

**2022 Spring WRRRC 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,

0:35 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

0:59 affordable water supply now and the future. And Erwin Kawata is the BWS Program Administrator

1:06 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

1:42 serious because the resources, the service that we provide, I really—is important for our community's

1:49 health and well-being. And our mission to provide safe, dependable, and affordable water now and into the

1:56 future. We want to ensure that the water systems that we operate are going to be providing safe

2:03 and dependable water service through all types of situations including when the water system—

2:10 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 all originates with the ua or

2:40 the rain falling on our vital watershed lands on the Ko'olau and Wai'anae mountains that helps

2:47 to recharge the underground aquifer. We are 100% dependent on groundwater for our drinking water.

2:54 So we have a rare—variety of sources that we tap the underground water in the aquifer from tunnels

3:01 that are dug at higher elevations that penetrate dike compartments where water is trapped there—

3:08 freshwater is trapped there and it flows out of the tunnel and into the pipe serving our community

3:14 without the need to pump water or use any forms of electricity. So

3:19 those are important tunnel sources for us. We also have shafts, like for example the

3:25 Hālawa Shaft, which actually you basically dig a inclined or slant access tunnel all the way down

3:34 until you hit the top of the aquifer, which we call the water table. And then we dig a tunnel  
3:39 horizontally out in that tunnel—water table, actually submerged in the water table itself.  
3:45 And from there we draw water near the upper reaches of the underground aquifer and pump into  
3:51 our system. But most of our water sources come from wells spread out throughout the islands,  
3:58 there are over 90 different locations, 194 groundwater well pumps that we have in our system.  
4:07 And also, you know, we have to treat the water, unfortunately, in Central O‘ahu.  
4:12 The lesson there is, you know, past large- scale agriculture, they left a legacy of  
4:19 pesticide contamination that they used to protect their crops from pests. And that's the—that residual  
4:29 chemicals are still affecting our groundwater in the areas, and this is mainly in Central O‘ahu, Waipahu  
4:35 area where we have to filter through large amounts of activated carbon to make it safe to drink. But  
4:44 then from there, it flows out to 171 water tanks; actually, it's—the number should be updated to 172.  
4:52 These water tanks actually store water so we basically pump in effect from our wells  
4:58 and into these tanks and then from there, distributed out to our customers. It helps to stabilize the  
5:03 water pressure, but it also stores water for peak demand periods during the day for—and also water  
5:12 for fire protection because the Honolulu Fire Department, when they open up a fire hydrant,  
5:17 you're touching a Board of Water Supply fire hydrant, and there's almost 21,000 of those in our system  
5:23 and the water that comes from it, it's from our system. So it's very important that we continue  
5:28 to maintain that vital public safety resource. We also serve customers at higher—at various  
5:35 elevations above sea level around the island. You know, people that live on the top of ridges,  
5:42 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  
5:52 zones that we serve customers, and waters conveyed to our customers the 1 million people  
6:00 through 2100 miles of water mains spread out through—throughout the island, with the largest  
6:06 being 42 inches in diameter. At the end of the day, the million people are served through 170,000  
6:14 metered water accounts or services. And that's how we get water to people every day.  
6:21 We operate this system 24/7. We have operators monitoring the system all the time.  
6:28 And, unfortunately also we have main breaks almost on a daily basis. So  
6:34 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,  
6:45 20 underground storage tanks under the ridge of Red Hill, constructed in place, what we  
6:50 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  
7:02 to construct the tanks, to make the space for the tanks. Each—these tanks are massive,  
7:07 250 feet tall, 100 feet in diameter, and can hold up to 12.5 million gallons of fuel  
7:15 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,  
7:26 they would bring in ships, tankers, and barges, which ship fuel and then pump it

7:32 from Pearl Harbor inland and uphill to these tanks at Red Hill. I think it's almost three miles  
7:40 distance, connected to that same underground top—tunnel that carries the fuel pipelines;  
7:47 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  
8:00 tanks, and I think everybody is familiar with this, are right over our precious sole source drinking water  
8:07 aquifer, and about 100 feet above it. Looking down at Hālawā Valley here, you can see the H3 Freeway,  
8:16 the Moanalua Freeway. These two rows of black dots there, 10 dots represent 10 tanks  
8:25 in each row. So 20 tanks total in about a half-a-mile where is their drinking water source  
8:30 called Red Hill Shaft. They also have another source across Hālawā Valley called 'Aiea-Hālawā Shaft.  
8:38 To the northwest of the facility, we have four Board of Water Supply wells, or Hālawā Shaft, or  
8:45 Hālawā Wells, 'Aiea Wells, and 'Aiea Gulch Wells. And to the south, we have our BWS Moanalua Wells.  
8:53 We haven't detected fuel, we've been testing them from 2014 and have yet to detect any fuel  
9:00 contamination in these wells. Well, what's important to remember, that under the  
9:06 surface of the land here is the underground aquifer. On one side of the—that aquifer on the Red Hill side  
9:14 is the Navy's drinking water source and also the fuel tanks. And the other side of the valley,  
9:20 a little less than a mile away, is our Hālawā Shaft and our other three wells—four wells in that area,  
9:25 basically, drawing water from the same connected aquifer underground. So our concern is fuel leaks  
9:32 that may imminent out of—emanate out of this facility that gets into the aquifer below  
9:38 and flows with the groundwater, could it flow across the valley. And if we keep on pumping, could we  
9:43 inadvertently draw that contaminated water into our water system and serve it to our customers? And  
9:49 that's all we're trying to avoid. The only way we can avoid that is circled in red here, are three  
9:55 of the Board of Water Supply four wells in this side of the valley. They are shut down right  
10:01 now, as a precaution. The Navy, circled in yellow, those two water sources are shut down. We know  
10:08 that Red Hill Shaft was heavily contaminated, and it may still be there. I haven't seen the data but  
10:15 back in December, Navy divers are going in there to try to basically soak up and remove whatever  
10:22 fuel they could collect from that—from the—their drinking water source and get it removed.  
10:31 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  
10:42 their water system serving Joint Base Pearl Harbor-Hickam. So the impacts that was seen  
10:47 that started in late November of last year to the joint water system Joint Base Pearl Harbor-Hickam  
10:52 is the Navy's water system. Separate from that is the Board of Water Supply, we did not have fuel  
10:58 contamination enter our system. But the common thread that connects both of us is that we have—we  
11:04 tap the same groundwater resources in this region. And we have wells that pump out of it. With the  
11:11 need to take the cautionary approach based on the precautionary principle  
11:17 here, we've shut down three wells to avoid inadvertently drawing contaminated water from  
11:22 the underground aquifer that might have migrated across the valley and put it into our system.

11:28 Hālawā Shaft represents around 20% of our supply, Hālawā Wells and ‘Aiea Wells about 50% of the supply.

11:35 So our challenge going into, especially during the summer, we know that water demand really

11:40 is affected by weather conditions. And when it's hot and dry in the summer, that's when our demand

11:47 for water from our customers increases to its highest. A lot of it is driven by outdoor uses,

11:55 such as irrigation demand. And that's—our challenge is going to be during that stress

12:02 period during the summer when the system requires more water—the highest amounts of water each day;

12:08 the reliability of our water system to continue to provide service to our customers.

12:15 And for Hālawā-‘Aiea, it's actually 50% of the supply. So the—of the two water systems,

12:22 the smaller ‘Aiea-Hālawā system is the most impacted at 50% of its supply no longer available.

12:37 So this is looking at water use. In the smaller ‘Aiea-Hālawā system, which serves about—we think about 20,000 residents

12:46 there. But it also includes Pearlridge Shopping Center and Pali Momi Hospital.

12:51 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

13:01 you can see it really fluctuates normally. And time is the scale on the bottom on the x-axis.

13:08 So if you look at it goes from January of 2021, all the way out to April 2022. You

13:15 see that during the—normally during the winter or spring, spring months, when there's more rain,

13:21 that water demand is lower. But as we enter the—to the hot, dry summers, we can see that

13:28 that's when we start to exceed this red line. This red line represents what we call the

13:34 the Q95 of max day. Basically, 95% of the max day—historically that we've seen for max day

13:44 conditions, which occur when days of maximum demand during the summers, we've seen it—Q95 being

13:51 around 4 million gallons a day. And you can see in 2021, which was a much wetter year than than we're

13:59 in right now, that the demand actually exceeded the four MGD rate. The average daily water demand

14:06 is around three-and-a-half. So the max day is about four, the average is about three-and-a-half.

14:15 And I'm sorry—I skipped over this. These blue lines represent the pipelines of that ‘Aiea-Hālawā

14:21 water system, stretching from on the west—east, Iwaena Street area, Hālawā Industrial Park,

14:28 all the way to the west, so Hekaha Street, Waimalu Stream area, and here's the Pearl Country Club Golf Course.

14:40 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,

14:51 the Honolulu downtown area, the center of business for the state—State of Hawai‘i actually. A number

14:57 of major hospitals in the system, like Queen's, Straub, Kapi‘olani, Kuakini hospital;

15:05 they're all located and served by this water system. It also includes our major university,

15:12 including this campus University of Hawai‘i at Mānoa, and also Kapi‘olani Community College. And,

15:20 and this part—what's shown in blue is—which is the pipelines that stretch across the system,

15:25 very interconnected grid of pipelines that stretch all the way out to East Honolulu to Hawaii Kai

15:32 area. There—we do have water systems that serve higher elevations and into the valleys like  
15:39 Kalihi, Nu‘uanu, Mānoa, Pālolo. That's not shown here. But the low service system is pretty much  
15:47 more the makai areas, at lower elevation makai of the freeway. Mauka of the freeway we also have a  
15:55 connected high service system. So this system right now is shown here, is a low service system.  
16:01 Hālawa Shaft is normally a water source that pumps into serving the needs of urban Honolulu.  
16:07 So you can see some wells that are located in Honolulu, like Kalihi Pump Station, Beretania,  
16:13 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,  
16:25 it basically—we needed to find water from outside of Honolulu and bring it into Honolulu—  
16:31 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 Punanani Wells,  
16:41 Kalauao Wells, Waiiau Wells, that also supplying water to urban Honolulu. So imagine if we pumped  
16:50 fuel contaminated water, not intentionally but inadvertently because contamination had migrated  
16:57 somehow across Hālawa Valley from the Red Hill Fuel Facility from their leaks and gotten into  
17:04 our Hālawa Shaft and pumped into this network of pipes. We would have a terrible, terrible time  
17:11 trying to clean it up. And the impact could be any—to customers anywhere in the system.  
17:17 Because that Hālawa Shaft water could even make its way into East Honolulu. This is the water demand  
for urban Honolulu,  
17:27 how much we have to produce every day to meet the demands of the businesses,  
17:33 the government agencies, and the people that reside in the city. You can see from the left y-axis, the  
17:41 numbers are much larger than ‘Aiea-Hālawa. The historical max day is 74 million gallons a day.  
17:50 The average is around 65 million gallons a day here. But you can see for 2021 we didn't even  
17:57 get to the historical 74 million gallons a day. Although this year, it is much drier  
18:04 than last year. One—maybe one way to look at it because this includes portions of 2022,  
18:11 if you look at January to about April of 2021, you can see that it barely reached 60 million  
18:19 gallons a day here, got over that just briefly in early April—April 2. Now look to the year 2021,  
18:28 from January. So January, yes started out pretty good. We had proved pretty close to normal  
18:34 rainfall in January. But we saw that February and March, really the—became so dry, maybe half  
18:44 of normal rainfall. And you can see that the water demand here on the right side of the graph for the  
18:50 months in 2022, actually start to climb at a much steeper rate, and right—and reach as high  
18:58 as over 65 MGD. With recent rains and our requests for water conservation, it looks like it's taking  
19:05 effect and help to bring the demand down but the overall upward trend is a concern for us.  
19:16 So now with the closure of Hālawa Shaft for the Honolulu Water System, this is an example, we  
19:23 basically transferred the pumping load to produce water to meet the demand of our customers to  
19:29 other wells in the system. We have a number of wells that feed into the Honolulu water system.  
19:36 One of them is our Beretania Wells here, right where, where my office is located.  
19:44 You can see that from around the end of November, we started to pump more

19:49 water out of Beretania to make up for the loss capacity at Hālawā. And you can see shown in the blue line  
as we increase that, we also on this graph track

20:01 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,

20:13 the saltiness of the water—and the water start to get saltier from the underground aquifer.

20:18 And remember, very simplistically, it's freshwater floating on saltwater in the cracks and crevices

20:23 in the lava rock of the aquifer. At this site, we also serve the high service system, the

20:31 areas mauka of the freeway, and we increase pumping into the high service.

20:38 And we can see there, we saw a much more pronounced and larger rise in the chloride levels of the

20:46 water that we are serving our customers; up to, I think over 220 parts per million.

20:53 What we want to do a stay below 250 parts per million, and typically want to try to keep our

21:01 sources at 160 or lower. But you can see it rose up rapidly when we cut back and pumping,

21:08 we basically saw a—the water become fresher. So we didn't want to stress the aquifer to a point where

21:14 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.

21:26 So what happened here at Beretania, I think we were pumping, after Hālawā Shaft was shut

21:31 down, where we increased pumping to around 13 million gallons a day from this location. With

21:38 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,

21:50 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.

21:58 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

22:09 five to six exploratory wells in the Waimalu and possibly one mauka Moanalua areas to help

22:18 look at replacing some of the capacity we lost with the shutdown of the three wells, Hālawā

22:23 Shaft, Hālawā Wells, and 'Aiea Wells. And install additional sentinel monitor wells in Hālawā Valley

22:29 to assist in the efforts by the Navy, Department of Health, and EPA to better understand what is

22:36 happening underground with the aquifer there and where fuel contamination might be moving,

22:42 perhaps across the valley. We're also looking at adjustments to our adjacent water systems

22:49 to see if we can move water excess capacity from other water systems to make up for the loss of our

22:56 three wells. Looking at going back to wells that we have not used for decades,

23:03 because the water became too salty to use, to see if it's—the aquifers freshened up there and we

23:10 can actually start to get a lower amount of water, freshwater out of those locations. Test pumping

23:16 some existing wells like the Wai'alae Nui Valley Well is located mauka of the Kahala Mall area,

23:24 a small capacity well, trying to see if it—how much it will yield and can we install a pump

23:32 there to put it online. Complete repairs at our Kalihi Pump Station,

23:38 like I showed earlier, Kalihi, Beretania, Kaimukī are very old, large pumping stations,

23:44 especially Beretania and Kaimukī. And I think they're, I know Beretania is over 100 years

23:50 old. Kalihi is probably in that range. Also, trying to complete and put back in service three  
23:57 wells, at Kalauao Wells that were down for repair. These facilities were under repair before  
24:05 the Red Hill crisis occurred. And normally with enough redundant capacity in the system like at a  
24:11 Hālawā Shaft, which has—can pump anywhere between 10 to 14 MGD, that gives us enough redundancy  
to  
24:20 allow us to take other wells out of service and still be able to meet the peak summer demands  
24:26 without affecting the service to our customers, and also not affecting the ability for new  
24:34 projects to get water meters and get served. Some of the longer term projects: a well field at ‘Ewa Shaft,  
24:43 wells in Kunia, Waikele Gulch in Waipahu, Waialele Wells are wells on the Windward side  
24:50 of O‘ahu. Also our seawater desalination project, which is currently in procurement  
24:55 to build these—a 1.7 MGD Seawater Desalination Plant in Campbell Industrial Park,  
25:03 with the ability to expand up to five MGD or 5 million gallons per day. That plan is targeted,  
25:12 if we're successful in this procurement and go through the design of the pilot testing,  
25:19 design, and construction. We're looking at getting it online and in service in early 2025. And I'll turn it  
25:30 at this point over to Erwin to talk about some of the exploratory wells and go ahead Erwin.  
25:36 **[Erwin Kawata (speaker):]**  
Thank you, Ernie. Okay, so this slide just simply shows the locations of where we plan to put exploratory  
wells.  
25:45 They're all at our existing Board of Water Supply reservoir sites such as ‘Aiea 497.  
25:52 The purpose is, as stated earlier, is to find or identify new water supplies to take the  
25:58 place of the capacity loss from the shutdown of the wells affected by this Red Hill situation.  
26:07 All of them are undergoing various stages of the permitting and the design and review process.  
26:14 So our hope is that we will be able to at least do at least one of these before the end of the year.  
26:22 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  
26:36 are successful, as many of you might know. We also are taking a look at a place to the very  
26:42 right of the slide, which is in Moanalua Valley. After review of that particular location, we found it  
26:49 to be not very feasible, we're looking at other locations within that area to see if there are  
26:56 potentially, you know, an alternate better site that we can explore and use there. Next please.  
27:07 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  
27:17 are essentially test wells for the purposes of collecting information from the subsurface aquifer  
27:24 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,  
27:34 were going way beyond the property boundaries to kind of understand if there is any potential  
27:43 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.  
27:55 All of those are, you know, as far as these sites, they're at the animal quarantine station.



28:01 We have one at the District Park and one over at the 'Aiea Elementary School. Back to you, Ernie.

28:10 Thank you.

[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

28:24 try to manage water use. So right now, because of the Red Hill situation, which has affected

28:30 the aquifer, we know that below the fuel tanks, there is fuel contamination in the groundwater.

28:37 We know that as far as half-a-mile away at Red Hill Shaft, there's fuel contamination there.

28:43 So the—that's, you know, caused us as a precaution to avoid sending contaminated water into

28:50 our system, to shut down three wells. So that's put us into a shortage condition.

28:55 We also could have a issue of low groundwater. So low groundwater is usually looking at the

29:02 condition of the resource, basically that measuring the top of the—of the underground aquifer and

29:08 see how that those levels fall over time, especially during the year when we get into

29:14 drought conditions that could last multiple years. So some of those situations in the past, at least

29:20 from what I remember having worked here in the Board of Water Supply a long, long ago, too—as in the

29:28 80s, you know, we ran into a situation with water contamination, but also with multi-year drought.

29:35 And we actually implemented mandatory restrictions on water use, I think it was outdoor uses at the

29:41 time. And what we saw was a pretty rapid drop in water use island-wide. So that could be—so folks,

29:52 I hope we're not also headed into that situation, which we—would be extremely terrible,

29:59 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.

30:11 So our rules and regulations provide us the legal authority to do, in our opinion,

30:16 what is necessary to implement special conservation measures to forestall

30:22 water shortages, to make sure that our customers have a reliable water service.

30:31 Now, this is kind of the sequence in a—are dealing with shortages. In the event here, was the

30:38 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

30:49 are still responding. And this is a very dynamic situation to move the load or the,

30:57 the need to make up that loss capacity to other wells. But we also need to watch very closely

31:03 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

31:14 we have to back off and adjust and transfer that load to other wells, existing wells in the system.

31:21 We've been assessing the remaining source capacity to meet the max they demand.

31:27 I think bottom line with Honolulu, if we can get wells—some wells at Kalihi Pump Station and Kaluaao

31:34 wells back in service, as we get into the summer months, I think that we'll be in—have enough

31:41 capacity in Honolulu to punch—to potentially make it through the peak demand periods of the

31:47 max day in the summer. But the big variable out here that we have no control of is weather. So



31:55 how the temperatures and the lack of rainfall, how that continues in the summer,  
32:02 that's going to drive water demand. So you know, we are looking at potentially  
32:07 declarations of water shortage. Ultimately, these declarations will be  
32:12 before the Board. And they may include conditions, potentially that might restrict water usage.  
32:21 But it'd be a process that we go before the Water Board and it'll be very transparent. And there  
32:28 will be a public hearing held by the Board to seek input before making any decisions going forward.  
32:35 And I want to make it very clear, we are not under a mandatory restriction on water use  
32:42 or mandatory water conservation at this time and we don't have a development moratorium or limitation  
32:49 on new development getting water meters from our system yet. We are evaluating the situation  
32:55 and it's going to be an ongoing, constant evaluation of the system, monitoring pumpage,  
33:02 of the condition of the underground aquifer, and also weather, rainfall primarily. We are—have  
33:09 already looking at reprioritizing our existing, our proposed CIP for Fiscal Year 2020–23.  
33:19 And, you know, we are actually in Fiscal Year 23; so, which goes into 24. Looking at prioritizing  
33:29 projects that relate to responding to the Red Hill situation as our—some of our highest priorities.  
33:35 Eventually, hopefully someday, and this could be a few years until we can get the—  
33:43 take the actions necessary to make up for the lost supply. Then we're going to be in the recovery  
33:49 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  
34:00 has an effect on water demand. So people don't water their yards, hopefully, when it's raining.  
34:06 So if any of you have a sprinkler system, please turn it off if it rains the night before.  
34:16 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,  
34:25 and there are some pumps that we—are designated as standby or backup pumps  
34:30 in case there be—there is a breakdown. So normal conditions we can meet the max day, the high day  
34:37 of high demand during the summer and be only pumping at the most 6—up to 16 hours a day.  
34:44 At the most we can operate the pumps to meet the daily water needs of our customers  
34:49 in 20, 24 hours. So if we see that, and it's general voluntary conservation messaging going out,  
34:58 if we see that we are operating our pumps now closer to 20 hours, and we actually now—we moved into  
35:06 targeted conservation messaging like we have right now, then we're in the alert condition. Where it  
35:13 gets really difficult and challenging is when—now the pumps are running almost continuously,  
35:19 not quite, at 22 hours out of 24 hours. At that time, you know, where we know that demand might  
overtake  
35:28 our supply. So that might be something that we might be considering at that point, or mandatory  
35:34 restrictions or mandatory water conservation measures. And it progressively really could  
35:40 even get to moratoriums on—limitations on new water meters for development. But I want  
35:46 to be clear that we're not there yet. But out of the two water systems, 'Aiea-Hālawā  
35:51 system is in a much more—much more challenged situation. So this is out of our rules also, Section 1-101,

36:04 1A. So extensions to the public— and connections to the public water systems,  
36:09 you know, will be approved by the Department (BWS), where pressure conditions permit;  
36:16 provided the meters are within the service limit as—excepted that's provided under Elevation  
36:21 Agreements. And the department has sufficient pressure and water supply available for domestic  
36:26 use and fire protection and can assume new or additional service without detriment to  
36:33 those presently being served. So this is kind of the balancing act between providing safe and  
36:40 reliable water service to our existing customers, but also accommodating the needs of the community  
36:47 to build affordable housing or do other projects and bring on new construction that might increase  
36:54 the water demand on the water system. So it's kind of this delicate balance that we have to maintain.  
37:03 And if we get into this situation, here, item number 5: Availability of water for proposed developments.  
And Category 1  
37:11 is adequate water supply, no problems; new developments, water is available. Category 2  
37:17 areas with limited additional supply, normally—and what you see here is that we don't—we don't  
37:25 actually issue advance water commitments. So the—when a developer writes in a letter to us,  
37:32 and they do it often very early in the project as part of their due diligence for their project;  
37:38 on entitlement issues, on infrastructure capacity, we'll send a response back to the developer  
37:45 that might say water is not available, or water is available.  
37:52 But the final determination will be at the time they come in for building permit.  
37:58 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,  
38:09 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  
38:20 the Red Hill situation, we are disclosing to— people asking about the availability of water to  
38:28 cite the Red Hill situation that's affected our aquifer. And also right now,  
38:36 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—  
38:45 we monitor or monitoring weather conditions that correlate to increased water demand, our system  
38:52 capacity, the pumps that are running, or pumps that are out of service, and also the condition in the  
38:59 aquifer. So we will make that determination as before, at the time of building permit.  
39:08 And in areas with no additional supply, this says here that you know existing lots that  
39:17 don't have a meter can get a small meter from us. So everybody has access to water.  
39:27 So in a moratorium, and these are some examples, these bullets of things that might occur.  
39:33 And again, I want to—want to reiterate, to not create panic here. We're not here yet.  
39:39 But if we had to go here, these are some examples of potential actions or requirements:  
39:44 limit approvals to a single minimum size water meeting for existing vacant lots;  
39:49 for projects that are redeveloping an existing parcel, perhaps look at limiting  
39:56 water demand for the redevelopment to existing water meters that served that parcel,

40:02 or previous water allocations or use on that process—parcel prior to development.

40:08 And if they need more water, some of the other options might be to do onsite reuse of water,

40:16 look at such such thing as grey water, reuse a storm water catchment,

40:22 AC air conditioning condensate recovery, high efficiency plumbing fixtures.

40:29 And another thing, option might be the no net gain and water use approach where a particular

40:37 parcel where they want to redevelop needs more water than what was used before in that parcel,

40:43 but there are other older buildings in the immediate area served by the same water system.

40:48 So perhaps the developer could approach the owners of those buildings and implement a

40:54 retrofit to—from low efficiency, high water using fixtures to high efficiency,

41:02 water efficient fixtures and the net savings from that apply that to their particular project at a

41:09 different location. So no net gain in water usage, sort of water capacity neutral to

41:15 the water system. And these are—I just want to caveat here, it is—these are just some

41:22 of the examples of our thoughts. And we are open to suggestions. And we're, you know, more recently,

41:28 you know, we've been encouraged that we've had a lot of discussions with developers,

41:33 that some of them are really looking at this very seriously. And one developer approached us

41:39 recently and well, I won't identify the developer, were still in discussions, was looking at the approach of

41:50 they want to build more units on their project, more than what

41:58 already exist. And they want to look at how can they do that and use less water than the

42:04 the project is currently using. So build more units using less water than already is being used,

42:11 and we really applaud that. I think that is really sustainable thinking.

42:15 And that's where I think we all as a community need to start to explore those options.

42:20 You know, there is hope here that water conservation—we know water conservation works.

42:28 That, and this is looking at the metropolitan or the Honolulu Water System over time from 2007 to

42:34 2021. You can see the average day demand has actually gone down over time, but if you look

42:43 around Honolulu from 2007 to 2021, I would say most of us would say that Honolulu has grown

42:50 as a city. That there are bigger buildings— that the densities have increased. And yet

42:57 you see here, the trend has been actually going downwards. So we know that water conservation,

43:04 improved plumbing codes that require higher efficiency fixtures, and water conservation by our

43:09 existing customers, I know can work here, but it requires everybody to do their part.

43:17 And this is a positive. So really, we're in a situation now that if it—would have been much worse if the

43:29 water demand for Honolulu was back here,

43:37 going over on average—sometimes on average over 80 MGD. Remember, we're looking at 74 MGD as

43:46 the max

43:54 day, and you know, so there's—there is hope. This proves, I think, it is possible.

44:01 In summary, three wells are shut down in response to the contamination issue. They have a water use

44:08 permit or for about in total I think 13.5, but also they have a peak pump capacity, especially

44:15 during the summer, to produce more—to pump more water from the aquifer for short durations of time

44:07 to meet the like, the max day conditions of 17.5. So 14, I mentioned out of Hālawā Shaft and three-and-  
44:14 a-half combined from 'Aiea and Hālawā wells. We need to encourage and stand in support of our  
Department of  
44:22 Health and the EPA to require the Navy to safely defuel as quickly as they can, take that fuel  
44:29 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.  
44:41 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  
44:54 the implementation of what's in that memorandum, and the defueling and permanent shutdown on the  
44:59 Red Hill Facility. Water conservation can be critically important from our customers and not  
45:06 only residential customers, but business customers and government customers also. So we reached out,  
45:14 I personally, I think I've talked to 24—24 of the largest water users in the systems,  
45:23 and we're continuing to reach out to them. Water demand can't exceed the supply, that  
45:29 is the constraint here. Or there could be water service disruptions that could take effect—  
45:35 take the form of lower water pressures. And perhaps at times when the reservoirs, the water  
45:40 tanks run dry, and we can't refill them over the course of the day, that some people might  
45:46 actually not see any water for periods of time during this—the year, especially during the summer.  
45:55 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

46:08 **[Keri Kodama:]**  
Alright, thank you so much for that excellent talk, a lot of really important information. So I'm going to  
46:17 do the—I'll address the Q&A now. I'll do it in order of most of them.  
46:27 So the first one is from Paul Eyre. He says, "The Navy's groundwater model has been rejected by both  
46:35 DOH and EPA because it does not adequately simulate the flow of water through the aquifer. Are you in  
46:41 a position to have the Navy resurrect the Board of Water Supply's 3D, solute transport groundwater flow  
model  
46:48 prepared by Todd Engineering in 2005? That model does a good job of simulating the flow  
46:55 and chloride concentration in groundwater from Honolulu to Waimalu. That model provide  
47:01 the foundation framework more current model that addresses the concerns at Red Hill and Hālawā.  
47:07 **[Ernie Lau:]**  
Hi, Paul, it's been a while, I know you—we talked just recently to you about this. Yeah, you know, we  
47:13 will take a look at that. I'm not familiar with the Todd model, which is done by—when Chester Lao  
47:20 was here at the Board of Water Supply as the head of our Hydrology-Geology Branch. But Paul,  
47:26 I'll reach out to our Hydro-Geo Branch to see if they're—if they can get access to the model.  
47:33 I'm not sure if they're familiar with how to, how to run the model. I'll—you know,  
47:38 the other month, so they—I'm glad the Department of Health and EPA rejected the Navy's model, which  
47:44 was—didn't seem to match the field data that was collected and what's avail—what's known of the area.

47:58 **[Keri Kodama:]**  
Okay, the next question is from Christina Jedra. "Aloha, Christina Jedra with Civil Beat here. Thank you for holding this event.

48:07 I'm wondering about Board of Water Supply's reaction to DOH's news this week that the Red Hill  
48:12 contamination appears to be 'stable and possibly contracting.' Do you concur with that conclusion? I'd love to hear your thoughts."

48:19 **[Ernie Lau:]**  
Okay. Hi, Christina. I really don't know a lot about how, how they're basing those findings are—  
48:28 on, you know, what's the basis for that statement? I think—I think there's  
48:34 general consensus that there needs to be much more thorough investigation and collection of data,  
48:40 including drilling more monitor or test wells, especially in the valley area to  
48:46 understand groundwater movement and contamination movement and also the complex geology better. So  
48:54 Christina, I can't say if I agree or disagree with them, I just don't know.

49:04 **[Keri Kodama:]**  
Next question from Rosie Alegado. "Given climate projections, what options are being considered to manage demand in  
49:11 addition to encouraging conservation? For example, water reuse, stormwater recapture?"

49:17 **[Ernie Lau:]**  
You know, I have always thought that stormwater recapture, you know, and that's something that is supported by the City  
49:24 Department of Facilities Maintenance, which is responsible for the area of stormwater management.  
49:31 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  
49:43 facility, which takes treated—secondary treated wastewater at Honouliuli and actually produce more  
49:50 water for irrigation and also industrial use from there. So as that's—as the plant expands there to  
49:57 a greater capacity and secondary, we want to expand the use of recycled or reused water.

50:08 **[Keri Kodama:]**  
Okay, next from Cliff Voss. "The recent spill was not the first in Red Hill facility's history. There are at least several  
50:16 previous fuel leakages. So have there been any indications of fuel-related contamination  
50:22 at potential downstream wells, Hālawā Shaft? If not, would that make it seem safer this time?"

50:29 **[Ernie Lau:]**  
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,  
50:39 and one on the South for about eight years. And we haven't actually seen any fuel contamination yet.  
50:46 But we're concerned is that we don't know for sure that fuel contamination might not make it to  
50:52 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  
51:04 still remember taking the class at UH many many years ago and you were the professor there.

51:16 **[Keri Kodama:]**  
Okay, next is Lynn Bailey.

[Aurora Kagawa-Vivian (host):]

Sorry, Keri. There's a

51:22 different, there's a question by Sophie Cocke that's got six upvotes.

[Keri Kodama:]

Okay, I might—mine might not be updated.

51:32 [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-

51:37 Advertiser. Question for Ernie. Senator Brian Schatz said earlier today that the

51:43 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?

51:52 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

52:02 if it tried to restart Hālawa Shaft as early as this summer with daily testing as a safeguard?"

52:07 [Ernie Lau:]

You know, that is—that's very true. And maybe I can ask Erwin, Erwin Kawata from our Water Quality Division to

52:16 tell us about how long it takes from the time a sample is drawn from the source

52:21 to the time we get actual the— analysis report from the laboratory.

[Erwin Kawata:]

Yeah, the petroleum analysis takes

52:28 about four weeks to complete, three to four weeks to complete. So even if you took a sample on day

52:36 one of a month, you still have to wait that—and you took another one on day two and day three

52:41 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,

52:53 we could be incurring contamination and not know it until we receive that test results. So

52:59 while it's, you know, it's—it sounds like a feasible idea. It still takes

53:06 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

53:19 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.

53:29 By the time we got the test results that told us we should have shut the pump down 30 days ago.

53:40 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.

53:49 **[Erwin Kawata:]**

Yeah, it is difficult because the method itself has certain procedures such as the extraction procedure,

53:57 it takes 16 hours to do the extraction. So even if you could get it to the laboratory faster,

54:03 or you were to sample it every day, you still have to go through that 16 hour extraction step

54:09 to—on that sample that you collect it. So like everything, there's a certain time period that

54:14 you have to go through to complete this, each of the different steps in the analysis.

54:27 **[Keri Kodama:]**

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

**[Aurora Kagawa-Viviani:]**

Okay. I'm going to [inaudible].

54:33 **[Keri Kodama:]**

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

**[Aurora Kagawa-Viviani:]**

Heather Kerkering asks,

54:38 "Do you have any influence over tourism numbers when our water levels are low or when in a

54:44 conservation mode?" Your second question is, "Is your expectation that the contaminated groundwater

54:50 and wells will become usable in the future?" So first question is about influence of your tourism numbers during conservation.

55:00 **[Ernie Lau:]**

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

55:13 and engaging with the tourism industry to look at how they can. Even the—putting aside the tourists,

55:22 the—these hotels have a lot of properties that are large water users. So how do we make working with

55:29 the hotels to get them to be as water efficient as possible? And I think they are actively looking at

55:34 that. Then also the other part of that is how do we educate the visitors that stay at these, these

55:41 destinations and actually encourage them to, to mālama the resource, to only—to not waste it. So we

55:50 are actively engaging with them. And there is one hotel chain that I won't mention at this time

55:56 because we're still in discussion, that is totally willing to work with us. We are going to be

56:01 reaching also out to the Hawai'i Tourism Authority, and doing a presentation like this with them and

56:07 talking about water conservation with—for visitors. And there is an effort that we're

56:16 working on with the Hawai'i Community Foundation, to look at how jointly work—to work together to

56:22 educate visitors coming into our airports, as they arrive. And the benefit of that, it'll also

56:29 help educate local people that are traveling to and from the mainland or between the islands.

56:39 **[Aurora Kagawa-Viviani:]**

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  
57:09 identified. I think the volume might have been are— over 180,000 gallons of fuel. And this is over  
57:17 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  
57:32 they use today. Airplanes also use different types of fuels. So there's a variety of a mixed  
57:37 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  
58:03 so it had to go somewhere. And the thought is that it's in the vadose zone or in the unsaturated rock  
58:08 underneath the tanks. And so, is that a potential source of fuel that can be made available to  
58:15 the groundwater underneath the tanks that are next to the vadose zone, and that's a concern we have  
58:21 is that it's a source of potential contamination that could potentially get released into that  
58:28 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

58:50 or systems or are the pipes completely separate?"

**[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  
59:02 Supply, supply and backup water to the Navy. or what we call "emergency water." Those,  
59:10 those are all metered. And they also have backflow prevention devices, except for one large connection  
59:16 that is—the valves are actually closed. So there are connections, but right now I think all the  
59:24 connections in the Navy water systems have been secured, shut down. We did have one going for  
59:31 a while after the fuel contamination issue broke out in late November. It was at Mānana housing,  
59:39 around mid-November before the fuel crisis situation happened. We had already  
59:46 temporarily supplied the Mānana—Mānana housing area of the military, which is near Pearl Highlands  
59:53 Shopping Center, with temporary water service because they had a pump breakdown. We've since  
59:59 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

1:00:15 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
- 1:01:37 describe the current method for cleaning up the contaminated water from the Red Hill spill?"
- 1:01:44 **[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
- 1:01:59 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

1:03:13 of Water Supply involved in advocating for and/or developing more wastewater reuse,  
1:03:19 to reduce potable water use, especially for irrigation purposes?"

**[Ernie Lau:]**

The answer is yes. We actually

1:03:29 funded a study which we did, potentially a scalping or, you know, taking some of

1:03:34 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

1:03:45 it for irrigation on the golf course, which uses potable water right now. And if it made sense,

1:03:52 we really wanted to try to work together with Department of Environmental Services, and in

1:03:57 the Environmental Services Department—I'm sorry, Department of Enterprise Services, which operates—

1:04:03 owns and operates the golf course, ENV also, and BWS, and see if we can do that. But one of the

1:04:10 challenges we found when we surveyed the quality of the wastewater in that sewer line is that

1:04:19 during times of low tide, yeah, though, the water was suitable for irrigation uses. But

1:04:24 at high tide, the salinity levels went so high, you couldn't use it for irrigation. So given the

1:04:32 fact that we're facing sea-level rise, that situation probably would get worse over time.

1:04:38 So that project, which was only a feasibility study, we couldn't, we didn't proceed on it.

1:04:45 But we want to look for more opportunities for that, in working—in partnership with ENV.

1:04:52 **[Aurora Kagawa-Viviani :]**

There's still many many questions in the chat. So I'm

1:05:00 in the Q&A, so I'm trying to keep up. But then Bailey asks another question, and again for the audience,

1:05:07 please upvote questions you really want to hear answered. When Bailey asked, "Under what

1:05:13 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

1:05:21 question many times and a simple answers is, one, I'm absolutely sure if I turn on those wells,

1:05:28 there's no chance that fuel tainted water will get into our water system to our customers.

1:05:41 I mean, that's my answer. Thanks, Aurora.

**[Aurora Kagawa-Viviani:]**

Jonathan Scheuer asked, "Understanding

1:05:47 this is less of a BWS issue than a Commission on Water Resource Management issue:

1:05:53 Who, if anyone, is monitoring these transforming pumping regimes for their effects on

1:06:02 springs along the shores of Pu'uloa, both in terms of quality and quantity?"

**[Ernie Lau:]**

Hi, Jonathan. I don't know the question—

1:06:11 answer to that. And I also grew up on the shores of Pu'uloa in Waipahu. But I'm not sure.

1:06:31 **[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

1:06:43 I'll ask and you choose. "Some of the spills happened tens of years ago. The Hālawā Shaft has been pumping

1:06:48 continuously for a long time. So wouldn't the fuel contamination have already reached there

1:06:54 by now from previous spills? And why the extra care this time by shutting it down?"

1:06:59 **[Ernie Lau:]**  
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,

1:07:12 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

1:07:22 for a northerly flow there. And also the contamination of the aquifer occurred even a

1:07:29 half-a-mile away at Red Hill Shaft, which is closer to being the other side of the valley so.

1:07:37 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

1:07:48 being served to people in their homes, and the impact they had on their families, on their lives.

1:07:56 It was a terrible thing.

1:08:03 **[Aurora Kagawa-Viviani:]**  
Thank you. There's a question from Lisa Marten

1:08:10 about grey water reuse. Her perception is that, "I thought grey water reuse was illegal on O'ahu

1:08:18 relating to individual properties using their own grey water, not centrally treated wastewater.

1:08:25 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?

1:08:37 **[Ernie Lau:]**  
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

1:08:47 is discussions with the Department of Health that we were participating in, and also changes to the,

1:08:54 I think, to the plumbing code that is gonna allow more of this to happen easily.

1:09:01 **[Aurora Kagawa-Viviani:]**  
Yeah, she clarified. I misinterpreted her question. She is interested in how to change the law that makes greywater reuse illegal. So you said it would be in the plumbing code?

1:09:10 **[Ernie Lau:]**  
Representative Marten, you know, we can read— please reach out to us, send me an email and/or Kathleen an email, and we can follow up with you

1:09:20 and give you a better understanding of where the discussions are on greywater reuse in buildings.

1:09:29 **[Aurora Kagawa-Viviani:]**  
Okay. Dayananda Vithanage,

1:09:38 I apologize if I've mispronounced your name, asked, "What is the potential impact

1:09:43 on water costs if Board of Water Supply has to get 10% of its water through desalination?"

1:09:52 **[Ernie Lau:]**  
Wow, 10%. That's on an average day basis, that'll be like 14.5 MGD. The plant we're looking at

1:10:01 is about 1.7, with an ability to expand it at 5. We'd have to evaluate the cost because

1:10:08 I think the point she's trying to raise is really, desalinated seawater is very expensive water.

1:10:14 The cheapest water is really groundwater. Drilling a well, tapping in an aquifer, and at most maybe having  
1:10:21 to chlorinate the water before we send it to our customers. That is the cheapest cost per gallon.  
1:10:27 And probably the lowest energy use except for our tunnels sources, which don't need energy to flow.  
1:10:35 But we'd have to evaluate that if we have to go down that road on how we're going to have to  
1:10:41 pay for it because Board of Water Supply, we're financially self-sufficient. We don't get any  
1:10:48 property tax revenue. We basically operate and maintain and improve the water system based on  
1:10:54 people paying their water bills and paying various charges related to the—to the water service.

1:11:09 **[Aurora Kagawa-Viviani :]**  
There was a question from Puakea Mo'okini-Oliveira. "When we talk about 'flushing,' quote, unquote,  
1:11:17 'flushing the systems,' are we saying water is being discharged into nearshore/offshore environments?  
1:11:22 If so, is there working group established on monitoring the potential effects?"

1:11:28 **[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.

1:11:38 That might be a good one to save for the Department of Health, next month.

1:11:46 **[Aurora Kagawa-Viviani:]**  
James Wollbrinck asks, and I'm going to wrap it up, maybe there's this and one more question. But  
1:11:54 James Wollbrinck asked, "Does the state opening up for travel cause it—cause an increase  
1:12:03 in 2020 to over 2021?" I think it relates to water demand. So has the change in travel produced  
1:12:13 a change in water demand that you've seen since the pandemic?

**[Ernie Lau:]**  
Yeah, it's, it's really hard to  
1:12:20 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.

1:12:30 But when we looked at—I can, I know the experience from the pandemic on March 20th, 2020,  
1:12:38 when tourism was shut down, in Waikīkī itself, I think we saw the water demand dropped by like  
1:12:44 3 million gallons a day less. They still had to use water because they have large buildings and  
1:12:51 landscaping and facilities that still requires water use, but less. No, but no visitors in that.  
1:12:58 And the workers that worked in Waikīkī, now were back at home, sheltering in place.

1:13:04 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  
1:13:16 to more normal conditions pretty rapidly. So the increase in tourism, it's going to be hard to say.  
1:13:25 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—  
1:13:36 additionally use. We could go property by property and look at occupancy and water  
1:13:43 usage property by property and something, that might be something we'll looking at.

1:13:48 **[Aurora Kagawa-Viviani:]**  
Okay, and this is the last question. I apologize to those who are—whose questions were answered,  
1:13:54 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  
1:14:06 to deal with the potential of a water shortage in the summer? Are there any world specialists  
1:14:11 being hired to pursue solutions that might be used if we cannot meet the daily water needs?"

**[Ernie Lau:]**

With, you know, we are

1:14:21 looking at options and experiences from other states too. You know, we have a consultant that's  
1:14:28 very familiar with California's experience when California has been in prolonged drought,  
1:14:34 to come—look at their ideas of what worked for those communities and see if some of that can be  
1:14:42 applied here. But we're, we're not at this point of hiring an expert. I am considering though,  
1:14:50 a creation of a special advisory group of different stakeholders that have a very important concern or  
1:14:59 related to availability of water and water restrictions that might come into effect. So  
1:15:06 I'm thinking about considering establishing formally a stakeholder group  
1:15:14 related to this Red Hill situation that could help give us advice and thoughts and feedback on various  
approaches that we might take.

1:15:23 **[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

1:15:36 our water supply. And thank you very much for taking time out at this really busy time  
1:15:42 to share your knowledge with us, with all of us. Thanks to everyone. Thanks, everyone for  
1:15:48 tuning in for this important seminar and hope to see you in our future seminars. Thank you.

**[Ernie Lau:]**

Aloha, everybody.

1:15:56 **[Keri Kodama:]**

Thank you.

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