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

Friday, October 28, 2016

9:00 A.M.

Volume 25

Pages 1 - 275

Reported By: Candace Yount, CSR No. 2737, RMR, CCRR
Certified Realtime Reporter

Computerized Transcription By Eclipse

California Reporting, LLC - (510) 224-4476
www.CaliforniaReporting.com

APPEARANCES

CALIFORNIA WATER RESOURCES BOARD

Division of Water Rights

Board Members Present:

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

Staff Present:

Diane Riddle, Environmental Program Manager
Dana Heinrich, Senior Staff Attorney
Kyle Ochenduszko, Senior Water Resources Control Engineer

PART IB

For Petitioners:

California Department of Water Resources:

James (Tripp) Mizell
Thomas M. Berliner
Jolie-Anne Ansley
Robin McGinnis

The U.S. Department of the Interior:

Amy L. Aufdemberge, Esq.

INTERESTED PARTIES:

For San Joaquin River Exchange Contractors Water Authority:

Paul R. Minasian

For The Environmental Justice Coalition for Water, Islands, Inc., Local Agencies of the North Delta, Bogle Vineyards/Delta Watershed Landowner Coalition, Diablo Vineyards and Brad Lange/Delta Watershed Landowner Coalition, Stillwater Orchards/Delta Watershed Landowner Coalition, Brett G. Baker and Daniel Wilson:

Osha Meserve

APPEARANCES (Continued)

For State Water Contractors:

Stefanie Morris

For Central Delta Water Agency, South Delta Water Agency (Delta Agencies), Lafayette Ranch, Heritage Lands Inc., Mark Bachetti Farms and Rudy Mussi Investments L.P.:

John Herrick, Esq.

For Butte Water District (BWD):

Dustin C. Cooper

For North Delta Water Agency & Reclamation Districts 999, 2060 and 2068:

Kevin O'Brien

For California Water Research:

Deirdre Des Jardins

For Delta Flood Control Group (Brannan-Andrus Levee Maintenance District; Reclamation District 407; Reclamation District 2067; Reclamation District 317; Reclamation District 551; Reclamation District 563; Reclamation District 150; Reclamation District 2098:

David Aladjem

I N D E X

///

///

///

///

///

///

I N D E X (Continued)

DELTA FLOOD CONTROL GROUP (BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT; RECLAMATION DISTRICT 407; RECLAMATION DISTRICT 2067; RECLAMATION DISTRICT 317; RECLAMATION DISTRICT 551; RECLAMATION DISTRICT 563; RECLAMATION DISTRICT 150; RECLAMATION DISTRICT 2098):

Friday, October 28, 2016 9:30 a.m.

PROCEEDINGS

---000---

CO-HEARING OFFICER DODUC: (Banging gavel.)

Good morning, everyone. It is 9:30 and we are now resuming the California WaterFix Water Right Change Petition hearing.

My name is Tam Doduc. With me here today are, to my right, Board Chair Felicia Marcus. Board member Dee Dee D'Adamo will be watching us on the Webcast today, so wave to her. And to my left are Dana Heinrich, Diane Riddle and Kyle Ochenduszko, who will be assisted by other staff today.

I apologize for my lateness this morning. We're blaming it on the weather and accidents that occur.

But because I was late, I will impose myself punishment and give three general announcements today.

First of all, please identify the exits closest to you. In the event of an alarm, please take the stairs down to the first floor, exit the building, and we will meet in the park across the street and wait for the all clear signal to return.

If you cannot use the stairs, please flag one of us down, or one of the emergency staff, who will be wearing these really ugly-looking orange fluorescent

vests and caps -- you won't miss them -- and you will be directed into a protected area.

Second announcement is, as always, this is being recorded and Webcasted, so please speak into the microphone and begin by providing your name and affiliation, especially for the court reporter who is here today and who will be making the -- We will be making the transcript available after the conclusion of Part 1B. If you wish it sooner, please make arrangements with her.

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

All right. Okay. Looking out in the audience, I see no one wearing USC colors today. Thank you.

(Laughter)

CO-HEARING OFFICER DODUC: Before we begin with the formalities, let's do some housekeeping.

Okay. Today we will hear first from Mark Orme. Mr. Orme is the final witness for Group 7, Panel 4.

And then after the completion of Mr. Orme's testimony, cross, et cetera, we will next hear from Group 7 and 15, the joint panel -- Sorry. We did that already. Forgot to do a checkmark.

We will next hear from Group 9, North Delta

Water Agency & Member Districts.

Is Group 9 here? I see that they are.

After Group 9, we will hear from Group 10 without the City of Brentwood. So that would be Brannan-Andrus Levee Maintenance District. And they are here.

And then we will move on to Group 15, the EBMUD-only panel and they are here as well.

After that, next on my list will be Group 17, the San Joaquin River Exchange Water Contractors Authority.

Mr. Minasian, are you here? Could you please come up?

We received and I think -- and all the parties did yesterday, a request from the Department, and I think it was a motion for Protective Order. We will need some time to consider that, and I assume you would want to respond to that.

So without penalizing you and your order in the -- in the presentation of case in chief, what we're going to do is move you to the end of the order while we consider that request. And we'll give you until noon of next Friday to file a response to that request.

MR. MINASIAN: That is very orderly.

CO-HEARING OFFICER DODUC: Microphone, please.

MR. MINASIAN: Very orderly and very acceptable.

I also heard and saw some complaints about parties working together in regard to scheduling, and I'd like an appropriate time to just tell you a little bit about how this unfolded, which I think is counterproductive to what you're hoping will happen in the future.

There's some good signs; there's some bad signs. If we tell you the stories of what's happening out in the field, I think you won't be so disappointed in the future.

CO-HEARING OFFICER DODUC: Thank you.

MR. MINASIAN: Is that mysterious enough?

CO-HEARING OFFICER DODUC: That is mysterious enough that I will be spending the entire day thinking just about that statement, Mr. Minasian.

(Laughter)

CO-HEARING OFFICER DODUC: All right. So now we have moved Group 17 all the way to the end of the line while we address the motion and -- and what not.

That means -- Miss Meserve, thank you for being here. Please come up.

I think you are representing Group 19, 20 . . . 24. In any case, you are trying to coordinate

three joint panels that could come up as early as next week or the following week.

Keep in mind that we are -- Our hearing days next week are just Thursday and Friday, and then the following week, we're meeting again on just Thursday.

MS. MESERVE: Yes.

CO-HEARING OFFICER DODUC: So, what does it look like for you?

And my request, or at least my -- my new experiment that I'm trying is: When your order comes up, you'll either need to be prepared to present part, if not all, of your case in chief or have someone who is able to make arrangements with another party to take your place.

MS. MESERVE: Yes. Thank you.

Osha Meserve for Land and the other parties, Groups 11 through 13, or direct -- order of direct 10, 11 and 12.

I've been listening to everything that's been going on. I haven't missed it. I've been diligently working to try to be ready to bring our panels and we very much want to present our evidence to the Board -- to the Hearing Officers. We can -- I have twisted arms and changed things as much as I could.

I understand next Thursday we have, first, Brentwood, then Antioch, then Sac Regional --

CO-HEARING OFFICER DODUC: That's correct.

MS. MESERVE: -- is that correct?

Okay. So I think we could be prepared to put on our Salinity Panel, which is 10 --

CO-HEARING OFFICER DODUC: Okay.

MS. MESERVE: -- right?

So we could be prepared to do that.

On Thursday, I'm not sure if we could do more on that particular day than that. And then I would propose to have 11 and 12 go on the Friday.

I can pick up from my -- Not to get too embroiled in details, which is too much to handle with everybody, but I can pull in -- I can have a more complete Panel 11 on Friday. So that's what I would be requesting.

I will --

CO-HEARING OFFICER DODUC: That will be excellent.

MS. MESERVE: I will monitor at the end of the day today. I need to go back to my office and prepare. But I will monitor to see where you end up today, and then if there's a need to update staff, I'll do so via e-mail?

CO-HEARING OFFICER DODUC: That is excellent work. Thank you very much, Miss Meserve.

MS. MESERVE: And I also wore jeans.

(Laughter)

CO-HEARING OFFICER DODUC: Oh, nice boots.

MS. MORRIS: May I ask a question of Miss Meserve on scheduling?

CO-HEARING OFFICER DODUC: You may ask a question of me, and then we'll see.

MS. MORRIS: I'm curious. She said that the Salinity Panel would be ready on Thursday, but is the Salinity Panel also available on Friday before the other panels?

CO-HEARING OFFICER DODUC: Assume we don't get to them on Thursday, they'll be available on Friday, and I see Miss Meserve nodding her head.

Excellent.

Mr. Herrick.

You are representing Group 21, who is 13th -- oh, Lucky Number 13 -- in our ordering.

We might get to you as early as next Friday and, if not next Friday, then the Friday after that.

MR. HERRICK: Smooth.

CO-HEARING OFFICER DODUC: Smooth?

MR. HERRICK: No problems.

CO-HEARING OFFICER DODUC: I'm sorry. The Thursday after that.

MR. HERRICK: We are planning, for the earliest, next Thursday, we could start. It wouldn't be a full panel.

But we're planning on probably Friday, most likely the 10th, but we'll be ready on any of those days --

CO-HEARING OFFICER DODUC: All right.

MR. HERRICK: -- to have at least most of the people ready.

CO-HEARING OFFICER DODUC: All right. Well, that should carry us through to November 10th for everyone to prepare their direct as well as their cross-examination, and we will keep rolling along as we do our best each day to try to check in on the schedule.

Thank you, everyone, especially Miss Meserve, for your hard work on this.

Okay. I think we are now -- Unless there are any other housekeeping matters, we will turn to Mr. Cooper and ask Mr. Orme, first of all, to please stand and raise his right hand.

MARK ORME,

called as a witness for the Butte Water District, having been first duly sworn, was examined and testified as follows:

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

MR. COOPER: Good morning. Dustin Cooper today appearing on behalf of Butte Water District.

As you noted, Hearing Officers, Mr. Orme is the last witness of Panel 4 of Group 7.

And a couple formalities before we transition to Mr. Orme's direct testimony.

I, again, would like to incorporate and adopt the opening statement presented by Mr. Alan Lilly on behalf of the Sacramento Valley Water Users, and to remind the Board:

The purpose of Mr. Orme's testimony today is to document and attest to the water rights held by Protestant B Water District that are potentially subject to injury from the proposed California WaterFix Project.

DIRECT EXAMINATION BY

MR. COOPER: Mr. Orme, would you please state your full name and spell your last name for the record.

WITNESS ORME: It's Mark Orme, O-R-M-E.

MR. COOPER: Mr. Orme, you understand that you are presenting your testimony under oath today; correct?

WITNESS ORME: Yes.

MR. COOPER: Is Exhibit MLF-50 an accurate statement of your written testimony?

WITNESS ORME: Yes.

MR. COOPER: Did you prepare and sign that

testimony?

WITNESS ORME: I was provided a template by legal counsel and, with that, I -- I filled it in, so, yes, I did prepare it.

MR. COOPER: Did you also sign it?

WITNESS ORME: Yes.

MR. COOPER: Would you please name the four entities that make up the Joint Water Districts.

WITNESS ORME: Richvale Irrigation District, Biggs-West Gridley Water District, Butte Water District and Southern Extension Water District.

MR. COOPER: Is the document that's been identified as Exhibit MLF-41 a true and correct copy of the Joint Operating Agreement between the Joint Water Districts?

WITNESS ORME: Yes.

MR. COOPER: Is Exhibit MLF-42 a true and correct copy of the 1969 Agreement On Diversion of Water from the Feather River between the State of California and entities that make up the Joint Water Districts?

WITNESS ORME: Yes.

MR. COOPER: Are you familiar with the exhibits that have been identified as SVWU-100 through 110, which is the testimony and supporting documentation prepared by MBK Engineers for this proceeding?

WITNESS ORME: Yes.

MR. COOPER: Are the MBK Engineers' testimony and reports in those exhibits the type of information you rely -- you review and rely upon as Butte Water District's General Manager to assess potential risks and impacts to Butte Water District's water supplies and operations?

WITNESS ORME: Yes.

MR. COOPER: At this time, Mr. Orme, would you please summarize your written testimony submitted for this proceeding.

WITNESS ORME: As mentioned, my name is Mark Orme. I'm the General Manager of Butte Water District, served in that capacity for about the last 21 years.

The purpose of my testimony today is to identify the water rights held by -- by Butte Water District by the District.

Butte Water District was formed in 1956 and covers approximately 31,000 acres. We border the Feather River and predominantly our crops are permanent crops because the soils are conducive to that. However, we do serve about 9,000 acres of -- of rice as well.

Butte Water District primary water rights are pre-1914 water rights which are held collectively with the other Joint Districts, Richvale Irrigation District,

Biggs-West Gridley Water District and Sutter Extension Water District.

In 1969, Butte Water District entered into an agreement along with the other Joint Districts for diversion of water from -- from the Feather Water -- from the Feather River. Excuse me.

MR. COOPER: That concludes Mr. Orme's direct testimony. He is now available for cross-examination.

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

Cross-examination by the Department.

As Mr. Berliner is coming up, let me see if there's anyone else wishing to cross-examine this panel.

Not -- No from -- That was a no from Miss Aufdemberge.

And Miss Morris, you have cross-examination.

Okay. So after Mr. Berliner will be Miss Morris.

MR. BERLINER: I anticipate about two or three minutes of cross-examination.

CROSS-EXAMINATION BY

MR. BERLINER: Good morning, Mr. Orme. My name is Tom Berliner and I'm with the Department of Water Resources.

I'll be asking you just a few questions today.

These are questions that I also asked of your other colleague General Managers from the Feather River agencies as well as from some Federal Settlement Agreement entities.

Do I understand correctly you drafted what's been marked as your testimony, which is MLF-50?

WITNESS ORME: Yes, that's correct.

MR. BERLINER: And other than the template provided by your attorney, did anybody assist you in preparing that testimony?

WITNESS ORME: No.

MR. BERLINER: And is the sole purpose of your testimony to identify the water rights held and claimed by Butte Water District?

WITNESS ORME: Yes.

MR. BERLINER: And you're not testifying here today as an expert; correct?

WITNESS ORME: That's correct.

MR. BERLINER: And other than the Butte water right -- Butte Water District water rights, you're not offering any other opinions or information; is that correct?

WITNESS ORME: That's correct.

MR. BERLINER: And I take it, in response to a question from your attorney, that you are relying on the

testimony of MBK Engineers in order to come to a conclusion that you have a concern about impacts of the California WaterFix on Butte Water District.

WITNESS ORME: That's correct.

MR. BERLINER: Are you relying on any other information?

WITNESS ORME: No. Predominantly that.

MR. BERLINER: Predominantly or exclusively?

WITNESS ORME: Exclusively.

MR. BERLINER: No further questions.

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

Miss Morris.

MS. MORRIS: Stefanie Morris, State Water Contractors. Good morning.

Mr. Orme -- I'm sorry.

Mr. Baker, could you pull up Exhibit MLF-50.

(Document displayed on screen.)

CROSS-EXAMINATION BY

MS. MORRIS: My question for you, Mr. Orme, is:

A minute ago, you just testified about the kinds of crops and also talked a little bit about 9,000 acres of rice.

And I was wondering: It's not in your testimony in -- anywhere in your written testimony.

Can you show me where you had that in your written testimony?

WITNESS ORME: It's not there, no. Just -- Just added a little bit of concern in the District, so . . .

MS. MORRIS: Okay. Did you add that for a particular reason?

WITNESS ORME: No.

MS. MORRIS: Okay. I have no further questions.

CO-HEARING OFFICER DODUC: Thank you, Miss Morris.

Any other cross-examination?

Any redirect, Mr. Cooper?

MR. COOPER: No.

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

And that concludes the case in chief for Group 7. Thank you for the good coordination.

And per Mr. Bezerra's request, I believe it was yesterday, we will expect your complete list of exhibits for submission by next Wednesday.

MR. COOPER: That's my understanding, yes.

CO-HEARING OFFICER DODUC: Okay. Next Wednesday at noon.

MR. COOPER: Yes. Thank you.

CO-HEARING OFFICER DODUC: And at that, we will wait for that.

And I understand that there are some outstanding written objections as well as one verbal objection with respect to Mr. Weaver's testimony, at least redirected testimony, that we are taking into consideration and we will issue a ruling subsequent to receiving your exhibits.

All right. Thank you again to Group 7 and all of your witnesses.

With that, I will now ask Group Number 9 to please come up.

CO-HEARING OFFICER DODUC: First of all, I want to thank the witnesses for -- for this panel for your patience yesterday. I know you were sitting in the audience waiting for your turn and we did not get to you, but thank you for -- for accommodating our somewhat in-flux schedule. Appreciate you doing that and being here.

We're going to ask you to go ahead and stand now and raise your right hand.

///

///

///

GARY KIENLEN, SHANKAR PARVATHINATHAN,
STEVE MELLO, TOM SLATER and MELINDA TERRY,
called as witnesses for the North Delta Water Agency & Reclamation Districts 999, 2060 AND 2068, having been first duly sworn, were examined and testified as follows:

CO-HEARING OFFICER DODUC: Thank you very much.

Mr. O'Brien, you may begin.

MR. COOPER: Thank you. Good morning, Hearing Officer Doduc, Hearing Officer Marcus, and I guess, by Internet, Board Member D'Adamo, and staff. I'm Kevin O'Brien. I'm here representing the North Delta Water Agency, and also Reclamation Districts 999, 2060 and 2068, which are Reclamation Districts within North Delta Water Agency that divert and use water in the Delta.

I'll start with a brief opening statement.

OPENING STATEMENT BY

MR. O'BRIEN: The California WaterFix Project as it's currently proposed will cause injury to legal users of water in the North Delta in two ways:

First, the Project will significantly alter the hydrodynamics of the North Delta, the way that water moves within the North Delta, which will in turn significantly change the water quality within the North Delta.

Now, the chief water quality concern in the

North Delta is, of course, salinity, and that's because of the -- the salt water of the San Francisco Bay, which pushes up into the Delta through tidal action.

And it really requires a delicate balance by the Operators of the State Water Project and the CVP to -- to basically maintain water quality in the North Delta.

Over the years, they've -- they've gotten pretty good at that, not perfect, but generally the water quality is maintained in accordance with certain legal requirements that we'll talk about.

But common sense tells us that if you put three new diversions smack dab in the middle of that area, each of which will divert up to 3,000 cfs, that that's going to change the way water moves within the North Delta, and it will, in fact, upset that -- that delicate balance that has been established over the last 30 years or so.

And we've already heard testimony from the Petitioners about their analysis of salinity impacts. Mr. -- Dr. Nader-Tehrani testified that the average increase in EC at Emmaton that will result from the California WaterFix Project is 18 to 19 percent per year. That's an average.

But one thing we've learned in this proceeding is that averages don't tell the whole story.

And so what you're going to hear this morning is testimony from Gary Kienlen and Dr. Shankar Parvathinathan of MBK Engineers, who have taken the modeling work that was done by the Petitioners, looked at it, and extracted from it numbers other than average numbers. And so we're going to look at the data -- and, again, this is data from the Petitioners' own modeling -- to look at what salinity impacts will occur on more of a -- of a month-to-month and year-to-year basis.

And what that testimony will show is a very different picture from the average numbers. In fact, Mr. Kienlen will testify that, in certain months, particularly August and September, which is a critical irrigation month in the North Delta, in some years, the increase in salinity caused by the California WaterFix Project will be as high as 78 percent at Emmaton. 78 percent.

So this is obviously an important issue, not only from an engineering standpoint but -- but from the standpoint of people who live and work in the Delta.

And Mr. Steve Mello and Mr. Tom Slater will be testifying based on their experience as third-generation farmers within the North Delta who have had to deal with the issue of salinity their entire lives in terms of farming, and some of the practical problems that salinity

and salt loading create for their farming operations.

And, in particular, this is important in the North Delta now because the crop mix has changed significantly there over the last 30 years. Whereas historically there were crops that were more annual crops grown, in the last couple decades, there's been a move towards permanent crops, particularly wine grapes. The area around Clarksburg is a significant wine grape-growing region now.

And so if salinity increases to the point where those permanent crops are harmed or destroyed, which is a significant risk here, that would obviously have very severe economic impacts on -- on this area.

The second area of injury that we'll talk about, again, is a result of the changes in hydrodynamics that will be caused by the WaterFix Project. But in this case, it's the question of surface water levels.

The three proposed diversions are located in very close proximity to Reclamation District 999, which Mr. Slater is the President of that Board of Trustees. And these diversions will -- again, I think this is common sense -- will cause a reduction in water levels.

And we'll hear some testimony from Mr. Kienlen as to the -- the miracle -- the quantitative aspect of that. But Mr. Slater and Mr. Mello will talk about the

practical problems that will cause.

And one of the things that's important to understand here is that a lot of the water diversions that occur within the North Delta are -- occur using what are called gravity siphons, which is, frankly, a fairly unique method of diversion in the State of California.

And it is just what it suggests. It's a -- It's a -- It's the pipe that operates through gravity. You don't have to pay for electricity or diesel or anything else. But it's dependent on water levels.

And Mr. Mello and Mr. Slater and Mr. Kienlen will -- will talk about basically how those facilities operate and their concerns that, with the changes in water levels that will occur as a result of this Project, many of those siphons will be rendered either very inefficient or, in some cases, perhaps inoperable. And that would then trigger the need for very expensive remediation.

Finally, and just briefly, you're going to hear about the 1981 contract between the Department of Water Resources and the North Delta Water Agency.

Landowners in the North Delta have paid over $10 million to the Department of Water Resources since 1981 to secure the protections of that 1981 contract.

And the two areas of protection most relevant

to this proceeding are: Number one, water quality; and, number two, basically protection against changes in water levels and changes in hydrodynamics, Article VI of the contract.

So Miss Terry will give us a very brief overview of that contract, and we'll talk specifically about concerns regarding future violations of the contract that will be caused by the California WaterFix.

Our position is that those violations would constitute injury of a legal user of water under California law, as would injury to -- to water rights and water right holders exercising their rights independent of the contract.

Lastly, I just want to briefly note that North Delta Water Agency joins in the testimony that was presented earlier in the hearing by Mr. Bray and Mr. Easton. North Delta Water Agency participated in the funding of that work and is a full -- is a full supporter of that testimony.

So, with that, I think we're going to begin with Miss Terry.

DIRECT EXAMINATION BY

MR. O'BRIEN: Miss Terry, can you please state your full name for the record and spell your last name.

WITNESS TERRY: Melinda Terry, T-E-R-R-Y.

MR. O'BRIEN: And you took the oath a few minutes ago; is that correct?

WITNESS TERRY: Yes, I did.

MR. O'BRIEN: Is NDWA-7 a true and correct copy of your written testimony prepared for this proceeding?

WITNESS TERRY: I actually have one non-substantive correction I would like to make.

The name of the flood control organization that I also represent is missing. On Page 2, Line 16, right before the acronym CCVFCA, that is in quotes and parentheses, it should say California Central Valley Flood Control Association.

But with that, yes, it is correct.

MR. O'BRIEN: Great.

And you are the current Manager of the North Delta Water Agency?

WITNESS TERRY: Yes.

MR. O'BRIEN: How long have you held that position?

WITNESS TERRY: Eight years.

MR. O'BRIEN: Can you briefly describe your duties as Manager.

WITNESS TERRY: Well, I have a broad range of duties. Primarily, what we do is, we do collect assessments from the landowners in the Agency. And I am

also responsible for administering the 1981 contract that I'll talk a little bit about, and that includes the annual payment we send to the Department of Water Resources.

But I probably spend most of my time reviewing documents and participating in Delta planning processes, such as WaterFix and its predecessor BDCP. And so that's so that I can advise the Board of Directors for the Agency, you know, when it may be necessary to pursue any legislative or legal actions to comply with the Agency's statutory responsibility to ensure lands within the Agency have a dependable supply of water of suitable quality available to them. And that's -- we -- it specifically is protecting water supply from the salinity intrusion events.

MR. O'BRIEN: I'm going to ask Mr. Baker if we could pull up Exhibit NDWA-33, which is a map.

(Document displayed on screen.)

MR. O'BRIEN: Miss Terry, if you could, in reference to NDWA-33 just briefly describe the jurisdictional boundaries of North Delta Water Agency.

WITNESS TERRY: Sure. The Agency was created in 1973 by a special act of the legislature, and so the dark outer line that you see is the legal boundary.

I wish -- Is it possible to see the whole

thing?

(Document displayed on screen.)

MR. O'BRIEN: There we go.

WITNESS TERRY: There you go.

So that dark outer line is the legal boundary of the North Delta Water Agency. It is approximately 302,000 acres, so it's almost half of the legal Delta.

The other thing that you see on there is, it's divided into -- It shows the boundaries of the five divisions within the Agency, and the Directors are elected by the landowners to serve on the Board for the Agency.

It also shows the county lines for the four counties that are -- that have lands within North Delta Water Agency.

So, at the top there, our most northern boundary is in West Sacramento at I Street Bridge, and so it -- it goes up higher than I think what some people think.

And then it comes down. You can see the Yolo Bypass there as part of Yolo County in West Sacramento, and -- and the bypass. It also skirts along the Sacramento River there by Downtown Sacramento down to Clarksburg.

Then you get into the Sacramento County region

on the right, which extends out the Agency's eastern border at Freeport.

And then you go past Hood, Courtland, down to Walnut Grove, kind of juts over across I-5 there on the east. And then you go past Isleton down to Sherman Island, which kind of looks like the boot of Italy down there, and that's the southernmost border of the Agency.

Off to the southeast there is a small portion of San Joaquin County, which is primarily the Thornton and Stan -- Staten Island.

And then on the left side, on the west side of our Agency, is the Solano County portion, which encompasses the Cache Slough complex there and is where the North Bay Aqueduct is located.

MR. O'BRIEN: On this map, there's some black dots at various locations.

Can you just briefly tell us what those signify.

WITNESS TERRY: Yes. Those are the seven monitoring locations that are identified in Attachment B of our contract that Mr. Kienlen will talk about later and . . . And they -- they're monitoring salinity -- sorry -- EC.

MR. O'BRIEN: Thank you.

I'd like to now pull up, if we could, Exhibit

NDWA-34.

(Document displayed on screen.)

MR. O'BRIEN: Miss Terry, was this an exhibit that was prepared at your direction?

WITNESS TERRY: It was prepared by me, yes.

MR. O'BRIEN: Yes. And what does it show?

WITNESS TERRY: This shows each of the divisions -- if you can get it all on the page again.

There are five divisions, so it has the names of our current Directors that serve. But then what it also shows are the Reclamation Districts that are within each of those divisions.

MR. O'BRIEN: I'd like to now move to the 1981 contract, which is DWR-306. If we could just pull up the first page of that.

(Document displayed on screen.)

MR. O'BRIEN: This is a true and correct copy of the 1981 contract between North Delta Water Agency and the Department of Water Resources; correct.

WITNESS TERRY: Yes, it is.

MR. O'BRIEN: Now, in your testimony, you identify certain provisions of the contract that are significant in relation to this particular proceeding. I'd like to just briefly walk through those.

I don't want you to offer any interpretations

of the contract. The purpose of this is just to give a brief overview.

So we're going to start with Article 8(a) Roman ii, which I think is two or three pages in.

(Document displayed on screen.)

MR. O'BRIEN: There it is.

So 8(a) -- 8(a)(ii). Let's take a minute and read that.

I'm just going to ask you basically how does that provision of the contract fit in to your work administering the contract that you described already?

WITNESS TERRY: Well, essentially Article 8 of the contract is where the state recognizes some of the rights of the water users within North Delta to divert from the channels for reasonable and beneficial uses.

It also has two declarations of the same thing, which is that those local diversions "and beneficial uses shall not be disturbed or challenged by the State."

It also indicates that DWR has given the assurance that water of the contract quality that Mr. Kienlen will talk about later shall be in the Delta Channels for beneficial uses on the lands within the Agency.

And that the State is also required to furnish water to the extent it's not otherwise available under

the water rights of the water users.

And, finally, within that section, it -- the State agrees to affirmatively defend the use of the water to maintain water quality criteria in the contract as an actual reasonable and beneficial use.

MR. O'BRIEN: Thank you.

And I'd like to next move to Article II Subsection (a)(i). I think it was on that previous page there.

(Document displayed on screen.)

MR. O'BRIEN: There you go.

The title of Article 2 is Water Quality.

I'll let everyone to take a second to read 2(a)(i).

I'll ask: How does that provision of the contract fit into your work in administering the 1981 contract?

WITNESS TERRY: Yes. I will generally cover it.

I will say that Mr. Kienlen is going to talk about this Article quite a bit and explain the criteria itself.

But, generally, for me, this is the provision about the State agreeing to operate the State Water Project to provide water qualities that are either equal

to or better of the Delta standards that are adopted by the State Water Resources Control Board, or the salinity criteria that is established in the contract, and that will be discussed by Mr. Kienlen.

But this section also has a provision that the -- they also -- the State also "agrees not to alter the Delta hydraulics in such manner as to cause a measurable adverse change in the ocean salinity gradient or relationship among the various monitoring locations . . . and interior points upstream . . ."

So that, again, will be part of what we discuss in our testimony.

MR. O'BRIEN: Thank you.

The next provision I'd like to look at is Article 6.

(Document displayed on screen.)

MR. O'BRIEN: Again, I'll just give the Board a minute to -- I think it's the first sentence that we're primarily focused on.

How does this Article 6 fit into your efforts to administer the contract?

WITNESS TERRY: This one is trickier but it's definitely related to this proceeding and the Permit and terms and conditions that may be placed on it.

But this Article, as you can see, is titled

Flow Impacts. And so, in this one, the State gave assurances that it shall not convey State Water Project in a way that would either cause a decrease, increase or reversal of the natural flows that is detrimental to the water users within the Agency or the channel embankments.

Also, they would not operate it in a way that will cause the surface elevations in the Delta channels to be altered to the detriment of both the embankments and the water users.

And, as you mentioned, our witnesses will be covering some of those aspects.

In that, as part of that, it does say the State is required to repair the damage, improve the channels, and is responsible for all diversion facility modifications that may be required.

MR. O'BRIEN: And, finally, I'd like to look at Article 12A which is towards the end of the document.

(Document displayed on screen.)

MR. O'BRIEN: How is that provision relevant to your duties as Manager?

WITNESS TERRY: Yes. This is definitely the enforcement provision, if you will, the remedy session.

And in this section, it describes the operational changes that the State Water Project must implement if the water quality falls below the criteria

in the contract.

And so they do have choices. They either can cease all diversion to their storage in State Water Project reservoirs, release stored water from the State Water Project reservoirs, cease all export by State Water Project from Delta channels, or any combination of those.

MR. O'BRIEN: Thank you.

I'd like to now pull up NDWA-39, if we could.

(Document displayed on screen.)

MR. O'BRIEN: Have you seen this document before, Miss Terry?

WITNESS TERRY: Yes.

MR. O'BRIEN: And was it prepared under your direction?

WITNESS TERRY: Under my direction, yes.

MR. O'BRIEN: And can you briefly tell us what this document shows.

WITNESS TERRY: This shows -- Our payments started in January 1982 and it shows our payment -- We make installments of two installments, and so for 2016, you see we've made the half installment so far.

But it's our total payments and, as you said earlier, it's just a little bit over $10 million --

MR. O'BRIEN: So these are --

WITNESS TERRY: -- since the contract.

MR. O'BRIEN: These are payments that are made by North Delta Water Agency to the Department --

WITNESS TERRY: Department of Water Resources.

MR. O'BRIEN: -- of Water Resources pursuant to the 1981 contract.

WITNESS TERRY: Yes.

MR. O'BRIEN: In your written testimony which is in NDWA-7 at Paragraph 18, you talk about an exhibit in NDWA-40, which is a film that was prepared for this proceeding, which we're going to see in a minute.

I just wanted to have you give some brief background on that -- on that film and how it was put together.

WITNESS TERRY: Sure.

Because, as you saw from the map, the Agency is really so large, and maps do not do it justice, we did decide to go ahead and prepare a very short film that will be narrated by our Chairman and -- but it will -- It was a way for us to be able to show you some of the areas where our monitoring locations are, some of the areas of the intakes that both a couple of our witnesses will talk about, and some of the types of crops.

And we also put in there a depiction of the water intakes because all of them are being constructed within our Agency boundaries.

MR. O'BRIEN: Very good.

That concludes Miss Terry's direct testimony we'll now move to Mr. Mello.

Mr. Mello, can you please state your full name for the record and spell your last name.

WITNESS MELLO: Steve Mello, M-E-L-L-O.

MR. O'BRIEN: Mr. Mello, you've taken the oath in this proceeding?

WITNESS MELLO: I have.

MR. O'BRIEN: Is Exhibit NDWA-9 a true and correct copy of your written testimony prepared for this proceeding?

WITNESS MELLO: Yes.

MR. O'BRIEN: You are the current Chairman of the Board of Directors of the North Delta Water Agency?

WITNESS MELLO: Yes.

MR. O'BRIEN: How long have you served on the Board of North Delta Water Agency?

WITNESS MELLO: Since 1990.

Excuse me. Since 2001. I got mixed up because I served -- I represented the North Delta Water Agency on the Delta Protection Commission starting in 1993.

MR. O'BRIEN: Okay. Mr. Mello, you're going to have to stay close to the mic there.

WITNESS MELLO: All right.

MR. O'BRIEN: They require that.

And your testimony states that you're a third-generation farmer in the North Delta; is that correct?

WITNESS MELLO: That is correct.

MR. O'BRIEN: Can you briefly tell us about your experience farming in the North Delta.

WITNESS MELLO: Well, when I grew up, I grew up on the ranch. I was always at my dad's side.

I started working in my Eighth Grade summer, and summers and holidays through high school.

Went away to college. Came back and started working full-time on the ranch in 1976. I took over full-time management. I was -- became the boss in '84.

MR. O'BRIEN: What crops do you grow?

WITNESS MELLO: They have varied over the year (sic).

But we have pears this year, corn, grain sorghum, sometimes called milo. We do some seed barley and also safflower. In -- In years past, we've grown some wheat but not this year.

MR. O'BRIEN: To do your farming operations, you divert water out of Delta channels; is that correct?

WITNESS MELLO: Yes, we do.

MR. O'BRIEN: So you're familiar with

irrigation practices in the North Delta.

WITNESS MELLO: I am very familiar, yes.

MR. O'BRIEN: You mentioned the Delta Protection Commission. You said that you served on the Delta Protection Commission.

WITNESS MELLO: I did for eight years.

MR. O'BRIEN: And can you just tell us briefly what the Commission is.

WITNESS MELLO: The Delta Protection Commission was created by an act of the legislature with the purpose of creating a Land Use Plan for the 740,000 statutory Delta. There was an approximately 540,000-acre Primary Zone for which we had land use authority.

There was -- The rest of the acreage, approximately 200,000, was held out in the Secondary Zone and would be administered by the municipalities, the cities, that were on the periphery of the Delta, with the exception of Isleton, which is in the middle of the Delta.

We, again, did -- created background reports that allowed us to do the findings to come up with a rationale for this Regional Land Use Plan that actually superseded the county's General Plans for those areas, and the counties had to amend their General Plans to conform with the Regional Plan of the Delta Protection

Commission.

MR. O'BRIEN: Miss Terry in her testimony referred to a film, Exhibit NDWA-40, which we're going to see here in a second.

Were you involved in the preparation of that film?

WITNESS MELLO: I was.

MR. O'BRIEN: What was your general role on that preparation?

WITNESS MELLO: My general role was to meet with the people and show them what we needed to shoot or direct them -- because I was very busy at the time -- to other people that would direct them to places to shoot.

MR. O'BRIEN: You were busy at the time with harvest; is that correct?

WITNESS MELLO: I was -- I'm always busy with something --

MR. O'BRIEN: Okay.

WITNESS MELLO: -- and at that particular time, I think it was harvest. It could have been something else.

MR. O'BRIEN: And does the film NDWA-40 accurately depict the jurisdictional area of the North Delta?

WITNESS MELLO: Yes, it does.

MR. O'BRIEN: Okay. Why don't we go ahead and run the film, and I'm going to ask Mr. Mello to narrate.

MR. BAKER: And just to be correct, it's 40 errata.

MR. O'BRIEN: 40 errata. Thank you.

(Video "Flyover" played.)

WITNESS MELLO: We're on the Sacramento River looking downstream. The I Street Bridge is right in front of us and the I Street Bridge is the northern boundary of the North Delta Water Agency.

To the right over the right bank is the City of West Sacramento, which is within our boundaries.

To the left over the Delta King is Downtown Sacramento as we approach the Tower Bridge.

The Sacramento River delivers water to the myriad of channels that run water into the Delta out to the Bay, partly down to the pumping plants, and provides us windivers (phonetic), the water we need.

This is the Freeport diversion of Sacramento County and East Bay MUD. This facility has capacity of approximately 290 cubic feet per second. These are the landside facilities.

The -- This compares to the capacity of each of the three diversions of 3,000 cfs apiece. So this diversion is magnified by over 10 for each of the three

new proposed diversions.

There are many crops that are grown in the Delta. Corn, alfalfa, wine grapes, tomatoes are some of them. There are many others.

Wine grapes are a key economic driver in the Delta and have become more prevalent over the last 30 years.

RD 999 has several diversions. The headquarter siphon depicted here diverts water from Elk Slough into the main canal and ends on to almost 26,000 gross acres. This main drainage canal doubles as the drain for the District as well as the water supply aspect.

MR. O'BRIEN: So this is all RD 999 there?

WITNESS MELLO: This is RD 999, yes, it is.

This is some property associated with Bogle Vineyards. And Bogle Vineyards, as do other growers in the area, grows a great many varieties of wine.

Bogle Winery is one of the 10 largest wineries in the United States and, again, is a key economic driver to the economy in the Delta.

The Sugar Mill has several wineries in it, smaller wineries, and wine tasting.

Several communities are in the Delta. This is the Town of Hood, which is downstream from Freeport.

We're looking here at Greene & Hemly's packing

shed. The historic Hemly House was built in 1875 and the packing shed has been in continuous operation since 1890.

Greene & Hemly packs Bartlett pears and many other specialty variety of pears, including apples.

We have several communities in the Delta. Courtland is depicted here.

The Paintersville Bridge is located downstream from the Town of Courtland between Sutter Slough and Steamboat Slough.

Here we're looking at Sutter Slough on the right and we're looking upstream on Elk Slough. The RD 999 siphon is upstream past that bridge. At the upper end of Elk Slough, there is a gated pipe into the Sacramento River. It does not free flow.

This is Steamboat Slough at the confluence of the Sacramento River. It runs downstream and to the west into the Cache Slough complex and provides water for diverters and environmental purposes out to the ocean.

Recreational boating is a key aspect to Delta economy.

The water quality monitoring station at Steamboat Slough and Sutter Slough is the furthest upstream monitoring station in the North Delta of the seven monitoring points.

MR. O'BRIEN: If we could pause it there.

I want to make it clear: These monitoring stations we're going to look at are the monitoring stations specified in the 1981 contract; correct.

WITNESS MELLO: That is correct.

MR. O'BRIEN: Okay.

WITNESS MELLO: We're looking at Miner Slough that comes off of Sutter Slough and over to the Cache Slough complex. This slough runs water to the Barker Slough Pumping Plant and the RD 2068 intakes.

The 2068 intakes pump water uphill, if you will, to irrigate the Delta uplands, which are located on the western side of our jurisdiction. The Delta wetland -- The Delta uplands or much different than the Delta lowlands. Main thing, is water's got to be pumped uphill quite a ways.

Back over to the east side of the Agency, the Cosumnes River and Mokelumne River come together. The complex is right to the east of Highway 5, about three-quarters of a mile.

Again, recreational boating. You have a kayaker here. Just happenstance he was there when we were filming.

To the right is the Cosumnes River Preserve; to the left was the river.

The Town of Locke is one of the oldest

Chinese-American communities on the West Coast and was established in 1915.

Locke is right upstream from the Delta Cross Channel. Walnut Grove is right to the right. So there's about a quarter mile in between the towns. The Delta Cross Channel is a facility operated by the Bureau of Reclamation that carries water easterly from the Sacramento River to Snodgrass Slough, then into the north and south fork of the Mokelumne for local diversions as well as eventual transfer to the State and Federal pumping facilities.

The Town of Walnut Grove has been around -- You know, I'm not really sure but 1860s, something like that.

The water quality monitoring point on the Sacramento River at Walnut Grove is just upstream of the confluence of the Sacramento River and Georgiana Slough.

Georgiana Slough also runs water south, downstream, into the Central Delta where it meets the Mokelumne River, and a great deal of that flow goes to the pumps.

This is the furthest-upstream siphon on RD 563 upon which I farm.

MR. O'BRIEN: If we could stop it there. We're going to talk about siphons, and you talk about it in your testimony. This might be a good spot to just

explain how a siphon works.

WITNESS MELLO: A siphon works by pulling a vacuum on the -- on the pipe. You have a -- a valve on the land side. You have an open pipe into the river.

You put a suction device on it to pull all of the air out of the pipe. When you open the valve on the land side, the water runs out into the irrigation system. And my experience shows that you need about a 3-foot differential in head.

Now, the head is the differential between the water surface elevation in the channel and the land surface where the water's being released from the siphon. They require no power, no diesel, no -- no electricity, nothing.

And if you notice, there are no power lines at the base of the levee.

(Video "Flyover" resumed playing.)

WITNESS MELLO: RD 563 has three different pumping stations -- this is one of them -- and that dewaters seepage, rainfall and tail water from irrigation.

We mentioned earlier there are seven water quality monitoring stations as part of the contract. This is the Mokelumne River at Terminous.

We have San Joaquin River at San Andreas

Landing. We have the water monitoring location at the Sacramento River at Rio Vista. This is on the west side of the river.

And the furthest-downstream monitoring location's at Three Mile Slough, which is upstream from Emmaton.

The Delta's a beautiful place. I grew up there. I'm very familiar with it.

The -- This depicts one of the pumping locations. As I mentioned earlier, there are three. They each have a capacity of 3,000 cfs. Each of them displace farmland, in some case diversions, in some cases orchards. Some of those orchards are up to a hundred years old.

The Hemly house is depicted to the right bottom screen, and this is within a few hundred yards of the lowest -- the most downstream diversion -- proposed diversion.

The pipeline route is depicted by the red lines and carries water from upstream to the Clifton Court Forebay and then the State and Federal pumps.

We all recognize the beauty of the Delta, and we thought -- the Board thought that we could give you a sense of Delta's place by providing you this video.

Thank you very much.

CO-HEARING OFFICER DODUC: Thank you. That was awesome.

MR. O'BRIEN: Thank you.

I'd like to -- I'd like to now pull up your written testimony, which is NDWA-9, and go to Paragraph 10 on Page 5.

(Document displayed on screen.)

CO-HEARING OFFICER DODUC: Mr. Jackson, feel free to refer to this video as often as you like.

MR. JACKSON: (Nodding head.)

MR. O'BRIEN: Mr. Mello, starting on Paragraph 10, which we have on the screen now, and through Paragraph 15, you describe agricultural water use within the Delta.

Let's start with Paragraph 10, and I'm just going to ask you to briefly summarize that part of your written testimony.

WITNESS MELLO: Historically, the predominant crops in the Delta were pears, coarse and cereal grains, sugar beets, asparagus, tomatoes, and alfalfa. However, in the past two or three decades -- I say three decades in the written testimony -- in particular, wine grapes, cherries and other fruit trees have been planted.

Typically, the irrigation system -- season is April through September, but it often extends into

October and November. It's not unusual to be irrigating in November.

Siphons and electric pumps are the primary method of diverting. And basically you will have pumps coming down and then, when the water surface elevation in the channel is above the land, that's when you divert the siphons, and that is the area that is really critical for water surface elevations.

MR. O'BRIEN: I'd like to now pull up Paragraph 16.

WITNESS MELLO: Do you want to -- Excuse me. Perhaps I've left out 13, 14, 15. Do I need to back up?

MR. O'BRIEN: Why don't you briefly summarize those and then we'll go to the topic of salt.

WITNESS MELLO: Yes. Okay. Thank you.

The siphon systems within the North Delta Water Agency were designed with historic water surface elevations in line -- in mind, and they have operated very efficiently over the years. It's a cheap method of diversion.

There are few electric pumps on my island, Tyler Island. I think there are five pumps out of 56 diversions. So the primary method of diversion is siphons.

The siphon system, if rendered inoperable by

lessened water surface elevations, are very expensive to replace. And in the event that a siphon needed to be replaced by a pump, the cost of the pump would be $25,000 just to get the utility company to put the transformers on the poles and string the wire to the pump facility, 25,000 for the pump facility itself, and another 8,000 to install it, and that is if power lines are present at the base of the levee.

In the event that power lines are not present at the base of the levee, the utility company charge to run power lines are approximately $50,000 per quarter mile.

There are many cases on our island -- there's a -- it's a mile and a half on one branch, could be about two and three-quarters on another.

These are not my ranches, but they're my neighbors'. They're my assessment payers. I need them to be profitable.

In many cases, the power company doesn't have enough voltage in the line and there may be necessity to upgrade the system of the power company, and that would be on the landowner's back, too. And, of course, this does not count permit costs. And I've not had to deal with doing this before, but I understand the permit costs are exorbitant.

Sorry for missing that.

MR. O'BRIEN: No. That's helpful, thank you.

(Document displayed on screen.)

MR. O'BRIEN: I'd like to now move to the issue of salt and salt loading which I think starts at Page -- Paragraph 16 of your testimony, which we have on the screen.

Can you just briefly summarize that portion of your testimony.

WITNESS MELLO: We're very, very concerned in the Delta with -- with salt -- salt. Salt from the Bay is carried by tidal action up into Delta channels, and there needs to be enough fresh water flow to keep it at bay, if you will.

You know, basically, annual crops, once they're mature, can handle a little bit more salt in the irrigation water so you get the crop to come to fruition, physiological maturity. But you would then salt-load --

(Cell phone "barking.")

WITNESS MELLO: -- the soil for the next year's crop, and seedling crops have a very hard time getting established in --

(Laughter)

CO-HEARING OFFICER MARCUS: Sorry. I forgot to turn it off.

WITNESS MELLO: Sorry?

CO-HEARING OFFICER MARCUS: Sorry. Sorry.

WITNESS MELLO: I'm deaf. I never heard it.

Seedling crops are much harder to get established when salt -- soil has been loaded with salts.

Permanent crops are particularly sensitive. Wine grapes, cherries, many of the myriad tree crops in the Delta, can handle very, very low levels of salt in irrigation water. Over time, it could actually kill the tree.

And I say you only need to kill my tree once. I'm not going to be able to plant it again, because if the soil was salt-laden enough to kill the tree, it will probably render that land unable to grow permanent crops again, wine grapes, trees, whatever.

You know, I have lenders that are particularly concerned about long-term viability and long-term value of our ground. So . . .

MR. O'BRIEN: In Paragraph 18, you talk about a specific situation where salt affected crop yields.

Can you briefly summarize that for me.

WITNESS MELLO: Yes.

Prior to the '76-77 drought, I know farmers -- Well, I know a lot of farmers in the Delta.

The farmers on Sherman Island were able to grow

State yield contest-winning corn crops. In the '76-77 drought, they had a beautiful crop. They knew the salt water in the river was pretty nasty, and the content of the water was high -- high -- high in salt. But they knew the immature crop could handle it and they wanted to get that crop filled out so they irrigated, thinking they could flood it and flush that crop -- that salt out of the soil later.

At that time, they were growing near six-ton corn. After that, they were only able to attain yields of about 80 percent of that.

And since the water monitoring point in the contract has been changed with -- by agreement between North Delta Water Agency and Department of Water Resources, the water quality on Sherman is now nasty all the time.

The State has bought most of the ground, leased it to different farmers. Same farmers farming it can only now attain yields of about 50 percent, three to three and a half ton of the six-ton he grew before. And there have been improvements in the cultivars. And had he kept up with the way things had been going, those yields would have been six and a half ton now, so . . .

MR. O'BRIEN: I'd like to now refer you to Paragraph 19 of your written testimony, NDWA-9.

(Document displayed on screen.)

MR. O'BRIEN: You talk there about some specific situations where lower water surface elevations have caused problems for farmers in the North Delta. I think this is Paragraphs 19 through 21.

Can you briefly summarize that testimony for us.

WITNESS MELLO: Yes.

In 2015, for the first time ever, Mello Farms had to hire a diver three times to clear intakes. Never happened before. Been farming there since '55.

The low water in the -- in the channels, coupled with the ex -- you know, unusually warm water because of low dam releases, created enough aquatic vegetation to plug our diversions.

Well, in addition to that, the lower water surface elevations rendered my pump on Georgiana Slough and my pump on Lost Slough, and my siphons on Georgiana Slough and Mokelumne River less efficient in delivering water to irrigate my crops.

On the alfalfa at the Locke Ranch that diverts from a pump on Georgiana Slough, the irrigation time to irrigate I believe it's 123.1 acres typically is five days. We would normally run 42 4-inch siphon pipe. We can only run 28 4-inch siphon pipe. And it increased

that irrigation time to eight days, nearly eight days, and you're running water day and night.

Because of that, you can't get over the alfalfa as quick. You lose yield, you lose quality, and because of the quality, you lose price. So not only are you getting less of it to sell, you're getting less per unit that you're selling.

Up at the pear orchard on Lost Slough, we typically would irrigate there in five days, four and three-quarters, five, right in there. It took almost eight days there to irrigate the orchard because we flood-irrigated that orchard.

It negatively impacted my ability to get on with my spray -- spray program that deals with different pear diseases. Because of that, it exacerbated an already bad blight year -- fire blight is a bacterial disease -- and resulted in me getting a half a pear crop. Never happened before. I was insured. It helped. I got 60 percent of the money back that I lost -- excuse me -- that I lost.

But it cost my company $58,000, 1800 bucks an acre, to cut the diseased wood out of the orchard, and that impacted yields going forward.

Typically, we're a 22-ton orchard, 20, right in there, sometimes better, sometimes a little worse. We

got 10-ton in '15, and in '16, there's an indicator that it's going to affect our long-term yields. We only got 13. And we --

MR. O'BRIEN: I'm --

WITNESS MELLO: -- have new diseases problems.

MR. O'BRIEN: I'm going to stop you there, Mr. -- Mr. Mello.

CO-HEARING OFFICER DODUC: Mr. O'Brien, we need to do a time check, because I think he's -- I believe you've spent about 40 minutes on your direct and you still have some witnesses to go through.

MR. O'BRIEN: We're probably about halfway -- maybe a little more than halfway done.

CO-HEARING OFFICER DODUC: Okay. Let's give you another 30 minutes, and perhaps we could go to some of the analysis that you wish to present.

MR. O'BRIEN: Yes.

(Document displayed on screen.)

MR. O'BRIEN: So, finally, Mr. Mello, I want you to just briefly summarize Paragraphs 22 through the end of your testimony, which talks about the concerns regarding water quality and water-level impacts relating to the WaterFix.

WITNESS MELLO: Yes, I will.

I'm sorry I'm too wordy.

CO-HEARING OFFICER DODUC: You get bonus time for the video, so that's fine.

WITNESS MELLO: Thank you. Thank you.

It's my feeling that the Petitioners have failed to establish that the California WaterFix Project will not cause injury to legal users of water within the Delta.

I believe it's going to impact water quality negatively, and I believe it's going to negatively impact -- it's going to lower water surface elevations.

Once ground is salt-loaded, growing crops is really an issue, having my property remain profitable. And you've got to keep in mind that not only profitable for me but profitable enough that I can pay the assessments to the Reclamation District that keeps the levees up.

You know, in -- near Rio Vista, the permanent crops down there are cherries, chestnuts, figs and pomegranates, and they're particularly sensitive to salt. Once you use water degraded by salt compounds, even over a short period of time, it's going to degrade the long-term productivity of the ground.

I absolutely believe that strop and stage can be devastating to we diverters. The cost to replace the siphons with pumps is extraordinary.

And in -- in short, I believe that farmers within the North Delta Water Agency must be made whole for all economic losses suffered as a result of the operation of the proposed Projects, including but not limited to increased pumping cost, increased infrastructure cost, increased operation maintenance cost and diminution of the value of their land.

Thank you very much.

MR. O'BRIEN: Next we'll go to Mr. Slater. Mr. Slater's testimony is fairly brief, and then the last witness will be Mr. Kienlen.

Mr. Slater, can you please state your full name and spell your last name.

WITNESS SLATER: Tom Slater, S-L-A-T-E-R.

MR. O'BRIEN: You've taken the oath in this proceeding?

WITNESS SLATER: I have.

MR. O'BRIEN: And is Exhibit NDWA-10 a true and correct copy of your written testimony?

WITNESS SLATER: It is.

MR. O'BRIEN: You're currently the President of the Board of Trustees of Reclamation District 999; is that correct?

WITNESS SLATER: That's correct.

MR. O'BRIEN: Can you just briefly describe

RD 999 in terms of its location and size and general operations.

WITNESS SLATER: RD 999 is approximately just short of 26,000 acres gross. It -- We farm predominantly the same crops Mr. Mello referred to, but we now are over a third of our acreage in wine grapes, so over 8,000 acres of grapes in Clarksburg of the Reclamation District 999.

We operate with -- mainly with three siphons that divert nearly all the water into the District from either the Sacramento River, Elk Slough or Sutter Slough. There are a few privately-held pumps along Elk Slough that are maintained by private landowners but not very much water is diverted from them. So, for the most part, we divert it all.

And we operate as a Drainage District as well as an Irrigation District, which is unique in the Delta in the North Delta Water Agency. I think there are two others.

So we have the benefit of using the same channels that we drain the District with in the winter as channels that we supply the parcels with in the summer, in the spring and summer, or whenever we need the water.

And it's a very efficient system. So, as water comes in in early spring, whatever is not used naturally

flows down to the southern portion of the District, and those pumps down there are relatively small compared to the big drainage pumps at the headquarters. They have a float and they pump water out, so we're pretty -- pretty darned efficient at water use.

We keep our costs down as well.

So, that's how the District operates, primarily with the three siphons.

MR. O'BRIEN: And you're also a third-generation farmer; is that correct.

WITNESS SLATER: I am.

MR. O'BRIEN: Now, I'd like to pull up NDWA-13, which is a map.

(Document displayed on screen.)

MR. O'BRIEN: First of all, if you could just point out the location of RD 999 on this map in relation to the three proposed Cal WaterFix intakes.

WITNESS SLATER: Yeah. If you can see Intake No. 2, which is the northernmost proposed intake, just above that -- it's actually just a few hundred yards -- it is a blue stream and that is Elk Slough, with a 6-foot gate into the river that we can operate in the winter to close for the flood protection. But that is the close -- that intake is just a few hundred yards from Elk Slough.

If you travel further up from Elk Slough

approximately one more mile where that river takes a sharp bend, that line is Winchester Lake and that is our northernmost siphon there. So Intake 2 is just a mile and a quarter from that siphon.

And if you come down Elk Slough, it basically parallels the river. And about where that -- the -- the -- the right edge of the Elk Slough sign there is -- is our headquarters, and that's where the main siphon -- It's a 60-inch siphon, which is 5 feet, of course, in diameter, a big siphon. As the crow flies, that isn't more than half a mile from Intake 3.

But, again, the -- the intakes to -- The diversions to look at are Elk Slough at the north and then continuing down Elk Slough, it connects with Sutter Slough, and that short little blue stream going over to the river just above the word "slough" in "Sutter Slough" is Sutter Slough.

So the three intakes are within the northern intake at Elk Slough and the southern intake at Sutter Slough. All that water is what comes over to our siphons.

And you continue down Sutter Slough just another mile, you'll come into our third siphon, called the Sutter Slough Siphon, that gives water to the southern end of the District.

MR. O'BRIEN: Referring back to your written testimony now, NDWA-10, in Paragraph 7 through 13 --

(Document displayed on screen.)

MR. O'BRIEN: -- you describe some concerns you have about impacts of the California WaterFix Project in two main areas: Number one, surface water elevations; number two, water quality.

Can you please summarize that testimony. Let's start with the concerns about surface water elevations.

WITNESS SLATER: Yeah. If you -- If you recall, I just stated those three intakes are very close to our diversion sites, or where we get water from; in other words, Elk Slough and Sutter Slough.

And as Dr. Nader-Tehrani testified in his testimony, most of the lower elevations will be -- will occur in and around those three intakes, which means in and around RD 999.

Yesterday's testimony talked about the Freeport diversion, and that's true as well, I presume.

So, with that in mind, if water does diminish, we've got siphons now that we've had experience -- or I have for the last 40 years, oftentimes will -- will not stop running.

Our siphons are on a float, so they -- as demand is increased, the siphon stays on. As demand

decreases, the siphon shuts off automatically. So it's -- So it's very efficient.

But there are times when demand exceeds supply in a summer month. With 110-degree temperature, and a lot of pumps running, these siphons can't service enough water.

So, that being said, we can only imagine a six-more-inch drop in elevation. You can't alter the siphon. Like Mr. Mello stated, the head has just been diminished by X percent, whatever you're at. And very few gallons -- Or a lot fewer gallons will come through the siphon, rendering most of the pumps in the District privately operating inoperable maybe. It's hard to conclude without actually seeing it. Some of the stuff is science and not reality, and -- and it's tough to compute.

But the bottom line is, surface elevations are going to drop because of the tunnels and of the -- the projected diversions, and we -- we claim that will harm us.

MR. O'BRIEN: Let's go now quickly to the water quality piece.

WITNESS SLATER: Water quality will be the same.

We -- We, as farmers, whenever we hear of an EC

increase in the Delta, flags go up, and they should go up. They were taught -- We were taught to observe things like that and try to manage it.

So when the Project is going to increase EC levels, it's certain -- Based on modeling, correct or incorrect, there -- there were plenty of numbers indicating EC rises. That concerns us just like Mr. Mello touched on. It's very difficult to only irrigate when EC levels are correct.

The contract addressed these issues in '91 beautifully. It was the best thing that was ever done to the Delta.

Those levels, we think, are being challenged, and -- and that's why we're concerned with the Project.

MR. O'BRIEN: Thank you, Mr. Slater.

We'll now move to Mr. Kienlen.

Hearing Officer Doduc, I believe Mr. Kienlen's testimony is going to take about 30 minutes. I know you typically like to take a morning break, so I just thought I'd put that out there.

CO-HEARING OFFICER DODUC: Actually, you anticipated me. I was about to do just that.

Would a -- Candace, would a 10-minute break be okay?

THE REPORTER: (Nodding head.) Um-hmm.

CO-HEARING OFFICER DODUC: Then we will resume at 11 o'clock.

MR. O'BRIEN: Thank you.

(Recess taken at 11:50 a.m.)

(Proceedings resumed at 11:00 a.m.)

CO-HEARING OFFICER DODUC: (Banging gavel.)

All right. It's 11 o'clock. Let's do a quick time check.

Mr. O'Brien, you'll need another half an hour.

I assume the Department will have cross-examination lasting more than half an hour?

MR. BERLINER: That's correct.

CO-HEARING OFFICER DODUC: Okay. In that case, then, let me make sure that Group 10 -- at least Mr. Cosio -- and the EBMUD panel know that we will not get to them until after lunch.

Mr. O'Brien, please continue.

MR. O'BRIEN: Thank you.

Mr. Kienlen, can you please state your full name for the record, and spell your last name.

WITNESS KIENLEN: Gary Kienlen, K-I-E-N-L-E-N.

MR. O'BRIEN: You've taken the oath in this proceeding?

WITNESS KIENLEN: Yes, I have.

MR. O'BRIEN: Is Exhibit NDWA-3 a true and

correct copy of your written testimony prepared for this proceeding?

WITNESS KIENLEN: Yes, it is.

MR. O'BRIEN: And is NDWA-4 a true and correct copy of your professional qualifications?

WITNESS KIENLEN: Yes.

MR. O'BRIEN: You are a principal in the firm of MBK Engineers; is that correct?

WITNESS KIENLEN: I am.

MR. O'BRIEN: Can you tell us a little bit about the history of your work with the North Delta Water Agency.

WITNESS KIENLEN: Yes.

When I first began my career with MBK in 1988, one of my duties was to track water quality and monitor the quality against the criteria in the contract.

Since about 1999, I have served as the Engineer for the Agency.

MR. O'BRIEN: If we could pull up on the screen, Mr. Baker, NDWA-11.

(Document displayed on screen.)

MR. O'BRIEN: Mr. Kienlen, was this exhibit prepared at your direction?

WITNESS KIENLEN: Yes, it was.

MR. O'BRIEN: And what does it show?

WITNESS KIENLEN: This is a map that is based on a map we obtained from the website of the Office of Delta Watermaster which identifies Points of Diversion in the Delta.

Shown on this map -- What -- What we have added to the information we obtained from the Watermaster's website is the boundaries of the legal Delta which is shown in green, the boundary of the North Delta Water Agency shown in yellow.

The blue dots that you see on this map represent Points of Diversion identified in statements of water diversion and use generally pertaining to riparian pre-1914 diversions.

The red dots depicted here are Points of Diversion that are identified under water right permits and licenses issued by the State Water Resources Control Board.

MR. O'BRIEN: Referring to your written testimony in NDWA-3.

(Document displayed on screen.)

MR. O'BRIEN: In Paragraphs 5 through 16, you describe the water rights within the North Delta Water Agency.

Can you please summarize that testimony for us.

WITNESS KIENLEN: Yes.

As -- As I identified in my testimony, the North Delta Water Agency itself does not hold any water rights, nor does it divert or deliver water within its boundaries.

The primary function of the Agency was to enter into the contract that was summarized by Miss Terry earlier this morning and to enforce -- administer and enforce the provisions of that contract.

The water rights within the Agency are held by individuals and other entity -- individual landowners and other entities, including some of the Reclamation Districts.

I've reviewed and I'm familiar with the 1956 Cooperative Studies and some subsequent reports that were prepared by the Department of Water Resources, the Bureau of Reclamation, and water users to evaluate and classify water rights within the Delta.

Also, I have reviewed the Water -- the files of the State Water Resources Control Board concerning water rights within the Agency, particularly with respect to a 2010 Engineer's Report and Report of Assessments -- Assessment Commissioners.

The water right -- The '56 Cooperative Studies and some of those earlier reports I referred to looked at the Delta within two regions, and I think Mr. Slater or

Mr. Mello mentioned the Delta lowlands and the Delta uplands.

Just a brief description of what those are:

The Delta lowlands were -- were used in the -- these early studies to look at areas defined in these studies as the areas generally encompassed by a 5 feet mean sea-level elevation. The lands within that boundary are considered Delta lowlands. They're generally, not -- not completely, but generally served by the Siphon Diversions that we've heard about this morning.

The Delta upland areas are the area between the Delta lowland boundary and the boundary of the legal Delta. These -- These areas are, of course, higher elevation -- they're above 5 feet -- and they generally require pumped diversions to get the water into their systems.

The 1956 Cooperative Studies and -- and some of those subsequent reports classified as -- as -- all of the lands within the Delta lowlands as being preparing to Delta channels. Those studies -- Some of those studies also identified approximately 12,000 acres within the Delta uplands in North Delta water rights riparian status.

In general, the -- the water rights within the North Delta Water Agency include these riparian rights,

pre-1914 rights, post-1914 water rights, including licenses and -- and permits issued by the State Water Board, and as well as the -- the rights under the contract.

Many of these water rights --

MR. O'BRIEN: Mr. Kienlen, I'm going to -- I'm going to -- In the interest of time, I think I'm going to stop you there.

Your written testimony goes into a fair amount of detail in terms of the water rights, and I think we've submitted a number of documents that essentially document the water rights; is that correct?

WITNESS KIENLEN: Yes.

MR. O'BRIEN: Great.

I'd like to move to a new topic now, which is how the water quality provisions of the 1981 contract work.

Let's, if we could, Mr. Baker, pull up DWR-306, which is the contract. We're going to go to the end of that document.

CO-HEARING OFFICER DODUC: And as Mr. Baker's pulling that up, Miss McCue has put up the monitors in there for those in the audience who wish to get a closer look.

(Document displayed on screen.)

MR. O'BRIEN: We could go -- I think there's some attachments, Mr. Baker, to the very end of the -- There's graphs.

(Document displayed on screen.)

MR. O'BRIEN: There they are.

Mr. Kienlen, can you briefly walk us through how the water quality requirements in the contract --

WITNESS KIENLEN: Yes.

MR. O'BRIEN: -- work.

WITNESS KIENLEN: This is Exhibit A to the 1981 contract, and it depicts the water quality criteria under that contract.

The criteria is based on what is referred to as the Four Rivers Index, or also commonly referred to as the Sacramento River Index, which is the sum of the forecasted natural flow or unimpaired flow for the Sacramento River at -- above Bend Bridge, the Feather River at Oroville, the Yuba River near Smartville, and the American River below Folsom.

The water quality is measured in terms of electrical conductivity, or EC. It's spelled out in -- in these exhibits in Millimhos or MilliSiemens per centimeter as far as the units used.

The lines on the graphs, and what -- what we see here on these charts, on all of them, are the --

the -- the Index, the Four Rivers Index across the X-Axis. And what you'll notice is that, as the -- as the forecasted inflow, natural flow, is increased, the increases, the water quality called for under the contract is better, the EC is lower.

You'll see numerous lines in these charts, and those identify the water quality for different time -- different periods during the year.

So the water quality criteria is based on the hydrology for that particular year, the forecasted hydrology, and the -- the time of year, so it's variable.

MR. O'BRIEN: Let's pull up, if we could, North -- NDWA-20.

(Document displayed on screen.)

MR. O'BRIEN: Can you explain -- Can you explain -- Oh, I'm sorry.

CO-HEARING OFFICER DODUC: Let me also make another offer to Mr. Jackson. We do have the three monitors up here if that would be helpful to you, or anyone else, for that matter.

MR. JACKSON: Thank you.

MR. O'BRIEN: Can you explain that figure, Mr. Kienlen.

WITNESS KIENLEN: Yes.

This is kind of how we follow the water quality

under the contract during the year. We typically prepare charts similar to these for the Agency and show those at their regular Board meetings.

We follow the -- This particular chart is for Calendar Year 2014, and it shows the water quality in the criteria in Sacramento River at Three Mile Slough.

We typically prepare charts similar to these for all of the stations.

Again, it's Calendar Year 2014 shown across the horizontal axis. We have the EC or conductivity on the vertical axis.

The blue line here is the 14-day mean or rolling average electrical conductivity in the Sacramento River at Three Mile Slough.

And that's an important point that I missed in describing the criteria. It's not -- It's -- It's a 14-day average, 14-day mean EC.

On the green line here is the -- is the 14-day mean EC for the Sacramento River at Emmaton.

The red line depicts the contract criteria for Calendar Year 2014 based on the Bulletin 120 Four Rivers Index.

You can see in the middle -- kind of in the middle and overlaying the -- the red line is a dashed black line, which shows -- which indicates the -- the

D-1641 objective for 2014. That -- That D-1641 standard at Emmaton extends from April 1 through August 15th of each year.

A couple of observations here:

You can see in October the contract criteria was exceeded. The blue line crosses the red line.

And I will point out that although the D-1641 standard is -- is typically at Emmaton, and this chart would indicate that perhaps it was exceeded, I would note that the -- pursuant to a Temporary Urgency Change Petition, TUCP, the contract -- or the D-1641 standard was relaxed and moved to Three Mile Slough in 2014 and, therefore, there was no exceedance of that objective.

MR. O'BRIEN: You mentioned D-1641 and the 1981 contract water quality criteria.

Just so the record's clear on this, are there situations in which the 1981 contract water quality criteria are more stringent than any requirement under D-1641?

WITNESS KIENLEN: A couple of things:

As I pointed out, the D-1641 standard, salinity standard, for the Sacramento River at Emmaton is only in place during the months of April through August 15th, whereas the contract criteria is year-round, 365 days.

If we could perhaps bring up NDWA-27, I can

show -- I can provide another example.

(Document displayed on screen.)

WITNESS KIENLEN: The -- One of the differences -- the differences in D-1641 and the contract, as I mentioned, the contract criteria is based on this Four Rivers Index, the forecasted inflow based on this Four River Index.

The D-1641 standard is based on water -- the Sacramento River -- the Sacramento Valley Year Type Index, which is a dimensionless index number that's defined in D-1641 that classifies water -- Water Years as critical through wet. And we won't get into that.

The -- If we look here in 2015, you can see a difference between that black dashed line, which depicts the salinity criteria at Emmaton under D-1641, and the contract criteria for that year based on the Sacramento River Index, which was -- which was about -- If I remember correctly, the Index -- the Four Rivers Index was about 9 million acre-feet based on the May 1 Bulletin 120 forecast.

MR. O'BRIEN: Next I'd like to pull up NDWA-44.

(Document displayed on screen.)

MR. O'BRIEN: What does this figure show us, Mr. Kienlen?

WITNESS KIENLEN: This, again, is looking at

2015. This shows the period from about June 25th through about August 3rd, I believe.

This is the Sacramento River at Rio Vista.

Again, the blue line here is the 14-day mean or running average, and the red line is the contract criteria for Emmaton during this period.

The green line shown here is the mean daily EC in the Sacramento River at Rio Vista. These are -- These are the values that are used to create the blue line.

And what we can see is that, on a -- on a daily basis, the conductivity was much higher than -- than the 14-day mean indicates.

This information is important to the farmers and water users in the Delta, such as was described by Mr. Mello and Mr. Slater. They have to time their irrigations not based on this 14-day average but what's really happening in the river when they actually need to irrigate.

MR. O'BRIEN: I'd like to shift gears now and pull up NDWA-32.

(Document displayed on screen.)

MR. BAKER: Just so you are aware, this is NDWA-32 errata.

MR. O'BRIEN: Thank you. Yes.

Mr. Kienlen, are you familiar with this

document?

WITNESS KIENLEN: Yes, I am.

MR. O'BRIEN: And can you give us a brief explanation of what it is and how it was prepared.

WITNESS KIENLEN: This is a Technical Memorandum that was prepared by myself and Shankar Parva -- Parvathinathan.

It -- It is an evaluation of the -- a review I guess would be a better term -- a review of the modeling conducted by the Petitioners for the California WaterFix Biological Assessment, BA.

The -- The -- We reviewed the results of that modeling in order to look at some of the -- some of the smaller time-steps of information that has been presented in some of the other testimony.

MR. O'BRIEN: Let's pull up Figure 1 on Page 3 of that exhibit.

(Document displayed on screen.)

MR. O'BRIEN: Thank you.

What does this figure show, Mr. Kienlen?

WITNESS KIENLEN: This is a comparison of the change in EC, or electrical conductivity, between the No-Action Alternative in the CalSim -- or the DSM-2 modeling prepared for the BA with the Alternative 4(a), or what I understand is the preferred alternative, and

has also been referred here -- here, I believe, as H3+.

One thing I want to point out are the units that are shown in conductivity. This is a different unit than we saw on the plots I showed earlier. This is in microsiemens per centimeter. It's a factor of a thousand.

So if we look at 3,000 here on this chart, it would be equivalent to 3.0 on the previous charts. So it's the same thing; it's just factoring issues.

MR. O'BRIEN: Now --

WITNESS KIENLEN: What we see on this chart is similar to what was presented by the Petitioners and I think referred to by Mr. O'Brien earlier.

There was a -- There was an indication a change in salinity in July and August of roughly 18 to 19 percent. That was presented in the Petitioners' testimony.

Again, we are looking here at Alternative 4(a), which I don't believe they presented.

So what we see here is 16 -- 16 to 17 percent as opposed to what they presented as 18, 19 percent. I think it's -- it shows that we're looking at pretty much the same data.

The -- One of the things that was shown on the charts but wasn't -- wasn't addressed in the testimony

that I have seen is changes outside of that April through August period. And, particularly, I'm looking here at the month of September where we see an increase of approximately 23 percent when we look at these monthly averages.

Now, these are all monthly averages. This is all of -- all of the months for the 16-year study period, 1976 -- Water Years 1976 through '91. This is the -- an average of all of the -- all of the months during that period.

MR. O'BRIEN: And this is all data that was extracted from the Petitioners' DSM-2 modeling; is that correct?

WITNESS KIENLEN: Yes. We conducted no modeling of our own. This -- All of -- This entire Tech Memo is based on the modeling conducted for the BA.

MR. O'BRIEN: Let's now move to Table 1 on Page 4, the next page.

(Document displayed on screen.)

MR. O'BRIEN: Can you briefly explain what that table depicts.

WITNESS KIENLEN: Yes.

As I -- As I indicated, you know, Figure 1 shows us this -- the monthly average for the entire period. What it doesn't tell us is what's the range of

those changes that make up that average.

We looked at the -- the average monthly change. So these, again, are averages, but these are the averages for -- the average change in EC from the No-Action Alternative to Alternative 4(a) for each month during that study period.

What you see in each of these boxes is the change and conductivity in microsiemens and also, in parenthesis, the percent change from the No-Action to Alt. 4(a).

The shaded boxes here depict those months where the EC increased by more than 4 -- more than 5 percent under Alternative 4(a) as compared to the No-Action Alternative.

One thing I'd like to point out is, if we look at -- You know, some of these percentages are quite -- quite higher than the 23 or the 17 -- 16, 17 percent.

Particularly, if we -- if we look at September of 1989, you will -- you'll see an increase in EC of over 1700 microsiemens, which is an increase over the No-Action Alternative of 78 percent.

MR. O'BRIEN: And, again, just so the record is clear on this:

Table 1 was extracted from the Petitioners' DSM-2 modeling?

WITNESS KIENLEN: Yes, it's based on the data from that model.

MR. O'BRIEN: And this data was not provided by the Petitioners in this proceeding; is that correct.

WITNESS KIENLEN: Not that I have seen.

MR. O'BRIEN: Let's now move to Figure 2 on Page 5.

(Document displayed on screen.)

MR. O'BRIEN: Can you tell us what -- what these graphs show.

WITNESS KIENLEN: Yeah. These are kind of -- These are kind of complex to understand, so I'm going to try to -- try to break it down as best I can here.

What we did is, we -- we plotted the EC from -- from the DSM-2 modeling under the No-Action Alternative, which is shown here on the horizontal axis, against the modeled electrical conductivity under Alternative 4(a).

What you see here in -- across the middle of this is a diagonal line. That diagonal line would represent times when the modeled EC is the same under both the No-Action and -- and the Alternative 4(a).

Plots pointed above that line -- Points plotted above that line represent an increase in EC under Alternative 4(a) as compared to the No-Action Alternative.

And if we focus on -- on the right-hand plot here, which -- which is for the April through September period, which is -- Mr. Mello identified as the primary or the key irrigation season of concern within North Delta for the crops there, we see in almost all conditions -- in most months -- I shouldn't say "almost all."

In most months during that period, we see an increase in EC under the Alternative 4(a). This is particularly true when we look at conductivities above a thousand microsiemens.

MR. O'BRIEN: So is this a situation where the use of averages that are based on a full year water quality may -- may not give us the most complete picture of changes in water quality that would be caused by the Proposed Project?

WITNESS KIENLEN: Correct. I think it's -- It's important to look at not only what those changes are but when they occur. This -- This kind of shows us when -- when a lot of those changes would happen.

MR. O'BRIEN: Let's now look at Figure 3 on Page 6 of NDWA-32.

(Document displayed on screen.)

MR. O'BRIEN: What does that figure show us?

WITNESS KIENLEN: This figure is the same as

Figure 1. However, this is showing the change in EC at Three Mile -- In the Sacramento River, it's at Three Mile Slough, which is -- is -- we've identified as the most downstream point -- compliance point or monitoring location under the North Delta Water Agency contract.

Looking at the months of July, August, September, which are, again, during that irrigation season, again, we see increases. They're not as high as Emmaton. I wouldn't expect them to be because there's a salinity gradient between those points. But it does show the average -- the monthly average -- On a monthly average basis, there are increases in all three of those months.

MR. O'BRIEN: Next, Table 2 on Page 7 of this exhibit.

(Document displayed on screen.)

WITNESS KIENLEN: Again, Table 2 is the same as Table 1. It's showing the change in EC for -- for each month during that 16-year period.

Again, the shaded boxes show increases in EC of over 5 percent. And, again, we -- if we look at September of 1989, we see quite a -- quite a large increase that's part of that 20 -- I believe 20 percent monthly average we saw there. The increase there is over 60 -- approximately 62 percent above the No-Action

Alternative, an increase of over a thousand microsiemens per centimeter.

MR. O'BRIEN: To your knowledge, did the Petitioners model impacts on the water quality in relation to the 1981 contract, or was it only done in relation to D-1641?

WITNESS KIENLEN: To my knowledge, and from what I've seen, I -- all I have seen is D-16 -- comparisons with D-1641. I do not -- I'm not aware that they modeled or at least presented anything in regard to the contract.

MR. O'BRIEN: Let's move now to Figure 4 on Page 8 of this exhibit.

(Document displayed on screen.)

MR. O'BRIEN: If you could just quickly walk us through this -- these figures.

WITNESS KIENLEN: Again, I -- I -- I explained the scatter plots earlier. We don't need to go into too much detail, I don't believe.

Again, at Three Mile Slough, we see the same condition where, during most periods -- during most months during the peak irrigation season, we see an increase in EC at the -- at Three Mile Slough between the No-Action Alternative and Alternative 4(a). And, again, this is particularly true at the higher conductivities

under the No-Action Alternative.

MR. O'BRIEN: I'd like to now move to the topic of changes in surface water elevations that would be caused by the California WaterFix Project.

Let's first pull up NDWA-13, which is a map.

(Document displayed on screen.)

MR. O'BRIEN: I think Mr. Slater used this map in his testimony, but I just want to help orient the Board and the audience as to the testimony we're going to have here for Mr. Kienlen.

Mr. Kienlen, first of all, without considering numbers, what would you expect in general to be the result of the construction and operation of these three proposed diversion facilities in relation to water levels?

WITNESS KIENLEN: Well, I -- I -- I believe you would see the greatest impact -- impact closer to the intakes.

I think the Petitioners made some reference to that as well, and I would agree that the closer you are to the intakes where the -- where the water's coming out of the river, you would see the largest impact to water levels.

MR. O'BRIEN: I'd like to pull up, again, NDWA-32, Figure 7, on Page 11.

MS. McCUE: Just to clarify, that's 32 errata.

MR. O'BRIEN: Thank you.

(Document displayed on screen.)

MR. O'BRIEN: Sorry. Figure 7 on Page 11.

(Document displayed on screen.)

MR. O'BRIEN: In the Technical Memorandum, Mr. Kienlen, just above these figures, you discussed the issue of water levels and you include these figures.

Let me first ask the foundational question:

Is the data that is presented here and that you're going to discuss also extracted from the Petitioners' DSM-2 modeling?

WITNESS KIENLEN: Yes. This is from the BA modeling.

MR. O'BRIEN: Can you please summarize this aspect of your testimony.

WITNESS KIENLEN: Yes.

As Mr. Slater and Mr. Mello have identified, if -- if water levels decrease, there's going to be challenges with some of the diversions in the Delta, particularly siphons and some of the pumps.

The Petitioners presented some information identifying that the -- the water levels below the pumps at -- the minimum daily water levels below the pumps or below the intakes could -- fell below a minimum level for

73 days during the study period and reached a conclusion that this is less than five days on average per year.

We were curious as far as when those -- when those conditions actually occurred, so we looked at things that -- We looked at the actual change between the No-Action Alternative and the Alternative 4(a) or H3+ for each day during the study period.

This -- And we did that in order, again, to get -- figure out when it was happening, how much it was happening during those times.

Again, this is a scatter plot very similar conceptually to what we -- what we've seen here earlier.

Here, we're plotting the minimum daily stage -- that's the lowest -- the lowest water level during each day -- under -- under the No-Action Alternative against the minimum daily stage under the Alternative 4(a) alternative.

Again, the diagonal line depicts those times when the stage would be equal under both modeled conditions.

Focusing, again, on the time when -- when the water users, the farmers, the irrigators, need the water most, the April-through-September period, we look at that chart. We see a decrease in water levels under most conditions.

There's -- There's a number of them, you know, at or above the line, but there's a significant number of times when the minimum daily water level is lower under Alternative 4(a) than it is under the No-Action Alternative.

If you look at these, you can -- the -- the -- the change is anywhere from zero to almost a foot in some -- in some -- under some -- on some days. Pardon me.

MR. O'BRIEN: The data that's presented in these plots is for the location Steamboat Slough at Sutter Slough; is that correct?

WITNESS KIENLEN: Yes. Thank you for that clarification. I meant to identify this.

This -- We -- We pulled up the data from the BA modeling for the station we found to be the closest to the intakes. This is -- This is in the Steamboat Slough at Sutter Slough, approximately 9 miles downstream of that most-downstream intake in -- and off the main stem of the river.

MR. O'BRIEN: So are the -- As you moved upstream, closer to the intakes from this location, what would you expect in terms of water levels?

WITNESS KIENLEN: I -- I would expect larger changes. I would expect the water levels to perhaps be

lower than this, but, again, this is -- We don't have -- We don't have data that shows that. It -- Just intuitively you would think, in following with -- with the Petitioners' comments, the closer you are to the intakes, I would expect to see larger impacts.

MR. O'BRIEN: That concludes Mr. Kienlen's testimony.

Hearing Officer Doduc, I would like to just put on the record Mr. Parvathinathan's qualifications and testimony. He's not going to be providing direct testimony, but he will be available to help with cross.

CO-HEARING OFFICER DODUC: Thank you, Mr. O'Brien.

MR. O'BRIEN: Dr. Parvathinathan, first of all, would you please state your full name and last name and spell your last name for the record.

WITNESS PARVATHINATHAN: My full name is GomathiShankar Parvathinathan, and the last name is spelled P-A-R-V-A-T-H-I-N-A-T-H-A-N.

MR. O'BRIEN: Dr. Parvathinathan, you've taken the oath in this proceeding; is that correct?

WITNESS PARVATHINATHAN: That's correct.

MR. O'BRIEN: And is NDWA-5 a true and correct copy of your written testimony?

WITNESS PARVATHINATHAN: That's correct.

MR. O'BRIEN: Is NDWA-6 a true and correct copy of your qualifications?

WITNESS PARVATHINATHAN: That's correct.

MR. O'BRIEN: You hold a Ph.D. degree in environmental engineering from Texas A&M; is that correct?

WITNESS PARVATHINATHAN: That's correct.

MR. O'BRIEN: And you also have experience working with the DSM-2 model; is that correct?

WITNESS PARVATHINATHAN: That's correct.

MR. O'BRIEN: That's all we have. Thank you.

CO-HEARING OFFICER DODUC: Thank you, Mr. O'Brien.

Let's go ahead and have the Department of Water Resources get set up for your cross-examination.

Just for planning purposes, who else intends to cross-examine this panel?

I see Ms. Morris as a maybe, Ms. Des Jardins and Mr. Herrick.

All right. And as Mr. Berliner is coming up, I would ask him first to give us a time estimate for his cross-examination.

Actually, as they're getting ready, how about I ask Mr. Herrick and Miss Des Jardins and Ms. Morris for your time estimates as well.

MR. HERRICK: John Herrick, South Dealt Water Agency.

Mine wouldn't be more than 15 minutes.

CO-HEARING OFFICER DODUC: Okay.

Ms. Morris.

MS. MORRIS: I think no more than 10 minutes.

CO-HEARING OFFICER DODUC: Ms. Des Jardins.

MS. DES JARDINS: 45 minutes.

CO-HEARING OFFICER DODUC: We'll see about that when we get to you and -- and have you outline your topic areas.

And Mr. Berliner.

MR. BERLINER: Good morning.

It was nice to start with a video. That was very nice.

My name's Tom Berliner --

CO-HEARING OFFICER DODUC: Actually, Mr. Berliner, for now, just a time estimate so I can tell the other groups what time we might get to them.

MR. BERLINER: I would like to try to get through Ms. Terry before lunch.

CO-HEARING OFFICER DODUC: Um-hmm.

MR. BERLINER: I might make it, but I'm happy to -- If you indicate when you want to stop, I'll try to find a logical stop. So at this point, I'm just going to

aim for noon.

CO-HEARING OFFICER DODUC: Okay. I -- I -- I -- If you can get through Miss Terry, that would be --

MR. BERLINER: That's my goal.

CO-HEARING OFFICER DODUC: -- fine. Okay.

MR. BERLINER: And if I see that I'm really close at noon and we're almost done, then I'll indicate to you how much more I think I might need.

CO-HEARING OFFICER DODUC: Miss Morris, before you leave, I'm curious:

Do you have cross-examination for Miss Terry?

MS. MORRIS: Yes.

CO-HEARING OFFICER DODUC: Okay. Never mind. I was -- I was trying to see --

MS. MORRIS: If I do, it would be primarily Mr. --

CO-HEARING OFFICER DODUC: All right. I was going to see if we could dismiss Miss Terry during lunch but I'm --

MS. MORRIS: The answer is no.

CO-HEARING OFFICER DODUC: -- afraid the answer's no. Okay.

And then Mr. Berliner?

MR. BERLINER: And I believe, for Mr. Kienlen, it may take 45 minutes.

CO-HEARING OFFICER DODUC: And would that be it?

MR. BERLINER: I'm anticipating that's it. I think there's a very low, low likelihood that I would have questions for any of the other witnesses.

But if Mr. Kienlen needs support in his answers, then we may need -- I'm going to totally butcher --

WITNESS PARVATHINATHAN: Parvathinathan.

MR. BERLINER: -- the gentleman's name.

I apologize.

So other than that, I'm not anticipating questions for the -- for the Board Members (sic).

CO-HEARING OFFICER DODUC: Okay. So a rough, rough estimate is that we will get to Mr. Cosio from Group 10 and the EBMUD-only panel around 2:30-ish based on the estimates that I've been given so far; okay?

And assuming that we take our lunch break between 12:00 and 1 o'clock.

MR. BERLINER: Yeah. I might -- It might be closer to 3:00 by my guess, but I think we're in that ballpark.

CO-HEARING OFFICER DODUC: Yeah. I -- I was going to say 2:30 to 3:00 but, to be safe, 2:30.

All right. With that, then, Mr. Berliner, you

may begin.

MR. BERLINER: Again, my time estimate for Miss Terry is about 20 minutes. I'm going to be asking about the 1981 agreement and the water quality standards.

CROSS-EXAMINATION BY

MR. BERLINER: Good morning, Miss Terry.

WITNESS TERRY: Good morning.

MR. BERLINER: A couple of preliminaries, if you wouldn't mind.

Can you confirm that you drafted the substance of the testimony that you gave which is marked as NDWA-7?

WITNESS TERRY: Yes. I drafted it with the assistance of two attorneys, Kevin O'Brien and Meredith Nikkel.

MR. BERLINER: And did they assist you with the substance of your testimony or just with the form of your testimony?

WITNESS TERRY: A little bit of both.

MR. BERLINER: A little bit of both.

In what respects did they assist with the substance?

WITNESS TERRY: Making sure the -- Just looking at the content that I had put in there in terms of what the provisions of the contract are.

MR. BERLINER: And -- And anything other than

that?

WITNESS TERRY: I don't think so.

MR. BERLINER: Okay. Thank you.

And you're not testifying today as an expert witness; correct?

WITNESS TERRY: Correct.

MR. BERLINER: And, as I understand it, you're here today to provide testimony that the California WaterFix, as currently proposed, may cause injury to legal users of water within the North Delta Water Agency despite the existence of the 1981 contract; is that correct?

WITNESS TERRY: Correct.

MR. BERLINER: Are you challenging the contract and contending that it does not protect the North Delta Water Agency water users?

WITNESS TERRY: No. Our reason for the -- filing the protest is that the contract itself does not cover some of the issues that are going to be caused by the Project.

So, for instance, we don't have salinity monitoring stations up in the far north where the intakes are going to be or over at Cache Slough.

And we also have no mechanism, or monitoring, or criteria, or minimum thresholds for water elevations.

Those sort of things would need to be developed and seemed appropriate for going into the terms and conditions of this Permit.

MR. BERLINER: In your -- So, do I understand that, in your view of the 1981 contract -- And I appreciate you're not an attorney, but you did spend some time walking through the agreement and sharing with us how you understand it.

So, is it your understanding that the contract does not protect the diverters within the Agency from adverse impacts due to water quality?

WITNESS TERRY: The contract does, actually, but it has seven monitoring locations, so, to the extent the impacts will be there, it -- it does.

Our concern is the location of the intakes and, after reviewing the modeling, that it would require some additional locations with the new criteria that we -- does not currently exist in the contract.

So, right now, I have the ability to enforce the criteria at seven locations, but if there's no criteria in other locations, it's difficult to enforce.

MR. BERLINER: And do you know specifically which other locations cause you concern?

WITNESS TERRY: Where the intakes are going to be, we lack some criteria up there, and over in Cache

Slough as well.

MR. BERLINER: And is your answer the same with respect to water levels, or do you have a different take on that?

WITNESS TERRY: The contract Article 6 addresses no alteration that's detrimental. But, as you can tell from that, there is no definition of what that means, so there's no minimum thresholds, there's no criteria, there's no direction for what response the Department would take to remedy that.

MR. BERLINER: And in your -- You commented earlier about water quality provisions under the -- under the contract, and Mr. Kienlen put some charts up regarding the difference between the provision for water quality in the contract and D-1641.

Is it your understanding that the contract requires the -- essentially the better of the two standards be met, whether it's 1641 or the standard in the contract?

WITNESS TERRY: Yes, that's my understanding.

MR. BERLINER: And if the Department of Water Resources doesn't meet either of those standards as applicable, is there a remedy in the contract?

WITNESS TERRY: Yes. That was the Article 2 that I discussed, which requires them to cease diversion

and to storage -- release stored water, stop exporting, or a combination of those.

MR. BERLINER: Okay.

WITNESS TERRY: And that's for water quality.

MR. BERLINER: And that water quality is based on a 14-day running average; correct.

WITNESS TERRY: Yes.

MR. BERLINER: And per an amendment to the contract, it's based on a standard at Three Mile Slough; is that correct?

WITNESS TERRY: Yes. The original contracts would have required the Department to build overland water supply for Sherman Island for the purpose of being able to move the monitoring location from Emmaton to Three Mile.

In lieu of that, the Department purchased the properties, as mentioned earlier, and then, consistent with Article 5, we did agree to move the compliance point from Emmaton to Three Mile Slough.

MR. BERLINER: And are there some provisions in the agreement regarding drought?

WITNESS TERRY: Yes. Article 4 of the contract addresses an emergency drought.

MR. BERLINER: And was the emergency -- Were the emergency drought provisions triggered during 2014,

'15 or '16?

WITNESS TERRY: Thank you for asking.

In fact, not for 2014, not -- I don't think we have -- I don't -- Not for 2016, but for 2015, for the first time ever, actually, the -- there's three conditions that all three have to be met, and that did occur in 2015.

MR. BERLINER: And when that occurs, what does the contract provide?

WITNESS TERRY: The Department actually has options at this point. The way I understand it is, they can:

One, try to meet the water quality if they can. That's a choice. If they had reservoir water, I suppose they could.

But their other option is, they can provide alternative water supply to the landowners that may be harmed, or they can establish a special claims process.

MR. BERLINER: And for 2015, what -- what occurred?

WITNESS TERRY: The Department of Water Resources did choose to establish a special claims process.

MR. BERLINER: And do you recall how much money was paid to the farmers within North Delta?

MR. O'BRIEN: I'm going to object on grounds that there's a process currently underway to deal with these claims that has not been concluded.

There have been offers made. There have not been offers finalized. It's essentially a settlement process at this point, and I don't think it's appropriate to get into the details of that in this hearing.

CO-HEARING OFFICER DODUC: Mr. Berliner.

MR. O'BRIEN: Well, let me try this a little differently.

Have payments been made to date to some of the farmers?

WITNESS TERRY: I cannot answer whether anyone has received a check. I don't know, because as Mr. O'Brien said, they're in the midst of that.

MR. BERLINER: But you have no personal knowledge as to whether anybody within North Delta has received payment.

WITNESS TERRY: No, I do not.

MR. BERLINER: And under the agreement, does the Agency have certain obligations with respect to the State?

WITNESS TERRY: Yes. We make an annual payment in two installments every year.

MR. O'BRIEN: And do you know how much you're

currently paying?

WITNESS TERRY: I would need to bring up -- Actually, no, wait, I did. I brought myself that number. Hold on a second.

I do. Here it is.

It is $468,685.

MR. BERLINER: Per year.

WITNESS TERRY: Per year.

MR. BERLINER: And that's --

WITNESS TERRY: Of course, that will raise again in 2017.

MR. BERLINER: And there's an escalator clause in the contract; correct?

WITNESS TERRY: Yes. It's allowed to raise up to a maximum of 25 percent over a five-year period.

MR. BERLINER: Do you know what that payment works out to on a acre-foot basis?

MR. O'BRIEN: Objection: Vague and ambiguous as to -- as to "acre-foot."

MR. BERLINER: I'll rephrase.

MR. O'BRIEN: Thank you.

MR. BERLINER: Do you know how many acre-feet were brought into the North Delta Water Agency in 2015?

MR. O'BRIEN: Objection --

WITNESS TERRY: No.

MR. O'BRIEN: -- vague and ambiguous as to "brought in." I don't know what that means.

MR. BERLINER: How many -- How many -- Do you know how many acre-feet of surface water were diverted by farmers within the North Delta Water Agency within -- in 2015?

WITNESS TERRY: No, I do not.

MR. BERLINER: Does the Agency meter any water use?

WITNESS TERRY: No, we do not.

MR. BERLINER: Does the Agency have any control over how much water farmers within the District use?

WITNESS TERRY: No, we do not.

MR. BERLINER: Is the District intending to be a groundwater sustainability agency under SGMA?

WITNESS TERRY: No, we are not.

MR. BERLINER: Does the Agency exercise any control regarding water use within the District?

WITNESS TERRY: No. There's not an acre-foot provision in our contract.

MR. BERLINER: That's a little different.

I'm asking regarding --

WITNESS TERRY: No.

MR. BERLINER: Your answer's no?

WITNESS TERRY: Yeah.

MR. BERLINER: Does the Agency have any sort of written agreement between itself and farmers to represent the farmers' interests before the State Water Board or other bodies?

WITNESS TERRY: No.

MR. BERLINER: And regarding the contract, does the -- do you recall: Does the Agency have an affirmative duty to offend (sic) as reasonable and beneficial the water quality criteria that are established in the contract?

WITNESS TERRY: I'm sorry. Could you repeat that?

MR. BERLINER: Yes.

Based on your familiarity with the agreement -- which I have to say is quite impressive -- is it your understanding that the Agency has an affirmative obligation to defend as reasonable the beneficial water qualities that are established in the contract?

WITNESS TERRY: Yes. I believe that's in Article 8.

MR. BERLINER: You do have a good recall of your contract.

And, again, in Article 8, does the Agency consent to the State's export of water from the Delta as long as the contract remains in full force and effect?

WITNESS TERRY: And is in compliance herewith.
MR. BERLINER: And if the --
WITNESS TERRY: If they're in com --
MR. BERLINER: -- State is in compliance.
WITNESS TERRY: If the State is in compliance, yes.
MR. BERLINER: Thank you.
And are you aware of what the water quality situation was in the area of the North Delta Water Agency prior to the construction of the State and Federal Water Projects?
WITNESS TERRY: No, I'm not.
MR. BERLINER: Do you have any knowledge that, prior to the construction of the contracts, water quality in the North Delta would vary seasonally?
WITNESS TERRY: I -- I -- That's not my area of expertise, so, no. I read a lot but . . .
MR. BERLINER: Okay. Well, that's fine. You don't have to have answers to all my questions.
WITNESS TERRY: (Laughing.)
MR. BERLINER: It's not a test.
WITNESS TERRY: You might want to ask Mr. Kienlen. He might, but I do not.
MR. BERLINER: I suspect he may know.
WITNESS TERRY: (Laughing.)

MR. BERLINER: Are the witnesses that are listed on the North Delta Water Agency's Notice of Intent for this proceeding appearing on behalf of the North Delta Water Agency?

WITNESS TERRY: I don't -- I don't know if I understand a distinction of "on behalf." What . . .

MR. BERLINER: Are they seeking to further the interests of the North Delta Water Agency by testifying here today?

WITNESS TERRY: I think they are representing their own interests within the North Delta Water Agency.

MR. BERLINER: Did you ask them to testify here today?

WITNESS TERRY: Did I personally?

MR. BERLINER: Yes.

WITNESS TERRY: I believe so. I think I was one of the people that asked, but yes. Identified them as individuals to testify.

MR. BERLINER: Have you been following this WaterFix proceeding?

WITNESS TERRY: I'd say about 50 percent, not all of it.

MR. BERLINER: That's a lot.

CO-HEARING OFFICER DODUC: What?

(Laughter)

WITNESS TERRY: Did I mention I wear the other Central Valley Flood Protection -- Flood Control Association hat?

MR. BERLINER: You see, there's a difference. The Hearing Officer thinks you should have watched all of it, and I'm amazed that you've watched half of it.

(Laughter.)

MR. BERLINER: Bear with me just a second. I'm almost done --

WITNESS TERRY: Sure.

MR. BERLINER: -- and I just want to check to make sure that I've . . . covered what I need to.

And for purposes of your testimony, are you adopting the information and opinions from Walter Bray in Exhibit Sacramento Valley Water Users Number 100?

WITNESS TERRY: Yes. I believe that was mentioned by Mr. O'Brien in his opening statement.

MR. BERLINER: I have no further questions for this witness.

CO-HEARING OFFICER DODUC: Okay. You sure?

MR. BERLINER: Yes.

CO-HEARING OFFICER DODUC: All right.

MR. BERLINER: Yeah.

CO-HEARING OFFICER DODUC: Thank you. With that, we'll take our lunch break and we will be back at

1 o'clock.

(Luncheon recess was taken at 11:55 a.m.)

Friday, October 28, 2016 1:00 p.m.

PROCEEDINGS

---000---

CO-HEARING OFFICER DODUC: (Banging gavel.)

All right. It is 1 o'clock. Welcome back everyone.

Mr. Berliner, please continue your cross-examination of Group 9.

MR. BERLINER: Thank you very much.

Mr. Kienlen, I would like to start with questions for you. Good afternoon.

Would you please confirm that you drafted the testimony marked as NDWA-3?

WITNESS KIENLEN: Yes, I did.

MR. BERLINER: And did you have assistance preparing that testimony?

WITNESS KIENLEN: Just in review and format, I guess. The content was drafted -- was prepared by myself.

MR. BERLINER: Okay. Thank you.

And you're here as an expert witness today; correct?

WITNESS KIENLEN: Yes, I am.

MR. BERLINER: And do you agree with the statement from -- that was made earlier that the North

Delta Water Agency does not hold any water rights and does not divert or deliver water?

WITNESS KIENLEN: Yes, I believe I made that statement.

MR. BERLINER: And do you know what the surface water use is -- volume of surface water use on an annual basis -- annual average basis is within the North Delta Water Agency.

WITNESS KIENLEN: No, I do not.

MR. BERLINER: Are you here today to provide testimony regarding alleged potential impacts to water users within the boundaries of the North Delta Water Agency that are based on, among other things, changes to water quality?

WITNESS KIENLEN: Yes.

MR. BERLINER: And also changes to water surface elevation?

WITNESS KIENLEN: Yes.

MR. BERLINER: And do you as part of your work have to address issues that come up under the 1981 agreement between North Delta Water Agency and the State?

WITNESS KIENLEN: Yes, I do.

MR. BERLINER: Are you familiar with that agreement?

WITNESS KIENLEN: Yes, I am.

MR. BERLINER: Is one of the contentions of the North Delta Water Agency that there need to be some additional monitoring points in addition to those that are specified in the agreement?

WITNESS KIENLEN: I think -- I believe Miss Terry made some reference to that. I'm not sure what the -- the Board of the North Delta Water Agency feels there.

MR. BERLINER: In your view as a professional dealing with water quality standards, is it your view that additional monitoring stations would be necessary?

WITNESS KIENLEN: Yes, I -- I believe if the Delta hydrodynamics are going to change, that there should likely be additional monitoring locations under the contract.

MR. BERLINER: Okay. And is the same true for water levels?

WITNESS KIENLEN: As -- As Miss Terry indicated, the contract does -- and I believe it's Article 6; maybe it's 8, 9. I forget the -- I'm not as well versed in the Article numbers as Miss Terry is.

There is a provision in the contract that does identify that the State Water Project -- that the State cannot move State Water Project water in a way that adversely affects water levels, flows and other items.

As Miss Terry indicated, there is no -- there's no definition of what exactly that means. There's no criteria or -- or standard, any way to measure that at this point.

MR. BERLINER: So your view, in order to address these water quality and water level concerns, the contract would be -- need to be amended; is that correct?

MR. O'BRIEN: Objection: It calls for a legal conclusion.

MR. BERLINER: Just based on the witness' understanding.

CO-HEARING OFFICER DODUC: Yes. He's free to answer he doesn't know if he doesn't know.

WITNESS KIENLEN: Really, that's a contract issue that I -- I don't know that I'm qualified to answer that.

MR. BERLINER: Okay. That's fine. Thank you.

Did the north -- Strike that.

Have you been following the Water Board's curtailment notices that have been issued during the course of the drought?

WITNESS KIENLEN: Yes, I have.

MR. BERLINER: Did the North Delta Water Agency water users receive curtailment notices?

WITNESS KIENLEN: I hesitate because I'm not

sure what they may have received, say, as far as notices in the mail or electronic notice -- notifications of curtailment.

MR. BERLINER: Would that be the kind of a water management issue that would -- normally would have come to your attention?

WITNESS KIENLEN: Not in relationship to North Delta Water Agency. We -- We -- My firm MBK does have clients in the Delta that hold the water rights and may have -- If they received notices, we may have been made aware of those.

MR. BERLINER: Do you have any knowledge as to whether water users within North Delta Water Agency were asked to reduce their water use by the State in 2014?

WITNESS KIENLEN: To my -- To my knowledge, water rights were curtailed, and that included some -- There were reductions and requests to curtail water rights in 2014. Some of those notices went to water right holders in the Delta.

To my knowledge, those -- If -- If notices such as those -- And I'm not aware that they were received. But if notices were received by water right holders in the North Delta, they could rely on the contract as opposed to their water rights.

MR. BERLINER: In other words, the contract

would have to make up the shortfall?

WITNESS KIENLEN: Yes.

MR. BERLINER: So they were in much better condition than a lot of other folks; correct?

WITNESS KIENLEN: In -- In my opinion, yes.

MR. BERLINER: Do you have -- Based on your experience, are you aware that, prior to the construction and operation of the State Water Project and the Central Valley Project, water quality in the North Delta would vary seasonally?

WITNESS KIENLEN: Yes, as it does today.

MR. BERLINER: And do you have knowledge that, in dry years, water in the Delta channels could become unusable late in the season or diminish crop yield?

MR. O'BRIEN: Objection as to geographic area. "Delta channels" is a pretty broad term. If we could have some greater specificity as to where in the Delta.

MR. BERLINER: Well, let's just start with gross within the legally defined Delta.

WITNESS KIENLEN: It is my understanding that, in certain portions of the Delta, that -- I believe that to be a correct statement.

MR. BERLINER: And did those conditions occur in the area that you've identified -- or that's been identified today as the area of the North Delta Water

Agency?

WITNESS KIENLEN: I believe portion -- that could have included portions of the area within North Delta, yes.

MR. BERLINER: So are there times that areas within the North Delta Water Agency receive better water quality than they would have otherwise received without the Projects?

WITNESS KIENLEN: Yes. And I think part -- that's part of what they're paying for under the contract.

MR. BERLINER: In your testimony, you stated that daily EC values exceeded the 1981 contract standard during several days at Rio Vista; correct?

WITNESS KIENLEN: Could we bring that exhibit up? Can we see that?

MR. BERLINER: Sure.

Why don't we start with North Delta Water Agency 44.

(Document displayed on screen.)

MR. BERLINER: Thank you.

Is that helpful, or would you like to see your written testimony, because we can pull that up as well.

WITNESS KIENLEN: This is helpful.

Could you -- Could you re -- repeat the

question?

MR. BERLINER: Yes.

Did you not indicate that daily EC values exceeded the 1981 contract standard value during several days at Rio Vista as reflected in this exhibit?

WITNESS KIENLEN: I believe what I stated earlier when presenting this exhibit was that the mean daily EC was higher than the contract standard. I -- I don't believe I used the word "exceeded."

MR. BERLINER: So what was the point in presenting this daily information given that the contract itself requires a 14-day average?

WITNESS KIENLEN: For me, it was -- it was -- it was two -- two things:

One is to demonstrate what the 14-day mean is, how you would calculate it, and what goes into that 14-day mean as opposed to, you know, it's a -- it's an average of those daily values.

The other point here that we -- that I was trying to address is that, during that period of time, farmers have to be careful, the water users within the North Delta have to be careful, of how and when they're irrigating, regardless of the compliance with the contract.

MR. BERLINER: And isn't that really an

internal water management requirement for -- for the farmers as to when they choose to divert?

WITNESS KIENLEN: Yes, it is.

MR. BERLINER: So they would be assured of a certain average water quality over time but, on any given day, they may choose to divert or not divert depending on the particular water quality at that time; is that right?

WITNESS KIENLEN: That -- That is correct. And I think if you look at even smaller time-steps, that you would see larger fluctuations and they have to -- they have to deal with water quality conditions even during a single day.

MR. BERLINER: And you've depicted that on this graph by the green line; correct?

WITNESS KIENLEN: The mean daily EC is depicted on the green -- by the green line on this chart.

MR. BERLINER: Do you know if the time period that's shown on this chart was coincident with when curtailments had been issued by the Water Board? This would be late July of 2015.

WITNESS KIENLEN: As I recall, Term 91 was imposed by the State Water Board in early 2015, and if I remember correctly, all post-1914 water rights were curtailed around the first of May in 2015.

MR. BERLINER: And during this particular time,

the -- because of the operation of the contract, the water users in the North Delta Water Agency were able to divert; correct?

WITNESS KIENLEN: Pursuant to the contract, yes.

MR. BERLINER: Yes.

Do you happen to know if, during the -- what were quite extraordinary drought years in 2013-2015, that DWR was able to meet the water quality provisions of six of the seven water quality stations that are identified in the contract?

WITNESS KIENLEN: Yes. The criteria was met at all stations. As this chart shows, it approached the criteria at Emmaton -- or at Rio Vista -- excuse me -- but did not exceed it.

MR. BERLINER: And did you testify earlier -- I want to make sure I understood that right -- that, for the Three -- Three Mile Slough station, it was met under the drought emergency provisions under the contract?

WITNESS KIENLEN: Are we speaking to 2015?

MR. BERLINER: Yes.

WITNESS KIENLEN: Could we bring that exhibit up, please, NDWA-27, I believe.

(Document displayed on screen.)

WITNESS KEINLEN: Mr. Berliner, could you

please repeat your question?

MR. BERLINER: Was the -- I'll rephrase it a little bit.

Was the remaining contractual provision for Three Mile Slough met under the drought emergency provisions of the contract during this time?

MR. O'BRIEN: I'm going to object: It's vague and ambiguous; it also calls for a legal conclusion.

CO-HEARING OFFICER DODUC: Mr. Berliner.

MR. BERLINER: Let me approach this from a different perspective.

The blue line, as I understand it, on this chart is a Three Mile Slough monitoring station; is that right?

WITNESS KEINLEN: The blue line is the 14-day mean EC in the Sacramento River at Three Mile Slough.

MR. BERLINER: At Three Mile.

WITNESS KEINLEN: Yes.

MR. BERLINER: Great.

Can you explain how the -- In relationship to the dotted line that you have there that is the D-1641 objective and the -- the red -- the red line is marked as the contract, how did meeting the Three Mile Slough objective -- how -- how is meeting the Three Mile Slough objective identified on this chart?

WITNESS KEINLEN: Let me make sure I understand the question. You referred to both contract criteria and D-1641.

Are you asking how the water quality at Three Mile Slough was met or not met --

MR. BERLINER: Correct.

WITNESS KEINLEN: -- under the contract?

MR. BERLINER: Yes, correct.

WITNESS KEINLEN: As the chart indicates, the contract criteria was exceeded in the months of -- during portions of the months of July, August, September, October, November and December. But I would -- Would I identify -- Well, I'll leave it at that.

MR. BERLINER: And -- And you recall that Miss Terry indicated that, because of those drought exceedances, certain compensation may be coming -- or is coming to water users in the District?

MR. O'BRIEN: Objection: That's a mischaracterization. I believe she said she didn't know whether checks were coming or not.

CO-HEARING OFFICER DODUC: It's ongoing.

MR. BERLINER: Well, let's -- let's clarify:

These are discussions regarding monetary payments; correct, Miss Terry?

WITNESS TERRY: Yes.

MR. BERLINER: And have you been participating in those discussions?

WITNESS TERRY: No, if you're asking about the payment.

MR. BERLINER: Yes.

WITNESS TERRY: No. That's a DWR process.

MR. BERLINER: Have you been attending meetings relating to that DWR process?

WITNESS TERRY: No. But we did invite DWR staff to come make presentations to the Board on the status of their process.

MR. BERLINER: Okay. Thank you.

And on this chart, do I read it correctly that there are times of year where the contract standard is -- provides a higher level of protection than D-1641?

WITNESS KEINLEN: Yes, that is correct.

MR. BERLINER: And do you recall in your written testimony, at Paragraph 24, that, in your opinion (reading):

". . . Once salt . . . intrudes into the Lower Sacramento in excess of the 1981 Contract water quality standard, it could (sic) require a significant volume of water to repel the salt (sic) water and recover acceptable water quality."

WITNESS KEINLEN: Could I see that paragraph,

please?

MR. BERLINER: Yes. If we could have Paragraph 24, please, Mr. Baker. It's NDWA-3.

(Document displayed on screen.)

WITNESS KEINLEN: Yes, that is what my testimony says.

MR. BERLINER: And you'll see on Line 18, you state, in your opinion, that (reading):

". . . Once salt (sic) intrudes into the Lower Sacramento," et cetera, "it can require a significant volume of water to repel the saline water and recover acceptable water quality."

On what basis are you making that statement?

WITNESS KEINLEN: Based on my experience with the contract and monitoring the quality under the contract, both at Emmaton when the standard was there, and now at Three Mile Slough.

When we do see exceedances -- and perhaps I could use a -- an example, hypothetical example --

MR. BERLINER: That would be --

WITNESS KEINLEN: -- of what I'm referring to, because I don't have numbers.

MR. BERLINER: That's fine.

WITNESS KEINLEN: But in -- in my experience, if water quality is being maintained within the contract

criteria at, say, a flow of 7,000 cfs at Freeport, as an example, and a change is made and that -- that flow at Freeport drops to some other -- some lower level, and for -- and, again, these are not -- these are not numbers -- real numbers that I -- I could -- I could produce some but I don't have these numbers.

But say they reduced the flow to 6,000 cfs at Freeport, and that results in the salinity exceeding the contract, if they then try to push that salinity back out, it's not a simple matter of going back to 7,000 cfs. In my experience, it would take a much greater flow, something over the initial flow of 7,000, to bring it back into compliance.

MR. BERLINER: Okay. And in your -- On Line 18 there, you refer to the Lower Sacramento.

What area are you referring to as comprising the Lower Sacramento?

WITNESS KEINLEN: Specifically in relation to the contract, I'm referring to Emmaton or Three Mile Slough.

MR. BERLINER: I don't want to put words in your mouth, but since the contract has been amended, would it be Emmaton or Three Mile Slough, or you view them both as comprising the Lower Sacramento?

WITNESS KEINLEN: Today, with the amendment, it

would be -- what I would be referring to is the water quality criteria at Three Mile Slough.

MR. BERLINER: Are you aware that there was an exceedance in 2014 of about 15 days at Three Mile Slough -- exceedance pursuant to the contract of about 15 days at Three Mile Slough?

WITNESS KEINLEN: I don't recall the exact number of days, but I think, as the chart we looked at earlier showed for Water Year -- or Calendar Year 2014, there was an exceedance for approximately that -- that length in the month of October.

MR. BERLINER: And do you recall how long it took to recover from that exceedance; in other words, to get back down below the standard?

WITNESS KEINLEN: If -- If the 15 days is the correct number, which I -- again, I believe is about -- you know, it was about two weeks, it was exceeded on -- on a certain date and 15 days or 16 days later it came back in -- back to within compliance.

I'm not -- I'm not sure I understood the question.

MR. BERLINER: Okay. I understand why you're answering in the way that you are.

In other words, the -- the -- the contract was being met, there was an exceedance for 15 days, and on

the -- let's just stipulate to 15 days -- and on the 16th day the criteria was being met.

WITNESS KEINLEN: Correct.

MR. BERLINER: So whatever the exceedance was, was resolved within 15 days in our example.

WITNESS KEINLEN: Yes.

MR. BERLINER: Okay. Did you review Mr. Bourez's Exhibit Sacramento Valley Water Users 100? It's Mr. Bourez's testimony.

WITNESS KEINLEN: Did I review Mr. Bourez's testimony?

MR. BERLINER: Yes.

WITNESS KEINLEN: I have read Mr. Bourez's testimony.

MR. BERLINER: Are you familiar with it?

WITNESS KEINLEN: Somewhat.

MR. BERLINER: Are you aware that Mr. Bourez did not indicate any exceedances of D-1641 during the time period we just discussed in 2014?

WITNESS KEINLEN: No, I'm not aware of what he did in regard to D-1641.

MR. BERLINER: And are you --

WITNESS KEINLEN: If I could follow up on that.

If we're talking about D-1641 as it pertains to salinity standard in the Sacramento River, there --

during the period of exceedance we're talking about here, which was October, there is no salinity standard under 1641.

MR. BERLINER: Salinity standard extended to August; correct?

WITNESS KEINLEN: Yes, but the exceedance of the contract was in October.

MR. BERLINER: And are you aware of any analysis that Mr. Bourez did regarding exceedance of the contract standard?

WITNESS KEINLEN: Not that I'm aware of.

MR. BERLINER: Are you familiar with DSM-2?

WITNESS KEINLEN: I'm familiar with the fact that there is a DSM-2 model and -- and basically what it does, but I am not a Modeler.

MR. BERLINER: Okay. Are you aware that DSM-2 includes the Cache Slough region?

WITNESS KEINLEN: I believe it does, but I would -- to -- for . . . But for clarity, I would -- I would refer that question to Mr. Parvathinathan.

MR. BERLINER: That's fine.

WITNESS PARVATHINATHAN: So may I hear the question again?

MR. BERLINER: Yeah.

WITNESS PARVATHINATHAN: The question is Cache

Slough in the DSM Model?

MR. BERLINER: Well, we'll start with some basics since we're having you testify for the first time.

WITNESS PARVATHINATHAN: Thank you.

MR. BERLINER: I understood, by the introduction that you gave to your qualifications in response to Mr. O'Brien, that you have experience with DSM-2; is that correct?

WITNESS PARVATHINATHAN: That's correct.

MR. BERLINER: And could you just in a sentence or two identify what your experience with DSM-2 is?

WITNESS PARVATHINATHAN: So, DSM-2 is a hydrodynamic model and it is used to develop the impacts of Project operations on Delta water quality and hydrodynamics.

So any of the planning models or planning projects would require that you evaluate the impact of the Project on Delta water quality.

For example, Shasta Lake Water Resource Investigation Project, Upper San Joaquin River Basin Storage Investigation Project, Los Vaqueros Expansion Project, North Bay Aqueduct Alternative Intake Project, and Santa Clara Restoration Projects, all these Projects required that you run DSM-2, and I was part of all this Project.

MR. BERLINER: And did you run DSM-2 for all of those Projects?

WITNESS PARVATHINATHAN: I ran DSM-2 for most of the Projects, except for Los Vaqueros Expansion and North Bay Aqueduct Intake Project.

But on these two Projects, I performed an analysis of the results provided by DWR for North Bay Aqueduct Intake Project and by CCWD for Los Vaqueros Expansion Project.

So I am -- I have run the models for the other Projects, but I have evaluated and presented the results for all -- almost all the Projects.

MR. BERLINER: Okay. Thank you.

I just wanted to make sure you were familiar with the model and have used the model in your work.

Thank you. Appreciate that.

WITNESS PARVATHINATHAN: If you don't mind, if I can make a quick clarification.

The DSM-2 model I experienced are of two kinds. One of them is the developers, which I would believe is the DWR, and the other are persons like me who are good at applying the model for practical planning purposes. I fall into the second category, although I am familiar with the physics of DSM-2 to an extent.

MR. BERLINER: But you have -- But you feel

comfortable, even though you're not a developer of the model, that your application of the model is giving you a level of understanding that you view yourself professionally qualified and experienced to operate the DSM-2 model.

WITNESS PARVATHINATHAN: "Comfortable" is -- I'm sorry to correct. It's a subjective term, so depending on the level of questions, I can really assume comfort there.

But I am comfortable, so definitely, yeah.

MR. BERLINER: Okay.

Have you, in -- in your work, had cause to review and analyze the DSM-2 EC results in the North Delta area?

WITNESS PARVATHINATHAN: To an extent. And for the North Bay Aqueduct Project, I had to look at some of the results, correct.

MR. BERLINER: And based on your work, did you see any increase in exceedance of water quality objectives under the North Delta Water Agency contract based on the 1976-to-1991 period covered in the DSM-2 model?

MR. O'BRIEN: I'm going to -- I'm going to object on grounds that the question is unclear in terms of what Project model runs we're talking about now.

Are we talking about Project model runs relating to Cal WaterFix or are we talking about some other Project?

MR. BERLINER: Sorry. Relating to Cal WaterFix. Thank you for clarifying.

WITNESS PARVATHINATHAN: Mr. Berliner, I'm sorry, if you'd allow me to repeat the question just so I make sure I understand it.

MR. BERLINER: Sure.

WITNESS PARVATHINATHAN: The question is, did I see any increase in violations of the NDWA contract at -- under this WaterFix modeling?

MR. BERLINER: Correct.

WITNESS PARVATHINATHAN: The Petitioners' model results document, and as I see in front of me -- I'm sorry. It's in front of me. I'm looking at DWR-66, which is the testimony from Dr. Nader-Tehrani.

It does not talk about NDWA contract violations.

MR. BERLINER: Did you perform any independent analysis?

WITNESS PARVATHINATHAN: Oh, sorry. Thank you.

I did perform an independent analysis, and I have provided a statement in my Technical Memorandum that states the number of violations of the NDWA contract

at -- in the Sacramento River at Three Mile Slough and also in the Sacramento River at Rio Vista.

MR. BERLINER: And are you familiar with where Mr. Mello and Mr. Slater irrigate?

WITNESS PARVATHINATHAN: I'm not sure 100 percent in my analysis because I'm just a number cruncher at times, and I'm sitting between Gary and the experts here who are more familiar with the Delta.

MR. BERLINER: Fair enough. Fair enough.

Do you know if any locations where the contract standard was exceeded are other than at Emmaton, Three Mile Slough or Rio Vista?

WITNESS PARVATHINATHAN: I'm -- I'm sorry. I'm trying to recollect. I have lots of numbers in my head and --

MR. BERLINER: Take -- Take all the time you need. And if you want to refer to a document, you're free to do so, sir. We can pull it up if that's of assistance.

WITNESS PARVATHINATHAN: I don't think so. I mean, I could be wrong, but I was focused on Three Mile Slough and Rio Vista for the reasons -- If I can -- If I can request for DWR-513 to be pulled -- to be shown on the screen, if that -- if that's okay.

MR. BERLINER: Of course.

WITNESS PARVATHINATHAN: Thank you.

MR. BERLINER: Mr. Baker, could we pull that exhibit?

WITNESS PARVATHINATHAN: 513, please.

MS. McCUE: Sorry.

WITNESS PARVATHINATHAN: DWR-513.

(Document displayed on screen.)

WITNESS PARVATHINATHAN: So please forgive me if I am speaking too long.

So the point is I -- when I started working on this analytical work, I started with DWR-513 and this particular graph.

And this particular graph shows a monthly average EC at Emmaton across the different alternatives, including the No-Action Alternative.

For -- To be -- To keep it brief, I would like to have the focus on the month of September. And there, the black line shows the No-Action Alternative. And the other bars starting from the tall one, the gray tall one, is the Boundary 1 value, and the following bars indicate the different alternatives.

So, I was just doing a data analytics work, so I tried to reproduce the same chart to be sure that I'm looking at the right numbers.

So, my first objective in my analysis to

reproduce this chart so that I will have a stronger foundation on my water -- on -- on the quality of the data, and then I can go disseminate that monthly average data to provide further clarification on the individual monthly changes in salinity.

So I started with Emmaton.

And if you could go back to NDWA-32 -- '4, sorry.

And here you just have to note here that the September values in -- in -- in the month -- September values at Emmaton is around 2,050 or something. And the third or fourth bar graph are around 2500 microsiemens per centimeter.

So, we were analyzing the results from the BA model Alternative 4(a). And the reason I had to keep this chart in reference is because, when I was doing the analysis, I did not have the DSM-2 outputs for all these different alternatives. So -- But I was having -- I was looking at Alternative 4(a), so I had to keep this chart in reference so that I am doing the right thing.

So, with this information, could we please go to NDWA-32, Figure 1, please.

MR. BERLINER: And before we leave this chart, for clarification, you understand why part of the chart is grayed out.

WITNESS PARVATHINATHAN: It is D-1641.

MR. BERLINER: So the part that's not grayed out is the D-1641 when applicable. So the rest of the values are shown but it's outside the coverage of D-1641.

And Mr. Nader-Tehrani had explained that in his testimony when he testified.

WITNESS PARVATHINATHAN: Thank you.

So I'm -- If we could please go to Figure 1 of NDWA-32.

MS. McCUE: We're pulling up 32 errata; is that correct?

WITNESS PARVATHINATHAN: (Nodding head.)

Yeah. The Figure 1, please.

(Document displayed on screen.)

WITNESS PARVATHINATHAN: And I looked -- Up here, you can see September, the value for the No-Action Alternative being near 2100 microsiemens per centimeter and the Project Alternative 4(a) is around 2600. And this chart is very much comparable to DWR-513.

So the reason I am showing this, this is how I started. So this is the first location I analyzed. And then the second table you could see, if we can scroll down a bit.

MS. McCUE: To Table 1?

WITNESS PARVATHINATHAN: It's table 1.

(Document displayed on screen.)

WITNESS PARVATHINATHAN: And the Table 1 breaks down the same chart into individual monthly changes under the Project Alternative.

And then I realized that this Emmaton is not under the amended NDWA -- in the North Delta contract. So then I proceeded to Three Mile Slough to do the same analysis based on the data I had.

And so I computed the violations of the NDWA contract also at Three Mile Slough and Rio Vista. And I have -- I have other locations where I have compared. Since I did not report it, I recollect that it -- there may not be any violations at that locations.

And -- And the computation of the violations of the NDWA contract is not an easy task. As you have seen in the NDWA -- in the North Delta contract summary, at the end, the standards are really complicated. It's not easy to just compute the days.

So I -- I'm not really confident about my statement about other locations at the moment. But as far as I know, to -- I don't think there were any violations at the other locations. I could be wrong.

MR. BERLINER: Thank you.

And could we scroll up just to the prior figure, please, Mr. Baker?

(Document displayed on screen.)

MR. BERLINER: I noticed that on these charts, while you indicated that there are increases of various percentages, what is the applicable water quality standard?

There -- You didn't indicate what these -- where the water quality standard applies.

WITNESS PARVATHINATHAN: So, as Mr. Kienlen discussed . . .

As Mr. Kienlen explained in his -- in his testimony, or in his presentation, that the standard -- NDWA contract standard is a function of the Four River Index.

So it isn't -- This chart is an average of the 16 years of the simulation. So I don't think it would be possible to plot the standard, which is variable and which refers to hydrology of the different years.

WITNESS KEINLEN: Perhaps I could clarify a little bit, Mr. Berliner.

MR. BERLINER: Sure. That's why we're here as a panel. We're trying to get -- We're trying to get the best information to the Board.

WITNESS KEINLEN: Okay. This chart shows the monthly average for the 16 years, so this is the average of all of the months.

The contract criteria is based on a 14-day mean, and it would be inappropriate, I believe, to plot a -- a 14-day mean criteria on a monthly average chart. It wouldn't tell us anything.

MR. BERLINER: So, if we wanted to compare -- If we went back -- Well, strike that.

If we wanted to compare the numbers that you've calculated as against the standard, which exhibit would you recommend that we look at?

WITNESS PARVATHINATHAN: Can I answer -- Can I answer the question, Mr. --

MR. BERLINER: Absolutely.

WITNESS PARVATHINATHAN: This is one of the challenging things I had.

So, to make a reference, again, could we please see 513 again, DWR-513?

(Document displayed on screen.)

WITNESS PARVATHINATHAN: And Figure C1, please.

Figure C1. Just C1.

Sorry, Page 5.

(Document displayed on screen.)

WITNESS PARVATHINATHAN: So the quick -- the quick answer -- so the answer may have two parts.

The first part, I would directly say that we computed the number of violations of the contract

standards at Three Mile Slough and at Rio Vista, and that is included in the Technical Memorandum as the number of days over the 16-year period of simulation.

And the reason I brought this up is to explain the second aspect, which is . . .

You can see here, this one shows D-1641 objective exceedance at Emmaton. And I understand Emmaton is not the point of compliance for NDWA anymore.

But here is a key point I would like to inform, which is, if you could look at the black solid line, which is the No-Action Alternative 14-day average salinity value, it crosses the dashed line for doing nearly 10 to 12 percent of the time.

But if you look at the gray line, which is, I think, for Boundary 1, 14-day average, it crosses the red dashed line for more than 22 percent of the time.

So this is the only reference I had. So I could see from this graph that I understood that at least there's 10 percent more likelihood of an operations under Boundary 1 producing more violations of the D-1641 standards.

So, with this in mind, I had to go back and compute if there are any violations of the D -- of the NDWA contract standards. And all I could do in the short time I had was just to add up the numbers based on my

daily -- based on the 14-day mean comparison of the salinity values at Three Mile Slough and at Rio Vista against the standards.

And I don't think we have produced anywhere else this violation summary. It takes -- The reason simply being, it takes a lot of time and it's a lot of calculations.

CO-HEARING OFFICER DODUC: Mr. Berliner, a time check.

How much more do you have?

MR. BERLINER: I would say about 10 minutes.

CO-HEARING OFFICER DODUC: Okay. And any --

MR. BERLINER: Unless I ask another one of these questions that elicit this very long response, which I actually had not counted on such a long response, but I didn't want to cut him off.

CO-HEARING OFFICER DODUC: No. Actually, that was helpful.

So give Mr. Berliner another 10 minutes, and we'll go on from there.

WITNESS PARVATHINATHAN: Sorry, Mr. Berliner.

CO-HEARING OFFICER DODUC: No.

MR. BERLINER: No, don't apologize. I should have anticipated that I might elicit a long response here and put a little more allowance in there.

Mr. Kienlen, referring to -- to your testimony.

You will recall that you opined that the -- that Dr. Nader-Tehrani had concluded that the 19 percent average increase in EC at Emmaton in July and August was not a significant impact.

Do you recall that?

WITNESS KEINLEN: Yes, I believe I -- I believe that is in my testimony and based on statements in his.

MR. BERLINER: And -- And would you agree that, in and of itself, showing an 18 or 19 percent increase is not necessarily an indicator of compliance or non-compliance with D-1641?

WITNESS KEINLEN: The 18 to 19 percent is -- is a 16-year monthly average.

One of the reasons we prepared the Technical Memorandum and looked at things the way we did is, I don't think you can draw any conclusion from a -- a long-term monthly average.

MR. BERLINER: Okay. And I don't know if you followed Mr. Nader-Tehrani's testimony, but -- Dr. Nader-Tehrani's testimony, but, to your knowledge, is it correct that the change in compliance was based on a modeling anomaly that was produced because of the time-step differential between CalSim and DSM-2?

WITNESS KEINLEN: Could you clarify "change in

compliance." With what?

MR. BERLINER: The -- Well, there's a -- a -- There's a model -- Are you aware that there's a modeling anomaly that's produced because of a time-step differential between CalSim and DSM-2?

WITNESS KEINLEN: Because I'm not a Modeler, I'm going to refer that question to Mr. Parvathinathan.

MR. BERLINER: That's perfectly fine.

WITNESS PARVATHINATHAN: Now I'm afraid to speak.

MR. BERLINER: No. I would -- I would encourage you. You've been quite helpful.

WITNESS PARVATHINATHAN: So -- Okay. I hope I --

MR. BERLINER: And your boss is watching so . . .

WITNESS PARVATHINATHAN: Could -- Could you please repeat the question so that I do not go on a rambling.

MR. BERLINER: Okay. I'm referring to a statement that had been made by Dr. Nader-Tehrani that concludes that the 19 percent average in EC at Emmaton in July and August was not significant.

Mr. Kienlen indicated he has a contrary opinion.

So my question was, isn't it true that the change in compliance is based upon a modeling anomaly produced because of the time-step differential between CalSim and DSM-2?

WITNESS PARVATHINATHAN: I'm afraid there are two facts that are being mixed here. Could we please -- Before that:

The first aspect here is, anomalies -- The point of both anomalies modeling behavior was presented by Dr. Nader-Tehrani to explain why there are violations of D-1641 standards under the No-Action Alternative.

So, looking at this chart, if you can recollect -- if I can recollect the numbers, Mr. Leahigh in his presentation explained that, based on the historical data review, the violations of the D-1641 standards are less than 5 percent or 2 percent, if I remember correctly.

But if you look at the chart in front of us, we see a violation of D-1641 standards under the No-Action Alternative, without the Project, to be nearly 12 percent. That means, out of 100 years, 12 years you would have a violation of the D-1641 standards.

And it is my understanding, based on a review of Dr. Nader-Tehrani, that he used -- he explained this way through the use of a term "modeling anomalies."

So if the modeling anomalies is true, why would we see a higher increased violations of the D-1641 standards under Boundary 1?

So, the 19 percent could be the cause of these increased violations.

So I wouldn't say that the modeling anomaly could be used to throw away the 18 percent change as being part of it.

MR. BERLINER: You were one of the authors of a Tech Memo that we saw earlier; correct?

WITNESS PARVATHINATHAN: That's correct, Mr. Berliner.

MR. BERLINER: Is it correct that the Tech Memo did not contain an analysis of compliance with D-1641?

WITNESS PARVATHINATHAN: Definitely correct.

MR. BERLINER: And did it also not contain an analysis of compliance with the 1981 contract based on DSM-2 results?

WITNESS PARVATHINATHAN: I'm sorry. I didn't get the second one.

MR. BERLINER: That it did not contain an analysis of compliance with the 1981 contract based on DSM-2 results.

WITNESS PARVATHINATHAN: It does. I'm sorry. I hope I said it correctly.

There are two statements in the Technical Memorandum that talks about the number of days of violation of the NDWA contract in the Sacramento River at Three Mile Slough and at Rio Vista.

Sorry?

MR. BERLINER: Okay. I just wanted to be sure you were finished.

WITNESS PARVATHINATHAN: Oh, sorry.

MR. BERLINER: Maybe I could return to Mr. Kienlen. The good news is, I'm nearly done.

A more general question for you.

In years such as 2014 and 2015, at times when flows in the Sacramento River at Freeport are below 5,000 cfs, is it your understanding that the North Delta Diversion is subject to a 5,000 cfs bypass flow criteria?

WITNESS KEINLEN: I -- I don't know the answer to that question. I'm not familiar with that bypass flow requirement.

MR. BERLINER: Okay. In that case, I'm pretty sure I don't have any other questions. Let me just double-check.

Could we just have another minute? Thank you.

I think that's it. Thank you.

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

Ms. Morris, you're up next and then Mr. Herrick.

I'm assuming that Miss Morris and Mr. Herrick stick with their initial estimate. We'll take a break before we get to miss Des Jardins.

MS. MORRIS: Good afternoon. Stefanie Morris for the State Water Contractors.

I have a couple questions for Miss Terry and then just a very brief couple questions for Dr. Shankar.

Did you say it was okay to call you Shankar?

WITNESS PARVATHINATHAN: Yes, that's okay. Shankar.

MS. MORRIS: And I apologize. I think I'm more nervous about pronouncing your name correctly than asking the questions.

CROSS-EXAMINATION BY

MS. MORRIS: So, Miss Terry, the questions I have are related to the contract. And both you and Mr. Kienlen testified that the areas of concern regarding WaterFix for the North Delta Water Agency were water quality and water levels; correct?

The reason you filed the Petition and your concerns about California WaterFix were having to do with water quality monitoring levels?

WITNESS TERRY: I did mention in my comments,

that, yes, those are two concerns -- two of the concerns, yes.

MS. MORRIS: And you also testified that the 1981 contract, which is labeled DWR-306, covers water quality and water levels; correct?

WITNESS TERRY: Well, that's not exactly what I said. In fact, I said that Article 6 mentions it, but it doesn't have definition of, you know, what a minimum threshold is for water elevations or flow impacts.

MS. MORRIS: Okay. So are you contending that the 1981 contract doesn't sufficiently protect North Delta Water Agency water users in regards to water levels and water quality?

WITNESS TERRY: That's not what I said, but we're here to talk about the Project --

MS. MORRIS: Well, that's --

WITNESS TERRY: -- and what I said was that the Projects from our review, is going to have the elevation changes. And this Petition is about establishing some terms and conditions that might relate.

And, as we said, some of those elevation changes are most significant around where those intakes are being located and they are, in fact, within North Delta Water Agency, and some of the diversions of our witnesses that have testified.

MS. MORRIS: That wasn't my question, so let me try this again.

I reread your testimony, because I wasn't in the room, on the rough transcript, and what I read was that you -- when Mr. Berliner asked you if the contract was protective of North Delta Water Agency users, that you did testify yes, but then you went on to say that the contract doesn't cover some of the issues that are going to be caused by the Project.

Do you recall that testimony?

WITNESS TERRY: I recall my testimony as pointing out that we don't have monitoring locations or criteria in the area for water quality. We only have seven locations currently, and now this new Project is coming along and we don't have any monitoring locations for elevations.

MS. MORRIS: Okay. Move to strike as nonresponsive.

Let me try this again: Is the contract as currently drafted, the 1981 contract as currently drafted, protective of the North Delta Water Agency water users?

WITNESS TERRY: To the extent --

CO-HEARING OFFICER DODUC: In the current scenario.

WITNESS KEINLEN: Yes, under the current scenario. But you can tell by the way some of the provisions are drafted that it is necessary when other Projects come along, circumstances change, that you may need to have additional agreements. It's not the sole operative thing of the agency.

The agency actually has statutes that require us to participate -- take legal and legislative actions. The contract is just one example of how the Agency does protect water users, but it does not mean that you may not want to have other agreements.

So, for instance, since 1981, we have had other agreements with DWR that relate to the contract. One of them, for instance, was just even agreed to, interpretation of the contract, so --

CO-HEARING OFFICER DODUC: So -- But, Miss Terry, the contract, then, does acknowledge that there might be changes in conditions that necessitate -- that require some flexibility and some further negotiations and agreements in order to protect your interests.

WITNESS TERRY: Yes, and there have been those agreements since 1981, when necessary.

CO-HEARING OFFICER DODUC: So while the contract does not and cannot predict every potential

scenario that could happen in the future, it does acknowledge that there are those potential for changes that would necessitate some further discussions and further agreements.

WITNESS TERRY: Yeah. It's general assurances. It's written as general assurances by the State in how they'll operate, but it may require additional definitions if not sufficiently defined.

In the case of the seven monitoring locations, we have very specific criteria. That's easy, but to the extent there may be other issues, for instance, related to Article 6 that may require additional agreements or . . .

MS. MORRIS: So, let me see if I can reach a common understanding here.

What I hear you saying is, if California WaterFix Project were to be approved, that you believe that the North -- existing North Delta Water Agency contract would not protect North Delta water users in terms of water quality and water levels; is that correct?

MR. O'BRIEN: Objection: It mischaracterizes the testimony.

MS. MORRIS: To be fair, I did say I'm trying to reach a common understanding.

I have asked very specific questions and I've

gotten very long answers. I really think it's a yes-or-no question.

MR. O'BRIEN: I'm going to object to that. The witness is under oath, and the witness should be allowed to answer the question as the witness deems appropriate, given -- given the duty to be truthful.

CO-HEARING OFFICER DODUC: Hold on, people.

Miss Morris, I'm confused about your confusion.

MS. MORRIS: Well, thank you, Chair, for trying to ask my question, but it wasn't exactly what I was trying to ask.

CO-HEARING OFFICER DODUC: So what is it that you're trying to ask?

MS. MORRIS: I've heard and read in the testimony that Miss Terry is saying that the 1981 contract is protective, but she lists a number of reasons -- which I understand, I don't need to hear them again -- that it may not be protective.

But she's not saying that she believes that that it's not protective for -- I'm sorry.

Let me say, she isn't saying that the contract is going to protect the North Delta Water Agency water users as to water levels and water quality when California WaterFix comes online, if it ever does. That's --

CO-HEARING OFFICER DODUC: I don't believe --

MS. MORRIS: -- the question.

CO-HEARING OFFICER DODUC: She's not saying that, is my understanding.

WITNESS TERRY: Yeah. And I -- I'm sorry if I'm really --

MS. MORRIS: So you're saying it is protective.

WITNESS TERRY: I'm saying it does have some protections, but there may be additional issues with a Project like this that has come along, and so those need to be addressed, and this was the proper venue to do so.

MS. MORRIS: Okay. So you're saying that the North Delta Water Agency is protective -- I'm sorry.

The North Delta Water Agency 1981 contract is protective to the water users for -- let's just say water levels now.

MR. O'BRIEN: Objection: Mischaracterizes the testimony.

MS. MORRIS: There's an objection --

WITNESS TERRY: I'd like to answer in a different way but you seem to not be happy.

Again, if you read Article 6, it's very clear that the intent is for the Department to provide some general assurances.

When a Project like this comes along and is

talking about those changes in the levels, Article 6 now needs to be further defined between, you know, the parties and . . .

MS. MORRIS: Let me try this.

CO-HEARING OFFICER DODUC: You've been trying.

MS. MORRIS: Yeah. I'm trying --

WITNESS TERRY: I'm trying --

MS. MORRIS: -- to get --

WITNESS TERRY: I'm trying to answer you, I really am. I'm --

MS. MORRIS: I'll move on if this --

CO-HEARING OFFICER DODUC: No, no. Hold on. I'm sorry.

So, perhaps it might help if you define what you mean by "protective."

MS. MORRIS: The con -- I -- I want to try this a different way and, if it does not work, I'll move. I will not waste your time.

The 1981 contract was entered into as a -- Would you characterize it as a settlement with the North Delta Water Agency and the Department of Water Resources related to is commonly known as the Peripheral Canal?

WITNESS TERRY: It had been negotiated well before I was there. I don't know specifically that is what was going on at the time.

Today's Project is different. There were, in fact, outlets of water that would have been in that Project that aren't in this one.

So to say that it's a settlement of this Project, if that's what you're trying to say, I'm not sure that that would be a true statement.

MS. MORRIS: That wasn't my question. My question was --

CO-HEARING OFFICER DODUC: Her answer, as I understand it, is that she does not know because it preceded her time.

MS. MORRIS: Mr. Mello, do you know?

WITNESS MELLO: Well, I'm not an engineer. What I understand -- And I was not involved with the original writing or settlement of this contract. I was a very young man at the time.

But this contract was a settlement between the people that led the North Delta Water Agency and the State of California at the time that mitigated the foreseeable impacts of a totally different Project that was the Peripheral Canal Project. That was 22,000 cfs. That included multiple outlets along its length into various Delta channels to help mitigate the impacts.

This particular Project, the WaterFix Project, is not the same Project.

MS. MORRIS: Okay. Thank you.
WITNESS TERRY: Maybe I can read one --
MS. MORRIS: I'm good.
WITNESS TERRY: -- of the --
CO-HEARING OFFICER DODUC: Hold on.
MS. MORRIS: I'm done --
CO-HEARING OFFICER DODUC: One at a time.
MS. MORRIS: -- and I'm ready to move on. Thank you very much.
Dr. Shankar, good afternoon.
WITNESS PARVATHINATHAN: Good afternoon.
MS. MORRIS: My question to you is, have you performed an analysis to evaluate increases in the North Delta Water Agency contract exceedances under Alternative H -- A -- 4H, H3+?
WITNESS PARVATHINATHAN: I'm glad. No, I did not do it.
MS. MORRIS: Okay. Thank you. I have no further questions.
CO-HEARING OFFICER DODUC: Thank goodness.
Mr. Herrick, let's see if we can get through your question with some clarity.
MR. HERRICK: Thank you, Madam Chair.
Madam Chair, John Herrick for the South Delta Water Agency.

Could we bring up the North Delta exhibit which is the contract, please?

WITNESS TERRY: That's actually DWR-306, I believe.

MR. HERRICK: Bring up DWR-306, please.

(Document displayed on screen.)

MR. HERRICK: Thank you.

And if you could scroll down a little bit, just a little bit in the first recitals.

(Document displayed on screen.)

MR. HERRICK: Right there, please.

CROSS-EXAMINATION BY

MR. HERRICK: Ms. Terry, you gave some testimony about this contract earlier; is that correct?

WITNESS TERRY: Yes, I did.

MR. HERRICK: And are you familiar with Recital (e), small E in parens, on the first page of the contract?

WITNESS TERRY: Yes.

MR. HERRICK: And could you quickly read that for us, that paragraph.

WITNESS TERRY: Yes (reading):

"Water problems within the Delta are unique within the State of California. As a result of the geographical location of the lands of the Delta and

tidal influences, there is no physical shortage of water. Intrusion of saline ocean water and municipal, industrial and agricultural discharges and return flows, tend, however, to deteriorate the quality."

MR. HERRICK: And this agreement was signed by both North Delta Water Agency representatives and DWR representatives; is that correct?

WITNESS TERRY: Yes.

MR. HERRICK: Um . . . Move on to Mr. Kienlen and perhaps Dr. Shankar.

Um . . . Excuse me for umming.

Mr. Kienlen, your exhibit showed increases or decreases in salinity as compared to the No-Action -- Excuse me. Let me start over.

One of your charts showed the percentages of increases in salinity at a particular location in the Delta between a No-Action Alternative and I believe it was Alternative 4(a) of the EIR; is that correct?

WITNESS KIENLEN: You're referring to the figures in the Tech -- the Technical Memorandum?

MR. HERRICK: Yes. Thank you.

WITNESS KIENLEN: Yes. We -- That tech -- Their figures do show changes between the No-Action Alternative and Alternative 4(a) as modeled in the

Petitioners' BA modeling.

MR. HERRICK: And you derived that information from the Petitioners' modeling; correct? It's not a result of modeling you did; is that right?

WITNESS KIENLEN: That's correct.

MR. HERRICK: And is it correct to say, then, that, from the data they had, they apparently did averages to present to the Board, whereas you broke out the information into different numbers, not the averages; is that correct?

WITNESS KIENLEN: I think it is fair to say that -- that what was presented by the Petitioners were monthly averages, meaning over the 16-year period.

What is included in our memorandum are some average monthly values, so there are averages included there, to be clear.

There's also information that is plotting specific points. The scatter chart plots is -- is an example, where we plotted the values under the No-Action Alternative for a day or -- or a minimum daily value against the Alternative 4(a) from their -- and, again, all from their modeling.

MR. HERRICK: And the analysis done by you put those percentages of the increases or decreases; correct?

WITNESS KIENLEN: Could we bring up the figure

you're referring to as a chart or something?

MR. HERRICK: I don't know what number that is. Sorry.

WITNESS KIENLEN: It would be NDWA-32, I believe, is the Tech Memo.

MS. McCUE: 32 errata.

(Document displayed on screen.)

MS. McCUE: Do you have a page number or --

MR. HERRICK: That one right there is good, Figure -- Figure 1.

WITNESS KIENLEN: So could you repeat the question?

MR. HERRICK: Yes.

Your -- I was just trying to -- to lay the groundwork for a couple questions here.

Your Figure 1 shows the changes -- the percent changes in EC between that No-Action Alternative and Alternative 4(a); correct?

WITNESS KIENLEN: On the monthly average --

MR. HERRICK: On the monthly --

WITNESS KIENLEN: -- basis.

MR. HERRICK: -- yes.

Now, does your analysis take a -- Let's take the September number.

Does your analysis tell us what a 23 percent

increase in salinity would do to any legal user of water, if anything?

WITNESS KIENLEN: No. It -- It shows that, on a monthly average basis, that the EC increased from roughly approximately 2100 microsiemens to 2600 microsiemens.

MR. HERRICK: Right. And we could actually pull further specifics out of the data and show any particular year's changes in salinity; could we not?

WITNESS KIENLEN: I think that's what's presented in Table 1 on the next --

MR. HERRICK: Right.

WITNESS KIENLEN: -- on the next page of this.

MR. HERRICK: But the percentage doesn't tell us the effect on any legal user; does it?

WITNESS KIENLEN: No.

MR. HERRICK: Okay. So we need some other expert to interpret the 23 percent change to see if, in fact, what it does to any other legal user; is that correct? Would you agree with that?

WITNESS KIENLEN: I'm not sure this 23 percent tells us much.

MR. HERRICK: So let me ask Mr. Mello.

WITNESS MELLO: Yes, sir.

MR. HERRICK: Are you aware of an analysis

that's been done by the Petitioners that explains what a 23 percent increase in salinity does to any particular diverter in the Delta?

WITNESS MELLO: No, I have not. But I do know that I have no confidence in what averages tell you.

I have to irrigate real-time. It doesn't do me any good to have part of the average come from months that I don't even irrigate in and then some of the key months that I'm going to irrigate in, it's -- the water quality is degraded.

And the 23 percent in September, for instance, is only part of the picture. There are some years that, as a -- if I recall correctly, that the number is 78 percent degraded, and there are days within that month that it may be worse than that.

So as an irrigator, I have to worry about salt-loading my soils that are going to impact the long-term profitability of my ranch. And there are times that I can't irrigate my crop. If it's a mature or annual crop, recall, I could irrigate it and it won't kill it, but it's going to hurt next year's crop.

So where do you draw the line? Am I going to take a yield hit this year and make less money because I have less quantity of corn to sell, for instance? Am I going to irrigate and maximize that, or am I not going to

irrigate and retain the long-term productivity of my ground? And that's the dilemma -- That is the dilemma that I am faced with.

I have no confidence in averages. 16-year average is nothing. What happened in 1915? It --

CO-HEARING OFFICER DODUC: Mr. Berliner --

WITNESS MELLO: -- doesn't make any difference to me.

CO-HEARING OFFICER DODUC: Mr. Berliner.

MR. BERLINER: Move to strike this answer as being entirely nonresponsive to the question asked.

CO-HEARING OFFICER DODUC: I found it quite interesting.

MR. HERRICK: Actually, my follow-on comment would be, he just answered the next three questions.

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

MR. HERRICK: I don't mean to make light of the objection. It was a long narrative. But I was going to ask a series of questions about that -- those very things, and I can ask them if you'd like. It's up to the Board.

CO-HEARING OFFICER DODUC: Let's -- Let's just leave it as is.

MR. HERRICK: Dr. Shankar, you're -- I believe

you're familiar enough with DSM-2 to give us some of your opinions on the reliability of the results that come out of the model?

WITNESS PARVATHINATHAN: Sorry to be rude, but I would have to go by the questions.

MR. HERRICK: Certainly. I'm just trying to --

WITNESS PARVATHINATHAN: Definitely. Definitely.

MR. HERRICK: You're familiar with the DSM-2 model.

WITNESS PARVATHINATHAN: Yes.

MR. HERRICK: Now, the DSM-2 model is basically used for two reasons or two purposes: One is comparative study by doing two different runs, holding most of the criteria the same and then changing one or two; and the other is a predictive manner; is that correct?

WITNESS PARVATHINATHAN: So far in my experiences -- experience, it has been only on the comparative mode. Of course, it could be used on the production mode but there are very few studies I have seen -- or I don't even remember any study that was used in a predictive mode.

MR. HERRICK: So when we see the Petitioners' modeling that tells us there's a large increase in salinity, we don't really know what the ultimate actual

salinity level will be. We're just looking at a difference between two different scenarios; correct?

WITNESS PARVATHINATHAN: As Mr. Munévar has presented, this is the best-available tool, and this is probably the best information we would have until we -- until the Project, if it is implemented, or when it's implemented.

MR. HERRICK: But do we know if the -- Let's just take a hypothetical:

If the 23 percent is 23 percent higher than 700 EC or is it 20 percent -- 23 percent higher than 300 EC, or is it 20 percent (sic) higher than 1,000 EC?

Does the model actually allow us to guess at what that future EC will actually be?

WITNESS PARVATHINATHAN: Just for a quick note on this:

This 23 percent is for Alternative 4(a). And if we look at the same chart for Boundary 1, it shows 55 percent, that being the secondary aspect.

But your -- To answer your question, I always look at it like we need a parallel universe to compare with the Project. And I don't know how really you could -- Even if in reality the Project were implemented, we wouldn't have an opportunity to compare that performance of the Project against a system where you

wouldn't have a Project. That does not exist in reality.

So, with that point, I would say, again, as I said before, this is the best information we have, and I wouldn't make a conclusion as to how this number could be validated or could -- could be the result you would see in the future.

MR. HERRICK: Well, let me -- I'm just trying to drill down on that. I appreciate your answer.

If this proceeding is trying to determine whether or not there's injury to legal users, and we have a model that tells us there's a difference between two scenarios -- so, in other words, what might the impacts be from a Project -- can we say with any confidence whether or not that is an injury if we don't know what that actual final number will be with the Project? We just know a comparative number.

WITNESS PARVATHINATHAN: "Injury" word really, this seems to be out of my head.

I always look at impacts as mathematical. I don't know how to relate the percent change to injury.

If you don't mind, if you can clarify how I can understand the word "injury," it would be useful.

MR. HERRICK: Have you seen DSM-2 model runs for EC in the Delta that are substantially different from the measured EC?

WITNESS PARVATHINATHAN: That's the purpose of the model. The model is calibrated and validated against observed data, and that's how we develop our confidence on the quality of the results as to how much it can simulate the reality.

And, of course, there are locations where the model performs well and there are locations where the model does not really simulate the reality, or simulate the conditions.

WITNESS KIENLEN: Perhaps I could --

MR. HERRICK: Please do.

WITNESS KIENLEN: -- add something.

And I'm -- And I am not a Modeler. I don't pretend to be one, but my -- I work with some of the best around, I believe.

My understanding of models is, they are used for that comparative analysis. Most models are not developed or were not developed to replicate historical or future conditions.

We try to -- They try, not me -- not "we."

They try to calibrate models to make sure they -- they are reasonable. We try to get them so that they reasonably reflect conditions, but they're not designed to replicate history. And they're not designed -- The models we're talking about here are not

designed to be predictive and tell us what's going to happen in the future. They've been designed to -- to make a reasonable -- The No-Action Alternative is a reasonable assumption or model of what we would expect to happen without a Project.

And then once we're comfortable with that, we layer on Projects to see, what does the Project do? How does it impact conditions?

MR. HERRICK: Let me give you a hypothetical.

I appreciate that answer.

So if, hypothetically, DSM-2 shows water quality at a particular location that is 400 EC lower than what it actually is, what conclusions can we draw when we run the model and say, "Oh, it might be 23 percent higher?" Can we draw any conclusions on the impacts to anybody?

WITNESS PARVATHINATHAN: So, that goes back to considering the -- the validity of DSM-2; is that correct?

You're saying that if the model underpredicts EC at the location by 400 microsiemens per centimeter, would this model be reliable in evaluating the real impacts of this Project?

Am I understanding correctly your question?

MR. HERRICK: Yes.

WITNESS PARVATHINATHAN: In my experience and my knowledge, I haven't seen the model underestimating salinity by 400 microsiemens per centimeter.

I don't remember the numbers of the different calibration reports, but DWR publishes the calibration reports frequently as they acquire more real-time data. And the model is also being evolved periodically with corrections to the code and corrections to the input data.

So with all these implements, DWR undertakes a calibration effort to ensure that the model is doing its best to reproduce or to simulate the real goal conditions.

Be --

MR. HERRICK: Can --

WITNESS PARVATHINATHAN: Someone can demonstrate that the model is really unbiased or really inadequate -- or really not good enough to simulate like the example you said, like 400 microsiemens, then one should take into consideration that bias or that errors while -- while assessing the Project impacts.

MR. HERRICK: So, Mr. -- Dr. Shankar, did you -- did you listen to my cross-examination of the Petitioners' Modeling Panel?

WITNESS PARVATHINATHAN: Somewhat, not -- I

don't know how many hours it went, but I -- I know you did.

MR. HERRICK: Do you recall when I introduced a document that purported to show a 300 EC difference between the modeled number and the actual number from -- under DSM-2?

You don't have to --

WITNESS PARVATHINATHAN: I'm sorry. If I had, I would have remembered, but I don't think I saw that document.

MR. HERRICK: Okay. I'm just trying to explore that.

WITNESS PARVATHINATHAN: Sure. Sure.

MR. HERRICK: If we don't know why the model is not accurately predicting water levels within some range of acceptable, you know, percentage, does that raise into question the results of the modeling?

WITNESS PARVATHINATHAN: It could be. It's a scientific effort, and you -- It has to be put in reference to the -- the current issue, and I don't think I'm -- It's cyclical -- as you see, cyclical issue. It needs to be evaluated thoroughly.

MR. HERRICK: That's all I have. Thank you very much.

CO-HEARING OFFICER DODUC: Thank you,

Mr. Herrick. That was interesting.

We will take our afternoon break and we will resume at 2:40.

(Recess taken at 2:25 p.m.)

(Proceedings resumed at 2:43 p.m.)

CO-HEARING OFFICER DODUC: (Banging gavel.)

All right. Please take a seat.

We are back for cross-examination of this panel by Miss Des Jardins.

Ms. Des Jardins, you had -- had estimated 45 minutes, so I would like to know the topic areas you'll be exploring.

MS. DES JARDINS: Oh, yes. They're all --

CO-HEARING OFFICER DODUC: I'm sorry. Is your microphone on?

MR. JACKSON: It went off.

MS. DES JARDINS: Oh. They're all questions on topic areas that previous cross-examiners have asked questions on and the witnesses have testified on.

They're not repetitive. They're designed to elicit new information and clarify previous test -- testimony.

CO-HEARING OFFICER DODUC: And specifically?

MS. DES JARDINS: I have --

CO-HEARING OFFICER DODUC: Are you focusing on

contracts? Are you focusing --

MS. DES JARDINS: There's -- There's some questions on DSM-2 and -- and calibration. There's some followup questions on that. Those shouldn't take very long.

There are some questions on . . . estimates of flows and diversions and -- in their estimated stage.

That -- That whole line of questioning, including DSM-2, I estimate will take no more than 20 minutes.

And then there's a couple questions on the contracts and on the foundation of the contracts and the original permits of the Bureau and the Department of Water Resources.

Those could take 20 minutes. They might actually take less. 45 minutes was sort of a . . . upper --

CO-HEARING OFFICER DODUC: Okay.

MS. DES JARDINS: -- estimate.

CO-HEARING OFFICER DODUC: Proceed. I would encourage you to ask your questioning as directly and succinctly as possible. If need be, we'll go back and establish foundation, but try to be direct.

MS. DES JARDINS: Okay.

CO-HEARING OFFICER DODUC: Thank you.

CROSS-EXAMINATION BY

MS. DES JARDINS: Mr. Parva -- Can you say your name again?

WITNESS PARVATHINATHAN: Shankar.

CO-HEARING OFFICER DODUC: We're calling it --

MS. DES JARDINS: Okay.

CO-HEARING OFFICER DODUC: We're calling him Dr. Shankar today.

MS. DES JARDINS: Dr. Shankar, I have -- I have here -- There is a 2014 -- The -- There's an Annual Report to the State Water Board on modeling in the Delta.

This is a 2014 report that was referred to in Mr. Munévar's testimony. There was a hyperlink but the actual report wasn't in the hearing record.

I have introduced it. It's Exhibit DDJ-106. And the reason I think it's relevant is, it has a chapter on -- The Department in 2014 states that they're going to take -- undertake a quantitative calibration of DSM-2. It states 2.1 Summary, the first part of Chapter 2 (reading):

"For the first time in its use, DSM-2 . . . is being calibrated in a quantitative manner with mathematically-based techniques. This chapter describes the background, motivation, goals, and status of the project, as well as preliminary

findings."

And then there's a definition of calibration.

Then it says (reading):

"In the past, Delta models, including DSM-2, have been calibrated with traditional methods, using only channel friction . . . and dispersion coefficients as calibration parameters. The" --

CO-HEARING OFFICER DODUC: Ms. Des Jardins, I'm waiting for you to get to a question.

MS. DES JARDINS: Yeah.

CO-HEARING OFFICER DODUC: Could I --

MS. DES JARDINS: Yeah. So I just wanted to ask him about this paragraph (reading):

". . . It implicitly assumes that other inputs are either perfect or . . ."

Yada yada.

This quantitative calibration, do you know if this was done by the time -- done for the model results that you used, or if the calibrations you're referring to are the -- the previous kind of calibration?

WITNESS PARVATHINATHAN: Sorry. I do not know.

MS. DES JARDINS: You don't know. Okay.

Let me go, then, to Exhibit DDJ-14.

And this is an excerpt from the older -- much older one.

Scroll down, please. Page --

CO-HEARING OFFICER DODUC: I'm sorry.

MS. DES JARDINS: -- 8 dash --

CO-HEARING OFFICER DODUC: What is --

MS. DES JARDINS: Page 8-2.

CO-HEARING OFFICER DODUC: So, I'm sorry, what is this document?

MS. DES JARDINS: Okay. Sorry.

This is the 2004 Methodology For Flow and Salinity Annual Report. It's Chapter -- an excerpt from Chapter 8, which has some information on -- DSM-2 was used for forecasting.

CO-HEARING OFFICER DODUC: Dr. Shankar, are you familiar with this document?

WITNESS PARVATHINATHAN: The way I'm blinking, definitely, I am not sure.

MS. DES JARDINS: There -- It's not -- This is documentation.

I just wanted to ask you about what it says about use of the model, and if that's still the case.

You do know about use of the model; don't you?

CO-HEARING OFFICER DODUC: Miss Des Jardins, let's try you just asking Dr. Shankar the question --

MS. DES JARDINS: I --

CO-HEARING OFFICER DODUC: -- without --

without going through all the document.

Is -- Is there a way for you -- Obviously -- Miss Des Jardins, obviously, we know your great interest in the issue of modeling and, obviously, your great familiarity with the context and the -- the subject matters, and so is Dr. Shankar, for that matter.

So let's see -- Let's try first: Ask your question.

MS. DES JARDINS: I don't remember exactly. I'd like to go to Page 8-4 and I can just read it, please. It's --

CO-HEARING OFFICER DODUC: But then you're --

MS. DES JARDINS: -- very short.

CO-HEARING OFFICER DODUC: -- you're -- you're veering into the area of testifying here as --

MS. DES JARDINS: No.

CO-HEARING OFFICER DODUC: -- part of --

MS. DES JARDINS: No, no.

CO-HEARING OFFICER DODUC: -- the cross-examination.

MS. DES JARDINS: I'm just -- I'm just asking about this passage, if I could did that, 8-4.

CO-HEARING OFFICER DODUC: You are going to ask about the passage, but you don't remember what the passage is.

MS. DES JARDINS: Can we go to it, please? And -- and you can look at it and determine. 8-4?

It's -- It's not meant to be testimony. I didn't -- It's not my own statement. This is actually a --

(Document displayed on screen.)

MS. DES JARDINS: 8-4, down at the bottom.

(Document displayed on screen.)

MS. DES JARDINS: Stop.

So it just says -- This is a statement by Department of Water Resources (reading):

"O&M's . . . Delta forecasts have shown . . . the DSM forecasting tool is effective at providing qualitative information . . . However, a more formal analysis of the ability . . . the (sic) current DSM-2-based forecasts to provide accurate quantitative results has not been conducted. It should be noted that DSM-2 real-time simulations can at times fail to reproduce or predict observed data due to a combination of errors in forecast model input and DSM-2 accuracy."

So, Dr. -- Dr. Shankar, you're not Department of Water Resources.

This is from 2004. I'm just curious: In your own use of the model, have you noticed that the

"simulation (sic) can at time (sic) fail to reproduce or predict observed data"?

And, you know, what -- what is your sense of how the model has been improved or not?

CO-HEARING OFFICER DODUC: In what particular incident or case or project?

MS. DES JARDINS: I'm talking about over time, and specifically with the WaterFix Project during his experience with using the DSM-2 model.

CO-HEARING OFFICER DODUC: Miss Morris.

MS. DES JARDINS: I'm at least --

MS. MORRIS: I --

MS. DES JARDINS: Having you compare it with --

CO-HEARING OFFICER DODUC: One at a time.

Miss Morris.

MS. DES JARDINS: -- observed data.

CO-HEARING OFFICER DODUC: One at a time.

Ms. Morris.

MS. MORRIS: Thank you.

Stefanie Morris, State Water Contractors.

The question's vague and ambiguous. It's also, I think, three questions.

But -- But the objection really is that it's -- I think it's improper for the -- the questioner to be reading things into the record when there isn't a

question.

And I am concerned about the record and the fact that this has happened several times, and -- and Miss Des Jardins is going to have the opportunity to testify.

I think it's an inappropriate way to cross-examine.

MR. O'BRIEN: I'm going to join that objection.

MS. DES JARDINS: I'm --

CO-HEARING OFFICER DODUC: All right. Hold on.

MS. DES JARDINS: I -- I wanted to --

CO-HEARING OFFICER DODUC: Wait. Ms. Des --

MS. DES JARDINS: -- respond.

CO-HEARING OFFICER DODUC: Miss Des Jardins, it's my turn to talk now.

MS. DES JARDINS: Okay.

CO-HEARING OFFICER DODUC: Would you please be quiet.

Dr. Shankar --

MS. DES JARDINS: Yeah.

WITNESS PARVATHINATHAN: Yes.

CO-HEARING OFFICER DODUC: Are -- Are you -- One, are you familiar with this statement, and, two, do you have any opinion at all to offer with respect to this statement?

And if you do not, then you do not.

WITNESS PARVATHINATHAN: I do not.

MS. DES JARDINS: Okay.

CO-HEARING OFFICER DODUC: Thank you.

MS. DES JARDINS: Then let me just ask one:

Have you compared DSM-2 with observed data in your work? And, if so, have you noted errors?

WITNESS PARVATHINATHAN: Yes, I have.

MS. DES JARDINS: You've com -- You've compared it with observed data?

WITNESS PARVATHINATHAN: I've done this before.

MS. DES JARDINS: Yes.

Have you noticed errors at times?

WITNESS PARVATHINATHAN: I was part of a calibration study.

I'm sorry. I should take it back.

I was part of a validation study for DSM-2 and . . .

So your question is, "Have you seen errors?" And all models, of course, have errors and --

MS. DES JARDINS: Yes.

WITNESS PARVATHINATHAN: And I have seen errors. I mean, I wouldn't imagine a model being perfect.

And so the errors -- sorry. I mean . . .

All models do have errors, and I have seen errors in DSM-2, and that was part of my validation study.

And if you're asking the magnitude of the errors --

MS. DES JARDINS: Yes.

WITNESS PARVATHINATHAN: -- are about . . .

Now, what is the frequency and where does it occur, I don't have any information on that.

MS. DES JARDINS: That was partly -- Do you -- If you had any sense of where the model was accurate -- more accurate or less accurate, or what the magnitude of the errors of the model were.

WITNESS PARVATHINATHAN: The model simulation, the hydrodynamics and water quality.

And the hydrodynamics is more complicated South-of-Delta where you have several kind of hydrodynamic forces act on the system: Banks, and Jones Pumping Plant, and you have other intakes, and you have seawater intrusion, and you have Sacramento-San Joaquin River stream. So the forces acting on the system differ at different locations.

So the model can tend to perform well in locations where the mixing process is simple, and it can tend to perform less accurately in certain locations

depending on hydrodynamics, depending on the timing of the year, depending on the hydrology conditions.

So, it is a really complex process that is very difficult to pinpoint where or when the model performs well or not.

MS. DES JARDINS: Do you have any sense of whether the models is better quantitatively or, at this point, it's only effective at providing qualitative information?

WITNESS PARVATHINATHAN: The word "quantitative" has multiple dimensions to it.

MS. DES JARDINS: Yeah.

WITNESS PARVATHINATHAN: So . . .

MS. DES JARDINS: Do -- Do -- So you think it's better to use in a relative manner in terms of an absolute level where you're deter -- looking -- comparing with a threshold for injury?

What's your sense of -- You know, if you don't have a sense of even the magnitude of errors, how do you think that applies?

WITNESS PARVATHINATHAN: My apologies. I think I didn't get the -- get --

MS. DES JARDINS: Oh.

WITNESS PARVATHINATHAN: -- the question.

MS. DES JARDINS: I'm -- I'm just saying:

So, if you compare the model output with the threshold for injury, what's the basis for that if you don't have a sense of the magnitude of error for the model?

WITNESS PARVATHINATHAN: I think we are talking two things here.

This specific document and errors talk about the model used independently or in a predictive mode.

The study we are dealing with right now is talking about a comparative analysis.

So the effect of an -- effective errors in a comparative analysis is -- is not as significant as when you use the model for a predictive forecasting mode.

MS. DES JARDINS: Do you think that the forecast of a 23 percent increase in salinity, it -- are you -- You know, do you have a sense of the possible errors in that kind of forecast where it's comparative between?

WITNESS PARVATHINATHAN: I don't have a -- I don't.

I think the best answer would be, I don't know how I could relate that 23 percent to the modeling errors.

MS. DES JARDINS: Okay. Thank you. That's all.

Then . . .

CO-HEARING OFFICER DODUC: Actually, I have a followup question for you, Dr. Shankar.

In the applications for which you use DSM/Sim, is there a better tool available that you could use?

It wasn't meant to be a trick question.

(Laughter)

WITNESS PARVATHINATHAN: No. I'm just going through a small head.

It's interesting question. There are numerous models and -- right now, and there are some three-dimensional models, and there are two-dimensional models, and there is one-dimensional model.

CO-HEARING OFFICER DODUC: So, let -- let me -- let me narrow the focus.

For the purpose of this hearing, for the purpose of the analysis that you conducted and is part of your testimony for this panel, could there have been a better tool?

WITNESS PARVATHINATHAN: I have to . . .

In . . .

I -- So, very simple answer: I do not know of a better tool.

CO-HEARING OFFICER DODUC: Okay. Thank you.

WITNESS PARVATHINATHAN: Sorry.

CO-HEARING OFFICER DODUC: No. Actually, I -- I just wanted to get your opinion on that. I wasn't asking you to come up with a better tool --

MS. DES JARDINS: Thank you.

CO-HEARING OFFICER DODUC: -- at least not today.

MS. DES JARDINS: Can we go to DDJ-104, which is the Board's panel on analytical tools.

(Document displayed on screen.)

MS. DES JARDINS: And I just want to ask about a table. It's a report of the 2004 analytical tools.

I want to go to Page 5, and there's a table on Page 5.

(Document displayed on screen.)

MS. DES JARDINS: There it is. Stop.

This just states, "Some Key Aspects in Calibrating and Testing a delta Hydrodynamics Model."

And it suggests matching point observations of stage, flow, salinity on tidally averaged places, matching key interior net-flow splits --

CO-HEARING OFFICER DODUC: Miss Des Jardins --

MS. DES JARDINS: -- representing --

CO-HEARING OFFICER DODUC: Yes. You were doing an excellent job about five minutes ago --

MS. DES JARDINS: So --

CO-HEARING OFFICER DODUC: -- with --

MS. DES JARDINS: So --

CO-HEARING OFFICER DODUC: -- asking --

MS. DES JARDINS: So --

CO-HEARING OFFICER DODUC: -- questions.

MS. DES JARDINS: So these are not my criteria. They're your 2012 panel's criteria.

But I wanted to ask Mr. -- Dr. Shankar if having this kind of calibration information, which was recommended by a panel of independent scientific experts, would have been helpful in assessing the error level of the models.

And just looking at the list, this is the list that the independent panel recommended be provided for Board proceedings, this kind of information.

WITNESS PARVATHINATHAN: Yeah. I respect the panel, and I think their statements are definitely much more credible than what I could say.

MS. DES JARDINS: Is this -- Is any of this information that they list here about the models -- about how well it matches point observations, et cetera, available for this hearing?

Well, maybe just within your area of expertise, which I think particularly would be matching point observations of stage, flow and salinity.

WITNESS PARVATHINATHAN: I'm not an expert in defending DSM-2. While I know enough about DSM-2 to talk about this, the DSM-2, they have been publishing reports for almost -- more than 10 years -- I don't remember -- where the model has been gradually improved.

And I see some of these issues being addressed in the gradual evolution of the model. But I am not sure if all of this directly addressed by the DWR Modeling Team.

MS. DES JARDINS: Are you aware of information that -- that was available for you to review for this hearing that was provided?

MR. O'BRIEN: Objection: It's vague and ambiguous.

MS. DES JARDINS: Is -- In that -- Did you review exhibits provided for this hearing related to DSM-2?

MR. O'BRIEN: Objection: Overbroad.

CO-HEARING OFFICER DODUC: Yes. Which exhibits?

MS. DES JARDINS: Never mind.

Okay. We're done with that one, so . . .

I --

CO-HEARING OFFICER DODUC: You have questions on contracts, I believe.

MS. DES JARDINS: Yes.

So, the -- Now, the next one, I wanted to go to -- I have a question about flows. I wanted to go to DWR-324, Page 5.

Oh, excuse me. It's -- It's my exhibit. Go look in the stick and -- Yeah. DDJ-112. This is -- Scroll down to Page 5.

(Document displayed on screen.)

MS. DES JARDINS: Page -- It's the next page. Sorry. It must be Page 6.

(Document displayed on screen.)

MS. DES JARDINS: Okay. Go up a little where it's highlighted.

(Document displayed on screen.)

MS. DES JARDINS: A little bit further.

(Document displayed on screen.)

MS. DES JARDINS: Up.

(Document displayed on screen.)

MS. DES JARDINS: There we go.

Okay. So, this is specifically about the question about stages and whether there would be a reduction -- in evaluating whether there would be a reduction in river stage at your Water Agency where you're testifying.

The Petitioners were supposed to provide

existing and proposed diversion release and return flow schedules, and they stated (reading):

"There will be some changes in the streamflow regime within the Delta due to the North Delta Diversion."

They refer to the testimony of Mr. Leahigh and Mr. Milligan and state (reading):

"DWR and Reclamation will continue to meet all the existing Delta water quality and flow criteria and any other regulatory requirements . . ."

Did you find that helpful? Was that sufficient for you to prepare your testimony, or did you have to rely on outside -- other information that was not provided?

CO-HEARING OFFICER DODUC: To whom are you directing this question?

MS. DES JARDINS: Who -- The person who testified about the stage -- the changes in river stages that were expected.

WITNESS KIENLEN: I guess I'll take that one.

MS. DES JARDINS: Yeah.

WITNESS KIENLEN: What we've reviewed and what we've testified to, and what's in our technical memorandum is in relation to the modeling results done by the Petitioners for the California WaterFix Biological

Assessment DSM-2 modeling.

MS. DES JARDINS: And that was the information that was provided.

WITNESS KIENLEN: Yes. And that's -- That's the -- The testimony we've given is based on that -- that modeling.

MS. DES JARDINS: And you indicated that you did not have time to fully extract all the DSM-2 results that were provided? Or . . .

Do I recall that correctly?

Did you have all the relevant results to -- Did you have time to extract and evaluate the relevant results related to flow and following?

MS. MORRIS: Objection: Relevance.

CO-HEARING OFFICER DODUC: She's following up on something that DWR testified to.

MS. DES JARDINS: The question is --

MS. MORRIS: She's asking if the information was helpful to him and if he had time to download all the DSM-2 files, and I'm objecting on the basis that's not; relevant to an injury claim.

MS. DES JARDINS: It's relevant --

CO-HEARING OFFICER DODUC: Hold on. Hold on.

I'll going to allow you to answer. Don't go away, Ms. Des Jardins.

She's asking about the work you performed in provided in your testimony, so answer in that context.

And if the answer is you don't know or no, then just say so.

WITNESS PARVATHINATHAN: I'm sorry. I thought the question was for Gary and I -- I did not really pay attention.

Could you please repeat it?

MS. DES JARDINS: It's just that in -- I do recall, imperfectly, that there was some testimony that the DSM-2 data was fairly complex and there was not sufficient time to analyze all of it.

I'm wondering if that was with respect to flows or water quality impacts.

CO-HEARING OFFICER DODUC: Well, first of all --

MS. DES JARDINS: One of my --

CO-HEARING OFFICER DODUC: First of all -- First of all, did one of you make such a statement?

MS. DES JARDINS: Yeah.

CO-HEARING OFFICER DODUC: Hold on. I'm asking them.

WITNESS PARVATHINATHAN: I made a statement not to that point. I said I didn't have time to evaluate the frequency of violations of the NDWA contract at all the

locations.

MS. DES JARDINS: Would that be with respect to river stage, or salinity, or both?

WITNESS PARVATHINATHAN: Water quality.

MS. DES JARDINS: Water quality. Okay.

WITNESS PARVATHINATHAN: That issue's not directly -- It was more of a calculation aspect that kept me away from doing it.

MS. DES JARDINS: Okay. Thank you. That's all.

Okay. Next exhibit is DDJ-94, and -- and I am moving on. This has to do with contracts.

(Document displayed on screen.)

MS. DES JARDINS: So, this is an order by the State Water Rights Board.

But scroll down a little, please, on this first page.

(Document displayed on screen.)

MS. DES JARDINS: "Order Denying Petition for Reconsideration of . . . D 990," which I got from the archives.

And this was -- Let's go down to Page 2, please.

(Document displayed on screen.)

MS. DES JARDINS: So this paragraph (reading):

"The Board is urged by the Sacramento River and Delta Water Agency (sic) . . . Delta Water Users Association . . . reconsider the provisions contained in Paragraph 23 . . . and extend or make provisions (sic) for extending the time in which parties within the watershed of the Sacramento River and in the Delta shall be preferred over Project users in the export area with regard to entering into contracts . . ."

Continue scrolling, please.

(Document displayed on screen.)

MS. DES JARDINS: It states that (reading):

"Their arguments" --

Keep -- Keep scrolling down.

(Document displayed on screen.)

MS. DES JARDINS: -- that they're concerned that the (reading):

"Paragraph 23 of the order will permit the Bureau to export stored water without limitation because the Bureau may refuse to enter into contracts and allow the" --

MS. DES JARDINS: Next page.

"-- 3- and 10-year periods to lapse."

CO-HEARING OFFICER DODUC: This is a pretty long document.

MS. DES JARDINS: Yeah. Let's keep going down.
CO-HEARING OFFICER DODUC: What is your question?
MS. DES JARDINS: Can we scroll down just a little bit? I'm not going to read from the entire thing.
(Document displayed on screen.)
MS. DES JARDINS: Keep going.
(Document displayed on screen.)
MS. DES JARDINS: Keep going.
(Document displayed on screen.)
MS. DES JARDINS: Keep going.
(Document displayed on screen.)
MS. DES JARDINS: Keep going.
(Document displayed on screen.)
MS. DES JARDINS: Okay.
MS. MORRIS: I'm going to object to this line of questioning --
MS. DES JARDINS: You know --
MS. MORRIS: -- on the basis that the --
Stefanie Morris, State Water Contractors. Sorry.
This is -- If -- If Miss Des Jardins had questions about the Water Rights Permits of DWR or the Bureau, then it would have been proper to ask that panel.
And I don't see the relevance of -- of this

decision, given that there's subsequent decisions that have preceded this.

CO-HEARING OFFICER DODUC: Thank you, Miss Morris.

I'm still waiting to hear the question from Ms. Des Jardins --

MS. DES JARDINS: Okay.

CO-HEARING OFFICER DODUC: -- so --

MS. DES JARDINS: Let me -- Let me just say export of the water which will be required and which is presently earmarked for use in the Sacramento Valley and Delta would be physically impossible in the absence of additional conduits.

So I -- This is specifically with respect to the Bureau.

I believe you said the Bureau was in negotiations with you up to 1981 to enter into contracts for water but those negotiations have lapsed?

CO-HEARING OFFICER DODUC: I don't think I heard that.

MS. MORRIS: Yeah, I don't.

MS. DES JARDINS: Okay. So --

MR. BERLINER: I --

MS. DES JARDINS: -- you were --

CO-HEARING OFFICER DODUC: Hold on. One at a

time.

First of all, Mr. Berliner.

MR. BERLINER: I'm going to object. This decision and that question are totally unrelated, so I fail to see --

CO-HEARING OFFICER DODUC: Actually, yes.

MR. BERLINER: I fail to see the relevance of this. If there's a question about the contract and its connection, I did have questions on that but not in the context of decision 990.

MR. O'BRIEN: I join that objection.

CO-HEARING OFFICER DODUC: Ms. Des Jardins, what is your question to Miss Terry with respect to contract, putting this aside?

MS. DES JARDINS: Well, I was going to go to D 990.

There were -- was water earmarked for -- water supply for the Delta lowlands and Delta uplands and they did testify about that the water -- about the 1956 and Delta lowlands and the Delta uplands.

And I'm wondering about the context in which I believe you testified that your negotiations with the Bureau lapsed at some point for supplying a water supply.

CO-HEARING OFFICER DODUC: I don't recall that.

MR. O'BRIEN: There's -- I think there's still

a relevance issue here, Hearing Officer Doduc, and --

MS. DES JARDINS: Okay.

MR. O'BRIEN: -- this has nothing to do with the issue of any --

MS. DES JARDINS: Okay. Then I'm --

CO-HEARING OFFICER DODUC: Let's move on, Miss Des Jardins.

MS. DES JARDINS: That's all my questions, then.

Thank you.

CO-HEARING OFFICER DODUC: Thank you.

Any redirect, Mr. O'Brien?

MR. O'BRIEN: Just one -- a couple very brief questions for Shankar.

Dr. Parvathinathan, actually.

WITNESS PARVATHINATHAN: Sorry?

WITNESS TERRY: He's showing off now.

MR. O'BRIEN: I practiced.

REDIRECT EXAMINATION BY

MR. O'BRIEN: In the Technical Memorandum, NDWA-32, that we've talked about, you explained that the DSM-2 modeling analysis you performed involved a comparison of the No-Action Alternative to the proposed action which is defined as CWF Alternative 4(a); is that correct?

WITNESS PARVATHINATHAN: That's correct.

MR. O'BRIEN: And just so the record's clear on this:

In the nomenclature that's being used in this hearing, is it your understanding that Alternative 4(a) is the same operational scenario as Alternative H3+?

WITNESS PARVATHINATHAN: I understand that to be the same.

MR. O'BRIEN: Okay. Thank you.

That's all I have.

CO-HEARING OFFICER DODUC: Thank you, Mr. O'Brien.

Any recross?

MR. BERLINER: (Shaking head.)

CO-HEARING OFFICER DODUC: That's a no from Mr. Berliner.

Miss Morris?

MS. MORRIS: I need one second.

CO-HEARING OFFICER DODUC: Mr. Herrick?

MR. HERRICK: (Shaking head.)

CO-HEARING OFFICER DODUC: Miss Des Jardins?

MS. DES JARDINS: No.

CO-HEARING OFFICER DODUC: Miss Morris.

MS. MORRIS: I'll be fast.

///

RECROSS-EXAMINATION.

MS. MORRIS: So I guess my question -- I just want to clarify.

So I had asked you earlier if you did perform an analysis to evaluate increases in the NWA (sic) contract exceedances under Alternative H3+.

Is your answer still no?

WITNESS PARVATHINATHAN: You had asked H3+?

That's -- You asked me. That's what I said "no" to; right? Because I didn't hear. I thought was it was B1 or H4. I didn't really clearly understand because the nomenclature -- I was used to BA Alternative 4(a) and I couldn't relate to H3+.

MS. MORRIS: So the answer is -- is different?

So, I'm asking you again, now that we are, I think, on the same page.

You want me to ask again or are you --

WITNESS PARVATHINATHAN: Sure. I think -- Okay. Let me really not confuse anybody.

Alternative 4(a) is equal to H3+; is that correct?

MS. MORRIS: Yes.

WITNESS PARVATHINATHAN: Okay. Then I did that.

MS. MORRIS: Okay.

WITNESS PARVATHINATHAN: Sorry. I'm . . .

(Laughter.)

MS. MORRIS: Okay. Then why didn't you include it in your analysis? I mean, why didn't you include it in your presentation to the Board?

WITNESS PARVATHINATHAN: I'm sorry. Didn't include which -- which one?

MS. MORRIS: The analysis that evaluated the increases in North Delta Water Agency contract exceedances under H3+.

WITNESS PARVATHINATHAN: It is included in the Technical Memorandum.

MS. MORRIS: Okay. Did you look at it for Three Mile Slough -- at Three Mile Slough?

WITNESS PARVATHINATHAN: Yes.

MS. MORRIS: And where is it in the Technical Memorandum? Just, can you give me the page number?

WITNESS KIENLEN: Give us just a minute, please.

WITNESS PARVATHINATHAN: Page Number 6.

MS. MORRIS: Can you pull it up, Mr. Baker?

WITNESS KIENLEN: Page 6, please.

MS. McCUE: It's NDWA-32 errata.

(Document displayed on screen.)

MS. MORRIS: Okay.

WITNESS KIENLEN: To the bottom. It's the last sentence in the last paragraph there.

(Document displayed on screen.)

MS. MORRIS: And what graphic shows the increases?

WITNESS PARVATHINATHAN: There's no graphics. That's all I had.

MS. MORRIS: Okay. Where -- So what is the basis, then? Where's the analysis that allowed you to make the statement that we see beginning on the very last sentence under the Table 2 title of this document?

MR. O'BRIEN: I'm going to object at this point. We're going beyond the two questions I asked on redirect.

CO-HEARING OFFICER DODUC: Miss Morris.

MS. MORRIS: I asked a question and I would have had followup questions but there was a misunderstanding.

CO-HEARING OFFICER DODUC: Fair enough.

Please answer.

WITNESS PARVATHINATHAN: When you -- If you don't mind, if I can rephrase the question.

You're asking me where is the analysis that substantiates this statement, or that supports this statement.

MS. MORRIS: Yes.

WITNESS PARVATHINATHAN: So I'm seeking clarification. What do you mean by "analysis"?

MS. MORRIS: Well, I'm a lawyer, not an engineer, and not a Modeler.

But I'm wondering -- You're the one who made the statement, so what analysis did you do and rely on to make this conclusion?

WITNESS PARVATHINATHAN: Really, thank you for the question.

This one statement took me a week to write, the reason being that if you go back -- I don't want to go back to it, but if you can look at the ND -- North Delta contract, the standards are the most confusing, because there are -- they vary by the 4-year inflows, and it has a really different sloping pattern.

So I tried my best to calculate -- It's a simple calculation. Count the number of days, the 14-day daily -- 14-day mean EC exceeds the NDWA contract. And that's all it -- For me, it's just an addition, but -- It's just a calculation, and I didn't really see a need for presenting it in any other way, just -- other than just reporting the number of days it crossed the line.

MS. MORRIS: The problem is, I can't understand how you came to this conclusion because that work isn't

documented anywhere; is it?

MR. O'BRIEN: Well --

MS. MORRIS: The calculation that you did and the -- I'm simplifying, but addition, subtraction, that's not actually shown in this report; is it?

WITNESS PARVATHINATHAN: Sorry. I mean, the same thing goes to my understanding of the D-1641 violation analysis computed by the Petitioners. I did not find any spreadsheets or calculations that showed it -- showed how it was done, so it is my understanding that . . .

MS. MORRIS: Okay.

WITNESS PARVATHINATHAN MELLO: That's how it is, so . . .

MS. MORRIS: So, did you do modeling -- Did you do any modeling analysis like that was done by the Petitioners to come up with this conclusion?

WITNESS PARVATHINATHAN: It is not a modeling analysis, so if I can explain what the statement means.

The statement basically is a simple calculation. The calculation is simple, but the data is complicated. So let me make clarification there.

So if you have a -- a month of data for every day that shows the standard and the next -- compared to another table that shows the EC value, the 14-day EC

value for every day at Three Mile Slough, I just compared those two numbers and say, if the computed 14-day EC mean is below the standard, then there's no violation. I count as one.

And if it is above the standard, then I -- I call it a zero if it is below, and if it's greater than the standard, I count it as one, and add the number of days it crosses the standard, and that is 20 days.

MS. MORRIS: Okay. And that's 20 days for the entire 16-year simulation period --

WITNESS PARVATHINATHAN: It is --

MS. MORRIS: -- correct?

WITNESS PARVATHINATHAN: -- 16 times 365. That is 5,280 days.

MS. MORRIS: Thank you. That was very good math.

(Laughter)

WITNESS PARVATHINATHAN: And I'm wrong. It's 5480.

WITNESS TERRY: 5480.

WITNESS PARVATHINATHAN: 5480, yeah. Sorry.

MS. MORRIS: I have no further questions.

CO-HEARING OFFICER DODUC: Thank you, Miss Morris.

Does that . . .

MS. DES JARDINS: Just one really quick recross question. It was on the same passage that Miss Morris had a question about, so . . .

CO-HEARING OFFICER DODUC: And the question is?

RECROSS-EXAMINATION BY

MS. DES JARDINS: Dr. Shankar, in writing this summary, is this the kind of summary that you are used to writing as a professional in preparing . . . preparing reports? And as far as the level of detail.

WITNESS PARVATHINATHAN: I really do not know if I have a professional style to -- I do not know. I have to think about it.

MS. DES JARDINS: Okay. That's all.

CO-HEARING OFFICER DODUC: Thank you.

Mr. O'Brien, does that conclude your case in chief?

MR. O'BRIEN: That concludes our case in chief.

CO-HEARING OFFICER DODUC: All right. And at this time, do you wish to move your exhibits into the record?

MR. O'BRIEN: I do.

CO-HEARING OFFICER DODUC: And I will take them under submission because I believe there are outstanding objections to them. So we will consider them, consider the objections, and issue a ruling within the next few

weeks or so.

MR. O'BRIEN: Very good. I would move to admit NDWA-1 through NDWA-274, inclusive, and also the erratas that we have submitted.

CO-HEARING OFFICER DODUC: Thank you, Mr. O'Brien.

And thank you to all the witnesses in this panel. That was most interesting.

MR. O'BRIEN: Thank you very much.

(Panel excused.)

CO-HEARING OFFICER DODUC: Okay. We're finally up to Group Number 10. Well, the portion that is not inclusive of the City of Brentwood.

As they're coming up, everyone stand and stretch for a little bit.

And let me get a time estimate. This does not have to be on the record.

(Recess taken at 3:23 p.m.)

(Proceedings resumed at 3:25 p.m.)

CO-HEARING OFFICER DODUC: All right. With that, we will resume with Mr. Aladjem.

MR. ALADJEM: Good afternoon, Chair Doduc, Chair Marcus.

David Aladjem, Downey Brand, here this afternoon on behalf of the Delta Flood Control Group,

otherwise known as Brannan-Andrus Levee Maintenance District and Reclamation Districts Number 407, 2067, 317, 551, 563, 150 and 2098.

And for purposes of convenience, we're just going to call them the Delta Flood Control Group this afternoon.

Madam Chair, I have a brief opening statement and then we'll go to Mr. Cosio's direct.

OPENING STATEMENT BY

MR. ALADJEM: Chair Doduc, we have been focused in these hearings almost exclusively, as we heard in the North Delta panel, on water quality, water level, flow impacts in the Delta.

Here, late on a Friday afternoon, we're going to shift gears and move to flood control impacts.

Mr. Cosio, who is a principal at MBK Engineers, who specializes in flood control engineering, will testify on behalf of the Delta Flood Control Group this afternoon that the WaterFix Project, if approved by this Board, will have a significant adverse effect on flood control in the Delta by adversely affecting Delta levees, particularly in the North Delta region.

Those effects will occur: Through pile driving, an estimated approximately 10,000 different piles, approximately 9 million different pile strikes;

through the obstruction of Delta channels by the construction of coffer dams and various other facilities associated with the WaterFix Project; by truck traffic, literally thousands and thousands and thousands of trucks over almost a decade of construction, that, in the opinion of the Delta Flood Control Group, will eviscerate the Delta levees.

Finally, these impacts are -- will also be associated with the dewatering of Delta channels and of groundwater in the vicinity of the Project.

As you heard in the North Delta presentation, that dewatering will have impacts on agriculture. And Mr. Cosio will testify as to how the WaterFix Project will adversely affect irrigation and drainage in the Delta region.

Turning from the direct effects of the Project, the Delta Flood Control Group wishes to inform the Board of a more general and a more troubling deficiency in the materials that have been presented to this Board.

In the engineering analysis that was presented to this Board by the Department of Water Resources, the Department represented to this Board: That the Delta levees were stable; that standard engineering practices would be able, in fact, more than adequate to address any issues associated with the construction of this Project.

Mr. Cosio, on behalf of the Delta Flood Control Group, will testify: That the Delta levees are, in fact, in a state of dynamic equilibrium; that the substantial changes contemplated by the WaterFix Project, through the construction process, have the potential and, in fact, are likely to destabilize those levees.

Mr. Cosio will also point out that the analysis provided to this Board by the Department does not consider that complexity.

Finally, for all of these reasons, the Delta Flood Control Group believes that the WaterFix Project will have a very significant adverse effect on levees and flood control in the Delta.

Notwithstanding the fact that Part 1 of these hearings is focused on legal injury to water, this is a very significant adverse effect to human uses in the Delta and justifies the Board in rejecting the Project on that basis alone.

Now I'd like to move to Mr. Cosio's direct testimony.

DIRECT EXAMINATION BY

MR. ALADJEM: Mr. Cosio, good afternoon. Welcome.

And could you please state your full name and spell it for the court reporter.

WITNESS COSIO: My name is Gilbert Cosio, Jr. Last name is spelled C-O --

MS. RIDDLE: Oh, please, I think we need to do the oath.

CO-HEARING OFFICER DODUC: I forgot to administer the oath to you.

MR. ALADJEM: Oh.

CO-HEARING OFFICER DODUC: Almost got away with it.

WITNESS COSIO: That was my plan.

GILBERT COSIO, JR.,

called as witness for the Delta Flood Control Group, having been first duly sworn, was examined and testified as follows:

MR. ALADJEM: And so, for the record now, Mr. Cosio, could you please state your full name and spell it for the court reporter.

WITNESS COSIO: Yeah. I didn't lie the first time. I was telling the truth.

My name is Gilbert Cosio, Jr.. Last name is spelled C-O-S as in Sam-I-O.

And if it's any consolidation, I can't spell Dr. Shankar's name, either, and he's one of my employees, so -- But he's a great guy, and that's the main thing.

MR. ALADJEM: And, Mr. Cosio, I think we can

establish on the record that you have now taken the oath.

WITNESS COSIO: Yes.

MR. ALADJEM: Mr. Cosio, is Delta Flood Control Group Exhibit 1 a true and correct copy of your testimony that was submitted on behalf of the Flood Control Group in these proceedings?

WITNESS COSIO: Yes, it is.

MR. ALADJEM: Have you had a . . . opportunity to review that testimony since it was presenting to the Board?

WITNESS COSIO: Yes.

MR. ALADJEM: Would you like to make any changes to that at this time?

WITNESS COSIO: Not at this time.

MR. ALADJEM: Mr. Cosio, is Delta Flood Control Group 2 a true and correct copy of your Curriculum Vitae?

WITNESS COSIO: Yes, it is.

MR. ALADJEM: And, Mr. Cosio, you are a principal at MBK Engineers?

WITNESS COSIO: Yes.

MR. ALADJEM: And if I read your vitae correctly, you have over 30 years of experience in the Delta?

WITNESS COSIO: Yes, I do.

MR. ALADJEM: You've been serving in that

capacity as a District Engineer for a number of Reclamation Districts; is that correct?

WITNESS COSIO: Yes.

MR. ALADJEM: Mr. Baker, could you put up Delta Flood Control 3, please.

(Document displayed on screen.)

MR. ALADJEM: And Mr. Cosio --

If we could scroll down a little bit.

(Document displayed on screen.)

MR. ALADJEM: -- is that a list of all of the Reclamation Districts that you have worked for in the Delta during your career?

WITNESS COSIO: Yes. In my capacity as District Engineer, I've represented all these Districts at one point or another. Currently, the 33 that are listed in the left column are the ones that we are current Engineers for, and the right column we have been Engineers in the past.

MR. ALADJEM: And is Delta Flood Control 3 a . . . exhibit that you prepared or was prepared under your direction?

WITNESS COSIO: Yes, it is.

MR. ALADJEM: Thank you.

Mr. Baker, could you put up Delta Flood Control Number 4, please.

(Document displayed on screen.)

MR. ALADJEM: And Mr. Cosio, is Delta Flood Control 4 a true and correct copy of this exhibit that you submitted to the Board?

WITNESS COSIO: Yes, it is.

MR. ALADJEM: And does this map show the Delta -- represent accurately, sir, the Flood Control Districts that were identified in Delta Flood Control 3?

WITNESS COSIO: Yes, it does.

MR. ALADJEM: Mr. Cosio, in your testimony, Delta Flood Control 1, you refer to a number of reports that were introduced to the Board -- submitted to the Board -- excuse me -- as Delta Flood Control 5 through 7.

Are those technical reports of the type that you would normally rely upon in your role as District Engineer?

WITNESS COSIO: Yes, they are.

MR. ALADJEM: And are the exhibits that were submitted to the Board true and correct copies of those reports?

WITNESS COSIO: Yes.

MR. ALADJEM: Mr. Cosio, Delta Flood Control Exhibits 8 through 10 are photographs of cracks on the slope of the levee at Grand Island, Reclamation District 3.

Did you observe those cracks in person?

WITNESS COSIO: Yes, I did.

MR. ALADJEM: And are those photographs accurate depictions of the cracking that occurred on that levee?

WITNESS COSIO: Yes, they are.

MR. ALADJEM: Mr. Cosio, Delta Flood Control 11 is a report on that levee cracking at Grand Island, Reclamation District 3.

Was that report prepared by the Department of Water Resources?

WITNESS COSIO: Yes, it was.

MR. ALADJEM: And did you receive a copy of that report in your role as District Engineer for RD 3.

WITNESS COSIO: Yes. That's why I received a copy.

MR. ALADJEM: And is that report the type of report you would normally rely upon in your activities as District Engineer for RD 3?

WITNESS COSIO: Yes, it is.

MR. ALADJEM: And, finally, sir, is the copy of that report that was submitted to the Water Board a true and correct copy of the report as you received it from the Department?

WITNESS COSIO: Yes, it is.

MR. ALADJEM: Let's proceed now to the substance of your testimony, Mr. Cosio.

Could you please summarize the key points of your testimony for the record.

WITNESS COSIO: Yeah. The two key points is:

Number 1, the WaterFix design and construction will impact the levees significantly in the -- in the Delta.

As Mr. Aladjem described, the components of the Project that will cause these impacts are the pile driving, the heavy truck traffic, the channel obstructions, and the dewatering of the area around the Project construction.

And the other point in my testimony is that the Department of Water Resources did not review or make analysis of the complexity of these Delta levees.

I'll explain in the direct testimony here -- and I've written down -- there are many, many things that you observe as you work on these levees that don't follow the standard engineering practices for Geotechnical Engineering or other types of engineering involving levees.

This type of experience is -- Or this type of knowledge is only gained through years of experience and through years of actually seeing these things happen.

MR. ALADJEM: Mr. Cosio, you said that the Delta levees, the experience you've had, doesn't necessarily conform to standard engineering practice.

What is it about the Delta levees that makes them unique that -- so that they don't conform to standard engineering practice?

WITNESS COSIO: So the North Delta, where the three intakes will be built, and a lot of the other structures, the levees are dredged out of the local channels. So the material that the clay's made out of is sanding material, very clean sand.

And the sand is -- was placed by dredges on what's commonly known as the natural levee. As sediments fall out of the river, as it overflows its banks, you get a natural mound of material, and this material's quite heavy because it's been moving under high velocity and it drops out as the velocity slows down.

And so the sand that's used to build the levees is actually built on additional sands and even gravels. That's how we characterize some of the foundation. It's actually gravel in the foundation, so it's a very porous material.

In addition, these levees were built on what was known, prior to Reclamation, as swamp and overflow lands. So, in some cases, we have lenses of organic

material in the form of peats and organic clays that then complicate the situation, since it changes the type of materials in the stratification materials at these levees.

Typical levee textbook standards look at situations like this assuming there's a homogeneous material and it reacts the same way during construction, after construction, and -- and the ability to be maintained.

In the Delta, we don't follow all those rules. Because the materials are so different, they cause problems because of stratification. And a lot of cases -- and I've explained in my written testimony -- there are instances where the difference in material actually causes internal problems to the levee that don't -- may not ever surface or express themselves on the surface so you can actually see there's a problem.

And that's what I fear is going to happen with some of the work going on around these levees in the North Delta.

MR. ALADJEM: Mr. Baker, if you could put up Mr. Cosio's testimony, DFG-1 on Page 5.

(Document displayed on screen.)

MR. ALADJEM: Mr. Cosio, on Pages 5 to 7 of your testimony, you describe the general effects the

WaterFix Project would have on Delta levees.

Could you please summarize that testimony now.

WITNESS COSIO: Yeah. In this part of my testimony, I describe what Mr. Aladjem has described as a state of equilibrium.

So the Petitioners' expert, Mr. Bednarski, had stated that these levees had been stable for decades. And although they've never failed in most cases, they are not stable. They're very dynamic.

But look at what they look like now compared to when they were built in the '50s. After the Corps of Engineers re-built them, they're not the same levee sections. They're constantly changing because of all the different forces and because of all the different maintenance activities that go on here.

And so they -- They -- The way I like to characterize it, they've reached a state of equilibrium. It's just like a block -- the game -- this game Django where you pile blocks up. It's a very stable structure, and you can pull pieces out.

But that one piece that topples it over, that's kind of what happens to these levees. We have to maintain them. Pieces fall out; we fix them. But, periodically, that piece falls out that just topples it all. And that's our fear as District Engineers.

We've got to watch these things, because we've got to hopefully anticipate where that piece is. If not, we're going -- we're going to lose these levees.

And in this case, I find that the activities due to the California WaterFix will enhance erosion, affect seepage and how these levees react, because, for the most part, water is part of the levee section, and by changing the elevation of that water, you change the strength of the levee.

And, then, as you construct features of the WaterFix around these levees using the piles that create little earthquakes, essentially, and the truck traffic and the . . . obstructions in the flow, they're going to increase the -- the probability that we're going to cause more levee stability problems and more -- definitely more maintenance issues.

MR. ALADJEM: Mr. Cosio, could you give us an example of how the standard engineering practices actually don't take into account the complexity of the situation in the Delta.

WITNESS COSIO: So, in my written testimony, I cited several examples. One, in particular, happened fairly recently.

We work for a Reclamation District in the Central Delta.

The City of Stockton was proposing to build a pumping plant on its -- on the Reclamation District levee in order to pump water out of the San Joaquin River and feed the North Delta area.

In order to build this pumping plant on top of this levee, they had to build a new levee immediately behind the old levee.

So they hired a reputable national firm to manage the project and design this new levee. This is a geotechnical firm that has offices all over the country and does a lot of work here in the valley.

We alerted them to some problems they were going to have during construction. And if you look at the actual engineering analysis, they didn't agree with this. They felt that this was going to be a very strong levee. And we didn't disagree. At some point, it would be a strong levee. But what they didn't understand is, getting to that point may or may not happen the way they'd envisioned.

And, so, after about two years of dealing with this, we came to a -- a -- a Conditions of Approval that we would let them build that levee, but we'd have to monitor what would happen as they went into construction. So, instead of building them in one lift, we asked them to build it in three lifts.

When they put the first lift, one of their monitoring points. Which, essentially, it was a stake in the ground next to where they were working, started moving. And, within a week, it moved about 13 and a half feet.

So, essentially, it was squishing that levee out from underneath itself and pushing it sideways. And we've seen that phenomenon happen. That's what we were worried about, because, if you do that too fast, it'll start flowing and then just keep going.

In this case, because we were monitoring it, we stopped them, and they realized after that point that things don't happen out here the way the textbooks say they're going to happen.

MR. ALADJEM: Thank you, Mr. Cosio.

Mr. Baker, if you could move to Page 9.

(Document displayed on screen.)

MR. ALADJEM: And Mr. Cosio, at Pages 9 to 11 of your testimony, you describe the potential effects of the WaterFix Project pile driving on Delta levees.

Could you summarize that testimony, sir.

WITNESS COSIO: Yes.

As I stated previously, this pile driving will essentially create millions of pile strikes that act as little earthquakes. They vibrate as -- for quite a

distance from where the pile's being driven.

The type of material these levees are made out of, these sands, is very uniformly graded. All the particles are about the same size.

And, so, when you shake this type of soil, it starts to densify. These particles start moving together trying to fill the voids. And this densification, if it occurs while the voids are full of water, could cause what's called liquefaction, which is the same failure mechanism that causes levees and buildings and other things to collapse during an earthquake.

Again, what our biggest fear is, that even though you might repair the damage you can see, the densification causes the levee crown to drop, or cracks appear, or the levee starts to slip.

You can see that and repair it, there's no doubt. But in our experience, we've seen many cases where internally we've got problems and we don't know that until we have a big problem, like water's running through the levee. And that's what I fear here.

There's going to be -- Because of the stratification of these soils, there will be instances where the sand will separate from the soils, create voids in that levee we don't see.

MR. ALADJEM: Thank you, Mr. Cosio.

At Pages 11 through 14 of your testimony, you describe the potential impacts of floodway obstructions associated with the WaterFix Project on Delta levees.

Could you please summarize that testimony.

WITNESS COSIO: Yeah.

Obviously, in a Project like this, when you're creating large diversions off a river system, much of that work's going to be out in the -- out in the channel.

And so you've got three diversion structures that are existing a hundred feet into the channel which, in most cases, that's at least 20 percent of the width of the channel. And then you're going to have a coffer dam in front of that which goes even further out into the channel to protect that -- that area as you construct it.

In addition, there are going to be floating barges and piles . . . floating barge . . .

Oh, what do they call them?

Oh, barge loading facilities, that's right.

Barge loading facilities out in the channel.

Now, the Petitioners analyzed the effects of the flood control impacts by using DSM-2, the model you guys just beat to death here for the last day.

But that's a one-dimensional model. And one of the concerns we have is that we don't disagree that we aren't going to have huge impacts on the amount of water

surface elevation change due to the flood.

Our concern is, is that all these piles and other obstructions are going to change the velocity -- the velocity and the direction of that velocity which does cause problems.

And we've run into this problem a lot with little boat docks and other things. You wouldn't think our major structures, but they change that two-dimensional flow of the water just enough.

Again, these things are equilibrium, and we slip out that one Django block and that starts coming down. And that's our concern with the in-channel obstructions.

MR. ALADJEM: Mr. Cosio, let's move along a little bit to the question of groundwater seepage and drainage and irrigation systems.

You discuss those on Pages 15 to 17 and 18 to 19 of your testimony.

And would you summarize that testimony for the Board.

WITNESS COSIO: The WaterFix improvements, the conceptual engineering document, describe the dewatering that has to take place in order to construct the WaterFix features.

The dewatering is described as lowering the

water table 5 to 10 feet for a considerable distance from where the structures are actually to be constructed.

What we've found in our experience, that dewatering next to levees of this sort does a couple things.

One, by pouring water out of the levee, it destabilizes the levee and causes problems with the stability of the levee. The ground around the levee starts subsiding just like in the San Joaquin Valley groundwater overdraft. The whole ground goes down.

And, as it subsides, it changes the level of the ground. And so if there are structures on that ground, they will have problems.

If it's farm ground, it changes the way water flows on and through that farm ground and impacts the ability to farm the ground.

In addition, as you dewater the area, you impact the ability to farm in the area, because the way the Delta is farmed is not like any other area. They farm utilizing the ability to -- to manage the groundwater level.

When they want to irrigate, a lot of the irrigation's done under what's called subirrigation. They actually let the groundwater come up, irrigate the crop, and then, when they're done irrigating, they pull

it down.

In this dewatering scenario, they're actually going to pull this water down, which means: One, they're not going to be able to subirrigate it; two, in a lot of cases, you're not going to be able move water from one field to another, because it's going to be pulled down into the ground, as the rest of the groundwater will -- will be.

So it's going to heavily impact the ability to farm in the North Delta, not only at the location of the WaterFix structures, but all around as this phenomena of drawing the water down spreads out for about half a mile, I think, is what the WaterFix documents estimated.

MR. ALADJEM: Mr. Cosio, on Pages 17 and 18 of your testimony, you describe the effects of truck traffic associated with the WaterFix Project.

Could you please summarize that testimony as well.

WITNESS COSIO: A truck weighs 80,000 pounds fully loaded. There's going to be thousands and thousands of these trucks running 24/7 on roads in the Delta.

Now, most of the main roads in the Delta are on top of levees. And, so, as this 80,000-pound vehicle's moving at 25 to 55 miles an hour, it's going to put a

huge force as it rumbles down the road, creating, again, vibrations similar to what was going on with the pile driving. And so these vibrations are going to, again, densify the sands. And during the winter, when the water comes up and saturates those sands, you take a chance of liquefying that material as you shake this thing.

And the big difference between the truck shaking and the pile driving is that the pile driving will dissipate -- the vibrations will dissipate as you get further away from the pile.

These trucks are going to go for miles up and down and around. This -- They're going to damage -- They don't just damage one spot. They damage miles and miles of levee as they pound along the top of these roadways.

MR. ALADJEM: Mr. Cosio, one final question here.

If you were summarizing your facts -- your -- your -- your view of the effects of the WaterFix Project on Delta levees, how would you do that, sir?

WITNESS COSIO: Well, like I said, these levees are -- are in a very tenuous state of equilibrium, and that the WaterFix, due to the four features we talked about, the pile driving, truck, channel obstructions and dewatering, will -- will offset this equilibrium and cause problems.

And the main point is that this has been has not been analyzed. The documents that have been presented by the Petitioners so far have not looked at this sort of phenomena.

MR. ALADJEM: Thank you, Mr. Cosio.

Chair Doduc, no further questions. He's open for cross.

CO-HEARING OFFICER DODUC: Thank you very much, Mr. Aladjem.

And we'll ask the Department to come on up.

MR. BERLINER: We have to stop at 5:00?

CO-HEARING OFFICER DODUC: Yes, we do. All the audio equipment shuts down.

MR. BERLINER: Good afternoon. Tom Berliner on behalf of the Department of Water Resources.

I'll be assisted this afternoon by Miss Jolie-Anne Ansley.

CO-HEARING OFFICER DODUC: I think you need to pull the microphone closer, Mr. Berliner.

MR. BERLINER: Did you get all that?

THE REPORTER: (Nodding head.)

CROSS-EXAMINATION BY

MR. BERLINER: Good afternoon, Mr. Cosio.

WITNESS COSIO: Good afternoon.

MR. BERLINER: Mr. Cosio, you've identified a

number of concerns and cautions this afternoon that you believe are applicable to the -- to the development of part of the California WaterFix Project; correct.

WITNESS COSIO: Yes, that's correct.

MR. BERLINER: However, none of the concerns or areas where you've cautioned have actually yet occurred; correct?

WITNESS COSIO: Could you clarify "yet occurred," under what conditions?

MR. BERLINER: Well, the Project's not yet designed; right?

WITNESS COSIO: Well, the documents presented are conceptual design.

MR. BERLINER: Yes. And in what stage of design would you consider that?

WITNESS COSIO: I would consider that 10 to 15 percent design.

MR. BERLINER: And they still have to go through a permit process; correct.

WITNESS COSIO: I believe so.

MR. BERLINER: And they still have to go through permitting with the Corps of Engineers; correct.

WITNESS COSIO: I believe so.

MR. BERLINER: Corps of Engineers familiar with levees in the Delta?

WITNESS COSIO: Not from a permeated -- permitting standpoint, they aren't.

MR. BERLINER: Does the Corps of Engineers have to issue a 408 Permit?

WITNESS COSIO: Yes.

MR. BERLINER: What factors will the corps be considering in their 408 Permit?

WITNESS COSIO: From our experience, they're going to look at, again, the textbook evaluation and analysis and not, in many cases, be aware of some of the intricacies that I explained in my testimony that cause the Delta to be so much different.

MR. BERLINER: Are you familiar with the Department of Water Resources division that deals with levees in the Delta?

WITNESS COSIO: Yes.

MR. BERLINER: Are they aware of the conditions of the levees in the Delta?

WITNESS COSIO: Not everybody is, no.

MR. BERLINER: Are some people?

MR. ALADJEM: Objection: Vague.

MR. BERLINER: Just responding to his answer, "not everybody."

CO-HEARING OFFICER DODUC: Yeah. So that implies some are.

WITNESS COSIO: Well, I don't know --

CO-HEARING OFFICER DODUC: Okay.

WITNESS COSIO: -- who may be.

MR. BERLINER: You're not aware that there may be people at DWR in their Delta levee program who might be familiar with the condition of levees in the Delta?

WITNESS COSIO: To a certain extent, they're familiar.

But I think what I tried to explain is, it's the day-to-day observation that you have to make that change the way you think about levees, when you see some of these oddball things happen that don't happen when you're just doing a normal levee project.

MR. BERLINER: What's your background in Geotechnical Engineering?

WITNESS COSIO: I'm a Licensed Civil Engineer, and I have taken soils and -- and classes of that sort, but I'm not a Licensed Geotech Engineer. I've working on levees for nearly 33 years.

MR. BERLINER: But you're not a licensed Geotech Engineer; are you?

WITNESS COSIO: No, I am not.

MR. BERLINER: Is MBK generally hired to do geotechnical work in the Delta?

WITNESS COSIO: We're hired to do that, but we

sub it out to a consultant we've been working with for about 30 years.

MR. BERLINER: Who is that?

WITNESS COSIO: It's Kevin Tillis from Hultgren-Tillis Engineers.

MR. BERLINER: And they're geotechnical engineers; right?

WITNESS COSIO: Yes, they are.

MR. BERLINER: And when MBK itself is not qualified to do work, is it routine that you sub that work to somebody who is qualified?

WITNESS COSIO: Do you mean in -- in all of our work or . . .

MR. BERLINER: Yeah, just generically. If you're -- If you're the -- the head of a job, let's call it the equivalent of the general on a job, and there are various disciplines that need to be undertaken, you routinely sub those out to subspecialties.

WITNESS COSIO: Yeah. The short answer would be, yes, we do.

MR. BERLINER: And that's pretty standard practice with engineering firms; is it not?

WITNESS COSIO: To a certain extent. I think, in our case, we don't try to do something that we haven't got as much experience as somebody else that could help

us out.

MR. BERLINER: And -- And is geotechnical engineering one of those areas?

WITNESS COSIO: Yes.

MR. BERLINER: Does, for instance, CH2M Hill have Geotechnical Engineers?

WITNESS COSIO: I don't know.

MR. BERLINER: Have you ever worked with any of the Geotechnical Engineers at DWR?

WITNESS COSIO: It's been a long time.

I never worked with them on a levee. I've worked with them on committees, like CALFED and that sort of thing.

MR. BERLINER: Well, let's narrow it to -- to levees.

So, you've not worked with them directly when it comes to levees?

WITNESS COSIO: Not in design and construction. I've worked with them on some emergency procedures during the '97 flood. We spent time with the Corps of Engineers and DWR Geotechnical Engineers to help us evaluate some of the flood problems we were having.

MR. BERLINER: And was that due to levee failures in the Delta?

WITNESS COSIO: Not levee failures. Just

problems like seepage and slumping of materials. Kind of standard practice to make sure that all the agencies are aware of what's going on.

MR. BERLINER: Do you recall a few years ago a major levee failed in the Delta?

WITNESS COSIO: Are you referring to Jones Tract?

MR. BERLINER: Yes, I am.

WITNESS COSIO: Yes, I did.

MR. BERLINER: Did you work on that?

WITNESS COSIO: No, I did not.

MR. BERLINER: Do you know who did?

WITNESS COSIO: On the actual failure?

MR. BERLINER: Yes.

WITNESS COSIO: Well, I know who the engineer is for the District, and I know that they hired out some of their postdisaster recovery work to another engineering firm.

MR. BERLINER: And do you know who that was?

WITNESS COSIO: KSN.

MR. BERLINER: Okay. And do you know what role the Department of Water Resources played in that repair?

WITNESS COSIO: I was not involved so I don't know what their role was.

MR. BERLINER: Okay. Are you familiar with the

Freeport project?

WITNESS COSIO: The Freeport --

MR. BERLINER: Water Diversion Project in the Delta.

WITNESS COSIO: Yes.

MR. BERLINER: And are you familiar with the recently-constructed new intake by the Contra Costa Water District at Old River?

WITNESS COSIO: I'm familiar with it, but I was not involved in it.

MR. BERLINER: My understanding is that you are District Engineer for -- I believe it's District 307?

WITNESS COSIO: I have been with 307, but we're not currently their District Engineer.

MR. BERLINER: Were you the District Engineer when the Freeport project was constructed?

WITNESS COSIO: No.

MR. BERLINER: And just for clarification, 307 is just across the river from the Freeport project; right?

WITNESS COSIO: Yes.

MR. BERLINER: Located about 800 -- The edge of 308's about 800 feet from Freeport, does that sound about right?

WITNESS COSIO: I don't know.

MR. BERLINER: Are you aware of how many pile strikes there were in the construction of the Freeport project?

WITNESS COSIO: No, I'm not.

MR. BERLINER: Would you expect that there were substantial number of pile strikes?

WITNESS COSIO: You know, I didn't observe that construction at all so I don't even know what kind of techniques they used.

MR. BERLINER: Are you aware of levee problems as a result of the construction of the Freeport project?

WITNESS COSIO: No.

MR. BERLINER: Did -- Are you aware of any -- All right. That's fine.

You mentioned some problems at Grand Island that you mentioned in your testimony at Page 9.

(Document displayed on screen.)

MR. BERLINER: And my understanding, based on -- on what you've written, is that there were some seepage problems that resulted in a partial failure of that levee; is that right?

WITNESS COSIO: It wasn't a seepage problem. What it was: The landowner alerted the Department of Water Resources that their foundation was failing because the ground around them was dropping. And they saw the

cracks in the levee and assumed that it was the levee having problems, and so they contacted the Department of Water Resources to inform them that -- As -- As far as they knew, the State was responsible for that levee, which they are. They've given the assurance to the Federal government they're going to -- to be the local sponsor for that levee.

The State started monitoring it and then alerted us, knowing that -- that Reclamation District Number 3 is the local maintaining agency. And so we then started looking into it and saw the cracks.

And the landowner's came to a Reclamation District meeting to explain what was going on and asked what the District was going to do about it.

And it turns out the landowner decided to go ahead and hire their own Geotech Engineer to investigate it. And what they found was, during the drought, the trees that lined one of their property lines was drawing the groundwater down to the point where the ground was subsiding, and that subsidence of the ground was -- was actually causing their foundation problem and the levee problem, which, in this case, the levee problem was quite severe. We're still worried about it because the cracks were expressed on the crown and there was slumping on the crown, and they were expressed down at the toe, and

they're arcing in a form that indicates it's a foundation failure.

And, so, now we're trying to, naturally, monitor that as the water comes up next time to make sure that we . . . can maintain that levee and keep it from failing due to excess see -- seepage.

MR. BERLINER: And were you the District Engineer for the Reclamation District -- Is it 3?

WITNESS COSIO: 3. Yes, we are.

MR. BERLINER: And 3 is responsible for the maintenance of that levee?

WITNESS COSIO: Yes.

MR. BERLINER: And yet you didn't detect this problem; correct?

WITNESS COSIO: We did not detect it until the landowner told us about it.

MR. BERLINER: In other words, you didn't detect it. You were told about it; correct.

WITNESS COSIO: Yes.

MR. BERLINER: And you stated at the conclusion of your discussion of this that what happened to knock this area out of historic equilibrium is unknown and could not have been predicted.

Is that an accurate statement?

WITNESS COSIO: Which line is that?

MR. BERLINER: The last line of your paragraph discussing the Grand Island problem, which is roughly Line 8 or so. It's single-spaced, so it's a little hard to judge exactly which line.

But you should be able to find that, sir.

WITNESS COSIO: Yeah, I found it.

MR. BERLINER: And that sentence is accurate as of today; right? That what happened to knock the area out of historic equilibrium is unknown and could not have been predicted.

WITNESS COSIO: Well, it was unknown to us that those trees were drawing the water table down.

MR. BERLINER: And, in your view, the trees drawing the water down was what -- Is that what knocked it out of historic equilibrium?

WITNESS COSIO: Yes. And it was not our opinion; it was actually the opinion of the Geotechnical Engineer hired by the landowner.

But it's a phenomenon we've seen in the past, that these trees do cause problems by lowering the water table.

MR. BERLINER: Okay. Thank you.

Have you reviewed the Department's Conceptual Engineering Report of July 2015?

WITNESS COSIO: Yes.

MR. BERLINER: And have you reviewed the Recirculated Draft EIR/EIS?

WITNESS COSIO: Yes. The documents that I reviewed are listed in my written testimony.

MR. BERLINER: I take it you reviewed Mr. Bednarski's testimony as well.

WITNESS COSIO: Yes.

MR. BERLINER: And you've raised several concerns or conclusions regarding levee stability and changes to the Sacramento River hydraulics; correct?

WITNESS COSIO: Yes.

MR. BERLINER: And in reaching your conclusions, did you perform any slope stability analysis?

WITNESS COSIO: No. I was just basing it on my experience where I've seen problems occur due to obstructions in the waterway.

MR. BERLINER: Okay. So I take it you also didn't perform any settlement calculations? Again, it was based on your experience?

WITNESS COSIO: Yes.

MR. BERLINER: And you also didn't perform any liquefaction analysis. You were just basing it on your experience?

WITNESS COSIO: Right. There was no data

provided to analyze, and being involved with these levees as long as I have, there really is no data at this time to be able to analyze all that. So that's why I'm basing it on my experience and what I've seen on these levees.

MR. BERLINER: And have you performed any geotechnical analysis to arrive at a conclusion that ground motion impacts from pile driving would affect the stability of levees?

WITNESS COSIO: No. Again, that's based on my experience. We've had levee slumps and slips when pile driving has been taking place.

MR. BERLINER: And yet you're not aware of any levee failures associated with the Freeport project; right?

WITNESS COSIO: No.

But in one of my examples I gave in my written testimony involved a -- a levee quite a distance from a development in Contra Costa County where the vibrations cracked that levee and the slumping caused foundation problems for a house on top of the levee.

MR. BERLINER: So let's take a look at that. That is on .pdf Page 9 of your testimony starting at about Line 9, which is up on the screen.

What condition was the . . .

Let's go to Page 8. Sorry. I have the wrong

page up there. Let's go back one.

(Document displayed on screen.)

MR. ALADJEM: Madam Chair, I believe it is at the bottom of Page 8.

(Document displayed on screen.)

MR. BERLINER: Here we go.

So, you indicated here that about 3 miles from the project, some -- a sandy levee experienced consolidation and the foundation of two structures on the levee cracked due to the vibrations.

Do you know if there had been any survey of baseline conditions and were those two structures analyzed before construction had begun?

WITNESS COSIO: No. We actually did talk to the Department of Water Resources about that and there was no analysis done.

We were concerned that it could cause problems but we were not included as a party to the EIR, or whatever was performed, and so we didn't have any way to put conditions on the project, evaluate the condition of the structures before and after the project.

MR. BERLINER: And what kind of structures were those?

WITNESS COSIO: They were houses.

MR. BERLINER: So could there have been

preexisting problems with those houses before construction began?

WITNESS COSIO: Well, there was damage to the houses but there was also damage to the levees. And so that's what we noticed initially, was that, on the levee, we're getting cracks, and then the homeowner informed us that cracks were forming in his floor.

MR. BERLINER: And do you know what condition the levee was in before the construction began?

WITNESS COSIO: No. We had re-built the levee in 1990, but, again, it's sandy material and so, quite likely, it was consolidating, intensifying.

MR. BERLINER: So it was a dynamic situation there?

WITNESS COSIO: Yes.

MR. BERLINER: And isn't it possible under dynamic situations, rather than stable situations, that you could experience cracks in foundations of buildings?

WITNESS COSIO: Well, that's my point, that when you start shaking these levees, things start moving.

MR. BERLINER: And isn't it also your experience that sometimes you get cracks when there isn't any construction work being done in an area?

WITNESS COSIO: Not that I'm aware of on these levees. We've never been alerted of such.

MR. BERLINER: Do you agree that there are well-established engineering logic and practice -- or call them standards if you will -- designed for construction projects on peat and soft soils?

WITNESS COSIO: Can you clarify? I mean, are you talking just in general or specific?

MR. BERLINER: I'm talking in general, if you're constructing on peat or soft soils --

MR. ALADJEM: Objection: Vague.

MR. BERLINER: -- on the Delta or elsewhere.

MR. ALADJEM: What structures? Where in the country? What? Where are we?

MR. BERLINER: Let me ask it again and then, if I'm too broad, I'll narrow it.

My question is whether there are engineering logic and practice designed for construction projects on peat and soft soils.

WITNESS COSIO: There are some, but you really have to know the local conditions to understand what else has to be considered.

MR. BERLINER: Okay. Fair enough.

And are those standards different substantially from engineering logic and practice that you would apply to construction on non-peat soils or on non-soft soils?

WITNESS COSIO: You can acquire a certain

amount of data that would alter how you construct on soft soils. The problem is, you never know whether you have enough data or not in areas like the Delta where peat changes so drastically from one foot to another.

MR. BERLINER: And so that requires some soil testing and analysis prior to start of construction; correct?

WITNESS COSIO: Yes, but you still have to know some of the local conditions to anticipate other problems that could happen, that you didn't capture in the soil testing.

MR. BERLINER: And I don't know if you were listening to the testimony of the Engineering Panel or not, but are you aware that they testified that they were planning to do considerable amount of soil boring and testing in order to ensure that when they build these multimillion-dollar tunnels, that they will have taken into account the kinds of soils that occur in the Delta?

WITNESS COSIO: Yes. But, again, I would caution you that, because these soils change so quickly, we've had problems just 20 feet from where we've taken a boring that had no similarities to the boring itself. So the problem is, you can never have enough information to adequately design something that will be foolproof.

MR. BERLINER: Well, I suppose there are

problems in every major construction problem -- project of one sort or another, but you've raised specific problems regarding levees.

WITNESS COSIO: (Nodding head.)

MR. BERLINER: Do you have an estimate of the number of pile strikes that might have occurred in the Freeport project?

WITNESS COSIO: No.

MR. BERLINER: You're generally familiar with that project, though, however; right?

WITNESS COSIO: Yes.

MR. BERLINER: In the context of size of the project, do you have a comparison as to how it compares to the size of one of the intakes for the California WaterFix Project?

WITNESS COSIO: Well, I know, capacity-wise, it's about 1/10th of the size.

But as far as the acreage and structures required to support the intake, I don't know what the comparison is.

MR. BERLINER: Okay. You stated in your testimony at Page 5 that (reading):

"Any change in the forces acting on the levee will cause the levee to be out of equilibrium, and likely result in levee damage . . ."

Correct?

WITNESS COSIO: Yes.

MR. BERLINER: Okay. And you also indicated on Page 10 that (reading):

". . . Water surface elevations in the Delta can (sic) increase substantially, often by about 20 feet" in winter months.

Is that right?

WITNESS COSIO: Yes.

MR. BERLINER: In your opinion -- So, is it your opinion that a change in river water surface elevations could result in levee damage.

MR. ALADJEM: Objection: Misstates the testimony.

MR. BERLINER: No. I'm asking his opinion, not his testimony in this regard.

I'll repeat the question:

Is it your opinion that a change in river water surface elevations could result in levee damage?

WITNESS COSIO: Yes. That's the main purpose of a levee, is to hold back the water surface. And in cases like the Delta, it does change quite a bit from the lower elevations to the flat elevations.

MR. BERLINER: And yet despite changes of 20 feet, generally speaking, the levees are doing quite

well; aren't they?

WITNESS COSIO: Well, like I said, they haven't failed, but we have a lot of problems that are out there now that we're monitoring and, in -- in most cases, they get worse, they don't get better.

And I'll give you an example:

We have one area on Grand Island, again, that we've had problems in the '86 and '97 floods which were the biggest floods on record in that part of the Delta.

We did a couple of repairs as recommended by the Corps of Engineers, but the area continued to seep when the river came up, and so we monitored it.

And for some reason, every time the river would go down, the area would dry up, the farmer could farm it, and everything was fine, so we just kept monitoring.

It -- It was wet. There was not a levee that FEMA would certify because it does have an exit gradient that's allowed, and so that's where the seepage was coming from.

In 2006, when the water came up, it was not a very big flood -- I think it as estimated about a 10-year flood -- we started getting Artesian flow where the water's shooting up about a foot above the ground, and we don't know what changed in that levee to cause it to not show this kind of stress during the much larger floods of

'97 and '86, yet it happened in 2006 and then it never stopped. Even after the water went down, it never stopped leaking so they could not farm it anymore, and we ended up to having to control that seepage with a structure called a seepage berm so we could keep the levee material in place and the levee stable while controlling the water coming through. And it cost the levee District about one and a half million dollars to do that.

MR. BERLINER: So, while you have this example, the -- these 20-foot changes in water elevation occur in large areas of the Delta; right?

WITNESS COSIO: No, not large areas. This is the -- the North Delta. And we still have a lot of influence of the channel itself, and so the water surface does raise quite a bit.

When you get down towards the lower end of Grand Island and into the Central Delta, it doesn't change a whole lot because the -- the flood elevations are controlled more by the tides than they are the flow coming down the rivers.

MR. BERLINER: Do you know how many miles of levees there are in the North Delta area that you're referring to?

WITNESS COSIO: I -- I couldn't estimate right

now off the top of my head.

MR. BERLINER: More than a hundred?

WITNESS COSIO: Yeah. 100's not a bad number. 100 to 150, I would say.

MR. BERLINER: And yet, with these changes in 20 feet of elevation of water, this 100 to 150 miles of levees, aside from the example you gave, and perhaps other localized problems, they're -- they're holding; right?

WITNESS COSIO: They're holding, but they -- they suffer severe damage during floods. And you might recall that, under Governor Schwarzenegger, they spent about $350 million just repairing erosion damage on these levees.

MR. BERLINER: Understood.

You indicated that you reviewed the Recirculated EIR/EIS maps for Alternative 4(a); right?

WITNESS COSIO: Yeah. If those were in those -- I reviewed parts of the EIR that were pertinent to levees, and I can't recall exactly.

And I listed those sections in my -- my written testimony, but I can't recall everything that was in them.

MR. BERLINER: And one of the things you indicated was, there was a barge loading facility located

on the Sacramento River Project levee about 1400 feet north of Twin Cities Road; right?

WITNESS COSIO: Um-hmm.

MR. BERLINER: Can we see DWR-565, please.

(Document displayed on screen.)

MR. BERLINER: We have hard copy.

MR. OCHENDUSKO: I'll take them.

MR. BERLINER: Is this the facility you were referring to?

WITNESS COSIO: No, it is not.

MR. ALADJEM: Mr. Berliner, for the record, what part of Mr. Cosio's testimony are you referring to?

MR. BERLINER: I'm referring to Page 5, Line 23.

(Document displayed on screen.)

MR. BERLINER: I think that's actually incorrect.

Wait. Let's go to Page 6, Line 7 and 8.

(Document displayed on screen.)

MR. BERLINER: So is -- Is the map that I put up what you are referring to in your testimony in Paragraph 19 on Page 6, Lines roughly 7 and 8, or is that a different one?

WITNESS COSIO: So, what I'm doing in this part of my testimony is just listing some of the features that

are going to be constructed in the North Delta.

And so I think you're kind of confusing the barge loading facility in the Sacramento River 1400 feet north of Twin Cities Road but that's over the Sacramento River.

This is over on Snodgrass Slough, which is the Intermediate Forebay constructed along Snodgrass Slough.

MR. BERLINER: All right. Then let me skip that.

You're familiar with the Non-Urban Levee Evaluation Program; right?

WITNESS COSIO: Yes, I am.

MR. BERLINER: And -- And just briefly, for the record, what -- what is the NULE Program?

WITNESS COSIO: The NULE Program was a program by the Department of Water Resources that compiled all the historic information on non-urban levees, and there were different phases they performed up and down the Flood Control Project.

And they compiled all that information and came up with a report on sites that needed repairs either as designed efficiencies or large maintenance projects that were either serious or critical.

MR. BERLINER: And that was compiled by the Department of Water Resources; correct.

WITNESS COSIO: Yes. They used a consultant, but it was under them, yes.

MR. BERLINER: And are the levee Reaches where the WaterFix intakes are going to be located defined as non-urban levees?

WITNESS COSIO: Yes.

MR. BERLINER: And is it correct that the NULE Program used the 1957 Design water surface elevations to evaluate freeboard and levee stability?

WITNESS COSIO: I believe they did because that's what the Corps used when they first built the project. I don't think they changed to the hundred-year flood.

MR. BERLINER: And is it correct that the design requires about 3 feet of freeboard?

WITNESS COSIO: The general design geometry of the original Sacramento River project, that's -- that was the minimum 3 feet above the '57 design level.

MR. BERLINER: And, just for the record, could you explain what "freeboard" is.

WITNESS COSIO: Freeboard is the height levee above the floodplain. So if the floodwater surface elevations is Elevation 10 and the top of your levee is Elevation 15, you've got 5 feet of freeboard.

MR. BERLINER: Thank you.

And is it correct that the NULE requirements require that a levee elevation be sufficient to withstand approximately a hundred-year flood?

WITNESS COSIO: That wasn't the point of the NULE. It was more to compile information to see what the state of the levee was.

They really didn't do -- establish any new standards or perform analyses on most of the levees in the Delta.

MR. BERLINER: Well, let me -- let me rephrase it because I'm being a little inaccurate there.

The 1957 Design for water surface elevations, did that require the levee elevation to be sufficient to withstand a hundred-year flood?

WITNESS COSIO: No.

MR. BERLINER: What did it require?

WITNESS COSIO: The Corps of Engineers established a water surface elevation, which is known to them as the 1957 Design, and then they just required that the levee -- the levees that were being incorporated into the Sacramento River Flood Control Project met certain geometric standards.

One of them was, you needed at least 3 feet of freeboard above that '57 Design flood elevation.

MR. BERLINER: And do you know what the

freeboard is that's being proposed for the California WaterFix levee elevations?

WITNESS COSIO: Not off the top of my head. I know they were looking at the 200-year flood elevation and basing the freeboard off of that.

MR. BERLINER: Would it surprise you that it would be 5 feet?

WITNESS COSIO: It would not surprise me.

But what's interesting is that most of the levees out there have more freeboard than the minimum 3 feet, yet they still have a lot of the structural problems. So it's not the size of the levee; it's more what's inside the levee, what it's made of.

MR. BERLINER: Understood. Thank you.

Now, you had cited a number of examples of projects where there have been some problem with some aspect of levee construction or other related activity.

As far as you know, isn't it correct that the Engineers that are working on the California WaterFix Project are not Engineers that worked on those projects?

WITNESS COSIO: As far as I know, yeah.

MR. BERLINER: I wanted to return to the construction project that you mentioned in Contra Costa County . . . where there was a failure --

MR. ALADJEM: For the record, is that the

project described on Page 8 of his testimony?

MR. BERLINER: Correct.

Do you know what types of investigations or analysis were performed in order to arrive at the conclusion that the foundation densification caused levee settlement?

WITNESS COSIO: No. There was just the timing of the levee cracking, and the damage to the houses coincided with the construction project.

MR. BERLINER: Are you aware if there's any documentation for that incident?

WITNESS COSIO: No.

MR. BERLINER: Now, you've expressed concern regarding pile driving; correct.

WITNESS COSIO: Yes.

MR. BERLINER: And did you review the Recirculated Draft EIR where construction techniques were discussed?

WITNESS COSIO: Yes.

MR. BERLINER: And did you also review the testimony that was provided here by the DWR Engineering Panel?

WITNESS COSIO: I reviewed Mr. Bednarski's testimony, but I didn't review -- I don't know who was on that panel, so . . .

MR. BERLINER: Okay. You -- Did you review his written testimony, or did you also review his oral testimony?

WITNESS COSIO: I reviewed his written testimony.

MR. BERLINER: And are you aware he was cross-examined during the course of the hearing?

WITNESS COSIO: I'm aware, but I did not watch it.

MR. BERLINER: Okay. And you haven't reviewed a transcript of that --

WITNESS COSIO: No, I haven't.

MR. BERLINER: -- cross-examination?

Okay. Are you aware that the engineering experts that testified indicated that pile driving was going to be minimized?

WITNESS COSIO: Yeah. I -- I did notice that they -- they did say that in the Recirculated documents.

MR. BERLINER: Are you familiar with cast-in-drilled-hole piles?

WITNESS COSIO: Yes.

MR. BERLINER: That doesn't use pile driving; correct.

WITNESS COSIO: No, but you have to do a lot of analysis to figure out how to design those.

MR. BERLINER: And are you aware that, at this point, the WaterFix intends to use that technique rather than impact pile driving for the -- for the intake foundations?

WITNESS COSIO: I don't know all the details on how they've changed from the number of original piles to what they have now. I know they still are going to use driven piles, but I don't know what the tradeoff was between driven versus the in-place concrete.

MR. BERLINER: Are you aware that the sedimentation basins will not require pile driving?

WITNESS COSIO: Yeah, I did notice that. They changed the design on that.

MR. BERLINER: If we could have DWR-570, please.

And we will finish by 5 o'clock.

(Document displayed on screen.)

MR. BERLINER: This is the Freeport Project.

Have you ever seen any photos of the Freeport Project construction before?

WITNESS COSIO: I have. I can't recall exactly which ones, but I remember, when it was under construction, I did see photos.

MR. BERLINER: And we have a hard copy, but if you're -- if you're looking at this, can you see the pile

drivers that are here?

WITNESS COSIO: Yes.

MR. BERLINER: And looking at that picture, would it appear evident to you that there must have been several hundred sheet piles and foundation piles in order to construct that portion of the project?

WITNESS COSIO: That's what it appears.

You know, I haven't counted them. This looks like the coffer dam is what it looks like.

MR. BERLINER: I believe that's correct.

And just for reference, because you can see it in the photo, that's RD 307 across the water; right?

WITNESS COSIO: Yes.

MR. BERLINER: And you indicated earlier you weren't aware of any levee failures in the vicinity of the Freeport Project; correct.

WITNESS COSIO: That's correct.

MR. BERLINER: Just for your information, we did speak to the Geotech Engineer for that project who confirmed there were no levee problems with that project.

Now, you indicated that vibrations from pile driving could lead to liquefaction in levees; correct.

WITNESS COSIO: Under certain conditions.

MR. BERLINER: And is that based on a geotechnical analysis or something else?

WITNESS COSIO: It's based on the fact that we've got these granular soils that will densify if vibrated. And because the water does come up during a flood, if construction's going on during the winter and they're vibrated when the core space is full of water, they can liquefy.

MR. BERLINER: Isn't liquefaction typically associated with seismic events?

WITNESS COSIO: Yes.

MR. BERLINER: And, typically, isn't the energy released by a seismic event not comparable to the amount of energy imparted into the ground by a pile driver?

WITNESS COSIO: That's kind of hard to say, depending on where you are.

However, the way you compact a sandy levee is to vibrate it. And it's not -- The vibrations of the compactor, which densifies the material under controlled conditions, is not like a seismic event, either.

MR. BERLINER: And we already established a couple minutes ago that the California WaterFix is not intending to use pile driving other than in some very limited circumstances; right?

WITNESS COSIO: Well, I haven't seen the data to say exactly, so I can't say how much less pile driving there's going to be compared to what was originally

estimated.

MR. BERLINER: And if pile driving would cause liquefaction and failures of levees, would you expect that an already-installed pile adjacent to another pile being driven would start to sink?

WITNESS COSIO: I've seen them sink.

MR. BERLINER: And is there any evidence in the Freeport Project that that occurred?

WITNESS COSIO: Not that I know of.

MR. BERLINER: To your knowledge, are the proposed intake sites -- I'm sorry. Strike that.

To your knowledge, have the levee Reaches at the proposed intake sites for the WaterFix Problem -- Project, Federal Flood Control Project levees?

WITNESS COSIO: Yes, they are.

MR. BERLINER: And in -- Are you familiar with 408 Permits?

WITNESS COSIO: Yes.

MR. BERLINER: In order to obtain the 408 Permit for the California WaterFix, won't the applicant have to prove that the proposed levee alteration and modifications won't impair the -- will not impair the usefulness of the project levees?

WITNESS COSIO: Well, in this case, they're going to rebuild the project levee. It'll be set back

from the original location, so that's what the Permit will be for.

MR. BERLINER: And it will require that the setback levees are as functional as the current levees, correct, at a minimum?

MR. ALADJEM: Objection: Calls for speculation.

CO-HEARING OFFICER DODUC: Do you know, Mr. Cosio?

WITNESS COSIO: I don't know, but I would assume they'd actually be better than the project levees.

CO-HEARING OFFICER DODUC: Okay.

MR. BERLINER: That's why I added "at a minimum" because I tend to agree with you: It will be equal or better.

And as far -- And as part of the 408 process, won't the permit applicant be required to submit engineering design submittals to the Corps of Engineer for their review and approval?

WITNESS COSIO: Yes.

MR. BERLINER: And won't that include hydraulic analysis to show the potential impacts on water surface elevations, and a geotechnical analysis to show the potential impacts on levee stability?

WITNESS COSIO: That will require an analysis

of the -- the impacts to flooding -- or flood elevation, water surface elevation, but I don't know if it's going to go as far as you need to go to estimate whether the change in blasting direction of the flow due to improvements in the waterway would damage existing facilities or not.

MR. BERLINER: You don't know? Is that -- Did I understand you right?

MR. ALADJEM: Objection: Misstates the testimony.

MR. BERLINER: Well, I'm ask -- I'm asking if he used the word that he does not know.

WITNESS COSIO: For what I understand of 408s, they're more interested in flood elevation and not the actual details on some of the changes in flow regime that could result in maintenance problems that I described -- described in my testimony.

MR. BERLINER: You indicated in your testimony today that various roads and highways were going to be used for the construction traffic; correct?

WITNESS COSIO: Yes.

MR. BERLINER: And you expressed concern that these might be roads that are situated on top of levees; is that right?

WITNESS COSIO: Yes.

MR. BERLINER: Are you familiar with State Routes 4 and 12?

WITNESS COSIO: Yes.

MR. BERLINER: Generally speaking, those are not on top of levees; right?

WITNESS COSIO: No.

MR. BERLINER: They're not on top of levees.

WITNESS COSIO: They are not on top of levees.

MR. BERLINER: And are you familiar with State Route 160?

WITNESS COSIO: Yes.

MR. BERLINER: You indicated in your testimony that the construction truck traffic for the WaterFix will be in excess of both the volume and weight of trucks ever seen in the Delta; is that right?

WITNESS COSIO: Yes.

MR. BERLINER: Are you familiar with the volume and weight of trucks that were used to construct the Freeport Project?

WITNESS COSIO: No.

MR. BERLINER: Would you imagine that the trucks that were used to construct the Freeport Project might be similar to the trucks that would be used to construct the WaterFix Project?

WITNESS COSIO: They'll be similar in weight,

but there will be a lot more for the WaterFix.

MR. BERLINER: But the weight will be about the same; is that right?

WITNESS COSIO: Yes, but it's the number and the repetitive pounding that they're going to have over a series of years that would cause the problems.

MR. BERLINER: And do you know of any analysis that's looked at existing truck traffic and the estimated truck traffic from the WaterFix Project?

WITNESS COSIO: What kind of analysis are you referring to?

MR. BERLINER: I'm just asking if you've -- if you've seen any analysis that compares existing traffic with what truck traffic is expected with the WaterFix Project.

I'm getting too close.

WITNESS COSIO: Not that I recall. I've seen the truck traffic described in the WaterFix but I don't think I've seen a comparison.

MR. BERLINER: Do you know what the average daily truck traffic is on -- Do you know what the average daily truck traffic is on Route 160?

WITNESS COSIO: No.

MR. BERLINER: Could I have DWR-570, please.

(Document displayed on screen.)

MR. BERLINER: If you could scroll down to the next page, please.

(Document displayed on screen.)

MR. BERLINER: You see the area highlighted in red that indicates the Hood Franklin Road area?

WITNESS COSIO: Yes.

MR. BERLINER: And I'm referring to Page 2 of this exhibit, for the record.

And it indicates that that's on Route 160; correct? If you look over on the left.

WITNESS COSIO: It intersects 160, but it is not 160.

MR. BERLINER: Let's start again.

On the left, it indicates it's for Route 160; correct?

WITNESS COSIO: I don't know what that column means.

MR. BERLINER: You're not familiar with it?

WITNESS COSIO: No.

MR. BERLINER: Okay. Then I'll skip it.

I'm going to move to another subject since you're not familiar with this.

In your testimony, on Page 18 -- And maybe we could go back to that for reference.

Mr. Baker, if you could scroll to 18, please.

(Document displayed on screen.)

MR. BERLINER: You indicated that the WaterFix (reading):

". . . Will lower the subsurface water elevation (sic) around the intakes and the Intermediate Forebay by about 10 feet in a radius of about (sic) 2600 feet from the dewatering wells."

Right?

WITNESS COSIO: Yes.

MR. BERLINER: I'm not sure if you've looked at this document, but Mr. Bednarski's testimony, his written testimony, referenced DWR Exhibit 218, which is the updated engineering procedures that includes deep slurry cutoff walls.

Are you familiar with that?

WITNESS COSIO: I believe so. Is that the document that was drafted by Gwen Buchholz.

MR. BERLINER: Exactly, yes. You're -- Then you're familiar with it.

WITNESS COSIO: (Nodding head.)

MR. BERLINER: Would you agree that the deep slurry cutoff walls would largely prevent a drop in groundwater elevations?

WITNESS COSIO: Based on that document, no. The document is very general, and it just -- there isn't

enough data acquired to actually document that.

That -- That's why I submitted as part of the exhibits with my testimony, 125, which shows -- which is a study performed by Department of Water Resources.

The report was published in 1967 to show how extensive seepages in the -- in this area when the water comes up.

And the reason I -- I attached that was because the source of seepage water in these areas is not directly -- it doesn't necessarily come directly from the closest point in the river. It comes from all around.

And, so, although the cutoff walls will slow the seepage down in front of the construction area, there will still be water seeping from other areas.

MR. BERLINER: So your conclusion is different than DWR's; correct?

WITNESS COSIO: I don't think they've done the analysis to figure out what -- That's why I still have relief wells in the plan.

MR. BERLINER: Have you read Gwen Buchholz's paper?

WITNESS COSIO: The one we were just talking about?

MR. BERLINER: Yes, the DWR-118. Yes?

WITNESS COSIO: Yes.

MR. BERLINER: And are you aware that DWR has made the commitment to perform the necessary surveys and geotechnical evaluations and perform needed improvements to segments of existing levee roads in order to avoid the kinds of impacts that you've identified?

WITNESS COSIO: To a certain extent. I've seen verbiage to that effect in different documents, but I don't know what the commitment was or if they understood all the impacts that I would be describing in my testimony.

MR. BERLINER: And that's a generalized concern that you have rather than specific to any particular Engineers; is that right?

WITNESS COSIO: Yeah. Because of the lack of analysis, you know, you really can't do a detailed estimate of what's going to happen.

But based on my experience, I've seen a lot of things happen that don't appear to be addressed in the documents I've reviewed.

MR. BERLINER: And so your argument at this point, basically, is that additional analysis and mitigation needs to be contemplated; is that right?

WITNESS COSIO: That's part of it, but that's not the whole thing.

Like I said, there are a lot of problems that

express themselves on the surface. But one of the concerns I have is, I've seen problems not express themselves on the surface and, later, we find out there was an impact we had no idea was occurring.

And that's where I'm concerned that you can't gather enough geotechnical information to figure out where all those problems are going to be.

MR. BERLINER: And how would you be able to generate -- to collect enough information?

WITNESS COSIO: I don't know if you can.

I can give you an example.

MR. BERLINER: Well, I'm sure there's always an example of a project where something went wrong.

But at some point, in order to build something, don't you have to convince yourself you've done as much -- about as much as you can and have to move forward?

WITNESS COSIO: If that means probably overcompensating and rebuilding a levee because you don't know what's going to happen, I guess that's what you would do.

MR. BERLINER: Okay. I have no further questions.

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

I believe the other person who has cross-examination is Miss Des Jardins.

MS. DES JARDINS: Can you please bring up DDJ-115?

(Document displayed on screen.)

MS. DES JARDINS: Thank you.

CROSS-EXAMINATION BY

MS. DES JARDINS: Mr. Cosio, I -- this is a map of the location of the Freeport Regional Water Facility, and it shows its location in the Delta. I provide it for your reference.

Where would you expect to see impacts if they were going to occur from the construction of this project?

And -- You know, and I'm looking at -- if there -- Is there any localization of impacts?

WITNESS COSIO: You're talking about the --

MS. DES JARDINS: Yeah. Yeah, because there were a lot of questions about this project, and . . . and it seems to be up more towards the pocket neighborhood in Sacramento.

WITNESS COSIO: Yeah. I don't really know anything about this project. I never reviewed the plans or observed construction, and I -- I don't work up that far north in the Delta, so the levee characteristics I'm

not familiar with, either, up there.

MS. DES JARDINS: Okay. In your experience, is there, like, some radius of influence -- Is -- Is there some attenuation of vibrations, you know, that's relevant?

And if you were looking for impacts, you know, about how far away would you expect them?

WITNESS COSIO: That's all subject to analysis to -- to investigate that, so it's all site-specific.

The only thing I added in my testimony was that, just based on my experience in Contra Costa County, the vibrations traveled about 3 miles.

MS. DES JARDINS: Okay. So, based on that experience.

There wasn't any kind of analysis of -- that it would be soil-specific for these areas provided; was there?

That would allow you to estimate something like 3 miles?

WITNESS COSIO: No.

MS. DES JARDINS: Okay. Are you aware of any vibration specifications associated with the project?

WITNESS COSIO: Are you talking about the Freeport Project or the Cal WaterFix?

MS. DES JARDINS: No. With the WaterFix and

your concerns.

Are you aware of any specifications for allowable vibrations during construction?

WITNESS COSIO: No, I am not.

MS. DES JARDINS: Are you aware of any proposed monitoring of vibration during construction?

WITNESS COSIO: No, I'm not.

MS. DES JARDINS: Would that be informed by the kind of analysis that you're suggesting?

WITNESS COSIO: Yeah. The level of design hasn't reached that point yet. That's the kind of information that I'd have to gather and establish some sort of criteria.

MS. DES JARDINS: Okay. The next question I have is with respect to potential sea-level rise.

If you -- there was sea-level rise -- I can provide foundation for this if needed -- of about 14 to 15 inches around the time that this was being constructed, would that have an impact on -- accumulative impact on the levee stability?

The combination of sea-level rise and the vibrations. I think it's -- it's estimated at 6 inches, but it could be higher.

MR. BERLINER: I'm going to object on the grounds of vagueness as to where the sea-level rise is

occurring.

Are we talking at the Golden Gate or somewhere else?

MS. DES JARDINS: Thank you, Mr. Berliner. I can go to the sea-level rise calculator slide that I provided.

MR. BERLINER: No.

CO-HEARING OFFICER DODUC: Mr. Cosio --

MR. BERLINER: I'm just asking for --

CO-HEARING OFFICER DODUC: Hold on.

MR. BERLINER: -- the location you're referring to.

CO-HEARING OFFICER DODUC: Mr. Cosio, are you -- do you feel that you have enough expertise to address questions -- to respond to questions regarding sea-level rise?

WITNESS COSIO: No. And we're talking about, you know, the construction period, so I'm not sure where the sea-level rise component comes in.

MS. DES JARDINS: Oh, it's -- it's -- It would be -- I had calculations.

It could be that I -- According to the Army Corps of Engineer calculator, by around 2035 under the highest estimates.

And there's some con -- You know, so that's a

question. Is there incomplete specifications?

CO-HEARING OFFICER DODUC: Now go back to Mr. Cosio.

MS. DES JARDINS: Yeah.

CO-HEARING OFFICER DODUC: Assuming any sort of level -- sea-level rise as Miss Des Jardins postulates, do you have expertise to offer an expert opinion on what impact that sea-level rise might have?

WITNESS COSIO: No, and I don't think the data exists right now.

As part of our responsibility as District Engineers for these Districts, we monitor sea-level rise estimates and consult with our Districts on their levee work.

But as far as this project, I wouldn't have any.

CO-HEARING OFFICER DODUC: Thank you.

MS. DES JARDINS: Okay.

CO-HEARING OFFICER DODUC: Please move on, Miss Des Jardins.

MS. DES JARDINS: So -- Yes.

My next question was with regard to Page 17 of the CALFED Record of Decision. If we could go back to my slides.

So, I have a CALFED Record of Decision here;

it's DDJ-116.

(Document displayed on screen.)

MS. DES JARDINS: We could -- Do you recognize this, Mr. Cosio?

WITNESS COSIO: Yes.

MS. DES JARDINS: Okay. There are specifications in it with regard to levee integrity.

So let's close that and go to the excerpt, which is DDJ-117.

(Document displayed on screen.)

MS. DES JARDINS: And I just want to scroll down here.

(Document displayed on screen.)

MS. DES JARDINS: So, there are a number of commitments made the last time this project came before the Board in the Joint Plan of Diversion, the CALFED Record of Decision, and this is a list. And one of them was to (reading):

"Improve and maintain . . . Delta levee system stability to meet . . . Army Corps of Engineers PL 84-99 standard."

There's a number of other ones.

I'm wondering what progress has been made on that.

MR. ALADJEM: Objection: Relevance.

MS. DES JARDINS: Okay.

CO-HEARING OFFICER DODUC: Mr. Cosio, do you have the expertise to answer a question about this program?

WITNESS COSIO: Yeah. I was heavily involved in this.

CO-HEARING OFFICER DODUC: Okay.

WITNESS COSIO: I was in several CalSim committees looking at levees.

CO-HEARING OFFICER DODUC: Can you provide an answer?

WITNESS COSIO: The short answer is, the State is no longer implementing the CALFED Plan.

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

MS. DES JARDINS: Okay. That's all my questions.

CO-HEARING OFFICER DODUC: Any redirect, Mr. Aladjem?

MR. ALADJEM: I will try to be very quick.

CO-HEARING OFFICER DODUC: Yes. You have two minutes.

REDIRECT EXAMINATION BY

MR. ALADJEM: Mr. Cosio, Mr. Berliner and you had a long discussion about the Freeport Project.

Do you recall that?

WITNESS COSIO: Yes.

MR. ALADJEM: Do you know, sir, how far away the Freeport Project is from the location of the intakes?

WITNESS COSIO: I don't know without a map in front of me.

MR. ALADJEM: Is -- Are you familiar with the levees in front of the Freeport Project?

WITNESS COSIO: No.

MR. ALADJEM: No further questions.

CO-HEARING OFFICER DODUC: Any recross?

MR. BERLINER: No.

CO-HEARING OFFICER DODUC: Miss Des Jardins?

MS. DES JARDINS: No.

CO-HEARING OFFICER DODUC: All right. Mr. Aladjem.

MR. ALADJEM: Madam Chair, on behalf of the Delta Flood Control Group, we'd like to move into -- or submit into evidence here Delta Flood Control 1 through 11, inclusive.

CO-HEARING OFFICER DODUC: Thank you very much.

We will take that under submission because I believe there are also objections outstanding on that.

All right. With that, thank you very much, Mr. Cosio.

WITNESS COSIO: Thank you.

(Panel excused.)

CO-HEARING OFFICER DODUC: We will reconvene on Thursday, November 3rd. We will begin with the EBMUD Panel, Group 15; followed by Brentwood; followed by the portion for Antioch that includes Dr. Paulson (phonetic); followed, if we have time, by Group 13, Sac Regional; and then, consequently, following with Miss Meserve and Mr. Herrick either on Thursday, Friday or Thursday of the following week.

And, also, sometime next week, I will expect representatives for Groups 22, 27, 30, 31, 32 and 38 to also appear before us to discuss scheduling for the week after Thanksgiving.

MS. ANSLEY: Just really quick. Julie Ann Ansley for the Department of Water Resources.

I'm sure it's -- it's me. On Thursday, when we take City of Brentwood, Dr. Paulson, does that -- will we also be doing the other witness for the City of Brentwood?

CO-HEARING OFFICER DODUC: My understanding is yes, but Mr. Aladjem?

MR. ALADJEM: Yes.

MS. ANSLEY: Okay. Thank you. Sorry.

CO-HEARING OFFICER DODUC: All right. Thank

you, everyone. Have a good weekend.

(Proceedings adjourned at 5 p.m.)

State of California)
)
County of Sacramento)

I, Candace L. Yount, Certified Shorthand Reporter for the State of California, County of Sacramento, do hereby certify:

That I was present at the time of the above proceedings;

That I took down in machine shorthand notes all proceedings had and testimony given;

That I thereafter transcribed said shorthand notes with the aid of a computer;

That the above and foregoing is a full, true, and correct transcription of said shorthand notes, and a full, true and correct transcript of all proceedings had and testimony taken;

That I am not a party to the action or related to a party or counsel;

That I have no financial or other interest in the outcome of the action.

Dated: November 9, 2016

_____
Candace L. Yount, CSR No. 2737