BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

CALIFORNIA WATERFIX WATER RIGHT CHANGE PETITION HEARING	)))

JOE SERNA, JR. BUILDING

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

BYRON SHER AUDITORIUM

1001 I STREET

SECOND FLOOR

SACRAMENTO CALIFORNIA

PART 1B

Thursday, November 3, 2016

9:00 A.M.

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Reported By: Deborah Fuqua, CSR No. 1248

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APPEARANCES:

CALIFORNIA WATER RESOURCES BOARD

Division of Water Rights

Board Members Present

Tam Doduc, Co-Hearing Officer:
Felicia Marcus, Chair and Co-Hearing Officer:
Dorene D'Adamo, Board Member

Staff Present

Diane Riddle, Environmental Program Manager
Dana Heinrich, Senior Staff Attorney
Samantha Olson, Senior Staff Attorney
Kyle Ochenduzsko, Senior Water Resources Control Engr.
Jean McCue
Jason Baker

For California Department of Water Resources

James (Tripp) Mizell, Senior Attorney

Duane Morris, LLP
By: Thomas Martin Berliner, Attorney at Law
Jolie-Anne Ansley, Attorney at Law

U.S. Department of the Interior, Bureau Reclamation,
and Fish and Wildlife Service
Amy Aufdemberge, Assistant Regional Solicitor

State Water Contractors

Stefanie Morris
Adam Kear
Becky Sheehan

(Continued)

APPEARANCES (continued)

Central Delta Water Agency, South Delta Water Agency, Lafayette Ranch, Heritage Lands Inc., Mark Bachetti Farms and Rudy Mussi Investments L.P.
John Herrick

Sacramento County Regional Sanitation District
Andrew Hitchings

Restore the Delta
Trent Orr
Yana Garcia
Barbara Barrigan-Parilla

East Bay Municipal Utilities District (EBMUD)
Fred Etheridge
Shawnda Grady

Islands, Inc. And Local Agencies of the North Delta; Bogle Vineyards/Delta Watershed Landowner Coalition; Diablo Vineyards and Brad Lange; Stillwater Orchards; Daniel Wilson
Osha Meserve
Michael Van Zandt

City of Stockton
Kelley Taber
Hanspeter Walter

California Sport Fishing Protection Alliance
Jackson

County of San Joaquin
Thomas Keeling

I N D E X

(All exhibits to be identified and admitted at the end of Joint Panel 1)

Thusday, November 3, 2016 9:00 a.m.

PROCEEDINGS

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CO-HEARING OFFICER DODUC: Good morning, everyone. It is 9:00 o'clock. Welcome back to this Water Rights Change Petition Hearing for the California WaterFix project.

I am Tam Doduc. With me here today are, to my right, Board Chair Felicia Marcus. I expect we'll be joined shortly by Board Member DeeDee D'Adamo. To my left are Dana Heinrich, Diane Riddle, and Kyle Ochenduzsko. We're also being assisted by Mr. Baker today, and I expect Ms. McCue later today.

Go Cubs! You are very fortunate because you now have a Hearing Officer who is in a very good mood today, but we'll see how long it lasts.

With that, three general announcements. First of all, please identify the exits closest to you. In the event that an alarm sounds, please use the stairs, not the elevator, to go down to the first floor. And we will regroup in the park across the street to wait for the "all clear" signal. If you are not able to use the stairs, please flag one of us, and you will be directed into a protected area.

Secondly, as always, this hearing is being

recorded and Webcasted, so please speak into the microphone and begin by stating your name and affiliation.

Our court reporter is here with us today. And please make arrangements with her if you would like the transcript earlier than the end of Part 1B, which is when we will be posting it on our website.

And finally and most importantly, my good mood not withstanding, please take a moment and put all noise-making devices on silent, vibrate, do not disturb.

Okay. Let's do a bit of housekeeping before we get started with EB MUD, conclusion of their case in chief.

Mr. Aladjem, I think you are here and everyone else has received the e-mail from the hearing team yesterday. While I certainly do not appreciate late requests such as the one that you submitted. I do and we do support and encourage continued dialogs with hopefully productive results in terms of settlement discussions. So as you know by now, your requests have been granted.

And I do see Mr. Emrick standing here because I do have a question for him. Mr. Aladjem, did you have anything do add?

MR. ALADJEM: Chair Doduc, David Aladjem, Downey Brand.

The City of Brentwood is very appreciative of the Chair's ruling, and we will endeavor to make the best use of the additional time.

CO-HEARING OFFICER DODUC: Mr. Emrick, your request, I wasn't sure if the delay request was only applicable to Dr. Paulsen's testimony or to the entirety of the City of Antioch's case in chief.

MR. EMRICK: It should be to the entirety of Antioch's case in chief. I left Mr. Bernal off because we hadn't scheduled a date yet for him to testify. So that's why I only had Dr. Paulsen on there.

CO-HEARING OFFICER DODUC: All right. Then we will do that.

MR. EMRICK: Thank you.

CO-HEARING OFFICER DODUC: So, Mr. Herrick, a question before we run down the schedule for the rest of today and tomorrow?

MR. HERRICK: Yes, thank you. John Herrick for South Delta Water Agency and other parties.

Given all the confusion with the schedule -- nobody's fault; I'm not blaming anybody -- my preference -- and it's up to the Board, obviously, but I think it would be helpful for us and for the State,

for the cross-examiners just to say, "South Delta parties, be here the 10th at 9:00 a.m. to go."

Now, we've told you we're available tomorrow afternoon, or if we hadn't -- but I wouldn't want to get into the middle of our technical panel on Friday at 3:15, you know, put on an hour and a half of something and then people standing -- so we have the beginning of somebody's cross that ends at 5:01 or something.

So that's my preference. I'm not trying to change anything, but it would be better for our witnesses, for me, and I think for even the cross-examiners to say, "You are the 10th at 9:00 a.m."

CO-HEARING OFFICER DODUC: You beat me to it so let's take a moment now and walk through at least try to estimate the order of presentation for today, tomorrow and next Thursday. Right?

So today we have EB MUD. Thank you for coming back.

MR. ETHERIDGE: Thank you. You're welcome.

CO-HEARING OFFICER DODUC: How long do you anticipate needing for your direct given that you've already presented part of your direct and this is a one-witness panel? I'm expecting you to stay within the 20-minute limit.

MR. ETHERIDGE: I have a very brief opening

statement. I think I can complete that in under five minutes. And the witness's testimony today should take approximately 20 minutes. I think together my opening and his testimony can be completed in under 30 minutes.

CO-HEARING OFFICER DODUC: All right. Let me get an estimate about cross-examination for EB MUD.

Mr. Mizell, we'll start with you.

Who all intends to cross-exam EB MUD? If you could come up and give me just a quick time estimate.

MR. MIZELL: Good morning, Tripp Mizell, DWR. We would anticipate about an hour.

CO-HEARING OFFICER DODUC: Okay.

Ms. Morris?

MS. MORRIS: Stefanie Morris, State Water Contractors. I wouldn't think more than 20 minutes.

CO-HEARING OFFICER DODUC: Okay.

And Mr. Herrick?

MR. HERRICK: John Herrick, South Delta parties. No more than ten minutes, just a brief cross.

CO-HEARING OFFICER DODUC: Okay. And we did commit to Sac Regional that they don't have to begin until 1:00 o'clock, so we will definitely finish up with EB MUD this morning.

And then at 1:00 o'clock, we will start with Sac Regional. Again, they are a one-panel, one group.

So I'm expecting them to stay within the 20-minute for direct.

What is the estimated cross-examination for Sac Regional?

MR. MIZELL: Tripp Mizell, DWR. We anticipate no more than 20 minutes, although it may be shorter.

CO-HEARING OFFICER DODUC: Okay. Anyone else for cross-exam of Sac Regional right now?

Mr. Herrick? You're covering all your bases, huh?

MR. HERRICK: Sorry. Just maybe one or two questions, so five minutes at the most.

CO-HEARING OFFICER DODUC: All right.

So, Ms. Meserve, we will definitely get to your Panel 1 later today. I expect we will spend the rest of today on your Panel 1. I'm trying to get an estimate as to whether we can finish -- if you could come up to the microphone -- we might get through both of your panels by the end of tomorrow.

And I'm looking at Mr. Mizell. Don't sit down yet because I'm going to be asked you about cross-examination.

Ms. Meserve?

MS. MESERVE: Yes, Osha Meserve for Land, et al. Yes, we're prepared to go at 1:00 o'clock or after

1:00, it sounds like. And then we're prepared for Panel No. 2 in our line-up for 9:00 a.m. tomorrow morning.

CO-HEARING OFFICER DODUC: Okay. And for each of your panels, how much time are you estimating for your direct, recognizing that they're a combination of several groups?

MS. MESERVE: Yes, and what we had put in our amended NOI, we had requested two hours direct for the first panel on salinity. We had requested one hour and 23 minutes, I believe, for the second panel on the physical injuries and groundwater injuries. And then we had requested I believe one hour and 15 minutes for the San Joaquin County-led harmful algal bloom panel.

CO-HEARING OFFICER DODUC: Okay.

MS. MESERVE: And then we will have brief opening statements that are not included within that time as well.

CO-HEARING OFFICER DODUC: All right.

Mr. Mizell, your estimated, at this time, cross-examination of these panels?

MR. MIZELL: Tripp Mizell, DWR.

I would anticipate at least two hours as our request for Panel 1. Panel 2, I think we would be within the first hour. And Panel 3, I would estimate

somewhere between those two, maybe an hour and a half, two hours at the most.

CO-HEARING OFFICER DODUC: Okay.

Ms. Morris?

MS. MORRIS: I would estimate at this time half an hour on Panel 1, ten minutes to nothing on Panel 2, and a half an hour on Panel 3.

CO-HEARING OFFICER DODUC: Mr. Herrick?

MR. HERRICK: John Herrick, South Delta parties. Maybe up to a half hour on Panel 1 and then maybe ten minutes on the other panels at most.

CO-HEARING OFFICER DODUC: Thank you.

I think it's fair to say that I can give you, Mr. Herrick, the commitment of starting your panel on Thursday, the 10th.

MR. HERRICK: That's very helpful. Thank you very much.

MR. WALTER: Ms. Doduc, just wanted to alert you --

CO-HEARING OFFICER DODUC: I'm sorry. you need to identify yourself.

MR. WALTER: Yes, Hans Peter Walter for the San Luis and Delta-Mendota Water Authority. For the panel we just talked about, I anticipate perhaps an hour. I'll try to avoid any duplication there may be,

but just as a placeholder, an hour, maybe a little more, maybe a little less.

CO-HEARING OFFICER DODUC: Okay. All right. I received a note from Mr. Brodsky that he's not available today but will be here tomorrow. So we will spend a bit of time at the beginning of tomorrow to discuss scheduling for the following weeks. But I see some people standing up right now.

So why don't you go ahead and come up and asks your questions or make your requests.

MR. ORR: Trent Orr for Restore the Delta --

CO-HEARING OFFICER DODUC: Is your microphone on?

MR. ORR: Looks like it's on.

CO-HEARING OFFICER DODUC: Okay.

MR. ORR: Okay. Trent Orr for Restore the Delta, and with me are Yana Garcia and Barbara Barrigan-Parilla.

We came because at the end of Friday's session you had said sometime this week, so we came on Thursday. So if we could talk --

CO-HEARING OFFICER DODUC: Let's talk now.

MR. ORR: -- to address the scheduling.

CO-HEARING OFFICER DODUC: Okay.

MS. GRADY: Our concern, Restore the Delta's

concern is that we would like to put on all five of our witnesses consecutively. And because of scheduling times, the best time that would work would be any two sequential days -- January 5th or 6th, or 10 through 13, any two days in that set of five days would work, otherwise we run into problems with one or the other of the witnesses.

And since all of the case kind of -- they're all woven together, the testimony of the various witnesses, it would make sense or we would, you know, greatly prefer to be able to present them all as a group.

CO-HEARING OFFICER DODUC: I appreciate your desire to present them as a group. And certainly we'll take that request under consideration. However, I am -- I can't guarantee at this time, simply because I don't know, with the pacing of the presentations of cases in chief, whether or when we might get to you.

So what I would like to do is take your request under consideration, but as we proceed -- and given the schedule at which we're proceeding, it's very likely that we may get to you as early as December. So depending on who remains and how we can shuffle the schedule around without avoiding a lot of dead time on the calendar, we will try to do our best. But it might

be that we will get to you earlier than January.

MR. ORR: If that is the case, we would also be available for the 8th and 9th of December. The problem is that that's -- those are the only two days that one of our witnesses would be available then. So we would have to be absolutely sure that she could get on and off on those days, or she's not going to be available again until January.

CO-HEARING OFFICER DODUC: All right.

MR. ORR: And we've submitted all of this, I believe, in filings. But that's, again, the short version.

CO-HEARING OFFICER DODUC: It's always good to be here and tell me in person.

MR. ORR: Yes, yes. Right. And we would -- you know, if you -- if things develop to a point where you need more information from us or things have changed, let us know and we'll come back up.

CO-HEARING OFFICER DODUC: Thank you. As you can tell by now from hopefully listening to the webcast, we're trying to do realtime management of the hearing here. So every day at least once, if not twice, we'll be checking in as things progress to look at the schedule for the upcoming two, three days or so and trying our best to try to move things along yet

still be as accommodating as possible but not, obviously, to -- to impact, at least too much, on the other parties as well.

MR. ORR: Yeah, no, I see you often on my computer screen. And I really appreciate --

CO-HEARING OFFICER DODUC: Yes, I was recognized recently at REI. It surprised the heck out of me.

MR. ORR: Yes. And, well, San Francisco is not right down the street, so thank you very much.

CO-HEARING OFFICER DODUC: Thank you. And thank you for coming, and thank you for making that request. It's noted.

Ms. Morris?

MS. MORRIS: Yes, thank you. I have a question about some submittals that were submitted by the Land panels on Monday as erratas. And I was wondering if you would like me to address that now or at 1:00 p.m. before their panel starts?

CO-HEARING OFFICER DODUC: What are your --

MS. MORRIS: Objections to basically new testimony, new PowerPoints.

CO-HEARING OFFICER DODUC: Let's wait until they come up then.

MS. MORRIS: Okay. Thank you very much.

CO-HEARING OFFICER DODUC: All right. Any other scheduling or other questions before we get to the long-waiting EB MUD panel?

(No response)

CO-HEARING OFFICER DODUC: All right. Seeing none, I will turn it over to Mr. Etheridge.

MR. ETHERIDGE: Thank you. Good morning, Hearing Officer Doduc, Co-Hearing Officer Marcus, Board Member D'Adamo and State Board staff. I just want to say as an initial comment, I'm impressed by the size of the crowd today given the length of that World Series game last night. We're lucky we're on the West Coast. If we were on the East Coast, that game would have ended after 1:00 a.m.

My name is Fred Etheridge, and to my left is Shawnda Grady. She will be assisting me today. I have a brief opening statement to make on behalf of the East Bay Municipal Utility District.

For the court reporter's benefit, I want to note that we may refer to East Bay MUD or EB MUD. And that's the acronym for the East Bay Municipal Utility District.

I'm here today to put on the last of EB MUD's Part 1B witnesses, Mr. Xavier Irias. He is East Bay MUD's director of engineering and construction. His

testimony will summarize East Bay MUD's existing Mokelumne aqueduct system, noting that the first of those aqueducts was constructed in 1929 to convey water diverted under East Bay MUD's Mokelumne River water rights to it's East Bay service area.

On a long-term basis, approximately 90 percent -- virtually all of East Bay MUD's water supply -- is conveyed via the Mokelumne aqueducts, making them the vital supply link to East Bay MUD's service area, its residences and businesses. You will see from the testimony of Mr. Irias that the alignment for the Petitioner's proposed twin tunnels would cross directly underneath both the existing Mokelumne aqueducts and East Bay MUD's proposed Delta tunnel. It will show how the proposed twin tunnels could injure East Bay MUD by impacting the Mokelumne aqueducts and East Bay MUD's proposed Delta tunnel.

His testimony describes 12 categories of impacts and includes a set of proposed conditions to address them as the State Water Board requested protesters to do here.

We note that in your February 11th, 2016 pre-hearing conference ruling, the Board encouraged parties to propose specific permit conditions as part of their cases, and consistent with that direction,

Mr. Irias's testimony contains proposed conditions to address the WaterFix impacts.

That concludes my opening statement.

I believe he needs to take the oath.

CO-HEARING OFFICER DODUC: Yes, he does.

(Witness sworn)

XAVIER IRIAS

called as a witness for Protestant Group 15, East Bay MUD, having been first duly sworn, was examined and testified as hereinafter set forth:

CO-HEARING OFFICER DODUC: Thank you. You may begin, Mr. Etheridge.

DIRECT EXAMINATION BY MR. ETHERIDGE

MR. ETHERIDGE: Thank you.

Mr. Irias, please state and spell your name for the court reporter.

CO-HEARING OFFICER DODUC: Please move the microphone closer to you and make sure it's on.

WITNESS IRIAS: Now it's on. Okay, thank you.

So it's spelled X-A-V-I-E-R, last name is I-R-I-A-S.

MR. ETHERIDGE: Have you taken an oath today?

WITNESS IRIAS: Yes, I have.

MR. ETHERIDGE: I'm going to ask you to

authenticate a series of exhibits.

Is East Bay MUD Exhibit 128 an accurate statement of your qualifications?

WITNESS IRIAS: It is.

MR. ETHERIDGE: Is East Bay MUD Exhibit 102 a true and correct copy of your testimony summary for this hearing?

WITNESS IRIAS: It is.

MR. ETHERIDGE: Is East Bay MUD Exhibit 153 a true and correct copy of your written testimony for this hearing?

WITNESS IRIAS: It is.

MR. ETHERIDGE: Is East Bay MUD Exhibit 177 a true and correct copy of East Bay MUD summary report on Strategy for Protecting the Mokelumne Aqueducts in the Delta?

WITNESS IRIAS: Yes, it is.

MR. ETHERIDGE: And is East Bay MUD Exhibit 178 a true and correct copy of East Bay MUD's Delta tunnel conceptual design?

WITNESS IRIAS: It is.

MR. ETHERIDGE: Thank you. Could you please summarize your testimony for the Board.

WITNESS IRIAS: Again, my name is Xavier Irias. I'm the director of engineering for East Bay

MUD, and my testimony today will cover three areas, essentially describing the injury of the Petitioner's proposed twin tunnel project to our Mokelumne aqueducts; and injury to our proposed Delta tunnel which would go underneath our aqueducts, more or less; and injury to our use of water under our water rights permits.

So I'll start by describing the Mokelumne aqueducts a little bit.

The Mokelumne River supplies 90 percent of the water that we provide to our customers. We first obtained the water rights in 1926. And the picture here shows three aqueducts, the first of which, the smallest one which is riveted steel in the center, was constructed in 1929. And again, those three aqueducts are the main lifeline to 1.4 million customers in the Bay Area that rely on those aqueducts to remain in service continuously.

This shows kind of the plan view. Those aqueducts run 90 miles. You see part of your reservoir over in the east, and our service area is over in the west. So it traverses a lot of area.

I'm going to zoom in on the next slide to the area of concern right now, which is the Delta region. So this shows those aqueducts, and you can see some

familiar landmarks there like I-5 on the right and Highway 4 kind of running west to east. And Bixler is generally considered to be the western extent of the Delta.

So there's a cross-section on this slide that shows what those aqueducts look like, very much like the photo I showed. The photo doesn't show how deep below the ground surface those aqueducts are supported, but because of the soils in the area, the supports have to be very deep. So those pipelines are elevated as shown in the picture. And I'll show a little more detail on the next slide.

Those pile depths run as deep as about 72 feet below sea level in order to keep those aqueducts stable in such poor soil conditions.

This is a photo showing a little bit more about what those support structures are like. The support structures are spaced at approximately 60-foot intervals, and you can see they have concrete caps, that then the piles themselves -- so those are the things that run sometimes about as -- 60 feet deep below this pile cap. And they are made of a variety of materials. Some of them are wood; some are concrete, et cetera.

This is another view, and it gives you a sense

of scale if you see those two people walking next to them. These are large pipes, and again, the typical interval is about 60 feet between supports.

The aqueducts that I showed you, being below sea level, they are vulnerable to levee failure. This is one of the hazards that our aqueducts are exposed to is, if a levee fails, it can cause inundation of those aqueducts. Again, this is what they look like in the dry.

When an event like this occurs -- this is one of the more significant flooding events. In 2004, a levee gave way that protects the Upper Jones Tract, and the result was the flood shown here. And this shows what it did to those aqueducts.

And for comparison again, I'll flip back to what they look like when they're dry.

So we had quite a bit of water. The aqueducts, of course not only are they not designed for submerged surface, but this was also a close call, given that when water rushes in like that, the sheer quantity of water -- scour is always a concern. So even though those piles that support the aqueducts are very deep, scour could threaten them. And if those piles were damaged, then we could potentially lose one or more of the aqueducts.

So events like this are a real concern for East Bay MUD given, again, how vital these aqueducts are, the main supply of water for 1.4 million people.

So the 2004 flood that I'm showing here was really a catalyst for East Bay MUD to take another look at risks in this Delta region because of the fragile levee system and look at what we could do to improve our long-term water supply security.

So we launched a study the following year in 2005, and we looked at all the hazards to our aqueduct system. And the findings that we had were memorialized in this report, the 2007 report entitled "Strategy for Protecting the Mokelumne Aqueducts in the Delta," and it's one of our exhibits.

So that report calls for a series of measures, short-term measures as well as long-term measures. The short-term included things like let's put in some interconnections among those three aqueducts. It recommended putting in interconnections both on the west side and on the east side so that, if we were to lose one of the aqueducts or even two of the aqueducts across the Delta, the surviving aqueduct or aqueducts would be able to be potentially used and provide more overall flow than if we didn't have the interconnects.

So that was the most urgent work that was

recommended, and that work, by the way, was completed. So it took -- a series of design and construction network was completed in the last few years.

It also recommended that we look at long-term measures. In the long-term, after evaluating I think about 16 different alternatives, the report said the best thing we could do in the long-term to protect that water supply is tunnel across the Delta. Rather than have pipes up on supports like that, if we could tunnel with a fairly deep tunnel, then we wouldn't be exposed to those hazards posed by the fragile levee system.

So the proposed Delta tunnel plan has also been moving forward. The conceptual design for that was completed in 2014, and that design shows that the alignment generally follows the existing aqueduct right of way. In other words, it's designed to substantially lie within land that we already own. In most areas, it's a hundred-foot strip of land that the aqueducts lie within. So there's room for that to fit a tunnel in, and that's generally the basis of this conceptual design.

The tunnel would house potentially two pipes up to 87 inches in diameter. So that conceptual design report, it included a plan and profile in some detail. I'll show you what that looks like.

So following up on that conceptual design that was in 2014, we're doing additional geotechnical investigation, and that work is underway right now.

This shows the proposed extent of the Delta tunnel, and you can see it's approximately 16 miles. It stretches from Bixler over to Stockton roughly at I-5, and that's the area of the worst soil. So it includes the elevated pipeline section of our aqueducts as well as about five miles where we have buried aqueducts but the soils are considered vulnerable to liquefaction.

This is a schematic of what that tunnel would look like. You can see the two 87-pipes inside the tunnel, and the tunnel -- the concept there is to go deep enough to be below the worst of the soils in that Delta region.

And it's also, you can see, offset from our existing aqueducts because of the concern about the foundations, which I mentioned go very deep. So even though we'd be deeper than the foundations, it's important to not cause vibrations and so on that could damage those aqueducts while we're building our tunnel.

So that was all considered in setting the elevation of our tunnel.

And this is a representative page from the

proposed plan and profile in the conceptual report. And rather than spend too much time on this site, I'll flip to one that's maybe more interesting for today's discussion.

This shows the reach where there's a right-angle crossing between the proposed -- the petitioner's twin tunnels that have been proposed, called "BDCP tunnels" in this slide, with our future Delta tunnel.

So what this slide shows, it's kind of a lot, and there's another view of it that might be clearer later. But we have a band -- given that it's only a conceptual design right now, there's a vertical band that's shown here, and that depicts -- that's kind of the orange cross-hatched band. That is the zone within which our future tunnel will lie.

So it's subject to refinement as we get additional geotechnical data and fine-tune the design of that tunnel. Our tunnel will be somewhere within that band.

Then we look at the right-angle crossing. It's the blue line in the plan above, and then it's shown as kind of a vertical blue line when you look at the profile. That's approximately where the BDCP tunnels will cross. And you'll see there's several

lines there, and that's indicative of the fact that over time the proposed locations of the twin tunnels have varied. And even today, I think there's significant -- maybe a lack of precision in exactly where those tunnels will end up.

So this is showing both the most shallow they could be as well as the deepest. And I think there is actually a drafting error on this profile that shows them deeper than they really should be, but the notes call it out correctly, and all of the callouts in written testimony, for example, are right. It's just that there's a drafting glitch on this particular slide.

So to summarize, the petitioner's proposed twin tunnels as they -- as we assess their impact on our Mokelumne aqueducts and on our own future tunnel, we're looking at the 40-foot diameter that's the ID of the twin tunnels and, as shown in the previous slide, crossing directly underneath our existing aqueducts and with elevation ranges that could potentially interfere with not only our Delta tunnel but even our existing piles that hold up our existing Mokelumne aqueducts.

This shows kind of the bird's-eye view of the whole thing. All I did was I took the previous slide and added on the petitioner's proposed twin tunnel

project. You see it crosses -- that's on Woodward Island is where that crossing occurs almost at right angles. This is kind of a close-up of that.

So as I said, Woodward Island, so right toward the northern end of that island, our aqueducts are running west to east. And we see the petitioner's twin tunnels crossing them at near right angles.

I think this makes the conflict issue probably a little clearer than the really fine print a couple slides ago. This summarizes a few things. It shows, first of all, our existing Mokelumne aqueducts. They're right at the very top. And it shows those very deep piles that I showed you in the very first couple of slides. And you can see how deep they go, as deep as minus-72 elevation.

And future piles, as we do maintenance work because -- to correct issues with our wooden piles that have deteriorated over time, as we replace those, those are likely to end up being deeper for various reasons. One of them is that, as the ground keeps subsiding -- these are friction piles, so you have to go increasingly deeper to get the support you need. So it's likely that future piles will go even deeper than the minus 72 shown here; for example, minus 80 or so.

So that's at the top. And you can see,

depending on where the Petitioner's tunnel ends up, that's a direct conflict where they would actually be hitting our existing as well as future piles as they try to bore the tunnel.

I recognize that, if you look at the most recent iterations of the twin tunnels -- I'm not quoting odds, but perhaps they're going to be lower than that maximum elevation. You still have the concern of being very, very close to those existing pile tips and, hence, threatening the existing stability, the stability of the existing aqueducts.

And clearly there's a direct conflict under almost any scenario with our future Delta tunnel, and that's the one shown in blue crossing the slide.

So I could call out these elevations, but I think these are a match. They're drawn consistent with the labeling. So there's a -- this shows a 50-foot band within which our tunnel would lie. So the blue pipe could be anywhere within that orange band.

So this presents literally a dozen different concerns, and they could be packaged different ways, but I tried to bundle it as 12 distinct areas of concern, the impacts that we would see on both our aqueducts and on the tunnel.

And the first and maybe most obvious is the

right of way encroachment. We own this hundred-foot strip of land within which both our present and future facilities are residing, and it's a direct conflict with that. With that, I have shown you on the previous slide direct interference with our structures, whether existing or future or both.

Concern No. 3 here is undermining and settlement. Aside from the direct interference concern, when you're tunneling in soft soil underneath something like our aqueducts, our aqueducts are not designed to have significant settlement occurring underneath them. And that's why, for example, when they have -- when they have issues with their supports from, say, rotted timber piles, we've been forced to take action over the years to correct that. They can't tolerate much settlement.

For example, across a 60-foot span, if they settled only three inches across that span -- so that's not very much when you're talking about a tunneling project -- three inches is enough to cause that steel to yield, which means it's being permanently damaged. And with that comes the risk of losing that aqueduct where it would burst open, cause major soil erosion, loss of service. So that's potentially a very huge deal if you have settlement that causes distress to the

aqueducts.

Number 4 is -- aside from the concern I mentioned, which could happen with or without changing groundwater levels, then you have the concern that if groundwater levels change, it could exacerbate the concern of soil settlement.

Groundwater levels could change for a variety of reasons. It would -- we would expect it to be the goal to minimize changes to groundwater levels. Nonetheless, it's a risk that could occur when something like a tunneling project is going on right underneath.

Number 5 is construction shafts that are necessary for building the twin tunnels. I recognize that right now they're not located next to our aqueducts or future Delta tunnel, but there's always the potential when you're tunneling that you end up needing to put in a rescue shaft, essentially, or a shaft that you hadn't planned on originally. And also recognizing that the design right now of the twin tunnels is very preliminary, so the final design may well show a shaft that's closer. But probably the biggest concern is you never know when you're going to need a shaft, so there could be a shaft that ends up very close to our facilities.

Number 6 is talking about seepage into the twin tunnels during the lifespan. Really, water flowing in either direction would be probably a concern. Seepage into the tunnels would be -- would be a concern probably during construction and during -- which could go on for years when the tunnels are dry and you have groundwater levels that run up, essentially, near the ground surface. So there's considerable hydrostatic head trying to push that water into the tunnel.

Any seepage could cause a loss of soil in addition to the impact No. 4, which is the groundwater levels themselves being drawn down. But if you have seepage going into the tunnels, there's a potential it's carrying soil with it, and that's always a concern. It could be a loss of support for everything up above it.

So that's something that is -- it's noted there as being during the lifespan. I don't think we're out of the woods once the tunnels are built because, to be maintainable, the tunnels could be taken out of service at any time.

And also there's no guarantee with information we have that the tunnels would always have a net outward pressure. I recognize that's probable, but the

expectation here is, if nothing else, for a maintenance outage you could have water trying to get into the tunnels.

This is the last of the dozen impacts. So starting with No. 7 at the top there, the twin tunnel lining, right now it's a proposed as a single-pass lining. So recognizing we expect it would be designed to be very stout and sturdy, we are talking about a tunnel that has to be there for -- right now the quoted life is 100 years. So over that hundred-year period of time, there is a chance that that lining could fail.

If it failed, it could well be catastrophic to our facilities. We'd be talking about something like a 40-foot-diameter tunnel. And you looked at how much soil there is above us. If the lining were to fail, it's hard to imagine exactly what would happen, but we know the outcome for our facilities, whether it's the Mokelumne aqueducts or, if we had a tunnel above, it certainly couldn't be good news. There would be a massive failure of the ground, potentially sinkholes and things like that.

Number 8 talks about the added costs of our own Delta tunnel. And this could vary, depending on which tunnel goes first, as far as exactly what the impacts are. But one way or the other, when you see a

direct conflict between the tunnels, our tunnel would have to somehow or other be designed to miss the twin tunnels or vice versa.

So if you took what would otherwise be a straight shot in the tunnel and you put in -- let's say you change -- you have a vertical offset where one tunnel goes under the other. That obviously poses construction cost impacts, whether you're adding additional shafts going deeper to deal with it -- and when you go deeper, that means more muck. Your shafts are deeper. There's a lot of costs during construction, potentially.

But on top of that, it's a lifelong impact because now you have a low spot in the pipe. And any time you take the tunnel out for maintenance, you have to deal with one more spot where you'd have to be able to de-water it. You have to be thinking about air relief any time you have a discontinuity in the vertical profile.

So it's something that we think would be a significant impact, not just during construction but during operations.

Impact No. 9 talks about the access roads and utilities needed to build the twin tunnels project. Those have not been described in any great detail, but

clearly there's a lot of material being moved around for such a mega project. Those roads would no doubt have heavy traffic running over them, and there's certainly a concern that one of those -- one or more of those access roads or utilities would end up imperiling our own aqueducts.

We're talking about right now an existing network of levee roads that are not particularly generous. So the access roads that would be built would -- they would be looking for routes that, because of the proximity of our aqueducts to the project, would be imperiled by those access roads.

Number 10, the power transmission facilities. We recognize right now the plan is for the power transmission facilities to mostly be parallel to the twin tunnels, which means crossing both our existing and future. And that would tend to -- if that remains, that would be a lesser concern than if it were going parallel, but it's still a concern because we could still, I think, have -- we have the -- first of all, the power transmission facilities themselves.

For example, even if you're crossing -- if there's an electric tower that needs a foundation, that's another structure, and it has the same risk of construction impacts as some of the other impacts we've

talked about; interference with our own pile supports, for example, or something -- if you're erecting a tower and it falls over. That's kind of impact No. 10, is physical damage.

Number 11 is talking about after the twin tunnel power transmission system is up and running, it still poses a hazard. And again, if it's crossing, maybe it's a lesser hazard than if it were running parallel. And that's because induced currents generally would be more of a concern running parallel.

But you still have things like fault conditions where you'd be concerned that there could be either enhanced corrosion or a safety issue because of, say, a ground fault from their power transmission system that would then make our steel aqueducts unsafe.

And then there's the direct fall hazard. If a power transmission line were to fall across our aqueducts, that would clearly be a concern.

Many of these concerns could be mitigated, of course, and that's coming up, is what we -- what we are proposing is mitigations for these concerns.

And the conditions, they're generally grouped into three areas which would be -- in the design and in the construction of the twin tunnels, there's a series of measures that need to be taken to protect our

infrastructure. And they're detailed in my written testimony, but generally it's -- they address all of those 12 impacts that I talked about, for example, making sure that the vertical alignment doesn't clash and making sure that the ground is adequately stabilized to address the really large concern of settlement to those existing aqueducts.

Number 2 is providing a strip of land in the crossing zone. And that's something that would greatly reduce the impact of the tunnel conflict because I talked about one tunnel or the other has to be modified. A strip of land within the crossing zone where the two tunnel projects are intersecting would allow -- essentially, for example, our tunnel could jog outward, thereby missing the -- if we rerouted our tunnel, I guess in short, we could use that strip of land to minimize the impact of that conflict.

Right now our own aqueducts are in the way of doing that, but an auxiliary strip of land next to ours would greatly alleviate that situation. It wouldn't eliminate the increase in construction costs necessarily, but it would go a long way toward making it feasible and making it safe.

And Condition No. 3 here is we're asking the Petitioners accept responsibility for any damage and

disruption to our facilities. That's a pretty simple concept. There's a few elaborations in the written testimony on that.

So that summarizes what I wanted to say today. Thank you.

CO-HEARING OFFICER DODUC: Thank you very much.

The Department -- as the Department is setting up for its cross-examination, why don't we take a short five-minute break because I don't want to interrupt their cross-examination later on. So by that clock on the wall, we will resume at 9:50.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. Thank you. It is 9:50, and we are back in session

Mr. Berliner, Mr. Mizell, please begin your cross-examination.

MR. BERLINER: Good morning. My name is Tom Berliner. I'm an attorney for the Department of Water Resources. I'm accompanied this morning by Tripp Mizell, who is also an attorney with DWR.

CROSS-EXAMINATION BY MR. BERLINER

MR. BERLINER: Good morning, Mr. -- Irias. Did I pronounce your name correctly?

WITNESS IRIAS: "Irias."

MR. BERLINER: "Irias"? Thank you.

Did you prepare the testimony that you offered today, or did you have assistance with it?

WITNESS IRIAS: I prepared the substantive part of it, and I had assistance from staff and review by attorneys.

MR. BERLINER: But you're familiar with the entire content of your testimony?

WITNESS IRIAS: Yes, I am.

MR. BERLINER: Very good. Thank you.

Is the primary source of water that goes through Mokelumne aqueducts water from the Mokelumne River, or are there other sources of water that go through the pipelines?

WITNESS IRIAS: That's a two-part question, and they're both true. The first, the primary water source is, indeed, from the Mokelumne River; and, second, there are additional sources.

The Sacramento River supply can be routed through those aqueducts.

MR. BERLINER: Where is the connection to route through the Sacramento supply?

MR. BAKER: I apologize, Mr. Irias. Can you move a little bit closer to your microphone, please?

MR. IRIAS: Sorry.

MR. BAKER: Thank you very much.

WITNESS IRIAS: The additional source of supply, that's the Folsom South Canal connection, and in the last few years, we built a series of pipelines to convey water from the canal over to our aqueducts.

MR. BERLINER: Thank you. You had put up a list earlier of about a dozen potential impacts that could result from the construction of the twin tunnels.

Do you recall that?

WITNESS IRIAS: Yes.

MR. BERLINER: Is that your best assessment of the potential impacts that could occur or areas where there may be problems or conflicts?

WITNESS IRIAS: It is.

MR. BERLINER: None of these are actual, with the exception, obviously, of the need for some right of way legal documentation, but none of the others that you put on your list are actual impacts that have occurred, right? These are concerns that you have?

WITNESS IRIAS: I would say none of them can be actual for a project that hasn't been built, since the twin tunnels are still just a concept. But I would say that many of those impacts are not just possible but probable or near certain.

MR. BERLINER: You've identified a number of

mitigation measures in order to eliminate a lot of your concerns; isn't that correct?

WITNESS IRIAS: That's correct.

MR. BERLINER: By the way, the concerns that you identified for the twin tunnels, do many of those exist as well for the proposed Delta tunnel that East Bay MUD's going to construct?

WITNESS IRIAS: I think that some of the general issues such as poor soils would be a factor in the design of any tunnel, including our own. But things like conflict posed by the twin tunnels of course wouldn't be a concern for our tunnel since we already own the land.

MR. BERLINER: Okay. But what about things like potential subsidence associated with construction or afterwards with operation or if the pipeline would fail, all of those kind of generic issues that could occur, are those sort of common to anybody who would be tunneling underground in the Delta area?

WITNESS IRIAS: I think I wouldn't generalize too much. Like -- as I said, if you're building a tunnel in the Delta, there's a series of factors that you have to consider to address things like liquefaction concerns, subsidence, et cetera. But things like having to reroute the tunnel to avoid

conflict with another tunnel is really by definition something that you only deal with if someone else is building a tunnel in conflict with yours.

MR. BERLINER: Understood. So we have a set of common concerns and then some very specific concerns related to the construction of these actual pipelines and where they will be; is that right?

WITNESS IRIAS: That's right.

MR. BERLINER: And, Mr. Baker, if we could pull up those two pages, I believe they're Pages 19 and 20 of the PowerPoint.

So just looking at your dozen issues here, am I correct that right of way encroachment would be unique to the twin tunnels?

WITNESS IRIAS: Yes, it would be.

MR. BERLINER: And No. 2, of interference with East Bay MUD structures, presumably the tunnel that East Bay MUD would be building will be -- will not interfere with its own structures, correct?

WITNESS IRIAS: That's correct.

MR. BERLINER: So that would be a WaterFix potential concern; correct?

MR. IRIAS: That's right.

MR. BERLINER: I take it undermining and settlement would be a generic concern? Anybody

tunneling would have that issue?

WITNESS IRIAS: They would certainly have that concern, and they would be looking for ways to make sure that it didn't turn into an actual issue during construction.

MR. BERLINER: Is it the same answer to No. 4?

WITNESS IRIAS: That's right.

MR. BERLINER: And same answer to No. 5?

WITNESS IRIAS: Yes.

MR. BERLINER: And seepage into the tunnels, that would be a problem for anybody tunneling; isn't that right?

WITNESS IRIAS: I think that it's -- it's accentuated because right now the twin tunnels as proposed don't even have a secondary liner, so that would be a particular concern for -- the twin tunnels as proposed lack features that would reduce that concern.

MR. BERLINER: Let's go to the next slide, please.

A lining failure, is -- that would be a concern for both the Delta tunnel and the twin tunnels?

WITNESS IRIAS: It could potentially be. It's something you'd be thinking about for any tunnel. I would agree with that.

MR. BERLINER: Number 8's kind of unique to East Bay MUD, right?

WITNESS IRIAS: No. Those are added costs beyond what we would spend if the twin tunnels weren't being built.

MR. BERLINER: Yes, that's what I meant.

WITNESS IRIAS: Okay.

MR. BERLINER: This is an East Bay MUD-only concern, right?

WITNESS IRIAS: Yes.

MR. BERLINER: Damage from twin tunnel access roads, were -- have you been following the proceedings?

WITNESS IRIAS: Not every minute of the proceedings, no.

MR. BERLINER: We've had some testimony about access roads and truck traffic and the like, so I won't bother to deal with that.

But you -- in building the East Bay MUD Delta tunnel, you'll be using heavy equipment trucks and having to move them through the Delta area; isn't that right?

WITNESS IRIAS: I would expect there would certainly be truck traffic, et cetera.

MR. BERLINER: And the similar kinds of trucks and equipment that the WaterFix is using, right?

WITNESS IRIAS: Yes, on a smaller scale.

MR. BERLINER: Yes, understood.

Regarding power transmission facilities, would that also be a concern with the Delta pipeline, or is that because of new power lines that are constructed for the WaterFix?

WITNESS IRIAS: The idea here, what I was trying to address is the need for the new power that would have to be brought in for the twin tunnels in order to power the tunnel boring machines.

MR. BERLINER: And those are temporary power facilities, right?

WITNESS IRIAS: That's right.

MR. BERLINER: Will East Bay MUD have to bring in temporary power to power its tunnel boring machines as well?

WITNESS IRIAS: It would.

MR. BERLINER: So then it's a common problem. Anybody who's using tunnel boring machines is going to have an issue like this, right?

WITNESS IRIAS: An issue that can be addressed, yes. I'd call it a concern, something that needs to be thought about during the design.

MR. BERLINER: And could be mitigated, right?

WITNESS IRIAS: Yes.

MR. BERLINER: And then regarding Item 11 on power transmission and AC-induced interference, is that a problem that would be common to tunnels as well?

WITNESS IRIAS: To both tunnels? Yes, potentially.

MR. BERLINER: And I thought on this item you had mentioned that it would be not as great a concern because the twin tunnels are perpendicular to the Mokelumne aqueduct; is that right?

WITNESS IRIAS: That's right.

MR. BERLINER: So is it then a greater concern for East Bay MUD's Delta pipeline because it's parallel to the Mokelumne aqueduct?

WITNESS IRIAS: No, not necessarily. It would depend on where the power lines are routed relative to the aqueduct, for example, and how near, things like that.

MR. BERLINER: So you'll be taking that into account when you do construction; is that right?

WITNESS IRIAS: Yes.

MR. BERLINER: And I take it same thing for No. 12. This is kind of a common issue and would be not unique to the twin tunnels, but anybody who's putting up any transmission lines, you have to worry about safety issues, right?

WITNESS IRIAS: That's right.

MR. BERLINER: Thank you. In your testimony, you had expressed concern that DWR address East Bay MUD's concerns; is that right?

WITNESS IRIAS: That's right.

MR. BERLINER: And are you aware that the Final Recirculated Environmental Impact Report has not yet been issued?

WITNESS IRIAS: I'm aware of that.

MR. BERLINER: And would you expect that East Bay MUD's comments that were submitted would be addressed in that final document?

WITNESS IRIAS: Actually, I would have expected our comments to be addressed quite a while before that, when we -- we've provided the substance of many of these comments as early as 2012, before either of the EIRs was published.

MR. BERLINER: And it's my understanding that DWR and East Bay MUD have actually met to discuss some of these concerns; is that correct?

WITNESS IRIAS: That's correct.

MR. BERLINER: And are those discussions ongoing?

WITNESS IRIAS: Not to my knowledge.

MR. ETHERIDGE: I would object just to provide

clarity on when these meetings occurred.

MR. BERLINER: I don't know the dates of the meetings. All I know is that there have been some meetings.

MR. ETHERIDGE: Well --

MR. BERLINER: I can ask the witness if he knows.

MR. ETHERIDGE: Well, I want to object on the sense that recently EB MUD and DWR had confidential settlement discussions earlier this year, and I don't know if you're referring to those meetings or other meetings.

CO-HEARING OFFICER DODUC: Mr. Irias, just answer the question to your -- the best of your ability without divulging any confidential information.

WITNESS IRIAS: My understanding is -- well, first of all, there were some discussions during the preparation of the first EIR somewhere around 2012 where we first voiced many of the same concerns, virtually all of them that I'm describing today, just not in as much detail.

And then more recently there were some settlement discussions in 2016, and the substance of those, it was confidential, but as far as I know, those settlement discussions are not happening right now.

MR. BERLINER: And are you familiar with the sections of the WaterFix documents that address concerns related to potential impacts to existing facilities?

WITNESS IRIAS: Yes, I am.

MR. BERLINER: And among those areas that the WaterFix documents have identified would include geotech issues; is that right?

WITNESS IRIAS: I know that the WaterFix documents do -- they do include a discussion of various geotechnical issues.

MR. BERLINER: Okay. And, for instance, one of them is settlement -- land settlement modeling -- or monitoring and development of a response program.

Do you recall that?

WITNESS IRIAS: I don't recall that with specificity.

MR. BERLINER: Okay. Are you aware that there are electrical power guidelines?

WITNESS IRIAS: I'm aware of at least some of the information in the EIR that describes the temporary power provisions, that there may be something in that large document that I missed.

MR. BERLINER: Have you exchanged geotech data with DWR outside of settlement discussions?

WITNESS IRIAS: I know that at the staff level that some data sharing has occurred.

MR. BERLINER: Do you have any reason to believe that you won't be able to work collaboratively and have plenty of opportunity to work with DWR regarding any construction conflicts that may come up regarding the WaterFix pipelines and East Bay MUD's facilities?

WITNESS IRIAS: Well, given that we voiced our concerns in 2012 and I didn't see the analysis that we had been asking for in the EIR, I think that some of these issues are best addressed relatively early in the project. The sooner they're addressed, the better.

So that's why, rather than pin my hopes on a prospectively what is vaguely possible, that's why we're trying to be specific about what ought to be done, and the written testimony even talks about by when.

MR. BERLINER: And I appreciate it. I thought your suggestions were helpful, and I appreciate that you came forward with those in your testimony.

You understand, of course, that the pipelines -- the twin tunnels are just at their conceptual stage at this point, right?

WITNESS IRIAS: That's my understanding.

MR. BERLINER: And that there's going to be ample opportunity to make adjustments as the designs are pushed further forward, right?

WITNESS IRIAS: Yes.

MR. BERLINER: Do you have knowledge that East Bay MUD in 2015 advertised a requests for proposals for engineering consultants to conduct subsurface explorations in the Delta to support East Bay MUD's proposed Delta tunnel?

WITNESS IRIAS: I do.

MR. BERLINER: Were you involved in that?

WITNESS IRIAS: Yes, I was.

MR. BERLINER: It's my understanding that in 2016 the East Bay MUD board of directors awarded $2.3 million to contract for engineering consultants to do soft ground tunnel geotech investigations.

Are you familiar with that?

WITNESS IRIAS: I am.

MR. BERLINER: Are those similar types of investigations even though, obviously, the twin tunnels is a larger project that you would think would be undertaken by DWR associated with the twin tunnels?

WITNESS IRIAS: I think much of it would be the same. It's -- the contract that is currently underway consists of developing what's called the

"geotechnical data report" or a GDR, and that's based on extensive data collection.

MR. BERLINER: And there's also going to be a seismicity report, right?

WITNESS IRIAS: That's correct.

MR. BERLINER: And you're aware, are you not, that the exact tunnel invert -- twin tunnel invert has not yet been decided?

WITNESS IRIAS: That's my understanding.

MR. BERLINER: Has East Bay MUD completed its geotech investigation yet?

WITNESS IRIAS: No, it has not.

MR. BERLINER: Do you know when that will be completed?

WITNESS IRIAS: The Phase 1 work is what's going on right now. So Phase 1 is estimated to be completed in 2017, and there may well be subsequent phases of investigation.

MR. BERLINER: So you don't have an end date target at this point?

WITNESS IRIAS: Well, I have a target for the work that's currently underway, but sometimes you do some investigation and realize you need even more detail at some locations.

MR. BERLINER: Has a CEQA document been

started yet for the Delta tunnel?

WITNESS IRIAS: It has not.

MR. BERLINER: Do you know when that will be started?

WITNESS IRIAS: No, I don't.

MR. BERLINER: And how long have you been studying the Delta tunnel?

WITNESS IRIAS: The study that recommended the tunnel was completed in 2007.

MR. BERLINER: So close to ten years at this point?

WITNESS IRIAS: Yes. That report, you may recall, recommended a range of actions. Some of them were near-term actions, and so the work was begun on those immediately. The tunnel was identified as a longer-term action.

MR. BERLINER: Does East Bay MUD have a target end date by which the tunnel will come into existence?

WITNESS IRIAS: There's no specific date right now.

MR. BERLINER: And prior to deciding whether to build the Delta tunnel or not, did you look at other options?

WITNESS IRIAS: Yes, we did.

MR. BERLINER: And were -- what kinds of

concerns were you looking at in developing your options, for instance, seismic issues or other issues?

WITNESS IRIAS: There was a range of concerns we looked at, all of the various natural hazards. So those were considered, including seismic issues, flooding. We looked at construction cost, lifetime costs, the operations and maintenance costs.

MR. BERLINER: Was one of the alternatives that you looked at a levee-oriented alternative?

WITNESS IRIAS: I believe there were a couple of options that looked at levee-oriented alternatives.

MR. BERLINER: And why did East Bay MUD decide to go with a tunnel rather than a levee-oriented alternative?

WITNESS IRIAS: The tunnel emerged as the best option from the standpoint of long-term reliability and lifecycle costs.

MR. BERLINER: What kinds of issues did you see with the levee alternatives?

WITNESS IRIAS: Levees required in some cases strengthening. So for the seismic hazard, we anticipated some levees would need strengthening. And then they have higher maintenance costs over their life than a tunnel when we considered the mileage of levees that we would be concerned with out of the vast network

of levees in the Delta.

MR. BERLINER: Are you going to be doing any levee work in conjunction with your Delta tunnel program?

WITNESS IRIAS: We continue to do levee work. We work with the reclamation districts. So every year we do levee work. So I wouldn't say it's maybe connected with the Delta tunnel, but it's ongoing. We frequently do levy improvement projects.

MR. BERLINER: Based on your knowledge and experience, do you have any reason to believe that the Delta tunnel concept as you have it at this stage, recognizing that it's early, can be successfully constructed?

WITNESS IRIAS: Can you say that again?

MR. BERLINER: Sure. Based on your -- I understand you're at the conceptual engineering level with the tunnels, right?

WITNESS IRIAS: Right.

MR. BERLINER: So based on the knowledge that you have today, do you have any reason to believe that the tunnel could not be successfully constructed?

WITNESS IRIAS: No reason at all.

MR. BERLINER: Are you going to be doing any pile-driving associated with the tunnel?

WITNESS IRIAS: I don't anticipate any.

MR. BERLINER: And are you going to be using a pressurized-based tunnel boring machine to do the construction?

WITNESS IRIAS: That's the -- yes, that's the anticipated method.

MR. BERLINER: I may be just about done with this witness. Let me just double-check.

We don't have any other questions for this witness.

Thank you very much.

CO-HEARING OFFICER DODUC: Thank you, Mr. Berliner.

Let's note for the record that the other petitioner, the Department of Interior, does not wish to cross-exam.

MS. AUFDEMBERG: That's true.

CO-HEARING OFFICER DODUC: All right. Ms. Morris?

Ms. Morris is a no as well.

Mr. Herrick?

Does anyone else wish to cross-exam? San Luis Delta-Mendota, they're before you, Mr. Herrick.

MR. WALTER: Yes, Hanspeter Walter for San Luis and Delta-Mendota Water Authority. I have no

cross, but I want to renew the objections that we put in writing in our omnibus objections to the testimony here: Speculative, lack of foundation, and irrelevant as to impacts of some future tunnel without foundation for when or if it will ever be built, in particular.

CO-HEARING OFFICER DODUC: So noted. Thank you.

Mr. Herrick.

MR. HERRICK: Thank you, Madam Chair, Hearing Officers. John Herrick for the South Delta Water Agency. I just have a couple questions.

CROSS-EXAMINATION BY MR. HERRICK

MR. HERRICK: Mr. Irias, you talked about as one of your concerns the fact that construction of the twin tunnels project might affect the settling or movement of the soils or earthen materials between the new tunnels and your pilings of the East Bay MUD pipeline, correct?

WITNESS IRIAS: That's right.

MR. HERRICK: Are you familiar with the various types of soils in between those zones, I'll say?

WITNESS IRIAS: I'm reasonably familiar with them. I am not a geotechnical specialist.

MR. HERRICK: By my question, I meant there

are numerous soil types and of different consistencies and different materials in the area; is that correct?

WITNESS IRIAS: That's correct.

MR. HERRICK: And those different soil types might be affected differently, depending upon the conditions that are applied to the situation, right?

WITNESS IRIAS: That's correct.

MR. HERRICK: So if there's vibrations or something from a twin tunnels boring machine, that might cause one thing to settle in a different manner than another material, correct?

WITNESS IRIAS: That's right.

MR. HERRICK: And that's the basis of your concern, is that it's not like a box of sand where you know how it will react; there are various materials, and the reaction from the tunneling might be hard to determine ahead of time, correct?

WITNESS IRIAS: That's not what I said. I think even if you knew for a certainty that excessive settling would occur, that wouldn't make it better when you're talking about an existing structure that is -- that can't tolerate that level of settlement.

MR. HERRICK: Do you believe that there's sufficient geotechnical investigation in the area of concern right now for anybody to determine whether or

not there could be injury to East Bay MUD?

WITNESS IRIAS: I think there's sufficient information to say there could be injury. I think that additional data could be gathered to fine-tune the estimates and also develop more detailed mitigations.

MR. HERRICK: The twin tunnels project is gravity flow from the intakes down to Clifton -- well, from the forebay, anyway, down to Clifton Court Forebay, correct? Or do you know?

WITNESS IRIAS: That's my understanding.

MR. HERRICK: And is it a potential problem that any rerouting of the twin tunnel project to protect East Bay MUD might significantly change the anticipated gravity flow slope on the twin tunnels project?

WITNESS IRIAS: I would say I haven't been trying to assess impacts to the twin tunnels. We've been focused on impacts of the tunnels on our infrastructure.

MR. HERRICK: Okay. Is there any -- is there any risk of the -- if the twin tunnels are not full all the time because they're not being operated, is there any risk of the upward pressure, like, floating because of the soil type and the moisture in the ground?

WITNESS IRIAS: I haven't analyzed the

stability of the twin tunnels. I'm sure you could look at buoyancy and figure out whether it would be a concern or not.

MR. HERRICK: Do you think the twin tunnels project should be approved prior to a determination that's agreeable to East Bay MUD about potential mitigation or addressing any concerns?

MR. BERLINER: I have an objection to that question.

THE COURT: Mr. Berliner?

MR. BERLINER: Tom Berliner for DWR. Object on the grounds of relevancy. This is an issue that is more likely than not outside this witness's expertise, but it's also a question of relevancy to the proceeding. His thoughts on this matter really don't make any difference.

CO-HEARING OFFICER DODUC: Mr. Herrick, your response?

MR. HERRICK: My response to that would be that I believe it is relevant. One of the potential outcomes of the hearing are conditions placed upon a permit, and if the engineering representative of East Bay MUD doesn't believe that such a condition as just don't harm somebody is enough, I think that's relevant to the proceeding. He may think that additional work

needs to be done. I think that's relevant to the decision here.

CO-HEARING OFFICER DODUC: All right. Overruled.

Please answer to the best or your ability.

WITNESS IRIAS: Could you repeat the question, please?

MR. HERRICK: I could probably rephrase it.

First, do you believe that the project should be approved at this level, anyway, pending a determination that East Bay MUD is satisfied with the potential mitigation or ways to avoid harm?

WITNESS IRIAS: I'm not sure I understand your use of the word -- if by "pending" you mean without such a determination, then I do not because the essence of my testimony is that the twin tunnels should move forward only with the conditions that I outlined in my testimony.

MR. HERRICK: Thank you very much.

I have no further questions.

CO-HEARING OFFICER DODUC: Thank you, Mr. Herrick.

Any other cross-examination of this witness?

(No response)

CO-HEARING OFFICER DODUC: Not seeing any, any

redirect, Mr. Etheridge?

MR. ETHERIDGE: No. Thank you.

CO-HEARING OFFICER DODUC: I have a clarifying question for you.

In response to one of Mr. Berliner's questions, you had stated that -- at least as I understand it, that you don't see anything that would impact the construction of the Delta tunnel.

Did I understand your answer correctly?

WITNESS IRIAS: I don't remember that exact question. Maybe if you ask your question and I'll try to answer it.

CO-HEARING OFFICER DODUC: If I could ask the court reporter, is it possible to go back?

THE REPORTER: It would take some time.

WITNESS IRIAS: I recall the question about whether I saw any reason why the tunnel could not be built.

CO-HEARING OFFICER DODUC: Correct.

WITNESS IRIAS: And I said no, I did not see any reason why it could not be built. The conceptual engineering report not only verified that it is feasible, but it even highlighted a path forward, specifically where we would put it and how it would be designed.

CO-HEARING OFFICER DODUC: All right. Thank you.

There's nothing else?

WITNESS IRIAS: Thank you.

CO-HEARING OFFICER DODUC: Mr. Etheridge, do you have some documents to move into the record?

MR. ETHERIDGE: Well, I think what we will propose to do, if it's acceptable to the Hearing Officers, is that we will submit a letter to the State Board and serve it on all parties within a week from today, by next Thursday, November 10th, listing all the exhibits we wish to move into the record.

CO-HEARING OFFICER DODUC: I think that is very acceptable, and we will wait to receive that before issuing our rulings on the various objections regarding those exhibits and this testimony.

MR. ETHERIDGE: Thank you very much. Again, we appreciate your setting the time certain for this testimony here today.

CO-HEARING OFFICER DODUC: All right.

MR. ETHERIDGE. Thank you.

CO-HEARING OFFICER DODUC: Thank you.

With that, this group is excused.

Before we take our long break and resume at 1:00 o'clock, I see Mr. Keeling in the audience. So

let me go ahead and address an outstanding request by Mr. Keeling.

Mr. Keeling, you had made a request for some of your elected officials to present the County of San Joaquin's policy statement out of order, since you are up, when we resume later this afternoon. And you had specifically requested that they be allowed to provide their policy statements on Thursday, December 15th.

While I certainly appreciate your efforts, your -- I think the word you used is "labor" to organize this, I am denying your request. We allowed for three days at the start of Part 1A for policy statements. We will also be allowing for days to make policy statements at the beginning of Part 2.

The allowance for parties to provide policy statements as part of their opening statements was a courtesy. I do not and will not be opening up the evidentiary portion of this hearing for intermittent policy statements.

So while I do appreciate your effort, I would encourage you to refocus that effort towards getting your electeds to provide policy statements, if they so wish, at the beginning of Part 2.

MR. KEELING: Thank you.

CO-HEARING OFFICER DODUC: With that, we will

go ahead and take a break, and we will resume at 1:00 o'clock. Thank you.

(Whereupon, the luncheon recess was taken at 10:19 a.m.)

AFTERNOON SESSION

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(Whereupon, all parties having been duly noted for the record, the proceedings resumed at 1:00 p.m.)

CO-HEARING OFFICER DODUC: All right. Welcome back everyone. It's 1:00 o'clock. We are resuming. Before we get to Mr. Hitchings and the Sac Regional panel, let's take this moment to do a little bit more housekeeping.

Okay. First, given that we expect to get to -- Ms. Meserve is not here yet. Hopefully she's rushing in any minute now.

While we're waiting for her, Mr. Herrick, if I might ask you to come up, and also DWR as well.

Mr. Herrick, there was a concern raised both by us and also by DWR with respect to Mr. Nomellini's testimony. And in particular, I wanted to ask first, DWR, in the correspondence that you sent last week where you identified various testimonies that should have been revised based on our last ruling as being outside the scope of Part 1, you had identified South Delta Water Agency's Mr. Nomellini's testimony as being among the group that you're concerned about. Do you have any specific areas of concern? I noticed there

was no page number listed in your table.

MS. ANSLEY: Hi. Jolie-Ann Ansley for DWR.

I think with Mr. Nomellini's testimony, when we went to designate, there were just almost too many. But I'm happy to give the broad topics and pages to provide some clarity, if I can.

CO-HEARING OFFICER DODUC: All right.

Mr. Herrick have you had a chance to review Mr. Nomellini's testimony with him in light of our ruling on October -- was it October? What date -- October 7th regarding being outside of the scope of Part 1?

MR. HERRICK: Yes, John Herrick, South Delta Water Agency, et al.

Dean Ruiz and I discussed it with Mr. Nomellini. We struck a lot of the stuff, and we debated about whether stuff fit into the categories that shouldn't be covered. So I fully anticipated there would be some necessary argument later. But we did go through, pursuant to that order, and line out -- I believe the direction was line them out, not to take them out -- and line out the stuff that was supposed to be in Part 2 or should be in Part 2.

CO-HEARING OFFICER DODUC: All right.

So Ms. Ansley, what in particular in the

revised testimony for Mr. Nomellini, which we are still reviewing, does DWR have objections to as far as the scope is concerned?

MS. ANSLEY: Sure. I think that our major issues are Pages 1 -- and I hope I have these right. I'm looking at the testimony here.

Pages 1 through 13 seem to be all complaints regarding the environmental review process which are outside the scope of Part 1 and Part 2. And please let me know if you need more information.

Starting on Page 13, he has a section that goes through public trust responsibilities, which my memory says has a lot of references to environmental needs of -- for water for environmental purposes and fish recovery.

Starting at around Page 17 -- and I do acknowledge that there is a section of this testimony that is now struck out that applies specifically to the Delta Reform Act; however, starting at about Page 17 or maybe Page 16 it becomes much more of a legal brief that, even though the sections are struck expressly referencing by name the Delta Reform Act, this is still fairly, in our opinion, a legal brief that does also point to the same concerns regarding reducing reliance on the Delta. So both a legal brief and not a complete

strike-out of Delta Reform Act issues.

And I think that that -- with his strike-outs, that takes us through about the last -- I think up to about 23. And then after that, I think I'd rather sit down and be more exact in making my pronouncements. But our main objections are the CEQA NEPA problems, the legal briefing, the continual references to environmental or fishery recovery, and continued pointing to, maybe not expressly, the Delta Reform Act.

CO-HEARING OFFICER DODUC: Okay.

MS. ANSLEY: Thank you.

CO-HEARING OFFICER DODUC: Mr. Herrick, any responds to those particular points in particular? They seem to be, without making a ruling or judgment right now, just the topics she outlined seem to be within our ruling as being outside of the scope. But what's your response?

MR. HERRICK: Yes, and I apologize for not being prepared to argue this this moment. Last night or yesterday afternoon, Mr. Ruiz filed the response to objections, I believe, with you guys. And he produced that. I talked to him along the way, but I didn't do that.

But so -- generally speaking, Mr. Nomellini's testimony sort of goes along the same line of argument

we used when we were doing cross-examination and would introduce statutes in that we're trying to show that the -- among other things, the base condition for proceeding is not being complied with, which means the analysis is incomplete.

Now, there's much more than that. I apologize for focusing on that one issue. But, again, I apologize, Mr. Ruiz filed the response last night, and I didn't review the file. I wasn't ready to argue that. I'm sorry.

CO-HEARING OFFICER DODUC: All right. We will take a look at that response. I wasn't aware it had come in. So let's flag this item for discussion as part of housekeeping first thing tomorrow morning. We want to address this tomorrow in order for you to present your case in chief on the 10th.

MR. HERRICK: I will be ready tomorrow morning. Sorry. Thank you.

CO-HEARING OFFICER DODUC: All right.

Ms. Meserve -- did I see Ms. Meserve come in? Yes. Please come on up.

Also in DWR's table which they provided last week, they raised concerns regarding testimony from two witnesses in Ms. Meserve's second panel, which I think will come up tomorrow.

Now, I'm going to turn to Ms. Ansley or someone from DWR again to give me some more details about your objections because I don't believe these two witnesses' testimony were specifically identified in our October 7th ruling as being those that we've identified as being -- as having testimony outside the scope of this Part 1, but we acknowledge that we might have missed some.

So, Ms. Ansley, could you provide any further explanation?

And then, Ms. Meserve, I'll ask you to try to respond.

I'm looking at Local Agencies of the North Delta, you have Mr. Elliot and Mr. VanLoben Sels. They're both witnesses for Ms. Meserve's Panel No. 2.

MS. ANSLEY: Hearing Officer Doduc, I'm just going to pull my objections up.

Speaking specifically to Mr. Elliot, I believe that our -- Mr. Elliot had some brief testimony regarding the impacts on the Delta agriculture and its general heritage as a, I guess, a community that's supported by agriculture, which seemed to be more towards the public interest. And I believe we identified the few page and line cites there. And that is identified in our objections at Page 9, Section A.

So it's a very brief section.

And then Mr. VanLoben Sels also had -- and this may have been changed a little bit by your ruling. We had filed an objection regarding -- he had construction impacts of the WaterFix on the Delta economy. I think, my memory serves, he was concerned about the construction, number of trucks that would be interfering with the trucks that deliver and take away produce from the Delta. So they were construction impacts that were more economic in nature. And I believe that was the genesis of our objections on Page 11 of the DWR objections, Part B, which are titled "Testimony concerning construction impacts are not relevant to Part 1 key issues."

So I think that those are the two key areas we were referencing. So they weren't necessarily on a water diversion facility; they were larger arguments.

CO-HEARING OFFICER DODUC: Ms. Meserve, any response at this time to those two witnesses in particular?

MS. MESERVE: Osha Meserve for Local Agencies of the North Delta. I'm just going to go over here.

Osha Meserve for Local Agencies of the North Delta and other protestants. It's not often I get to say it's too short for me, so that's nice.

So we did file responses to the objections as soon as we were able. So we have addressed these issues in Pages -- looks like 5 and 6 of our responses. I think, you know, in general, these are percipient witnesses who are very familiar with their own lands, and they're also familiar with the project, and they have concerns.

I believe looking at, for instance, you know, there is a lot of testimony that was somewhat similar in, you know, the way that protestants have -- I'm sorry -- petitioner's have, you know, explained the need for their project and the way they see the need for new diversions and how that's going to be very helpful.

This is opinion that I believe that the farmers that they've objected to are able to make. I believe the Board is in a -- and the Hearing Officers are in an excellent position to weigh that evidence as they see fit. To the extent it also overlaps a tiny bit with what might come up in Part 2, I don't really see that as being an issue. The testimony of these witnesses focused on the legal injure to uses of water within their realm. So, yeah, I don't see why this testimony would be stricken. And I believe it should be -- remain in the record.

And there's probably other reasons outlined in our responses that I'm not getting to, but I'd be happy to answer questions.

CO-HEARING OFFICER DODUC: Thank you. And thank you for flagging the fact that you did provide a response. We will spend some time tonight taking a look at that as well, and we will also revisit this as part of housekeeping items first thing tomorrow.

MS. ANSLEY: Respectfully, we would like to also let you know that we are prepared to speak when Land Panel 1 is going up. We do have prepared some objections to renew, obviously, that we had filed previously.

But these responses by Land, et al. were filed yesterday at 4:31. And in addition to the responses to the DWR objections, there was also filed this week some revised testimony as well as a declaration from Ms. Meserve that we would also like to speak on at the beginning of their testimony. So just to give you notice.

CO-HEARING OFFICER DODUC: Okay. We're all playing catch-up now with all the multiple comments.

MS. ANSLEY: We weren't expecting housekeeping right now on that. So we are prepared do that when you feel it's appropriate.

CO-HEARING OFFICER DODUC: All right. We'll get to that, then, first thing in the morning.

Anything else, Ms. Ansley?

MS. ANSLEY: Or first thing when her panel goes up next.

CO-HEARING OFFICER DODUC: Okay.

MS. ANSLEY: Thank you.

CO-HEARING OFFICER DODUC: And moving on from there, given that -- I'm sorry. Do you have something to add before I move on to my next list?

MS. MESERVE: Yes, thank you. I would just suggest that, because these objections relate to the physical injury panel, which should go tomorrow, but I think it may be better for the process to just address them at that time would be my suggestion, I think.

CO-HEARING OFFICER DODUC: Mr. Mizell?

MR. MIZELL: Yes, Tripp Mizell, DWR.

Just to be clear, the additional objections that Ms. Jolie mentioned --

CO-HEARING OFFICER DODUC: Ms. -- who?

MR. MIZELL: Ansley, sorry. Using her first name, like I'm in kindergarten -- actually relate to Panel 1 of Land, so it would not be our preference to address the objections after Panel 1 had already presented. We'd like that do that prior to Panel 1

presenting, if possible.

CO-HEARING OFFICER DODUC: I expect Panel 1 will be presenting today.

MR. MIZELL: So I'd like to address those objections, if the Board will allow, before we go to Panel 1 today then.

CO-HEARING OFFICER DODUC: Okay. Moving on to the next item in my housekeeping list.

I need to give the City of Stockton -- is the City of Stockton here? Ah, good. Giving you a heads-up that, given the way this is going, you may be called upon to present your case in chief next Thursday.

MS. TABER: Thank you, Chair Doduc. Kelley Taber for the City of Stockton. And that would be acceptable to the City of Stockton. And we've spoken with the other parties, and it appears that there would be no objection if Stockton presented its case in chief at the start of the day on Thursday, which would work with the schedule for Stockton's counsel, Mr. Simmons.

And our witnesses and counsel are unavailable the following week. So I think if we can confirm that, that would be the most efficient.

CO-HEARING OFFICER DODUC: All right. We will try to confirm that tomorrow.

MS. TABER: Thank you very much.

CO-HEARING OFFICER DODUC: And then Mr. Brodsky will be here tomorrow as well because his group then would be next. And Mr. Jackson will be here tomorrow as well. You need not come up right now because I believe both Mr. Brodsky -- Mr. Brodsky has requested to not present his case in chief before November 30th. And Mr. Jackson similarly would like to not have to present his case in chief on November 17th and 18th.

Which leaves us to Restore the Delta, who has already earlier this morning requested December 8th and 9th.

So going down the list, I need to have Group 38, Pacific Coast Federation of Fishermen's Association and Institute for Fisheries Resources, No. 37, Ms. DesJardin, potentially be ready for presenting their case in chief -- I don't have all my dates, the following week, which would be November -- that would be November 17th and 18th. And that would also lead us to North Delta CARES, No. 39, No. 41 Snug Harbor Resorts, No. 43 Clifton Court.

So all of these groups are on notice that they may be as early as the 17th or 18th or potentially December 1st or 2nd.

So we'll be having a lot of housekeeping discussion tomorrow. But essentially everyone's on notice. We're getting to the time where everything is starting to crunch together, so we'll do our best to try to work with everyone on scheduling. But I do not want a lot of dead time on the calendar simply to wait for cases in chief to be presented.

We still have to go through, issue our rulings on some of the objections pertaining to Part 1A as well as Part 1B, and then allow you some time to prepare for rebuttal. So we can't be having weeks of dead time in our schedule waiting for cases in chief to be presented. We need to wrap those up. Okay?

So with that, we will continue this discussion first thing in the morning, but for now, Mr. Hitchings, please present your panel.

MR. HITCHINGS: Thank you Chair Doduc, Members of the Board and Board staff. Andrew Hitchings for Sacramento Regional Sanitation District.

And I'd like to at the outset just thank the Board for accommodating the schedule for this panel to present today at 1:00 o'clock.

The protestant Regional San submitted a written opening statement in this matter with its case in chief on August 31st. I'd like to briefly summarize

some of the key points from that written opening statement.

Regional San currently provides approximately 3.5 million gallons a day of recycled water for beneficial reuse under an existing State Water Board water right order that allows is to provide up to 10 MGD of recycled water.

Regional San is also, as I think Members of the Board are aware, constructing the Echo Water Project, which is a $2 billion investment that's going to provide disinfected tertiary treated effluent suitable for recycling and reuse for a broad range of purposes.

And with that, Regional San is then planning a substantial increase in its recycled water service based upon the additional capacity that will be available through the Echo Water Project. In fact, the testimony and exhibits that have been submitted show that they do have a new pending petition for change wastewater petition that would be for up to approximately 50,000 acre-feet a year of recycled water service to their so called South County Ag Project.

Approval of the California WaterFix Petition could impair Regional San's rights to the recycled water that it discharges. To the extent that the

petition itself assumes that the treated effluent will continue to be discharged at the rate or amount that it is or that it will somehow be available to meet obligations, standards, or objectives that are directly or indirectly related to flows, those assumptions are factually incorrect and also not consistent with applicable law as to ownership of treated wastewater discharges.

An order in this proceeding that's based on upon that assumption could injure Regional San given that it is a legal user of its wastewater discharges and its rights to those wastewater discharges.

So with that, I'd like to turn the panel and start the direct case in chief and direct exam.

CO-HEARING OFFICER DODUC: Not before I administer the oath.

MR. HITCHINGS: Thank you.

(Panel sworn)

PRABHAKAR SOMAVARAPU and CHRISTOPH DOBSON, called as witnesses by Group 13, having been first duly sworn, were examined and testified as hereinafter set forth:

CO-HEARING OFFICER DODUC: Thank you.

Now, Mr. Hitchings, you may proceed.

DIRECT EXAMINATION BY MR. HITCHINGS

MR. HITCHINGS: Thank you. The district's witnesses on this panel for Part 1 of the hearing are Prabhakar Somavarapu, the district engineer, and Christoph Dobson, the district's director of policy and planning.

And the panel's testimony has two primary purposes. One is to document and attest to the district's rights and interests in the use of its treated wastewater discharges from its Sacramento regional wastewater treatment plant and, two, to provide foundational evidence regarding the potential injury to the district's rights to its treated wastewater discharges if the California WaterFix project or any order approving it assume or rely on those continued discharges of any particular volume from the district.

And the direct testimony, the written testimony that has been submitted and the testimony that will be summarized today touched on those two key purposes.

So with that, Mr. Somavarapu, could you please state your name for the record and spell your last name.

WITNESS SOMAVARAPU: Prabhakar Somavarapu, S-O-M-A-V-A-R-A-P-U.

MR. HITCHINGS: And you understand that you're presenting your testimony under oath, correct?

WITNESS SOMAVARAPU: Yes, I do.

MR. HITCHINGS: Is Exhibit SRCSD-1 an accurate statement of your written testimony?

WITNESS SOMAVARAPU: Yes, it is.

MR. HITCHINGS: Did you prepare and sign that testimony?

WITNESS SOMAVARAPU: I had the outline from our attorneys, and I made edits and final changes and signed it.

MR. HITCHINGS: And at this time, would you please summarize your testimony submitted for the proceeding?

WITNESS SOMAVARAPU: I will.

I'm the district engineer for Sacramento Regional Sanitation District, or Regional San, serving about 1.4 million people in the Sacramento region providing wastewater conveyance and treatment services. Regional San offers a treatment plant, Sacramento Wastewater Treatment Plant, in Elk Grove, which has a permitted capacity of 181 million gallons per day at regular capacity.

My testimony is to summarize the improvements that Regional San is making to its facility which

expands its ability to recycle it's water from the current roughly 3 1/2 million gallons per day. The project that we're doing today is a regulatory required project which is approximately, as Mr. Hitchings has mentioned, approximately $2 billion.

It is currently under construction, on target to be completed by 2023 as permit requires us to do. And once it's completed, we will be able to have Title 22 quality water for all of our effluent from May through October and most of our effluent for the rest of the year. In essence we would be able to, if opportunities are available in the region, to be able to recycle most of the water from that point on.

And we also -- our board has adopted a policy in early 2000s to increase our recycling goal to almost 40 million gallons a day by 2024.

With that goal in mind, we have embarked on a project which is in the planning periods today, which is what Mr. Hitchings just briefly described.

And we also -- that goal is consistent with the California's goal of increasing recycling in the state, and it would substantially help the state in accomplishing that goal. And much of that project Mr. Dobson will describe, where it is and what it will do.

MR. HITCHINGS: Thank you.

Our next witness on this panel is Christoph Dobson.

Mr. Dobson, could you please state your name for the record and spell your last name.

WITNESS DOBSON: My name is Christoph Dobson. Last name is spelled D-O-B-S-O-N.

MR. HITCHINGS: You understand that you are presenting your testimony under oath, correct?

WITNESS DOBSON: Yes, I do.

MR. HITCHINGS: Is Exhibit SRCSD-2 an accurate statement of your written testimony?

WITNESS DOBSON: Yes, it is.

MR. HITCHINGS: And did you prepare and sign that testimony?

WITNESS DOBSON: I did, with the help of counsel and staff member pulling it together, and I revised it and signed it.

MR. HITCHINGS: And do you have any corrections to your written testimony to make at the proceeding today?

WITNESS DOBSON: Yes, I do have one correction. It's on Page 6, Line 28. There's a reference to Water Code Section 1212, and that should be changed to Section 1211.

MR. HITCHINGS: And for the record, Regional San did submit a notice of errata correction for that on October 28th.

At this time, Mr. Dobson, would you please summarize your testimony submitted for the proceeding.

WITNESS DOBSON: Sure. I'm the director of policy and planning for Sacramento Regional County Sanitation District. We like to go by "Regional San." In that capacity, I manage -- among several things, I manage the water recycling program.

My testimony describes Regional San's goals in developing our ability to recycle water and also just talk about some of the work we've done in the past on water recycling as well as what we're currently doing and then the plans for the future, all related to water recycling.

For well over a decade, we've been actively involved in numerous efforts to recycle our effluent that comes from the Sacramento Regional Wastewater Treatment Plant. And we're making a lot of progress in that area and are looking to continue to do more water recycling.

It's been touched on before, but we have a goal that was approved by our board of directors to increase water recycling throughout the Sacramento

region to up to 40 million gallons per day by 2024.

We have a master water reclamation permit from the Regional Water Quality Control Board to recycle up to 10 million gallons per day. So that's a smaller plant that's at our treatment plant that's in operation right now.

That water is distributed by the Sacramento County Water Agency. It's part of a wholesale agreement that we have with them. So we provide the wholesale water, and then the Sacramento County Water Agency or SacWa, they deliver it on a retail basis to the customers, which are basically landscape irrigation is what it's used for.

Since 2003, we've been doing that, and we've delivered over 3 billion gallons of recycled water to the City of Elk Grove for that purpose.

We also have a number of other water recycling projects which I touch on in my written testimony. But our most significant and most ambitious project is the South County Agriculture and Habitat Lands Recycled Water Program. And that's a mouthful, so we call it South County Ag for short.

This program would provide up to 350,000 acre-feet of water, recycled water, per year in agriculture and habitat lands in South Sacramento

County. And basically the idea is we provide the recycled water to the farming community in that area. They're currently using groundwater, pumping groundwater to irrigate their crops. And in place of that, they could use the recycled water, significantly reduce the amount of water they're pumping.

And that allows groundwater recharge to occur. It provides them another source, a dependable source of water. So it provides groundwater recharge, groundwater storage, increases the storage there. And then it also has some very nice ecosystem benefits as well.

We currently -- just the progress on that project, we released a Draft EIR for that program over the summer. We also filed a wastewater change petition under Water Code Section 1211. And we anticipate beginning to deliver recycled water on that project in 2023. And again, 2023 is the date when the Echo Water Project comes online. So we hope to have the South County Water Project ready to go, so we the turn the valve when the water is available and deliver the recycled water.

And that summarizes my testimony.

MR. HITCHINGS: That concludes the direct testimony for this panel. Thank you.

CO-HEARING OFFICER DODUC: Thank you, Mr. Hitchings.

Let's get an estimate -- actually, I did this morning, in terms of cross-exam.

And I believe the Department anticipates 20 minutes. And Mr. Herrick anticipates about five minutes. Mr. Herrick is now saying no cross?

No cross.

Anyone else wishing to conduct cross? Not Ms. Meserve, who stood up and confused me. In that case, then, the Department of Water Resources, you are the only one conducting cross-examination.

Please come on up.

MR. BERLINER: Thank you, Madam Chair. Tom Berliner on behalf of Department of Water Resources. We don't actually have any cross-examination, but we have an objection to this testimony.

CO-HEARING OFFICER DODUC: All right.

MR. BERLINER: It's my understanding that in the protest or objections that were -- was filed by Regional San and in Mr. Hitchings's opening statement, he made certain contentions regarding the reliance of the CWF on discharges from Regional San's facilities.

Neither of the witnesses testified at all on any impact of Regional San on the WaterFix discharges

or WaterFix disch- -- or withdrawals or WaterFix withdrawals on impacts to Regional San. Their testimony was very limited as to Regional San's program, which is fine. But they have not shown any harm. They have not discussed the WaterFix and its implications for their program.

And while I appreciate that Mr. Hitchings said that this testimony was foundational, they've not conducted any cross-examination. This is their case in chief -- I'm sorry, cross-examination regarding the impacts of WaterFix withdrawals on Regional San's discharges, to be specific.

This is their case in chief. This is the time that they're supposed to put on their evidence regarding harm, and they haven't put any evidence on. So in light of that, we'd ask that this testimony be stricken as not being relevant to showing any injury to a legal user of water.

CO-HEARING OFFICER DODUC: Your response, Mr. Hitchings?

MR. HITCHINGS: Yes, thank you.

These objections were addressed in the responses that Regional San has already submitted to the written objections, and this testimony is foundational evidence. The objection that was just

summarized, again, there's a little bit of burden shifting going on here. It's their burden to demonstrate no injury to other legal users of water.

They have not, notwithstanding the fact that Regional San has had detailed comments on the environmental documents, Regional San filed its protest in January, they had the opportunity in their direct case in chief to address that, in their petition materials to address that and have failed to do that.

Regional San will make the connection with regard to legal injury in it's legal briefs. And this foundation evidence is important to do that.

There is also evidence that has been submitted by the petitioners that can be used as part of that legal briefing, the modeling evidence and testimony that can make that linkage. But Regional San is in an awkward position here in the sense that some of these issues could be considered possibly Part 2 issues, but they don't want to be construed as having waived a legal injury to water rights issue for the purposes of Part 1.

So I would request that the Board overrule those objections at this time. And there still are the pending written objections before the Board.

CO-HEARING OFFICER DODUC: Thank you.

Any additional comments, Mr. Berliner?

MR. BERLINER: It's my understanding that Regional San has not provided any information for the record regarding the water right petition that they have to change their use.

In addition, the linkage that Mr. Hitchings referred to in part of their brief is a legal argument; whereas, here, we're obtaining facts. And we have a right to know the facts upon which they claim injury. We've made our case, and we've based ours on information currently available to us.

If there are CEQA issues to be addressed, those will be addressed within the context of the CEQA document. But insofar as demonstration of injury, we have not seen any from Regional San. We don't believe that, given that they've concluded their testimony, that they can show any legal injury.

CO-HEARING OFFICER DODUC: Thank you. We will take all of that under advisement, both what you have said here today as well as all the written objections and responses that have been filed with us.

And I think what I would like going forward, Mr. Hitchings and other attorneys, is when you complete your case in chief, you have one week, a one-week time frame, till noon next week to submit in writing the

list of exhibits you wish to move into the record. Other parties have done so, and I think that's just a good practice to continue.

MR. HITCHINGS: Thank you. We were going to suggest that. So that would be by noon of next Thursday; is that correct?

CO-HEARING OFFICER DODUC: Correct.

MR. HITCHINGS: Thank you very much.

CO-HEARING OFFICER DODUC: Something else?

MR. WALTERS: Yes, Hanspeter Walters, San Luis and Delta-Mendota Water Authority.

I want to join in that objection. One of the reasons I don't have cross is I really didn't understand what the injury was from any of the written testimony submitted. And, again, San Luis and Delta-Mendota joins in the objections. There's really been no showing of injury or any foundation laid for any alleged injury. To the extent they're claiming an injury, I guess, from reliance on their discharges or something like that totally lacks foundation and is speculative.

CO-HEARING OFFICER DODUC: All right. Thank you. So noted.

Thank you, Mr. Hitchings, and thank you to your witnesses.

MR. HITCHINGS: Thank you very much.

CO-HEARING OFFICER DODUC: Ms. Meserve, we are now up to your Panel No. 1.

And I understand, Mr. Mizell, that you wish to have a discussion before she brings up her panel.

MR. MIZELL: Yes, thank you very much. Tripp Mizell, DWR.

Previously, the Department has filed objections to many witnesses on Land's witness list but specifically with regard to Land Panel 1 as to exhibits that were submitted without a sponsor and exhibits that were submitted without any foundation.

At -- on October 31st, there were some erratas filed and a declaration filed by Ms. Meserve. The declaration by Ms. Meserve attempted to cure the objections that we had noted on these exhibits. But it was -- you know, if she was improperly filing a declaration, counsel is not allowed to establish foundation for exhibits in this manner, through a declaration.

So her declaration was filed on November 2nd at 4:31. So I guess that would have been last night at 4:31. In fact, the declaration suffers from many of the same problems that our original objection raised. So to that extent, we have an attorney who cannot be

cross-examined trying to cure defects about exhibits that are being submitted into evidence as to what they are, how they were developed, and how much weight they should be given.

Also, until part of the -- in part of the declaration, Ms. Meserve admits she created the exhibits in conjunction with a group called BSK & Associates.

To our knowledge, no one from BSK & Associates is being produced as a witness, so we are unable to ask BSK & Associates about these exhibits that were developed. And as per Ms. Meserve's statements, none of her witnesses helped to develop them, so we can't ask her witness panel about these exhibits.

Again, it's an attempt to cure the defects that we've raised previously through a declaration, and we just believe that's an improper use of a declaration at this time.

That's the extent of my -- you know, my objection to what was filed last night.

I do have some additional comments on the exhibits that are going to be used by witnesses in Panel 1 more specifically.

CO-HEARING OFFICER DODUC: Let's hold that for now, and let me ask Ms. Meserve to come up and address

what you've said so far.

MS. MESERVE: Good afternoon. Osha Meserve for Lands, et al. Let's see. The declaration is quite limited. Obviously the response is where the meat of what -- we received, I think, some 50 pages of objections for every single thing in our case in chief. So I did my best to go through all of that, with staff and respond to everything.

There was -- you know, obviously as counsel, I worked on making sure that we could pull together all these exhibits. They've objected even to the references within -- you know, each expert relied on references. And I had the experts compile those references for the convenience of the parties and of the Hearing Officers. And they've objected to that.

CO-HEARING OFFICER DODUC: I believe the objection is would those experts be available for cross-examination.

MS. MESERVE: Well, the experts are all coming forth. We have a long list of witnesses that are about to appear before you. And there will be -- additional authentication will occur during the panel itself, during each panel with respect to the exhibits.

And I would note with respect to the numerous objections to the graphical representations mostly made

by BSK Associates that it's not like every single person who created a graphic that appeared in the cases in chief or in the cases in chief of petitioners or any of the other parties is here today to testify. It would have been impossible for me to know to put those people on the NOI back in January.

So I'm not sure what the point of all this is.

We're trying to put forth information that helps show that they haven't met their burden regarding injury and that there will in fact be injury. I haven't heard anything about how any of the documents or graphics we've submitted is incorrect, has been altered, anything like that. So I believe all these objections are without merit.

CO-HEARING OFFICER DODUC: Mr. Mizell?

MR. MIZELL: Yes. It seems, if I understood Ms. Meserve's response correctly, that she was getting the points that I was going to make in the remainder of my objection.

The extent of what I've already discussed is that we believe her declaration is inappropriate because it attempts to cure faults with the exhibits as having lacks foundation and lack of a sponsor.

When she was responding to lack of a sponsor, she said they're either foundational or "I crafted them

with BSK & Associates."

That does not cure the fact that none of her witnesses referenced those documents. So submitting documents into evidence that have no basis in the written testimony being filed is -- it's an orphan exhibit; it has no home; it has no testimony. And therefore, it can't be effectively cross-examined.

And in terms of foundation, what I'd like to do is let Ms. Ansley provide some additional detail, as many of these objections were prepared by a number of attorneys who -- with DWR.

CO-HEARING OFFICER DODUC: Ms. Ansley?

MS. ANSLEY: Okay. Thank you very much, Jolie-Ann Ansley for the Department of Water Resources.

Again, this is sort of a two-part argument, as Mr. Mizell said. The first part is to exhibits that were placed on the exhibit list that had no testimony concerning them or referencing these exhibits. They're listed in our objections.

I understand that, last night, Ms. Osha [sic] filed her responses in these declarations seeking to clarify the foundation for those exhibits that had no relevance established or foundation. And so we maintain our objections to those particular exhibits and object to her using herself as a witness to bring

them into evidence.

The second part was -- and this is more to evidence -- and I believe in her responses she said that she was trying to put on the exhibit list exhibits that were relied on by her experts but then never discussed or referenced by her experts. So in that way, if an expert wants to rely on experts, that's of course fine. It's just obviously better if they expressly refer to it and let us know what the evidence is.

But our second series of objections was to exhibits that are referenced in the testimony but lacked foundation about their creation. They were clearly figures that were created by an outside company for which there is no witness that purport to show injuries. And we had no information about how they were created, who created them. It was more of a routine lack-of-foundation objection.

So there are two parts there which Ms. Meserve attempts to correct in her declaration filed last night. So that would be the sum of our objection to exhibits that lack foundation and her declaration.

We also have -- and Mr. Mizell will continue this discussion. We also have objections to revisions to testimony that were submitted earlier this week on

Monday.

CO-HEARING OFFICER DODUC: Before Mr. Mizell moves to that point, Ms. Meserve, your response?

MS. MESERVE: Thank you. Just briefly, with respect to my declaration, I'm a little confused as to the argument that's being made because my declaration doesn't speak to any of the exhibits without references.

And I believe that, given what you've just discussed in the terms of the protestants within one week submitting their evidence for their case in chief, that that would -- to the extent there turns out to be any exhibits that are orphaned for any reason, that would give me a chance to correct that. And then if I don't, obviously, they could object. So my declaration does not address that issue.

With respect to the maps, I did attach to my declaration additional information regarding how they were made. I also do have a former employee of BSK here today on Panel 1, and he is prepared to help authenticate those exhibits.

So I apologize that the -- all of the information was not made available right at the time we filed all of this. I could have used an additional five hours. But, you know, we did the best we could.

And I'm going to correct it now. If we don't have the ability -- you know, if it doesn't get corrected, then I believe there will be ample opportunity for the petitioners to bring that up if I cannot correct it.

CO-HEARING OFFICER DODUC: Anyone else, hang tight for now. I only want to hear from Ms. Meserve and DWR. Ms. Ansley?

MS. ANSLEY: I would just like to say that Paragraphs 3 and 4 of her declaration actually do reference the exact exhibits which I stated in our objections lack a sponsoring witness, for lack of a better description.

And I do think it is improper to have the attorney of the case in chief attempt to correct foundational problems with exhibits and testimony that's been submitted, so we renew our objection to her declaration.

CO-HEARING OFFICER DODUC: All right. Next, Mr. Mizell, will this be your final point?

MR. MIZELL: Yes. Just speaking to the modified exhibits that came in on the 31st.

So on the 31st, errata were filed for both Witness Grant and Witness Ringleberg. And both of them introduced new evidence at that time. And in some cases, it was evidence that was not contained within

the written materials filed in a timely manner by Ms. Meserve. I'd like to maybe take it point by point so that I'm absolutely clear.

With regards to Witness Grant, his original PowerPoint slide presentation was two pages. It consisted of maps, and not a tremendous amount of text. The revised version is -- looks like seven full pages, many of which contain extensive text explaining the graphics and as well as new text. And apparently on Page 7 of that group, he replaced the charts wholesale.

So that -- Mr. Grants's revisions to his PowerPoint I believe go beyond the extent to which errata are normally used and actually introduce new testimony at this time. We think that's improper and we'd object to that.

With regards to Mr. Ringleberg, he filed an errata. And what we have here is substantial amount of new information. And if we could -- if we can just for a few more minutes, I'd like to simply walk us through the PowerPoint because I have specific points for each of the pages that we find objectionable.

It seems like, even right off the bat with the cover page, he's attempting to clarify and refocus his message by adding or by deleting the "Northern Delta" term and replacing it just with "Delta."

On its face, that may not be substantive, but we thought that it instructed us to look further into his testimony to see if there were any changes. And when we did, we actually found quite a few. So on Page 2, it's actually an entirely new slide. All of the bullet points are new. And the bottom bullet point is not found anywhere within his written testimony.

On Slide 5, it, too, is a brand-new slide, and the first bullet point is not within his written testimony.

Slide 6 is a new slide, but we did -- we were able to trace this back to his written testimony, so to the extent that it's simply clarifying the material that he's previously submitted to the Board, we would like it noted that it was not previously a slide, but we don't have any objection to content of the slide itself.

On Slide 10, the graph has been altered to expand the time frame which it covers on both ends of the scale.

Depending upon the point Mr. Ringleberg intends to make with this particular slide, that may be a significant change or not. It was -- we were unable to tell at this time if that was significant.

Similarly, the graph on Slide 11, he extended

the graph on the scale to bring it further into May.

On Slide 12, this is a new slide. And the second bullet point is new opinion. Now, unlike some of the other new materials this does not provide a reference and we have no way of verifying it since it's not within his written testimony. So it's very hard to develop effective cross-examination with new unsubstantiated opinion being introduced as a PowerPoint.

Slide 13 is new to this PowerPoint, although it is found as an attachment at the very back of his written testimony. So the content again is not objectionable, but the fact that it's making an appearance so late in the day does cause us some concern.

Slide 14, on the other hand, is new material and is not found in his written material anywhere.

And if we go to the last slide, Slide 16, the second bullet point here, the second -- I guess the second point in the paragraph there is entirely new and not contained within the written testimony. There was no change sheet for red line provided with this information. It took us quite a bit of effort and scrambling to determine what had changed when it was submitted on the 31st.

I appreciate your patience in letting me walk you through that. And that is the conclusion of our objections.

CO-HEARING OFFICER DODUC: All right.

Ms. Meserve?

Hold your horses, Ms. Morris.

Ms. Meserve, please? Do you have any response?

MS. MESERVE: Thank you. I have to first apologize. This was a clerical error that happened with respect to the rush to get everything uploaded on the deadline for our case in chief. And unfortunately, we didn't notice it until a few days ago. So we did submit it as an errata. The file is the same as what was completed a couple days before the deadline in fact.

So I apologize to the parties for this oversight on our part.

I think I did check through it in the same way that Mr. Mizell did because I figured this would be the problem. I think in large part it's -- you know, the written testimony supports all of the things in the PowerPoint. I think it's pretty obvious that what was uploaded was a draft that was incomplete, unfortunately. Anyway, it just was a clerical error.

But I believe that there's been a few days to review it. It generally tracks what the testimony is. I don't think that the -- these are conclusions that Mr. Ringleberg could draw from, you know, the expertise that's outlined in his CV and, you know, that you'll hear about today if we can get to that.

So I guess I would ask that we be able to use the correct PowerPoint for purposes of his presentation. I think it would work better for everyone.

And to the extent there are continuing objections that there's actually something new in here and different, that that be reserved to deal with at the back end of the proceedings.

Thank you.

CO-HEARING OFFICER DODUC: Before we take a break to discuss this, I will allow other parties to chime in.

Ms. Morris, briefly, please.

MS. MORRIS: I will be brief. I want to join in the objection, and I will just note that there is brand-new graphics that were not contained anywhere and opinions. This is surprise testimony.

It was clear that, if parties wished to use a PowerPoint, they had to submit it on time. And by

submitting this at the end of the day on Monday, it is completely inefficient time for us to go through and be able to effectively cross-examine.

CO-HEARING OFFICER DODUC: Ms. DesJardin, briefly.

MS. DesJARDIN: Yes. This is in my due process motion. The Ninth Circuit opinion that is the precedent for the Board admitting all of the petitioner's evidence in and weighing objections at the end is Calhoun versus Bailar. I discuss it in that motion.

And to the extent it's applied, it is with the assumption that the evidence can be corroborated during the hearing. I respectfully request that you consider this point in considering this issue.

CO-HEARING OFFICER DODUC: Thank you.

Mr. Jackson?

MR. JACKSON: One of the reasons that I didn't have my clients prepare a summary is because in terms of the evidence, it is -- the summary runs the risk of limiting what you put in in terms of evidence, and people look only at the summaries.

In a -- while the rules here are basically designed to go more to the weight of the evidence than the admissibility of the evidence -- and we're all,

we've practiced in front of you for years, used that -- it became very clear early in this hearing that the goal of the inadequately -- inadequately presented proponents -- by the way there is --

CO-HEARING OFFICER DODUC: Mr. Jackson, you're on thin ice here.

MR. JACKSON: Well, this is terrible, so I need to express some of it.

There's a motion in front of you, which my clients have joined, to dismiss this petition because it's inadequate under law.

So what we're getting now is a sort of a gang-up on parties who are trying to present evidence to show injury when it's not their duty to show injury. It's is other side's duty to show injury. And this is -- I know you're not going to like it, but this is a violation of due process, both procedural and substantive due process.

And usually in a courtroom, where we have tighter rules on what's admissible in terms of evidence, what's admissible in terms of demonstrative evidence -- which is what they're trying to do here, to demonstrate to you what they think is important in the broader amount of evidence that they've shown you.

What's happening is that the cases are getting

steadily narrowed so that the people who are affected can't put on their evidence and demonstrate to you while they put it on what the foundation is and what the relevance is.

And so it seems to me that there -- you know, fundamental fairness is what due process is about. And there are two standards here.

And maybe it's our fault that we didn't notice early enough that we were not supposed to try to deprive the state and the federal government from their opportunity to put on their case the way they sought.

CO-HEARING OFFICER DODUC: Wrap up, please, Mr. Jackson.

MR. JACKSON: But that's what's happening to us now. Thanks.

CO-HEARING OFFICER DODUC: Anyone else wishing to put in their two cents?

(No response)

CO-HEARING OFFICER DODUC: All right. With that, we'll take a break. Right now, it's 2:00. We'll resume at 2:15.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. We are back in session.

Mr. Mizell, I'm glad you're up there. I had

some questions. You had a concern with respect to Witness Grant's presentation.

Mr. Baker, if you could put up the screen for everyone to see.

According to what I had, what Mr. Grant revised was a statement of qualifications.

MR. MIZELL: That is correct. I was actually standing up here to make a correction. I was erroneously referring to Mr. Grant. What I meant to refer to was Mr. Tootle, IL-37 I believe.

So the first objection was to Mr. Tootle. I recognize that he's not presenting until Panel 2, I believe. And so I had that misfiled in my notes, and I apologize.

CO-HEARING OFFICER DODUC: All right. So now, we're left with just Mr. Ringleberg. Did I pronounce his name correctly?

WITNESS RINGLEBERG: Yes.

CO-HEARING OFFICER DODUC: All right. In that case, consistent with the Board's policy of discouraging surprise testimony, the objections with respect to Mr. Ringleberg's revised PowerPoint presentation, that's II-25 Revised, is sustained with respect to introduction of new evidence, and new information.

Let me, before I continue, the remainder of the objections voiced by DWR and joined by Ms. Morris we'll take under advisement. But with respect to the revised presentation by Mr. Ringleberg, II-25 Revised, that objection is sustained.

Ms. Meserve, I will give you the option, if you will would like, to have Mr. Ringleberg present his case in chief tomorrow, after he's had a chance to review his material.

While we are not allowing 22 -- or II-25 Revised, he had submitted a prior presentation that he may use. He may, of course, also refer to exhibits that he had previously submitted, his testimony as well as figures and information in that testimony as part of his presentation of his case in chief.

If he's prepared to do that today, wonderful. If not, you may have until tomorrow to recall him.

MS. MESERVE: Thank you. May I confer with Mr. Ringleberg just briefly?

CO-HEARING OFFICER DODUC: All right.

And, Mr. Mizell, since you have revised your other objection, pertaining to a witness from Panel 2, we will revisit that tomorrow. But unless something is drastically different, if it pertains to surprise testimony, the ruling should be expected to be similar.

MR. MIZELL: Thank you.

CO-HEARING OFFICER DODUC: Ms. Meserve?

MS. MESERVE: Yes. Mr. Ringleberg is prepared to go forward today on his original PowerPoint and testimony.

And then with respect to the Tootle testimony for tomorrow, I'm not sure if -- I guess they're still objecting. I guess I would just ask that the petitioner's reconsider their objections to Tootle. It's really just pictures of things that are other places. And I've referenced those within the slides -- Tootle's slides reference them.

So there's nothing surprising in Mr. Tootle's testimony. Of course, you know, so that -- I don't think there should be any problem with Mr. Tootle's. We respect the Board's rulings regarding Mr. Ringleberg's testimony.

CO-HEARING OFFICER DODUC: We will revisit that tomorrow since we did not get a chance to discuss that previously. All right. With that, thank you all for weighing in on that topic.

We will now turn to Ms. Meserve to present her Panel No. 1. Do you wish to provide a policy/opening statement first?

MR. VAN ZANDT: Thank you, Hearing Officer.

Michael Van Zandt for the salinity panel, the combined salinity panel. I'll be doing the examination of this panel and defending the cross.

CO-HEARING OFFICER DODUC: So no statement?

MR. VAN ZANDT: There is a short statement, opening statement, yes.

CO-HEARING OFFICER DODUC: Oh, all right.

You know what? I will just go ahead and ask you to stand and raise your right hand. We'll get that done with.

(Panel sworn)

ERIK RINGLEBERG, MICHELLE LEINFELDER-MILES, STAN GRANT, BRAD LANGE, TOM HESTER

called as Panel 1 witnesses by Groups 19 and 20, having been first duly sworn, were examined and testified as hereinafter set forth:

DIRECT EXAMINATION BY MR. VAN ZANDT

MR. VAN ZANDT: Thank you, Madam Hearing Officer, Members of the Board and staff.

This panel will be presenting two farmers, operators, managers of farms in the North Delta in particular Ryer Island and areas that are close to Ryer Island. That's Mr. Tom Hester, who is the president of Islands Inc., and Mr. Brad Lange, who is a member of

Lang Twins but also a partner in Diablo Vineyards. We also have Stanley Grant, who will be presenting some expert testimony. And we also have Dr. Michelle Leinfelder-Miles, who will also be presenting expert testimony, and Mr. Erik Ringleberg as well.

To start off with, Mr. Hester -- Mr. Hester is the president of Islands Inc., and he's a long-time resident of the Delta and has farmed on Ryer Island for over 36 years.

So there's two Ryer Islands in the Delta, so it's important to distinguish, the Ryer Island just off here, just north of Rio Vista, served by Miner Slough and Steamboat Slough, both tributaries to the Sacramento River.

Islands owns riparian water rights acquired beginning in 1868, currently places about 9,269 acre-feet of water to beneficial use, irrigating permanent crops and also some annuals.

Irrigation methods that they use include sprinklers, flood irrigation and sub-irrigation. And the water is diverted from Miner and Steamboat sloughs and some other sloughs in the vicinity of Ryer Island using a system of siphons.

And you'll hear Mr. Hester testify about his concern for the quality of water as it may be affected

by the WaterFix proposal and, in particular, his concerns about saltwater intrusion into the Delta and its potential impacts on his farming operations on Ryer Island for Islands Inc. We're also concerned about the quantity of water that will be available if WaterFix is approved, and he will talk specifically about the effect of withdrawing that amount of water potentially on his siphons in the two sloughs. And basically you'll hear from him that, without sufficient quality and quantity of water, there could be damage to his crops to the point where they may be destroyed. And he does ask that the Board deny this petition.

For Mr. Brad Lange, you will here his testimony. He's the owner and operator of Lange Twins, Inc. which is a partner in Diablo Vineyards. They grow grapes in Lodi, Clements Foothills in the North Delta under the name of Lange Twins.

In the North Delta, Lange Twins farms about 1600 acres of grape Ryer Island, Pearson District, and Merritt Island. Now, Mr. Lange will testify it takes considerable amount of investment to grow grapes in the Delta and that considerable amount of investment is at risk if Lange Twins and Diablo Vineyards and other grape operations do not receive sufficient quantities

of high quality water.

Mr. Lange will also be talking about his observations over the decades of growing grapes in the Delta, that's on the tolerance of those grapes for salt intrusion. In the Delta.

Mr. Lange will testify he has experience with salt intrusion in the recent drought years, and he will talk about those experiences with the Board.

Turning to the combined salinity panel, this testimony is being offered on behalf of Islands Inc., Delta Watershed Land Owner Coalition, Bogle Vineyards Diablo Vineyards, Stillwater Orchards and the Local Agencies of the North Delta. And it is the combined efforts of these three qualified experts that you see before you on crops that are grown in the Delta.

So first you'll here from R. Stanley Grant. Mr. Grant has a BS in geography from the California State University Hayward an MS in soil science from the University of California Davis, certified professional horticulturalist. And a certified professional soil scientist. He'll testify about the WaterFix opportunities to add saltwater intrusion and about the saline water use in the Delta.

Next you'll hear from Dr. Michelle Leinfelder-Miles. Dr. Leinfelder-Miles is a Delta

crops resource management advisor with the University of California Cooperative Extension in San Joaquin County. She has 18 years' experience in agricultural cropping systems. And Dr. Leinfelder-Miles has a BS in crop science and management from U.C. Davis, an MS in horticulture from Cornell university, and her Ph.D. in horticulture from Cornell University.

And Dr. Leinfelder-Miles will testify about the soil chemistry associated with salt intrusion on croplands and will provide evidence of soil testing that she actually conducted herself on Ryer Island as it relates to the issue of salt build-up in the soil.

And, finally, you'll here from Mr. Erik Ringleberg. Mr. Ringleberg is a Ph.D. candidate in riparian wetland research at the University of Montana. He has BS in microbiology from Colorado State University, and an MS in environmental science from Leslie University in Cambridge, Massachusetts.

Mr. Ringleberg will testify about the likely impacts on agriculture as it relates to water quantity and quality in the Sacramento River downstream of the North Delta intakes. And he will also provide some criticism of the project analysis that has been presented by petitioners.

First, I would like to direct my questions to

Mr. Hester, if I may.

Mr. Hester, state your name for the record, please.

WITNESS HESTER: My name is Tom Hester.

MR. VAN ZANDT: Is your microphone on?

WITNESS HESTER: I'm Tom Hester.

MR. VAN ZANDT: And where are you employed, Mr. Hester?

WITNESS HESTER: I'm employed with Islands Incorporated, which is located on Ryer Island in the Delta.

MR. VAN ZANDT: What position do you hold at Islands Inc.?

WITNESS HESTER: I'm currently the president, general manager in charge of the farming operation.

MR. VAN ZANDT: How long have you worked at Islands Inc.?

WITNESS HESTER: 36-plus years.

MR. VAN ZANDT: What other positions have you held at Islands Inc. over the years?

WITNESS HESTER: Well, I've held everything that has to pertain with agriculture. But previously, I was a vice president of the company and did virtually the same duties that I do now.

MR. VAN ZANDT: And how long have you actually

been the president of Islands Inc.?

WITNESS HESTER: Approximately five years.

MR. VAN ZANDT: Where is Islands Inc. located?

WITNESS HESTER: It's about 30 miles south of Sacramento, two miles north of Rio Vista, just west of the -- just east of the Sacramento deep water channel which is also Cache Slough.

MR. VAN ZANDT: How many employees does Islands Inc. have?

WITNESS HESTER: We have about 12 to 15 full-time employees, 30 during the season, and we'll also hire more employees for harvesting of fruit during that time of the year.

MR. VAN ZANDT: How many acres does Islands Inc. form?

MR. HESTER: We own about 6,000 acres. We farm about 3700 acres, and we lease out the remaining acres to some other tenant farmers.

MR. VAN ZANDT: Are you familiar with Island Inc.'s water rights?

WITNESS HESTER: Yes, I am.

MR. VAN ZANDT: What type of water rights does Island Inc. own?

WITNESS HESTER: We have riparian and pre-1914.

MR. VAN ZANDT: I'm going to show you Exhibit II-37, if I could, please.

Mr. Hester, do you recognize II-37?

WITNESS HESTER: Yes, these are 14 of the diversions that Islands uses to divert water into the island.

MR. VAN ZANDT: And based on your personal knowledge of Islands Inc. water rights, does II-37 accurately reflect the water rights that Islands Inc. claims?

WITNESS HESTER: Yes. Last year we had to go through the exercise of having to research and validate these water rights. And, yeah, I can see that those are them. And I also did the applications for the S.O. numbers

MR. VAN ZANDT: What is the total amount of water the Islands Inc. Diverts in a year?

WITNESS HESTER: In 2013, we diverted 9,269 acre-feet.

MR. VAN ZANDT: What are the sources of water that Islands Inc. uses?

MR. HESTER: Ryer Island is surrounded by four sloughs. We have Cache, Sutter, Steamboat, and Miner. We divert water from all four of those sloughs.

MR. VAN ZANDT: How many points of diversion

or intakes does Islands Inc. have with all these sloughs?

WITNESS HESTER: We have 17 that we use

MR. VAN ZANDT: Okay. Show you an Exhibit II-38.

And Mr. Hester, can you describe for the record what II-38 is?

WITNESS HESTER: It's a map of Ryer Island.

MR. VAN ZANDT: Is this a true depiction of the intakes at Ryer Island that Islands Inc. uses?

WITNESS HESTER: Yes, it does. It shows the property that we own, and it also shows the intakes that supply those parcels.

MR. VAN ZANDT: Maybe you could walk around a little bit in terms of the internal features of the island, what appear to be some internal waterways?

WITNESS HESTER: Most of these Islands are shaped kind of like a bowl. So a lot of those lines, they're property lines and they're also ditch lines. So everything drains towards the middle. And the center of the Island is Elk Slough. So everything will drain from the outside into that Elk Slough area, which will eventually go to the south for discharge.

MR. VAN ZANDT: Why are you testifying here today, Mr. Hester?

WITNESS HESTER: To stand up for our and protect our water rights.

This application is to protect the water rights of the Central Valley Project and the State Water Project. But our existing water rights need to be protected also. And this Board needs to recognize that. This petition has the potential to injure those existing water rights that we have.

MR. VAN ZANDT: What types of crops does Islands Inc. grow on Ryer Island?

WITNESS HESTER: We grow pears, apples, cherries, alfalfa tomatoes, corn, wheat, and safflower.

MR. VAN ZANDT: Show you Exhibit II-39, please. Are you familiar with II-39, Mr. Hester?

WITNESS HESTER: Yeah. This is a spreadsheet that we put up that shows the ranches that we own, the acres on those ranches, the crops that are planted with the acres on those, and who are the growers on those properties.

MR. VAN ZANDT: Is this a true and correct copy of the cropping patterns, the crop map that Island Inc. operates under?

WITNESS HESTER: Yes, that's true. It changes a year to year, the cropping pattern, a little bit. But we do one of those every year, yes.

MR. VAN ZANDT: What type of irrigation methods does Islands Inc. use?

WITNESS HESTER: We use sub, sprinkler, flood, and furrow irrigating.

MR. VAN ZANDT: How is the water distributed to Islands Inc. Farms within Ryer Island?

WITNESS HESTER: Through a series of siphons and from the sloughs, water will be diverted off those sloughs into the island. And then they'll go into a series of canals. And then water will be pumped out of those canals on adjacent fields to those crops.

MR. VAN ZANDT: How do the siphons actually work?

WITNESS HESTER: Well, prima siphon will vacuum the air out of it, and then they'll gravity feed into those adjacent channels.

MR. VAN ZANDT: So the distribution of water throughout the island is primarily through gravity feed?

WITNESS HESTER: Yes, it's gravity feed.

MR. VAN ZANDT: Do the siphons depend on a certain level of water in order to work?

WITNESS HESTER: Yeah, the higher the water is in the river, the more efficient they are, the more water you'll get. The lower the water is in river, the

less water you'll get. If the water goes low enough in the river, then the siphons won't work at all.

MR. VAN ZANDT: So what are some of the concerns that you have about California WaterFix and the new tunnels?

WITNESS HESTER: Well, salinity is an issue, water levels in the river's an issue, subsidence of the land's an issue, crop damage is an issue, maintaining the supply chain is an issue, and also crop financing.

MR. VAN ZANDT: What are your concerns about salinity and California WaterFix?

WITNESS HESTER: Well, if the salinity goes up, it can damage the crop; it can damage the plant; and it can also put permanent damage on the ground.

So we want to make sure that we keep our water clean so that we don't have to have that salinity into the island.

MR. VAN ZANDT: How do you monitor the salinity in the river at this point?

WITNESS HESTER: There's several monitoring sites around the outside of the island. And when we know that there's issues or potential low flows that we have to monitor, we'll watch those -- those monitoring devices. And if the salinity comes up, the numbers come up too high, then we'll have to shut off those

diversions.

MR. VAN ZANDT: What do you -- what must you do to protect crops on Ryer Island if there is high salinity in the river?

WITNESS HESTER: Well, if we see that, then, yes, we'll shut off the water to those siphons, and it could starve those crops of water.

MR. VAN ZANDT: So what happens to the crops if you have to shut down the siphons and you can't irrigate?

WITNESS HESTER: Well, we could see low yields or unmarketable crops. We could see plant damage. And if it's severe enough, you could actually see that the plant will die. And in permanent crops, you could see permanent damage.

MR. VAN ZANDT: What are your concerns about water levels as a result of California WaterFix?

WITNESS HESTER: If the water levels go too low, then we won't get enough water. And usually when the water levels are too low, then we don't have good flows in the river. And the if that's the case, there's a chance -- there's pretty good chance that you'll have salinity issues.

And if those salinity issues are high in combination with the low flows, then there's a pretty

good chance we're not going to have enough water on the island to supply all the crops. And if that's the case, that happens, then that's, again, an injury to our water rights.

MR. VAN ZANDT: Mr. Hester, does Islands Inc. have a contract with the North Delta Water Agency that provides any water to your farm?

WITNESS HESTER: Ryer Island is within the boundaries of the North Delta Water Agency. And the North Delta Water Agency has a contract with the State of California. It's a quality contract.

MR. VAN ZANDT: Does that contract with North Delta Water Agency protect your farm from reductions in water supply that would be caused by California WaterFix?

WITNESS HESTER: It's not a protection. There is a -- there is a safety net if -- but it's based off of a drought situation. And usually a drought situation is an act of god. And if you were to take water out of the top part -- or siphon water off before it comes down to us, well, that's not an act of god. So I don't know if we'd be protected from that or not.

MR. VAN ZANDT: Does the contract with North Delta Water Agency protect your riparian rights in the Delta?

WITNESS HESTER: No.

MR. VAN ZANDT: What are your concerns about the supply chain as a result of California WaterFix?

WITNESS HESTER: Well, if you have to make crop adjustments and you lose crops, you'll have to change the cropping pattern. You could lose the buyers for those crops. You can lose suppliers for those crops. Pretty soon things start to collapse. You don't have all your tools that you're able to use.

MR. VAN ZANDT: What financial impacts do you think the tunnels will have on Islands Inc.?

WITNESS HESTER: All -- I go -- we use an operating loan for the crops. And a lot of farmers do. And when we were in the drought, we were asked questions about water supply and water quality.

And if that's an issue -- if you have an issue where you can't prove that you have good water quality, or good water supply, it might pull your operating loan from you. You might not be able to get one.

MR. VAN ZANDT: And that could affect your ability to get the line of credit you say?

WITNESS HESTER: Yes.

MR. VAN ZANDT: Did the recent droughts cause you some concerns regarding California WaterFix?

WITNESS HESTER: Yes, we noticed that there

was higher salinity in the rivers around us, and we also -- there was also proposed to put barriers up. Those barriers could have cut us off from water flows coming through. It could have raised salinity on us. Yeah, that was a concern.

If this petition goes through, that could create a permanent-type drought situation, which we'd have to -- which we would consider is an injury to our exiting water rights.

MR. VAN ZANDT: Mr. Hester, last question. What are you asking the Board to do?

WITNESS HESTER: I would ask them to deny this petition.

MR. VAN ZANDT: Thank you, Mr. Hester.

I'd like to turn my to questions to Mr. Lange, if I could.

Mr. Lange, state your name for record.

WITNESS LANGE: Bradford Lange.

MR. VAN ZANDT: Mr. Lange, what's your relationship to Diablo Vineyards?

WITNESS LANGE: I'm co-owner, partner, as well as the general manager.

MR. VAN ZANDT: How many years have you been associated with Diablo Vineyards?

WITNESS LANGE: Since its inception in 2001,

15 years.

MR. VAN ZANDT: And what does Diablo Vineyards produce?

WITNESS LANGE: Are you associated with a vineyard management company?

WITNESS LANGE: Yes, I am. Lange Twins, Inc., of which I'm part of.

MR. VAN ZANDT: How many how many acres of vineyards does Lange Twins manage?

WITNESS LANGE: We have approximately 1400 acres of our own family ground, also about 6500 acres of other ground throughout our viticultural areas that we farm in.

MR. VAN ZANDT: Where exactly does Lange Twins farm?

WITNESS LANGE: We farm in three distinct viticultural areas. One is in the Clements Hills, east of Lodi. The other is Lodi itself and sounding areas of the City of Lodi, and also the North Delta.

MR. VAN ZANDT: Do you know how many tons of grapes Lange Twins produces in the North Delta on an annual basis?

WITNESS LANGE: Depending on the year, but we will produce around 1,000 tons, which equates to about 2 1/2 million gallons of wine.

MR. VAN ZANDT: Where on Ryer Island are your grapes grown?

WITNESS LANGE: We are located primarily in the southern part of the island. The first vineyard is on the far southern tip of Ryer Island. The balance is on the east side of the island that lie within or on Steamboat Slough.

MR. VAN ZANDT: And how many acres on Ryer Island do you farm?

WITNESS LANGE: Approximately 600 acres.

MR. VAN ZANDT: How long have you been farming Ryer Island?

WITNESS LANGE: Since about 2001.

MR. VAN ZANDT: Are you familiar with the water rights used by Lange Twins on Ryer Island?

WITNESS LANGE: Yes.

MR. VAN ZANDT: Show you Exhibit Lands 6, please. You need to go down to the bottom, zoom out a little bit.

Mr. Lange, can you identify the water rights on Lands 6 that are located on Ryer Island?

WITNESS LANGE: Yes, it's -- there are two diversions on the vineyards that are -- border on Steamboat Slough, as well as if you go further south, right to the tip of the island, there is another

diversion there.

MR. VAN ZANDT: And those are the blue triangles?

WITNESS LANGE: Yes.

MR. VAN ZANDT: And you have some other diversions that you manage as well within the Delta?

WITNESS LANGE: Yes. As you go north, there's other diversions, one on -- two on Snodgrass Slough and one on Duck Slough and one on Elk Slough, up on Merritt Island.

MR. VAN ZANDT: Scroll up a little bit, please.

And, Mr. Lange, is this a true and correct depiction of your diversion points in and around Ryer Island in the Delta?

WITNESS LANGE: Yes.

MR. VAN ZANDT: The areas marked in yellow there, can you identify those, please?

WITNESS LANGE: My eyes weren't what they used to be, excuse me. And this is really dark.

MR. VAN ZANDT: Looks yellow on here. Is that the location of the tunnels?

WITNESS LANGE: Well, I -- yes. I mean, to me, it's green. The diversion sites?

MR. VAN ZANDT: Yes. We'll say "lime."

WITNESS LANGE: Good. I'm with you.

Yes, on what's labeled "Wheelhouse," that's on Merritt Island. It would be a virtually adjacent to a couple of the intakes that are being proposed.

MR. VAN ZANDT: And Mr. Lange, do you know what types of water rights Lange Twins manages in and around Ryer Island?

WITNESS LANGE: Yes.

MR. VAN ZANDT: What type is it?

WITNESS LANGE: It's pre-1914 riparian water rights.

MR. VAN ZANDT: And I asked Mr. Hester this question. I'll ask you the same. Do you have a contract or is there a contract with the North Delta Water Agency that benefits your operations?

WITNESS LANGE: My understanding of the contract that North Delta Water Agency has protects what's actually in the contract, but it does not mention or address any concerns for my pre-1914 riparian water rights.

MR. VAN ZANDT: Can you tell us what type of varietals you grow?

WITNESS LANGE: We grow pinot grigio, pinot noir, gerwurztraminer, chenin blanc, chardonnay, and a little bit of zinfanny.

MR. VAN ZANDT: What is the market for your wine?

WITNESS LANGE: The markets that are open to us is not only nationwide but internationally.

MR. VAN ZANDT: Is there anything special about the grapes that are grown in the North Delta?

WITNESS LANGE: Yes, like I mentioned earlier, we farm in three distinct viticultural areas, the North Delta being one.

North Delta is a very unique environment, not only for the soils, and the temperatures, but also the Delta, what we affectionately call "breezes," which really are Delta winds that really cool off, coming through and off of San Francisco Bay, cools off the Delta region very quickly as opposed to as we go east into Lodi and Clements.

So with that coolness and short heat spikes, that gives us a totally different character within the wines that we use and the wines that we produce.

So the relationship that the Delta has with not only the surrounding water within the Delta but also San Francisco Bay and the onshore breezes that we predominantly get through our growing season, we really truly have a unique character of wine that is different from what we have in Lodi and what we have in Clements

Hills.

Actually, quite a few of our customers specifically request having their fruit being sourced from the North Delta.

MR. VAN ZANDT: Mr. Lange, what type of investment does it take to grow wine grapes in this area?

WITNESS LANGE: In today's dollars, we would expect to spend about 14,000 to $15,000, just in the development of per acre. Just in the development of the vineyard. That would represent -- the 1600 acres that we currently have in the Delta, that would represent about a $24 million investment. We'd also have to factor in the land cost, which I would estimate to be somewhere around another $24 million worth of investment or about $16,000 an acre.

So between the two, if you add it up, we have $30,000 per acre invested in the crops and the vines that we farm. With that type of investment, we'd consider that a generational investment. And we -- it definitely takes a number of years before we can start recouping the dollars that it took to invest in that vineyard.

MR. VAN ZANDT: Mr. Lange, do you have any concerns about water quality in the North Delta as it

relates to California WaterFix?

WITNESS LANGE: Yes, with the diversions of water out of the Sacramento River, it will produce less freshwater going through the Delta, which will begin the degradation of our quality of water. Our water quality is critical to our vineyards.

As a permanent crop it will show an accumulation of salt within the plant over time. With that accumulation, then, it will be -- if it's high enough, it will then begin to affect yield. It will affect wine quality -- grape quality, resulting in less wine quality.

So it's a direct threat to our business. It's a direct threat to the people that depend upon us for sourcing of the grapes. It's a direct threat to the ongoing success of our agricultural enterprise.

MR. VAN ZANDT: And, Mr. Lange, what are your concerns about California WaterFix and the tunnels that are proposed here?

WITNESS LANGE: I see it as removing from our system the ability to not only continue to provide good quantity of water but also quality of water which injures my pre-1914 water rights.

Again, water's critical. So I would view the twin tunnels or the diversions and the amount of the

diversions as a direct threat to the ongoing success of my farming operation.

MR. VAN ZANDT: And, Mr. Lange, one final question. What are you asking the Board to do?

WITNESS LANGE: I encourage and respectfully request that you deny the petition.

MR. VAN ZANDT: Thank you very much.

Now turn my attention to Stanley Grant, please.

Mr. Grant, would you take a look, please, at II-1 -- excuse me II-1 Revised.

Mr. Grant, is this a true and correct statement of your qualifications?

WITNESS GRANT: Yes, it is.

MR. VAN ZANDT: Would you just summarize your qualifications for the board, please?

WITNESS GRANT: I am a vineyard consultant and soil scientist. And I'm self-employed. My company is Progressive Viticulture. I received a bachelor's of science degree in geography with an emphasis in physical geography; that is the lay of the land, land forms, soils, vegetation, and the interaction between all of those things.

I worked for a few years in the capacity as a geographer, first as a cartographer with the U.S.

Geological Survey and then in the aerospace industry. I was part of an interdisciplinary group that developed a guidance system for a cruise missile. And that cruise missile would fix upon water bodies and use those water bodies as reference points in its navigation.

I then returned to college because I wanted to get into agriculture, studied soil science at U.C. Davis, obtained a master's degree with an emphasis in soil fertility. I am a certified professional horticulturalist through the American Society for Horticultural Science, which I've been for a couple of decades. Also a certified professional soil scientist through Soil Science Society of America.

I have 29 years of experience as a professional agriculturalist. And I first worked in the Sacramento River Delta in 1987 as a student intern. And I've been involved in varying degrees since. During my tenure as viticulturalist at Gallo Vineyards, I had occasion to work there. Also, while I was director of farming for Duarte Nursery, I did some customer service work for them.

Since 2001, the Delta has been a primary market for my consulting business. During the growing season, I'm there every Tuesday and usually every other

Monday. Currently, I'm working on a petition that will be submitted to the Department of Treasury, the TTB, as to enlarge the Clarksburg American Viticulture Area, which includes almost the entirety of the North Delta.

That summarizes my experience.

MR. VAN ZANDT: Thank you.

Could we take a look at II-2, please. Mr. Grant, I'm showing you a copy of 11-2. Is this a true and correct copy of the testimony that you submitted to the Board?

WITNESS GRANT: Yes, it is.

MR. VAN ZANDT: Okay. And there are a series of exhibits that you've also associated with your testimony. II-4 through II-11. And are those all true and correct copies of the materials that you referenced in your testimony?

WITNESS GRANT: Yes, they are.

MR. VAN ZANDT: Thank you. And, Mr. Grant, if you would, please, you have a PowerPoint you would like to present to the Hearing Officers?

WITNESS GRANT: Please.

I would like to actually skip the first slide. It just has to do with saltwater intrusion into the Delta. And would like to go right into the next slide and talk about these blends of sea water and river

water that are brackish. They are rich in dissolved minerals, which are known as salts. High levels of sodium and chloride are among the minerals in sea water and blends of sea water and freshwater. So these waters are at the same time saline, sodic and high in chloride. And they harm crops in several ways, which is really what I want to talk to you about today.

And I want to emphasize woody perennial crops, trees and vines in particular, because -- well, for several reasons. One is -- well, as you just heard from Mr. Lange, there are high capital costs for the development. And because of this, there are long-term return-on-investment expectations. Also trees and vines are quite sensitive to salinity.

And we are also concerned about long-term exposures with perennial crops because every year's crop -- well, in the case grapevines, next year's crop is determined, in part, this year. And so we're always managing two crops, the one that's developing in the buds and the one that's hanging on the vine. So we're concerned about long-term effects of exposure and decline.

The other factor is the increasing acreage of vineyards and orchards in the Delta. This has been an ongoing trend. It's a trend that is likely to

continue. There's new vineyards and orchards going in as we speak. And part of the reason for that is, again, as Mr. Lange mentioned, it's a successful venture. Vineyards and orchards do quite well there. They're well suited for it.

In fact, when I really first started consulting in the Delta in 2001, there was about 5-maybe 6,000 acres of wine grapes in the Delta. Right now there's nearly 22,000. So it gives you an idea of the magnitude of expansion.

Now, soils -- I'm just talking in general about the soils in California. They're about 45 percent mineral matter, about 25 percent air, about 25 percent water, and about 5 percent partially decomposed plant and animal remains, what we call organic matter. This is the part we call the soil solution. Now, these soil solutions have very little capacity to resist chemical change. That is, they have very low buffering capacity. So as a consequence, irrigation water passing through soils easily change the chemistry of that soil solution.

So soils receiving saline, sodic and high chloride irrigation waters will very rapidly become themselves similarly saline, sodic, and high in chloride. Now, as concentrations of salts increase,

when they reach a certain level what happens -- measured as electrical connectivity, it will create an osmotic gradient, an energy gradient essentially. And trees and vines have to work against that energy gradient to take up any water. So essentially, the salts predispose trees and vines to water stress.

This begins to happen for vines in the range of 1.5 to 2.5 decisiemens per meter, measured as electrical conductivity. For the trees, the thresholds are lower. I'm speaking mainly about vines because that's my expertise.

Here some data to underscore that point. In this table on the top line, we have irrigation water salinity, again, in decisiemens per meter.

And then the second line we have grape yield. And as you can see, at an irrigation salinity level of 1 point -- of 1 decisiemen per meter, there's really no impact on yield. But by the time you get out to 4.5 decisiemens per meter, the yield has been cut in half.

Now, pears and cherries and, presumably, apples, which are the most common tree crops in the Delta, are more sensitive to salinity than grapevines. So we would expect the harm to yield reduction to be greater than what's illustrated in these data.

Now, we're also concerned about the effects of

salinity on soils and how that impacts the root zones for trees and vines. The salts are neutral associations of positively and negatively charged ions. The positive ones we call cations; the negative ones, anions. In waters that are affected by sea water, saltwater intrusion, the most prevalent cation is sodium.

And as sodium -- sodium will increase in soils, of course, receiving waters -- these waters for irrigations. Soils themselves are negatively charged. And this charge resides mainly in the organic matter and in the clay minerals. So these positively charged ions will adhere to the soil particles. When sodium is abundant, it will displace other cations in water, and we measure this as the exchangeable sodium percentage or ESP.

Now, as the ESP, the exchangeable sodium percentage, approaches 6 percent, soil particles will disperse rather than aggregate. And when that happens, the porosity of soil decreases. It's permeability to air, water, and elongating plant roots diminishes. And the root environment becomes -- well, it has the potential to become waterlogged and anoxic. And of course, that's an environment that's not healthy for roots. It's also not healthy for all the soil microbes

that benefit those roots.

On the other hand, though, it is beneficial to those microbes that are pathogenic to plants. So under these conditions, plant growth and productivity diminishes. And because of the compromised root system, so does their use of water.

In this chart -- I just want to draw your attention to the diagonal line. What this chart does is it relates the relative content of sodium in irrigation water to the relative content of sodium in soil. And that arrow there points to that threshold value of 6 percent. So you can see that it doesn't take much sodium on the scale here to cause problems for trees and vines.

To minimize stress, crops irrigated with saline water need more water than they would if they were irrigated with Sacramento River water, which is fairly pure. They need to this extra water when they're irrigated with salty water to overcome that salt induced water stress.

Also, growers will also use it to leach, dilute and leach those salts from the root zone. They want to move those salts away from the roots to the ground blow. And this extra water that is required is termed the leaching fraction. And in this chart, we

have on the horizontal axis, the electrical conductivity of the irrigation water. And then on the vertical axis, we have the weighted uptake of salinity taken up by the plants.

And what I want to draw your attention to is the red box at the bottom for sensitive crops. We're talking about trees and vines. And the first arrow shows a line there, that diagonal line. If you go to the top, it says point 5. That's an extra 5 percent water that's required for those plants. That would apply to trees, some very sensitive plants.

For vines, which are a bit more tolerant, the level will be higher. But you can see out by about 2.25 decisiemens per meter, they require 50 percent more water to dilute and leach the salts from the root zone.

Now, this leaching fraction reduces the efficiency of water applied. It increases what we call the application of efficiency. That is the amount of water that you apply that actually stays in the root zone because you're purposely applying more than you want to to move those salts out.

Secondly, it diminishes the amount of water that's beneficially used by the crop, again, because water's being moved intentionally out of the root zone.

Along with that, we have an increases energy consumption for the additional pumping costs for that extra water. And along with that, we have increased costs for labor, system maintenance, and other aspects of irrigation.

As I mentioned, sodium and chloride are prominent in blends of intruded sea water and river water. They readily associate due to their negative charges. But they bond very weakly. They have very weak ionic bonds. So they are highly soluble, and they will readily dissociate.

Now, both those ions, when they're in the soil solution, will readily move from the soil into the plants as they take up water. Once they're in the plants, they're going to move as far as they can. They're following the transportation stream, that is the water that's traveling through the plant and out into the atmosphere through the tiny pores on the leaves. And so their destination is the edges of the leaves.

And these ions will accumulate there on the edges of the leaves. And when the concentrations are sufficient, they will become toxic, and those tissues will die. And the threshold concentrations for grapes are about 4.25 percent sodium and about

point 5 chloride, point 5 percent.

Here are some data for two vineyards, adjacent vineyards on Merritt Island late October 2010. And I want to draw your attention over to the far right, the chloride numbers. These are well above that point 5 percent threshold value. And these leaves showed that at that time.

More telling though is what was going on in the soil, where these salts were coming from, these chlorides. Both vineyards you can see here, in the area that was affected, had elevated salts, well above the 2.5 upper threshold. And the chloride levels were -- well, that salinity was due, as you can see, mainly to chloride because the chloride was well above the 350 parts per million, which is our threshold value of concern in soils in vineyards.

So what does this mean? Well, these leaves on vines and trees, they're little solar panels. They're out capturing sunlight, converting that radiant energy into chemical energy. And when those tissues are damaged, essentially, that solar panel's not the size it used to be. So that plant's capacity to photosynthesize, to grow, develop, and ripen fruit, to ripen woody tissues, all those things are compromised. Ripening woody tissues is actually very important in

trees and vines because those woody tissues will bear most of the fruit the next year.

In some very severe cases, it actually affects the plant's capacity to survive. Here are some data. And I want to draw your attention to the data point there in red. It corresponds -- and this is an error. This has been changed actually. It corresponds to a concentration of 1700 parts per million chloride. That's a typo. And along with that, there's a 52 percent yield reduction.

From the same study, they looked at vine survival. Again, looking at the 1700-part-per-million chloride concentration in soil solution, in the fourth year of this study, they had 17 percent of the vines die.

Now, berries, grape berries, are also destinations for sodium and chloride. And when the concentrations of sodium and chloride become sufficiently high in berries, the wines that are made from these berries, their sensory characteristics are impact, and they are distinguishable as salty flavored. Other descriptors for such wine include flat, dull, soapy, seawater like, brackish. And these are characteristics that don't appeal to winemakers or wine consumers. And actually, you'll end up with a wine

that's not sellable.

So as with salinity, management of excess sodium and chloride requires additional water. And again, applying that additional water decreases the efficiency of applied water, both in terms of application efficiency and irrigation efficiency.

There's another negative viewpoint about this situation too. And that is, sodium, being positively charged, competes with other positively charged ions, mineral nutrient ions in the soil like potassium, magnesium, and calcium. So when it's prevalent like that, the vines are less able to take up potassium and magnesium. Chloride competes negatively with nitrate, which is the primary form of nitrogen taken up by trees and vines.

So to overcome these imbalances in mineral nutrients to ensure that plants are properly nourished, growers need to apply more fertilizer when soils are high in sodium and chloride.

One more important thing. That is, I have talked about leaching and applying this extra water. Well, leaching is only effective when that water that's pushed below the root zone has somewhere to go. So a secondary requirement for leaching is adequate subsurface draining.

Unfortunately, well-drained soils are somewhat uncommon in the Delta. Rather, most soils are subject to high water tables that restrict drainage. That can be overcome, but it requires expensive drainage systems. So I'm going to show you a project in which we use these drainage systems.

These are a series of soil maps. We're looking at topsoil here. And if you would, look at the dark red. Those are areas of concentrated salts. That's in the top soil.

In the subsoil, they're actually more concentrated but a little more widespread. The reason for the concentration is this piece of ground -- you wouldn't know it driving by, but it is rich for irrigation purposes, which facilitated the growing of field crops, not necessarily for vines. But the client I'm working with was looking at this site for a vineyard.

This is the moisture in the soil at the time the soils were mapped. And you can see that the dark blue there, that's where the moisture was highest and that's also where the chloride was highest. Those are zones of accumulation.

Below ground, it's a little different. And that's -- you can see it's uniformly very wet; 60

percent moisture is high moisture. And that's because of the high water table. A little less where the ridges were, but by and large, the entire soil is wet. An additional challenge is that it's a soil that -- the entire property is mapped as Sacramento clay. It's a soil that doesn't have a large drainage potential.

This is the tile drain system the grower put in. And the tile drain system is kind of a misnomer. What it is is a series of perforated pipes enveloped in gravel. And the spacing is varied according to the concentration of chloride. We use the soil data to design the system.

And the -- there's a pump at the south end there. If you can read it says "sump." That pump creates a negative pressure that draws the water, the soil water, out. The grower put this in at a cost of about $160,000.

We also blocked the vineyard according to soil conditions. Blocks 1, 3, 5, 7, and 8, were planted immediately because we didn't have a concern. The part that was tile drained was farmed with field crops for a year or two to give opportunity to leach out that chloride and the other salts.

And this is the vineyard in July 2015. The grower's done a very good job it's a nice uniform

highly productive vineyard.

There's a complication, of course, when you have tile drains. And that is you have to take that salt-laden water and put it somewhere. Well, it goes back into the sloughs and the rivers. And that by itself is not really a problem now, but it certainly could be if growers in the Delta are having to deal with waters that are laden with salts from in-water -- from intruding salt water from the bay estuary.

So the ultimate solution is actually the current situation. And that is continued use of very high quality Sacramento irrigation water. And I have some real data to back that up, too. This is just some samples collected at random for a vineyard I work with on Grant Island. And you can see on the EC values, the salinity values, one date he had zero. That water is nearly pure. It's very high quality water.

There was a time in September 2007 where we did have a little bit of elevated salts. And that was due mainly to sodium. So I'd just like to leave you with these conclusions.

The current conditions in the Delta are the most sustainable. There's ample availability of high quality, low salt irrigation water. Salt-induced water stress and sodium toxicities are uncommon. They

do occur, but they're a very limited extent. And they occur under some very specific circumstances. As a result, there's very little need for extra water for leaching. On-farm water use efficiency is very high.

In fact, I'm of the opinion that Delta irrigators are some of the best that I know of. They have to deal with excess water -- well, they have to be concerned about the excess water in the subsoil, so they manage their water in the topsoil very carefully. And as things stand right now, Delta vineyards and orchards produce high quality fruit and wine for people in the U.S. and consumers beyond.

Thank you very much for the opportunity to talk to you today. That's all I have to say.

MR. VAN ZANDT: Mr. Grant, I have a follow-up question. The correction that you noted with the 700 PPM was changed to 1700 PPM occurs two times in the side presentation, correct?

WITNESS GRANT: That is correct.

MR. VAN ZANDT: Does it also occur in your written testimony that you submitted?

WITNESS GRANT: Yes.

MR. VAN ZANDT: Madam Hearing Officer, we provided some correction sheets to substitute in to correct those errors, thank you.

Turn to Dr. Leinfelder-Miles if I could, please.

Dr. Leinfelder-Miles, would you take a look at Exhibit II-12, please. And looking at Exhibit II-12, is this a true and correct statement of your qualifications?

WITNESS LEINFELDER-MILES: Yes, it is.

MR. VAN ZANDT: Could you summarize your qualifications, please, for the hearing officers?

WITNESS LEINFELDER-MILES: My name is Michelle Leinfelder-Miles. I'm the Delta Crops Resource Management advisor with UC Cooperative Extension based in San Joaquin County but serving the five-county Delta region. I've been in that position for almost five years.

I have a BS in crop science and management from UC Davis and an MS and Ph.D. in horticulture from Cornell University.

MR. VAN ZANDT: Thank you.

Now, would you turn your attention to Exhibit II-13, please. And Dr. Leinfelder-Miles, is this a true and correct copy of the testimony that you submitted to the Board?

WITNESS LEINFELDER-MILES: Yes, it is.

MR. VAN ZANDT: Thank you. You also have a

list of several references that are associated with your testimony. Those include II-15 through II-22 and also II-41 and 42. Are those all true and correct copies of the reference material you reference in your testimony?

WITNESS LEINFELDER-MILES: Yes, they are.

MR. VAN ZANDT: Okay. And you have prepared a presentation for the Board today.

WITNESS LEINFELDER-MILES: Yes, I have.

MR. VAN ZANDT: Yes, please give that.

WITNESS LEINFELDER-MILES: Okay. Thank you for the opportunity to make a statement today. I'm going to be talking about the effects of water quality on soil salinity and leaching fractions in the Delta.

Just a general background on salinity. Salt problems occur in agricultural systems around the world and in approximately a third of the irrigated land in the world. They predominate in arid climates, Mediterranean climates like we have here in California.

Salt exist in soil for reasons that are naturally occurring and also reasons that relate to management, things like weathering of rock, the transport of salts through irrigation water, amendments that we may put into the soil for fertilizer or organic matter, and then the presence of a shallow saline

groundwater.

Again, a little bit of background on salinity. At the top of the screen are some examples of different salts. The most familiar will be sodium chloride, NaCl. These consist, as Mr. Grant spoke about in his testimony, they consist of cations, which are positively charged ions, and anions, which are negatively charged ions.

When those ions, when those salts are in solution, they'll disassociate. So the negatives and the positives will disassociate. And that movement of those ions we can detect with an electrical current. So you'll notice that we distinguish salinity with electrical conductivity. That's the way that we measure salinity.

And that's characterized by the abbreviation "EC." And it's characterized by the abbreviation "ECe," little "e" when that's relating to the soil, or "ECw," when that's relating to the water.

And then I made a notation of different units at the bottom of the slide because sometimes folks will use different notations. I'll primarily be using decisiemens per meter, which is equivalent to one millimole per centimeter or a thousand microsiemens per centimeter, which is sometimes what you see water

quality notated as.

Mr. Grant talked about the effects of salinity on plants. So I'll go through this pretty quickly. But the most predominant effect on plants is called osmotic stress. And that happens when the salts in the soil solution are higher than the solutes, the plant sugars, that are in the plant roots.

And what happens is the plant has to remobilize sugars into their plant roots in order to have water come into the plant roots, otherwise the plants are water stressed. So that movement of sugars and solutes from the top of the plant to the bottom of the plant requires energy. And therefore, that energy's not put into plant growth.

And oftentimes what we see with osmotic stress is not some specific symptom in the plants but it's more of a generic stunting that a grower may or may not realize is salinity stress.

Another effect is that specific ions like those Mr. Grant mentioned -- boron, chloride, and sodium, will have specific toxicities on plants. So here pictured is a walnut tree. And just like that grape leaf that he showed, the margins of the leaves turn brown. Those are dead cells. And those will no longer photosynthesize. And if those cells aren't

photosynthesizing, then it's not helping the plant grow. So therefore you're limiting the plant growth and plant productivity when there's those specific ions that are being toxic to the plant.

And then finally, the soil degradation that can happen under saline conditions, it impairs infiltration and drainage. So in this picture, you'll see there's some white crusting in the corner of that field. That's a characteristic of salts building up and not being able to be leached through the soil.

There are other visual characteristics which I've named. But in the Delta, I primarily see that white crusting. It can result in standing water and poor aeration in the soil. So if there was a crop present in that field and there was poor aeration of the roots, then of course those plants are not going to be growing as well.

So I'd like to make a distinction between applied water salinity and soil salinity. Irrigation water carries salts. And when that water is applied to the soil, then those salts build up in the soil. And those salts accumulate at a higher level than what they were in the water that was originally applied.

And the reason that is is because water evaporates from the soil, and it's transpired from the

plants. That water leaves the system but the salts stay behind in the soil.

The salts may accumulate disproportionately in the soil profile, so they don't necessarily accumulate at the top. They may accumulate that levels that are deeper, and I'll have some data so show that. And then finally, crop salinity tolerances, we have numbers. And Mr. Grant presented some of those numbers for grapes. We have numbers for soil salinity and water salinity which are related to the potential of crops to yield at a certain level.

So ideally we have crops produce at 100 percent yield potential. But if salinity reaches certain levels in the soil or the water, then we have a scale of how we think the crops will yield, scaled back from 100 percent.

I want to note that the irrigation water, the tolerance levels that we have for irrigation water relates to the irrigation water that is applied to the fields, not necessarily the water salinity that exists in waterways. It's specifically what's applied to the field.

So now I'm going to go through a few slides where I'm showing data from research projects that I've conducted over the last few years. This first slide

relates to a drip irrigation tomato field in the Delta. That tomato field was in its first year of drip irrigation in 2013. Prior to 2013 it was irrigated in different ways, flood or furrow irrigation.

You'll see on the left side of those squares a little blue line or circle, oval. That indicates the buried drip line that was installed into the field about 10 to 12 inches down.

The left square, all those green and yellow marks, that indicates the soil salinity in that field at the start of the project in 2013, when that drip irrigation system was installed. And then the squares on the right-hand side, that's the fall of 2015, three years later after three years of drip irrigation in that field.

You'll notice that the salinity in the soil has changed quite dramatically from when it was furrow or flood irrigated to when it was drip irrigated for just three years. Drip irrigation is considered a best management practice for agriculture. In tomato fields it's important because we're applying water very efficiently to plant roots, but it's also been related to fruit quality and productivity.

We don't want that fruit to plump up with a lot of water. We want it to have sugar so that it

tastes good. And by using drip irrigation, we are helping to improve fruit quality as well as apply water very efficiently. But a consequence of that is that we may not be getting the level of leaching that we were getting with furrow and flood irrigated systems so we see the salinity buildup.

The legend that I have below those two squares comes from a reference in the scientific literature based on the soil salinity tolerance of tomato. You'll see that a hundred percent yield potential is 2.5 decisiemens per meter, the left side of that legend. And we would expect zero percent yield with 13 decisiemens per meter.

So in this case we still are -- we have average root zone salinity that is under that 2.5 decisiemens per meter. But we have in just a few years moved our salinity in the wrong direction.

I want to go through this slide quickly because I want to get right into the picture on the next slide. But the next experiment I'm going to talk about is the flood irrigated alfalfa experiment where I sampled soil in seven different alfalfa fields in the South Delta. In those seven field, we had four out of the seven were reaching soil salinity at 10 decisiemens per meter at its shallowest three feet.

So this is a graph depicting one of those fields that illustrates that point. That same manual that I had the legend for in the processing tomato field also has salinity tolerances for alfalfa. We would expect a hundred percent yield potential in alfalfa when salinity is at or below two decisiemens per meter.

You'll see that in this field, we were barely at or below two decisiemens per meter in that top foot. Alfalfa roots have the ability to grow two, three, four feet, even deeper depending on the age of the plant and the conditions in the soil. In this case, the soil conditions are not exactly what we would want them to be to get full yield potential of that alfalfa.

The five different samplings that I did in the spring and the fall of 2013 and '14 and then the spring of 2015, you'll see that there's an increase in salinity from spring to fall in each of those years.

You'll also see that there are some points that are standing on their own. Those represent salinity and depth of groundwater. It would appear to me that the salinity is not going below that 90 centimeter mark, because we've got groundwater that's at about that level in the springtime. It's impeding the movement of salts below that level. So it's

important to maintain good quality water because we have a restricting layer, that is, the groundwater, that's preventing movement of salts much below that.

Now I'd like to come to this last project that I've conducted more recently on Ryer Island in August of 2016. This was a one-time soil sampling, unlike the previous studies which were over three years. Both of the soils that I sampled in are considered low permeability soils. They're silty, loamy, clayey type soils, which are described in my testimony.

The pear orchard you'll see the top right of the picture, I did a random sampling throughout that pear orchard. And for reasons relating to the irrigation system, namely that it's a sprinkler-irrigated system so we would assume that a fairly uniform application of water across the field.

My samples were composited at the foot depth level. I'll show you a diagram of that. But basically I sampled randomly throughout the field. All of the samples collected from the top foot were composited; all of them from the second foot were composited; so on and so forth down to the fifth foot.

In the vineyard, I took two different grid samplings. And the reason I did that is because the vineyard is drip irrigated. So we would expect a

wetting pattern much different than a sprinkler-irrigated wetting pattern which would be more uniform. So you'll see two marks on that, the vineyard down at the bottom left corner of the picture.

MR. VAN ZANDT: Dr. Leinfelder-Miles, those two, that picture that you just showed, are those two parcels related to the operations of Mr. Hester and Mr. Lange?

WITNESS LEINFELDER-MILES: Yes. The vineyard is farmed by Mr. Lange, and the pear orchard is farmed by Mr. Hester.

MR. VAN ZANDT: Okay.

WITNESS LEINFELDER-MILES: And I also want to point out the vineyard samples the accident two grids that I sampled are relatively close to one another because I wanted to have different samplings just to see, but I wanted to be in the same soil series. So I didn't want to get too far apart in the vineyard and have drastically different soil characteristics, soil texture, or inherent properties to the soil. I wanted those inherent properties to be the same, but I wanted to have two different pictures so that I wasn't just looking at one thing, one snapshot.

I go into the methods of how I sampled in the pear orchard on this slide and in my testimony. Again,

I composited samples from the different foot layers. I sampled groundwater and ran electrical conductivity on those soils.

And then my methods in the vineyard, the picture illustrates how I sampled in a grid pattern 30 centimeters, 60 centimeters, 90 centimeters and 120 centimeters away from the vine row. You'll see the grid pattern in a future slide.

But the reason I did that, again, is because you can see at the top of that picture there's a -- the drip irrigation line is above ground, hanging from the trellis of the grape vines. So that will drip down onto the ground, and that water will move across the soil or down the soil. And the wetting pattern will be different, say, at 30 centimeters than at 120 centimeters, farther -- about halfway between vine rows where there isn't a drip line.

And this picture just illustrates how deep I went, again, down to 150 centimeters or about five feet.

This slide just describes my laboratory methods. We did all the testing for salinity in the UC Cooperative Extension Laboratory in San Joaquin County, making saturated pastes of those soils. This is very typical methods of how to conduct salinity. And then

we take the extract from that soil by partial vacuum, and we test that extract; hence, the "ECE" notation for electrical conductivity of soil. We take that with an electrical conductivity meter.

So this slide illustrates the salinity that I saw in the pear orchard. The top foot had salinity of about 0.4 decisiemens per meter. And then down at five feet, we looked at salinity that was approximately 1.1. Groundwater was below the sampling depth at about 165 centimeters and had salinity at approximately 0.4.

When you average that root zone salinity, the average of all those numbers from top to bottom is 0.74. And we use that average number of the root zone because that's what our crop tolerances are denoted as. We would expect yield declines in pear at about 2.5 decisiemens per meter for that average root zone.

So this in this case, we would not expect to see yield declines in this orchard at this time, based on the conditions that we have.

In the vineyard, I'm going to denote them as north and south. Really, it was just for my own keeping straight.

You'll see the grid pattern that I described earlier, and you'll see the legend below that grid pattern. Again, that comes from the same reference

that I used and Mr. Grant used to describe the processing tomatoes.

We would expect to see yield declines when the average root zone salinity in a vineyard reaches 1.5. At 1.5 or lower, we would expect to get a hundred percent yield potential, again, all else being equal and all else being in good condition.

In this case, we see that the salts are getting built up around in that 60-to-90 centimeter depth, around three feet. And then they're moving out about three feet to 90 centimeters away from the vine.

So the wetting front is moving salts from that depth and that width away from the vines. And when we look at that average root zone salinity, again taking all of those numbers and averaging them and then comparing them to the legend at the bottom, there is the potential for salinity to be impacting yield in this vineyard.

And then if we look at the south grid that I sampled, we see that, you know, it's good to take more than one sample because things are variable in the field. We see that the average root zone salinity is higher in this place in the vineyard. And there's still definitely the potential for salinity to be impacting yield under these current conditions.

Now I relate the salinity, the electrical conductivity to the saturation percentage. We find saturation percentage of soil in our procedure for making saturated pastes to conduct electrical conductivity. Saturation percentage correlates with soil texture.

Soil texture is an inherent soil property. This isn't something that can be managed. This is something that's inherent to the soil that a grower has to deal with.

Saturation percentage relates generally to the soil texture. In this case, a saturation percentage of approximately 65 to 135 would characterize a clay soil. So we see those sorts of percentages down at the depth below the highest salinity. That's, to me, telling me that the soil texture, the inherent properties of the soil is inhibiting the salts from moving any lower in this soil profile. And we see the same sort of thing in the other grid pattern.

So what is a grower to do? Well, the primary way that we manage salinity is with leaching. Leaching occurs whenever water is applied in excess of soil moisture depletion by evapotransporation, that is, the water that's evaporated and transpired by plants. Leaching can occur whenever the rainy season is or

whenever an irrigation event occurs, depending on if enough water is applied to leach.

I go through some of the equations here and in my testimony on how we determine what the leaching fraction is or the amount of water that passes below the root zone.

And then in this slide, I describe the leaching requirement. The leaching requirement differs from the leaching fraction in that the leaching fraction is the amount of water that passes below the root zone. The leaching requirement is the amount of leaching we need in order to maintain crop yields.

And here's an example from alfalfa. Our established thresholds for water in soil are 1.3 for water and 2.0 for soil. We put those into that equation, and we have a leaching requirement for alfalfa of 15 percent.

And then if we put that on a graph and we change the salinity of the water -- because water salinity changes with time and location in the Delta -- we see that we could have anything from a 5 percent leaching requirement to a 25 percent leaching requirement if that water salinity varies from point 5 decisiemens per meter to 2.0.

Now, we use 15 percent as a general rule of

thumb in agriculture. But there are times when we may not be able to achieve a 15 percent leaching fraction, leaching requirement. And that's because we have these shallow groundwater, saline groundwaters. We have low permeability soils, like I've shown you in the previous graphs.

So now if we go back to the Ryer Island case scenario, the base of the root zone in this case is where I have the red circle. The reason that is is because we know the salts aren't moving much below this. There's impediment to the salts moving below that. Those impediments would prevent roots from proliferating below that level also. So we look at what the average soil salinity was or -- excuse me the base of the root zone salinity. We put that into our equation.

And in this case, I didn't have water salinity data. So I used California Data Exchange Center Data and looked at the water salinity at Rio vista between April 1st and August 10th. And I determined that the average seasonal water there was point 1.

Now, again, I want to clarify like I did in a previous slide. This is not necessarily the irrigation water salinity that was applied to the vineyard or to the pear orchard. This is just the data that I had

available to me, and it's the average of that data.

So using that data, we find that we need a 2 percent leaching we get a 2 percent leaching requirement using that data. And we achieved a leaching fraction of 2 percent. So in 2016, our leaching requirement and leaching fraction were met. They were equal.

However, if we used the water salinity that was in -- tested at Rio Vista in 2015, it was higher in salinity. And we find, using those same equations , that the leaching requirement would have been 7 percent. So if we only had a leaching fraction of 2 percent but we would have had a leaching requirement of 7 percent, then those vines would have been experiencing salinity higher than what we would hope for if we were looking to get 100 percent yield potential, which is what we'd be looking for.

So if it's not possible to apply a 7 percent leaching fraction due to soil permeability, proximity to groundwater, other agronomic considerations, then the higher ECw of 2015 compared to 2016 would suggest detrimental effects on crop yields, increases in the salt load of soil, or both.

So to conclude, leaching is the primary means of managing salt. On Ryer Island, our data illustrate

the inherent low permeability of certain Delta soils, the build-up of salts in the soil to levels that have the potential to effect crop yields, and a low achieved leaching fraction.

The Delta's unique growing conditions put constraints on growers' abilities to manage salts by leaching and achieve a leaching fraction that meets the leaching requirement to sustain crop yields. So salinity will continue to impact Delta agriculture, especially under conditions of higher surface water salinity. Thank you.

CO-HEARING OFFICER DODUC: Thank you.

MR. VAN ZANDT: Thank you, Dr. Leinfelder-Miles.

One more presentation, Madam Hearing Officer?

CO-HEARING OFFICER DODUC: Before you proceed, though, let me do a quick check-in.

We've already -- I think we've put 60 Minutes on the clock?

MR. VAN ZANDT: Correct.

CO-HEARING OFFICER DODUC: How much did we put on the clock that just ran out?

JASON BAKER: We've been following NOI, and each witness has been within their time limits on the tracker sheet.

CO-HEARING OFFICER DODUC: Okay. Let me ask, how much time do you anticipate needing for Mr. Ringleberg?

MR. VAN ZANDT: I think he's going to be about 20 minutes.

Is that right?

CO-HEARING OFFICER DODUC: All right. I'll check with the court reporter. Are you doing okay for another 20 minutes?

THE REPORTER: Yes.

CO-HEARING OFFICER DODUC: All right. Why don't we go ahead and finish up, and then we'll take a short break before cross-examination begins.

MR. VAN ZANDT: Thank you.

So our last witness today, Mr. Erik Ringleberg.

Mr. Ringleberg, if I could turn your attention to Exhibit II-23, please.

CO-HEARING OFFICER DODUC: Mr. VanZandt, let me again remind you, with respect to Mr. Ringleberg's testimony, we have stricken the new revised exhibits that he submitted. And his testimony today should be within the scope of the written testimony that he provided by the deadline.

MR. VAN ZANDT: Understand. Thank you.

Mr. Ringleberg, showing you II-23. Is this a true and correct copy of your statement of qualifications?

WITNESS RINGLEBERG: Yes, it is.

MR. VAN ZANDT: Would you summarize your qualifications, please, for the Board?

WITNESS RINGLEBERG: Sure. So essentially, academically, I became a microbiologist many, many years ago and worked in both traditional agriculture as a food and dairy microbiological as well as an environmental microbiologist, transitioned because of personal interest in large scale ecosystem, human and environmental interactions into environmental science and education.

And then as a result of those efforts, I focused my academic direction to the interface of water in soils and became a riparian and wetland ecologist and really, for the last 20 years, focused on riparian wetland restoration.

I think in terms of the relationship to water quality issues, I participated as an expert, as a planning commissioner, and variety of venues associated with drinking water quality, wildlife habitat. And specifically, as associated with this, I ran a water quality lab with the Pyramid Lake Paiu Tribe and

directed their operations for the management of water quality over Pyramid Lake. And as a part of the Truckee River Operations Agreement, I was one of the tribal representatives in that extended negotiation.

MR. VAN ZANDT: Thank you. I'll show you II-24, please.

And II-24, is this a true and correct copy of the original testimony that you submitted?

WITNESS RINGLEBERG: Yes, it is.

MR. VAN ZANDT: You also have some references that you have noticed with your testimony. And they are listed as II-26 through I believe it's II-36. Are those all true and correct copies of the reference material you reference in your testimony?

WITNESS RINGLEBERG: Those are all the references but do not include the original PowerPoint II-25.

MR. VAN ZANDT: Okay. Thank you. And I believe Ms. Meserve has some additional documents she wants you to authenticate as well.

DIRECT EXAMINATION BY MS. MESERVE

MS. MESERVE: Thank you, Mr. Van Zandt.

Just briefly, and I hope that we can make sure that Mr. Ringleberg gets to do his entire presentation. I just want to take a couple of minutes. I have given

Mr. Baker a folder of the Land exhibits that were assisted in preparation by BSK Associates. And those exhibits are Land 3. I don't think we need to take the time to look through all of them.

I don't know if maybe you could just zoom in on the numbers, I'll read them off. Land 3, 4, 5, 6, 7, 57, 58, 59, 60, and 61. We will become more familiar with these exhibits tomorrow, but for purposes of Mr. Ringleberg, have you reviewed these figures in advance of this hearing today?

WITNESS RINGLEBERG: I have. I was the director for natural resources and planning at BSK Associates. And I assisted in the direction and preparation of all of these figures with the exception of 59, 60, and 61.

And in that capacity, those figures were done after I left the employ of BSK. But the base maps that those maps are founded on were the prior work products that we had created for the North Delta.

CO-HEARING OFFICER DODUC: Ms. Meserve, will Mr. Ringleberg be available tomorrow as part of that panel to answer questions?

MS. MESERVE: He was not noticed as a panelist for the physical injuries panel, so, no. I mean, he is a witness for -- and he was in the land notice. I

mean, he's well noticed to appear on anything. For purposes of organizing the testimony, we did put him on that particular panel.

CO-HEARING OFFICER DODUC: Ms. Morris?

MS. MORRIS: Stefanie Morris, State Water -- I would just renew the objection that I don't think -- Mr. Ringleberg did not reference these exhibits in his testimony. He doesn't talk about them in his testimony.

So having him authenticate documents that he he's not even relying on is inappropriate.

CO-HEARING OFFICER DODUC: Anyone else?

(No response)

CO-HEARING OFFICER DODUC: All right. We will still take that under advisement.

Please proceed, Ms. Meserve.

MS. MESERVE: Thank you.

And in general, how were these maps created? Maybe we could just show up the Land 3 as an example. And zoom out so folks can see.

WITNESS RINGLEBERG: Sure. So these are standard consulting work-product GIS maps we use. Every GIS typically -- this is a, I think, 10.6 GIS package. We took an underlying base map, and the base maps all come standard with the GIS package. They're a

composite of all the different aerial photos and geographic references.

And for this particular figure, we used the DEIR's figure of maps, projected those pdfs onto a scaled GIS figure. And there's some elements up here, in particular with the red arrows that show the tunnels, are not to scale or they're shifted slightly for visibility purposes.

But if you scroll down to the bottom of this figure, you can see in the lower left-hand corner the standard description of -- perfect. Thank you.

You can see it was prepared by Kevin Grove, on a particular date. Location is approximate, infrastructure to scale, but the tunnel's expanded for illustration.

Then if you look over to the right of the data sources for the underlying figures.

MS. MESERVE: And you also assisted in preparing and working with BSK even after you were not an employee there with respect to Land 58. Can you explain that, please?

WITNESS RINGLEBERG: Sure. So the GIS staff don't have a strong geographic understanding of the local area. And I have spent considerable amount of time in the Delta, so I was able to work with staff to

help them and some folks from the local community who had provided some of the data associated with the additional figures and coordinated those so that they all were as accurate spacially as possible.

CO-HEARING OFFICER DODUC: Hold on a minute here, Ms. Meserve. I expect I'm going to hear an objection from the Department. But a question -- I'm a bit confused now. This seems to be beyond the scope of this witness's direct testimony.

MS. MESERVE: We did not ask Mr. Ringleberg to testify regarding these maps. I honestly didn't believe there would be any problem with them because they're based on all petitioner's own maps. And as I mentioned before, I've never heard any issue with them being inaccurate or misleading.

Indeed, there's hundreds of maps within petitioner's testimony that there's nobody there to talk about how they were made. So I feel this is going well beyond what should be required.

But because the issues were raised and because I have Mr. Ringleberg here today, I thought perhaps it would be helpful if folks could hear from him in general about how the maps were made.

CO-HEARING OFFICER DODUC: Is there a reason why you selected to not include this in your rebuttal

and make it your case in chief?

MS. MESERVE: These maps are essential to our case in chief with respect to showing the relationship of the diversions in the Delta. Actually, you know, if -- with respect to Land 5, 6, and 7, those relate to protestants, who are my clients. And these are the maps that show where their diversions are in relation to the tunnels.

So we have Mr. Brad Lange sitting here today. The map that Mr. Van Zandt referred to is Land 6. So it pertains -- you know, in trying to organize the testimony into panels, it broke apart some things that could have been glommed all together but, you know, are now separated apart. So I would ask for your understanding of what we're trying to do.

CO-HEARING OFFICER DODUC: All right.

Ms. Ansley?

MS. ANSLEY: Yes, Jolie-Ann Ansley, Department of Water Resources.

Obviously we object because these figures had been modified if they were indeed based on, originally, petitioner's underlying materials. And certainly identification of some sort of impacts is a modification.

We also note that will the date -- although,

I'm sorry, my eyes are very poor -- seems to be 2/10/2016, which certainly would be far after, I believe, Mr. Ringleberg left BSK Associates.

So in addition to the objections we've already raised, which I will not rehash, we do have an added objection of him trying to authenticate documents that he didn't prepare that are by a company after which he left. Thank you.

CO-HEARING OFFICER DODUC: All right.

MS. MESERVE: Mr. Ringleberg, could you clarify how long you worked at BSK?

WITNESS RINGLEBERG: I worked for BSK for approximately six years. And it was I believe mid June when I left, June 2016 that I left that firm.

CO-HEARING OFFICER DODUC: Thank you, everyone. We will take all that under advisement.

Ms. Meserve?

MS. MESERVE: Go ahead.

DIRECT EXAMINATION BY MR. VAN ZANDT (resumed)

MR. VAN ZANDT: Thank you.

Turning back to Mr. Ringleberg, you have an original PowerPoint presentation II-25, the original. Would you give that to the Board, please?

MR. BAKER: I have a question. The clock shows eight minutes and 57 seconds; is that correct?

MS. MESERVE: I would ask for the Hearing Officer's lenience in allowing our -- we've taken up some time with argument over things that really weren't --

CO-HEARING OFFICER DODUC: Let's go ahead and give him his 20 minutes, please.

MS. MESERVE: Thank you.

CO-HEARING OFFICER DODUC: Oh, let me check with the court reporter.

Should we take a short break for you?

THE REPORTER: That would be great, please.

CO-HEARING OFFICER DODUC: Let's go ahead and take a short break, and we will resume at 4:05.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. Everyone, welcome back.

Before we resume, I will make announcement regarding start time for tomorrow. We will be starting at 9:30 tomorrow instead of at 9:00. There's quite a bit for the hearing officers to discuss with the hearing team, so you get an extra half an hour tomorrow.

All right. With that, Mr. Van Zandt, please continue.

Your microphone is not on.

MR. VAN ZANDT: There it is.

DIRECT EXAMINATION BY MR. VAN ZANDT (continued)

MR. VAN ZANDT: Mr. Ringleberg, you have a presentation you are going to be giving to the panel?

WITNESS RINGLEBERG: I will.

MR. VAN ZANDT: Thank you.

WITNESS RINGLEBERG: Thank you. So, titled "Northern Delta Salinity Responses to Project's Implications on Flow and Salinity." The focus in the Northern Delta for this articulation was really fairly straightforward. There's relatively complex South and Central Delta salinity issues which the Board is well aware of. And the majority of the concern in terms of the big change in salinity is in the Northern Delta for the purposes of this conversation.

So, current conditions. So, these were actually my draft slides, and so I will switch to the subject material quickly here with the assistance of Mr. Baker.

Mr. Baker, could you go to II-6, Page 2. Great.

Down in "key findings" here, so this is a work product of the Contra Costa Water District. This is the technical summary of their expansive technical review. I'll be talking briefly of that as well.

So essentially key findings, first bullet.

The Delta has become far more saline in the past hundred years because of human activity. Third bullet down, before freshwater diversions occurred in the 1940s, the Delta and freshwater bay would freshen every winter, even during the extreme droughts of the 1930s. However, that pattern has changed. During recent droughts, the Delta did not freshen. Without seasonal freshening --

THE REPORTER: Excuse me.

MS. RINGLEBERG: Yes?

THE REPORTER: Can you please slow down when you read.

WITNESS RINGLEBERG: Absolutely.

CO-HEARING OFFICER DODUC: Hold on.

Ms. Morris?

Finish it, Mr. Ringleberg, and then we'll get to Ms. Morris.

WITNESS RINGLEBERG: Sure.

-- contaminants and toxins can accumulate in the system.

CO-HEARING OFFICER DODUC: All right. Ms. Morris?

MS. MORRIS: I'm sorry. I just want to verify. Is this II-6, did you say?

WITNESS RINGLEBERG: That's correct.

MS. MORRIS: Because I'm looking at -- I'm sorry, but this is outside the scope of his testimony. If you look at his testimony on Page 2, when he talks about the Contra Costa District studies, he's citing to Exhibits II-26 and II-27. He doesn't cite to II-6, nor has it been authenticated.

CO-HEARING OFFICER DODUC: Ms. Meserve or Mr. Van Zandt?

MR. VAN ZANDT: Mr. Grant has already authenticated this, and this is background information that is the basis for Mr. Ringleberg's testimony. So I think it's just background information, is all.

MS. MESERVE: Isn't it the same report? One is the report itself, and one is the highlights?

WITNESS RINGLEBERG: That's correct. And II-11 and II-27 are both the same master report.

CO-HEARING OFFICER DODUC: All right.

MS. MESERVE: I would ask that we be allowed to submit our case in chief as Petitioners were.

CO-HEARING OFFICER DODUC: Hold on, people.

Ms. Morris has the right to make her objection. Her objection is taken under advisement.

Mr. Van Zandt, you may continue.

MR. VAN ZANDT: Thank you.

So, Mr. Ringleberg, is -- the document that you're reading from is also part of II-27; is that right?

WITNESS RINGLEBERG: It is the technical summary for II-27, which is the same document as II-11.

MR. VAN ZANDT: II-27 is one of the documents that you authenticated as part of your testimony?

WITNESS RINGLEBERG: That is correct. And my comparison of the technical summary and the master document itself, the findings are simply just pulled out of the conclusions?

MR. VAN ZANDT: Thank you. You may continue.

WITNESS RINGLEBERG: Thank you.

And then the final bullet, in terms of salinity, the Delta's now in a state of drought in almost every autumn because of human activity, including water diversions.

So the next copy, II-11 or -27, Pages 14 and 15. That's it.

So we understand from Contra Costa's analysis that the Delta during certain seasons is in a state of permanent drought as a result of diversion activities. And how did they get there? They got there through a reconstruction of the historic salinity as you would expect with the same physical geography of the Delta

and the same environmental conditions of Delta but not in the historic Delta. So basically impaired versus unimpaired.

So the interaction between saline ocean water from the Pacific Ocean and freshwater from the rivers flowing into Delta determines ambient salinity conditions in the Delta and the Bay.

CO-HEARING OFFICER DODUC: Okay. Hold on, Mr. Ringleberg.

Mr. Mizell.

MR. MIZELL: To make this as efficient as possible, I'd like to just assert a standing objection to authentication now at this time of any of the exhibits that we've previously objected to as either being orphaned or lacking foundation, and we'll leave it at that.

CO-HEARING OFFICER DODUC: Thank you, Mr. Mizell, for that efficient objection. So noted and taken under advisement.

MR. VAN ZANDT: Okay. You may proceed.

WITNESS RINGLEBERG: Thank you.

At the bottom of the page, the data follows the expected inverse exponential relationship between flow and salinity. So unambiguously, San Francisco Bay reconstructed data shows that there is a strong

connection between flow and salinity, as you would expect. There are some differences shown in the next page.

So if you could move to the top of the following page. Right there. Perfect. Thank you.

Reconstructed salinity increases as reconstructed unimpaired Sacramento River flow decreases. This agreement is strongest in dry years. So said another way, that the relationship between salinity and flow is strongest in drought years and dry years. And their analysis was a broad span, not necessarily including DWR's classes.

Moving further down. Since 1969, observed salinity has exceeded reconstructed salinity in all years except the extremely wet years of 1982 and 1983. So the current conditions are much saltier than expected from the historic data.

If we can move to Page 28 in the same document.

These are the conclusions from Contra Costa Water District's analysis as they relate to existing conditions.

Long-term data demonstrate that the difference between historical NDO's, net Delta outflow, and unimpaired NDO is increasing over time, indicating that

water management actions have reduced Delta outflow significantly.

Further down, NDO has declined in all other months.

Final bullet. On average, water management practices have resulted in reduced Delta outflows in whole months except September and October. The greatest reduction in Delta outflow relative to unimpaired conditions occurs in the months March through June, when spring snow melt is captured in reservoirs and some of the remaining river flows are diverted for direct use.

CO-HEARING OFFICER DODUC: Did the court reporter get that?

THE REPORTER: Yes.

WITNESS RINGLEBERG: I'll slow down.

CO-HEARING OFFICER DODUC: Please slow down and try not to mumble.

WITNESS RINGLEBERG: So if we could go back to my presentation, then.

Next slide. Excuse me. Okay.

So now we have the understanding of the historical salinity in the system. And how does it function on a day-to-day basis?

What we know from a practical sense, having

heard from the prior testimony that salt influences plants in certain ways, it influences the yields as a result from those agricultural plants, and it influences the flavor quality of certain plants, specifically grapes; that salts builds up in those soils as described earlier.

And the special nature of Delta drainage and the soils in context with the prior application of surface diverted water means that both the water quality, the EC of the surface water, and the salinity of the soils interact together.

So when we talk about the EC of the diverted water, the electrical conductivity of that water doesn't necessarily cause a negative impact on the plants that it's being applied to. It's the combination of those local soils and that diverted water.

And that's really important for the next couple parts of this presentation, that you can look at threshold levels of EC in the river water, but that and the combination of relatively poor drainage in these areas that are already, as we saw in Ms. Miles' presentation, right at the limits for certain species in certain areas on Ryer Island.

So how do we better understand the project's

impacts on that? Well, the project is proposing to withdraw water, which I'll talk about later, but that withdrawal of the water has an influence on how the salt itself mobilizes in that system. So I'm going to describe just briefly here how that salt mobilizes in.

So essentially in the Delta there's is a tug-of-war between the flow of the rivers and the hydraulic head of the rivers pushing into this Delta. And the Delta, which is dominated tidally by this mass of tidal signal. I think you folks have heard this a million times.

What happens, though, is that it goes from a river-based system when there's high flows to a much more lacustrine, a lake-bed system of a broad, flat, sea level estuary system when those river levels are down. And that's the area that we're most concerned about.

During high flows the rivers dominate. That has a really strong effect, pushing the saltwater out of the system. The residence time which you hear a lot about, the residence time declines, but that's a good thing for purposes of salt because that means that salt's getting pushed out.

For our purposes, we're concerned about the times when those flows are low and the rivers don't

dominate that tidal signal. That tidal signal very rapidly builds that salt pulse up the system.

And why Ryer Island is particularly important is because Ryer Island sits at the confluence of the most broad channels in the Sacramento River system and abuts directly into Ryer Island.

So that's the area of focus for this part of the Delta, is because it is more closely aligned with some of the hydraulic flows we wee more in the Western Delta. In droughts the tidal signal from the Sacramento River declines, and a tidal influence comes up.

So I'll try to explain how that works fairly rapidly here.

If you could -- okay.

So we talked a lot about salt. I'm going to keep going on that.

Project operations mirror the drought. So let's talk about what that means.

So if you could go to -- let's see if I can -- my testimony, which would be 11-24, and if you could go to the very last page of -- last series of pages of 11-24. Okay.

MS. McCUE: For the record, I think it's II-24.

WITNESS RINGLEBERG: Oh, sure. Yes. Fair enough; "II."

Please go up. Thank you. Right there.

So in my written testimony, I identify the conditions that the project has described that are the bounding limitations on project operations at the North Delta. And they have cited extensively to the purposes of D1641 as a way of limiting salinity.

But what I took a look at -- and this is synthetic data, data that I created from a basically randomized plot, which shows D1641 just in a nutshell is not reflective -- it's an average, and it's a 14-day running average. It's a very powerful tool of dampening noise, which is very useful in some circumstances, but in this case the noise being dampened is actually the salinity pulse coming up from the Bay to Ryer Island.

So I wanted to give just a brief illustration of how D1641 with the rolling average being used actually allows salinity pulses well up to 5,000 microsiemens or --

Please, let's -- can we go to the second one? The next further slide.

So 5,000 was chosen for a reason. 5,000 was chosen because in the period of record here -- and it's

very difficult to read, which is why I expanded the slide and my other slides, so you could actually see the dates.

But the salinity in the system during the last three years of droughts spikes. And it spikes, as you would expect, late summer and fall after following a wet year. And then the second year, it spiked spring through fall into winter, and in the third year you can see the amplitude is increased and is significantly worse in the third year.

So as a scientist, these spikes are the things that are influencing the ability of the growers to take water onto their land. You can't see the EC by looking at the water being diverted onto your land. You have no idea that this is actually happening.

And these are real data from that system, the closest USGS station from Rio Vista. So this actually tells quite a few stories all at once. One, it shows the sort of alternating pattern of tides. At the finest scale, it shows the monthly pattern of the larger tides, and it shows -- in the portions where the blue band is the thinnest, it shows -- that's -- the freshwater outflow is actually damping that salinity from reaching Rio Vista.

So this really in a nutshell tells the full

story of this. This is why droughts are bad because you can see that the salinity not only gets bad for certain periods and spikes high, but then that area under the curve, that area under the spike, that's the salinity where the operator doesn't have a chance to operate any other way. They're drawing water in that big blue zone the entire growing season.

So this is the important part of the story as it relates to Ryer Island, but it also tells you the story about outflow.

If you go to the next slide, lower down.

This is outflow at the same station. And outflow is obviously the opposite of this in this context because as your outflow increases, it pushes that salinity back out. So it's a really simple relationship here. We're not talking about rocket science. We're talking about a large amount of water coming down the Sacramento River, pushing the saltier water out of the Bay.

And the longer the period is that we don't have that freshwater outflow, then that saltwater migrates monotonically up that river system every tide, and it ends up spiking and influencing the ability of the Ryer Island withdrawals from being able to put freshwater on their crops.

So there's another way of looking at exactly the same data, actually a slightly more sophisticated way for the purposes of looking at where the water is coming from.

So DWR has done an excellent job of this at Old River because it affects the projects. So I just want to give you a little snapshot. A way of understanding what the influences of this change in point of diversion would be, would be to do this at Rio Vista or to complete the same analysis at other areas within the Delta so that you could see through project operations what the difference in contribution of the water is.

And the reason why this is so important is, if -- look at lightest blue. That's the Sacramento River influence. That's Sacramento River water all the way down at Old River. And when you divert the water in the North Delta, you've lost that ability to freshen up all that water through the entire Delta that's now currently freshening up the water at Rock Slough.

That big blue prism which represents approximately 90 percent of the total source of the water in this particular image, that's Sacramento River water. When you pull that water out of the system by diverting it to North, the contribution of Sac River

drops dramatically.

And that's important for the next slide which is the salinity fingerprint.

When you pull the Sacramento River water out of the system, which in this case is the same light blue, or you'd have the tidal influences which is the Martinez you see, which is that now kind of brighter teal color, you can see that the dots at the top which are salinity skyrocketed.

So every time you have that increased contribution of EC from the Bay-Delta coming out of the Bay, that has a massive increase in salinity, as you can imagine. So the dotted blue line is the overall change in salinity just by the variation of adding additional intrusion with less outflow.

So that tells the story right there. The less outflow you have, the more salinity comes in from the oceans and skyrockets your continuous salinity.

For us to understand the project impacts on us, we have to have these sort of data calculated for our area to be able to truly understand what the impacts of the projects are going to be, and it has impacts beyond salinity with other things like dissolved organic carbon.

Go back up to the top of the presentation.

Four slides.

MR. VAN ZANDT: Mr. Ringleberg, you want to go back to II-25?

WITNESS RINGLEBERG: No. We are in the right spot. Thank you.

Keep going. Okay. Perfect. You can leave it there for a second.

So I've run out of time here. It's not quite as coherent as I would like it to have been.

But specifically we've seen that in the current conditions, which the last three years by any reckoning has been a drought in this system, that the flows of the Sacramento River have been declined to the point where we have very high levels of salinity over very long periods of time at Rio Vista.

And the project operations and the project operational slides that I have provided are, unfortunately, unavailable because of the legal question. But the project operations essentially keep the flows within that exact same window.

So the downstream release of water as described by the project at Freeport, using the Freeport operational criteria stair steps that you folks have seen several times already identifies that the project will, in late summer and early fall, in

essentially all water years except for the extreme dry years will be essentially the equivalent as what we've seen in the last three years of the drought in terms of overall flows from the Sacramento River system.

That has significant impacts on Ryer Island and its operations as a result of the salinity that's been allowed to draw up within the system and has significant impacts within the Central and South Delta as well because that system is currently being freshened by those flows that are being carried through Georgiana and the Delta Cross Channel.

And I think that summarized my points.

MR. VAN ZANDT: Madam Hearing Officer, we originally asked for 30 minutes for this witness. I don't know if Mr. Ringleberg still has some expansion on the points that he's already made that he'd like to go back to, but we would, if we could, have maybe given him a few extra minutes.

CO-HEARING OFFICER DODUC: Do you have anything additional that is within the scope of your originally submitted testimony?

WITNESS RINGLEBERG: I certainly do. If we could go to II-29, Page 2.

All right. Thank you for your indulgence, Madam.

Right at the very bottom of this figure, you can see this is a report that was provided by ICF, which was the consultant for the project for the Delta Science Board, I believe. And right here is where they took a look at selected flows, and you can see an extremely dry year of 1924. So because of the --

CO-HEARING OFFICER DODUC: Sorry. What are you looking at?

WITNESS RINGLEBERG: Oh, I'm sorry.

CO-HEARING OFFICER DODUC: What am I looking at?

WITNESS RINGLEBERG: Sure. Excuse me. The very last bullet --

CO-HEARING OFFICER DODUC: Okay.

WITNESS RINGLEBERG: -- cites the following year. And so on the following page, there will be additional bullets, but this is -- we're starting with a critically dry year, 1924.

And the way the model works is you have to kind of pre-select the year classes that you're looking at. So they picked a subject year, 1924. And the mean Freeport flow in 1924, for the purposes of the analysis in the model, is 9345 cfs.

So if we go down to the following page.

MR. VAN ZANDT: If you would, Mr. Ringleberg,

could you identify for the record the document that you're referring to which is II-29, I believe.

WITNESS RINGLEBERG: Right. So this is the scientific panel request from the Delta Science Board of the California WaterFix. This is one of the peer reviews that the Delta Science Board team did on specific subject matter areas, and it was prepared by ICF Consultants.

MR. VAN ZANDT: And it's dated April 18th, 2016?

WITNESS RINGLEBERG: It's dated April 18th, 2016. It was my original submission.

May I proceed?

MR. VAN ZANDT: Yes.

WITNESS RINGLEBERG: Great. The dry years, then, the dry year 1989, the mean Freeport flow is 16,000.

So if you go to the following page. Stop right there, please. Okay. Actually, for purposes of time, let's go the following one. Just a little bit further down. Perfect. Okay.

So what I wanted to show you with this particular graphic is that this is a response from the consulting team that developed the environmental document, but also it shows you the operational rules

and essentially real sequences without actually having the true final operational rules the project says are in development and will be developed dynamically. These are the rules that they're essentially bound by for bypass flows.

And if you look at the flows here, which if you look at the bypass flow which is the very lightest blue line under that, it's very difficult to read, which is why in our figures we normally try to expand it artificially so you can actually see where the lines are.

But you can see that the lines for the early part of the year, outflow basically doesn't get over 20,000. And then we have some outflow up until June, and then it plummets again to below 20,000. And then through July it doesn't get over 20,000 until a little spike here in September, and actually it falls off the map and actually gets much lower.

And so what the project operations have described is that they will be mimicking the flow conditions that are identical to the mean Freeport flow of essentially 9,000 during the critical dry year in '24 and the mean flow of 16,000 in a dry year. So the system will essentially be operating below-average years through most of the time periods available to it

for operations.

And I think that was actually the last one that I wanted to add, given the time that we have. Thank you.

MR. VAN ZANDT: Thank you, Mr. Ringleberg.

Two other little housekeeping things, if I could, Madam Hearing Officer.

Mr. Hester, would you take a look at II-40 errata. Is that a true and correct copy of the testimony you submitted for this hearing?

WITNESS HESTER: Yes, it is

MR. VAN ZANDT: Okay. And, Mr. Lange, would you take a look at II-43, please.

Is that a true and correct copy of the testimony that you submitted to this hearing?

WITNESS LANGE: Yes, it is.

MR. VAN ZANDT: Madam Hearing Officer, that concludes this panel testimony.

CO-HEARING OFFICER DODUC: Thank you. Let me get a clarification from the Department.

Mr. Mizell, you did not mention Mr. Hester's revised testimony in your objection. Am I to assume that that is not -- that you do not believe this revised testimony includes the new surprise data to which you are objecting?

MS. ANSLEY: As far as I understand, Mr. Hester's revisions add in -- his original testimony, he had blanks instead of where his exhibits, reference exhibits would be. So it would say, like, Exhibit, blank. And he went through and he added in, I believe, three. Ms. Meserve can remind us. I think he added in three references that had been previously blanks.

Three of those are three of the exhibits I did note that nobody had referred to in any testimony. So I think she notes it in her responses, but I'm happy to also provide that.

CO-HEARING OFFICER DODUC: No, that is fine. Thank you.

Given the lateness of the hour, I think what I would like to do is not begin the Department's cross-examination until tomorrow.

Let me take a moment right now and remind Mr. Brodsky, Mr. Jackson, and other representatives that they should be prepared to come tomorrow to discuss scheduling of cases in chief for the week of November 17th and 18th, the week before Thanksgiving.

And we will resume at 9:30 tomorrow.

And actually, before we do, let me see if I can -- one of the things that I expect we will be

discussing tomorrow morning is this surprise direct that Ms. Meserve conducted with Mr. Ringleberg in order to authenticate some documents.

I believe that that was an objection that was valid, at least by Ms. Morris. I don't know if the Department wanted to join in on that, but I'll give you the opportunity, both of you, both the Department and Ms. Morris as well as Ms. Meserve, to in the very short time that we have, if you would like, provide any additional arguments or responses for our consideration as we deliberate on this in the morning before we reconvene at 9:30.

I'll start with the Department and Ms. Meserve, and then I will provide the opportunities for others to weigh in.

MR. MIZELL: I believe that the Board's heard the concerns we have, and I don't have anything to add at this point.

CO-HEARING OFFICER DODUC: Okay.

MR. BERLINER: One other point for the Board's consideration. The documents that were cited by the -- from the Contra Costa Water District, those documents were withdrawn by Contra Costa when they submitted their letter to the Water Board related to the settlement. So those documents have no authentication.

They're not in the record. They're not part of the proceeding. We don't know who drafted them, et cetera.

So we have objections as to those documents.

MS. MESERVE: Excuse me, but we submitted them. Are you saying they're not true and correct copies? I mean, I think that we're sort of -- this is becoming a little bit of a zoo. We haven't altered anything. These are documents which are in the public domain. We're trying to use them to present our case in chief, and it appears that DWR and others don't want us to be able to use these true and correct copies to do -- to tell our story.

CO-HEARING OFFICER DODUC: Hold on. Hold on, Ms. Meserve. And, by the way, I take exception to your commentary of my conduct of this hearing as a "zoo."

MS. MESERVE: I'm sorry. It was not referred to you.

CO-HEARING OFFICER DODUC: Mr. Herrick.

MR. HERRICK: It's not related to that.

MR. BERLINER: I would just point out, we don't know that they're true and correct copies. These were -- that's my point. Contra Costa did not authenticate these documents and withdrew them. So there's a presumption that they're true and correct because they're labeled as Contra Costa documents, but

there's no underlying authentication of these documents. So we don't know what Contra Costa would have said about these documents.

CO-HEARING OFFICER DODUC: All right. So noted.

MR. VAN ZANDT: May I be heard?

CO-HEARING OFFICER DODUC: Mr. Van Zandt.

MR. VAN ZANDT: We have an expert witness. An expert witness can rely on other documents that he comes across in his research. There's no reason to question that these documents were not originally produced by Contra Costa County. They were. And he's authenticated that he looked at those, and they are basically self-authenticating. And an expert can rely on those documents.

So you can't object to a document that an expert relies on because it's forming part of his opinion. And he technically doesn't even have to authenticate the document. But the reality is, it is out there; it's in the public domain.

We could ask you to take administrative notice of this document because it exists and it appears to be self-authenticating. Thank you.

CO-HEARING OFFICER DODUC: All right. Enough.

Any final response, Mr. Berliner?

MR. BERLINER: I'll note Kevin O'Brien's objections to documents and opinions based on opinions, just invoke that here. I completely disagree with Mr. Van Zandt's interpretation of the law regarding a document that an expert relies on.

CO-HEARING OFFICER DODUC: All right.

Ms. Des Jardins.

MS. DES JARDINS: I just wanted to note, I also rely on documents that are published by public agencies that are in the public domain. It is just common practice. Not everybody has the $4.4 billion budget of DWR to do all their own original research.

CO-HEARING OFFICER DODUC: Enough of the commentary.

MS. DES JARDINS: Thank you.

CO-HEARING OFFICER DODUC: Thank you. It's noted.

I did ask for comments and responses on that. All right. We're closing the door on that.

Mr. Herrick.

MR. HERRICK: Thank you. John Herrick for South Delta parties again.

As a clarification, I've been in e-mail with Dean Ruiz, co-counsel. He said that he understood that the -- a previous order said that DWR would provide

their specific objections as to why this striking -- stricken testimony wasn't enough by October 28th. So he said since it wasn't done by DWR, he doesn't know the specifics to argue tomorrow morning.

CO-HEARING OFFICER DODUC: They did provide something. That's the document to which I was referencing this morning.

MR. HERRICK: October 28th? Okay.

CO-HEARING OFFICER DODUC: Yes.

MR. HERRICK: I'm sorry. I'm just relaying the e-mail he said to me. So we'll go dig that up and address that.

CO-HEARING OFFICER DODUC: Tell him to check the website. I believe it has been posted. It was a relatively short document. Hence, my further delving into the specifics earlier this morning.

MR. HERRICK: Thank you very much. Sorry.

MS. MESERVE: Madam Hearing Officer?

CO-HEARING OFFICER DODUC: Ms. Meserve.

MS. MESERVE: Sorry. I'm very sorry. We did receive objections, you know, from DWR and others. II-29, I believe, was not among them as well. I would have to sort through and do another table to sort all this out. I don't think that includes II-29. Anyway, so we'll need to sort it out. I would just ask that we

be allowed to do that at the back end of these proceedings.

CO-HEARING OFFICER DODUC: All right.

Ms. Morris?

MS. MORRIS: I apologize, but for the record, II-29 was ICF's memo, and I think we were talking about the Contra Costa reports and studies which were marked as II-27 and -28. So I just want it to be clear what we're talking about so there isn't confusion.

CO-HEARING OFFICER DODUC: So there is no objection to II-29. There are objections to II-27 and -28.

MS. MESERVE: There actually aren't.

MR. VAN ZANDT: There is no objection to II-27.

MS. MORRIS: We're making objections based on the testimony. And then in addition, he referenced separate II -- I forget the -- I cannot recall; the Contra Costa 6 and something else.

CO-HEARING OFFICER DODUC: You're referring to his direct testimony which was just conducted?

MS. MORRIS: Yes. Thank you.

CO-HEARING OFFICER DODUC: All right. And as we conclude today, I will again remind the groups whose number I don't remember now that we are trying to

project ahead to cases in chief for November 17th and 18th and cases in chief for the week after Thanksgiving. So I again will expect that parties who are up in the order according to the table be, one, either prepared to present their case in chief; or, two, have coordinated with another party to take their place in the order of proceedings.

So we will discuss all of that tomorrow.

After all, I did twist Ms. Meserve's arm, and she did get her witnesses here in the order which was required of her, and it's only fair that other parties be treated in the same way.

Ms. Meserve.

MS. MESERVE: Thank you. Just for clarification for my panel tomorrow, the physical injury panel, is there a time I could tell them that they need to be here by in order that they may not have to wait around too much?

CO-HEARING OFFICER DODUC: That's fair enough. I believe the Department had estimated two hours for your cross-examination of this panel, and Ms. Morris had indicated 30 minutes, San Luis Delta-Mendota has indicated 30 minutes, and Mr. Herrick has indicated 30 minutes. So I think it's safe for your Panel 2 to be prepared to come in around 1:00 o'clock.

MS. MESERVE: Thank you.

CO-HEARING OFFICER DODUC: In the miraculous event that we finish with this panel early, I think there's plenty of things for us to discuss. So we will plan on proceeding in that manner. Okay? All right. Thank you everyone. We'll see you at 9:30.

(Whereupon, the proceedings recessed at 4:43 p.m.)

STATE OF CALIFORNIA)
) ss.
COUNTY OF MARIN)

I, DEBORAH FUQUA, a Certified Shorthand Reporter of the State of California, do hereby certify that the foregoing proceedings were reported by me, a disinterested person, and thereafter transcribed under my direction into typewriting and is a true and correct transcription of said proceedings.

I further certify that I am not of counsel or attorney for either or any of the parties in the foregoing proceeding and caption named, nor in any way interested in the outcome of the cause named in said caption.

Dated the 10th day of November, 2016.

DEBORAH FUQUA

CSR NO. 12948