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BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAII

In the Matter of the Petition of LANAI RESORT PARTNERS, To Consider an Order to Show Cause as to whether certain land located at Manele, Lanai, should revert to its former Agricultural and/or Rural land use classification or be changed to a more appropriate classification due to Petitioner's failure to comply with condition No. 10 of the Land Use Commission's Findings of Fact, Conclusions of Law, and Decision and Order filed April 16, 1991. Tax Map Key No.: 4-9-02: Por. 49 (Formerly Tax Map Key No. 4-9-02: Por. 1)	Docket No. A89-649 INTERVENOR LANAIANS FOR SENSIBLE GROWTH'S SUBMISSION OF TESTIMONY OF WILLIAM MEYER; EXHIBITS "A" and "B"; CERTIFICATE OF SERVICE

INTERVENOR LANAIANS FOR SENSIBLE GROWTH'S SUBMISSION OF TESTIMONY OF WILLIAM MEYER

Pursuant to Minute Order No. 2 filed July 6, 2016, Intervenor Lanaians For Sensible Growth hereby submits the expert testimony of William Meyer, attached hereto as Exhibits "A" and "B."

DATED: Honolulu, Hawaii, September 1, 2016.

DAVID KAUILA KOPPER
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EXHIBIT I-16

TESTIMONY OF BILL MEYER

Q. What is your name and address?

A. I am William Meyer. I live in Prescott, Arizona at 13709 Forked Trail, Prescott, AZ 86305.

Q. What is your current occupation?

A. I am a hydrologist by training and am now retired from the U.S. Geological Survey Office, where I worked for 38 years between 1961 and 1999. When I retired in 1999, I was the Hawai'i District Chief for that office.

Q. Did you provide a copy of the resume attached for this commission to consider as part of your testimony?

A. Yes, I have attached a copy of my resume as Exh. LSG-016-R, which truly represents a summary of my educational and professional background and training.

Q. Have you been previously qualified as an expert in hydrology before in any proceeding?

A. This Commission qualified me as an expert in hydrology during the 1993-96 proceedings it held in this current docket. In addition, the State Commission on Water Resources Management has qualified me as an expert in hydrology in various proceedings before it. For example, I testified as a hydrological expert in the Waiahole contested case hearings on issues before it involving: (1) the amendment of interim instream flow standards and water use permits to authorize the use of water from Windward O'ahu streams and (2) the Waiola and Kukui Molokai, Inc. contested case hearings involving the applications for ground water use from the Kualapu'u aquifer on the island of Moloka'i.

EXHIBIT A

Q. Do you have a master's degree in hydrology?

A. Yes, from the University of Arizona.

Q. What does your training allow you to do?

A. My hydrological training covers a wide area of study and disciplines. Perhaps the most relevant training is the use of mathematical models to assist in the prediction of the effects of ground water pumping a well on ground-water levels and other characteristics of a ground water flow.

Q. What is the relevance of your training, skills, and background to the issues presented in this proceeding?

A. This commission is being asked to determine whether Condition #10 of the decision in this docket was violated. The issues boil down to (1) whether chloride content alone is determinative of water potability, i.e., whether humans can consume it; (2) whether the water in wells located in the Palawai Basin on Lana`i contain potable water; (3) whether the wells from which water is being drawn to irrigate the golf course and landscaping at Manele are from the high level aquifer; and (4) whether water of less than 250 mg/l is being taken from the wells in the Palawai Basin because it is being drawn from other sources from higher wells that serve as the source of potable water for the residents of Lana`i.

My training in hydrology allows me to address each of these issues hopefully to assist this commission in resolving the issues in this docket. These are subject areas that are not commonly known to the general public which require some degree of specialization to fully appreciate. In fact, I would say that there are common misunderstandings related to these issues that could easily confuse commission members

unless they fully appreciate the dynamics of ground water hydrology. I can offer some help in addressing these issues because of my particular education, training, and work experience.

Q. Does the chloride content of water alone determine whether the water is potable?

A. Chloride content does not determine potability. Potable water is water that is considered by the United States Environmental Protection Agency (EPA) to be safe to drink. The EPA has identified contaminants that make water unsafe to drink and established maximum contaminant levels (MCL) for concentration of each of these contaminants in drinking water. Chloride is not considered to be a contaminant that makes water unsafe to drink. There is no national or State of Hawaii MCL for chloride concentration in water. By definition then, chloride content does not determine whether water is potable or non-potable. The chloride content of water at all extraction sites on Lana`i, except from Palawai Basin is generally less than 30 mg/l and overall water quality is excellent. However, I note that the most recent records of pumping and chloride readings from well 1 indicates that chlorides have dropped from the historic high of over 816 mg/l in 1948 to under 274 mg/l for the first time at the end of 2005.

Q. What is the impact of not having national or State of Hawaii MCL for chloride concentration in water?

A. Because chloride content is not considered to be a contaminant that makes water non-potable or unsafe to drink, all the water in wells located in the Palawai Basin is potable, even when they have elevated levels of chloride that appear to be falling as more water is pumped out of the basin. I have seen no evidence since entering this case

as an expert of contaminant levels in this water that render it non-potable. The company using this water certainly has not produced any evidence that the water it is using to irrigate its golf course at Manele is non-potable.

The EPA considers a chloride content of 250 mgl to be a secondary standard for drinking water. This still means that water with a chloride content equal to or greater than 250 mgl is considered to be safe to drink. Secondary standards are set in consideration of water order or taste. The secondary standard of 250 mgl for chloride is based on the fact that higher concentrations of chloride are detectable by taste to some individuals, but even at the relatively higher concentrations of chlorides in wells 9 and 14, there is no reason that the water from these wells cannot be used for human consumption as it is. The potential that some individuals might consider the water to be salty can be easily addressed by combining or blending the water from the two wells with other water having a lower chloride content. After all, Maui County does exactly that by blending the high chloride water from wells in Lahaina with other lower chloride water and delivering that blended water for consumption by residents in that area. Nothing in county, state, or federal law prevents the county board of water supply from providing this water to these residents. The chloride content of water from well 1 is certainly within acceptable limits for human consumption without worrying about taste.

Q. Is there any doubt that wells 1, 9 and 14 are in the high level aquifer?

A. No. All the experts who have testified in this case agree that wells 1 and 9 are in the high level aquifer. I don't think there is much doubt that well 14 is also similarly located in the aquifer.

Q. Are any of these well sources "alternate sources" as condition #10 requires?

A. Based on the testimony of James Kumagai, who the company retained as its water expert, none of these sources meet his definition of "alternate sources". See, Transcript, 7/12/90 at 117:15 to 118:23[1] (Kumagai, describing what are alternate sources outside the high level aquifer for Manele golf course irrigation); Tr. 3/9/90 at 77:13 to 78:22 (Leppert, assuring use of only alternate sources of Manele golf course irrigation water, including effluent). Moreover, Tom Nance provided a diagram which clearly depicts these wells within the high level aquifer. See, Exhibit LSG-025-R.

Q. Is it clear that the company knew what was the high level aquifer from which no water was to be taken under Condition #10 of the 1991 LUC order?

A. It was company representatives who actually defined what would be "alternate sources" outside the high level aquifer which would be tapped for Manele golf course irrigation water. Tom Leppert and James Kumagai were very clear on what constituted the "alternate sources" to which the company was going to be limited under the condition. Tr. 3/9/90 at 139:22 to 141:4 (Leppert verifying company plans to search for alternate sources of irrigation water); Tr. 7/12/90 at 143:18 to 144:7; at 144:21 to 145:9 (Kumagai describing plans for finding alternate sources of irrigation water outside high level aquifer); Tr. 7/12/90 at 193:10 to 194:25 (Kumagai affirming planned use of effluent to irrigate Manele golf course); Tr. 7/12/90 at 195:1 to 196:8 (Kumagai describing plans to locate alternate sources for Manele golf course irrigation); Tr. 7/13/90 at 5:12 to 6:3 (Kumagai describing availability of nonpotable alternative water sources

[1] References are to the page and line numbers (page:line numbers) of the identified transcript (by date).

outside high level aquifer which haven't been found yet); Tr. 7/13/90 at 12:21 to 13:13 (Kumagai on likelihood of developing alternate sources in time for irrigating constructed Manele golf course – with exceptional effort); Tr. 7/12/90 at 31:18 to 32:20 (Kumagai on availability of brackish water from "lens" outside high level aquifer).

Q. In his December 16, 1994 testimony to this commission, Tom Nance called your statement that the drop in chloride levels in wells 1 meant that more than half the water taken from well 1 was potable "silly". Tr. 12/16/94, 153:20-21. Mr. Nance also disagreed "unequivocably" with former CWRM chair Keith Ahue's conclusion that more than half the water taken from well 1 during that time its chloride level fell from 800 mg/l to the mid-300 mg/l was potable water taken from higher elevation drinking water wells in Lana'i's high level aquifer. *Id.* at 153:22-25. Specifically, he says:

> That's numerically ridiculous. If you get water which is a mixture of saltwater and fresh water, saltwater is 18,600 milligrams per liter of chloride. What you are going to find is that the 800 milligrams per liter of water was probably 90, 92, 93 percent fresh water and the rest seawater, and 300 milligrams per liter water is 95, 96 percent fresh water and the balance is seawater, so the difference is a couple percent.

What is your response to this testimony?

A. I think he is wrong. Water of less than 250 mg/l is being taken from the wells in the Palawai Basin because it is being drawn from sources from higher wells that serve as the source of potable water for the residents of Lana'i. There is a general movement of water from the center of the island toward the ocean with water flowing from areas of high ground-water levels to areas of lower water levels. In the high level aquifer, water flows from dike compartments with high water levels to those with lower water levels as part of this movement.

The rate of movement of water between dike compartments is, in part controlled by the different water levels between the dike compartments. The greater the difference in water levels the greater the rate of subterranean movement, other things being equal.

Ground-water pumpage from wells 1, 9, and 14 has caused water levels in the dike compartments these well are located to be lower than they would be naturally. That increases the difference between the upper level drinking well water levels and the lower level Palawai Basin wells 1, 9 and 14. This dynamic causes greater amounts of water to flow to these lower level compartments from the surrounding area than would naturally occur. Thus, indisputable drinking water located in the higher elevation wells on Lana'i naturally flow toward and replace the water being taken out of wells 1, 9, and 14. The laws of physics cannot be clearer. If you acknowledge that there is a hydrologic interconnection between the upper water level of the high level aquifer and the lower water levels of the Palawai Basin, you cannot logically deny that continued pumping from wells 1, 9, and 14 increases the rate of movement of water from the higher level to the lower level than would naturally be the case.

Q. Mr. Nance offers the explanation that the amount of water flowing into wells 1, 9 and 14 is explained by the presence of sea water contributing to the chloride content of water in those wells. How do you react to this explanation?

A. Strangely, if Mr. Nance's argument is closely examined, it turns out that he is literally saying that much more than 50 percent of the water being pumped from well 1 is freshwater for chloride concentration of the water pumped from the well equal to both 800 and 300 mgl. As stated by Mr. Nance, for a chloride concentration of 800 mgl, somewhere between 90 to 93 percent of the water being pumped from well 1 was

freshwater. The remainder was seawater. For a chloride content of 300 mgl, the freshwater contribution to the well was 95 to 96 percent of the pumped water. The remainder was seawater.

In any case, Mr. Nance's premise concerning the cause of relatively high chloride content in well 1 is incorrect. The presence of relatively high chloride content in wells 1, 9, and 14 as compared to other wells in the high level aquifer is most likely the result geothermal activity. The presence of geothermal activity is demonstrated by the relatively high temperature of the water in wells 1, 9, and 14 as compared to the other wells in the high level aquifer. The initial chloride content of water at well 1 in 1948 was 816 mg/l in 1948. In contrast, the normal chloride content of water in the high level aquifer being currently used for drinking water is closer to 30 mgl. By the company's own records, the chloride content of the water withdrawn from well 1 had fallen to 274 mg/l by the end of 2005.

This reduction could only be the result of water with much lower chloride content than that in the vicinity of well no. 1 flowing to the well in response to pumpage from it. The amount of water reaching the well had to have increased over time, thereby lowering the chloride content over time at the well which has been the process actually observed..

In order to reduce the chloride content of water pumped from well no. 1 from 816 mgl to 286 mgl, the percentage of water at 30 mgl being withdrawn from the well, as it moves down slope as pumping in the Palawai Basin continues, has increased from an initial value of zero to a present value of about 67 percent of the water being pumped.

The amount of water with a chloride content of about 30 mgl entering wells 9, and 14 is also increasing over time as shown by the decrease in chloride content that has

occurred at these wells over 2005. Chloride content at wells 1, 9, and 14 may be expected to continue to decrease as an even greater amount of water with a chloride content of about 30 mgl is diverted to these wells in response to their continued pumpage.

Q. Could the presence of sea water intrusion explain the presence of sea water in wells 1, 9, and 14?

A. Nance assumes that seawater is the source of the high chloride content. Thus the well would be pumping water from the transition zone between freshwater and seawater. He discounts the addition of freshwater as the reason for the chloride content declining in the well. As he states,

> What you are going to find is that the 800 milligrams per liter of water was probably 90, 92, 93 percent fresh water and the rest seawater, and 300 milligrams per liter water is 95, 96 percent fresh water and the balance is seawater, so the difference is a couple percent.

His reasoning cannot be sustained by the laws of physics. The point here is that the well is not pumping from the transition zone. If this were true the chloride content in the well would INCREASE, NOT DECREASE as the well is pumped. Instead, the evidence shows the chloride levels in wells 1, 9, and 14 steadily decreasing over time as water is pumped. If there was sea water intruding into the bottom of these wells, the only logical consequence is chloride readings increasing, not decreasing. As a hydrologist, I simply cannot fathom how he believes that lowering of the chloride content at the three wells that has occurred over time supports his view that the well is pumping from the transition zone; nor can I fathom Mr. Nance's attempts to deny the logic of water moving from higher level well sources to the lower level sources in the Palawai Basin as the reason for the decrease in chloride content at the three wells.

Q. Can you think of any other precedent for what is happening on Lana'i as it relates to the possible connection between sea water and increasing chlorides in an operational well in a high level aquifer?

A. As suggested by Mink, no other well in Hawaii in a high level aquifer with a water elevation of more than 800 feet has been known to be affected by sea water contamination. It is more likely that the high chloride content in well no. 1, 9 and 14 is derived from geothermal activity in the Palawai Basin and therefore the high chloride water is restricted to this area.

Q. Do you have any doubt that potable water is the primary constituent of the water being pumped from wells 1, 9, and 14?

A. Frankly, because there is no evidence that there is a contaminate in the water being pumped from those wells that exceeds U.S. EPA or the State of Hawaii standards for drinking water, all of the water being pumped is potable. The level of chlorides being recorded in those wells are irrelevant to that inquiry.

Even if the secondary standard for chloride content of 250 mg/l is applied, mixing of water from wells 1, 9, and 14 with higher level water of approximately 30 mg/l from the same sources now being tapped for the drinking water of the island residents will render water from these three wells completely acceptable for drinking purposes. That mixing of the waters from wells 1, 9, and 14 with that from the other wells in the high level aquifer will reduce the chloride content of the resultant water is a fact that cannot be denied hydrologically.

Thus, whether you look at the situation from the point of view of potability standards or the movement of ground water, the company is using potable water by tapping the ground water from wells 1, 9, and 14.

Q. Can the LUC find comfort in the presumption that the sustainable yield of the Lana'i High Level Aquifer (which includes the Palawai Basin) in the State's Water Resources Protection Plan (WRPP) is 6.0 mgd and that current usage is less than half of that amount?

A. With respect to the sustainable yield of Lana'i's water supply, I would leave this Commission with one cautionary note. As stated in the WRPP, "sustainable yield is calculated as the total supply developable. In most cases the estimate would be potable where optimal extraction techniques were employed, meaning location and depth of wells, but in some instances none of the estimate would be potable." (p.V-3). It is crucial to any understanding of the ground water supply on Lana'i to remember that the amount and spacing of wells is the key to any reliance on the sustainable yield of the island.

Whether one wants to claim that pumpage from the Palawai Basin is potable or non-potable, it still must count against the sustainable yield of the High Level Aquifer. Moreover, the current configuration of wells on the island can allow for the extraction of only about 3 MGD. To expand that potential yield, one must not only increase the number of wells and properly space them to achieve a higher yield, while also account for any unknown limitations, like the potential contamination of those other sources. Until one measures the water quality of those future sources and the hydrological changes that

occur, one cannot be certain of the reliability of obtaining a given amount of water from any future water wells developed.

Q. Are you aware of a Master's degree in civil engineering that features a "specialty in hydrology" from any academic institution in the country?

A. I cannot say what constitutes a "specialty in hydrology" for one holding a master's degree in engineering, as Mr. Nance testified he has. Tr. 12/16/94, 109:20-25. I haven't heard of that qualification except in this context.

Q. Can decades of experience make up for the absence of credentials of the limited coursework in hydrology, short of an actual degree in hydrology?

A. Certainly work experience can help one toward acquiring more knowledge about hydrology. However, that experience is only relevant if it involves the study of field conditions that match what you are claiming to be qualified to assess. In the case of Lana`i, a hydrologist is dealing with a very unique geological setting, where you have an ancient caldera as the central feature of the hydrology being examined. That geology has unique features that affect the dynamics of that hydrology. My concern is that no matter what amount of experience you might have with other parts of Hawai`i, where basal aquifers are more commonly the water sources being examined, an untrained eye may not appreciate the nuances unique to a caldera overlying water sources.

I have received the formal training on geological features like a caldera which affects any analysis of the underlying hydrology. Without that training, one could easily misinterpret data from such a source. For example, I believe Mr. Nance has misinterpreted the chloride data attributable to wells 1, 9, and 14.

WILLIAM MEYER, Ph.D.

called as a witness at the instance of Intervenor, being previously sworn to tell the truth, the whole truth, and nothing but the truth, was examined and testified as follows:

EXAMINATION

BY MR. MURAKAMI:

Q Would you state your name, address for the record, please?

A My name and address?

Q Yes.

A My name is William Meyer. My work address is 677 Ala Moana Boulevard, Room 415.

Q Mr. Meyer, you have been here for the testimony of Roy Hardy, were you not?

A Yes.

Q In general do you agree with the contents of his testimony tonight?

A Yes, I do.

Q Directing your attention to his testimony about the pumping levels that I asked him to calculate, would you agree that that set of information could be helpful to providing more information on the prediction of what the pumping level would be for the wells involved under scenario six?

A Yes. I would agree that it would be helpful for

EXHIBIT B

doing that, yes.

Q He stated that he was not quite sure whether he could do that given limitations on the study with respect to, I think, the regional nature of the drawdown and the individual well's efficiency.

Would those constraints limit the value of that information in terms of its predictive value?

A I guess it's two thoughts on that. One is I believe can you take the model predicted water levels and use those predicted water levels to calculate a theoretical drawdown in a well? And the answer to that is yes you can.

The second part of that question is having calculated the theoretical drawdown in the well can you then calculate the actual drawdown in the well which would require knowing the efficiency of the well.

And Roy was, I believe, saying the efficiency of one well varies, of wells vary. A rough rule of thumb is that a well is only 50 percent efficient. meaning you take the model predicted drawdown at 2,000 square foot and double it and that is a way of accomplishing that. It's acceptable.

Q From a layman's standpoint how would you best explain why there would be a further drawdown for predicting the pumping levels?

A Roy did actually, I think, a good job of that in a way. He was talking about the fact the model predicts the

drawdown of the water level in a 2,000 square foot node in the model. And that the well was only a foot or two in diameter. It's not 2,000 foot square. So as the water goes from the 2,000 foot square node into a 1 or 2-foot area, it has to speed up very fast going through that small area. That causes it to lose energy which causes the water level to drop.

Q Is that what is generally known as the cone of depression in hydrological terms?

A No. It's that strictly well efficiency. Happens right around the well.

Q The question of potability has come up. There seems to be some confusion about what guidelines apply. Is there a potability standard by which this Commission can judge whether or not potable water is being used or not?

A In my mind, yes. I think that was addressed with some of the last questions of Roy. I think that to my knowledge in the industry the standard that is used is the EPA standard where they have, they have values for what they call primary standards for certain chemical constituent standards. If you see those values you do not have potable water.

They have what they call secondary standards. You can exceed those standards. It has nothing to do with whether the water is potable, drinkable, useable or not.

Chlorides are a secondary standard. Under EPA guidelines chlorides would never be used to say whether the

water was potable or not. The guidelines used in the United States are the EPA standards. You're required to use it. States can use tougher standards but they must use at least those standards.

Q Has the state Department of Health adopted a stricter standard?

A With regard to some chemical constituents, yes. They have no standards with regard to chlorides which are the same as EPA has.

Q Again chlorides alone would not determine potability for water?

A Chlorides do not determine potability.

Q And it is true, is it not, that there are Maui wells there are currently being used for drinking water that exceed 400 parts per million?

A Oh, yes. They have been for years.

Q Now, with respect to the discussion on recharge, what is your concern about the applicability of the fog drip assumptions made in this model?

A I don't know that I have a concern. But I think Roy touched upon it. The model is very sensitive to recharge in general.

Of all the recharge calculations -- well, there's two separate recharge calculations. One is percipitation and the methodology used for that is very standard.

The second part of the recharge calculation is fog drip. There's no standard method for calculating fog drip. The fog drip that's used in the model, for instance, is based on three years of data essentially cut to maybe about under one tree.

So that doesn't necessarily tell you what's going on in the whole area during that time, and you don't know whether the area has changed over time. So the fog drip is the weak link in the model in my estimation.

The model used the Eckhart's data faithfully and the best it can be done. There's been testimony while I have been here that forest cover has decreased since his study. If that's true then fog drip has decreased.

Q Would it be a reasonable condition of this Commission to require better data on fog drip through a new study updating this model?

A Yes. Yeah. Roy said everybody not just hydrologists wants more data. Doctors want more patients but yes.

Q What about the recommendation concerning gathering information through test wells?

A That would be desirable in the sense that the high-level area's expanded considerably as was discussed by Roy. And the model has high water in levels where we have no water level data other than our supposition that they should be

there and the model predicts they are there.

We have no data to really support that so that would reinforce the model's calculations also.

Q Would the simple fact the expansion of the recharge area as apparently has been calculated give cause to this Commission to be less concerned about the amount of water available on this island for use?

A No, not at all.

Q Why is that?

A Well, I think when you go through Roy's scenarios as was just done, you're still left with in order to tap the resource would require a significant number of wells. If fog drip changes from what the model says it is, the model predictions would be high. And you still aren't dealing with much different numbers than, and questions to those numbers, than you were before, actually.

Q So the size of this recharge area, if it gets bigger, doesn't necessarily mean there's more water and we can be less vigilant on the limitations on water supply on this island?

A Well, as the size gets bigger there's obviously more water. It probably would be better to say the earlier estimate had such a small area for a large amount of water that probably wasn't there. If you just stuck with that small area.

Q But just to kind of make sure I understand the last

point, is, is it more relevant to be concerned about the size of the recharge area than how wells are spaced in order to achieve maximum sustainable yield?

A The latter is the important subject. The model allows you to predict the probable spacing of wells necessary to develop a certain amount of water. Knowing recharge value doesn't allow you to do that at all.

Q Turning to the model, is it under the standards of the profession of hydrology reasonable to make predictions based on 18 days of pump testing data?

A As compared to the model?

Q Yes, as compared to the model.

A Well, the standard, as I'm aware of the standard techniques used within the industry models are the standard. Eighteen days aquifer tests are used with some fear because they only tell you what happened for 18 days.

Q How about six months?

A As this model points out the system takes decades and perhaps hundreds of years to respond to pumpage. That's what you need to know and 18 days doesn't approach decades or hundreds of years.

Q How would you explain the inconsistency between that period of time which effects are detected in the model and the changes in salinity that occurred in Well 1 over a much shorter period of time in the past 20 years where chloride levels

dropped by about one half?

A Well, for the chloride levels to drop by one half or by any amount, if you're pumping a well at a certain chloride concentration and the chloride concentrations begin to decrease, what that means is that water that's come into the well that now has lower chloride concentrations.

If you look at the model results and they say, okay, it may take ten years for a water level to decline to reach Well 4 or some other well that's fine, but you must remember all water in between the well you're pumping, let's say, is getting into Well 1 before you see a response to Well 4. It's worked its way up into the upgradient area over time.

Q So the movement of the water in between the wells might proceed at a different and much faster rate than the lowering of water wells in the upgradient potable water well source?

A It isn't that it's proceeding faster, it just hasn't gotten up there yet.

Q There's been much criticism leveled by the company about the value of relying on mathematical modeling as a tool for prediction. Statements have been made that this impact has been overrated, I think was the term used.

What can you say about the standard utilized by this model in coming up with the predictions it has in this particular instance?

A I think this model is the best means of attempting to predict how this, how the groundwater system on this island will respond to pumpage. And that it allows you to make that prediction for any distribution of wells you may choose to try to make. Without this model I don't think you can make those predictions.

Q So given your knowledge of the profession of hydrology is there any consensus that groundwater modeling under the term of hydrology utilized here is either overrated or something that should not be utilized in making predictions it has?

A Again, groundwater modeling is the standard for the industry. In colleges they teach well hydraulics, for instance, running a well test as almost an introductory course. Modeling is an advanced course that you have to learn additional things to get to. That's what they want you do leave school with that ability so you can make models.

MR. MURAKAMI: Thank you. That's all I have.

CHAIRPERSON: Petitioner?

CROSS-EXAMINATION

BY MR. FUNAKI:

Q Mr. Meyer, you had mentioned that the fog drip is the weak link in this model?

A I don't know that that was my words but if it was, it is a weak link in the sense that it's one of the least.

Q Roy Hardy had testified that the fog drip estimate in the model was the best estimate from current available information. Do you have any other information that would contest the 1800 MGD is not the correct fog drip estimate?

A Yeah, again the fact that when the fog drip estimates were made there's been some testimony to the effect that the forest cover has been reduced by, I believe, as much as 25 percent. That could change the numbers that we used in the model. The model used the number at that time which is all that we could do. We had no way to say we'll have a 25 percent reduction.

Q Are you personally familiar with any studies that's shown there's been a decrease in forest cover?

A Not personally no. Just testimony.

Q Your testimony is not to change the facts and findings and conclusions of the water model?

A I don't think my testimony does that. I think I pointed out these caveats.

Q So you don't dispute what's in the findings and conclusions?

A No.

MR. FUNAKI: Thank you.

CHAIRPERSON: Maui?

MR. ZAKIAN: No questions.

CHAIRPERSON: OSP?

CROSS-EXAMINATION

BY MS. OGATA-DEAL:

Q Do you agree with the conclusion of the study on page 124 and 125 that states that "It is clear that the estimated groundwater recharge to the entire island is more than previously estimated"?

A Yes, I agree with that.

MS. OGATA-DEAL: Thank you.

CHAIRPERSON: That's it? Commissioners? Again from all of us I'd like to extend a big mahalo to you for your participation in this particular issue and your continuing sharing of the information that you have provided. I think it has given us a better basis to understand what we have to address. Thanks, Dr. Meyer.

THE WITNESS: It's been my pleasure.

CHAIRPERSON: All right. Then I think since we have pretty much wrapped up what we have come here to do, we will adjourn this evening's proceedings at this time and reconvene tomorrow morning about 9:30 to respond to additional testimony, if required, by Mr. Hardy, and then the Commission has some non-related matters we have to take care of.

MR. MURAKAMI: Mr. Chairman, I brought up in the prehearing a concern about the inconsistency in the figures reflecting the inflow to the Manele golf reservoir and the outflow. And the Answers to the Interrogatories as far as I

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAII

In the Matter of the Petition of	)	Docket No. A89-649
	)	
LANAI RESORT PARTNERS,	)	CERTIFICATE OF SERVICE
	)	
To Consider an Order to Show Cause as to whether certain land located at Manele, Lanai, should revert to its former Agricultural and/or Rural land use classification or be changed to a more appropriate classification due to Petitioner's failure to comply with condition No. 10 of the Land Use Commission's Findings of Fact, Conclusions of Law, and Decision and Order filed April 16, 1991.	)	
	)	
Tax Map Key No.: 4-9-02: Por. 49 (Formerly Tax Map Key No. 4-9-02: Por. 1)	)	
	)	

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing document was served upon the following parties at their last known address by U.S. Mail, postage pre-paid on September 1, 2016.

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