2022 Spring WRRC Seminar Series

The Impacts of the Red Hill Crisis on the Board of Water Supply

Ernie Lau and Erwin Kawata

0:10 [Keri Kodama:]
Okay, I think now it'd be a good time to get started. I'll let—just people continue filtering in. But for those who are here, Hi and welcome

0:21 to another one of our spring Water Resources Research Center seminar series.

0:29 And we're back on the topic of Red Hill. And this week have Ernie Lau and Erwin Kawata, who will be talking about the impact on the Board of Water Supply. So, to introduce our speakers,

0:44 Ernie Lau was appointed on February 1, 2012 as the Board of Water Supply Manager and Chief Engineer.

0:51 He is responsible for the overall strategic direction and management of Board of Water Supply, with a focus on expanding the department's mission to provide a safe, dependable, and affordable water supply now and the future. And Erwin Kawata is the BWS Program Administrator for the Water Quality Division. I'd like to turn it over to our speakers now. Ernie, please go ahead.

1:11 [Ernie Lau (speaker):]
Oh, Aloha everybody. Ernie Lau for the Honolulu Board of Water Supply. I also have with me Mr. Erwin Kawata. Together, both Erwin and

1:24 I have been tracking this Red Hill—Navy Red Hill Fuel Facility issue for about eight years now.

1:35 So our vision for the Board of Water Supply is Ka Wai Ola, Water for Life. We take this very serious because the resources, the service that we provide, I really—is important for our community's health and well-being. And our mission to provide safe, dependable, and affordable water now and into the future. We want to ensure that the water systems that we operate are going to be providing safe and dependable water service through all types of situations including when the water system—the demand for water is at its highest, which is usually during the summer months, we want to make sure that the water system can provide reliable water service to our community.

2:22 This is a snapshot of the infrastructure that it takes to serve 1 million people every day on O'ahu with safe drinking water.

2:29 We have to be able to pump or produce about 145 million gallons a day on average. It it all originates with the rain falling on our vital watershed lands on the Koʻolau and Waiʻanae mountains that helps to recharge the underground aquifer. We are 100% dependent on groundwater for our drinking water. So we have a rare—variety of sources that we tap the underground water in the aquifer from tunnels that are dug at higher elevations that penetrate dike compartments where water is trapped there—freshwater is trapped there and it flows out of the tunnel and into the pipe serving our community without the need to pump water or use any forms of electricity. So those are important tunnel sources for us. We also have shafts, like for example the Hālawa Shaft, which actually you basically dig a inclined or slant access tunnel all the way down
until you hit the top of the aquifer, which we call the water table. And then we dig a tunnel horizontally out in that tunnel—water table, actually submerged in the water table itself. And from there we draw water near the upper reaches of the underground aquifer and pump into our system. But most of our water sources come from wells spread out throughout the islands, there are over 90 different locations, 194 groundwater well pumps that we have in our system. And also, you know, we have to treat the water, unfortunately, in Central O'ahu. The lesson there is, you know, past large-scale agriculture, they left a legacy of pesticide contamination that they used to protect their crops from pests. And that's—the—that residual chemicals are still affecting our groundwater in the areas, and this is mainly in Central O'ahu, Waipahu area where we have to filter through large amounts of activated carbon to make it safe to drink. But then from there, it flows out to 171 water tanks; actually, it's—the number should be updated to 172. These water tanks actually store water so we basically pump in effect from our wells and into these tanks and then from there, distributed out to our customers. It helps to stabilize the water pressure, but it also stores water for peak demand periods during the day for—and also water for fire protection because the Honolulu Fire Department, when they open up a fire hydrant, you're touching a Board of Water Supply fire hydrant, and there's almost 21,000 of those in our system and the water that comes from it, it's from our system. So it's very important that we continue to maintain that vital public safety resource. We also serve customers at higher—at various elevations above sea level around the island. You know, people that live on the top of ridges, all the way down to the valleys, all the way down to near the shoreline. And overall in our water—this water system, we have a what we call 100 different pressure zones that we serve customers, and waters conveyed to our customers the 1 million people through 2100 miles of water mains spread out through—throughout the island, with the largest being 42 inches in diameter. At the end of the day, the million people are served through 170,000 metered water accounts or services. And that's how we get water to people every day. We operate this system 24/7. We have operators monitoring the system all the time. And, unfortunately also we have main breaks almost on a daily basis. So this is a situation I think a lot of people here are familiar with the Red Hill fuel tanks situation built between 1940 and 1943, 20 underground storage tanks under the ridge of Red Hill, constructed in place, what we call field constructed. Basically they drilled a vertical shaft from the top of the ridge down and they then hollowed out a cavern below the mountain to construct the tanks, to make the space for the tanks. Each—these tanks are massive, 250 feet tall, 100 feet in diameter, and can hold up to 12.5 million gallons of fuel right now. And the bottoms of the tanks are connected by pipelines, large single walled steel pipelines that run in a lower tunnel that goes all the way down to Pearl Harbor. So Pearl Harbor, they would bring in ships, tankers, and barges, which ship fuel and then pump it
from Pearl Harbor inland and uphill to these tanks at Red Hill. I think it's almost three miles distance, connected to that same underground top—tunnel that carries the fuel pipelines; is also their drinking water source, which was constructed around the same time the Red Hill facility was built. It is actually accessed through the same fuel pipeline tunnel, and the bottoms of the tanks, and I think everybody is familiar with this, are right over our precious sole source drinking water aquifer, and about 100 feet above it. Looking down at Hālawa Valley here, you can see the H3 Freeway, the Moanalua Freeway. These two rows of black dots there, 10 dots represent 10 tanks in each row. So 20 tanks total in about a half-a-mile where is their drinking water source called Red Hill Shaft. They also have another source across Hālawa Valley called ‘Aiea-Hālawa Shaft. To the northwest of the facility, we have four Board of Water Supply wells, or Hālawa Shaft, or Hālawa Wells, ‘Aiea Wells, and ‘Aiea Gulch Wells. And to the south, we have our BWS Moanalua Wells. We haven't detected fuel, we've been testing them from 2014 and have yet to detect any fuel contamination in these wells. Well, what's important to remember, that under the surface of the land here is the underground aquifer. On one side of the—that aquifer on the Red Hill side is the Navy's drinking water source and also the fuel tanks. And the other side of the valley, a little less than a mile away, is our Hālawa Shaft and our other three wells—four wells in that area, basically, drawing water from the same connected aquifer underground. So our concern is fuel leaks that may imminent out of—emanate out of this facility that gets into the aquifer below and flows with the groundwater, could it flow across the valley. And if we keep on pumping, could we inadvertently draw that contaminated water into our water system and serve it to our customers? And that's all we're trying to avoid. The only way we can avoid that is circled in red here, are three of the Board of Water Supply four wells in this side of the valley. They are shut down right now, as a precaution. The Navy, circled in yellow, those two water sources are shut down. We know that Red Hill Shaft was heavily contaminated, and it may still be there. I haven't seen the data but back in December, Navy divers are going in there to try to basically soak up and remove whatever fuel they could collect from that—from the— their drinking water source and get it removed. So our challenge right now for the Board of Water Supply, the common thread that connects the Navy and the Board of Water Supply, is not necessarily their water system serving Joint Base Pearl Harbor-Hickam. So the impacts that was seen that started in late November of last year to the joint water system Joint Base Pearl Harbor-Hickam is the Navy's water system. Separate from that is the Board of Water Supply, we did not have fuel contamination enter our system. But the common thread that connects both of us is that we have—we tap the same groundwater resources in this region. And we have wells that pump out of it. With the need to take the cautionary approach based on the precautionary principle here, we've shut down three wells to avoid inadvertently drawing contaminated water from the underground aquifer that might have migrated across the valley and put it into our system.
Hālawa Shaft represents around 20% of our supply, Hālawa Wells and ‘Aiea Wells about 50% of the supply.

So our challenge going into, especially during the summer, we know that water demand really is affected by weather conditions. And when it's hot and dry in the summer, that's when our demand for water from our customers increases to its highest. A lot of it is driven by outdoor uses, such as irrigation demand. And that's—our challenge is going to be during that stress period during the summer when the system requires more water—the highest amounts of water each day; the reliability of our water system to continue to provide service to our customers.

And for Hālawa-'Aiea, it's actually 50% of the supply. So the—of the two water systems, the smaller ‘Aiea-Hālawa system is the most impacted at 50% of its supply no longer available.

So this is looking at water use. In the smaller ‘Aiea-Hālawa system, which serves about—we think about 20,000 residents there. But it also includes Pearlridge Shopping Center and Pali Momi Hospital.

The units on the left vertical axis is MGD or million gallons per day. The orange line represents how much we have to pump each day to meet that demand, and you can see it really fluctuates normally. And time is the scale on the bottom on the x-axis.

So if you look at it goes from January of 2021, all the way out to April 2022. You see that during the—normally during the winter or spring, spring months, when there's more rain, that water demand is lower. But as we enter the—to the hot, dry summers, we can see that that's when we start to exceed this red line. This red line represents what we call the Q95 of max day. Basically, 95% of the max day—historically that we've seen for max day conditions, which occur when days of maximum demand during the summers, we've seen it—Q95 being around 4 million gallons a day. And you can see in 2021, which was a much wetter year than than we're in right now, that the demand actually exceeded the four MGD rate. The average daily water demand is around three-and-a-half. So the max day is about four, the average is about three-and-a-half.

And I'm sorry—I skipped over this. These blue lines represent the pipelines of that ‘Aiea-Hālawa water system, stretching from on the west—east, Iwaena Street area, Hālawa Industrial Park, all the way to the west, so Hekaha Street, Waimalu Stream area, and here's the Pearl Country Club Golf Course.

This is the Honolulu Water System. It's a much larger water system. We think it might serve around 400,000 people here, includes our major business center, the Honolulu downtown area, the center of business for the state—State of Hawai‘i actually. A number of major hospitals in the system, like Queen's, Straub, Kapi‘olani, Kuakini hospital; they're all located and served by this water system. It also includes our major university, including this campus University of Hawai‘i at Mānoa, and also Kapi‘olani Community College. And, and this part—what's shown in blue is—which is the pipelines that stretch across the system, very interconnected grid of pipelines that stretch all the way out to East Honolulu to Hawaii Kai.
area. There—we do have water systems that serve higher elevations and into the valleys like Kalihi, Nu‘uanu, Mānoa, Pālolo. That's not shown here. But the low service system is pretty much more the makai areas, at lower elevation makai of the freeway. Mauka of the freeway we also have a connected high service system. So this system right now is shown here, is a low service system. Hālawa Shaft is normally a water source that pumps into serving the needs of urban Honolulu. So you can see some wells that are located in Honolulu, like Kalihi Pump Station, Beretania, Wilder, and Kaimukī. When Honolulu was first developed, the well sources within Honolulu—could keep up with the demand for water. But as Honolulu grew, it basically—we needed to find water from outside of Honolulu and bring it into Honolulu— Honolulu to meet its demand. And we headed out toward the Pearl Harbor aquifer, we headed west. So we have a—wells that are not even shown here like Punanan Wells, Kalauao Wells, Waiau Wells, that also supplying water to urban Honolulu. So imagine if we pumped fuel contaminated water, not intentionally but inadvertently because contamination had migrated somehow across Hālawa Valley from the Red Hill Fuel Facility from their leaks and gotten into our Hālawa Shaft and pumped into this network of pipes. We would have a terrible, terrible time trying to clean it up. And the impact could be any—to customers anywhere in the system. Because that Hālawa Shaft water could even make its way into East Honolulu. This is the water demand for urban Honolulu, how much we have to produce every day to meet the demands of the businesses, the government agencies, and the people that reside in the city. You can see from the left y-axis, the numbers are much larger than ‘Aiea-Hālawa. The historical max day is 74 million gallons a day. The average is around 65 million gallons a day here. But you can see for 2021 we didn't even get to the historical 74 million gallons a day. Although this year, it is much drier than last year. One—maybe one way to look at it because this includes portions of 2022, if you look at January to about April of 2021, you can see that it barely reached 60 million gallons a day, got over that just briefly in early April—April 2. Now look to the year 2021, from January. So January, yes started out pretty good. We had proved pretty close to normal rainfall in January. But we saw that February and March, really the—became so dry, maybe half of normal rainfall. And you can see that the water demand here on the right side of the graph for the months in 2022, actually start to climb at a much steeper rate, and right—and reach as high as over 65 MGD. With recent rains and our requests for water conservation, it looks like it's taking effect and help to bring the demand down but the overall upward trend is a concern for us. So now with the closure of Hālawa Shaft for the Honolulu Water System, this is an example, we basically transferred the pumping load to produce water to meet the demand of our customers to other wells in the system. We have a number of wells that feed into the Honolulu water system. One of them is our Beretania Wells here, right where, where my office is located. You can see that from around the end of November, we started to pump more
water out of Beretania to make up for the loss capacity at Hālawa. And you can see shown in the blue line as we increase that, we also on this graph track
the saltiness of the water as measured as chlorides in parts per million. So as we increase the pumping rate from the end of November, all the way to early March we saw the,
the saltiness of the water—and the water start to get saltier from the underground aquifer.
And remember, very simplistically, it's freshwater floating on saltwater in the cracks and crevices in the lava rock of the aquifer. At this site, we also serve the high service system, the
areas mauka of the freeway, and we increase pumping into the high service.
And we can see there, we saw a much more pronounced and larger rise in the chloride levels of the water that we are serving our customers; up to, I think over 220 parts per million.
What we want to do a stay below 250 parts per million, and typically want to try to keep our sources at 160 or lower. But you can see it rose up rapidly when we cut back and pumping,
we basically saw a—the water become fresher. So we didn't want to stress the aquifer to a point where it could cause a long-term or even permanent damage to the aquifer at this location. We have to moderate how much we pump to maintain the quality of the water coming out of the aquifer.
So what happened here at Beretania, I think we were pumping, after Hālawa Shaft was shut down, where we increased pumping to around 13 million gallons a day from this location. With the drop now, we're pumping about 7 million gallons a day and we see the improvement in water quantity. And that's probably a as much as we can stress it. So that also causes us to address,
adjust how much we're pumping from other wells that feed into our system and increase the burden on those wells to make up the water that we don't have here.
So some of the critical projects that we're looking at in response to the Red Hill situation is immediately go out and try to develop five to six exploratory wells in the Waimalu and possibly one mauka Moanalua areas to help look at replacing some of the capacity we lost with the shutdown of the three wells, Hālawa Shaft, Hālawa Wells, and ‘Aiea Wells. And install additional sentinel monitor wells in Hālawa Valley to assist in the efforts by the Navy, Department of Health, and EPA to better understand what is happening underground with the aquifer there and where fuel contamination might be moving,
perhaps across the valley. We're also looking at adjustments to our adjacent water systems to see if we can move water excess capacity from other water systems to make up for the loss of our three wells. Looking at going back to wells that we have not used for decades, because the water became too salty to use, to see if it's—the aquifers freshened up there and we can actually start to get a lower amount of water, freshwater out of those locations. Test pumping some existing wells like the Wai‘alae Nui Valley Well is located mauka of the Kahala Mall area, a small capacity well, trying to see if it—how much it will yield and can we install a pump there to put it online. Complete repairs at our Kalihi Pump Station, like I showed earlier, Kalihi, Beretania, Kaimukī are very old, large pumping stations,
especially Beretania and Kaimukī. And I think they're, I know Beretania is over 100 years
old. Kalihi is probably in that range. Also, trying to complete and put back in service three
wells, at Kalauao Wells that were down for repair. These facilities were under repair before
the Red Hill crisis occurred. And normally with enough redundant capacity in the system like at a
Hālawa Shaft, which has—can pump anywhere between 10 to 14 MGD, that gives us enough redundancy to
allow us to take other wells out of service and still be able to meet the peak summer demands
without affecting the service to our customers, and also not affecting the ability for new
projects to get water meters and get served. Some of the longer term projects: a well field at ‘Ewa Shaft,
well in Kunia, Waikele Gulch in Waipahu, Wailele Wells are wells on the Windward side
of O‘ahu. Also our seawater desalination project, which is currently in procurement
to build these— a 1.7 MGD Seawater Desalinization Plant in Campbell Industrial Park,
with the ability to expand up to five MGD or 5 million gallons per day. That plan is targeted,
if we're successful in this procurement and go through the design of the pilot testing,
design, and construction. We're looking at getting it online and in service in early 2025. And I'll turn it
at this point over to Erwin to talk about some of the exploratory wells and go ahead Erwin.

Thank you, Ernie. Okay, so this slide just simply shows the locations of where we plan to put exploratory
wells.
They're all at our existing Board of Water Supply reservoir sites such as ‘Aiea 497.
The purpose is, as stated earlier, is to find or identify new water supplies to take the
place of the capacity loss from the shutdown of the wells affected by this Red Hill situation.
All of them are undergoing various stages of the permitting and the design and review process.
So our hope is that we will be able to at least do at least one of these before the end of the year.
As in all cases, these are exploratory wells, or we're going to install a test pump to see if these locations
can produce water quantities sustainably, not all exploratory wells
are successful, as many of you might know. We also are taking a look at a place to the very
right of the slide, which is in Moanalua Valley. After review of that particular location, we found it
to be not very feasible, we're looking at other locations within that area to see if there are
potentially, you know, an alternate better site that we can explore and use there. Next please.
This slide is—has, shows the locations in the red dots of monitoring wells that we're going to plan to
install. As most of you know, monitoring wells
are essentially test wells for the purposes of collecting information from the subsurface aquifer
in terms of water samples, as well as things like information such as water levels. As you can see, in relation to the Navy's existing monitor wells, shown in yellow dots there,
were going way beyond the property boundaries to kind of understand if there is any potential
contamination that's moving away from the property. You can also see their locations in relation to our
existing wells, shown in that orange diamond shape there.
All of those are, you know, as far as these sites, they're at the animal quarantine station.
We have one at the District Park and one over at the ‘Aiea Elementary School. Back to you, Ernie.

[Ernie Lau:]
Thanks, Erwin. So at this point, you know, we're going to talk about some of the procedures or the process, should we need to try to manage water use. So right now, because of the Red Hill situation, which has affected the aquifer, we know that below the fuel tanks, there is fuel contamination in the groundwater.

We know that as far as half-a-mile away at Red Hill Shaft, there's fuel contamination there.

So the—that's, you know, caused us as a precaution to avoid sending contaminated water into our system, to shut down three wells. So that's put us into a shortage condition.

We also could have a issue of low groundwater. So low groundwater is usually looking at the condition of the resource, basically that measuring the top of the—of the underground aquifer and see how that those levels fall over time, especially during the year when we get into drought conditions that could last multiple years. So some of those situations in the past, at least from what I remember having worked here in the Board of Water Supply a long, long ago, too—as in the 80s, you know, we ran into a situation with water contamination, but also with multi-year drought.

And we actually implemented mandatory restrictions on water use, I think it was outdoor uses at the time. And what we saw was a pretty rapid drop in water use island-wide. So that could be—so folks, I hope we're not also headed into that situation, which we—would be extremely terrible, that we could be seeing the beginning of drought, maybe multi-year drought. I hope that is not the case. I pray for rain every day as I walk my dog.

So our rules and regulations provide us the legal authority to do, in our opinion, what is necessary to implement special conservation measures to forestall water shortages, to make sure that our customers have a reliable water service.

Now, this is kind of the sequence in a—are dealing with shortages. In the event here, was the issue of the contamination of the aquifer, the shut down of Red Hill Shaft. Our subsequent response, also a shut down of our three wells, we responded initially and we are still responding. And this is a very dynamic situation to move the load or the, the need to make up that loss capacity to other wells. But we also need to watch very closely what's happening with the aquifer, the—in the immediate area where the wells are located. And if the wells are starting to see elevated levels of chlorides or becoming more salty. And then we have to back off and adjust and transfer that load to other wells, existing wells in the system.

We've been assessing the remaining source capacity to meet the max they demand. I think bottom line with Honolulu, if we can get wells—some wells at Kalihi Pump Station and Kalauao wells back in service, as we get into the summer months, I think that we'll be in—have enough capacity in Honolulu to punch—to potentially make it through the peak demand periods of the max day in the summer. But the big variable out here that we have no control of is weather. So
how the temperatures and the lack of rainfall, how that continues in the summer, that's going to drive water demand. So you know, we are looking at potentially declarations of water shortage. Ultimately, these declarations will be before the Board. And they may include conditions, potentially that might restrict water usage. But it'd be a process that we go before the Water Board and it'll be very transparent. And there will be a public hearing held by the Board to seek input before making any decisions going forward. And I want to make it very clear, we are not under a mandatory restriction on water use or mandatory water conservation at this time and we don't have a development moratorium or limitation on new development getting water meters from our system yet. We are evaluating the situation and it's going to be an ongoing, constant evaluation of the system, monitoring pumpage, of the condition of the underground aquifer, and also weather, rainfall primarily. We are—have already looking at reprioritizing our existing, our proposed CIP for Fiscal Year 2020–23. And, you know, we are actually in Fiscal Year 23; so, which goes into 24. Looking at prioritizing projects that relate to responding to the Red Hill situation as our—some of our highest priorities. Eventually, hopefully someday, and this could be a few years until we can get the—take the actions necessary to make up for the lost supply. Then we're going to be in the recovery stage and hopefully that will be a wet year where there's going to be a lot of rain that help—will help to replenish the aquifer, and rainfall not only replenishes the aquifer, but it immediately has an effect on water demand. So people don't water their yards, hopefully, when it's raining. So if any of you have a sprinkler system, please turn it off if it rains the night before. So these are kind of the water shortage conditions that we're looking at. And it's based on hours of operation of our pumping units, our well pumps, and there are some pumps that we—are designated as standby or backup pumps in case there be—there is a breakdown. So normal conditions we can meet the max day, the high day of high demand during the summer and be only pumping at the most 6—up to 16 hours a day. At the most we can operate the pumps to meet the daily water needs of our customers in 20, 24 hours. So if we see that, and it's general voluntary conservation messaging going out, if we see that we are operating our pumps now closer to 20 hours, and we actually now—we moved into targeted conservation messaging like we have right now, then we're in the alert condition. Where it gets really difficult and challenging is when—now the pumps are running almost continuously, not quite, at 22 hours out of 24 hours. At that time, you know, where we know that demand might overtake our supply. So that might be something that we might be considering at that point, or mandatory restrictions or mandatory water conservation measures. And it progressively really could even get to moratoriums on—limitations on new water meters for development. But I want to be clear that we're not there yet. But out of the two water systems, ‘Aiea-Hālawa system is in a much more—much more challenged situation. So this is out of our rules also, Section 1-101,
1A. So extensions to the public—and connections to the public water systems, you know, will be approved by the Department (BWS), where pressure conditions permit; provided the meters are within the service limit as—excepted that's provided under Elevation Agreements. And the department has sufficient pressure and water supply available for domestic use and fire protection and can assume new or additional service without detriment to those presently being served. So this is kind of the balancing act between providing safe and reliable water service to our existing customers, but also accommodating the needs of the community to build affordable housing or do other projects and bring on new construction that might increase the water demand on the water system. So it's kind of this delicate balance that we have to maintain.

And if we get into this situation, here, item number 5: Availability of water for proposed developments. And Category 1 is adequate water supply, no problems; new developments, water is available. Category 2 areas with limited additional supply, normally—and what you see here is that we don't—we don't actually issue advance water commitments. So the—when a developer writes in a letter to us, and they do it often very early in the project as part of their due diligence for their project; on entitlement issues, on infrastructure capacity, we'll send a response back to the developer that might say water is not available, or water is available.

But the final determination will be at the time they come in for building permit. Prior to November of last year, our response was—in the Honolulu water first system as an example to inquiries, questions about availability of water, what—it was a response, basically it said that water is available. However, final, final determination on that would be at the time of building permit. Right now, because of the Red Hill situation, we are disclosing to—people asking about the availability of water to cite the Red Hill situation that's affected our aquifer. And also right now, we're not saying we're not able to determine if water is available, it'll be determined at the time of building permit. Remember, we're kind of in this dynamic situation that we're— we monitor or monitoring weather conditions that correlate to increased water demand, our system capacity, the pumps that are running, or pumps that are out of service, and also the condition in the aquifer. So we will make that determination as before, at the time of building permit.

And in areas with no additional supply, this says here that you know existing lots that don't have a meter can get a small meter from us. So everybody has access to water.

So in a moratorium, and these are some examples, these bullets of things that might occur.

And again, I want to—want to reiterate, to not create panic here. We're not here yet.

But if we had to go here, these are some examples of potential actions or requirements: limit approvals to a single minimum size water meeting for existing vacant lots; for projects that are redeveloping an existing parcel, perhaps look at limiting water demand for the redevelopment to existing water meters that served that parcel,
or previous water allocations or use on that process—parcel prior to development.
And if they need more water, some of the other options might be to do onsite reuse of water,
look at such such thing as grey water, reuse a storm water catchment,
AC air conditioning condensate recovery, high efficiency plumbing fixtures.
And another thing, option might be the no net gain and water use approach where a particular
parcel where they want to redevelop needs more water than what was used before in that parcel,
but there are other older buildings in the immediate area served by the same water system.
So perhaps the developer could approach the owners of those buildings and implement a
retrofit to—from low efficiency, high water using fixtures to high efficiency,
water efficient fixtures and the net savings from that apply that to their particular project at a
different location. So no net gain in water usage, sort of water capacity neutral to
the water system. And these are—I just want to caveat here, it is—these are just some
of the examples of our thoughts. And we are open to suggestions. And we're, you know, more recently,
you know, we've been encouraged that we've had a lot of discussions with developers,
that some of them are really looking at this very seriously. And one developer approached us
recently and well, I won't identify the developer, were still in discussions, was looking at the approach of
they want to build more units on their project, more than what
already exist. And they want to look at how can they do that and use less water than the
project is currently using. So build more units using less water than already is being used,
and we really applaud that. I think that is really sustainable thinking.
And that's where I think we all as a community need to start to explore those options.
You know, there is hope here that water conservation—we know water conservation works.
That, and this is looking at the metropolitan or the Honolulu Water System over time from 2007 to
2021. You can see the average day demand has actually gone down over time, but if you look
around Honolulu from 2007 to 2021, I would say most of us would say that Honolulu has grown
as a city. That there are bigger buildings—that the densities have increased. And yet
you see here, the trend has been actually going downwards. So we know that water conservation,
and we really applauded that. I think that is really sustainable thinking.
And this is a positive. So really, we're in a situation now that if it—would have been much worse if the
water demand for Honolulu was back here,
going over on average—sometimes on average over 80 MGD. Remember, we're looking at 74 MGD as the max
day, and you know, so there's—there is hope. This proves, I think, it is possible.
In summary, three wells are shut down in response to the contamination issue. They have a water use
permit or for about in total I think 13.5, but also they have a peak pump capacity, especially
during the summer, to produce more—to pump more water from the aquifer for short durations of time
to meet the like, the max day conditions of 17.5. So 14, I mentioned out of Hālawa Shaft and three-and-a-half combined from ‘Aiea and Hālawa wells. We need to encourage and stand in support of our Department of Health and the EPA to require the Navy to safely defuel as quickly as they can, take that fuel away from being right over our drinking water aquifer because as long as it exists over our drinking water aquifer, it is a real and present danger to our water resources for further damage.

With—and I appreciate Secretary Austin's decision on the document in his March 7th memorandum, but I'm also very keenly aware that I want to see actually the implementation of what's in that memorandum, and the defueling and permanent shutdown on the Red Hill Facility. Water conservation can be critically important from our customers and not only residential customers, but business customers and government customers also. So we reached out, I personally, I think I've talked to 24 of the largest water users in the systems, and we're continuing to reach out to them. Water demand can't exceed the supply, that is the constraint here. Or there could be water service disruptions that could take effect—take the form of lower water pressures. And perhaps at times when the reservoirs, the water tanks run dry, and we can't refill them over the course of the day, that some people might actually not see any water for periods of time during this—the year, especially during the summer.

And I'll stop sharing at this point and be available for questions. Thank you so much for putting up with me.

Q&A Begins

[Ernie Lau:] Hi, Paul, it's been a while, I know you—we talked just recently to you about this. Yeah, you know, we will take a look at that. I'm not familiar with the Todd model, which is done by—when Chester Lao was here at the Board of Water Supply as the head of our Hydrology-Geology Branch. But Paul, I'll reach out to our Hydro-Geo Branch to see if they're—if they can get access to the model. I'm not sure if they're familiar with how to, how to run the model. I'll—you know, the other month, so they—I'm glad the Department of Health and EPA rejected the Navy's model, which was—didn't seem to match the field data that was collected and what's avail—what's known of the area.
Okay, the next question is from Christina Jedra. "Aloha, Christina Jedra with Civil Beat here. Thank you for holding this event. I'm wondering about Board of Water Supply's reaction to DOH's news this week that the Red Hill contamination appears to be 'stable and possibly contracting.' Do you concur with that conclusion? I'd love to hear your thoughts."

Okay. Hi, Christina. I really don't know a lot about how, how they're basing those findings are—on, you know, what's the basis for that statement? I think—I think there's general consensus that there needs to be much more thorough investigation and collection of data, including drilling more monitor or test wells, especially in the valley area to understand groundwater movement and contamination movement and also the complex geology better. So Christina, I can't say if I agree or disagree with them, I just don't know.

Next question from Rosie Alegado. "Given climate projections, what options are being considered to manage demand in addition to encouraging conservation? For example, water reuse, stormwater recapture?"

You know, I have always thought that stormwater recapture, you know, and that's something that is supported by the City Department of Facilities Maintenance, which is responsible for the area of stormwater management. Trying to retain that and reuse it on-site really makes sense. Water reuse, we really believe in that. We are going to look at expanding our recycled water facility, which takes treated—secondary treated wastewater at Honouliuli and actually produce more water for irrigation and also industrial use from there. So as that's—as the plant expands there to a greater capacity and secondary, we want to expand the use of recycled or reused water.

Okay, next from Cliff Voss. "The recent spill was not the first in Red Hill facility's history. There are at least several previous fuel leakages. So have there been any indications of fuel-related contamination at potential downstream wells, Hālawa Shaft? If not, would that make it seem safer this time?"

We—like I said earlier, we've been testing it—I mean, I thought I said it—that we've been testing our five closest wells, four on the Northwest, and one on the South for about eight years. And we haven't actually seen any fuel contamination yet. But we're concerned is that we don't know for sure that fuel contamination might not make it to those to those wells if we, especially if we turn on the pumps and start to hasten the migration across the valley. We just don't know, we can't take that risk. And Cliff, by the way, Hi, I still remember taking the class at UH many many years ago and you were the professor there.

Okay, next is Lynn Bailey.
[Aurora Kagawa-Vivian (host):]
Sorry, Keri. There's a different, there's a question by Sophie Cocke that's got six upvotes.

[Keri Kodama:]
Okay, I might—mine might not be updated.

[Aurora Kagawa-Viviani:]
Refreshing. Okay. [overlapping dialogue] Can I read it?

[Keri Kodama:]
Yeah.

[Aurora Kagawa-Viviani:]
For you.

[Keri Kodama:]
Yeah. Go.

[Aurora Kagawa-Viviani:]
"Hi, Sophie Cocke with the Star-Advertiser. Question for Ernie. Senator Brian Schatz said earlier today that the BWS could test Hālawa Shaft daily to ensure the water is safe, suggesting that this could be a means for bringing the well back online. Is this feasible?
As we saw with the Navy's test of its Red Hill Shaft last year, it took weeks or months to get the results back. By the time the contamination hit, it was too late. Would BWS face a similar dilemma if it tried to restart Hālawa Shaft as early as this summer with daily testing as a safeguard?"

[Ernie Lau:]
You know, that is—that's very true. And maybe I can ask Erwin, Erwin Kawata from our Water Quality Division to tell us about how long it takes from the time a sample is drawn from the source to the time we get actual the—analysis report from the laboratory.

[Erwin Kawata:]
Yeah, the petroleum analysis takes about four weeks to complete, three to four weeks to complete. So even if you took a sample on day one of a month, you still have to wait that—and you took another one on day two and day three exact—for example, you still have to wait that three to four weeks for the sample result collected on day one for you to get that. And in that time span, we could be incurring contamination and not know it until we receive that test results. So while it's, you know, it's—it sounds like a feasible idea. It still takes a certain period of time to complete the analysis.

[Ernie Lau:]
So in the meantime, the Hālawa Shaft say was pumping at 10 MGD. And it was kept running for 30 days, you know, that's a lot. It's millions of gallons of potentially contaminated water that would have been into the water system serving 400,000 people.

By the time we got the test results that told us we should have shut the pump down 30 days ago.
I think the reality, or isn't it Erwin? That it's, it may be—it's very difficult to get results back, like overnight.

Yeah, it is difficult because the method itself has certain procedures such as the extraction procedure, it takes 16 hours to do the extraction. So even if you could get it to the laboratory faster, or you were to sample it every day, you still have to go through that 16 hour extraction step to—on that sample that you collect it. So like everything, there's a certain time period that you have to go through to complete this, each of the different steps in the analysis.

Okay. Aurora, who's next? You're gonna have to moderate that. [overlapping dialogue]

Okay. I'm going to [inaudible].

Mine's not updating, the upvote for some reason.

Heather Kerkering asks,

"Do you have any influence over tourism numbers when our water levels are low or when in a conservation mode?" Your second question is, "Is your expectation that the contaminated groundwater and wells will become usable in the future?" So first question is about influence of your tourism numbers during conservation.

Okay, we don't have any influence over tourism numbers coming to our island to, to visit, but we are—we recognize that. So we are actively reaching and engaging with the tourism industry to look at how they can. Even the—putting aside the tourists, these hotels have a lot of properties that are large water users. So how do we make working with the hotels to get them to be as water efficient as possible? And I think they are actively looking at that. Then also the other part of that is how do we educate the visitors that stay at these, these destinations and actually encourage them to, to mālama the resource, to only—to not waste it. So we are actively engaging with them. And there is one hotel chain that I won't mention at this time because we're still in discussion, that is totally willing to work with us. We are going to be reaching also out to the Hawai‘i Tourism Authority, and doing a presentation like this with them and talking about water conservation with—for visitors. And there is an effort that we're working on with the Hawai‘i Community Foundation, to look at how jointly work—to work together to educate visitors coming into our airports, as they arrive. And the benefit of that, it'll also help educate local people that are traveling to and from the mainland or between the islands.

Great. And her second question was, "Is your expectation that the contaminated groundwater involves will become usable in the future?"
56:49 [Ernie Lau:]
I don't know. I wish I knew if the—how long the fuel contamination could reside there. There's a big question right now.

57:02 We know through the administrator order and consent discussions, 72 documented releases were identified. I think the volume might have been are— over 180,000 gallons of fuel. And this is over the life of the facility, which is almost 80 years old. So really a large variety of different fuels.

57:26 Because, you know, the Navy ships use different types of fuels back in World War II from what they use today. Airplanes also use different types of fuels. So there's a variety of a mixed bag of fuels stored there. Erwin you want to add anything to a possible response to that question?

57:44 [Erwin Kawata:]
Yeah, sure. Thank you, Ernie. So as Ernie indicated, yeah, there, there is a large number of releases, 72 releases documented.

57:56 There were and in that number of releases, the estimated volume is about 180,000 gallons. And so it had to go somewhere. And the thought is that it's in the vadose zone or in the unsaturated rock underneath the tanks. And so, is that a potential source of fuel that can be made available to the groundwater underneath the tanks that are next to the vadose zone, and that's a concern we have is that it's a source of potential contamination that could potentially get released into that groundwater, and then made available to move with the groundwater as it flows and dissolves.

58:35 [Aurora Kagawa-Viviani:]
Okay, okay.

58:41 [Keri Kodama:]
There was a question that was missed from Lynn Bailey. "Do the Board of Water Supply and Navy share any distribution lines or systems or are the pipes completely separate?"

58:50 [Ernie Lau:]
Okay. Hi, Lynn. Okay,

58:57 we do have emergency connections to the Navy water system, which is more for the Board of Water Supply, supply and backup water to the Navy. or what we call "emergency water." Those, those are all metered. And they also have backflow prevention devices, except for one large connection that is—the valves are actually closed. So there are connections, but right now I think all the connections in the Navy water systems have been secured, shut down. We did have one going for a while after the fuel contamination issue broke out in late November. It was at Mānana housing, around mid-November before the fuel crisis situation happened. We had already temporarily supplied the Mānana—Mānana housing area of the military, which is near Pearl Highlands Shopping Center, with temporary water service because they had a pump breakdown. We've since been able to shut that connection down. So all connections I believe right now are shut down.

1:00:09 [Aurora Kagawa-Viviani:] Okay, there's a question by Meredith Wilson. "Has the Navy been able to locate where the fuel plume is located and generally moving? Is this even plausible?"
1:00:20 Every day the fuel remains in the tanks, the remediation of the aquifer delays."

1:00:26 [Ernie Lau:]
I don't know, the progress on that, you know, we're not privy to all the information. I notice there are some people from the health department

1:00:36 on this meeting that might be able to better respond to that. I do want to acknowledge, hopefully in the near future, we'll have a better understanding because

1:00:45 we have been invited to participate in a smaller working group

1:00:50 that involves the—we've been invited by the EPA and Department of Health. So we've agreed to join that group in the hopes that a, a good clear action plan can be developed.

1:01:03 And that we might be able to get better access to information.

1:01:11 [Aurora Kagawa-Viviani:]
I just want to add, that there will be a presentation on May 6 by some of DOH specialists. So

1:01:18 some of these questions that might be appropriate, more appropriate at that time.

[Ernie Lau:]
Thank you, Aurora.

1:01:23 I'll make sure I register for that meeting.

[Aurora Kagawa-Viviani:]
Yeah. And that's for the public too.

1:01:30 So you could defer this question. This is from Gerardo Gonzalez, "Can you briefly describe the current method for cleaning up the contaminated water from the Red Hill spill?"

1:01:37 [Ernie Lau:]
I'm gonna ask her. Yeah, thank you, that's probably a better question by the Department of Health.

1:01:50 For what we know, I'm gonna ask Erwin to share what he knows.

[Erwin Kawata:]
Yeah, what—when the contamination event

1:02:00 happened, what we understand was, the Navy spent a number of days and weeks flushing their pipeline system, the Navy's water system, as well as the homes with just

1:02:11 potable water. And that was a very long and lengthy process. And as far as its effectiveness,

1:02:20 certainly those homes in the water system was deemed safe for use by Department of Health after

1:02:28 a number of attempts to flush it and do some confirmation testing. So based on that experience,

1:02:35 that's the only information that we have, is to be able to gauge how you would remove

1:02:42 petroleum contamination from the water system.

1:02:52 [Aurora Kagawa-Viviani:]
Okay. Keri, I assume I'm just gonna take over the Q&A. So.

[Keri Kodama:]
Yeah, that might be

1:02:58 better since mine is not updating correctly.

[Aurora Kagawa-Viviani:]
Okay. So we'll just rotate out,

1:03:06 excuse me. The next question is from Hudson Slay, and he asks, "Is Board of
of Water Supply involved in advocating for and/or developing more wastewater reuse, to reduce potable water use, especially for irrigation purposes?"

[Ernie Lau:]
The answer is yes. We actually funded a study which we did, potentially a scalping or, you know, taking some of the wastewater from a large wastewater line that runs through Ala Wai Golf Course, harvesting some of that wastewater, treating—treating it, and with the intent to try to reuse it for irrigation on the golf course, which uses potable water right now. And if it made sense, we really wanted to try to work together with Department of Environmental Services, and in the Environmental Services Department—I'm sorry, Department of Enterprise Services, which operates—owns and operates the golf course, ENV also, and BWS, and see if we can do that. But one of the challenges we found when we surveyed the quality of the wastewater in that sewer line is that during times of low tide, yeah, though, the water was suitable for irrigation uses. But at high tide, the salinity levels went so high, you couldn't use it for irrigation. So given the fact that we're facing sea-level rise, that situation probably would get worse over time.

So that project, which was only a feasibility study, we couldn't, we didn't proceed on it. But we want to look for more opportunities for that, in working—in partnership with ENV.

[Aurora Kagawa-Viviani:]
There's still many many questions in the chat. So I'm in the Q&A, so I'm trying to keep up. But then Bailey asks another question, and again for the audience, please upvote questions you really want to hear answered. When Bailey asked, "Under what conditions might operations restart at the wells that are shut down due to the Red Hill release?"

[Ernie Lau:]
You know, I've been asked that question many times and a simple answers is, one, I'm absolutely sure if I turn on those wells, there's no chance that fuel tainted water will get into our water system to our customers.

I mean, that's my answer. Thanks, Aurora.

[Aurora Kagawa-Viviani:]
Jonathan Scheuer asked, "Understanding this is less of a BWS issue than a Commission on Water Resource Management issue: Who, if anyone, is monitoring these transforming pumping regimes for their effects on springs along the shores of Pu‘uloa, both in terms of quality and quantity?"

[Ernie Lau:]
Hi, Jonathan. I don't know the question—answer to that. And I also grew up on the shores of Pu‘uloa in Waipahu. But I'm not sure.

[Aurora Kagawa-Viviani:]
Things are moving around. Okay. There is another question from Cliff Voss, and I'm not sure if you answered it or addressed this already, but
I'll ask and you choose. "Some of the spills happened tens of years ago. The Hālawa Shaft has been pumping continuously for a long time. So wouldn't the fuel contamination have already reached there by now from previous bills? And why the extra care this time by shutting it down?"

That's a good question. I think this time, you know, the location is—the leak occurred, or the earlier leak was Tank Number 5, in 2014, at least that we're aware of. But the recent leak was at Tank 20, toward the northern end of the facility. And we think there, you know, there's the potential for a northerly flow there. And also the contamination of the aquifer occurred even a half-mile away at Red Hill Shaft, which is closer to being the other side of the valley so.

So this time we're really taking a precaution. And the other thing that is different Cliff, I witnessed firsthand the impact of jet-fuel contaminated water being served to people in their homes, and the impact they had on their families, on their lives. It was a terrible thing.

Thank you. There's a question from Lisa Marten about grey water reuse. Her perception is that, "I thought grey water reuse was illegal on O'ahu relating to individual properties using their own grey water, not centrally treated wastewater. How can we change that?" And I'm assuming, I'm going to interpret your question is: How can we make better use of grey water on individual properties on the island of O'ahu?

I wish Barry Usagawa was here for my water resources, he'd be able to get the answer right out, on that. I'm not as familiar but I think there is discussions with the Department of Health that we were participating in, and also changes to the plumbing code that is gonna allow more of this to happen easily.

I apologize if I've mispronounced your name, asked, "What is the potential impact on water costs if Board of Water Supply has to get 10% of its water through desalination?"

Wow, 10%. That's on an average day basis, that'll be like 14.5 MGD. The plant we're looking at is about 1.7, with an ability to expand it at 5. We'd have to evaluate the cost because I think the point she's trying to raise is really, desalinated seawater is very expensive water.
The cheapest water is really groundwater. Drilling a well, tapping in an aquifer, and at most maybe having to chlorinate the water before we send it to our customers. That is the cheapest cost per gallon. And probably the lowest energy use except for our tunnels sources, which don't need energy to flow. But we'd have to evaluate that if we have to go down that road on how we're going to have to pay for it because Board of Water Supply, we're financially self-sufficient. We don't get any property tax revenue. We basically operate and maintain and improve the water system based on people paying their water bills and paying various charges related to the—to the water service.

[Aurora Kagawa-Viviani:]

There was a question from Puakea Mo'okini-Oliveira. "When we talk about 'flushing,' quote, unquote, 'flushing the systems,' are we saying water is being discharged into nearshore/offshore environments? If so, is there working group established on monitoring the potential effects?"

[Ernie Lau:]

Again, you know, we weren't involved in that. I think this relates to the actions the Navy took in response to the fuel contamination crisis.

That might be a good one to save for the Department of Health, next month.

[Aurora Kagawa-Viviani:]

James Wollbrinck asks, and I'm going to wrap it up, maybe there's this and one more question. But James Wollbrinck asked, "Does the state opening up for travel cause it—cause an increase in 2020 to over 2021?" I think it relates to water demand. So has the change in travel produced a change in water demand that you've seen since the pandemic?

[Ernie Lau:]

Yeah, it's, it's really hard to tease that out from the data. Like I mentioned earlier, weather is really the—one of the biggest factors that causes water demand to vary.

But when we looked at—I can, I know the experience from the pandemic on March 20th, 2020, when tourism was shut down, in Waikīkī itself, I think we saw the water demand dropped by like 3 million gallons a day less. They still had to use water because they have large buildings and landscaping and facilities that still requires water use, but less. No, but no visitors in that. And the workers that worked in Waikīkī, now were back at home, sheltering in place. So we saw actually water demand kind of redistributed to other areas. We saw a temporary dip in water demand island-wide, but then we saw water demand kind of come back to more normal conditions pretty rapidly. So the increase in tourism, it's going to be hard to say. Definitely tourists coming to our island, they consume water, they use water. So, you know, it's gonna be really hard to figure out how much they use—additionally use. We could go property by property and look at occupancy and water usage property by property and something, that might be something we'll looking at.

[Aurora Kagawa-Viviani:]

Okay, and this is the last question. I apologize to those who are—whose questions were answered, but maybe Pat, you can leave contact emails for follow-up in the chat. Arleen Velasco
1:14:00 asks, "Do you know if an emergency task force has been formed by our local government to deal with the potential of a water shortage in the summer? Are there any world specialists being hired to pursue solutions that might be used if we cannot meet the daily water needs?"

[Ernie Lau:] With, you know, we are looking at options and experiences from other states too. You know, we have a consultant that's very familiar with California's experience when California has been in prolonged drought, to come—look at their ideas of what worked for those communities and see if some of that can be applied here. But we're, we're not at this point of hiring an expert. I am considering though, a creation of a special advisory group of different stakeholders that have a very important concern or related to availability of water and water restrictions that might come into effect. So I'm thinking about considering establishing formally a stakeholder group related to this Red Hill situation that could help give us advice and thoughts and feedback on various approaches that we might take.

[Tom Giambelluca (director, WRRC):] But I do want to add my thanks to Ernie Lau and Erwin Kawata for all that you do to guide us and to help protect our water supply. And thank you very much for taking time out at this really busy time to share your knowledge with us, with all of us. Thanks to everyone. Thanks, everyone for tuning in for this important seminar and hope to see you in our future seminars. Thank you.

[Ernie Lau:] Aloha, everybody.

[Keri Kodama:] Thank you.

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