential and risk of something really bad happening?

Of major interest is the condition of the tanks. The Navy took samples from one of the tanks and had them analyzed. BWS has reviewed them. See below for a photo of a sample from one tank's steel liner.

(Coupon #7) Barrel – back side

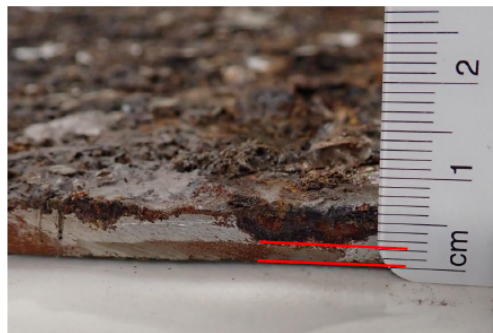


NDE Predictions:

- Minimum remaining thickness: 0.135" to 0.187"

June 25th Observations:

- Apparent remaining thickness: 2mm = 0.079"



Erwin explained that the liners started off as 0.25" thick, but in this sample, it was found that rust had reduced the thickness to 2 millimeters (0.079"). The Navy uses a scanning technique to try to determine where they need to repair. In the sample shown above, the scanning technique gave a "NDE prediction" of minimum remaining thickness of "0.135 to 0.187", but what was actually measured in that same sample was much less (0.079"). This was just one sample and the impacts of rust can vary. There were 10 samples collected, and it was found that half had corrosion that was more than what was originally anticipated. The backside of some had very dark stains that looked like hydrocarbon or petroleum.

One of the BWS's main concerns is that the Navy's current way of trying to figure out where to make repairs could be underestimating the situation. Erwin explained how tanks are being repaired: find a hole, put a patch on it, and weld the patch onto the tank. Based on the sheer size of a tank, it's statistically impossible to find every spot that needs to be repaired. Missing a place that needs to be repaired could lead to leaking fuel into the environment and then accumulating in the groundwater.

Erwin said the steel liner is the only thing that keeps the fuel from getting into the environment. If something is happening to the steel liners, then the BWS's concern is that the tanks could be leaking without us knowing. The Navy has said that the only time that leaks ever occurred was in 2014. But the Navy's own records show that there have been releases in the past dating back to 1940s, up through the 1980s.

Part of the Red Hill AOC was a requirement to look at different ways of improving or upgrading these tanks. Erwin said the detailed information about improvement/upgrade options (see next page) reflects what the Navy shared at a community meeting.

TUA	Description	ROM cost per Tank (\$M)	Number of Tanks (% capacity)	Project End Date	Years to Complete	Cost per Year (\$M)
1A	Restoration of Existing Tank	10 – 25	18 (100%)	2031	12	15 – 38
1B	Restoration of Existing Tank + Coating	25 – 100	18 (100%)	2037	18	38 – 100
1D	Remove existing liner, Install New Steel Liner	100 – 250	18 (100%)	2038	19	95 – 237
2A	Composite Tank (Double wall) Carbon Steel	25 – 100	20 (88%)	2040	21	24 – 95
2B	Composite Tank (Double wall) Stainless Steel	100 – 250	20 (88%)	2037	18	111 – 278
3A	Tank within a tank (Carbon Steel)	100 – 250	20 (80%)	2038	19	105 – 263
Alt	New Tanks	100 - 250	40 (100%)	2051	32	125 – 312

The first option (1A) is the existing way of patching the steel liners described earlier. Option 3A is the “tank within the tank”, secondary containment. The Navy also looked at an alternative location to put new tanks (Alt).

The Navy said the leaks in 2014 occurred because of human error and not from repairing the tank improperly. Leak detection measures what has already been released. Unfortunately, it doesn't prevent leaking. From the BWS's standpoint, the best way to contain leakage is to have secondary containment. Secondary containment is a “tank within the tank” with a space in between that catches and contains any leaks, preventing any fuel or liquid from getting directly into the environment.

Erwin told the group that, in August of last year, the Navy said that their preferred tank upgrade option is to keep doing what they're doing (1A). BWS has some concerns about that.

- That decision relies on information or studies that still being developed.
- The analysis of the coupons (samples) is not done. A laboratory report was made available in November, but BWS hasn't had a chance to see it.
- Some groundwater flow reports contain information that doesn't match what was measured in the field.

The BWS is trying to understand the direction of groundwater flow in the area of the tanks. For the most part, the direction of groundwater flow is from mountain to the sea. But, is some flow also going across the valley? A groundwater model is used to study this. A model is essentially a computer program that helps to describe what's happening in nature, much like a hurricane model that predicts the path and intensity of a storm.

The Navy reported modeling results in July 2018 that claimed as much as 700,000 gallons could leak into the environment and not impact the groundwater. The Navy's report also stated that all of the groundwater flows from the mountains to the sea. But BWS conducted aquifer tests to see if there were any indications of groundwater flow across the valley. Erwin said that, to test that question, the BWS pumped our wells at very high rates and watched what happened to water levels. Water levels in wells one side of the valley fell when we pumped very hard on

the wells on the opposite side. That indicates that there's some groundwater communication flowing across the valley, not just from the mountains directly to the sea. The field tests also demonstrate that, potentially, contamination from the Navy's fuel storage tanks could move toward BWS's water source.

Modeling is an important tool that the Navy is using to help guide decisions about tank upgrade alternatives. At a minimum, a model has to be able to predict what is observed in real time in the field. If it cannot do that, the model is not calibrated. The Navy's field measurements of water levels in its monitoring wells are shown in yellow in the chart on the next page. The blue line in the chart shows what the Navy's groundwater flow model predicts. When the model is not calibrated, as appears to be the case at Red Hill, it can misinform the conclusions being made. As the Navy is drawing some very important conclusions, it is relying on a model that is faulty and has technical problems that BWS and the regulatory agencies are concerned about.

BWS Review – GW Flow – cont.

Navy Interim GW model calculation of groundwater levels at Navy monitoring wells (blue line) does not match with measurements collected in the field (yellow line)

BWS: Lack of correlation between observed and model simulation means the model is not calibrated. This is a fundamental requirement of a good model and it's ability to produce reliable results. DOH and EPA share this same concern.

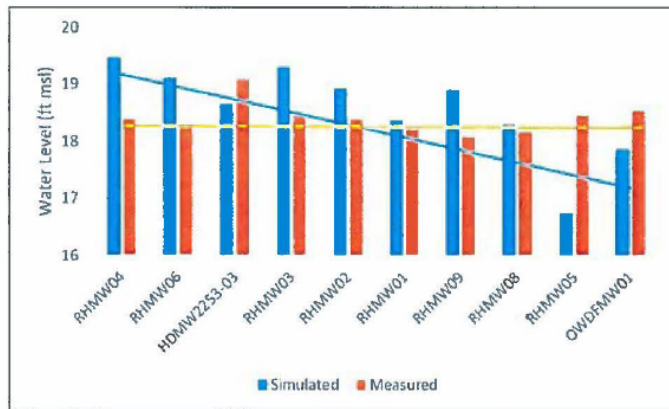


Figure 1. A comparison of the simulated and measured groundwater elevations in the RHMW. RHMW07 is excluded from this graph since the water level in this well is very anomalous. The Red Hill Shaft (2254-01) is also excluded due to questions about the top of casing reference. Ref. Hawaii Department of Health memorandum to G. Fenix Grange from Robert Whittier re: Comments on the Progress of the Red Hill Groundwater Flow Model, February 20, 2018.

∴ Model not calibrated.

Erwin said the bottom line is that the Navy's fuel storage facility was built in the 1940s and its tanks continue to rust. A large volume of fuel is stored in this aging facility that sits just 100 feet above the aquifer. This condition poses unacceptable risk to our groundwater.

Q: How can the Navy say the groundwater system could handle 700,000 gallons of fuel leakage without impact? How could that possibly be substantiated?

A: We have some very significant concerns about the Navy's model and we've expressed them to the regulatory agencies. We think the regulatory agencies are going to have to direct the Navy to redo the model to predict what's happening in nature. But from our standpoint, any amount of fuel that leaks into the environment is unacceptable.

Q: What about the US EPA and other federal agencies that might want to be involved in this?

A: The US EPA, Hawaii State Department of Health (DOH), and the US Navy Defense Logistics Agency are the parties of the AOC. EPA and DOH are serving as the regulatory agencies that oversee the Navy's work related to the AOC. BWS participates as a subject matter expert and provides comments about work products coming out of the AOC process.

Q: What are the other alternative sites for relocating the tanks?

A: Alternative sites include land in the Pearl Harbor area that sits over the cap rock. BWS thinks that area is much better suited than Red Hill. The major reason why the Navy wants to keep the tanks where they are now is that they are underground and protected from attack. The Navy also likes gravity feed from the tanks. We've suggested that the Navy diversify some of their fuel storage, possibly through partnerships with the private sector.

Q: If new tanks were built on alternative sites that are over cap rock, could they still be underground?

A: Land over cap rock is almost at sea level, making it very difficult to build tanks like these underground. The best practice these days is to move away from underground storage tanks. It's hard to maintain tanks that are underground. Tanks this large should be above ground.

Comment: It would be great for more people to have access to this presentation. It probably should go to every single Neighborhood Board on the island. The information needs to be put out there to mount a really strong public concern. We can fight over developments, but this is about whether we survive here on this island at all with water.

A: The BWS knows that we have an irreplaceable resource to protect and we should leave this resource for future generations in a better condition than we got.

Q: What happens with monitoring when the federal government shuts down?

A: EPA was furloughed, so there was no forward movement during the government shut down in January 2019. The Navy was still working, but nothing was happening related to the AOC.

Comment: If the Navy double lined the tanks, would the BWS look at that as having your concerns resolved and back off? I can understand why the Navy wants to continue having tanks underground, especially when the climate is significantly changing and we get threats of hurricanes. Above ground tanks of this size could become a challenge in a hurricane.

A: Originally, BWS wanted to have these tanks relocated. But we understand the Navy's need for the fuel, and appreciate some of their concerns. From our standpoint, secondary containment is a compromise that provides more protection and minimizes the threat. We would be much more comfortable having secondary containment than single wall tanks.

Comment: The ideal solution that puts the aquifer at no risk would be relocating the fuel storage facility to the coastal areas over the cap rock. I recognize that the Navy has its mission and requirements. Secondary containment is probably a compromise, better than just a single-

wall 0.25” steel plate that was installed 75 years ago. Keeping the tanks single-wall is really unacceptable to us because we now have physical evidence of rust on the outside of that steel plate. It’s a matter of time before a disaster happens. There will be more frequent and perhaps even larger leaks, because with corrosion, the rusting process doesn't stop.

Comment: In the beginning, these tanks were built in secret, but they are not a secret anymore. They were declassified in 1995. It's all over the Internet now. There were good reasons to have the tanks underground in the 1940s, but with the technology and weapons of today, I'm sure they can be penetrated if attacked.

Comment: Why is the Navy’s Red Hill facility significantly different from a local gas station that is required to double-line their fuel storage tank? I think that a lot of them went out of business because they didn't have the bells and whistles for sniffing out a leak and having tests done every year, etc. They had to double-wall the tanks and heaven help if they got a leak. They’d have to exhume the soil, ship it to the mainland, and pay fines.

A: Ernie said that, up until recently, the Navy’s fuel tanks were actually exempt from the regulations. That was the basis for the Sierra Club’s lawsuit – that the State DOH was exempting the Navy from the underground storage tank rules that the small corner gas station had to meet. The judge agreed and required the DOH to revise their rules and take away that exemption.

Ernie reviewed a table of seven alternatives being considered for improving or upgrading the tanks (see page 5). The Navy prefers options that basically keep the status quo. The cost per tank of the cheapest option is \$10 to \$25 million. The cost per year of this cheapest option would be about \$15 – \$38 million, and to patch all of the tanks would take about 12 years. The Navy’s Defense Logistics Agency owns the fuel in these tanks, and it is likely that they can easily fund that amount per year. In August of last year, even before making a recommendation to the EPA and DOH under the AOC, the Navy disclosed that the cheapest option, 1A, is their preference.

Ernie acknowledged that the options of double-wall tanks or tanks within tanks are more expensive – about \$100 – \$250 million per tank. Capacity would decrease by about 20 percent and the upgrade work would take more time, up to 19 years compared to 12 years to complete option 1A. The tank within a tank option 3A would cost around \$105 – \$263 million per year. However, if the Navy spread the costs over the 19 years, the annual appropriation needed would be much more manageable.

Ernie said he thinks that once the federal government shutdown ends, the Navy will formally put in their recommendation for 1A. If there's a disagreement among the three parties, that dispute will be resolved by the US EPA and not the state of Hawaii, per the AOC. He said that he has recently had discussions with the Interim Director of the DOH, Dr. Bruce Anderson. Dr. Anderson has stated, *for the long-term*, the fuel tanks at Red Hill eventually need to move. He understands that whatever you put in the ground is eventually going to reach the water.

Ernie explained that when the State signed the AOC, it gave up the right to veto solutions. He said that as he mentioned earlier in the BWS Updates, the State Legislature is currently considering a bill to create an oversight task force, led by the governor or his appointee. With this new oversight task force, the AOC process would be more transparent. The bill being

considered would also relax some of the criteria related to upgrades; it proposes to delete the requirement that there would be no more leaks after upgrades to the tanks.

Q: What's the role of the State Commission on Water Resource Management (CWRM) in this? Why couldn't the Commission on Water Resource Management be that oversight?

A: Ernie said that, under the State Water Code, it would seem that the CWRM has responsibility to not only regulate how much is being used from a resource, but also to protect it from risks like this to keep the public trust resource available for use for the people of Hawaii by preventing further contamination. He said that the DOH Director is a member of the CWRM and is attending those meetings.

Q: Where are our elected representatives on this issue? Are they being kept informed?

A: Ernie said that the BWS tries to keep them informed. Congresswoman Tulsi Gabbard is supportive of BWS's position. Congressman Ed Case realizes the seriousness of the situation, but he's also trying to better understand the pros and cons of both sides.

Comment: Elizabeth Reilly said she would be glad to arrange for more conversation between Congressman Case and BWS.

A: Ernie said BWS would appreciate that help.

Comment: If really bad contamination from the Navy's fuel storage happens, the problem is going to be BWS's responsibility to solve. What are you going to do for water? You should talk about that a lot. People will get scared hearing about it, but with the possibility of such risk to so much of our water resources, the downside has to be front and center. If it isn't part of the conversation, people aren't going to realize that risk is out there.

A: Ernie agreed, and added the President has the ability to exempt environmental regulations for military facilities, one year at a time.

Comment: We're talking about the State Department of Health and the US EPA. EPA only allows the State certain powers that it designates to the State. If EPA doesn't want to designate this or listen to the State, it doesn't have to. A classic example is landfills. EPA designates to the states the permitting and licensing. But if rubber meets the road, EPA can pull all that back and put it under its own jurisdiction, and then the State would not be involved in licensing and permitting. I think this is the same thing. One thing that everybody needs to understand is that with EPA being part of the AOC, even though the DOH is part of it also, EPA has a stronger voice because it can pull things back. This is going to be a balancing act, especially with this administration.

A: Ernie said that, currently, the federal underground storage tank regulations come from the EPA. The State DOH is delegated to administer those regulations. That's called primacy and is similar to how the State of Hawaii handles the Safe Drinking Water Act. But, the EPA could pull that back. He said BWS monitors informational briefings of Committees of the Legislature.

SCORECARD UPDATE -- IMPLEMENTATION OF THE WATER MASTER PLAN

Barry Usagawa, BWS Water Resources Program Administrator, said as part of the Water Master Plan, we identified metrics for the water system and water resources. We created a scorecard and report our progress annually. Barry said progress has been made in some areas and not in others, but the main point is to know what we need to work on as we try to achieve our goals.

The scorecard summary is based on six functions of how we provide water. The indicators include financial, operational capacity, structural and management goals. The metrics are quantifiable. We use colors to indicate our current state. Green indicates we are on track. Yellow indicates we are missing the goal by 10 percent or less. Red indicates we are missing a goal by more than 10 percent. The scorecard includes metrics from the Strategic Plan and the Water Master Plan, to report progress to the BWS Board. Below are highlights of scorecard results:

Sustainable Water Supply

- The BWS is on track to meet the goal of providing at least 12 percent of total water supply using non-potable sources. Increases accomplished in 2018 were largely from non-residential customers using more demineralized recycled water. As Ewa grows, recycled water use will continue to increase.
- The metric for annual water resource yield is to pump less than 90 percent of the total permitted yield. BWS pumped 72 percent of the available supply in 2018, well under 90 percent.
- The three metrics for watershed management are: 1) money budgeted for watershed management, 2) acres of watershed that are surveyed for invasive plants, 3) and area protected by fencing. BWS is continuing to increase funding for watershed management with a goal of spending an amount of money equal to 4 percent of our Capital Improvement Plan (CIP) (\$3.3 million in 2016). The watershed protection budget started at \$1.4 million and that has increased to \$1.8 million in 2018. It will take time to build the capacity to effectively spend the money on projects that are worthwhile. Acres of watershed surveyed went up considerably in 2018. Fencing is rated as red, but that is tied to fencing projects that protect important watershed areas, so this metric will go up and down over time.
- The metrics for the conservation program are funding and per-capita demand. The funding goal is similar to watershed management – 4 percent of the CIP. As of last year, the budget increased to \$1.5 million of funding for our rebate programs. Currently, BWS offers a \$40 rebate for rain barrels and \$75 for a front-loading washer. BWS will offer rebates for weather-based irrigation controllers and is investigating a program for sub-meters so people can see how much water they use for irrigation, including agriculture customers. Per-capita consumption is the total amount of water produced divided by the number of people served by BWS. Until the next census, the BWS will not have an accurate accounting of how many people we serve. The per-capita projection is currently 155 gallons per day, a green rating.

Capture Metrics

- Standby source capacity, water levels in index wells, and permitted or sustainable yields were all rated green. BWS is providing ample standby source capacity to meet the

maximum day demand, maintaining stable water levels, and never exceeded the total permitted yield in 2018.

Treatment and Water Quality Metrics

- Water quality compliance is excellent, with treatment all online.

Pumping and Other Move Metrics

- Pumping capacity is rated green. The target is 90 percent of pumps available for use. We pump 145 million gallons on average, and we have about 425 million gallons of pumping capacity. We need more standby capacity because when the pumps go down they take a year to repair. We want to ensure that we have enough standby capacity to meet all the pumping demands, so these are rated yellow.
- The emergency power metric was rated red. However, BWS has about five generators that are in planning or under construction. One was just completed at Beretania. When these come online, the current rating will change. A lot of these metrics are tied to construction projects and those take several years to build.

Pipelines and Other Deliver Metrics

- Pipeline breaks have two metrics: Number of breaks per 100 miles of pipeline and number of breaks or leaks repaired annually. A three-year average helps to identify long-term trends. The BWS's goal is 300 or fewer breaks per year. We had 331 in 2018. Reducing this number is tied to progress of replacing pipelines. As BWS replaces the pipes identified as high priority, the number of main breaks should start to decrease. The metric for transmission pipeline breaks is fewer than 14. In 2018, there were 13.
- Non-revenue water is a combination of water loss and meter calibration. A loss of 8.1 percent or less is our target, based on an AWWA benchmarking survey in 2017. The amount of water pumped but not sold (non-revenue) was calculated at 7.4 percent in 2017. We don't have the data to calculate a percentage for 2018 yet.
- The target for replacing pipelines is 21 miles per year. In the last couple of years, the BWS budgeted six to eight miles of pipeline replacement construction projects. Measuring just what is in the ground, completed and online, the numbers seem lower, at around three miles. This is one of the critical metrics we're monitoring. Construction takes five to seven years to get through planning, design and construction.

Barry said that the goal has been to ramp up to replacing 21 miles per year within 10 years. But because of the length of time needed for design and construction, it's going to take 13 years to actually get that rate of pipelines in the ground and in service. He said the predictive model of main breaks shows that as BWS works to plan and implement pipeline replacement, main breaks will start to decrease below 300 per year. If BWS replaced no pipes, the number of breaks would be up at 500 per year by 2035, which would be totally unacceptable.

Q: You talked about non-revenue loss connected with leak detection. Is there any intrusion?

A: There is no intrusion because water in the pipeline is under internal pressure.

Q: When you talked about water quality meeting standards, I would think that some of the wells would be better or worse than other wells. How is this metric scored if one well doesn't fare as well as the others?

A: That metric is based on the number of water quality violations. Constituents fluctuate in the source wells, and certain sources have more than others. This metric is based on whether or not the Safe Drinking Water Act is violated, and none of our wells were in violation.

Q: Pipeline replacement is ramping up to achieve 21 miles per year. There's a big jump from 3 miles in 2018 to 21 miles in 13 years. I know manpower was a concern. Do you folks have enough people to do what's needed? Are you contracting it out or have you hired people to be able to meet the forecasted goal of five miles of pipe in 2019? Do you have the resources for engineering to get the packages out and get it constructed?

A: Ernie said that BWS is looking at staffing in other areas, making sure that we don't have any bottlenecks in functions like in contracting and procurement. He said having enough resources to meet the annual goal of 21 miles of pipelines replaced is a combination of human resources, more efficiency in how we do the work, and also use of consultant support until we build internal capacity. If you look at the next 10 years or so, we have to sustain staffing at a high rate.

Comment: That was just one of my concerns. I know when we asked about staffing capacity in earlier meetings, that was one of your reservations. In ramping up construction, you might at some point find conditions like the crews are stepping on each other, or working on the same street as other projects, or you can't get the permits. There are all those factors. I hope you bring it back up to the group, because I know staffing is going to be a challenge.

UPDATE ON OUTREACH TO AG AGENCIES AND FARMERS

Dave and Barry updated stakeholders on recent outreach and information gathering to help guide the development of a new Water System Facilities Charge (WSFC) for agriculture customers. Dave reviewed background information that had been presented to the Stakeholder Advisory Group at prior meetings. The WSFC is a one-time charge, based on meter-size, paid when a customer makes a connection to the BWS water system for the first time. The purpose of the WSFC is to:

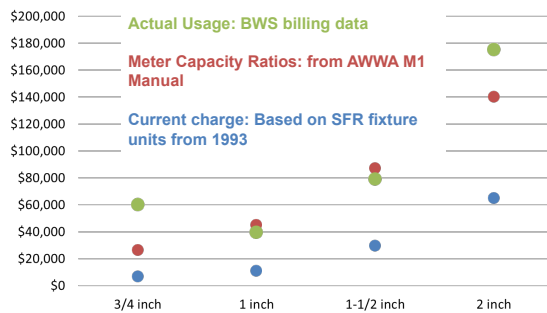
- Fund growth-related capacity expansions to the water system
- Equitably recover earlier investments in oversizing the system

Some system elements need to be upsized over the years so they are constructed with that larger capacity and that costs more money upfront. The WSFC helps to equitably recover that money. The WSFC can also be charged if and when a customer buys a larger meter for additional capacity from the system. As long as a meter stays in place and does not need to be upsized, there's no additional WSFC. The WSFC applies to the backbone of the system that is shared by all customers. The methodology for setting and administering the WSFC comes from the American Water Works Association's (AWWA) M-1 manual; this is the methodology that BWS is following.

Dave said the BWS’s current WSFC was established in 1993 and that water use patterns have changed since then. As BWS was updating the water rates, they recognized it would also be appropriate to analyze the WSFC and determine what changes were needed.

Dave told the group that the BWS is particularly focused on how the agricultural customers might be impacted. The average agricultural customer on Oahu uses about 6,000 gallons of water a day, which is more water than half of the single-family residences on island use in an entire month. Ag customers use 2.5 percent of the water but only make up 0.3 percent of BWS’s customers. BWS is sensitive to the fact that adjusting the charge to reflect that capacity usage could mean a substantial charge for new Ag customers connecting to the system for the first time. This is why so much effort is going into setting the new WSFC rate.

Comparison of WSFC options for Ag



Dave said that stakeholders have given consistent feedback at previous meetings, encouraging BWS to outreach to farmers and Ag agencies before raising the WSFC. BWS listened to them and has taken that advice. Stakeholders said that going to the full cost of the WSFC all at once was too high, and that there should be an extensive effort to identify potential ways to both reduce the charge and conserve water. Dave said that BWS has been very busy following up with agricultural agencies and meeting with local farmers.

Barry thanked the Stakeholder Advisory Group for their input that having access to fresh local produce is an island-wide benefit. To support local agriculture and our health, BWS is looking at ways to justify setting a more affordable impact fee (WSFC) for new farmers connecting to the system. About 10 new Ag customers connect to the BWS system each year. Barry reminded the stakeholders that current BWS Ag customers already have water meters and will not be affected by the charge. Most of the large farms on the island get water through their own large private wells, or use surface water from sources like the Waiahole ditch. BWS provides potable water for farms in the North Shore, Waimanalo, and Waianae.

The BWS is taking a strategic approach to keep fees affordable for new farmers by possibly requiring them to submit a water use plan as part of applying for a meter. Water use plans would help accomplish the following objectives:

- Ensure that farmers know how much water they should be using per acre.

- Right-size the meter to limit wasteful water use. Smaller meters cost less.
- Create an education program so farmers learn more about ways to conserve water.
- Develop and implement conservation incentives for farmers to discount submeters, weather-based irrigation controllers, soil moisture sensors, etc. BWS would allow water bills to be adjusted if leaks were detected and repaired.
- Obtain State assistance to develop new water sources to buy down impact fees directly benefitting farmers.

A water use plan would help determine an appropriate amount of water as a goal, based on the number of acres in irrigation, types of crops grown, and soil conditions. Such a plan would be required when new farmers buy their meters and connect to the BWS system. If farmers buy the largest meters, they pay the highest costs. Water use plans will help inform Ag customers that they could comfortably manage with smaller meters and pay half the costs. Right-sizing water meters will help customers limit wasteful water use.

Barry explained the importance of conservation tools like submeters to help determine water loss. Weather-based irrigation controllers and soil moisture sensors can help farmers to operate their automatic irrigation systems more efficiently. Expanding our conservation programs to incentivize Ag to use less water will give BWS a stronger platform to ask the State for funding for new wells. The outside funding would help the BWS to offset the costs of the WSFC, especially if those new sources directly benefited farmers.

Barry told the group that BWS met with four agencies and groups since the last stakeholder meeting. He met with the Agribusiness Development Corp. (ADC) in December, and the State Department of Agriculture (HDOA), University of Hawaii College of Tropical Agriculture and Human Resources (CTAHR), and Hawaii Kai farmers in January. At each of those meetings, he discussed the Ag WSFC and strategy of requiring water use plans.

Barry told the group that the purpose of these recent meetings was to look at opportunities and barriers for implementing the Ag water use plan, determine conservation measures that farmers can use, and tools needed to assist and incentivize Ag customers to use water efficiently. They discussed how to develop water use plans that would be beneficial to Ag customers, thus ensuring that they would follow their plans and actively conserve water.

The ADC agreed that the BWS should expect farmers to cooperate with conservation programs in return for a subsidized WSFC. The ADC is supportive of the BWS requiring new farmers to submit water use plans.

The HDOA said that they also support BWS's proposed strategy. HDOA currently requires soil conservation plans for their leaseholders. Those conservation plans do not currently address water usage. They recognized that it is in HDOA's and BWS's best interests to work together. The agencies have a shared goal of conserving the water supply through efficient water use. The HDOA said that they expect the Food Safety Modernization Act (FSMA) to be enforced and that it may impact farmers' financial bottom line. It is possible that may create the need for more farmers to turn to using potable water. They talked about creating agricultural hubs where small farmers could take their fresh produce to a processing (washing) facility to meet food safety requirements. HDOA provides non-potable water for irrigation to Ag customers at

lower rates than BWS, which is potable. They believe that the cost of water is a strong incentive for BWS customers to conserve.

Q: Is there a certain method of watering crops that's preferred by the agriculture community?

A: Furrow irrigation is “out”. It’s going to be spraying, low angle short reach irrigation, or drip, depending on the crop.

Comment: You are working with the groups that should be answering this question. CTAHR was tasked with developing a per-crop analysis of how much water was being used. They came up with something like 2,000 gallons per acre for all crops. Nobody in farming is using that figure. But farmers will need that information if they are going to put together a water use management plan like you described. Adequate funding for the needed research by the university is a concern. Adequate funding for the HDOA is another concern. The HDOA gets just 0.02 percent of the State budget. Access to that information is really important not only for agriculture to grow crops and to be more sustainable, but also to all of us to have more local products available.

A: If farmers don't understand their water use plan they will be less likely to follow it. So BWS wants to require a simple plan. CTAHR developed a model for the CWRM of how to allocate well water for agriculture and created a list by crop and water use. The water use range is around 2,000 to 2,500 gallons per acre.

Barry said that BWS also met with CTAHR, including Dean Nicholas Comeford and others. CTAHR has a lot of resources and provides education, research and extension programs that support agriculture and resource management. They have the GoFarm program that trains new farmers, which includes teaching the business side of farming. BWS would like to add water use planning and conservation measures to the GoFarm curriculum. CTAHR has cooperative extension service agents who could potentially help educate new farmers.

Barry said that CTAHR and HDOA are interested in forming a partnership with BWS regarding Ag water conservation and the proposed water use plans. The next step is to create a memorandum of understanding (MOU) where we would identify our common objectives, like developing a cooperative agriculture water conservation program including water use planning tools, water conservation incentives, and education of new farmers and agriculture students about efficient water use in farming on Oahu.

BWS also met with the farming community in Hawaii Kai and thanked Elizabeth Reilly for setting up that meeting. The discussion included subsidized Ag water rates and other upcoming rate changes, feedback and suggestions on water use efficiency, possible changes in the Ag WSFC, and local water pressure conditions. Barry said that that a lot of discussion focused on the new monthly customer charge based on meter size. The monthly charge is currently \$9.26. Given that farms typically have meters up to 2”, the monthly customer charge will be higher than \$9.26. On the other hand, the subsidized Ag water use tier threshold is decreasing from 13,000 gallons per month to 6,000, which should reduce some cost impacts. Barry offered to estimate bills for those who attended the meeting, applying the new rates to their average water use. CDM Smith subsequently provided the water bill comparison and BWS sent letters to the farmers with suggestions on how they could reduce their water bills.

Barry said that the farmers suggested water-conserving methods such as:

- Using mulch and/or cover crops to reduce evaporation
- Installing submeters, weather-based irrigation controllers and soil moisture sensors
- Learning how to detect and repair leaks

Farmers said they would really use submeters for leak detection and weather-based irrigation controllers for their automatic irrigation systems would help. One farmer reported that she got rid of her automatic system and now waters by hand.

They were open to water use plans to help new farmers determine their water needs, and were supportive of more interagency cooperation. Representatives of the Hawaii Association of Conservation Districts and South Water Conservation District attended the meeting and provided information to the group.

Barry closed by explaining the next steps, which is to meet with the new director of HDOA and develop the multi-agency MOU (HDOA, CTAHR, and BWS). He said that he has spoken with Michelle Gorham with the West Oahu Soil and Water Conservation District about agriculture education programs. Barry said that other next steps include:

- Meet with Windward farmers
- Support State legislative funding
- Seek BWS Board input
- Refine BWS's strategic approach for affordable impact fees (WSFC) for farmers
- Reach out to Small Business Regulatory Review Board including public outreach
- And, then seek BWS Board consideration of a new WSFC for Ag customers

Q. Would it be a good idea to work with the Hawaii Association of Conservation Districts to get the various approaches to conservation? West Oahu is very different from Windward. It would also be good to meet with the Waiahole-Waikane Community Association.

A: We are starting with Michelle Gorhman at West Oahu Soil and Water Conservation District, but we'll definitely bring this to Association and to the other districts.

Comment: It is as important as it always was to have water flowing streams, feeding estuaries and all of that. With what's happening at Red Hill and the impact it could have to our island, I think we have to look at the water system a little differently than we ever did before.

Comment: Beware of averages. If you can use real-number graphs instead of averages, we'd be even more educated.

Barry asked the group if the strategy makes sense, and asked if anyone had comments.

Comments: I support it.

Comment: I was at the Hawaii Kai meeting and I think you captured the information really well. We are also trying to get Michelle Gorham over to South Oahu to do some of that same good work.

Q: What's the average agricultural customer water use and for what acreage?

A: Six thousand gallons per day. Most of these farms are small, and not all of them are actually farmers. Dave added that BWS analyzed the water use of all its agricultural customers. He said you're right; it absolutely does vary by acreage and by crop. BWS did regression analyses looking at the amount of acreage versus the amount of water used. We also tried to see if water usage correlates to meter size and surprisingly enough, none of those relationships were statistically significant. Water usage is all over the place. We were hoping to find those relationships and come up with something that was powerful for the answer to your question, and it's not there.

Comment: We're trying to encourage agriculture and we have to start focusing on small rural family farming where farmers live on Ag land. If we really want to make a dent in how much food we're producing for people to eat here, we have to go back to that. We're losing our small rural family farms all over the state. We can't just look at what BWS is doing. We've got to invite all water users. If everybody starts to develop water use plans, whether they're using private water or BWS water, we're all going to benefit from learning what amount of water is needed, in what part of the island, depending on what is being grown. If BWS strongly encourages water use plans, and everybody's on the same page – CTAHR, HDOA, and Water Conservation Districts – with the kinds of plans and information that we're trying to bring forward, we're going to be way farther ahead on using only what we really need for Ag water in the next 10 or 15 years .

Comment: There are a number of nonprofits that are now taking on huge areas of agricultural land. It's probably worth getting them together to talk about water use as well.

Q: Has there been any kind of correlation done to look at your large Ag users to see if CRWM could determine how much water they could potentially pull out of a well on their property instead of buying potable water from BWS delivered via pipelines?

A: When someone comes in to BWS for a meter for a large agricultural subdivision – or a golf course – our first position is look for a well that's on site, especially when their property is above the potable aquifer. I can have that conversation with the CRWM.

Comment: The picture with kids reminds me that Jack Johnson with the Kokua Hawaii Foundation has a school program where they teach how to grow food, grow worms, and use water. BWS might try to get something into their lesson plans.

Barry thanked everyone for their comments and their support for the Ag WSFC strategy he described.

SUMMARY AND NEXT STEPS

Dave thanked everyone for coming and giving great feedback. The next meeting will be April 25, 2019 at the Blaisdell Center. Dave asked everyone to mark their calendars – stakeholders do not want to miss this meeting.