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

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SECOND FLOOR

SACRAMENTO CALIFORNIA

PART 1A

Thursday, August 11, 2016

9:00 A.M.

VOLUME 9

Pages 1 - 262

Reported By: Deborah Fuqua, CSR No. 1248

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APPEARANCES:

CALIFORNIA WATER RESOURCES BOARD

Division of Water Rights

Board Members Present

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

Staff Present

Diane Riddle, Environmental Program Manager
Dana Heinrich, Senior Staff Attorney (a.m.)
Samantha Olson, Senior Staff Attorney (p.m.)
Kyle Ochenduzsko, Senior Water Resources Control Engr.

For California Department of Water Resources

Mark Cowin, Director
James (Tripp) Mizell, Senior Attorney
Cathy Crothers, Assistant Chief Counsel
Ken Bogdan, Senior Attorney

Duane Morris, LLP
By: Thomas Martin Berliner, Attorney at Law

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

State Water Contractors

Stefanie Morris
Adam Kear
Becky Sheehan

(Continued)

APPEARANCES (continued)

Cities of Folsom and Roseville, San Juan Water District, and Sacramento Suburban Water District
Alan Lilly
Ryan Bezerra

Placer County Water Agency
Daniel Kelly

Save the California Delta Alliance, et al.
Michael Brodsky

Sacramento Valley Water Users, North Delta Water Users
Kevin O'Brien

East Bay Municipal Utility District
Jonathan Salmon

Friant Water Authority
Greg Adams

South Valley Water Association
Nicolas Cardella

Islands, Inc. and Delta Watershed Landowner Coalition
Michael J. Van Zandt

Planning and Conservation League
Jonas Minton

Bogle Vineyards, Diablo Vineyars, Stillwater Orchards, and Delta Watershed Landowner Coalition
Osha Meserve

Pacific Coast Federation of Fishermen's Associations and Institute for Fisheries Resources
Ben Eichenberg

I N D E X

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EXHIBITS

CROSS-EXAMINERS' EXHIBITS		ID	ADMIT
North Delta Water Authority			
NWDA-1	Plot prepared by MBK Engineers	107	-
NWDA-2	Plot prepared by MBK Engineers	109	-
Planning & Conservation League			
PCL-2	Slide headed "Temperature Projections"	240	-

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Thursday, August 11, 2016 9:00 a.m.

PROCEEDINGS

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CO-HEARING OFFICER DODUC: Good morning everyone. It's 9:00 o'clock. Welcome back to the California WaterFix Petition Hearing. As usual, I have to go through some announcements.

I am Tam Doduc, Board Member, Hearing Officer. Next to me on my right is Board Chair and Co-Hearing Officer Felicia Marcus. To the Chair's right is Board Member DeeDee D'Adamo. To my left are Dana Heinrich, Diane Riddle, and Kyle Ochenduszko.

We also have other staff assisting us today.

By now, hopefully, you have identified the exit closest to you. But if you have not, please do so now. In the event of an alarm, we will evacuate this room. Please take the stairs down to the first floor, exit, and cross the street to the park. If you are not able to use the stairs, you will be directed into a protected vestibule.

This hearing is being recorded and webcast, so please speak into the microphone and begin by identifying your name and affiliation.

We have a court reporter with us today. We will be putting the transcript on our Web site as soon

as possible after the completion of Part 1A. If you need to have it sooner, please make your arrangements with the court reporting service.

Finally, please take a moment, check all noise-making devices, as I am doing so right now. Thank you.

And before we begin, I've had now, I guess, two requests to address some procedural matters. We will begin with Ms. Morris.

MS. MORRIS: Good morning, thank you. My request is there are a number of documents that have been either marked or shown to the witnesses, and they've been referenced in the record but have not been provided to the rest of the parties.

And so my request is that anything that is marked or showed to the witnesses be posted on the Board's Web site by the end of the day or perhaps next morning, sometime quickly so the rest of us have access to those documents.

CO-HEARING OFFICER DODUC: That's fair enough. Let me turn to my staff, though, because even though those have been identified for the purpose of cross-examination, we have not always -- we have not taken many of them into the record. And some of them have been marked for, you know -- with temporary

marking. So I'm not sure what would be the best way to do that.

Ms. Riddle.

MS. RIDDLE: So we have been starting to post some of them. Not all of them are marked for identification. So maybe starting from here on out, we can ask that everybody at least request to mark anything they're submitting for identification because I agree with Ms. Morris, it's going to get confusing if we don't do so.

So we will do our very best to post them as soon as possible, and we've got some up there now.

MS. MORRIS: Thank you.

MR. OCHENDUSZKO: Also this would be a great time to do the pitch that, if you do have exhibits that you do wish to be displayed or to be used as part of your cross-examination, please work with our staff at the front of the room and make sure that they're fully organized so that we can make sure that we have a smooth posting process.

MS. RIDDLE: If we can do that sooner than later, so maybe in the morning folks can get the materials they may want to use that day or the next couple of days to staff, and that will make for sooner posting and ready use of the documents when you come up

for your cross.

CO-HEARING OFFICER DODUC: And I will piggyback on that. Mr. Hitchings, Mr. Cooper, and so far Mr. Lilly have done a really good job so far in terms of identifying for the record the particular document to which you are addressing your questions during your cross-exam. It's important to do that for the transcript and for the record because otherwise it will be difficult to do the cross-checking afterwards as you're reading the transcript.

So I will remind all of you when you're conducting cross-examination or even direct, for that matter, even though it's up on the screen, it's being shown and we have the flash drive, please identify what it is that you're referring to for the official record.

MS. McCUE: Excuse me. Can I add one more thing? We haven't received copies of all of the documents that have been shown to the witnesses. I have been tracking the ones that have been given a number and we have a title or we've been handed a copy.

But there's a few documents along the way that the witnesses were shown that we were never given a copy and it wasn't given a number.

CO-HEARING OFFICER DODUC: So I will direct everyone now who has conducted cross-examination, if

you have not provided the documents to Ms. McCue to do so by the end of today. Actually, you know what? By noon tomorrow, that way it will give you some time if you need to scan or whatnot. But get it to her so we can get it up on the Web site.

And from now on, what additional documents you intend to use during your cross-examination, have it available and give it to Ms. McCue by the end of the day upon which you're using it. Right?

Mr. Berliner, you had a --

MR. BERLINER: You've taken care of it.

CO-HEARING OFFICER DODUC: Actually, Ms. Morris did.

All right. Thank you. With that, we are ready to resume with cross-examination by Mr. Lilly.

JOHN LEAHIGH, RON MILLIGAN,
MICHAEL ANDERSON and MARK HOLDERMAN
called as witnesses by the petitioner,
having been previously duly sworn, were
examined and testified further as
hereinafter set forth:

CROSS-EXAMINATION BY MR. LILLY (resumed)

MR. LILLY: As I mentioned yesterday, I'm Alan Lilly, and I represent the cities of Folsom and Roseville, San Juan Water District, and Sacramento

Suburban Water District. And right now, I'll continue my questions with Mr. Milligan.

Mr. Milligan, are you familiar with the fact that the amount of water stored in Folsom Reservoir reached a historic low December of 2015?

THE WITNESS: Yes, I am.

MR. LILLY: And what was the lowest storage amount in Folsom Reservoir during 2015?

WITNESS MILLIGAN: I don't recall off the top of my head.

MR. LILLY: Can you give us a rough approximation subject to that caveat?

WITNESS MILLIGAN: I believe it was in the neighborhood of 147-, -46,000 around, oh, gosh, 9th or 10th of December.

MR. LILLY: We won't hold to you the exact number or date, but we appreciate the approximation; it's probably pretty darn close.

So are Reclamation and DWR proposing that the State Water Resources Control Board include any conditions in its order on the California Water Fix Change Petition that would require any specific minimum storage levels in Folsom Reservoir?

MR. MIZELL: Objection, compound question. Maybe the statement about DWR can be addressed to one

of the DWR witnesses.

MR. LILLY: I believe Mr. Milligan's testimony said that Reclamation was familiar with all DWR exhibits. I think it's a fair question.

MR. MIZELL: True, but not speaking for DWR.

CO-HEARING OFFICER DODUC: Enough, enough. We'll start with that. The witnesses always have the option to say they do not know or to refer the question to someone else.

But go ahead and try to answer, Mr. Milligan.

WITNESS MILLIGAN: I will say Reclamation is not.

MR. LILLY: Do you know whether DWR is proposing any such conditions?

WITNESS MILLIGAN: I don't believe they are, but I don't know for sure.

MR. LILLY: So Mr. Leahigh, do you know, is DWR proposing that the State Water Resources Control Board include any condition in its order on the California WaterFix Change Petition that would require any particular minimum storage amount in Folsom Reservoir?

WITNESS LEAHIGH: No, I don't believe DWR is.

MR. LILLY: So going back to you, Mr. Milligan, I think you testified yesterday that you

were familiar with the fact that the City of Folsom and San Juan Water District received water that's diverted from Folsom Reservoir through Folsom Dam; is that correct?

WITNESS MILLIGAN: Well, from plumbing, if you will, that draws water out of the lake.

MR. LILLY: Fair enough. And the water basically goes through the dam and then into pipes that are conveying it to San Juan Water District?

WITNESS MILLIGAN: Correct.

MR. LILLY: And Folsom?

WITNESS MILLIGAN: Yes.

MR. LILLY: And are there any other public agencies that receive water through this conveyance method?

WITNESS MILLIGAN: There are some waters that are wheeled through that -- I'll say the San Juan component of this, that it goes through that particular point of diversion, and San Juan then wheels it to City of Redding and I believe Sac Suburban.

MR. LILLY: Did you mean City of Roseville?

WITNESS MILLIGAN: Yes, I -- sorry, yes.

MR. LILLY: And then Sacramento Suburban Water District?

WITNESS MILLIGAN: Yes.

MR. LILLY: All right. And approximately how many people receive water -- I mean customers receive water -- I'd better restate that.

How many people receive water that is diverted through Folsom Dam through these conveyance facilities?

WITNESS MILLIGAN: I'm not aware.

MR. LILLY: Is it fair to say it's approximately half a million people?

WITNESS MILLIGAN: That sounds about right.

MR. LILLY: And at what reservoir storage level does the intake for this pipeline through the dam go dry?

WITNESS MILLIGAN: Well, we're not quite sure.

MR. LILLY: Okay. Tell us the Reclamation's or your best understanding of what that number, that storage amount is.

WITNESS MILLIGAN: I am not sure. We've done some studies that -- without any modifications, I believe, that could be as low as 80,000.

MR. LILLY: All right. And the reason you don't know for sure is the reservoir has never gone that low since it started operating?

WITNESS MILLIGAN: We've never gone that low, and as we talked about yesterday, it somewhat depends on the rate of flow through the systems that may be

required at a particular time.

MR. LILLY: All right. So what would happen if -- to the water supplies for these agencies that normally receive water through this intake if the intake were to go dry?

WITNESS MILLIGAN: Well, hypothetically, I think that, where Reclamation would be anticipating that, would deploy some kind of temporary pumping system to make water available to these municipalities.

MR. LILLY: All right. And is that -- has such a temporary pumping system ever actually been implemented?

WITNESS MILLIGAN: No.

MR. LILLY: So are there some uncertainties as to the capacities and exactly how well such a system would work?

WITNESS MILLIGAN: It's not been tried, so I assume that there would be some uncertainties. But a great deal of work's gone to the engineering of this. We have had, let's say, concerns that it is possible that, given the extended drought of the last couple years, that something might be needed. And we've explored various designs with the districts involved.

MR. LILLY: All right. Now, shifting forward in time from December 2015, did Folsom Reservoir fill

to the maximum amounts allowed by the applicable flood control rules during the winter of 2015-2016?

MR. BERLINER: I'm going to object on the grounds of relevancy. We've been not objecting to this line of questioning for some time, but I fail to see how this ties into the issues that are in front of the Board, and perhaps Mr. Lilly can make an offer of proof because operations at Folsom at this level have nothing to do with the California WaterFix.

CO-HEARING OFFICER DODUC: Mr. Lilly?

MR. LILLY: I'm going to establish that the operations during the winter of 2015 and 2016 and on into 2016 appear to be inconsistent with the baseline modeling that has been submitted for this proceeding, so I think it's quite relevant.

CO-HEARING OFFICER DODUC: I will allow it.

MR. LILLY: So Mr. Milligan, again -- I'll just state it this way. Do you know what the maximum storage was in Folsom Reservoir so far during 2016?

WITNESS MILLIGAN: Off the top of my head, no. I want to say it was probably closer to 800,000.

MR. LILLY: Okay. And was that basically -- was the limitation on filling it further because of the flood control rules at that time?

WITNESS MILLIGAN: No.

MR. LILLY: Why didn't it fill any fuller?

WITNESS MILLIGAN: Fairly weak inflows to the reservoir in the spring. As I think we've kind of hit upon in this testimony or cross-examination earlier, although we had near-normal water content snowpack, the runoff was considerably less than that, particularly when we got into the late May-June time frame and into July. So runoff into the reservoir tailed off pretty significantly, and that would have been the period of time when we would have seen our maximum storage.

MR. LILLY: "Would have seen," you mean under normal conditions, or I'll say average-year conditions not following a four-year drought?

WITNESS MILLIGAN: Most years, we will see the maximum storage in the reservoir at -- in the spring. So late May into June would be our maximum. There are times during extreme flood events that the lake will fill during the winter, but that was certainly not the case this last year.

MR. LILLY: All right. Now please examine Exhibit BKS-6, and I'll ask Mr. Baker to put that up on the screen. And I did hand you a paper copy of that yesterday.

And I think all the Board Members, attorneys and staff also have copies of that.

WITNESS MILLIGAN: I have it.

MR. LILLY: And, again, you don't need to read all of it right now, but did you in fact sign this letter?

WITNESS MILLIGAN: That is my signature.

MR. LILLY: Okay. And I assume, then, you wrote it and read it before you signed it?

WITNESS MILLIGAN: My staff helped prepare this under my direction.

MR. LILLY: All right. And were you responsible for preparing Reclamation Sacramento River Temperature Management Plan for 2016?

WITNESS MILLIGAN: My office was, yes.

MR. LILLY: And was that -- you say your office. Was that under your supervision?

WITNESS MILLIGAN: Yes.

MR. LILLY: All right. So now please refer to the last page of Exhibit BKS-6, which is Attachment C to the temperature management plan.

And I will say, for the record, we have not included the whole plan. It's many pages long. Our questions just concern Attachment C. Do you see Attachment C?

WITNESS MILLIGAN: I do.

MR. LILLY: Does this page state what

Reclamation's projections were for its plans to operate CVP facilities in 2016 as part of the temperature management plan?

WITNESS MILLIGAN: It's an operational forecast based on a -- in this particular case, a summary of -- dated at that particular time an estimated 90 percent exceedance hydrology.

MR. LILLY: Okay. So the first table in Attachment C, which is headed "Storages," does this in fact list the projected end-of-month storages for the various CVP reservoirs during the remainder of 2016?

WITNESS MILLIGAN: Yes, it does.

MR. LILLY: So for Folsom Reservoir, is it correct -- I just want to make sure I'm understanding this right because we have to make sure we look at the acre foot numbers and not the elevation numbers.

But it appears projected end-of-September Folsom storage was 326,000 acre feet? It's either -6 or -8. I can't tell.

WITNESS MILLIGAN: I cannot tell from this copy either, but looking at it, I would say it's -8, it's 328-.

MR. LILLY: So the projected end-of-September storage was 328,000 acre feet?

WITNESS MILLIGAN: Yes.

MR. LILLY: And the projected end-of-December storage was 218,000 acre feet?

WITNESS MILLIGAN: Correct.

MR. LILLY: So in fact, just to be clear, Reclamation's plans, at least as of July of this year, were to draw Folsom down to 216,000 acre feet by the end of December?

WITNESS MILLIGAN: If we were to experience a 90 percent exceedance hydrology, both as it related to the summer through the rest of the water year and then through the fall.

MR. LILLY: Okay. So then if it turned out that water year 2017 were a critically dry year, would there be any problems with Reclamation's ability to deliver water from Folsom Reservoir to suit the cities of Folsom and Roseville and San Juan Water District during 2017?

WITNESS MILLIGAN: It's hard to say.

MR. LILLY: But if the inflow were low, such as associated with a critically dry year, there could be problems by the end of 2017, could there not?

MR. BERLINER: Object on the grounds of vagueness as to "problems." Are we talking about the physical problems or regulatory problems? If he'd be more specific.

MR. LILLY: Okay. The witness has just described all the physical problems, so obviously that's what I was talking about. But I'll restate it.

So, Mr. Milligan, if Folsom Reservoir were to drop to 216,000 acre feet by the end of the December in 2016 and then if 2017 were to be a critically dry year, could some of the physical problems that you've previously described with getting water out of Folsom Reservoir for delivery to the cities of Folsom and Roseville and the San Juan Water District occur?

WITNESS MILLIGAN: They could, but not necessarily.

MR. LILLY: Okay. And presumably it would depend on its specific details of the hydrology?

WITNESS MILLIGAN: Correct, particularly in the American River Basin.

MR. LILLY: Now, if you could go down in the last page of Exhibit BKS-6, Attachment C, which you have before you, to the second table, this table is entitled, "Monthly River Releases." Do you see that?

WITNESS MILLIGAN: Yes.

MR. LILLY: Okay. And so -- and I realize for each entry there's both a thousand acre feet number and a cubic feet per second number. And I'm going to ask about the cubic feet per second number. So, again, I'm

focusing on the American River.

So just so we're clear, these are the projected releases from Folsom Reservoir and Nimbus Dam into the Lower American River for these months during 2016?

WITNESS MILLIGAN: These would be an average flow for the month.

MR. LILLY: Okay. For each month that's listed in the table?

WITNESS MILLIGAN: Yes.

MR. LILLY: All right. And is it -- I won't ask you about the specifics of each number, but is it fair to say that the numbers for June, July, and August are significantly higher than the numbers for September, October, November?

WITNESS MILLIGAN: Yes, they are higher.

MR. LILLY: All right. And why are the numbers for June through August for American River releases significantly higher than the numbers for the proposed September through December releases?

WITNESS MILLIGAN: Well, there's a number of factors that went into the forecast and in tandem with the temperature plan, in part to help with -- manage temperatures on the Lower American River as well as meet salinity management in the Delta and to help

support CVP operations of the Delta.

MR. LILLY: Is this mode of operations -- and I realize the specific numbers vary from year to year. But is this mode of operations with substantially higher American River releases during June through September then through October through December, has that been how Reclamation has operated the American River unit for the past several years?

WITNESS MILLIGAN: Well, this not getting to specific numbers, but the trends of being higher releases in the summer than the fall is the typical operation for Folsom.

MR. LILLY: All right. And do you know if the modeling work that is described in the exhibits that the petitioners have submitted for this hearing are consistent with these seasonal differences in American River releases?

WITNESS MILLIGAN: My recollection and review of the CalSim runs are that this general trend of higher in the summer with lower releases in the fall is pretty consistent across a lot of the output from CalSim.

MR. LILLY: So to the best of your knowledge, this trend is in fact reflected in the CalSim modeling?

WITNESS MILLIGAN: Correct. Again, the

specific numbers will vary by year to year.

MR. LILLY: All right. So let's go, then, back to your testimony which I've marked as BKS Exhibit 7. And I've -- I'll ask you to turn to Page 3 of that exhibit.

WITNESS MILLIGAN: I have it.

MR. LILLY: Okay. And I won't read the whole highlighted sentence, but is it fair to say that this paragraph states that, when there are rapid changes in Delta salinity conditions and additional Delta outflow is required to maintain the standards -- and I will quote -- "then the response may be to immediately release water stored at Folsom Lake," closed quote, to address this problem; is that correct?

WITNESS MILLIGAN: I think the text kind of stands for itself, but that's not an inaccurate representation that's there.

MR. LILLY: All right. Is that the -- the need to use Folsom Reservoir for what I'll call these rapid responses, is that primarily because it is closer to the Delta than either Orville or Shasta Reservoir, and therefore the transit time from Folsom Reservoir to the Delta is significantly less?

WITNESS MILLIGAN: The release from Folsom because of its proximity to the Delta does make it,

I'll say, the first response. But typically what will happen is there will also be simultaneous releases potentially from Orville and Shasta, as necessary, that would backfill behind that release. So although it may be the first, it's usually also the first to be backed off if it's a short-term -- a short-term need.

MR. LILLY: All right. And, now, I think you previously talked about the National Marine Fishery Service 2009 biological opinion for the Central Valley Project operations. Does that in fact impose some limitations on Reclamation's ability to use releases of water from Shasta Reservoir to implement Delta salinity and flow requirements?

WITNESS MILLIGAN: I'm not sure that we've discussed that, but there are some provisions in some of the RPAs that would suggest that we would look to use, where possible, Folsom and to some degree even Orville in partnership with DWR to meet certain requirements that would be necessary to help with temperatures on the Upper Sacramento River.

MR. LILLY: So basically, there could be times when you need to preserve the storage in Shasta for cold water pool in Shasta Reservoir?

WITNESS MILLIGAN: At least help with the management thereof, yes.

MR. LILLY: All right. So do these limitations, then, basically put more pressure on the Bureau to use Folsom Reservoir for implementing Delta salinity and flow requirements?

WITNESS MILLIGAN: I think what it does is that it requires us to look more closely at how we integrate the operations of the various projects to be able to meet the -- all the objectives.

So it does create, say, more of a challenge in creating the operation. It may or may not present a circumstance where it puts more pressure, so to speak on, Folsom.

MR. LILLY: And do you know if the modeling that has been described in the exhibits and testimony submitted for this hearing takes into account all of these, as you said, challenges in the balancing of operations between Shasta and Orville and Folsom?

WITNESS MILLIGAN: Based on my review, it does attempt to do that, although where these are more complicated is in extremely dry years. And I think as we've talked a little bit about, years like 2014-2015 really aren't quite captured in that data set.

MR. LILLY: And I think you've testified, that's one of the reasons that the Bureau and DWR had to file temporary urgency change petitions in those

years?

WITNESS MILLIGAN: Correct.

MR. LILLY: All right. Now, shifting back to the Lower American River, are you aware that the City of Sacramento operates the Fairbairn facility which diverts water from the Lower American River downstream of Folsom and Nimbus dams in the vicinity of Howe Avenue?

WITNESS MILLIGAN: Yes, I do.

MR. LILLY: And are you aware that the City of Sacramento's water right permits for this diversion contain terms that limit the City's rights to divert water when Lower American River flows are below certain rates?

WITNESS MILLIGAN: Yes.

MR. LILLY: As the CVP's operator, do you consider these permit terms in the City of Sacramento's water right permits from the Fairbairn diversion when you decide how much water to release from Folsom and Nimbus dams into the Lower American River?

WITNESS MILLIGAN: Coordination with the City is part of what goes into our decision making, and so, yes, it's considered. But we certainly -- if we need to see lower releases, it obviously depends on the time of the year, and we would be in close coordination with

the City as to what their needs are.

MR. LILLY: So if the California WaterFix project were constructed and in operation, would it affect how Reclamation does this coordination with the City of Sacramento on diversions at the Fairbairn facility?

WITNESS MILLIGAN: I don't believe it would affect how we would do the coordination, no.

MR. LILLY: Now, were you involved in CVP operations during 2004?

WITNESS MILLIGAN: Depends on when in 2004.

MR. LILLY: Okay. I know your testimony says that you became the manager of the CVP operations office in November 2004. I just wanted to know were you involved at all in the CVP operations before November, before you took that position?

WITNESS MILLIGAN: Probably minimal.

MR. LILLY: Okay. Do you remember that, in June of 2004, there was a levee break on Jones Tract in the Delta?

WITNESS MILLIGAN: Yes, I do.

MR. LILLY: And, in fact, that levee break affected Delta water quality; is that correct?

WITNESS MILLIGAN: Yes, it did.

MR. LILLY: In response to that levee break,

what changes did Reclamation have to make to its CVP operations?

WITNESS MILLIGAN: That, I am less familiar with, but it did require some increased releases across quite a few of the reservoirs.

MR. LILLY: Including Folsom Reservoir; is that correct?

WITNESS MILLIGAN: That's correct.

MR. LILLY: Do you know how much additional water Reclamation had to release from Folsom Reservoir in response to that?

WITNESS MILLIGAN: I do not.

MR. LILLY: Do you know whether or not those additional releases affected the carryover storage in Folsom Reservoir during the remainder of 2004?

WITNESS MILLIGAN: I do not recall. But it wouldn't surprise me that by September we probably had lower storage than may have been forecast.

MR. LILLY: Do any of the exhibits and testimony that the petitioners have submitted for this hearing analyze any scenarios in which the Cal WaterFix project would be operating and there would be a Delta water quality emergency similar to that 2004 Jones Tract levee break?

WITNESS MILLIGAN: I don't believe anything

like that is embedded in the CalSim modeling, or -- and I'm not aware of any other types of modeling of that type of scenario.

MR. LILLY: Now, shifting forward to 2014, are you aware that DWR initially notified its Feather River Settlement Contractors that they would receive 50 percent allocations?

WITNESS MILLIGAN: I -- I believe that was the case. But I could not tell you specifically how I became aware of that.

MR. LILLY: All right. Well, Mr. Leahigh, maybe it's -- this is probably -- in fairness to Mr. Milligan, it's better I ask you this question.

In 2014, did DWR initially notify its Feather River Settlement Contractors that they would receive 50 percent allocations?

WITNESS LEAHIGH: Yes, I believe early on in 2014, the deficiency criteria in the contract with those settlement contracts, that it was forecast to meet the threshold for a reduction in their deliveries.

MR. LILLY: And then, in fact, later on in 2014, those -- DWR increased those allocations to 100 percent; is that correct?

WITNESS LEAHIGH: Yes, the allocation was later revised to 100 percent based on the change in the

forecast which indicated that the deficiency clause would not be triggered in the contract.

MR. LILLY: All right. So I'm going to shift back to you, Mr. Milligan. Did this change in DWR's allocations for the Feather River Settlement Contractors affect how Reclamation operated Folsom Reservoir during 2014?

WITNESS MILLIGAN: Although the delivery to Feather River Service Area Contractors does maybe have some implications as relates to COA accounting, I don't know that it necessarily affected how Folsom Reservoir was operated.

MR. LILLY: So you don't know one way or the other?

WITNESS MILLIGAN: We've never done an analysis to say what might the operations have been -- if the allocation to Feather River Service Area had been at 50 percent, what the changes might have been at Folsom, no.

MR. LILLY: Now, if you can go to your testimony -- this is Exhibit BKS-7, Page 4, in the third paragraph. Do you have that in front of you?

WITNESS MILLIGAN: Which page again?

MR. LILLY: I'm sorry. It's Exhibit BKS-7, Page 4.

WITNESS MILLIGAN: I have that.

MR. LILLY: Page 4.

WITNESS MILLIGAN: I'm sorry. Yes, I have that now.

MR. LILLY: Now I'm going down to the third paragraph, and the first sentence, which I have highlighted, states, "I am aware of the modeling of project operations to support the petition before the Board." Do you see that?

WITNESS MILLIGAN: Yes.

MR. LILLY: Now, please refer to Exhibit BKS-1, the third and fourth pages. And I'll just state we previously discussed these with other witnesses. These are two pages from the 2009 biological opinion issued by the National Marine Fishery Service for Central Valley Project operations. Do you have that in front of you?

WITNESS MILLIGAN: I'm still searching for No. 1. If it's -- maybe it's best I'll just read it off the screen?

MR. LILLY: Either way. It's the same thing, same document.

WITNESS MILLIGAN: I don't seem to have with my papers No. 1 one, so I'll look here.

MR. LILLY: Okay. All right. Fair enough.

Mr. Leahigh might be able to help you. I gave him copies as well. But the screen has the exact same document.

WITNESS MILLIGAN: I'll read if from the screen, if that's okay.

MR. LILLY: Fair enough. And then I've just highlighted on the third page, "Action," Roman Numeral I.2.2C, which is entitled, "Implementation and exception procedures for EOS storage of 1.9 MAF or below." And then the next sentence says, "If EOS storage is at or below 1.9 MAF, then Reclamation shall..." Do you see that?

WITNESS MILLIGAN: Yes, I do.

MR. LILLY: Just so we're clear, that "EOS storage" is referring to end-of-season storage in Shasta Reservoir; is that correct?

WITNESS MILLIGAN: End of September, yes.

MR. LILLY: Oh, excuse me. End of September, end of water year. Thank you.

WITNESS MILLIGAN: Okay.

MR. LILLY: So then if you can go to the next page of that exhibit, Page 4 of Exhibit BKS-1, and just take a minute to review. I've highlighted Paragraph 5 and within that Subparagraphs (b) and (c). Just take a minute to read those, and let us know when you've read

those.

WITNESS MILLIGAN: Yes, I've read those.

MR. LILLY: Okay. And are you familiar with these paragraphs?

WITNESS MILLIGAN: Yes, I am.

MR. LILLY: How does Reclamation coordinate the operations of Folsom Reservoir and Shasta Reservoir to comply with these paragraphs when these conditions apply?

WITNESS MILLIGAN: Well, this is probably part and parcel to a temperature plan for a particular season and the reason we do forecast ahead to determine where we would be end of September. And also kind of in tandem with this was the temperature-targeted capability of the temperature plan.

This would be a somewhat restricted active component because, if I recall -- and I don't see the page ahead -- but this is probably if we were in a drier circumstance that temperature management would be more challenging, that we'd formulate what we could achieve and our operations through the summer in coordination with DWR; these would be the type of planning that we would do.

MR. LILLY: Okay. Does the modeling work that is described in the exhibits and testimony that DWR and

Reclamation have submitted for this hearing recognize the needs to prepare a temperature management plan like what you've just described to comply with these requirements?

WITNESS MILLIGAN: Well, these requirements are not as easy to code in because they're not hard and fast. Obviously, "last resort" means to the extent that you can do some other operations and meet some of these criteria that -- it would seem to me that the modeling, although they have hard coding of this, that for the most part it tries to meet this criteria.

MR. LILLY: Okay. So is it fair to say -- I'm trying to paraphrase what you said. The actual development of the temperature plan may not be something that could be modeled in advance because you need to know the specific circumstances at the time?

WITNESS MILLIGAN: Well, certainly it's a seasonal plan. So it's not something that we would use CalSim to -- as an example, to develop in a particular year; whereas the modeling that's been done for this petition is predominantly as it relates to this within CalSim.

So does CalSim capture these specific rules? I think it would be difficult to go to CalSim and find lines of code that have this. But to my review, we're

pretty close to what this is representing because it talks about last resort and balancing and the needs within this.

So for the resolution of the CalSim modeling, I think we've captured this pretty well.

MR. LILLY: And then, as you say, there would have to be specific refinements each year when you know the exact conditions?

WITNESS MILLIGAN: Absolutely.

MR. LILLY: Now, if I could ask Mr. Baker to put up Exhibit DWR-514, and particularly go to Page 17, which has Figure 14 on it.

Mr. Milligan, can you see that?

WITNESS MILLIGAN: Yes.

MR. LILLY: This figure is labeled, "Simulated End of September Folsom Storage"; is that correct?

WITNESS MILLIGAN: Yes, it is. And I think the "SEP" would suggest this is the end of September.

MR. LILLY: Okay, thank you. So I was just going to ask -- that kind of leads into my next question -- what is your understanding of what this figure shows?

WITNESS MILLIGAN: This is what's referred to as a exceedance probability plot of -- out of a CalSim simulation, I would assume, the collective data for

each of the years in the simulation looking at the projected end of September storages at Folsom and kind of ranking them from the lowest to the highest and kind of spacing them out as to a probability.

MR. LILLY: Okay. And the five curves that are shown in this figure are for the no-action alternative, Boundary 1 and Boundary 2 and the H3 and H4 scenarios that we've previously discussed?

WITNESS MILLIGAN: That is correct.

MR. LILLY: So is it correct that -- again, you have to look at the details here. But I want you to look at the curve, the dark blue curve, which is for Alternative 4A, H4 scenario in comparison to the black curve for the no-action alternative. If you can kind of sort of focus on those two curves out of the five. Can you do that?

WITNESS MILLIGAN: The H4 versus the black no-action curve?

MR. LILLY: Yes.

WITNESS MILLIGAN: Yes.

MR. LILLY: The H4 dark blue curve versus black NAA curve?

MR. MILLIGAN: I can pick it out.

MR. LILLY: Okay. Good. And is it fair to say that, between the -- about the 8th percent

exceedance probability and the 40 percent exceedance probability, the H4 curve is above the NAA curve?

WITNESS MILLIGAN: Yes, it is.

MR. LILLY: So does this mean that the model results indicate that the end of September Folsom Reservoir storage would be higher under the 4H [sic] scenario than under the NAA scenario during those exceedances?

MR. MIZELL: At this point, I'd simply like to note for the Board's information that this exhibit is being pulled forward from the modeling testimony, and we will have additional people who can interpret the modeling results with far more specificity.

CO-HEARING OFFICER DODUC: We'll acknowledge, but I think the witnesses can answer to the best of their ability.

WITNESS MILLIGAN: Could you repeat your question?

MR. LILLY: Yes. Just looking at -- I just want to make sure we all understand what it means that the dark blue curve is higher than the black curve between the 80 percent and 40 percent exceedance probability. So my question is does this mean that the model results indicate that the end of September Folsom Reservoir storage would be higher under the 4H scenario

than under the NAA scenario during those percentage exceedances?

WITNESS MILLIGAN: That is what it's indicated.

MR. LILLY: Yes.

WITNESS MILLIGAN: Although, I would point out -- I'm sure the modeling folks will as well -- the years that line up above and below aren't necessarily the same years. Each of the rankings across from lowest to highest are just that, and they may not be exactly the same sequence. That could be a little -- so when you take the particular exceedance, say 60 percent, and you look at the difference there, which in this case is probably one of the bigger ones, you're not necessarily looking at the same two years in the simulation.

MR. LILLY: Okay. I think that's an important clarification.

CO-HEARING OFFICER DODUC: Mr. Lilly, I'm sorry for interrupting your train of questioning. Just for matter of timekeeping, though, what additional lines of questioning do you like to explore, and how much additional time would that be?

MR. LILLY: Okay. Well, I was going to finish asking Mr. Leahigh [sic] about this figure, and then I

was going to ask him -- I have just a few other modeling questions, questions relating to his descriptions of the modeling results in his testimony.

And then I have for Mr. Leahigh just a couple of questions about a couple of aspects of his testimony.

So I estimate, depending on the length of the answers, it probably will take approximately 30 minutes, although it could be slightly more to finish both.

CO-HEARING OFFICER DODUC: Okay. Let's shoot for finishing it in 30 minutes.

MR. LILLY: All right.

CO-HEARING OFFICER DODUC: Okay.

MR. LILLY: So, Mr. Milligan, subject to that qualifications that the years may not exactly line up, though, it is fair to say that this -- during these percentage exceedances, this plot shows higher end of September Folsom storage under the H4 scenario than under the NAA scenario; is that correct?

WITNESS MILLIGAN: That's correct.

MR. LILLY: And under the H4 scenario, there would be higher Delta outflow obligations than under the NAA scenario; is that correct?

WITNESS MILLIGAN: There would be.

MR. LILLY: And also under the H4 scenario, there would be the capacity of 9,000 cubic feet per second for moving water across the Delta that does not exist in the NAA scenario; is that correct?

WITNESS MILLIGAN: I don't know if I quite agree with that characterization.

MR. LILLY: Oh, well, please tell me what I'm missing here. I thought the whole point of Alternative 4A was to build the 9,000 cfs of conveyance capacity from the North Delta diversion down to the South Delta pumps?

WITNESS MILLIGAN: That's correct, but it's not to say that there's 9,000 cfs more capacity. That would discount the existing channels in the Delta. I wouldn't -- so that's my concern is that there may be an additional conveyance, but it is just a different path than what is currently done to convey that water from that cell.

MR. LILLY: So it would probably be more accurate to say there would be new capacity of 9,000 cfs?

WITNESS MILLIGAN: I'm not sure I quite agree with -- let's say that there's the North Delta diversion in place as we've described it to be operated.

MR. LILLY: Okay. Is it really likely that end of September Folsom Reservoir storage would be higher under a scenario with increased Delta outflow obligations and the additions of the twin tunnels as compared to a no-action alternative?

MR. BERLINER: Objection, argumentative. The witness has already responded to that question.

CO-HEARING OFFICER DODUC: Actually, I'd like to hear the response again in that case.

WITNESS MILLIGAN: I will -- I, in listening to the question, see it as two parts.

So is the first part would be the question of higher outflows. My understanding of those outflows are more on the above-average water year types, which would be in the 50 percent to 100 to the 10, so the higher flows. So the area that's curved, where we had higher storage, were actually areas where that particular parameter probably isn't kicking in. So I would say that that's a non-issue with that particular part of the hydrology.

The question of, let's say, there's some new capacity, as Mr. Leahigh kind of outlined yesterday. A lot of that is -- the advantage of that is to pick up flows in the wintertime that's excess flows. So it's not affecting storages at the reservoirs. It allowing

us to pick up water that's in excess in the Delta in the winter. And to the extent that that allows us to put water into storage at San Luis in the wintertime coming to the spring allows the operators potentially to have less -- less pressure to move water across the Delta during the summer and, in these particular water year types, could actually manifest itself into slightly higher storage at Folsom.

MR. LILLY: All right. So let's go forward now and look at the curve -- it's kind of the dash-dot curve in this figure. And this is Figure 14 on Page 17 of Exhibit DWR-514.

And I want you to look at the dash-dot curve for the Boundary 2 scenario. Do you see that?

MR. MILLIGAN: Yes, I do.

MR. LILLY: Is it correct that this curve is higher than the black curve for the NAA alternative everywhere between approximately the 95 percent exceedance and down to the zero percent exceedance, except there's I think one small crossover around the 30 percent exceedance; is that correct?

WITNESS MILLIGAN: It does seem to be going all over the cross here.

MR. LILLY: Okay. So in fact this modeling -- it's your understanding that this modeling indicates

that the end of September Folsom Reservoir storage would be higher under Boundary 2 scenario than under the NAA scenario for all of these exceedance percentages except for that short crossover around the 30 percent?

MR. BERLINER: Just for clarification, at the 30 percent that you're referring to, you're then referring from 30 percent down to zero or just at 30 percent?

MR. LILLY: I think the figure is pretty darn clear.

MR. BERLINER: That's why I'm asking because, to me, it looks like it's below the black line for 30 percent onward until it gets down pretty close to zero. So I just want to confirm.

MR. LILLY: Okay. Well, Mr. Milligan, maybe you should -- I think Mr. Berliner may be raising an important clarification. So maybe you should just let us know if that's your understanding as well.

It appears that the Boundary 2 scenario is above the NAA curve between 95 percent and about 30 percent and then drops below between about 30 percent and zero percent; is that correct?

WITNESS MILLIGAN: That's my reading of the graph.

MR. LILLY: Okay. And from your experience as the operator of the Central Valley Project, do you think it's likely that the end of September Folsom Reservoir storage actually would be higher under a scenario with the -- higher Delta outflow obligations in the Boundary 2 scenario between the 90 percent exceedance down to the 30 percent exceedance?

WITNESS MILLIGAN: When we get into the Boundary 1, Boundary 2 scenario, these are something that I've spent less time with the particular features of that compared to H3, H4 runs.

But in -- they are fairly complicated. And I think the culmination of the things that are in each of those boundaries do lend themselves that this probably is not an inaccurate presentation. I think it would take a little time to understand why it's doing that. Maybe that's a question for the modelers to kind of tease out.

MR. LILLY: Okay. Fair enough. While we're still on this figure, I want to shift now down to the 100 percent to 95 percent exceedance area. And is it correct that all of these curves are flat at a storage level of about 90,000 acre feet?

WITNESS MILLIGAN: There is a kind of 90,000-acre-foot limit there.

MR. LILLY: Okay. And I think you previously testified Folsom Reservoir actually never has dropped that low since it began operations?

WITNESS MILLIGAN: That is correct.

MR. LILLY: If it were to drop to 90,000, would Reclamation have to cut off its water supplies to the entities that we previously discussed that received water directly from the dam?

WITNESS MILLIGAN: We'd have to mechanically intervene there to be able to access that last 90,000 acre feet.

MR. LILLY: Okay. And then if the storage were 90,000 acre feet at the end of September, would it be likely to drop even lower during October?

WITNESS MILLIGAN: That would depend on the releases of the inflows.

MR. LILLY: But normally October is not a big rainfall or snow year -- month, is it?

WITNESS MILLIGAN: It is not. But if we were at 90,000 acre feet at October, we'd probably see a pretty minimal release as well.

MR. LILLY: All right. And that leads into my next question, the fall run Chinook salmon spawn in the Lower American River during November through January; is that correct?

WITNESS MILLIGAN: That's my understanding, maybe a little earlier for some coming upstream.

MR. LILLY: So if you had to cut back the releases because Folsom Reservoir were at this low storage level, how would Reclamation address the needs of the fall run Chinook salmon on the Lower American River?

MR. MIZELL: Objection, strays into Part 2.

CO-HEARING OFFICER DODUC: I think he can answer that from an operational perspective.

Mr. Milligan?

WITNESS MILLIGAN: I would have to look. This is where the specific years involved in these simulations are kind of important to know what years these are so you can think about them as a total package as the operations for the year.

You don't get to 90,000 acre feet end of September quickly. That's a long kind of glide path, and we would probably come up with a plan understanding that this fall period would be very difficult for fall run Chinook and prioritize our action.

MR. LILLY: Then the steelhead spawn in the Lower American River in the approximately December through February period; is that correct?

WITNESS MILLIGAN: That's my recollection.

MR. LILLY: And the steelhead are listed as a threatened species under the Endangered Species Act?

WITNESS MILLIGAN: They are.

MR. LILLY: So would there be even more challenges for Reclamation to maintain flows in the Lower American River for the steelhead spawning if we had 90,000 acre feet of storage at the end of September and then dry conditions continued?

WITNESS MILLIGAN: I would say that would be probably a challenging scenario.

MR. LILLY: So considering these challenges for both municipal water supplies and Lower American River fisheries, is it realistic for the petitioner's modeling to have scenarios where 5 percent of the time end of September Folsom Reservoir is 90,000 acre feet?

WITNESS MILLIGAN: I think it is certainly one piece of information that would -- so we understand, given the sets of assumptions that went in, that this would be the outcome.

MR. LILLY: So it might be that the models would need to be refined to address these questions?

WITNESS MILLIGAN: It could be that some additional modeling or supplemental information would be helpful in this type of year type, which would have been something similar to change petitions,

potentially, like we saw the last couple of years.

MR. LILLY: Just so we're clear, by "change petitions," you mean the temporary urgency change petitions?

WITNESS MILLIGAN: Yes, as it relates to drought conditions. My recollections is that in many past simulations that I've reviewed where I've actually looked at the actual years that correspond to these what I'll call dead pool, the numbers are typically later in prolonged drought sequences.

So year four, five, six of prolonged drought would be the kinds of things that drive you here. And those would be the types of things that would probably beg for the situation like we saw the last couple years. We are -- we would be thinking more proactively and planning. But if we did not do anything like that, this would probably be the outcome.

MR. LILLY: All right. So I want to shift now back to your testimony and BKS-7, Page 4.

Okay. Excellent. We now have that up on the screen.

So the last highlighted sentence of the third paragraph says, "Given the operational range set forth in the project testimony, it is anticipated that new diversion points could be operated in a manner that

will not impede Reclamation's ability to meet its requirements and may add flexibility to the coordinated operations of the project."

Do you see that?

WITNESS MILLIGAN: Yes, I do.

MR. LILLY: And what do you mean by the "operational range"?

WITNESS MILLIGAN: Well, in particular, the operational range between H3 and H4 with some consideration to Boundary 1, Boundary 2.

MR. LILLY: Okay. So that's basically the range of different Delta outflow scenarios, and I believe there are also some differences in the South Delta requirements; is that correct?

WITNESS MILLIGAN: That is correct.

MR. LILLY: So this -- does this operational range include any different ranges of upstream reservoir operations other than what might be necessary to meet those changes in Delta outflow requirements and South Delta water volume requirements?

WITNESS MILLIGAN: It approaches the range of operations upstream that conform with the four scenarios we just talked about.

MR. LILLY: Okay. But the operational range does not include other variations in upstream reservoir

operations that Reclamation or DWR might decide to do for water supply reasons, does it?

WITNESS MILLIGAN: Well, the simulation tries to account for how we would operate for water supply with these scenario in place.

MR. LILLY: But there's no -- there's no real range of operations for water supply, is there? There's just one set of assumptions for water supply and then the variations are in the Delta outflow requirements and South Delta salinity requirements?

WITNESS MILLIGAN: I see those as all kind of part and parcel. We operate the project as -- at least for the CVP in an integrated fashion. So we would operate upstream based on what we needed in the Delta and to be able to balance our other commitments upstream.

So I think that the range that's represented in this set of modeling covers more or less where we would be in terms of our upstream operations, provided that's all static.

MR. LILLY: Okay. Well, let's -- I'll state it another way.

Let's assume that the State Water Resources Control Board were to adopt all the requirements for the H3 scenario and DWR and the Bureau were to build

the Cal WaterFix project and it's permit conditions required it to meet the H3 requirements. Are you okay with that assumption for this purpose?

WITNESS MILLIGAN: I think that's something that's been modeled, so I follow you so far.

MR. LILLY: Okay. So if that were the case, would DWR and Reclamation still have some substantial flexibility in how they decided to operate their upstream reservoirs with that regulatory constraint of H3 in place and with the Cal WaterFix facilities in place?

WITNESS MILLIGAN: Probably on a scale or magnitude of what we -- the latitude that we currently have within our operations.

MR. LILLY: Okay. And I don't know if you can just -- can you describe what -- it's a little hard to quantify that. But can you describe what you mean by that latitude or scale that Reclamation currently has?

WITNESS MILLIGAN: There may be any of a number of -- obviously a set of criteria isn't going to lock us into the nearest hundred cfs of release each day of the year. So there's certainly going to be some discretion between the projects and how to balance the variations in hydrology, circumstances of maintenance work with us or other partners on the rivers, and even

circumstances of the fishery. So there's some variation around a set of criteria that the projects will work around within our other obligations.

MR. LILLY: And, in fact, the DWR and Reclamation also have some discretion in deciding how to do the operations plans, like the 2016 operation plan that you described for the temperature management plan?

WITNESS MILLIGAN: We do.

MR. LILLY: So I'm going to now shift to the first page of Exhibit BKS-7. And I think you previously discussed this briefly, that you are responsible for ensuring that Reclamation meets its responsibilities related to the Federal requirements that are listed here and the State requirements and other water right permit conditions; isn't that correct?

WITNESS MILLIGAN: Yes, again, as it relates to the operation of the project.

MR. LILLY: So if the Cal WaterFix project were constructed, would there be any other constraints on Reclamation's operations of the Central Valley Project besides these types of requirements that are discussed in this sentence of your testimony?

WITNESS MILLIGAN: None come to mind to me,

but I would be willing to listen if there was. But I'm not aware.

MR. LILLY: I believe that the modeling work makes some assumptions, obviously assumes that the projects will comply with these Federal and State requirements. But it makes some additional assumptions regarding how the projects will be operated. Is that your understanding?

WITNESS MILLIGAN: Yes, it does. And whether they would fall into the terms of the biological opinion or a permit term or condition, I'm not sure. My assumption is it would be one of those types of things.

MR. LILLY: Okay. So if there were any modeling assumptions that did not fall into either a permit term or a biological opinion, would Reclamation commit to operate the Cal WaterFix project to be consistent with those other modeling assumptions?

WITNESS MILLIGAN: It would depend on what it is. There are -- there's certainly a difference or distinction to be made between a modeling assumption and something that the projects would operate to.

MR. LILLY: Okay. And we'll just leave it at that. I have to move on to Mr. Leahigh.

So if we could put up on the screen exhibit

DWR-4, which is his slides.

Okay.

WITNESS LEAHIGH: And just for clarification, this is DWR-4 not DWR-4 Errata, which is what I used for the summary of my testimony.

MR. LILLY: Okay. And I appreciate that because -- that's the one I made my notes on, but I appreciate the clarification.

So could we move to Page 34.

And I think Mr. Leahigh, you may have testified about this previously before. But under the second big bullet, it says, "Proposed CWF North Delta Diversions." And then the second line bullet below that says, "Increased opportunity to use existing water rights," and then the second sub-bullet below that says "Rediversion of stored water due to balanced conditions." Do you see that?

WITNESS LEAHIGH: Yes, I see that.

MR. LILLY: So is it possible that there could be changes in the amounts of stored water that are released during that balanced conditions for rediversion through the North Delta facilities if the Cal WaterFix is built?

WITNESS LEAHIGH: Yes. As I testified a number of times now, there would be opportunities to

redivert stored water in maybe the late spring period. That may be just a shift in seasonal timing, perhaps, in some years. Other years, in the winter years, I think I testified that that could be, on the balance, additional rediversion of water for that season.

MR. LILLY: Okay. And are any of those types of changes discussed in your written testimony that's Exhibit DWR-61?

WITNESS LEAHIGH: I believe I have the same statement here, if it's shown in this PowerPoint, in my written testimony.

MR. LILLY: Okay. Just that qualitative statement, but no additional detail; is that correct?

WITNESS LEAHIGH: No additional detail, that's correct. I think it was pointed out that I did talk about the rediversion of stored water occurring in winter years. So I did -- I do think I added that qualifier.

MR. LILLY: Okay. Can you tell us where in your written testimony, Exhibit, DWR-61 that discussion occurs? Because I'm not trying to be difficult, but I could not find it.

WITNESS LEAHIGH: Yeah. I apologize. I'm going to need a copy of my testimony. I -- I believe it may have been pointed out during the

cross-examination by Mr. Cooper.

MR. BAKER: Excuse me. Do we need DWR-61 up?

MR. LILLY: Yes, I would like DWR-61 on the screen.

And I just have a few more questions, Ms. Doduc. But if it would help for him to take a break to look at his Exhibit 61, to look at it, we could do that. It's certainly your decision.

CO-HEARING OFFICER DODUC: Mr. Leahigh, do you need some time?

WITNESS LEAHIGH: I think I've found it.

MR. LILLY: Oh, okay.

MR. BAKER: Before we go on, just to clarify, it's DWR Page 35 in the Errata for DWR-4. So what BKS -- I can't recall -- that was just up shows 34, but in the errata, it's Page 35.

MR. LILLY: Okay. I appreciate the clarification.

That was not a BKS exhibit. I had just asked for DWR-4 to be put up there. But if you put up DWR-4 amended, that would have the different slide number. So I appreciate the clarification.

So Mr. Leahigh, have you found the point to in your written testimony, Exhibit DWR-61 where it discusses the potential changes in operations of

upstream reservoirs with Cal WaterFix project in place?

WITNESS LEAHIGH: Yeah, I think I found it. But if I can have just maybe 20 seconds to make sure this is the right location.

MR. LILLY: Please go ahead. I think you can have a little more than that if you need to because I understand your testimony does go on for several pages.

I was hoping they'd stop the clock, though.

CO-HEARING OFFICER DODUC: So your generosity of time does not extend to your time. Okay?

MR. LILLY: That's a nice way of putting it. Thank you. The clock is still running. It's okay. We're almost done.

MR. BAKER: Yeah, I believe, Mr. Lilly, can you direct me to the page number on DWR-61?

MR. LILLY: No, I'm asking Mr. Leahigh to do it for us.

WITNESS LEAHIGH: Yes, I believe it would be Page 16, the top of Page 16.

MR. LILLY: So are you referring to Lines 1 through 4 on Page 16 of Exhibit DWR-61?

WITNESS LEAHIGH: Yes.

MR. LILLY: And is there any other discussion that provides any more detail than this in your written testimony about how the changes in operations of

upstream reservoirs could occur with the Cal WaterFix project?

WITNESS LEAHIGH: Offhand, offhand I don't recall there being any additional language.

MR. LILLY: All right. If we could move forward to Page 19 of Exhibit DWR-61 and particularly down near the bottom of the page. And I'll just read at Page -- excuse me -- at Line 22, it refers to the proposed operating rules for CWF. And my question is what are those proposed operating rules? And please take a minute to read the whole sentence so you have the context of the question.

WITNESS LEAHIGH: Yes, okay.

MR. LILLY: So what are the proposed operating rules for CWF that you're referring to here?

WITNESS LEAHIGH: So this paragraph was in reference to the example that I gave for hypothetical California WaterFix operation this past spring and the reference there to "during drier periods."

So there would be, under the hydrology that we experienced this spring, there would have been a great opportunity to divert additional excess flows. But some of that could be offset by other periods of time where the proposed operating rules under California WaterFix would actually result in lower available

diversions.

And that would -- those circumstances would result from maybe drier conditions where we're not actually able to utilize the North Delta diversion. And because the California WaterFix would have more restrictive Old and Middle River requirements in the South Delta diversion, a combination of those two factors could result in actual, at times, lower diversions overall with the California WaterFix in place.

In fact, there are very small examples of that in the graphic that I -- that was put together.

MR. LILLY: Okay. So these proposed operating rules refer to the potential additional limitations on South Delta diversions and potential limitations on when the North Delta diversion could be used; is that correct?

WITNESS LEAHIGH: Yes, that's correct.

MR. LILLY: Okay. So now if you can just flip back to Page 7, I'll ask Mr. Baker to flip back to Page 7, at Lines 13 through 15.

There's -- at Line 13, it says, "A quantitative analysis of system operations under both the current system and the outer boundaries can be found in the modeling testimony."

What do you mean by "outer boundaries"?

WITNESS LEAHIGH: Yes. So that would be Boundary 1 and Boundary 2.

MR. LILLY: Okay. Thank you.

Now, there was some discussion yesterday about the Banks Pumping Plant capacity, which I believe you said was 10,300 cubic feet per second; is that correct?

WITNESS LEAHIGH: Yes, with all units functioning, that that's the physical capacity of the pumping plant, yes.

MR. LILLY: Yes. And then I think you also said that, between March to mid December, the Corps of Engineer permit for the Clifton Court facility limits DWR's ability to take water from the Delta into Clifton Court to 6,680 cubic feet per second; is that correct?

WITNESS LEAHIGH: Yes, that's correct for the most part.

MR. LILLY: Okay. And I just want to make sure I did the math right. But if we take 10,300 minus 6,680, the difference is 3,620; is that correct?

If you want, you can write it out or use your calculator. I'm not trying to be difficult. I'm just asking you if one minus --

WITNESS LEAHIGH: If we're just talking the subtraction, yes, I'll take your word for it that

that -- that seems to be about the right number.

MR. LILLY: Okay. I think I got it right. So in fact, if there were a scenario or circumstance where DWR was diverting at the full authorized Corps permit rate of 6,680 cubic feet per second from the Delta into Clifton Court and the North Delta diversion facility were in place -- and I understand there may be some bypass flow limitations, but assuming the bypass flow limitations were not a factor here -- DWR could divert that additional 3,620 cubic feet per second from the North Delta diversion and convey it to Banks and then run it through the Banks Pumping Plant; is that correct?

WITNESS LEAHIGH: Well, I'm not sure I have all the information I'd need for your hypothetical here. It would certainly depend on how much water supply was in the system. We certainly couldn't divert additional supply if it wasn't available.

MR. LILLY: Oh, I'm not saying you always could. There at least could be some circumstances where, if the supply was available in the system, you could divert that additional 3,620 cubic feet per second at the North Delta diversion; is that correct?

WITNESS LEAHIGH: Yeah, as a hypothetical. Again, I don't know that I have all the information I

need, but, yes, in theory, with all of the pumping units available and the water supply meeting all of the North Delta diversion criteria, theoretically, that would be possible.

MR. LILLY: All right. I understand that there would be some caveats that you would have to know for the specific circumstances.

So then my follow-up question is, if there were a joint point of diversion authorization, there at least could be some times when Reclamation could release additional water from Folsom or Shasta Reservoir, and that water could be diverted at the North Delta diversion under these circumstances and run through the Banks Pumping Plant; is that correct?

MR. BERLINER: Objection, vague and ambiguous. If -- are you referring to when full diversions are taking place on the State-side plus additional CVP water, or CVP water instead of the additional amount of State water that you referred to?

CO-HEARING OFFICER DODUC: Mr. Lilly?

MR. LILLY: I'll clarify. I thought I was clear, but it's fine. I'll clarify.

So, Mr. Leahigh, my hypothetical assumption is DWR is diverting at the full permitted capacity of 6,680 from the Delta into Clifton Court.

And my question is, under those circumstances, if DWR were not diverting any water at the North Delta diversion but the joint point of diversion authorization were in place, could there be some sometimes when the Bureau of Reclamation could release water from Folsom Reservoir or Shasta Reservoir and that up to 3,620 of that could be diverted through the North Delta diversion?

WITNESS LEAHIGH: Well, again, this is going to depend on a lot of factors. It's not entirely clear what the scenario is. I think the most likely scenario, if we were utilizing all of that capacity, is that it -- the source of that water would be excess flows in the system.

It's very unlikely that for pumping levels that high the source of the water would be stored water releases. It's much more likely that would be a diversion of excess flows.

CO-HEARING OFFICER DODUC: But the capacity is there?

WITNESS LEAHIGH: The capacity is there.

MR. LILLY: So under at least some circumstances, it's possible that there could be that additional rediversion of water release from storage?

CO-HEARING OFFICER DODUC: Please answer --

WITNESS LEAHIGH: It's highly unlikely.

CO-HEARING OFFICER DODUC: That's fine. That's fine. Please answer the question, Mr. Lilly.

MR. LILLY: I'm on to my last question.

CO-HEARING OFFICER DODUC: Good, because you're out of time.

MR. LILLY: I have two more questions. If I could ask Mr. Baker to refer to Exhibit DWR-61, which we already have up, and just the next page, Page 8.

And again, at lines -- going from Lines 3 to 5, basically at Line 5, this says that the historical hydrology over the past several drought years are truly unprecedented. Do you see that?

WITNESS LEAHIGH: Yes, I do.

MR. LILLY: And then the last slide, if Mr. Baker can put up Exhibit DWR-4, Page 30.

MR. BAKER: Just to clarify, we're going to open the DWR-4 Errata exhibit.

MR. LILLY: Okay. So then it will probably be Page 31, if my numbering is right. Okay. Thank you.

So -- and Mr. Leahigh, I think you previously testified that this scatter plot shows annual precipitation and annual average temperature; is that correct?

WITNESS LEAHIGH: Yes, that's correct.

MR. LILLY: And the black squares are the basically for the years since 2000?

WITNESS LEAHIGH: Yes. I was just going to say, if you're going to have an in-depth question on this chart, I would probably refer you to Mr. Mike Anderson, who prepared this chart for me. He might be better expert to answer the question.

MR. LILLY: Okay. And that's fine.

Mr. Anderson, we did want to make sure you got to answer a few questions today.

WITNESS ANDERSON: Thank you.

MR. LILLY: And my question really is fairly simple. Does this figure show, in fact, a trend toward warmer average annual temperatures since 2000 compared to the previous years?

WITNESS ANDERSON: It show that in the 21st century, the observations have been at or above the period record average.

MR. LILLY: For the temperature?

WITNESS ANDERSON: For the temperature.

MR. LILLY: And at least in some years the precipitation has been below the average as well; is that correct?

WITNESS ANDERSON: That is correct.

MR. LILLY: So, I mean, obviously none of us

can predict the future. But isn't it fair to say that these unprecedented drought conditions that have occurred in the past could in fact occur again in the future?

WITNESS ANDERSON: It is possible, yes.

MR. LILLY: So with that, Ms. Doduc, I don't have any more questions. I would like to offer the revised versions of Exhibits BKS-1, 2, and 3 into evidence. The only difference from what I submitted several days ago is I've added labels so they say Exhibits BKS-1, 2, and 3 at the bottom.

CO-HEARING OFFICER DODUC: Just for a matter of consistency and to help us with organization, I will ask that exhibits be identified but not moved into the record for now. And we'll save all of that towards the end.

MR. LILLY: Okay. Well, I was going to ask to move the other exhibits, BKS-4 through 7, but I think you've told me I should wait.

CO-HEARING OFFICER DODUC: Yes.

MR. LILLY: So, and with that, Mr. Anderson, Mr. Milligan, and Mr. Leahigh, thank you very much for attention to my questions.

CO-HEARING OFFICER: Thank you. And with that, we will take a 15-minute break, and we will

resume at 10:35.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. It's 10:35.

We will resume with cross-examination by Mr. Kelly.

I'm sorry. Before you begin, Mr. Kelly, my understanding is that will complete cross-examination by Group 7; is that correct?

MR. KELLY: That's my understanding as well, unless anyone else has follow-up.

MR. LILLY: So Ms. Doduc, before Mr. Kelly starts -- and this is Alan Lilly.

CO-HEARING OFFICER DODUC: Mr. Lilly, I think you can lift up the microphone. I'm in pain watching your back.

MR. LILLY: I just unstuck the duct tape, but thank you.

I just wanted to clarify about the exhibits. You said you would consider that later. And just so we want to make sure we're here at the right time, is later at the end of this panel or at the end of DWR's entire case?

CO-HEARING OFFICER DODUC: Yes, later would be at the end of Part 1A.

MR. LILLY: Okay. Thank you very much for the clarification.

CO-HEARING OFFICER DODUC: Thank you for requesting it. We are so polite.

Mr. Kelly, please begin.

MR. KELLY: Thank you. And I have a few documents that I'm going to reference. I provided those to Mr. Baker. Those documents are excerpts from materials that have already been offered by other parties. I provided them to Mr. Baker solely for convenience. There's no modifications or highlighting on any of those.

CROSS-EXAMINATION BY MR. KELLY

MR. KELLY: So good morning, gentlemen. I have a few follow-up questions from the questions asked by Mr. Hitchings, Cooper, and Lilly. And I'd like to start, Mr. Milligan, with you.

And if staff could pull up DWR-1 Errata, I have Page 7 from that exhibit.

And, Mr. Milligan, are you familiar with what's depicted in DWR-1 Errata, Page 7 -- I'm sorry, Page 8?

WITNESS MILLIGAN: Yes, I am.

MR. KELLY: And did you have the opportunity to watch any of Mr. Bednarski's engineering

presentation last week?

WITNESS MILLIGAN: Unfortunately, no.

MR. KELLY: Okay. In Mr. Bednarski's testimony, he showed some videos of tunnel construction. And he showed some pretty detailed depictions of the North Delta diversion facilities, the tunnel and the pump stations at Clifton Court Forebay. And so I have some questions for you to see if the lift pumps at Clifton Court Forebay are the end of the line, so to speak, as far as the CVP is concerned.

Do you know whether or not there are any facilities that will connect the North Clifton Court Forebay to Federal facilities in the South Delta?

WITNESS MILLIGAN: By that do you mean, in essence, the existing Clifton Court Forebay, where the -- whereas they've bifurcated it here?

MR. KELLY: Let's talk that through. My understanding is that the North Delta diversions, the water diverted from the North Delta diversions will end up in the northern part, the new northern segregated part of the Clifton Court Forebay and that the existing Clifton Court Forebay will be expanded to the south, will remain roughly the same size, and that southern portion of Clifton Court will operate independent of the northern part and will still receive water through

the gates of Clifton Court.

Is that your understanding as well?

WITNESS MILLIGAN: That is.

MR. KELLY: So do you know whether or not there's any connection of any type between the new Northern Clifton Court Forebay and the Federal facilities in the South Delta?

WITNESS MILLIGAN: I'm not sure what those are, but I do believe that there were arrangements being made for that.

WITNESS LEAHIGH: Yes, this is John Leahigh, and that's my understanding as well, that there would be a connection between the filtered water from the North Delta diversion that feeds into the northern bifurcated part of Clifton Court that would connect directly to Jones Pumping Plant.

WITNESS MILLIGAN: And there's a kind of pinkish-colored canal that's depicted on this figure.

MR. KELLY: And that was the facility I was going to ask about. And when you say a pink-colored line, I see a -- what I think is a pink-colored line that runs from right about the middle of Clifton Court Forebay on the left-hand side of that diagram, goes straight down to -- it's not depicted on there, but it's the Byron Highway, and then runs -- appears to run

roughly paralegal to the Byron Highway into what's labeled the Delta-Mendota Canal. Is that what you're talking about, Mr. Milligan?

WITNESS MILLIGAN: That's my understanding.

MR. KELLY: And so after Mr. Bednarski testified and, frankly, after your testimony yesterday with respect to the joint point of diversion of the South Delta, I went back and I looked at Mr. Bednarski's testimony, and I looked at the environmental documents. And the environmental documents reference a connection via siphon.

Mr. Bednarski has a single line in his testimony that references a cross-connection from the intake of the State Water Project to the intake channel of Jones Pumping Plant.

Are you aware of any such facility being proposed as part of this project?

WITNESS MILLIGAN: I think that is consistent with this diagram, that that place, what's labeled here as the Delta-Mendota Canal, is the approach channel to the Jones Pumping Plant.

MR. KELLY: So the Jones Pumping Plant is essentially the beginning of the Delta-Mendota Canal, or the DMC. So where the words "Delta-Mendota Canal" are there, that's not really the Delta-Mendota Canal;

that's the approach channel, correct?

WITNESS MILLIGAN: I would probably make that distinction.

MR. KELLY: Okay. And so do you know how water will get from North Clifton Court Forebay into the approach channel of Jones Pumping Plant, whether or not that approach channel will be otherwise segregated from the Delta?

WITNESS MILLIGAN: I'm not that familiar with that part of the design at this point.

MR. KELLY: And so has reclamation -- whoever can answer this question is fine. Has either reclamation or DWR done any analysis of the operation of the North Delta diversions with that interconnection into the approach channel of Jones Pumping Plant?

MR. LEAHIGH: I'm pretty sure that's been done, but I personally don't know the specifics of that.

MR. KELLY: So from an operational perspective, are either of you able to provide any testimony with respect to how those facilities will operate?

WITNESS MILLIGAN: I think that the level that we're having this discussion, I think that that's probably more of an engineering design question. I

think that we were more prepared to think about, let's say, the overall operation of the projects, how water would get to the Delta and be diverted. And then this is a much finer resolution in terms of just how this design will work.

And this is an area where a number of design options have been looked at and probably will continue to be defined.

MR. KELLY: So I appreciate that. And when the engineering panel was here, they deferred operational questions to this panel. So my question isn't about the engineering of that cross-connection facility. My question is with respect to the operation of that facility in conjunction with a new North Delta diversion.

So are either of the -- are any of the panelists able to discuss how that cross-connection facility would work in conjunction with the Jones Pumping Plant?

WITNESS MILLIGAN: Not to a great level of resolution, which I'm thinking is what your question is related to. I think it will be functional in theory to move CVP water from the North Delta through the tunnel into the forebay and then find its way into the approach channel to Jones Pumping Plant.

MR. KELLY: Do you know whether the approach channel will be physically separated from the Delta while those operations are occurring?

WITNESS MILLIGAN: My assumption is that it would be during that operation, but I don't know what the design of that looks like.

MR. KELLY: So do you know if any facilities are proposed as part of this project that would accomplish that separation?

WITNESS MILLIGAN: My assumption is that they would have to be to keep that separation. I think, from a quality standpoint, that that would be part of the project, to separate what might -- in many cases, a higher quality water, means less salinity, to separate that from kind of backing into the Delta.

MR. KELLY: But from an operational perspective, neither DWR nor Reclamation has considered that as part of the operations of this project?

WITNESS MILLIGAN: Well, at least for Reclamation, not myself. That would probably be some -- this has probably had a great deal of thought, but I'm not aware of exactly where it stands at this point.

MR. KELLY: Mr. Leahigh, for DWR would that be the same?

WITNESS LEAHIGH: Well, generally yes, the diversions from the North Delta, which would be screened, have fish screen, that water would be -- would come -- would feed into the both Banks and Jones at a point downstream of the other existing fish facilities because that water would already be screened.

So I'm not sure exactly the details of your question or if that gets to your -- what you're asking.

MR. KELLY: Do you know any more about the operation of that facility as part of the California WaterFix project?

WITNESS MILLIGAN: Generally, I -- I know that part of it. But sitting here right now, I don't recall all the details.

MR. KELLY: Following up on Mr. Lilly's question with respect to the ability to utilize the South Delta diversion facilities in conjunction with the North Delta diversions, is there a scenario under which you cannot currently operate South Delta facilities, both Federal and State, and that the California WaterFix project would give you that flexibility such that you could operate the State facilities at their maximum physical capacity and the Federal facilities at their maximum physical capacity?

WITNESS LEAHIGH: Well, the limit of the North Delta diversion is the 9,000 cfs. So that -- if your question was if we were unable to divert from the south and the north only? I'm sorry.

MR. KELLY: If you were unable to divert at the full physical capacity from the South Delta, could you, in combination with the -- a combination of the North Delta facilities and some diversion of the South Delta facilities, would you be able to move water, export water, at the full physical capacity of Banks and Jones given the interconnection between the North Clifton Court Forebay and Jones Pumping Plant?

WITNESS LEAHIGH: Yes, my understanding is that would physically be possible under the right conditions.

MR. KELLY: Thank you.

WITNESS MILLIGAN: I guess I'd add it could be possible without that interconnection. There could be a circumstance where Jones Pumping Plant was diverting at its max capacity strictly from the South Delta as we are now, and the State project could have a combination of water through the tunnel and some additional Clifton Court intake to be able to operate this.

MR. KELLY: What's the full physical capacity of the combined facilities?

WITNESS MILLIGAN: Just short of 15,000 cfs, I would think.

MR. KELLY: And at what times of the year can those facilities be operated to export that full physical capacity?

WITNESS MILLIGAN: Most likely winter during high flows, particularly if the San Joaquin River is running high.

MR. KELLY: When you say "winter" how would you define "winter" in months?

WITNESS MILLIGAN: Well, I would envision that maybe as a January, February, potentially March time frame where you would see high flows like that.

MR. KELLY: And so in your opinion as an operator of the project, would the existence of a California WaterFix with diversions from the North Delta and the interconnection between North Clifton Court Forebay and Jones Pumping Plant expand that window under which you could operate facilities, those facilities, anywhere near that capacity?

WITNESS MILLIGAN: I'd have to go back to the modeling to see if that's actually the case. Obviously it would have to be done in a way that is available water, as John's mentioned. And that's been a bit difficult to put our -- to identify that there's much

outside the realm of what's typically been done.

MR. KELLY: So if we were to assume that the North Delta diversion facility would enable the projects to pick up that additional water, is it possible that the window would increase to allow exercise of anywhere near the maximum physical capacity of any of the projects -- of the export pumps? Is it possible?

WITNESS MILLIGAN: I think we really should go back to the modeling output to see -- there may be some combination of events that would allow that. I think that we would look at that, see what those were.

But most likely, it incorporates times where you have excess flows in the system.

MR. KELLY: Mr. Leahigh, would you concur with that, or would you answer that differently?

WITNESS LEAHIGH: No, I think for the most part I concur. It's a little difficult question to answer, just -- expanding the window maybe under certain years, and, again, it depends on which scenario we're talking about for WaterFix.

MR. KELLY: Let's talk about the scenario that DWR is proposing as part of the WaterFix. Under the scenario that you're proposing with the project that you're proposing, would those opportunities be more

frequent?

MR. MIZELL: Objection, vague and ambiguous. We have a range of scenarios. Can we take it one by one, if it pleases the Board?

CO-HEARING OFFICER DODUC: Actually, no. I understand Mr. Kelly's question very well, and so the witness will please answer.

WITNESS LEAHIGH: Well, depending on the scenario, again, under certain months, it may expand the window, and other months, it might shrink the window. So on the aggregate, it's hard to say.

CO-HEARING OFFICER DODUC: I think that's the best answer you're going to get, Mr. Kelly.

MR. KELLY: That's fine.

CO-HEARING OFFICER DODUC: Please move on.

MR. KELLY: Thank you.

Mr. Leahigh, yesterday, in response to some questions about the capacity related to what we've been talking about, you had responded -- and correct me if I'm wrong. I don't want to mischaracterize what you said. But you had said it depends on what conditions are imposed on the project with respect to the ability to move water.

Is that a fair characterization of how you responded to those questions yesterday?

WITNESS LEAHIGH: I believe that was my response to some of the questions yesterday, part of my response.

MR. KELLY: I'm sorry?

MR. BERLINER: Part of my response to some of the questions yesterday, that I do -- that's my recollection.

MR. KELLY: And DWR has proposed this WaterFix project, correct?

WITNESS LEAHIGH: Yes.

MR. KELLY: And as part of the preparation for the submittal to the Board, DWR has spent a considerable amount of time and money studying the project; isn't that correct?

MR. LEAHIGH: Yes.

MR. KELLY: So when I ask my questions about the ability of DWR to move water, I want to know what the ability to move water is under DWR's proposed project. And so I guess what I'd like to know is -- let me break this down.

The California WaterFix project will be operated as part of an integrated State Water Project, correct?

WITNESS LEAHIGH: Yes, I believe that's part of the proposal.

MR. KELLY: And the CVP and the State Water Project are operated in an integrated fashion through the COA; aren't they?

WITNESS LEAHIGH: Yes.

MR. KELLY: And is it your testimony that the Department of Water Resources has not considered the full range of possibilities of the movement of water with the California WaterFix as part of an integrated system that includes the State Water Project and CVP?

WITNESS LEAHIGH: No, I believe we have considered a range of possibilities as part of our proposal.

MR. KELLY: And so in considering that range of possibilities, have you determined whether or not there's going to be additional opportunity to move stored water when you otherwise would not be able to do so without WaterFix?

MR. MIZELL: Objection, asked and answered.

CO-HEARING OFFICER DODUC: Let's let Mr. Leahigh answer that.

WITNESS LEAHIGH: Well, I think we would have to look at the modeling results to really know how that -- how that fits into the various range of proposals. I think my testimony is this is how I -- I see new facility in place on how it would affect the ability to

move unstored water, redivert unstored water. I think I've testified a number of times under what conditions that would occur and the limited nature of that.

MR. KELLY: Are you familiar with the modeling that's been conducted as part of the WaterFix project?

WITNESS LEAHIGH: Yes, I'm familiar with it.

CO-HEARING OFFICER DODUC: Mr. Kelly -- Mr. Kelly, let me interrupt. We'll stop the clock for you.

Mr. Leahigh or Mr. Milligan, for that matter, from your understanding of the modeling of the various scenarios, was there any distinction made in terms of the movement of water -- in terms of the movement of water whether there was stored water or unstored water? Was that distinction made as part of the modeling parameter?

WITNESS LEAHIGH: Well, I think you can get at that answer indirectly by looking at the end-of-year storage levels --

CO-HEARING OFFICER DODUC: Okay.

WITNESS LEAHIGH: -- amongst all the scenarios. And when I look at the results of the modeling, I see end-of-year storage levels very similar on all of the scenarios.

So that tells me that seasonally they're -- in

the drier instances, in the drier-to-average years, at least as it relates to the State Water Project, I don't see that in the drier-to-average years there's additional stored water being moved as part of the project.

CO-HEARING OFFICER DODUC: So would your answer to Mr. Kelly's question be that you did consider that as part of the end -- the reservoir storage?

WITNESS LEAHIGH: Yes.

CO-HEARING OFFICER DODUC: Does that help, Mr. Kelly?

MR. KELLY: It does.

So I have a follow-up question.

Has the Department of Water Resources considered whether there would be additional opportunities to move stored water that's not reflected in the modeling submitted as part of the WaterFix project?

WITNESS LEAHIGH: Yes, I have considered it, just based on my professional expertise as the State Water Project operator, that the -- under those dry and average years, we're moving -- we're essentially moving all of the stored water that we're comfortable with in those particular years but that there may be opportunities, as I've testified numerous times, in

some of the wetter years where we're very flush with storage, that there may be some opportunities to move some additional stored water with an expanded capacity through the Delta.

MR. KELLY: That's helpful. So you said that -- you qualified the release of additional stored water in dry years to what you're comfortable with. Can you explain to me what that means?

WITNESS LEAHIGH: Yes. So what that means is, as part of our planning process for project operations, we are continuously evaluating what our responsibilities are in terms of meeting regulatory -- all regulatory requirements, all of our contractual requirements. So we're continuously evaluating the amount of storage that we have available to meet all of those needs. And so we're looking at all of those first.

If there's additional storage available, we would consider moving that for our south of Delta deliveries. But until we've established that we have the storage to meet those other needs, you know, there's some flexibility on how much additional storage we can move for our south of Delta customers.

MR. KELLY: And so with WaterFix project in place, do you know whether there would be sufficient

flexibility to make a judgment call to move additional stored water in dry years?

WITNESS LEAHIGH: Well, so the circumstances today with the capacity that's available to us today, that, most of those drier years, we're not using the full capacity we have today to move stored water.

So in the future, with expanded capacity, conveyance capacity across the Delta, I don't see we would be using any of that additional capacity in those drier to average years.

MR. KELLY: So, again, you said most of the time you have excess capacity. I'm wondering whether or not there's any scenario under which you could exercise your judgment in a dry year with a California WaterFix project in place where you could move additional stored water?

WITNESS LEAHIGH: Again, we wouldn't be moving it if it would be affecting our ability to meet our other regulatory or contractual requirements.

MR. KELLY: Are there any written policies or permit conditions currently that you're aware would prohibit you from doing that?

WITNESS LEAHIGH: Well, we're required to meet all of our regulatory requirements and contractual requirements. So those would be the written components

that you're taking about.

MR. KELLY: Do any of those requirements mandate that you maintain a certain level of storage?

WITNESS LEAHIGH: No, because it's -- it's not as simple as that. There are various factors that are going to affect -- that we have to take into consideration when making these decisions on evaluating whether we have sufficient storage, so projected inflows, projected release requirements, a number of things. So it actually would be counter-productive to set a -- a single value that would work for all circumstances.

MR. KELLY: So a range of values, then, might be more appropriate to account for variability in runoff and other factors?

WITNESS LEAHIGH: Well, I don't know -- I wouldn't necessarily go with a range. Again, there are a number of factors involved that would need to be assessed.

MR. KELLY: Mr. Milligan, would your answer differ at all from Mr. Leahigh's?

WITNESS MILLIGAN: I wouldn't say differ. I guess I would add that many of our contractual obligations don't tell us how to do it. They tell us -- basically lay out what our obligations are. And

those still remain in play. So those are -- we'd spend some time talking about full array of what those things are. We aren't asking for any changes in those.

MR. KELLY: Do you know whether or not the California WaterFix, if constructed, would enable Reclamation to move additional stored CVP water south of the Delta?

WITNESS MILLIGAN: Not outside the range I think John described. I think he did a good job in terms of the drier range of the hydrologies and probably the mid range. The capacity that we have currently is one that meets those needs. And the times would be when it's wetter, there's excess water available. And the real benefit here is a flexibility of management of the Delta, how that water moves across the Delta, and to pick up those unstored flows.

MR. KELLY: So as part of your decision making process in the operation of the CVP, is there a certain amount of judgment that you have with respect to the releases of stored water to move to different areas of the state?

WITNESS MILLIGAN: I'll say flexibility or to be able to think about how to position water in storage -- obviously, again, within all the contractual and physical limitations, and we're talking about one

change of a physical limitation. But contractually, regulatory-wise and just the realities of hydrology kind of guide us to what's the right balancing of where the water should be at a particular time.

MR. KELLY: And who makes the determination of how to exercise that flexibility?

WITNESS MILLIGAN: Well, that's -- that assignment is to, in the case of the CVP, to the Central Valley operations office, of which I'm the head of.

MR. KELLY: So it's your office. So ultimately, you are the last person that okays or says no to using that flexibility?

WITNESS MILLIGAN: I would say that that would probably fall with the regional director and then maybe the Commissioner of the Bureau of Reclamation. But the group assigned to come to that and do that on a day-to-day basis is the operations office.

MR. KELLY: And so the way that that flexibility is exercised can differ depending on who exercises that flexibility, who makes those decisions, correct?

WITNESS MILLIGAN: I think it's probably more variation of the situation that sits before them. But all of these things are the judgment of professionals

that are doing this on a day-to-day basis.

MR. KELLY: Absolutely. And if somebody else was in your position, they might exercise that flexibility and make a judgment call different than the way you might make it, correct?

WITNESS MILLIGAN: Probably within the same construct and framework, there may be slight variations, yes.

MR. KELLY: But flexibility --

CO-HEARING OFFICER DODUC: Mr. Kelly, Mr. Kelly, I think you've gone down this path as far as you have between you and the other cross-examiners on this topic.

MR. KELLY: I'll move on. I'll move on.

CO-HEARING OFFICER DODUC: I want you to move on.

MR. KELLY: Mr. Baker, can you pull up SWRCB-83, please, from the files I gave you.

And this is Page 18 out of the -- I believe it's the 2009 Biological Opinion.

Mr. Milligan, are you familiar with that document?

WITNESS MILLIGAN: Yes, I am.

MR. KELLY: And do you know what an RPA is?

WITNESS MILLIGAN: Yes, I do.

MR. KELLY: What is an RPA?

WITNESS MILLIGAN: That is a reasonable and prudent alternative. That's an acronym for "reasonable and prudent alternative."

MR. KELLY: And are those alternatives that are included in a biological opinion that you comply with? Or how are RPAs relevant to you in the operation of the project, of the CVP?

WITNESS MILLIGAN: They make up a set of guidance or operating criteria, if you will, to avoid jeopardy or adverse modification to a federally listed or threatened or endangered species.

MR. KELLY: Okay. And so this RPA -- do you know what this RPA does or tells you to do?

WITNESS MILLIGAN: I know what the objective of it is.

MR. KELLY: What's the objective? Let's start there.

WITNESS MILLIGAN: It's stated there. It's to help establish a quantity of water going forward in terms of preserving a cold water pool for Shasta Reservoir.

MR. KELLY: And does it direct in a certain percentage of years to hit minimum end-of-September storage in Shasta?

WITNESS MILLIGAN: That is the objective, with the caveat of dealing with extended drought periods. I need to scan this really quick. I need to crane my head many one direction to speak directly to you and to read the text.

MR. KELLY: Yeah, if you want to take a minute to read it, that's fine. And I've only got a few minutes left. So I'm going to wrap this up really quick.

WITNESS MILLIGAN: It talks about ten-year running periods, measured in, as I said, ten-year running averages which do not explain -- which aren't explained by the hydrologic cycles, e.g., extended drought.

So there is a consideration that, in a ten-year period, you're going to have potential between extended drought periods which some of these, you know, very general averages do not apply.

MR. KELLY: Fair enough. If we were to look at exceedance plots, would Reclamation come close to meeting those minimum end-of-September storage targets in those percentage of years on exceedance plots, if you know?

WITNESS MILLIGAN: If you look at the exceedance plots for the modeling that was done in the

biological assessment for this consultation, you would find that, yes, because that was the basis for those averages.

MR. KELLY: Okay. Can you pull up now DWR-514. And I have Figure 12, which is Page 15 of that exhibit.

So this was in materials submitted by DWR. And what this shows is the results in exceedance probability under no-action alternative, Boundary 1, H3, H4, and Boundary 2; is that correct?

WITNESS MILLIGAN: Yes, this is similar to the Folsom plot of the same type we saw just a little bit ago.

MR. KELLY: And the no-action alternative is the solid black line; is that correct?

WITNESS MILLIGAN: That is correct.

MR. KELLY: Okay. And this shows -- if you could just scroll up a bit or -- I never know whether to say scroll up or down.

I want to see the top of the page. This says "End-of-September Shasta storage," correct?

WITNESS MILLIGAN: Yes.

MR. KELLY: All right. So if we can flip very quickly back to SWRCB-83, so that says in 87 percent of years, the minimum end-of-September storage should be

2.2 million acre feet. Am I reading that correct?

WITNESS MILLIGAN: Yes.

MR. KELLY: So let's go back -- 87 percent of years 2.2-. Let's go back to DWR-514. And let's scroll so you can see the percentage exceedances.

So if I look on that chart at roughly the 87 percent exceedance, and I look at where the no-action alternative is, it looks to me like the no-action alternative here, 87 percent of years, is roughly 1.7 million acre feet.

Is that a rough -- an accurate but rough approximation of where the no-action alternative shows end-of-September storage on that plot?

WITNESS MILLIGAN: It's a little hard to see on the black line. It's kind of jogging there, so.

MR. KELLY: 1.6- to 1.8 million acre feet for the 87 --

WITNESS MILLIGAN: Probably. It looks like there's a couple of data points there that are in the mix that are probably, again, difficult to tag.

MR. KELLY: Okay. But certainly not 2.2 million acre feet, correct?

WITNESS MILLIGAN: No. That's correct.

MR. KELLY: And would you expect in a condition without WaterFix, that Reclamation would

attempt to operate the project consistent with the biological opinions?

WITNESS MILLIGAN: As it relates to this topic?

MR. KELLY: Yes.

WITNESS MILLIGAN: Given the difficulty and since 2008 and the number of drought years that we've experienced in there, it's been difficult to peg where we are in that ten-year average.

But this may be an area, as we're going to reconsult with NOA fisheries, to tune this up a bit.

MR. KELLY: So let me ask it this way. The way that the no-action alternative is plotted on this graph, the no-action alternative does not meet all existing regulatory requirements; isn't that correct?

MR. MIZELL: Objection, calls for a legal conclusion.

CO-HEARING OFFICER DODUC: I think he can interpret that.

Mr. Milligan?

WITNESS MILLIGAN: I would not take it that way, no.

CO-HEARING OFFICER DODUC: How would you take it?

WITNESS ANDERSON: Could I interject real

quick here? I apologize.

CO-HEARING OFFICER DODUC: Mr. Anderson?

WITNESS ANDERSON: I think an important point to be made here is you're asking a difference over a ten-year average versus a plot constructed from individual years, which has already been stated these years are not aligned chronologically. And that creates a fundamental difference between the two numbers that makes this pointless.

MR. KELLY: Well, so what I'm trying to understand is I'm looking at exceedance probabilities for carryover at Shasta that don't appear to meet the RPAs in the BiOps.

WITNESS ANDERSON: This isn't any individual year. The BiOps require a ten-year running average.

MR. KELLY: Do you know, anybody on the panel, whether there was any modeling conducted of the no-action alternative to determine whether or not the no-action alternative complied with the requirements in the BiOps?

MR. MIZELL: I'm going to object as to relevance. This is asking questions about the existing projects and their compliance with regulatory requirements and is not focused on the California WaterFix and what it might achieve.

MR. KELLY: If I may, Ms. Pierre testified during her testimony that the no-action alternative complied with all existing regulatory requirements. I'm just trying to confirm whether or not they've actually determined that to be true.

CO-HEARING OFFICER DODUC: Please answer.

WITNESS MILLIGAN: I think this modeling output is consistent with the biological opinions.

MR. KELLY: Thank you. Last question. This shows Shasta getting close to 500,000 acre feet of storage end of September in roughly about the 95 percent exceedance, correct -- or 550-, or 600,000 acre feet?

WITNESS MILLIGAN: Depending upon which one of the lines you're looking at that wiggles down there a little bit, but roughly.

MR. KELLY: Has Shasta ever gone that low?

WITNESS MILLIGAN: No, it has not.

MR. KELLY: Do you know what assumptions were made in the modeling runs that produced this graphic? In other words, let me maybe focus that a little bit.

Do you know whether or not the modeling runs that were used to generate this graphic included project operations including the export of stored water?

WITNESS MILLIGAN: Which one of the lines?

MR. KELLY: The no-action alternative.

WITNESS MILLIGAN: Yes, it did.

MR. KELLY: Do you know, where the -- do you have any opinion or any knowledge as to where the no-action alternative line would be if you removed exports from the no-action alternative?

WITNESS MILLIGAN: No.

MR. KELLY: And I guess, you know, one of the things, Mr. Milligan, that trouble me when I look at this graph is I hear a lot of people talking about how climate change crashes the reservoirs and how all of this is a result of climate change. And when I start to understand what's in the modeling, that there's still water being exported and released for other requirements, it appears to me that climate change might not be the driver of those reservoir levels, that it's the assumptions that are in CalSim that drive the reservoirs that low.

Is that a fair characterization of why we see reservoirs that low in 5 percent of years?

WITNESS MILLIGAN: In this particular case, it is. There are assumptions embedded in CalSim that have been there since the inception of CalSim for its purpose of comparative modeling that do drive the

reservoirs collectively.

Trinity saw the same kind of phenomenon as Folsom that take it down because it prioritizes meeting the D1641 and senior water right obligations at the expense -- if it means taking the reservoir down to this level, that's what CalSim does.

MR. KELLY: Does it ever prioritize getting water to San Luis or to the Exchange Contractors?

WITNESS MILLIGAN: It does to the Exchange Contractors.

MR. KELLY: Okay. No more questions. Thank you.

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

That concludes cross-examination by Group 7.

Group No. 8? Is not here.

Group No. 9, Mr. O'Brien.

CO-HEARING OFFICER DODUC: Mr. O'Brien, do you anticipate taking about an hour?

MR. O'BRIEN: Hopefully a little less.

CO-HEARING OFFICER DODUC: All right.

Then we will take our lunch break after Mr. O'Brien finishes;

No pressure, Mr. O'Brien.

MR. O'BRIEN: None taken.

CROSS-EXAMINATION BY MR. O'BRIEN

Good morning, members of the Board and staff. Good morning, panelists.

I'm Kevin O'Brien. I'll be asking questions this morning on behalf of the North Delta Water Agency and Reclamation Districts 99926D and 26DA, which all divert water within the North Delta Water Agency.

And I believe most of my questions will be for Mr. Leahigh.

If we could pull up DWR Exhibit 306, which is the 1981 North Delta Water Agency contract? Thank you.

First question, Mr. Leahigh, are you generally familiar with this contract?

WITNESS LEAHIGH: Yes, generally familiar.

MR. O'BRIEN: Is it part of your job as chief of State Water Project operations to make sure the State project is operated in compliance with this contract?

WITNESS LEAHIGH: As far as the -- the water quality criteria in this contract, yes. Typically, it doesn't require a lot of focus in that when the D1641 standards are being met, typically it means all of the criteria are being met in the contract.

MR. O'BRIEN: I'm going to ask my question again.

As the chief of State Water Project operations, is part of your job to ensure that the State Water Project complies with this contract?

WITNESS LEAHIGH: Yes.

MR. O'BRIEN: I'd like to take a look at some of the provisions of the contract. Let's start with Recital A. I won't read it aloud, but it's highlighted on the screen. If you could just take a look at Recital A.

Is that recital a fair summary of the purpose of the contract as you understand it?

WITNESS LEAHIGH: Yes.

MR. O'BRIEN: Let's flip over to Article 2. I think it's on the next page. Yes, 2A, Roman I, "Water Quality." It says, "The State will operate the SWP to provide water qualities at least equal to, better of: 1, The standards adopted by the SWRCB as they maybe establish from time to time, or, 2, The criteria established in the contract as identified on the graphs included as Attachment A."

Is that also consistent with your understanding of the water quality requirements of the contract?

WITNESS LEAHIGH: Yes.

MR. O'BRIEN: So as I understand that, and I

want to see if you understand it the same way, where the State Water Board has establish a water quality objective in the Delta but the contract, Attachment A, water quality objectives are more stringent, the State Department of Water Resources would be required to comply with the more stringent Attachment A requirements; is that your understanding?

CO-HEARING OFFICER DODUC: Mr. O'Brien, actually, for my benefit, could you repeat the question.

MR. O'BRIEN: Sure. I just -- there's two possibilities in terms of applicable water quality requirements. There's the State Board objectives, which are currently contained in D1641. We know what those are. And then there's also these Attachment A water quality objectives that are part of this contract.

And I'm trying to establish that, under this 2A, Roman I, the State is required to comply with the more stringent of those two things when they're not exactly the same.

CO-HEARING OFFICER DODUC: Thank you.

Mr. Leahigh?

WITNESS LEAHIGH: Yes. As my understanding, I will say as I stated up front, that, if we are meeting

the -- the D1641 standards are more onerous, generally, than the terms in this contract.

MR. O'BRIEN: Is that always the case?

WITNESS LEAHIGH: I believe that's the -- that's always the case. Yes.

MR. O'BRIEN: So you're not aware of any situations where the water quality requirements of the 1981 contract control over and above the D1641 water quality requirements?

MR. MIZELL: Objection, misstates the witness's testimony.

CO-HEARING OFFICER DODUC: That's what I heard him say.

Mr. Leahigh, correct it if it's wrong.

WITNESS LEAHIGH: Yeah, I think if -- as long as the two projects are meeting the D1641 standards, at times very specific to the locations on the graphs in this contract, the D1641 objectives are -- are there's a higher requirement.

During other periods, if we're meeting Water Quality Control Plan standards, the incidental effects on some of the other criteria in this contract are also being met.

MR. O'BRIEN: Are you aware that there's a period of time later in the year -- typically I believe

it would be in the August time frame -- where the water quality requirements for the 1981 contract are actually more stringent than the D1641 requirements?

WITNESS LEAHIGH: No, I'm not familiar with that. I'm not sure if that is the case.

MR. O'BRIEN: Do you know either way?

MR. BERLINER: Asked and answered.

WITNESS LEAHIGH: Yeah. As I stated, I've reviewed the criteria in this contract, and generally it's my belief, if we're meeting the D1641 objectives, then we're always satisfying the conditions for water quality in this contract.

MR. O'BRIEN: Okay. Thank you. The water quality objectives set forth in Attachment A include some monitoring locations; is that correct?

WITNESS LEAHIGH: Yes.

MR. O'BRIEN: In terms of the Western Delta, do you recall that, at least in this original contract, Emmaton was the location of the monitoring location?

WITNESS LEAHIGH: Yes, in the original contract, that was the case. And my understanding, that was amended by a subsequent contract.

MR. O'BRIEN: There was an amendment to the contract that moved the monitoring location; is that correct?

WITNESS LEAHIGH: That's correct.

MR. O'BRIEN: And moved it to what location?

WITNESS LEAHIGH: Three Mile Slough.

MR. O'BRIEN: Okay. I'd like to move now to Article 12-A of the contract. This is the remedies provision. I'll just read the highlighted section.

It says, "If the water quality in Delta Channels falls below that provided in this contract, then at the request of the Agency, the State shall cease all diversions to storage in SWP reservoirs or release stored water from SWP reservoirs or cease all export by the SWP from Delta Channels or any combination of these to the extent that such action will further State compliance with the water quality standards set forth in this contract, except that the State may continue to export from Delta Channels to the extent required to meet water quality requirements in contracts with the Delta agencies specified in Section 11456 of the California Water Code."

As the chief operator of the State Water Project, do you operate in accordance with that provision?

MR. BERLINER: I'm going to object. We've not objected before, but we're getting into questions about contract interpretation between two parties. This is a

private contract, so to speak. It's not the subject of the WaterFix. If there's some relation here to operations of WaterFix, I think that's fair game. But asking to go through contract provision by provision and how the Department is meeting or not meeting it is really an issue as between the agency and the Department. It is not appropriate for jurisdiction before the Water Board.

CO-HEARING OFFICER DODUC: Mr. O'Brien?

MR. O'BRIEN: The focus of Part 1A of this hearing is the question of whether California WaterFix will cause injury to legal users of water.

California case law makes clear that injury can include violations of contractual rights; that's the Rovi decision. This is a contract between the State of California and North Delta Water Agency. Our position is that the California WaterFix project will cause violations of this contract. I'm going to be getting into the specifics of that here in a minute.

I think this is very relevant to what this proceeding is about.

CO-HEARING OFFICER DODUC: I agree. The objection is overruled. Please continue with your questioning.

WITNESS LEAHIGH: I think, yes, I do believe

we follow the provisions of this, the provision you point out in the contract.

MR. O'BRIEN: I'd like to now change focus to DWR-4 which is the PowerPoint, Page 22. It's one of the pie charts.

MR. LONG: Can you repeat that exhibit number?

MR. O'BRIEN: I believe it's DWR-4. It's the PowerPoint that was used for Mr. Leahigh's testimony.

CO-HEARING OFFICER DODUC: I think we had a discussion yesterday about using the original submitted exhibits instead of the errata version because cross-examiners prepare their questions based on that.

So I think just as a matter of consistency when he asked for 4, and not 4E, please bring up 4 because otherwise we'll have to keep correcting the page number.

CO-HEARING OFFICER D'ADAMO: I would just ask, for reference, if staff could note the errata page number as well, for those of us that are going off the errata.

MS. McCUE: So when the exhibits are entered --

CO-HEARING OFFICER DODUC: Okay. What is the easiest way to do it.

MS. McCUE: My understanding was that DWR

would offer the errata into the record. So is both DWR-4 and DWR-4 Errata going to be offered into the record? That's why we were trying to keep it to the errata, tie it to the errata page.

MR. O'BRIEN: And I'm fine using the errata, I've got -- as the Chair mentioned, I prepared based on the original, so --

CO-HEARING OFFICER DODUC: I just want to be consistent in how we do it. So then going forward, we will pull up the errata version, and we will make corrections as necessary when referencing the page number if the cross-examiner is operating from the non-errata version.

MR. O'BRIEN: Thank you.

CO-HEARING OFFICER DODUC: Okay.

MR. O'BRIEN: I believe I need the next page, which is 22.

CO-HEARING OFFICER DODUC: Yes.

MR. O'BRIEN: I need the pie chart for Emmaton, so let's figure out what's --

MR. LONG: 20 maybe?

MR. O'BRIEN: Page 20. There you go. Thank yo.

Mr. Leahigh, you discussed this pie chart in your direct testimony. This is a chart though shows,

as I understand it, the percentage of compliance with the water quality requirements at Emmaton. You said these are the D1641 water quality requirements?

WITNESS LEAHIGH: Yes.

MR. O'BRIEN: And as I understand it --

WITNESS LEAHIGH: Well, I'm sorry. Just to clarify, it's a combination of both 1485 and D1641.

MR. O'BRIEN: Okay. Thank you.

As I understand this pie chart, it essentially indicates that the State Water Project and the CVP have been out of compliance with the Emmaton standard during this 1984-to-2015 time period approximately 2.6 percent of the time; is that correct?

WITNESS LEAHIGH: Yes. And just to be clear, this is the original document. And this is and -- this contains one of the errors, and the reason for the errata is the time frame is not correct. It should be 1978 through 2017 -- 2015.

MR. O'BRIEN: Okay. Thank you for that clarification.

And you mentioned earlier that, for the North Delta contract, instead of measuring water quality at Emmaton, we now monitor water quality at Three Mile Slough; is that correct?

WITNESS LEAHIGH: That is correct.

MR. O'BRIEN: Where is Three Mile Slough located in relation to Emmaton in the Delta?

WITNESS LEAHIGH: Three Mile Slough is located upstream of Emmaton on the Lower Sacramento River.

MR. O'BRIEN: So the way the North Delta contract works in terms of this particular water quality requirement is there's a numerical requirement that must be met at Three Mile Slough; is that generally correct?

WITNESS LEAHIGH: That's generally correct, yes.

MR. O'BRIEN: My question is whether the Department has prepared a similar noncompliance analysis for the requirements of the 1981 North Delta contract at Three Mile Slough?

WITNESS LEAHIGH: No, we have not.

MR. O'BRIEN: As you sit here today, can you tell me how many times the Department has been out of compliance with the Three Mile Slough water quality requirements of the 1981 contract?

WITNESS LEAHIGH: I can't say for certain, but I know that the criteria in the North Delta Water Agency contract, the numbers are similar to D1641, and generally the water quality is significantly fresher at the Three Mile Slough location, being upstream on the

Sacramento River.

So in my estimation, typically there would not be periods where we would have exceeded those criteria.

MR. O'BRIEN: Ever?

WITNESS LEAHIGH: Well, certainly last year, during the emergency drought conditions, as part of the temporary urgency change petition, the -- part of our petition was to move the criteria for Emmaton upstream of Three Mile Slough.

And even with that modification, which was allowed, we continued to struggle with meeting the requirement at that location. And so not only did we -- so we did have some exceedances of the modified standard last year. So I believe that was also the case, then, for the North Delta Water Agency contract as well.

MR. O'BRIEN: So just so the record's clear, in 2015, there were exceedances of the water quality requirements of the North Delta contract at Three Mile Slough; is that correct?

WITNESS LEAHIGH: That is correct, as the criteria. That's not the entire contract. But as far as the criteria are concerned, that is the case.

MR. O'BRIEN: At Three Mile Slough?

WITNESS LEAHIGH: At Three Mile Slough.

MR. O'BRIEN: I'd like to pass out two exhibits. I've included these on a thumb drive, and I'll pass these out to counsel and the witnesses and to the Board.

MS. McCUE: I just want to take a second because what we had up here was DWR-4 Page 20. So DWR-4 Errata, if you can open that, I think it was Page 21 was the same pie chart.

Okay. So it's Page 22 in DWR-4 Errata, for the record. Thank you.

MR. O'BRIEN: If we can pull up on the screen a document -- it's a graph that's been marked NDWA-1.

(North Delta Water Authority Exhibit NDWA-1 marked for identification)

MR. O'BRIEN: Mr. Leahigh, I'll represent that this is a plot that was prepared by MBK Engineers. It was not prepared for this proceedings. It's part of a regular reporting that MBK Engineers does for the North Delta Water Agency Board of Directors, and it's part of the public record from a board meeting of the Board last year.

This -- and I realize this graph is not something you've seen before. So let me take a moment to orient you.

The green line represents the water quality of

the Sacramento River at Emmaton. And then the blue line represents water quality for the Sacramento River at Three Mile Slough. So the green line would be D1641 water quality location, and the blue line would be the 1981 contract water quality location. The North Delta Water Agency contract water quality criteria is depicted in the red line. And the D1641 requirements for water quality are depicted in the dashed line.

So I guess my question to you, sir, is whether this data depicted on NDWA-1 is consistent with your understanding and recollection of what occurred at least during the early part of 2015 with respect to water quality at the Three Mile Slough location and the Emmaton location.

MR. MIZELL: I'm going to object to the relevance of this line of questioning, given this is talking about a drought period that's not included within the California WaterFix.

And I would just say that we're talking about current operations, current compliance, current contractual standards and not the future.

CO-HEARING OFFICER DODUC: Mr. O'Brien, is it the same rationale that you provided earlier to Mr. Berliner's objection?

MR. O'BRIEN: That and the fact that DWR has

opened the door to the question of past compliance with water quality requirements with their pie chart. And the question of future compliance with water quality requirements of the contract, I think, is a significant issue, which I'll be getting into here shortly.

CO-HEARING OFFICER DODUC: Agreed.

Overruled.

Please continue.

MR. O'BRIEN: Let me repeat my question, Mr. Leahigh. It's actually quite simple.

I just want to see if this NDWA-1 is reflective of your general understanding of what happened in terms of water quality at the Three Mile Slough and Emmaton locations back in the spring and early summer of 2015.

WITNESS LEAHIGH: Yeah, as you stated, this is the first I'm seeing these graphics. But assuming the data on them are correct, generally I am aware that under the emergency drought situation there was some exceedances of the criteria in the North Delta Water Agency contract.

MR. O'BRIEN: Let's now move to NDWA-2, the next plot.

(North Delta Water Authority Exhibit NDWA-2 marked for identification)

MR. O'BRIEN: It's basically the same year, just later in the year, and I'll ask you the same question.

Does this plot -- is it consistent with your general understanding of what happened with respect to water quality at the Three Mile Slough and Emmaton locations in 2015?

WITNESS LEAHIGH: Yes, I -- I don't know the specifics on the dates, but I know that there were exceedances of the criteria last year, as I've testified.

MR. O'BRIEN: Are you aware that any of the land owners in the North Delta Water Agency claimed any injury as a result of these water quality violations?

WITNESS LEAHIGH: Well, I do know that our contract with North Delta Water Agency does have provisions that apply in emergency drought years and that there is a claims process as part of the provisions of the contract.

MR. O'BRIEN: And are you aware that claims of injury based on these violations have been submitted?

MR. BERLINER: Objection, relevance. Now we're into a direct dispute between North Delta and the Department.

CO-HEARING OFFICER DODUC: Please answer.

WITNESS LEAHIGH: No, I'm not familiar with the specifics of any claims against the Department.

MR. O'BRIEN: But you are aware that claims have been submitted?

WITNESS LEAHIGH: I'm not surprised. I guess I would put it that way.

MR. O'BRIEN: I'll leave it at that. I'd like to now refer to DWR Exhibit 66, which is the testimony of Mr. Nader-Tehrani. And I've provided a highlighted version of that exhibit. I'd like to refer to Page 5, Lines 16 and 20. If you could just take a moment to read the highlighted lines there, Mr. Leahigh.

First of all, have you had a chance to review this portion of Mr. Nader-Tehrani's testimony before?

WITNESS LEAHIGH: I have reviewed Mr. Tehrani Nader -- Nader-Tehrani's testimony, yes.

MR. O'BRIEN: And this 18 to 19 percent figure that's in this highlighted provision, is it your understanding that that's an average annual projected increase in EC at Emmaton?

WITNESS LEAHIGH: I don't know the specifics of this. I'm actually a little bit more familiar with the graphics, the exhibits that went with Mr. Nader-Tehrani's testimony.

MR. O'BRIEN: So you don't know whether this

18 to 19 percent figure could be higher, for example, in certain years such as low flow years, drought years? Do you have any understanding about that?

WITNESS LEAHIGH: No, again, I don't recall the specifics of this particular paragraph. I'm more familiar with his -- the graphics as part of his exhibit.

MR. O'BRIEN: Are you aware of any analysis that's been done by DWR regarding the impacts on farmers in the North Delta of this projected 18 to 19 percent increase in EC at Emmaton?

MR. MIZELL: Objection, misstates the evidence. There are caveats that go along with this that Mr. Tehrani will be explaining when he's before the Board to explain his testimony that's represented on the screen.

CO-HEARING OFFICER DODUC: Rephrase your question, Mr. O'Brien.

MR. O'BRIEN: Let me break it down.

Mr. Leahigh -- and I'm certainly not trying to misrepresent Mr. Tehrani's testimony as we've put it on the screen. I'm just simply trying to get at the question of whether there's been any analysis within DWR that you're aware of of the ultimate effect of any increases in EC at Emmaton that would be caused by the

California WaterFix project on farmers within the North Delta Water Agency.

WITNESS LEAHIGH: Yes, I'm familiar with the modeling that was used to reach some of these conclusions. And this actually goes directly to my testimony in that, with respect to the exceedances or the water quality differences, in this particular instance, I don't see that the -- for this time frame on a day-to-day operation that the modeling is -- doesn't account for the response capabilities in real time to respond to salinity intrusion at various locations in the Delta.

But as -- the model is generally good in comparative purposes on more of a monthly time step.

MR. O'BRIEN: I'm going to move to strike that answer as completely non-responsive to my question.

My question is really quite simple, which is whether there's been an analysis of the impacts on farmers of this projected change in water quality. He did not answer that question, and I'd like to strike it.

CO-HEARING OFFICER DODUC: Mr. Leahigh, please answer that specific question.

MR. MIZELL: I'd like to just note that the questioner's asking an analysis and a modeling question

of an operator. And Mr. Leahigh is doing his best to provide him with an answer that's based upon his expertise.

CO-HEARING OFFICER DODUC: The question, though, is to his knowledge was such an analysis conducted.

WITNESS LEAHIGH: Analyses have been conducted on the part of the modelers and myself in terms of our abilities to meet the Water Quality Control Plan objectives as they relate to agricultural interests in the Delta.

MR. O'BRIEN: I'm going to ask my question one more time.

Has an analysis been done, to your knowledge, by the Department of Water Resources of the impacts on farmers in the North Delta of the projected increases in EC at Emmaton as described in Mr. Nader-Tehrani's testimony? I think it's a yes or no question.

CO-HEARING OFFICER DODUC: It is a yes or no question.

To your knowledge.

WITNESS LEAHIGH: Very specifically, no. I --

CO-HEARING OFFICER DODUC: Thank you.

WITNESS LEAHIGH: -- stand by my statement.

CO-HEARING OFFICER DODUC: Mr. O'Brien?

MR. O'BRIEN: I'd like to move back to the 1981 contract briefly, Article 6. If you could take a moment just to read Article 6, Mr. Leahigh, let me know when you're ready.

WITNESS LEAHIGH: Okay.

MR. O'BRIEN: Are you familiar with this provision of the 1981 contract?

WITNESS LEAHIGH: I'm not real familiar with it.

MR. O'BRIEN: Are you generally familiar with it?

WITNESS LEAHIGH: Generally.

MR. O'BRIEN: Are you aware that, within the North Delta Water Agency, a number of the farmers that irrigate utilize the gravity siphons.

WITNESS LEAHIGH: I'm not aware of the specifics.

MR. O'BRIEN: But you're aware generally that gravity siphons are used in the North Delta?

WITNESS LEAHIGH: I'm aware that there's diversions occurring in the North Delta.

MR. O'BRIEN: With gravity siphons?

WITNESS LEAHIGH: I'm -- again, not the specifics.

MR. O'BRIEN: I'm not asking for specifics. I'm just asking whether you're aware that water diversions in the North Delta occur through the use of gravity siphons. I think, again, it's a yes or no question.

MR. MIZELL: I'm going to object. Asked and answered and argumentative.

CO-HEARING OFFICER DODUC: Hold on.

Mr. Leahigh, please answer yes or no.

WITNESS LEAHIGH: No.

MR. O'BRIEN: So you have no awareness of the use of gravity siphons in the North Delta?

MR. BERLINER: Objection, asked and answered.

MR. O'BRIEN: Okay. I'll withdraw that.

CO-HEARING OFFICER DODUC: We'll take that as a "no," Mr. O'Brien.

MR. O'BRIEN: Thank you.

I'd like to now refer back to Mr. Nader-Tehrani's testimony, DWR-66, Page 9, Lines 11 through 23.

MR. LONG: Sorry. The page again?

MR. O'BRIEN: Page 9, Lines 11 through 23.

If you could just take a moment to read the highlighted language.

WITNESS LEAHIGH: Okay. I've read it.

MR. O'BRIEN: Are you ready?
WITNESS LEAHIGH: Yeah.
MR. O'BRIEN: First of all, are you generally familiar with this aspect of Mr. Nader-Tehrani's testimony?
WITNESS LEAHIGH: I'm generally familiar with it.
MR. O'BRIEN: So you're generally aware that the modeling projects that there will be reductions in surface water levels in the area of the vicinity of the proposed new intakes as described in this highlighted paragraph?
WITNESS LEAHIGH: Yes, as described in the paragraph, which was -- yes.
MR. O'BRIEN: As I read this paragraph -- and I want to see if you have a same understanding -- it basically says that during lowest flow or lower flow conditions that the projected reduction of water levels would be about half a foot or six inches; is that correct?
WITNESS LEAHIGH: This appears to be what it states, yes.
MR. O'BRIEN: And when we talk about a change in water levels of half a foot, is it your understanding that that change would be caused by the

operation of the California WaterFix project?

WITNESS LEAHIGH: Well, I didn't develop this testimony. I think it speaks for itself. It talks about limited area of influence, but it does talk to this effect being as a result of the additional diversions at that -- at the petitioned intake locations.

MR. O'BRIEN: Thank you. To your knowledge, has DWR performed any analysis as to the impact of these projected reductions of the water surface elevations as shown in this highlighted testimony on legal user's of water within the North Delta Water Agency?

WITNESS LEAHIGH: I don't know.

MR. O'BRIEN: You're not aware of any such analysis?

WITNESS LEAHIGH: I'm not aware, but I couldn't say definitively for DWR if that's the case.

MR. O'BRIEN: Okay. Mr. Milligan, are you aware of any such analysis that's been done by the Bureau of Reclamation?

WITNESS MILLIGAN: No I'm not.

MR. O'BRIEN: Mr. Leahigh, I'm going to switch gears here a little bit now and go back to some testimony that Mr. Bednarski provided.

He told me in response to a question I asked that, to his knowledge, the requirements of the 1981 North Delta Water Agency-DWR contract were not taken into consideration in the development of the conceptual design for the California WaterFix project. Do you have any reason to disagree with that?

WITNESS LEAHIGH: I -- yeah, I have no knowledge as to whether the provisions were part of the development of the proposed project.

MR. O'BRIEN: To your knowledge, has the Department proposed any terms and conditions in connection with the proposed approval of the change petition that would require the Department to meet the requirements of the 1981 contract?

WITNESS LEAHIGH: I'm not aware of any such provisions.

MR. O'BRIEN: If the North Delta Water Agency were to propose that, as a condition for approval of the change petition, DWR be required to meet all requirements of the 1981 contract, would you have an objection to that?

MR. BERLINER: Objection, relevance. This particular witness --

CO-HEARING OFFICER DODUC: Mr. Berliner, I didn't hear you.

MR. BERLINER: Objection as to relevance. This witness is an operator for the Department, is not in setting policy or -- policy of the Department regarding meeting particular contracts.

CO-HEARING OFFICER DODUC: Mr. O'Brien?

MR. O'BRIEN: Well, Mr. Leahigh is the chief of State Water Project operations. He's certainly at a very high level in the Department of Water Resources. I think the question of terms and conditions that might be attached to any State Board order is a pretty relevant issue in this proceeding.

And I'm simply asking if he would have concerns about that.

CO-HEARING OFFICER DODUC: All right. I will allow the question.

Please answer.

WITNESS LEAHIGH: Well, I think it would be rather redundant in that we already have an agreement in place.

MR. O'BRIEN: But my question is whether you would have any objection to including the various requirements in the agreement in the State Board approvals.

WITNESS LEAHIGH: I would not.

MR. O'BRIEN: You're familiar with the Delta

Cross Channel, Mr. Leahigh?

WITNESS LEAHIGH: Yes.

MR. O'BRIEN: Can you just generally describe that facility and it's general operations.

WITNESS LEAHIGH: Well, being that it is a Bureau facility, I might want to refer you to Mr. Milligan for having the most expertise on that particular facility, since it's operated by the -- owned and operated by the Bureau of Reclamation.

MR. O'BRIEN: Fair enough. We haven't had a chance to talk to you much, Mr. Milligan. So if you could maybe just give a very brief summary of the Delta Cross Channel operations?

WITNESS MILLIGAN: Sure. The Delta Cross Channel has been a part of the CVP in the Delta for a great many years, and it's used to help manage salinity in the Delta and facilitate the movement of water from the north, from Sacramento River down towards the pumping plants.

We do operate it in -- at times open and closed to try to manage the flow of water in the Sacramento River, both in terms of flows and salinity in the Sacramento and try to balance that with freshening of flows and water in the Central Delta.

There are periods of time that the gate needs

to be closed because -- because of migrating salmonids that can wander into the Central Delta and have less ability to migrate. So that does dictate some of the timing on closing. So it's not just a bar quality set of criteria. There's also considerations for fish migration as well.

MR. O'BRIEN: Is it your understanding that the operation of the Delta Cross Channel can affect water quality -- and I'm talking about EC here -- at Emmaton and Three Mile Slough?

WITNESS MILLIGAN: Yes, it can.

MR. O'BRIEN: Can you just briefly describe how that works?

WITNESS MILLIGAN: Sure. The water, the quality of the water coming down the Sacramento River is typically of a good quality as it relates to salinity. And adjusting how much flow goes down the main stem of Sacramento River which would then go to Emmaton -- versus then to the Central Delta which may have an effect on Jersey Point and that central part of the Delta salinity -- in essence, one could manipulate that with opening and closing the gate.

The gates there are very large, it's not something to be done lightly. We do a lot of this in conjunction with projected tight cycles and

anticipation of wind, flows, and things may be changing in the Sacramento River as well.

It is a facility that would be closed during higher flows on the Sacramento for flood considerations. We don't want to raise water levels in Central Delta to the point where they may present a flood risk as well, so that's a -- sometimes the area is also a consideration of when we close the gate.

MR. O'BRIEN: To your knowledge, Mr. Milligan, as part of the project description for the Cal WaterFix project is there any proposal to change the way the Delta Cross Channels operate?

WITNESS MILLIGAN: No. No, I haven't seen anything that would suggest that we would have to change the same lines of thinking in terms of how it would operate.

MR. O'BRIEN: I'd I like to go back to Mr. Leahigh for just a few more questions.

We talked about Mr. Nader-Tehrani's testimony regarding projected changes in water levels as a result of the Cal WaterFix project.

If those changes in the water levels were to affect the ability of farmers in the North Delta Water Agency to operate their diversions, in your mind, would that be a serious cause of concern?

WITNESS LEAHIGH: Are you saying that the operations at the new facility would impact those users' ability to divert water?

MR. O'BRIEN: Correct.

WITNESS MILLIGAN: Yes, that would definitely be a concern.

MR. O'BRIEN: Thank you. I have no further questions.

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

With that, we will take our lunch break and resume at 1:10, with Group No. 10.

(Whereupon, the luncheon recess was taken at 12:06 p.m.)

AFTERNOON SESSION

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(Whereupon, all parties having been duly noted for the record, the proceedings resumed at 1:10 o'clock p.m.)

CO-HEARING OFFICER DODUC: All right. Good afternoon. It is 1:10, and we are back in session.

Before we resume with cross-examination by Group No. 10, I received a request to just sort of do a look-ahead for planning purposes.

So Groups 10 through, shall we say, 17, how many of you are intending to conduct cross-examination? Actually, if you wouldn't mind coming up to microphone and give me a time estimate of how much time you think you'll need.

MR. ADAMS: Greg Adams on behalf of Friant Water Authority, Group 16. I have about only about 15 minutes probably of questioning. But I know Nicolas Cardella is also our Group 16, and he has a separate line of questioning.

MR. CARDELLA: Nicolas Cardella on behalf of South Valley Water Association. I don't think my line of questioning will take more than about a half an hour.

CO-HEARING OFFICER DODUC: All right. So

about 45 minutes for Group 16.

Anyone else?

MR. SALMON: I'm Jonathan Salmon for Group 15. That's East Bay MUD, and I may need the full hour.

CO-HEARING OFFICER DODUC: Anyone else? Mr. Aladjem, were you planning -- no? Okay.

In that case, someone better tell Mr. O'Laughlin to get here because we actually might get to him today.

What about Group 19? Ms. Meserve is not here yet, I don't think, but I know she has cross-examination.

MR. VAN ZANDT: Michael Van Zandt, for Islands, Inc., and probably take about 45 minutes.

CO-HEARING OFFICER DODUC: And you are Group --

MR. VAN ZANDT: 19.

CO-HEARING OFFICER DODUC: 19. All right. So it looks like we might be able to get through probably to about Group 19 today. At least we'll aim to anyway.

Group No. 10, I heard there was no cross-examination. All right.

Group No. 11? Not here.

Group No. 12? Also not here.

13? Not here.

So we're up to Group No. 14 now. Not here.

Group No. 15? And you're the one that needs roughly 60 minutes?

MR. SALMON: Perhaps.

CO-HEARING OFFICER DODUC: All right. You're up. And thank you, Mr. Brodsky, for that suggestion.

CROSS-EXAMINATION BY MR. SALMON

MR. SALMON: Good afternoon, panelists, staff members, Members of the Board. My name is Jonathan Salmon. I'm an attorney for East Bay MUD, Department -- Group 15; we are Group 15.

Generally my questions today will be directed to Mr. Leahigh. I do have a few questions for Mr. Milligan as well, and I will indicate when I am asking Mr. Milligan.

Would State Board staff please display Document 2 from the flash drive I submitted this morning? That's an unaltered version of Exhibit DWR-411, four-eleven.

Mr. Leahigh, this slide was discussed yesterday and I believe briefly this morning as well. I would like to ask a few more questions about it. It illustrates a possible WaterFix project operation scenario during the time period December 1, 2015 through April 30, 2016, correct?

WITNESS LEAHIGH: Yes, that's correct.

MR. SALMON: Why was that time period chosen for the simulation depicted in this exhibit?

WITNESS LEAHIGH: That time period was chosen primarily because that's the period in which we could show the opportunities that would exist if the California WaterFix were in place and the ability to capture additional excess flow.

We actually started back in December, just as sort of a warm-up period to indicate that -- you know, in those early months of the year, there would not have been an opportunity, and so we wanted to clearly delineate at what point in time the North Delta diversions would have been able to start operating.

MR. SALMON: Why does this exhibit not include the first two months of the water year, October and November?

WITNESS LEAHIGH: Yeah, the reason would be there would be limited utility in showing those first couple of months in that there would be no difference between the actual diversion capability and the diversions under the WaterFix.

MR. SALMON: Was a similar conceptual simulation modeled or developed for those two months?

WITNESS LEAHIGH: No.

MR. SALMON: How about for water years 2014 or 2015? Were those -- either of those years modeled in a manner similar to that shown on this exhibit?

WITNESS LEAHIGH: No, we have not modeled those years.

MR. SALMON: Is it fair to infer from the fact that you chose water year 2016, and specifically the portion of that water year shown here, to simulate that you would have considered operating the North Delta diversion during that period had it been in existence?

WITNESS LEAHIGH: Yes. Had it been in existence and operating under the scenario H3 criteria, this was -- this represents how that diversion and outflow, delta outflow, would have changed under that scenario.

MR. SALMON: Let's look at the dotted red line on that chart. The dotted red line is higher than the solid red line with a couple of brief exceptions starting in the first half of January and extending generally through the end of April; is that correct?

WITNESS LEAHIGH: Yes. It looks like there is a very -- well, actually, the only period where I see the dotted red line lower than the solid red line would be in I believe the early March.

MR. SALMON: Correct. With that exception, do

you agree that the dotted red line is generally higher than the solid red line?

WITNESS LEAHIGH: Yes.

MR. SALMON: And what does it indicate to you when that dotted red line is higher than the solid line?

WITNESS LEAHIGH: That indicates that during those time periods that the total diversion for both projects -- so this would be a combination of both the existing South Delta diversion location and the petitioned North Delta diversions. When the -- so when the cumulative diversion would be greater than our actual record of diversion this past spring.

MR. SALMON: So in other words, would you say that those are times when diversions from -- the total diversions from the Delta would be greater with WaterFix than they would have been without WaterFix?

WITNESS LEAHIGH: Yes, generally that's the case, with the one exception that it pointed out in early March.

MR. SALMON: Would staff please display Document 1 from this flash drive. And that's a highlighted version of Mr. Leahigh's written testimony; that testimony was DWR Exhibit 61. I'd like to go to Page 18 of that.

Mr. Leahigh, the last sentence of that highlighted paragraph states, "This example does not change upstream SWP/CVP operations." Is that readable from where you're sitting, the highlighting?

WITNESS LEAHIGH: Yes, it is.

MR. SALMON: Is the example you're referring to in that sentence the simulation that's shown on Exhibit 411?

WITNESS LEAHIGH: Yes, the exhibit we were just reviewing, yes.

MR. SALMON: Okay. And seeing as the upstream operations did not change, as you've stated in that portion of your testimony for that example, would it be fair to assume that the simulated releases from upstream storage in that example are no different than the actual real-world storage releases made during this period?

MR. MIZELL: Objection, misstates his prior testimony on the source of the water in that ground.

CO-HEARING OFFICER DODUC: Repeat your question.

MR. SALMON: That's what I'm getting at is what is the source of the water in that ground.

CO-HEARING OFFICER DODUC: Why don't you ask that, Mr. Salmon.

MR. SALMON: Okay. Actually, I'll get to it in due time. So I'll move on.

Let's show document -- the water year simulation, water year 2016 simulation again, that graph. The graph shows that, if the WaterFix had been operated in water year 2016, the State and Federal water projects could have diverted an additional 1.2 million acre feet of water for export; is that correct?

WITNESS LEAHIGH: Yes, that is correct.

MR. SALMON: So because upstream operations did not change, that additional 1.2 million acre feet must have originated from some source other than upstream storage, correct?

WITNESS LEAHIGH: Yes, that is correct.

MR. SALMON: What was the source of the 1.2 million acre feet?

WITNESS LEAHIGH: So as I indicated as the summary of my written testimony, in the winter-spring period, a large amount of the flow that comes into the Delta is actually generated from either unregulated rivers and tributaries that come into the Sacramento basin or just the direct run-off from the precipitation that falls on the valley floor itself, downstream of the major reservoir release points.

Some of this, though, was passed-through inflow from the project reservoirs as well.

MR. SALMON: Would any of it be considered stored flow that's rediverted from the Delta, or is all of the 1.2 million not previously been stored, even though it may have been passed through storage facilities, dams upstream?

WITNESS LEAHIGH: Yeah, none of the 1.2 million acre feet during this period would have been a rediversion of the storage withdrawal.

MR. SALMON: There appears to be a dip in early March, which we've pointed that out. I'd like to ask you about that dip. That's what I'll call it, the dip.

What does that dip indicate to you? And I'm speaking of that period, again, the first -- beginning of March, where the dotted red line is below the solid red line.

WITNESS LEAHIGH: Yeah, so generally, again, the dotted red line is a combination of the South Delta and the North Delta diversions acting together. So what it's not is just the North Delta. So in other words, during much of this period, because of the new Old and Middle River constraints as part of the WaterFix that would be more restrictive at times than

the current Old and Middle River restrictions, under the WaterFix scenario, there would be periods where the South Delta diversion would be lower than it is today under existing regulation.

And so that period in the beginning of March would have been one of those periods where the South Delta diversion under the WaterFix would be lower than the actual that occurred historically in March this year.

And it also indicates that there was very -- there was not sufficient flow in the Sacramento River to utilize the North Delta diversion to any large extent. So the combination of the two, North and South diversion, on the WaterFix would actually have been less than our actual South Delta diversion this year during that small period.

MR. SALMON: To make sure I understood correctly, are you saying that that dip was caused by a combination of Old and Middle River restrictions that are more stringent than the current restrictions and flows in the Sacramento River that are too low to use the North Delta diversion?

WITNESS LEAHIGH: That's correct. So the primary reason is the more restrictive Old and Middle River criteria in the proposed California WaterFix

criteria.

MR. SALMON: Are there any other factors you are aware of that would have caused that dip?

WITNESS LEAHIGH: No, that -- that would have been the reason.

MR. SALMON: Do you know how many days that continues for?

WITNESS LEAHIGH: Well, it's hard to tell, but it looks like just a handful of days, perhaps.

MR. SALMON: Do you have an idea of roughly how much less water would have been available to be diverted from the Delta during the period of time represented by that dip than in the scenario without WaterFix?

WITNESS LEAHIGH: It's hard to tell. It's a very small amount. I'd say it's probably, just by eyeballing it here, 50,000 acre feet or less.

MR. SALMON: Would staff please display Page 19 of Mr. Leahigh's testimony and scroll to the last paragraph.

So I believe you were asked about part of this earlier today. I have some follow-up questions. That first highlighted sentence starting on Line 20 states, "Though just over 1.2 million acre feet of water could have been diverted and stored January through April

2016 with the project in place, the proposed operating rules for CWF would require reduced pumping during drier periods in order to protect the environment."

And the second sentence says, "The water supply developed during these periods may be offset in part by reduced pumping at other periods of less favorable hydrology." The reference to 1.2 MAF, does that refer to the water year 2016 simulation that we were discussing earlier?

WITNESS LEAHIGH: Yes, it's in reference to that specific time period at which we did this analysis.

MR. SALMON: You also mentioned proposed operating rules in the first sentence. Following up on Mr. Lilly's question from earlier, you referred to limits on when the North and South Delta diversions could be used, that together these restrictions -- if I recall your testimony, that together the restrictions could result in less pumping at times. Is my recollection correct?

WITNESS LEAHIGH: Yes, that's correct.

MR. SALMON: Which limits or restrictions specifically did you have in mind when you were answering Mr. Lilly's question and when you were referring -- when you were writing this and referring

to proposed operating rules?

WITNESS LEAHIGH: Yes. Most specifically, it would have been the more stringent Old and Middle River requirements, so the same -- the same reason that that small dip occurred in early March.

MR. SALMON: You used the word "reduced pumping." Reduced in comparison to what?

WITNESS LEAHIGH: Reduced in comparison to the actual operations.

MR. SALMON: Without WaterFix?

WITNESS LEAHIGH: The actual operation -- the historical diversions and, yes, without WaterFix.

MR. SALMON: In the second highlighted sentence, you mention an offset. Why would the "offset in part by reduced pumping" occur?

WITNESS LEAHIGH: Well, so, for example, let's say that indeed that first part of March there is a reduction in diversions of 50,000 acre feet. That 50,000 acre feet offset some of the 1.2 million acre feet of additional diversion. So that would be an example of what I mean by "offset."

MR. SALMON: And that's an example of an offset that would be required by Federal regulation, correct, criteria?

WITNESS LEAHIGH: The new criteria proposed is

part of the proposed project.

MR. SALMON: So it would be a compelled to offset? Or let me rephrase.

Would that be a compelled reduction in pumping?

WITNESS LEAHIGH: I'm not sure what you mean by the word "compelled."

MR. SALMON: Would the offset be the result of requirements or restrictions that would be placed on system operations?

WITNESS LEAHIGH: Yes, if the petition as proposed with these new Old and Middle River restrictions was part of the project, part of the approved project, then, yes, it would be as a result of that new criteria.

MR. SALMON: So you didn't have in mind any voluntary reductions or offsets in pumping on the part of the water project operators, correct?

WITNESS LEAHIGH: Well, only voluntary in the respect that we're presenting these new operating rules as part of the petition project.

MR. SALMON: Okay. So it's the operating rules driving it, if I understand correctly?

WITNESS LEAHIGH: Yes.

MR. SALMON: I'd like to understand when the

pumping reductions would occur. And we have that one example in early March that is simulated.

More generally, your testimony and highlighted portion refers to periods of less favorable hydrology. What did you mean by "less favorable" periods, less favorable compared to what?

WITNESS LEAHIGH: So generally what I mean by that is during periods when flows on the Sacramento are insufficient to really utilize the new proposed North Delta diversion location to any great extent but yet we would still be subject to the more restrictive Old and Middle River criteria in the South Delta, and a combination of those two factors could result in some periods where reduced pumping would occur than would have been the case otherwise.

MR. SALMON: Can you give an example of the degree to which the hydrology would need to be less favorable before these offsets or pumping reductions occur?

WITNESS LEAHIGH: Well, there's very explicit criteria laid out as part of the new North Delta diversion, but it's very complex in relation to the time of year and the amount of flow. So it would really vary depending on how it fit in with that criteria for the new North Delta, proposed as part of

the new North Delta diversion.

MR. SALMON: Are you referring to the proposed new North Delta bypass criteria?

WITNESS LEAHIGH: Yes.

MR. SALMON: Regarding these offsets, could such an offset possibly have occurred during the first two months of water year 2016 that are not included in the graph we were looking at earlier?

WITNESS LEAHIGH: Well, yeah, I suppose that would be possible, that there could be -- there could have been a period -- with not having analyzed it, it's not entirely clear if there would have been a -- some of the South Delta criteria possibly could have lowered the overall diversion rate. But having not analyzed that period, I couldn't say for sure.

MR. SALMON: But you believe it's possible?

WITNESS LEAHIGH: It's probably possible, yes.

MR. SALMON: How about any time after the end of April in the water year 2016? Could an offset or reduced pumping of this sort have occurred?

MR. LEAHIGH: Again, we didn't analyze anything after April 30th. So, yeah, I can't say conclusively whether there would have been offset during that period or not.

MR. SALMON: And you can't say that there

would not?

WITNESS LEAHIGH: Correct.

MR. SALMON: Do the less favorable hydrologic conditions in which reduced pumping would occur potentially include times when the Delta is in balanced condition, such as the summer or the early fall?

WITNESS LEAHIGH: I'm sorry. Could you repeat the question?

MR. SALMON: Yeah, you referred to less favorable hydrologic conditions that could lead to reduced pumping. Could those conditions and therefore the reduced pumping occur during a time when the Delta is in a balanced conditioned, for example, summer or early fall?

WITNESS LEAHIGH: So it probably depends on the scenario. So I'm not sure which scenario you'd be -- are you still talking about H3, which is the one that we analyzed?

MR. SALMON: Sure. I'll ask you about H3.

WITNESS LEAHIGH: Actually, I'd have to review it for that time period to really make a good assessment. I -- yeah.

MR. SALMON: How about within Boundary 1 to Boundary 2 range?

WITNESS LEAHIGH: Again, would have to review

the assessment. I -- what really would rely upon would be some of the long-term modeling [sic].

MR. SALMON: Well, hypothetically, if the WaterFix project were approved and new criteria were adopted that resulted in reduced pumping during balanced conditions, would you expect that releases from upstream storage would also be reduced?

WITNESS LEAHIGH: Certainly if there was a restriction, an overall restriction in the diversion rate because of the new criteria associated with an approved California WaterFix, if the source of that water was upstream reservoirs, it would depend on what some of the other reasons for the releases were upstream.

But if they were being released solely for rediversion, then there may have been an opportunity to cut back those releases. I don't think -- I think that's probably -- it's probably pretty rare that that would have occurred, if at all, but it would be --

MR. SALMON: Rare that what would occur?

WITNESS LEAHIGH: The scenario that I just laid out.

MR. SALMON: That?

WITNESS LEAHIGH: That there would be reduced overall diversion capability during the period in which

we're typically in balanced conditions, say, the summer, early fall period.

MR. SALMON: Is it possible that those conditions could happen and therefore that releases from upstream storage would be reduced?

WITNESS LEAHIGH: I wouldn't completely rule it out. But I think it's probably not likely if that was the case.

MR. SALMON: If a pumping reduction occurred that did result in reduced releases from upstream storage, would you expect to see lower in-stream flows in the Sacramento River than otherwise would be present?

WITNESS LEAHIGH: Like I said, in the event -- in the unlikely event that this scenario played out, it certainly wouldn't reduce the minimum required in-stream releases, but it's possible if one of the reservoirs was able to cut back releases that there would be a lower amount of flow, in-stream flow from that reservoir.

MR. SALMON: Your testimony also states that the newly developed water supply will be offset in part. That's in the second highlighted sentence.

Does that mean that you expect WaterFix will result in a net increase in diversions from the Delta?

WITNESS LEAHIGH: Under Scenario H3, yes, would expect to see increase in diversions on average as due to the WaterFix. And that's what the modeling indicates.

MR. SALMON: Is there any scenario before this Board for consideration that would have a different result?

WITNESS LEAHIGH: Yes, all of the scenarios have different results.

MR. SALMON: Is there any scenario between Boundary 1 and Boundary 2 that is not expected to result in a net increase in diversions from the Delta?

WITNESS LEAHIGH: Yes, I believe Boundary 2 actually shows a reduction in overall diversions as compared to the no-action alternative. And I believe H4 is very similar to the amount of diversion, if not slightly less on average. The other two, Boundary 1 and H3, show increases in overall average diversion capabilities.

MR. SALMON: And H3 is the project currently proposed, correct?

WITNESS LEAHIGH: No, there's a -- there's a range for the proposed project, H3 to H4.

MR. SALMON: Yesterday I recall you describing an operation for the high outflow scenario where higher

releases would occur in the spring and then releases would have to be backed off in the summer or fall. Do you recall that statement?

WITNESS LEAHIGH: Yes, I recall that statement that there may need to be -- depending on the source of the flow to meet the new spring outflow criteria, there may be a need to back off releases later.

MR. SALMON: And to clarify, by "backed off," did you mean that reservoir releases would need to be released -- or reduced? Pardon me.

WITNESS LEAHIGH: Possibly, if that was possible, again, if the releases were not being made for other purposes.

MR. SALMON: Since this backing off would happen in the summer or fall, is it possible that those periods of backing off releases from storage are also periods when the Delta would be in a balanced condition?

WITNESS LEAHIGH: Yeah, if there was a -- if that sort of change was taking place, it's likely would have occurred under a scenario where we would have been in balanced conditions.

MR. SALMON: Question for Mr. Milligan. This morning I think you mentioned a shift in seasonal timing in the cross-ex to Mr. Lilly. Do you recall

that?

WITNESS MILLIGAN: I may have.

MR. SALMON: What did you -- what were you referring to?

WITNESS MILLIGAN: I'd need some more specifics. I don't recall exactly what context that was in.

MR. SALMON: Let me ask a slightly different question. Generally speaking, even if we assumed that total releases from upstream storage over an entire water year do not change under WaterFix as compared to without WaterFix, is it possible that WaterFix would result in a shift in the timing of releases from upstream storage during the various months within that water year?

WITNESS MILLIGAN: There may be some movement from one month to another in terms of changed criteria in the Delta particularly.

MR. SALMON: What kind of movement would you expect?

WITNESS MILLIGAN: I guess that depends on the criteria that come into play. May not have -- again, if it's a control of the release that's maybe on that particular river system just upstream of the reservoir, that probably doesn't manifest itself in terms of a

change, and it may not be much of a shift.

To the degree that we'd have some flexibility to do that, there may be some movements depending on the hydrology or, again, the criteria in place.

My assumption would be more trying to be strategic about when in the summer we would probably make releases.

MR. SALMON: So it's fair to say that, with WaterFix in place, there's -- a potential exists for upstream releases to be shifted around in timing to meet those -- the needs that you just identified?

WITNESS MILLIGAN: It's possible.

MR. SALMON: I'd like to ask about the new flow criteria, Mr. Leahigh.

Are there any new flow criteria that don't currently exist that operators would need to take into account before using the North Delta diversion facilities?

WITNESS LEAHIGH: I don't completely understand that question. There would be new flow criteria as part of some of the scenarios under WaterFix, so H4, for example.

MR. SALMON: How about the new proposed North Delta bypass flow criteria? Is that an example of new criteria that don't exist that would need to be

considered in operation of the North Delta intakes?

WITNESS LEAHIGH: Yes. So that would be brand-new criteria that the only reason for its existence would be to regulate a new North Delta diversion.

MR. SALMON: And what's your understanding of the purpose of those criteria? What are the North Delta bypass flow criteria trying to achieve?

WITNESS LEAHIGH: Those criteria were developed for fishery purposes, and I am not -- I'm not well versed in the precise reasons for those, the development of that criteria.

MR. SALMON: Were you or your staff involved in any way in the development of the North Delta bypass flow criteria?

WITNESS LEAHIGH: No.

MR. SALMON: Did you have any understanding of which considerations went into the development of the proposed new bypass flow criteria on the North Delta?

MR. MIZELL: I'm going to object to that question as being within the purview of Part 2 of this. He's looking for biological justification for the criteria.

CO-HEARING OFFICER DODUC: And I believe that Mr. Leahigh is experienced enough a witness to answer that question.

WITNESS LEAHIGH: Yeah, I really don't have a very good understanding of why that criteria was developed as it was. It was definitely biologically driven.

MR. SALMON: To the best of your knowledge, were reverse flows occurring on the Sacramento River upstream of Georgiana Slough up to Freeport taken into consideration in the development of the proposed new North Delta criteria?

WITNESS LEAHIGH: If I recall, I believe there is some aspect of -- in the criteria that avoids any increase in reverse flows that may be occurring otherwise.

MR. SALMON: Reverse flows in that location?

WITNESS LEAHIGH: Correct.

MR. SALMON: Near Freeport and downstream?

WITNESS LEAHIGH: Which can occur today.

MR. SALMON: Are you aware of any evidence that would show or any reason to believe that the new bypass flow criteria would improve reverse flows near Freeport? By "improve" I mean reduce the velocity.

WITNESS LEAHIGH: No, I don't believe that would be the case.

MR. SALMON: You don't believe that the bypass flow criteria would improve reverse flows?

WITNESS LEAHIGH: I'm not -- what do you mean by -- improve reverse flows?

MR. SOLOMON: Reduce the velocity of reverse flows that occur near Freeport.

WITNESS LEAHIGH: No, I don't believe they would reduce the velocity of reverse flows.

MR. SALMON: Would operation of the bypass flow criteria have the opposite effect? Do you have a view as to whether they may worsen reverse flows?

MR. MIZELL: Objection, vague and ambiguous. What other river conditions are we talking about? Because it could be on an incoming tide, outgoing tide, any number of conditions.

MR. SALMON: I'm asking in general, not under any particular condition.

WITNESS LEAHIGH: Well, as I've already stated, I believe there is some criteria associated with the new diversion that takes that into consideration, that it would not affect the reverse flows more than they occur today.

MR. SALMON: Are you aware whether DWR or the Bureau of Reclamation have proposed any permit term or condition to the State Water Board that is intended to prevent the WaterFix project from causing or exacerbating reverse flows in the Sacramento River near

Freeport?

WITNESS LEAHIGH: As I'm stating, I believe there's some aspect of the reverse flow crit- -- I'm sorry -- the bypass flow criteria that takes that into account.

MR. SALMON: I asked regarding permit terms or conditions. Were there any proposed on this issue that you are aware of?

WITNESS LEAHIGH: Well, to the extent that this criteria is a permit condition, then, yes, that would be the case.

MR. SALMON: And do you recall specifically what it is in the proposed North Delta bypass flow criteria that addressed reverse flows in that location?

WITNESS LEAHIGH: No, I don't recall.

MR. SALMON: Could the new North Delta bypass flow criteria be altered through the Temporary Urgency Change Petition process?

WITNESS LEAHIGH: I don't know.

MR. SALMON: You don't know whether they could?

WITNESS LEAHIGH: If the criteria, the proposed criteria could be changed?

MR. SALMON: If they were incorporated into this project.

WITNESS LEAHIGH: Oh, if they were incorporated into this project.

MR. SALMON: Yes.

WITNESS LEAHIGH: I don't know for sure. I -- they may be somewhat subject to the adaptive management process as far as trying to incorporate whatever the latest science is and with regard -- biological science is with regard to those bypass flows.

MR. SALMON: Would operators have the authority to modify those bypass flow criteria outside of the TUCP process?

WITNESS LEAHIGH: Outside the TUCP process?

MR. SALMON: Correct. So without seeking or receiving approval of the temporary urgency change to this criteria, could the criteria be altered at the discretion of project operators?

WITNESS LEAHIGH: I don't believe -- as part of the petition, the criteria is what it is. And that would be our commitment, to operate to the criteria that are proposed.

MR. SALMON: Is it fair to say, then, that they could not be altered by the discretion of the operators without pursuing a TUCP?

WITNESS LEAHIGH: I believe that would be the case.

MR. SALMON: In your opinion, do you believe that the adoption of the proposed new North Delta bypass flow criteria would affect the likelihood that State Project Water operators would pursue TUCPs in the future?

WITNESS LEAHIGH: No, I don't believe so. But that's very speculative. I don't -- I don't know.

MR. SALMON: I'd like to ask a few questions about real-time operations. Let's look again at your written testimony. It's still up there. I'd like to go to Page 3, Lines 16 and 17. It's highlighted.

You stated, "SWP/CVP operates in real-time, which is very different than analyzing or critiquing possible project operations through model simulations." What did you mean by that statement?

WITNESS LEAHIGH: Yeah, so I think, as I've testified a number of times, in terms of the day-to-day real-time project operation decisions that the SWP and the CVP are making with regards to salinity management, in the Delta, I don't believe the modeling captures that aspect very well. The model is unable to respond to real-time events.

So there's parts of the model that I think are -- the models's not able to capture. One is the actual day-to-day meteorological influences on tides,

for example, and the ability of project operators to respond to those conditions. So that aspect of the modeling is what I'm referring to here.

The overall -- I think what I also stated, though, is I feel the model is very good in terms of the monthly time step and projecting forward as far as for planning purposes on looking at the effects of -- on any project.

MR. SALMON: Are you speaking there of modeling that's done in the context of real-time operations?

WITNESS LEAHIGH: In this -- the lines here in the -- in my testimony? Yeah, it's talking in terms of the real-time, day-to-day operations of the projects.

MR. SALMON: Were you referring to the modeling that was done for the California WaterFix project?

WITNESS LEAHIGH: Yes.

MR. SALMON: Were you also referring to -- strike that.

Does the State Water Project use modeling on a regular basis to inform its real-time operations in general?

WITNESS LEAHIGH: Yes, we do utilize models of various sorts to help inform decisions that we make as

supplemental information to our experience and also observations of real-time conditions.

MR. SALMON: Which models are used to support real-time project operations currently?

WITNESS LEAHIGH: Well, we have a number of models. Probably the ones that are most used would be pretty simplistic spreadsheet tools that are essentially mass balance tools, which represent the system in terms of Delta inflows, export rates, Delta consumptive uses, releases from upstream, and the travel times associated with those releases.

We also utilize simulation models, so -- such as the Delta -- Delta Simulation Model to project forward on what changes in operations, how those might affect salinity conditions moving forward. So we do a lot of what-if type scenarios to try to plan and schedule project operations.

MR. SALMON: You mentioned the Delta simulation modeling. Are you referring to DSM-2?

WITNESS LEAHIGH: Yes.

MR. SALMON: And you just listed several purposes for which you do modeling to support real-time operations. Do you use DSM-2 to model each of the factors that you just mentioned?

WITNESS LEAHIGH: Yeah. So DSM-2 is a model

more looking at the -- the hydrodynamics within the Delta itself give us a representation of, again, the hydrodynamics plus the impacts of the hydrodynamics on salinity conditions, for example. So that's an aspect of the model that we will use to help inform decisions.

MR. SALMON: So it's fair to say you use DSM-2 to project future conditions to inform your real-time operations?

WITNESS LEAHIGH: Yes, we use them to help forecast. The issues with the simulation models, just as any model, they're going to be imperfect. And, again, DSM-2 cannot capture meteorological effects, but we generally use the models in a comparative mode.

So they're not as good as a predictive tool, but we do use them more so in terms of looking at different scenarios of operational differences and how that might have a difference in the -- in a parameter such as salinity, for an example, in certain locations in the Delta.

MR. SALMON: Do you perform both long-term and short-term projections with DSM-2 to inform real-time operations?

WITNESS LEAHIGH: Generally in the shorter term, short to mid-term. So, say, days to weeks out.

MR. SALMON: Like a one- or two-week look

ahead, for example?

WITNESS LEAHIGH: Yes, that's typically how we utilize it, the time frame in which we're looking at.

MR. SALMON: What's the time step for the output data when you're doing the model runs?

WITNESS LEAHIGH: Well, I believe the output data is actually -- time step is as fine as 15-minute -- I believe 15-minute intervals, maybe even less. But typically we're looking at it in terms of daily averages, the output.

CO-HEARING OFFICER DODUC: Mr. Salmon, may I ask you a question to perhaps nudge you along a little bit? Where are you going with this line of questions?

MR. SALMON: What we're trying to do is understand how at least the State Water Project and, more generally, the coordinated ops use modeling in their real-time operations.

What we have in mind is the reverse flow issue at Freeport, which is the grounds for our protest. We believe that the modeling that DWR routinely does to operate the project could also be used to identify and perhaps mitigate for reverse flow impacts if they are caused by the WaterFix project.

CO-HEARING OFFICER DODUC: Then I will ask you to be more direct in your questioning.

MR. SALMON: Fair enough.

Did you mention that tidal influences was one of the -- one of the things that is modeled by DSM-2 that you modeled?

WITNESS LEAHIGH: Yes, tides are a major portion of what DSM-2 factors in.

MR. SALMON: And you say that one problem is that meteorologic -- it's difficult to model the effect of meteorological influences on tide; is that correct?

WITNESS LEAHIGH: Yeah, that's correct. DSM-2 is able to model the astronomical effects on the tide very well. Meteorological is a real challenge.

MR. SALMON: Do you routinely use tidal stage modeling to inform real-time operations of the State Project?

WITNESS LEAHIGH: Well, we typically are using DSM-2 -- we use it both for water quality and for stages in the Delta, primarily in the South Delta for stages.

MR. SALMON: Do you agree that tidal influences could affect reverse flows in the Sacramento River between Georgiana Slough and Freeport?

WITNESS LEAHIGH: I'm sorry. Between Freeport and --

MR. SALMON: Georgiana Slough?

WITNESS LEAHIGH: Yes, yes.

MR. SALMON: To the best of your knowledge, have DWR and the Bureau proposed any permit term or condition that would require the WaterFix operators to model any effect that the WaterFix may have on reverse flows in that location and mitigate for any impacts that are identified?

WITNESS LEAHIGH: Yeah. To the extent that it's embedded the bypass flow criteria -- and actually, rather than me continuing to say "I don't know completely," I think the modelers, perhaps, would have a much better idea to get at your question.

MR. SALMON: Would staff please display Exhibit DWR-1 Errata, Page 10 of that. I'm going to shift gears a bit.

That doesn't look right. I'm looking for the slide titled "Alternatives Comparison" that we've had up several times that depicts the alternatives. Is it maybe one off? That's Page 8. I'm looking for Page 10.

Thank you.

Mr. Leahigh, you're familiar with this graphic, yes?

WITNESS LEAHIGH: Yes.

MR. SALMON: And do you intend to operate the

WaterFix project within the range between 4AH3 and 4AH4, the range labeled "Initial Operating Criteria"?

WITNESS LEAHIGH: That is our proposed project, yes.

MR. SALMON: Why did you use the word "initial" -- or why do you understand that the word "initial" is used there?

WITNESS LEAHIGH: So, yeah, I think the reason the word "initial" is used there is because of the other aspect of the project, which is the adaptive management portion of this.

As annual reviews take place, there's possibilities that the operating criteria could change through this adaptive management process, looking at the most recent biological sciences.

MR. SALMON: So it's fair to say that adaptive management operational decisions could result in outflows that fall above or below the range bracketed by H3 and H4?

WITNESS LEAHIGH: Yeah, I think that's possible. And, again, that's -- that's the reason for the wider boundaries that are -- are being assessed as part of this proposal, the Boundary 1 to Boundary 2.

MR. SALMON: Do you have an understanding of how Boundary 1 and 2 differ in their operational

assumptions, if at all, from H3 and H4?

WITNESS LEAHIGH: I generally do. I don't recall all of the details, sitting here right now.

MR. SALMON: Is there anything you do recall?

WITNESS LEAHIGH: Generally --

CO-HEARING OFFICER DODUC: Let me interrupt here. Instead of having Mr. Leahigh trying to remember what Ms. Pierre testified to in her testimony, where are you going with this? And please be more direct in your questioning.

MR. SALMON: I'll just move to my next question.

CO-HEARING OFFICER DODUC: Yes, there's no need to lay this extensive foundation.

MR. SALMON: Did you engage with the CalSim II modeling team to develop the operational assumptions for the Boundary 1 and 2 simulations?

WITNESS LEAHIGH: No.

MR. SALMON: Are you aware of whether anyone on your staff did?

WITNESS LEAHIGH: I don't believe so. Probably can't say that definitively, but I -- I don't recall anyone from my staff.

MR. SALMON: Did you review the CalSim II modeling results under Boundary 1 and 2 scenarios to

validate whether the model performance is realistic from your perspective?

WITNESS LEAHIGH: I've looked -- I've reviewed all of the DSM-2 output for all of the scenarios shown here, the one H3-H4 Boundary 2. And nothing stood out at me as being off base.

MR. SALMON: Okay. I'd like to go to Document No. 4 from the flash drive, Page 12. That document is a highlighted copy of Mr. Nader's written testimony. I'd like to ask the operators about one issue he raised.

Mr. Leahigh and Mr. Milligan, can you please read that highlighted paragraph. I know it's kind of long. It starts on Line 2 of Page 12. And let me know when you're ready.

CO-HEARING OFFICER DODUC: Before you object, Mr. Mizell, I recognize this is not these witnesses' testimony that is yet to be introduced before us. And I expect that they will answer the questions to the best of their ability, and if they do not know, they may say they do not know.

So I don't expect to hear an objection from you with respect to this particular exhibit. And that was also a hint to be more selective in your objections.

WITNESS LEAHIGH: I've read the paragraph.

WITNESS MILLIGAN: Yes, I have as well.

MR. SALMON: Mr. Leahigh, are you generally familiar with the San Luis rule curve?

WITNESS LEAHIGH: To a very limited extent. I know this is a curve that is used by the modelers in an attempt to emulate the decisions that operators make. It's not -- the rule curve in CalSim is not something that we use as operators.

MR. SALMON: But San Luis operations can affect the timing of storage withdrawals during the year, correct?

WITNESS LEAHIGH: Again, I don't know all the specifics of -- that go into the rule curve. Generally, again, I know it is an attempt by the modelers to try to emulate the human element, if you will, in actual operations in making those decisions of making those releases from the upstream and the diversions.

MR. SALMON: I understand. My most recent question was actually asking about real-world operations.

WITNESS LEAHIGH: Oh, okay.

MR. SALMON: That in general, would you say that San Luis operations affect the timing of your

withdrawals from storage during the year?

WITNESS LEAHIGH: Well, it's all part of a comprehensive plan. I went through the various factors that we are assessing when we're making our delivery allocation recommendations to the Director. And this is just one component of the more comprehensive view of what we're looking at in terms of making those determinations and then the forecasted operations that kind of falls out of that.

MR. SALMON: Would you say San Luis is an important component of the State Water Project?

WITNESS LEAHIGH: Yes.

MR. SALMON: So it would be important to model San Luis Reservoir operations as accurately as possible then, correct?

WITNESS LEAHIGH: Yes.

MR. SALMON: Did you review or discuss with anyone the San Luis rule curve assumption that was included in the WaterFix CalSim II model?

WITNESS LEAHIGH: I've had general discussions about the rule curve assumptions with the modelers even prior to California WaterFix development as part of our ongoing efforts between operations and modelers to better emulate the system, represent the system.

So, yes, definitely over time I've had

discussions with the modelers.

MR. SALMON: Did you review the assumptions that were included in the modeling done for the WaterFix project regarding the San Luis rule curve or offer input specifically for the WaterFix project?

WITNESS LEAHIGH: Specifically on the WaterFix project, after reviewing some of the modeling results as it relates to State Water Project operations, the results seemed to be good to me, and I didn't feel the need to discuss further with the modelers the rule curve criteria.

MR. SALMON: Did you offer an opinion at any time to the modelers on what an appropriate rule curve would be under the WaterFix or if the WaterFix comes into operation?

WITNESS LEAHIGH: Not specifically on the WaterFix. As it relates to State Water Project operations, I think it would be similar as far as -- for WaterFix as it is without WaterFix.

MR. SALMON: Okay. Thank you.

I realize I'm about out of time. I have about three more questions, and they're all for Mr. Milligan.

CO-HEARING OFFICER DODUC: All right. We'll allow you --

MR. SALMON: Five minutes should do it.

CO-HEARING OFFICER DODUC: -- five minutes.

And let me also take this opportunity to establish for the record that Ms. Heinrich has left us for the day, and we're now joined by Samantha Olson from the Office of Chief Counsel.

You may continue, Mr. Salmon.

MR. SALMON: Thank you.

Mr. Milligan, you recall the 1.2 MAF in new water supply on that Exhibit 411 that we were discussing, right?

WITNESS MILLIGAN: If it's the -- I hope it's the same exhibit, but, yes, I believe I do.

MR. SALMON: We could display it if --

WITNESS MILLIGAN: Maybe we should just for clarity. But, yes, I do.

MR. SALMON: Okay. It's I think Document 2 on my flash drive.

WITNESS MILLIGAN: Is this the graph?

MR. SALMON: Yes.

WITNESS MILLIGAN: Yes, I do recall the 1.2-.

MR. SALMON: Yesterday, you were asked about Coordinated Operations Agreement, or COA.

WITNESS MILLIGAN: Yes.

MR. SALMON: Under the COA in the form that it exists now, do you know what proportion of the 1.2 MAF

would have been available to the CVP, if any?

WITNESS MILLIGAN: I would say no because the new facility isn't covered by COA. So it's a bit of an open question.

MR. SALMON: What do you mean that it's not covered by COA?

WITNESS MILLIGAN: Well, diversions at this particular location are not explicitly within COA, so it's not clear precisely what the rules covering that would be in terms of availability of water to the project.

Give an extreme example, if this was strictly a State Water Project facility of which Reclamation had no right to put water through it, maybe none of this water is.

MR. SALMON: Is it your view that traditional COA accounting would not apply to water that is diverted through the new intake facilities?

WITNESS MILLIGAN: I don't have that understanding.

MR. SALMON: Your understanding is that it's an unresolved issue, correct?

WITNESS MILLIGAN: That's correct.

MR. SALMON: I'd like to display Mr. Milligan's testimony. That's Exhibit DOI-7. And

Page 3, please.

So in the final sentence of the first full paragraph, under the heading that's labeled, "Statement On Contracts," so it's actually that first paragraph below the heading, the final sentence reads, "Reclamation's initial allocations are typically made in February and can be adjusted throughout the year to reflect changing hydrology, regulatory conditions, and other factors."

WITNESS MILLIGAN: Yes, I see that.

MR. SALMON: Can you describe the other factors that you consider when you're deciding whether to adjust initial allocations and how much to adjust them?

WITNESS MILLIGAN: Well, there's -- I'm trying to think of -- a lot of things that first come to mind are hydrology related and/or regulatory conditions which may be considerations of management for things like cold water, related to the biological opinions.

Obviously, if there's any kind of facility failure, something about the facilities that may limit our availability to release water or store water could change our allocations going forward as well.

MR. SALMON: Within the scope of the hydrological factors that you consider?

WITNESS MILLIGAN: Correct. It would be just another factor. For example, a gate failure at Folsom would certainly be a condition that's not hydrologic or regulatory that might have implications that relates to allocation.

MR. SALMON: Do you consider changes in reservoir storage that occur between February and May?

WITNESS MILLIGAN: We do.

MR. SALMON: Thanks, I have no further questions.

Thank you Mr. Leahigh and Mr. Milligan.

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

We'll check with the court reporter.

Are you okay with going until about 3:00, and then we'll take a break?

THE REPORTER: Yes, that's fine.

CO-HEARING OFFICER DODUC: Okay. Let's move on now to Group No. 16. I believe in total there will be two cross-examiners for about 45 minutes in total. All right. Please come up.

As you can sense by now, I'm encouraging the cross-examiners, when you ask your questions, to be direct. Obviously a lot of foundation has already been established by the previous panels as well as the very

extensive cross-examination conducted earlier for this panel. So there is no need to cover everything again.

And given the level of expertise and seniority of especially Mr. Leahigh and Mr. Milligan, I'm confident that they will be able to answer to the best of their abilities. But if we do need to revisit foundation issues, we will. But you may assume that, unless we do so, a lot of the foundation has been established.

MR. EICHENBERG: Ben Eichenberg, representing PCFFA and IFR. A point of clarification regarding timing. I recalled that each party was allotted an hour and that the groupings were for convenience and didn't necessary remove that hour grant for each party. Is that still the case?

CO-HEARING OFFICER DODUC: It is the case that each grouping or each party will be granted an initial one hour, and then we will see. As far as the additional time being requested, it's a matter of how efficiently that time has been used, how productive the cross-examination is being, how relevant it is to improving the record and helping us in our decision making process.

MR. EICHENBERG: And I've learned a lot about how that works so far. But then, so, for instance, I

represent PCFFA and IFR. If an attorney for IFR came, would that attorney be allotted an hour for his cross-examination as well?

CO-HEARING OFFICER DODUC: As long as it's productive and it's not repetitious of your cross-examination.

BEN EICHENBERG: Understood.

CO-HEARING OFFICER DODUC: In other words, do not waste my time or anyone else's.

BEN EICHENBERG: Thank you.

CO-HEARING OFFICER DODUC: With that, you may begin.

MR. ADAMS: Thank you. Good afternoon. My name is Greg Adams. I'm appearing on behalf of Friant Water Authority and it's participating members. And I appreciate Hearing Chair Doduc's comments, and because of that, I may even take less than the 15 minutes I had proposed before.

CROSS-EXAMINATION BY MR. ADAMS

MR. ADAMS: Staff, if you could pull up DWR-114. And Mr. Salmon just spoke about this, but I only had one specific follow-up question. And DWR-114, as we just discussed, is the -- outlines the Boundary 1 and Boundary 2 analysis.

And this question is for, I guess, probably

for Mr. Milligan. Is Reclamation proposing that the State Board include a condition in any approve permit for the project that real-time operational decisions must fall within the range of the Boundary 1 and Boundary 2 analysis?

WITNESS MILLIGAN: No, I don't believe we are.

MR. ADAMS: Thank you. Staff, if we could now go to DOI-7. And this is Mr. Milligan's testimony, Page 2 -- there we go, second full paragraph. And I know we've gone through this a little bit, but specific to this question, that paragraph reads, "Additionally, Reclamation must operate the CVP consistent with many other statutes, regulatory requirements, and contractual obligations."

And then jumping down to the last sentence of that paragraph, "CVP operations must also meet obligations to those holding State-granted water rights which are senior to CVP rights, such as the Sacramento River Settlement Contractors and the San Joaquin River Exchange Contractors, whose senior rights on the San Joaquin River are met from other sources, like the Sacramento River or Delta," is that correct, what I read, that?

WITNESS MILLIGAN: Yes.

MR. ADAMS: Staff, could you pull up Exhibit

DOI-10 for us, please.

This exhibit is the Second Amended Contract for the Exchange of Waters between Reclamation and the group commonly referred to as the Exchange Contractors. And that's Contract No. ILR-1144. Are you familiar with this contract, Mr. Milligan?

WITNESS MILLIGAN: It's been a little while since I've opened it up, but, yes, I am.

MR. ADAMS: Is this contract one of the obligations you were referring to in the above paragraph?

WITNESS MILLIGAN: Yes, it is.

MR. ADAMS: And my question, then, is will Cal WaterFix be operated to deliver to the Exchange Contractors the water to which they are entitled under the exchange contract from a water source other than the San Joaquin River?

WITNESS MILLIGAN: I will probably rephrase a little bit that my thinking is that the Central Valley Project will be operated with the Cal WaterFix in place to meet the obligations of the contract.

MR. ADAMS: So it's your testimony that the Cal WaterFix will not change -- CVP will continue to meet that obligation even with Cal WaterFix in place?

WITNESS MILLIGAN: Yes, that's correct.

MR. ADAMS: I think that's all the questions I have for today. Thank you.

CO-HEARING OFFICER DODUC: Thank you.

And there was one other cross-examination in Group 16, I believe?

MR. CARDELLA: Good afternoon, everyone. My name is Nicolas Cardella.

CO-HEARING OFFICER DODUC: Your microphone is not on.

MR. CARDEALLA: Good afternoon. My name is Nicolas Cardella. I'm here on behalf of the South Valley Water Association and its member agencies.

If staff can go ahead and open the PDF document that I gave earlier and go to the second page. This is an excerpt from Mr. Leahigh's testimony on Page 7.

CO-HEARING OFFICER DODUC: And while staff is doing that, let me say that I do not have your name on my list. You might want to spell your last name for the court reporter.

MR. CARDELLA: C-A-R-D-E-L-L-A. And "Nicolas" is without an H.

CO-HEARING OFFICER DODUC: We don't have you as a representative on our list.

MR. CARDELLA: Is that based on the notice of

intent to appear? I'm here on -- Alex Peltzer is a partner in my law firm, and he was listed on the notice of intent to appear along with the law firm. So my understanding is that, as an associate of the law firm, I would be appropriate to conduct cross-examination.

CO-HEARING OFFICER DODUC: All right. We'll have to correct that for our record. Thank you.

CROSS-EXAMINATION BY MR. CARDELLA

MR. CARDELLA: So let me direct your attention to the second highlighted text on this page. Can you go ahead and read that, and let me know once you've finished.

This is for Mr. Leahigh.

WITNESS LEAHIGH: Yes, I've read it.

MR. CARDELLA: Now, I know this is something you've been asked before, I'm going to take it a little bit in a different direction.

But what kind of particulars exist in real-world operations that cannot be accurately simulated by model? I know you mentioned salinity management, but is there anything else?

WITNESS LEAHIGH: Yeah, salinity management was the primary thing I had in mind when I wrote this. And it would be all of the factors that influence salinity -- so the tides, the Delta inflows, what have

you.

MR. CARDELLA: So other than salinity management, there's nothing else that cannot be accurately simulated by the model? Any factors related to that?

WITNESS LEAHIGH: It's a little unclear what the question is. The --

MR. CARDELLA: I can rephrase it for you.

So you state in your testimony that many particulars exist in real-world operations that cannot be accurately simulated by model. One of those is clearly salinity management. My question is are there any others?

WITNESS LEAHIGH: So the time frame that I'm talking about here when I'm talking about simulation models is the day-to-day operations. So that's the context of my answer.

Again, salinity management was the primary thing I'm talking about, but the factors, again, would be the stages in the Delta being affected by metrological conditions. It would also be flows coming into the system, and it would also be the actual Delta consumption that's occurring that we have estimates of and -- but aren't entirely understood. So those would be -- those would be the things I'm referring to here.

MR. CARDELLA: And all those things are factors related to real-time decisions regarding salinity management; is that correct?

WITNESS LEAHIGH: Yeah, and I guess it goes beyond that. It goes to the extent that we are -- we have a network of monitoring stations that's giving us real-time feedback that we're responding to. And that's something that the simulation model does not have.

MR. CARDELLA: Okay. What's the basis for your opinion that simulation models cannot accurately simulate something? Let's start with meteorological conditions.

WITNESS LEAHIGH: Well, because I know that the models do not -- well, for one thing, they couldn't possibly have a forecast for the time periods that they're talking about. They could not have forecasts for day-to-day metrological conditions. That's not possible because those forecasts don't exist for the time frames we're talking about. So that's the basis.

The other basis is the comparison of our actual historical record on meeting objectives versus what the model would indicate as far as the compliance record.

MR. CARDELLA: I'm sorry. I don't see the

relevance of that to my question. Let me just try and rephrase the question.

I understand that you said that meteorological conditions can't accurately be simulated by model because they occur too -- on a day-to-day basis, and the model can't capture that; is that correct?

WITNESS LEAHIGH: Well, yeah. You know, the time frames that you're looking at with a model are typically days, weeks, months out. And you don't have day-to-day meteorological forecasts to that precision for that period of time.

MR. CARDELLA: Okay. You also mentioned that one of the things the models were unable to accurately simulate were how the operators respond to those day-to-day conditions; is that correct?

WITNESS LEAHIGH: That's correct.

MR. CARDELLA: What's the basis for your opinion that the model cannot accurately simulate that?

WITNESS LEAHIGH: I'm not aware of any feedback mechanism within the model that is reacting to its own output, for example, that's not making any changes as a response to observed conditions, which is the case in real life.

MR. CARDELLA: Mm-hmm. You had mentioned in earlier testimony about the San Luis rule curve as an

attempt to model the human element. How do you reconcile that testimony with your testimony here?

Because it seems that that's an attempt to replicate through the model real-time decision making, and yet here it appears that you're saying the opposite.

WITNESS LEAHIGH: Well, no. So the rule curve for San Luis is not a day-to-day operation. It's more on a monthly time step. And I think what I've already testified to is I think the model does very well in terms of monthly time steps. It doesn't do very well for the day to day. There's too much volatility on the day-to-day basis as far as all the factors that influence operations.

But as you average that out over monthly periods, you can -- the model has a better handle on -- it can deal with those sorts of things because that's typically more on average what the parameters are. So the model does much better on simulating the system when it -- with respect to a monthly time step.

MR. CARDELLA: And that process you just described, that wouldn't work for metrological conditions; is that correct?

WITNESS LEAHIGH: Yes, because again, the -- it's a degree of volatility. So metrological events

are very unpredictable on a day-to-day basis, but you get more into -- that volatility reduces for the longer time periods that you're looking at.

So monthly averages would be much less volatile than on a day-to-day basis.

MR. CARDELLA: And you couldn't calculate any sort of monthly average of meteorological conditions; is that correct?

WITNESS LEAHIGH: Well, so the model is generally using historical data, which would be influenced by typical meteorological conditions that occur over a longer period of time. And so when you're dealing with historical averages, you will capture the effects of those metrological conditions that have occurred historically and which would be your best guess as to what's going to occur in the future.

MR. CARDELLA: So using the historical record, could you simulate metrological conditions?

WITNESS LEAHIGH: Well, the model is simulating the effects of metrological conditions on the hydrology along with other project operations and other -- other factors that influence the operations --

MR. CARDELLA: I'm sorry. I thought --

WITNESS LEAHIGH: -- such as regulation.

MR. CARDELLA: I thought you just said that

the model is simulating meteorological conditions; is that correct?

I'm trying to understand how -- you know, what the limits of the modeling are here. And I'm having trouble following some of the explanations.

CO-HEARING OFFICER DODUC: Well, let me interject here. If you want to get into the specifics of the modeling, that should be asked of the modeling panel.

I will ask you to refocus or redirect your questions to Mr. Leahigh or Mr. Milligan or the other panelists, for that matter, on the operation aspects of the model, perhaps how they interpret the model and use the results in operational decisions but not to dwell too much on the actual models themselves because this is not the modeling panel.

MR. CARDELLA: This witness has testified that the modeling is not capable of accurately simulating these conditions. I'm clearly trying to ask what the basis for that opinion is. If he doesn't know, he doesn't know. But he shouldn't be drawing that conclusion in his testimony.

CO-HEARING OFFICER DODUC: Fair enough.

But, Mr. Leahigh, answer to the best of your ability but -- well, I won't try to coach you as your

attorney has been.

But I will again remind -- since I don't have your name, I don't remember your name -- the cross-examiner that this is not the modeling panels. I will give you a little bit of leeway, but not too much more on going into the modeling aspects.

MR. CARDELLA: I don't intend to spend more time on this than I have to.

CO-HEARING OFFICER DODUC: All right.

Mr. Leahigh?

WITNESS LEAHIGH: Okay. You know, perhaps I'm not articulating myself well, but I think I talk about many factors which led me to that conclusion.

I'm not sure where you are in your questioning because now you seem to backtrack to my statement, original statement, in the testimony. So I'm not sure where the questioning is now.

MR. CARDELLA: That's the starting point for the question. And your testimony was that the models are not capable of accurately simulating certain aspects of real-time operations, one of those aspects being salinity management. And you said that the reason why it could not accurately simulate salinity management was because it could not simulate meteorological conditions. And my question was why it

could not simulate meteorological conditions.

WITNESS LEAHIGH: Depends on which model we're talking about first of all. So could you be more specific on which model you're referring?

MR. CARDELLA: The model that was used for the purposes of this proceeding.

WITNESS LEAHIGH: There were at least a couple models that were used for this proceeding, would be -- the shorter term time step would have been the Delta simulation model. And the monthly time step model would have been the CalSim model.

MR. CARDELLA: My question was how the mete- -- why your opinion is the metrological conditions cannot be simulated by the model.

If your response to that is it depends on which model is used, then I'm going to have to ask you, are there models that can simulate those things?

WITNESS LEAHIGH: So my response was that, in order to simulate -- in order to have meteorological effects simulated in a model, you would need a forecast of that meteorological information very precisely and for a longer time period.

And I think what I've stated is that that precise and duration of a metrological forecast does not exist; therefore, a simulation model would not be

able to model the effects of that in the -- over the time frame that I'm talking about in my testimony.

MR. CARDELLA: And this is just one final question to clarify. And your testimony is that the historical record cannot be used to simulate that?

WITNESS LEAHIGH: Over longer time steps, the historical -- the effects of metrological conditions on hydrology can be utilized in simulation models.

MR. CARDELLA: Okay. I'm going to move on to a new topic. This is actually going to be for Mr. Milligan, and this is going to be -- if we can go to the fourth page of the PDF document that I furnished staff.

So, Mr. Milligan, you say that Reclamation will continue to coordinate in managing and operating the CVP in a manner that's protective of other water users.

I believe you testified yesterday that, when you used the phrase "operating the CVP in a manner that's protective of other water users," you meant operating in a way that's not going to adversely effect other water users; is that correct?

WITNESS MILLIGAN: I'm not sure if those are my exact words or not, but to that effect, yes.

MS. RIDDLE: Mr. Cardella, can you please

reference the document that you are referring to for the court reporter and the record.

MR. CARDELLA: This is DOI-7 at Page 4.

When you say "other water users" in this excerpt, does that include CVP water service contractors?

WITNESS MILLIGAN: It's other legal users of water.

MR. CARDELLA: So your answer is "yes"?

WITNESS MILLIGAN: My answer is what it was.

MR. CARDELLA: Is it your opinion -- or to the extent you have any opinion -- strike that. Let me rephrase.

Is it your testimony that the project will not result in any adverse impacts to CVP water service contractors?

WITNESS MILLIGAN: Based on my review of the modeling and my understanding of the project, that we would not move forward with something that would adversely affect our CVP contractors.

MR. CARDELLA: So the basis for that opinion is the modeling and your experience, I think you said?

WITNESS MILLIGAN: That and the idea that why would we move forward with a project that would hurt the project -- I mean, the CVP?

MR. CARDELLA: I'm going to move on. This is still for Mr. Milligan.

DOI-7 at 2, I believe it should be the next page of my PDF.

This was gone over a little bit in the previous cross-examination, but do you have any understanding regarding obligations imposed on the Bureau of Reclamation by the exchange contract?

WITNESS MILLIGAN: I understand the terms of the exchange contract.

MR. CARDELLA: Would you be able to explain the substance of the Bureau's obligations under the exchange contract?

MR. BERLINER: Objection, violates the best evidence rule. We have the exchange contract here. It's available. It speaks for itself.

CO-HEARING OFFICER DODUC: So what is your specific question, Mr. Cardella?

MR. CARDELLA: My question was just to try and give some context for the next question. I was going to --

CO-HEARING OFFICER DODUC: Ask the next question, please.

MR. CARDELLA: Do you know if the Bureau of Reclamation has ever failed to deliver to the Exchange

Contractors sufficient substitute supply from the Delta?

WITNESS MILLIGAN: I'm not sure about the legal significance to the word "adequate," but there have been times where we have delivered less than the absolute contract quantities specified in the contract.

MR. CARDELLA: And when was that?

WITNESS MILLIGAN: To be honest, I think there have been many years where we have -- that the requested water was less than the quantities in the contract. But I do know last year was a year where the needs did exceed what we were able to provide.

MR. CARDELLA: And what about in 2014?

WITNESS MILLIGAN: We probably did have some periods of time where they -- we were short of what was probably desired.

MR. CARDELLA: And when this occurs, do you know what is the result for Friant Division contractors?

WITNESS MILLIGAN: That's a slightly different question. But if we were unable to meet those quantities via the Sacramento River, Delta side of our operations, then water can be released at Millerton to the San Joaquin River down to the Mendota pool.

MR. CARDELLA: And is that -- would you

consider that an undesirable outcome for Friant Division contractors?

MR. BERLINER: Objection, relevance.

CO-HEARING OFFICER DODUC: I think the witness can answer it.

WITNESS MILLIGAN: I'm not a Friant Division contractor, so I couldn't say. But my assumption is they would not prefer that outcome.

MR. CARDELLA: Okay. I'm going to move on now to some of the modeling.

You said in your testimony that you're aware of the modeling that's been performed as part of the petition; is that correct?

WITNESS MILLIGAN: Yes, I am.

MR. CARDELLA: Do you have any understanding with respect to the modeling results for Exchange Contractor deliveries?

WITNESS MILLIGAN: I have seen summations and groupings of deliveries to the Exchange Contractors, yes.

MR. CARDELLA: Do you have any understanding with respect to the models's assumptions regarding source of water used to satisfy the Exchange Contractors' demands?

WITNESS MILLIGAN: Yes.

MR. CARDELLA: And what is your understanding?

WITNESS MILLIGAN: It appears that the model results would show that the Exchange contracts can be serviced from -- via the Delta throughout the entire simulation.

MR. CARDELLA: Maybe I wasn't clear. My question was about the modeling assumptions. Is that what your answer was intended to address?

WITNESS MILLIGAN: The assumptions?

MR. CARDELLA: Yeah.

WITNESS MILLIGAN: The assumptions are to try to meet the terms of the Exchange Contract.

MR. CARDELLA: Do you know if the model assumes that all water used to satisfy Exchange Contractor demands comes exclusively from the Delta?

WITNESS MILLIGAN: It makes that as the first priority.

MR. CARDELLA: And so there's no situation where that doesn't occur under the model simulation; is that correct?

WITNESS MILLIGAN: I did not see that in the model output, that there was a shortage as it relates to trying to meet that from the Delta.

MR. CARDELLA: So has any modeling been submitted for purposes of this proceeding where the

modeling simulates what is to occur if the source of water for Exchange Contractor demands is someplace other than the Delta?

WITNESS MILLIGAN: I don't believe so.

MR. CARDELLA: Okay. Do you believe that that's a reasonable assumption for the model to make, given operations that you mentioned?

MR. BERLINER: I'm going to object again as to relevance. This has to do with south of Delta issues. It was explained earlier that the model aggregates south of Delta issues. Really, this is asking about longstanding South Delta issues here.

CO-HEARING OFFICER DODUC: Mr. Milligan can answer that to the best of his ability.

WITNESS MILLIGAN: The question has a set of just how CalSim operates. And this does -- goes back to the identification of very low storage levels at Folsom and Shasta that we talked about earlier this morning, is that the model is making every attempt to meet the Exchange contract from the Delta and out of CVP storage in Folsom and Shasta. And in the simulation, it shows that driving those reservoirs to a fairly low storage place.

We've experienced -- the last two years have been circumstances where that is not desirable outcome

upstream. And the hydrology has been a bit more extreme, as we've kind of showed in terms of the record that went into the simulation. So there are circumstances that we've seen here recently that lie outside the simulation of the model and should be thought through at some degree.

MR. CARDELLA: So just to clarify that I understood your answer there, is it your testimony that it is not a realistic assumption for the models to, in all cases, assume that the water used to satisfy Exchange Contractor demands comes from the Delta?

WITNESS MILLIGAN: I don't think it's necessarily an assumption, but it is an outcome that covers all possible hydrology. Our experience has been no, that it is possible that a set of circumstances will arise that water would need to be released from Millerton to meet the Exchange contract.

MR. CARDELLA: My question is whether that assumption -- excuse me -- whether that simulation of the model in that fashion is realistic given the last few years.

WITNESS MILLIGAN: I think it's a -- it is a set of data that's useful and, depending on how it's used, may or may not be necessarily be the full range of what's realistic.

If the intent is to show a realistic question of what could happen in some extreme hydrology, like the last few years, then that would probably require some additional modeling.

MR. CARDELLA: Is it useful for determining impacts to Friant Division contractors when water from sources other than the Delta is used to satisfy Exchange Contractor demands?

WITNESS MILLIGAN: I think it's more difficult to assess the effects to the Friant Division.

MR. CARDELLA: Is it possible at all to assess those effects?

WITNESS MILLIGAN: I think it will entirely be driven by your sets of assumptions. The set of assumptions currently in CalSim have been used in a comparative mode for a long time. If one were to make some different assumptions as it relates to CalSim and the Northern system and Delta operations to try to force this issue, so to speak, then it will depend on those assumptions.

MR. CARDELLA: And those different assumptions that you're referring to, those have not been made and submitted to the Board for this proceeding; is that correct?

WITNESS MILLIGAN: No, they have not.

MR. CARDELLA: Okay. Thank you.

I'm going to move on to another topic now. You testified yesterday, Mr. Milligan, that the project would operate under a modified coordinated operations agreement pursuant to procedure for review and adjustments; is that correct?

WITNESS MILLIGAN: Well, I would assume that, given something of the magnitude of a new North Delta diversion that we would at least go through the review process and make -- and work through the process to see if there were any adjustments that need to be made.

MR. CARDELLA: And, Mr. Leahigh, do you agree with Mr. Mulligan's testimony on that point?

WITNESS LEAHIGH: Yes, I agree on that point.

MR. CARDELLA: Just for the court reporter's sake, I might refer to the COA. When I do that, I'm referring to the Coordinated Operations Agreement.

Turning back to Mr. Milligan, you also testified that there's a provision in the COA that the CVP and SWP are to review the COA in the event additional or new projects come online. And the California WaterFix would certainly meet that test; is that correct?

WITNESS MILLIGAN: Taking that in two parts, it's my opinion that the COA does have such a

provision. And it's my belief that something in the magnitude of the WaterFix would rise to that level.

MR. CARDELLA: And, Mr. Leahigh, do you agree with Mr. Milligan's testimony?

WITNESS LEAHIGH: Yes. I believe the California WaterFix would be of the magnitude in which a review would be called for.

MR. CARDELLA: Do either of you know which provision of the COA contains the text that would require modifications as a result of the implementation of the California WaterFix?

WITNESS MILLIGAN: Am I allowed to look through the COA I was given yesterday to --

MR. CARDELLA: Absolutely.

CO-HEARING OFFICER DODUC: Is there a reason why they need to know the exact provision?

MR. CARDELLA: Because I don't know it, and I would like to know. The first I heard this was yesterday during their testimony. So I'm interested so that I can look it up.

CO-HEARING OFFICER DODUC: All right.

WITNESS MILLIGAN: The COA is a fairly short document. It's probably pretty clearly defined. If you want me to take the time, I can.

CO-HEARING OFFICER DODUC: Go ahead.

MR. CARDELLA: You can just provide that reference later. I don't want to waste time. There's no urgent need for that.

CO-HEARING OFFICER DODUC: All right. Then we'll save that for later.

MR. CARDELLA: Mr. Milligan, you testified yesterday regarding COA accounting procedures; is that correct?

WITNESS MILLIGAN: We did touch on that testimony.

MR. CARDELLA: Part of your testimony was that certain in-basin uses require additional water from storage, and the responsibility for making those releases would be divided between the CVP and the SWP according to percentages specified in the COA; is that correct?

MR. CARDELLA: At times when additional water is needed to meet in-basin needs, yes.

MR. CARDELLA: Are these releases always made in accordance with the percentages specified in COA?

WITNESS MILLIGAN: They are accounted in that fashion, particularly during balanced conditions. When they're -- and I think part of your point on the testimony was to say that, on a daily basis, that isn't exactly what occurs. So an accounting is done, and

then that running account gets adjusted as the season progresses.

MR. CARDELLA: So the answer would be no, they aren't always made strictly according to those percentages?

WITNESS MILLIGAN: Operational changes are not always made that way, but as we go through the season, we try to balance out which actions were taken at which facilities.

MR. CARDELLA: So to make sure I understand, there might be instances where the releases are not made in accordance with what's specified in the COA, but there will be an accounting performed that brings that water back so that, if one project releases more than is required in the COA, it will get that water back somehow?

WITNESS MILLIGAN: The example, very simplistically, would be that the COA accounting flows are coming at different rates from the different reservoirs. And if you followed the strict rules of the accounting as things changed as needed on the river, you'd be making changes to each of the reservoirs on a daily basis. And that's not very practical.

So it's much easier and probably better from a

management of the rivers themselves to make adjustments less frequently than account as to which river, when the next change needs to be made, and what the magnitude of that adjustment should be made to keep these accounts somewhat in balance.

MR. CARDELLA: So when those accounts are out of balance, so to speak, is that what's referred to as a COA debt?

WITNESS MILLIGAN: That term has been used, yes.

MR. CARDELLA: Do you have any understanding as to whether, in 2014, repayment of a COA debt contributed to the Bureau of Reclamation being unable to fully satisfy Exchange Contractor demands from the Delta?

WITNESS MILLIGAN: Which years again?

MR. CARDELLA: 2014.

WITNESS MILLIGAN: So a debt in 2014 to meet Exchange contracts in 2014?

MR. CARDELLA: A debt in any of the preceding years that had an effect in 2014 of the Bureau being unable to fully satisfy the Exchange --

WITNESS MILLIGAN: I don't believe -- I would not agree with that statement, no.

MR. CARDELLA: So the answer would be no,

repayment of a COA debt did not contribute to the Bureau being unable to fully satisfy Exchange Contractors' demands from the Delta?

WITNESS MILLIGAN: One might say that a COA debt in itself would be water that was not available to the CVP. So balancing that book would just be an indication that there just was not enough water from the CVP to meet the objective of fulfilling the water from the Delta.

MR. CARDELLA: So repayment of the COA debt was not involved in --

WITNESS MILLIGAN: Balancing COA or repaying any COA debt or rebalancing of the COA occurs regardless and, by the terms of the COA, should be kept fairly in balance. So if there is an imbalance, the project's priority in terms of it being consistent with its water right would be to keep a balance on the books.

MR. CARDELLA: Let me try and rephrase the question. I think this is a fairly simple yes or no question.

Did repayment of a COA debt play any role in the Bureau of Reclamation being able to -- unable to fully satisfy Exchange Contractor demands from the Delta in 2014?

WITNESS MILLIGAN: I would say no because I believe that any COA debt was a representation of water that the project should not have -- that the projects were able to -- it's just an indication of a limitation of water available to the CVP.

MR. CARDELLA: So the answer is no?

WITNESS MILLIGAN: The answer is no.

MR. CARDELLA: Okay. I'll move on.

Mr. Milligan, I believe you testified --

CO-HEARING OFFICER DODUC: Mr. Cardella, how much longer do you need?

MR. CARDELLA: I've got one more question in this line, and one more line after that.

CO-HEARING OFFICER DODUC: And how long -- what is that additional line, and how long do you anticipate needing?

MR. CARDELLA: I don't think it will take very long. It relates to testimony that the operations in recent years are statistical outliers and whether they should be expected to be within the range of future conditions for operations under the WaterFix.

CO-HEARING OFFICER DODUC: So let's finish up -- you had one question left in this line, and let's finish it up, and we'll take a break for the court reporter.

MR. CARDELLA: Okay.

Mr. Milligan, I believe you testified yesterday that it was unclear at this time whether the CVP or the SWP would have priority over new diversions from the California WaterFix; is that correct?

WITNESS MILLIGAN: I think it was what the proportion would be, and so a question of priority.

MR. CARDELLA: So what do you mean when you say "the proportion would be"?

WITNESS MILLIGAN: Well, we just talked about COA, which talked about sharing of both responsibilities and available supply and how those percentages and/or -- are they counted separate and distinct from the current COA. And that's the process that would go into a review and ultimately maybe a change in some of the COA.

MR. CARDELLA: So would it be fair to say that one of the issues that is unclear at this time is how much of the water that is added to the system's supply as a result of the WaterFix will be part of the CVP supply and how much will be part of the State Water Project supply?

WITNESS MILLIGAN: I think terms of, let's say, south of Delta yield, that may be achieved through the WaterFix, the proportionality of that between the

two projects still needs to be resolved.

MR. CARDELLA: So in terms of the split of that water, that's what needs to be resolved between the projects?

WITNESS MILLIGAN: That's what I mean, yes.

MR. CARDELLA: Okay. That's all I have.

CO-HEARING OFFICER DODUC: For that line of questioning?

MR. CARDELLA: For that.

CO-HEARING OFFICER DODUC: Okay. We will take a 15-minute break. We'll resume at 3:17.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. It is 3:17. Before we resume -- we're going to have to find a better way of doing this, I think. But apparently Mr. O'Laughlin has now requested to not conduct his cross-exam today. So let me do a quick time check here.

Is Group No. 17 here today?

(No response)

CO-HEARING OFFICER DODUC: All right. Group No. 18 is Mr. O'Laughlin.

Group No. 19 is Ms. Meserve. You are here. How much time do you anticipate needing?

I can't hear you. Actually, would you mind

coming up?

So in toto, Group 19, how much time do you believe you need?

MS. MESERVE: I will probably need an hour, I'm estimating.

MR. VAN ZANDT: I think about 45 minutes for mine.

CO-HEARING OFFICER DODUC: Okay. Group 20? Is Group 20 here?

The last gentleman, I guess you have to come back and identify yourself for court reporter.

And Group 20 is not here.

Group 21 is Mr. Herrick. So there is a possibility -- hold on. It is 3:20.

Mr. -- hold on. I have to look up your name -- Cardella, do you anticipate needing another ten minutes?

MR. CARDELLA: I think that should do it.

CO-HEARING OFFICER DODUC: Okay. And then Ms. Meserve will need an hour.

MR. VAN ZANDT: Michael Van Zandt for Group 19, and I will need about 45 minutes.

CO-HEARING OFFICER DODUC: We will not get to Mr. Herrick today. He does not have to rush in.

All right. Mr. Cardella, please resume your

cross-examination.

MR. CARDELLA: If staff could pull up the last page of the PDF document I provided, please. This is DWR-61 at Page 13.

MR. LONG: Sorry. What's the page number again?

MR. CARDELLA: In the DWR exhibit or in the PDF document I provided?

MR. LONG: Page number of DWR-61.

MR. CARDELLA: It's at Page 13.

So I'd like to direct your attention to the third paragraph, beginning with the Exhibit DWR-406. This is for Mr. Leahigh.

Can you go ahead and read that paragraph and let me know when you're finished.

WITNESS LEAHIGH: Yes, I've read it.

MR. CARDELLA: And in particular, I want to direct your attention to the last two lines, specifically the statement "...should be considered statistical outliers from what would be within the expected range of conditions."

Is it your opinion that conditions during the past four years are statistical outliers that should not be within the expected range of conditions for future operations with the California WaterFix in

place?

WITNESS LEAHIGH: Yes, my conclusion in my testimony is based on the discussions I had with Mr. Michael Anderson, State climatologist, also on our panel here.

MR. CARDELLA: And Mr. Anderson, would you agree with that characterization?

WITNESS ANDERSON: Yes, I would.

MR. CARDELLA: So how do you reconcile that opinion with testimony you provided earlier that it is possible that the last four years of exceptional drought could occur in the future?

WITNESS ANDERSON: Extremes are always possible. '77 occurred, 2015 occurred. Each individual extreme is possible and may not be expected.

MR. CARDELLA: So your testimony is that extremes should not be considered when analyzing future conditions?

WITNESS ANDERSON: You can analyze extremes in and of themselves through a variety of means. Any specific extreme must be treated in the nature that it is experienced, particularly in a water management framework.

MR. CARDELLA: My question is whether the extremes should be considered.

WITNESS ANDERSON: They can be considered, but it depends on the manner in which you consider them.

MR. CARDELLA: How would it depend on the manner in which you consider them?

WITNESS ANDERSON: Modeling can consider a range of outcomes that would be under normal operating procedures. Extremes are often analyzed in a manner that looks at that aspect of the distribution. In the case of what was shown in some of the modeling results, that would be in the extreme ends of the model. And often those cases are analyzed separately to evaluate what special considerations might be needed under those conditions.

MR. CARDELLA: So is it your opinion that the extremes are not relevant when considering the impacts of a major change in California's water infrastructure?

WITNESS ANDERSON: I would not say that.

MR. CARDELLA: So would you say that the extremes are relevant?

WITNESS ANDERSON: They are relevant, but they are also considered statistical outliers.

MR. CARDELLA: Right. So they should be within the expected range of conditions as extremes?

WITNESS ANDERSON: In and of themselves as they are analyzed as extremes, yes.

MR. CARDELLA: If I could just have a moment to review my notes.

That's all I have, thank you.

CO-HEARING OFFICER DODUC: Thank you.

Let's check and make sure, Group 17 is not here.

Group 18 has requested to conduct cross-examination next Thursday.

So we're now up to Group 19. And I expect, given the time estimates just provided, we will conclude today with cross-examination by Group 19. We will begin tomorrow with cross-examination by Group 21 because my understanding is Group 20 is also not conducting cross-examination.

So if you could please let Mr. Herrick know. Someone was asking me that question during the break. Thank you.

CROSS-EXAMINATION BY MR. VAN ZANDT

MR. VAN ZANDT: Good afternoon, Members of the Board and the staff, Distinguished Panel. I'm Michael Van Zandt for Islands, Inc. There is a large island in the middle of the Delta; Ryer Island is the location of the client that I represent.

And I'll direct most of my questions to Mr. Leahigh, if I could. And could you pull up DWR-61

and go to Page 3, please, Lines 20 through 23.

So Mr. Leahigh, we have here a mention of management of net Delta outflow is the fundamental way in which salinity is managed in the system if there are uncontrollable variable factors. And I wanted to ask you, you mentioned two factors in your testimony, one being releasing more water from storage; the other is reducing diversions in the South Delta.

Can you think of any other factors, variable factors, that could control the amount of salinity that arises in the Delta?

WITNESS LEAHIGH: Well, just to be clear, the -- yeah, the releases and the -- any change in releases or change in diversions were the tools available to the projects in order to manage conditions in the Delta.

The factors that influence -- the variable factors that influence the salinity, I've included the tidal influences, inflows into the Delta, net Delta consumptive use. So those were some of the other factors -- net Delta outflow.

MR. VAN ZANDT: Do the temporary barriers have any impact on reducing salinity intrusion?

WITNESS LEAHIGH: Well, you'd have to be a little more specific on where and in what respect.

MR. VAN ZANDT: Well, there's one at False River. Just recently, there was one that was proposed in one of the sloughs just adjacent to Ryer Island. Do you know if a barrier such as that would help prevent saltwater intrusion?

WITNESS LEAHIGH: Yeah, so it sounds like you're referring to the emergency installation of the West False River barrier last year?

MR. VAN ZANDT: Correct, yes.

WITNESS LEAHIGH: Okay. So yes, that was because the projects were projecting that we would have insufficient storage to provide the normal hydraulic barrier to salinity intrusion. The result of that was the construction of the physical rock barrier at West False River to aid in the blocking of that salinity intrusion into the Central Delta.

MR. VAN ZANDT: Okay. We'll go back to the salinity issue in just a second.

If you go to Page 4 of your testimony, DWR-61, Lines 1 through 3, here you're referring to the high priority requirements of the water system, or in-basin requirements, are met before developing water supply for the water supply contractors.

In my reviewing the testimony, I rarely see a mention of riparian rights. Are riparian rights

included in what you call the in-basin requirements?

WITNESS LEAHIGH: Yes. So my definition of the in-basin requirements were a combination of the Bay-Delta standards and also other legal users of water. So to the extent the riparians are legally diverting water, they would be included as the in-basin requirement.

MR. VAN ZANDT: If you go to Page 5 of DWR-61, Line -- looks like Line 12. And the sentence begins, "All unstored flow goes first to meet in-basin requirements." Do you see that?

WITNESS LEAHIGH: Yes.

MR. VAN ZANDT: How does State Water Project manage unstored flow so that it meets in-basin requirements, or is that even part of your management responsibilities?

WITNESS LEAHIGH: It is part of our water management responsibilities. Some of that unstored flow is not within our control. It comes into the system downstream of the project reservoirs -- well, part of that isn't in our control by the fact that we would not divert the unstored water unless all the in-basin requirements are being met.

Also, some of the unstored flow would be flow upstream of the reservoirs that we would have to allow

to pass through the reservoirs to meet any of the in-basin requirements before we could start diverting that water.

MR. VAN ZANDT: And could you tell us how those in-basin requirements -- how are they measured? How do you determine what the in-basin requirements are that you have to manage the unstored flow for?

WITNESS LEAHIGH: Well, the portion of the in-basin requirements that are associated with the water quality control plan standards and are implemented through D1641, some of those are nominal outflow requirements. So those are measured through the equation that I had as part of my testimony, which is also at part of D1641.

As far as any of the salinity requirements in D1641, there's essentially, if you will, Delta outflow equivalent in order to ensure that those water quality -- sorry -- salinity requirements are being met. So that would be a way to measure whether or not in-basin requirements are being met or not.

MR. VAN ZANDT: Is that also -- when you're doing this, do you also attempt to measure the quantity of water that must be released or in the river to satisfy the in-basin requirements in addition to the water quality issues?

WITNESS LEAHIGH: Well, essentially, the working assumption would be that any of the diversions taking place between our release locations and the Delta would be legal requirements, unless the Water Board were to curtail or make a decision that those diversions were not legal. Otherwise, we'd be under the working assumption that they were legal.

And so essentially, the result would be, if we're meeting the Water Quality Control Plan standards, then we have indeed met the condition as far as all of the in-basin requirements being met.

MR. VAN ZANDT: What inventory of in-basin requirements in particular for diversions along the river, what inventory do you use as the person who's operating this, the State Water Project?

WITNESS LEAHIGH: I'm sorry. I don't understand your use of the term "inventory."

MR. VAN ZANDT: Well, there's going to be demand on the river from various diverters. And in order to make sure that there's sufficient supply in the river to supply all those needs, the in-basin requirements are part of that. Is there an inventory of those types of diversions that you use in your operation of the project?

WITNESS LEAHIGH: Well, yes. So essentially

how it works is the difference between our release points upstream, we do measure how much flow actually ends up showing up at Freeport gauge. So that is a measurement point.

We don't have a real good handle on the rate of diversion that's occurring between our release point and that measurement point at Freeport on any given day, but generally, we're -- so the difference between our collective releases and what shows up at Freeport is what we reference as a net depletion or net appreciation in the Sacramento Valley. But that's an unknown that we're working with.

We will make adjustments to our releases as needed depending on how much flow actually ends up arriving at Freeport gauge on the Sacramento River. So we're responding to what's really an unknown.

MR. VAN ZANDT: Do you have a mechanism if there is a shortage as a result of the proposed Cal WaterFix structures if the in-basin requirements are not being met? Do you have a mechanism to address that, some kind of a complaint system or information system that the water right owner could go to and find out why they're not getting their supply of water?

WITNESS LEAHIGH: Well, we would -- just as in operations without the California WaterFix, all of our

releases are going to be needing -- going to be meeting all those other legal diverters first. The final outcome is going to be are we meeting the Water Quality Control Plan standards or not.

And as long as we are meeting those flow and salinity standards, we would have no reason to believe that any legal user of water is not receiving their -- their entitled water.

MR. VAN ZANDT: If you go to Page 6, Lines 19 through 28, I believe it is.

Here we're talking more specifically about the various factors that affect salinity. And my question has to do with, given the fact that the major thing that is done that helps the salinity issue is reducing the diversions at South Delta -- and there's a lag time, correct, for releases from the upstream reservoirs in terms of its effect on the salinity?

WITNESS LEAHIGH: Yes, there is lag time. There's a delay on when the water is released upstream and when it makes its way to the Delta.

MR. VAN ZANDT: Okay. And you talk later in your testimony about exceedances for the water quality standards, that that would also include exceedances for salinity?

WITNESS LEAHIGH: Yes.

MR. VAN ZANDT: I'm just wondering, conceptually, if you're taking 9,000 cfs out of the river, if, given the capacity of the Cal WaterFix, that much water coming out of the river, would there be an option for the SWP to reduce the amount of diversions into the Cal WaterFix facilities in order to help solve the salinity problem?

WITNESS LEAHIGH: Yes, absolutely.

MR. VAN ZANDT: Is that written into a plan somewhere or adopted as a policy?

WITNESS LEAHIGH: Yes, it's part of our obligation to meet the water quality control plan standards through D1641.

MR. VAN ZANDT: And that would continue for Cal WaterFix?

WITNESS LEAHIGH: That is correct. We would be meeting any water quality plan objectives assigned to the projects.

MR. VAN ZANDT: Now I wanted to talk a little bit about the exceedances. We don't need to put the slides back up again, but in your testimony, I think you give this example of a 10 percent of the -- 10 percent -- there's 10 parameters you have to meet, and if you didn't meet one of them, then 10 percent would be the exceedance for that day. And then if you didn't

have any exceedances the next day, then it would be reduced to 5 percent.

So all those figures that we looked at where you said, you know, 1.2 percent exceedance or a 2.6 percent exceedance, they're all averages, right, over a period of time, 20 years; is that correct?

WITNESS LEAHIGH: Yes, so, well, most of the standards, have probably been -- well, I shouldn't say "most" necessarily, but a good number of the standards have been in effect since D1485, so back as far as 1978.

Other standards were adopted as part of the 1995 Water Quality Control Plan. That was probably the second time period in which a significant number of new standards kicked in. So depending on how far back the standard goes, that would be the time period on which we were basing that overall average exceedance rate.

MR. VAN ZANDT: And the excerpt that I'm referring to is DWR-61, on Page 9, Lines 5 through 11.

So the question is, Mr. Leahigh, we have an exceedance for salinity, and we have irrigators, you know, farms along the Delta obviously. And the question is what steps would the State Water Project take under the Cal WaterFix facilities to further prevent exceedances, assuming that, if you have one of

these parameters that is exceeded on any given day, irrigating with water which exceeds the salinity numbers may have a significant impact on the farmers' ability to grow their crops?

WITNESS LEAHIGH: Yes, so there was -- so what did we do in response to ensure that that doesn't happen? That's the question?

MR. VAN ZANDT: Right.

WITNESS LEAHIGH: Yes, so as part of my testimony, I talked about the tools available to the projects in order to meet all these standards. So our effort is to ensure no exceedances. So we'll do that in terms of releasing a sufficient amount of water from upstream reservoirs in the event there's not enough natural flow to meet the objectives.

And we also have a certain amount -- if we're releasing water in excess of that needed just to meet the standards, some of that flow will be diverted at the South Delta.

If we encounter some of these real-time conditions that I showed in my summary of my written testimony, such as a salinity intrusion event along either the lower San Joaquin River, lower Sacramento River, the way we would respond to that is either reducing the diversions from the South Delta or

increasing releases from the upstream reservoirs in order to provide additional outflow.

And we can try to pinpoint that more in relation to where we're having more salinity issues in a particular objective. So, for example, in the southern part of the Delta, we'd be more likely to -- or the Central Delta I should say, we would be more likely to decrease our diversion rate from the South Delta. Something on the Sacramento River, we would increase our releases from upstream would probably be more effective.

In the case of the Cal WaterFix, as I demonstrate in my -- or I was talking to in my summary, is that, with a diversion point along the Sacramento River, the North Delta intake, that's another tool that would be available to us if we had salinity conditions, let's say, intruding on the lower Sacramento River; we could shut off those diversions in order to allow more of the releases from upstream to flow down the Sacramento River to combat that salinity intrusion that could be occurring.

So the times that we've had these exceedances at those locations has been when the magnitude of the salinity intrusion event and the suddenness of it would have been greater than our ability to respond. So

that's the reason that we have had exceedances in the past.

We typically try to provide somewhat of a buffer in order to account for the typical type of volatility that exists. But there's occasions when, again, that suddenness or severity of that intrusion event is greater than our ability to react.

So the California WaterFix North Delta diversion would just give us another tool as far as the geographic location in the Delta on which we would have some influence on the hydrodynamics.

MR. VAN ZANDT: I think I saw a slide -- you don't need to pull it up. But there's a number of monitoring stations throughout the Delta that track the salinity levels in the river, correct?

WITNESS LEAHIGH: That's correct. That was part of my summary.

MR. VAN ZANDT: Okay. Do you have an understanding of how, say, an irrigator in the Delta, if one of those alarms goes off and you're about to exceed or have exceeded salinity level, how do the irrigators get notified that there's an issue with the quality of water that's coming down to their diversion points?

WITNESS LEAHIGH: Well, we don't have a

notification process per se, but all of these salinity gauges, monitoring stations throughout the Delta are telemetered. And they're accessible from the Department's of California Data Exchange Center Web site. So all of this data is available to the public. You can call up real-time information. Most of it is hourly data. There's also -- some stations report as precise a time frame as every 15 minutes.

So that would be publicly available information that the public has access to. That would give them some indication as to what the salinity trends may be in their particular area.

MR. VAN ZANDT: As an operator with the potential now of transporting more water through the Cal WaterFix facilities, do you anticipate that the salinity in the river will rise as a result of those diversions?

WITNESS LEAHIGH: Well, it depends on -- you've got to be a little more specific on location. We would continue to endeavor to meet all of the Water Quality Control Plan standards. So in that respect, I don't see any change whatsoever with the California WaterFix.

MR. VAN ZANDT: Is there any plan to increase the number of monitors, telemetry monitors along the

river to provide more real data to the State Water Project on salinity?

WITNESS LEAHIGH: The monitoring system that's in place now is fairly comprehensive. I think that there are instances where additional monitoring comes in place periodically. But I don't know that we have any specific plans to add any additional monitoring stations to the already comprehensive network.

MR. VAN ZANDT: You mentioned the temporary barriers. You actually talk about them on Page 11, DWR-61, Lines 15 through 19. And the language is, "Pursuant to the order, DWR has conducted monthly coordination meetings with SDWA, the USBR and State Board staff regarding installation and operations of the temporary barriers to improve circulation and water quality in balance with protecting water levels adequate for agricultural diversions."

With the implementation of Cal WaterFix, if it occurs, will there be more active use of these temporary barriers, you think, in the Delta to protect water quality and water levels for agricultural diversions?

WITNESS LEAHIGH: So in response this particular question, we do have on the panel the program manager for the temporary barrier program,

Mr. Mark Holderman. So I think he might be able to -- the one to best answer.

MR. VAN ZANDT: To just answer a question.

WITNESS HOLDERMAN: Yes, I think there's a little confusion about temporary barriers, and it's pretty common. The barrier you're probably thinking of is the West False River rock barrier that we put in last year in response to the drought. And there are different temporary barriers that have been installed for well over 20 years in the South Delta that we install every year, remove every year.

And that's to benefit the South Delta Water Agency. And that's to mitigate for the impacts of the project pumping down in that area, in terms of its impact on water quality and stage. So those aren't similar barriers. They're completely different, and they're not -- those barriers would not be affected by -- by this project. These operations will continue.

And the description in John's testimony about coordination with all these different agencies, that continues right now.

MR. VAN ZANDT: Will there be any plan to perhaps use that type of a temporary barrier in the north part of the Delta to help with water quality or the water levels?

WITNESS HOLDERMAN: If we needed to install additional barriers during the drought to maintain or prevent further degradation of water quality in the Delta, then the northern barriers, ones we've looked at are on Sutter Slough, Steamboat Slough and that area.

We still continue to look at those, and we are in the early planning stages for obtaining potentially a five-year permit from various regulatory agencies to be able to install not only the West False River barrier, which we did last year, but potentially a couple more in the North Delta if needed, if the drought were that serious. And that's just to have permits available in the 2019 -- for five years beyond that, just in case it's needed, just in case the drought continues or gets more severe.

But it's very unlikely that we would install barriers in the North Delta unless things were even more extreme than last year.

WITNESS LEAHIGH: And the only thing I'd add to that answer would be that, you know, the situation that would cause the decision to install these emergency salinity barriers, that situation should be independent of whether the California WaterFix were approved or not.

MR. VAN ZANDT: Okay. That leaves my next

question, which is on Page 11 of DWR-61, down on Lines 21 through 24. And it says, "DWR contracted with consultant ICF International to investigate and evaluate sources and patterns of high salinity and recommend alternative actions."

Do you know that study has been completed?

WITNESS HOLDERMAN: The study is in final draft form. It has not been completely finalized. We're probably within a month of finalizing that report and making it available on our Web site, the Bay-Delta office Web site for public consumption, I guess. It's not out there for view.

It's a study that we did in coordination with South Delta Water Agency and Delta Water Master, State Water Resource Control Board Staff. And there was a lot of data gathered, a lot of analysis done, and that's being wrapped up right now.

MR. VAN ZANDT: Is it possible to share with -- any other possible recommendations that might come from that study other than reducing diversions or releasing more water from the reservoirs? Any other proposals that you know?

WITNESS HOLDERMAN: This is just looking at -- this is just looking at salinity issues in the South Delta, not the Delta overall. There's very little that

can be done for salinity in the Old River area near Tracy Road, where we have one of our compliance stations. There's very little that can be done in terms of operating the projects to effect a change in salinity there.

And the survey shows that there's a large source of water from local ag returns and potentially from salinity from the groundwater that is contributing to the exceedances that John is showing on his testimony at that particular station.

So some of the recommendations or the alternatives that are in the study talk about doing some plumbing changes in that area to try to improve circulation, to try to reduce those hot spots, where the salinity builds up and then results in an violation or an exceedance, I should say, of a water quality objective in that area.

MR. VAN ZANDT: Do you think that any of those improvements might also be used in the north part of the Delta?

WITNESS HOLDERMAN: I would not know. I've not studied that area. And I'm not sure what -- this is a very localized problem, South Delta. And I don't know if there's a similar situation in the North Delta.

WITNESS LEAHIGH: Well, I would add that, at

least based on our -- the compliance record for the other parts of the Delta, the -- any exceedance of those other objectives is extremely rare.

So that's why this is a special case as it relates to these objectives in the South Delta and these other -- this other investigation that's going on.

MR. VAN ZANDT: Can you pull up DWR-409, please.

And this was referred to at your testimony DWR-61 as to -- Page 14 Lines 17 and continuing to the end there.

So this graph I suppose is showing a pretty bleak situation with regard to the water years, especially water year 2015.

And my question is, if climate change is a reality and it has the unfortunate effect of reducing the amount of water that's going to be available in the Delta over the next however many years, 1500 years, whatever it is, has that been taken into account in the modeling and in planning for operations of the Cal WaterFix facilities as we go forward?

WITNESS LEAHIGH: Well, my short answer is that, if that is the case, that this is a longer term trend or this would be a concern for the system

regardless of whether California WaterFix were put in place or not. So, now, I can't speak to how likely it is that this is something that would continue. Perhaps our climatologist could speak to that.

But, you know, WaterFix is not a project designed to address the type of phenomenon that you're referring to. It's an improvement on the location of the diversion within the Delta is the scope of the climate change project -- I'm sorry -- of the WaterFix project. Excuse me.

MR. VAN ZANDT: I guess my question was, in doing any of the planning for operation of the Cal WaterFix facility, is any potential reduction in the amount of water that would be managed in that system, has that been contemplated at all or considered?

WITNESS LEAHIGH: Well, we've talked about the period of record that's been used as -- well, the modelers will get more into what the -- what their analysis was based upon in terms of the hydrologies. Again, we testified to the fact that that has been an outlier year. It certainly has caught folks' attention during the past couple of years.

But I think, as Mr. Anderson testified, it certainly falls in the category of an outlier in terms of expectations.

MR. VAN ZANDT: Okay. So let me be more specific. So if I understand your testimony, since you're considering it to be an outlier, right now, there's no plans within the operation of Cal WaterFix facilities to make adjustments based on potential significant reductions in water supply?

WITNESS LEAHIGH: Yeah, I don't believe there would be any plans that would be different to deal with these types of years -- would be any different with Cal WaterFix than they would be without the California WaterFix.

MR. VAN ZANDT: If in fact that climate change is a reality, and most people believe it is, the question then becomes -- the capacity that we're talking about here is the 9,000 cfs for the California WaterFix facilities. Does that -- is that, you know, consistent with what might maybe be viewed as a shrinking water supply and perhaps a water supply that won't be there to divert through those facilities?

WITNESS ANDERSON: Can I go ahead and interject here, if you don't mind?

I think the characterization of the climate change and the way it would play out in terms of a hydrologic outcome is the concern that you're looking at, whether it's an annual volume or whether it's an

event based in the way that that hydrology arrives. There remains expectations into the future of great uncertainty in the total quantity of precipitation change that may arise in Northern California and it's associated runoff.

The concern more is the timing of it and the expectation that more of that would happen in the winter, more associated with our atmospheric events that arise in that time period.

What that would imply would mean that you would have a greater number of periods of excess flow during the winter and spring but maybe less periods of snow melt runoff in the spring and summer.

MR. VAN ZANDT: So the question for Cal WaterFix is is there some consideration that perhaps the -- I heard testimony the other day from the engineers that they intend to have the 9,000 cfs transmission at full capacity.

If that capacity does not exist, what plans does State Water Project or CVP have to address the lack of resource to go through the Cal WaterFix facilities?

WITNESS LEAHIGH: Well -- so this is John again.

To follow up on Michael Anderson's statement

about the expectations on the pattern change with climate change, what he just stated is the expectation that we would see additional excess flows, unregulated flows in the wintertime as a result of higher snow lines, a more direct runoff.

Depending on the actual permitted conditions that are applied to the WaterFix, what the modeling shows is that we would actually have the tools to better manage the system with the new North Delta intake in order to capture a higher percentage of these flows that are coming in the wintertime with -- so a higher percent of the excess flows. Because of that shifting pattern, we would have more opportunity to capture those. To the extent that taking advantage of excess flows in the winter years, that would still occur. Climate change is a change on average. So we would still expect to see some volatility from year to near.

But to the extent that the new WaterFix project could take advantage of capturing those excess flows with the climate change, pattern change it would better prepare water districts throughout the state by allowing them to store water that's captured in these winter years in their internal storages -- say, groundwater or surface water storages. It would better

prepare those water districts to deal with the drier years that are going to be occurring in the future.

So in that respect, the California WaterFix would -- again, depending on the permit conditions, could be a very positive overall for water supply management throughout the state.

MR. VAN ZANDT: Does it happen with that process -- would there be a possibility that Cal WaterFix would be looking to increase the storage capacity of the upstream reservoirs, Shasta, Folsom? Oroville?

WITNESS LEAHIGH: That is not part of the California WaterFix project. It's strictly a conveyance. It's primarily a conveyance project.

MR. VAN ZANDT: Could you go to Page 18 of your testimony, Lines 10 through 23, I believe.

Could you put up DWR-4E, Page 37.

So we looked at this chart from your presentation several times, Mr. Leahigh. But my question is about the capacity of the system. And obviously we're looking at a time period here of December 2015 to April of 2016, roughly 150 days. And in that time period, you testified that 1.2 million acre feet of additional water might have been available for California WaterFix; is that right?

WITNESS LEAHIGH: That was the amount, the volume of additional diversion that -- greater than the actual diversion this year if the WaterFix project were in place and operating to the H3 scenario, yes.

MR. VAN ZANDT: Okay. And would the -- the plan would be to have that entire 1.2 million acre feet to go through the -- go through the three tunnels, right?

WITNESS LEAHIGH: Well, that's not exactly right. The -- most of that 1.2 million acre feet would -- it actually might be -- the amount that would go through the new North Delta diversion points may be slightly greater than 1.2 million acre feet because the assumption is some of the South Delta diversion would decrease. The 1.2 million acre feet is the total difference between a combined north and south diversion under WaterFix versus just the South Delta diversion currently.

MR. VAN ZANDT: So it would be the increase in the diversion?

WITNESS LEAHIGH: Increase in the overall diversion, correct.

MR. VAN ZANDT: As I indicated the engineering panel was testifying about the intention is to have the entire 9,000-cubic-foot-per-second capacity fulfilled.

Do you know how many days out of the year it's anticipated that you will have the diversions running at full capacity?

WITNESS LEAHIGH: Oh, that would vary significantly from year to year. I couldn't say just sitting here what that change would be.

MR. VAN ZANDT: Do you know what the -- if you ran this, say, for the 150 days that we're talking about here, would you agree -- I've done the math; you can tell me if I'm right or not. It's about 2,681,000 acre feet of water that would go through the pipes at 9,000 cfs. Do you think that's about right?

WITNESS LEAHIGH: Don't have my calculator handy, but if you're saying that if we were running the North Delta diversion at full 9,000 cfs for 150 days...

MR. VAN ZANDT: Right.

WITNESS LEAHIGH: I'll take your word for it if you've done the calculation.

MR. VAN ZANDT: All right. I guess my question is if, in this time period, we're talking about you only had 1.2 million, so we would be using less than half the capacity of the facilities to put 1.2 million through the system?

WITNESS LEAHIGH: Yeah, that's right. And you can sort of pick that out off the graph that we

wouldn't be able to fully utilize the entire 9,000 cfs for this entire time frame.

It looks like it would only occur during those periods where you see the dotted red line at kind of it's highest extent. Those are most likely the periods where we are utilizing the full 9,000. So looks like there's about -- second half of January, maybe the first week of February, and then it looks to be about three weeks in March is probably we were running the full 9,000, looks like maybe into April there as well.

MR. VAN ZANDT: I think it was testimony before that January, February, March were expected to be the big runoff times. So if we did have additional years of drought as we go forward here, the likelihood is that the system would not operate at full capacity for a few years, correct?

WITNESS LEAHIGH: Well, the system would be opportunistic nature that when we did have these high excess flow, that would be the time that we'd want to divert, we'd want to have the capability of diverting the flows.

In many wet years, there may be long periods of time when that excess flow is in the system that we can't currently divert. But most every year, there would be some periods of time where there would likely

be excess flow to those needed for the standards. But we currently do not have the diversion capability to take advantage of that.

So that would happen -- for example, this year was really an average year, but yet these are fairly significant numbers as far as excess outflow that did exist this year.

MR. VAN ZANDT: I want to switch and just talk about, for a few minutes here, water levels. Can you pull up DWR-5E, Page 78.

And Exhibit 5E is the modified modeling presentation. And this is back in the -- in the Water Level section, which is all the way at the end of the presentation, on Page 78.

Have you seen this chart before, Mr. Leahigh?

WITNESS LEAHIGH: Yes, I've reviewed the modeling exhibits.

MR. VAN ZANDT: By my reckoning, this is the closest chart that is -- chart that the depicts the water levels closest to Ryer Island, right across the river from Rio Vista.

So as I interpret this chart, and would you agree, that it looks like the exceedance for the minimum stage would not occur except for maybe 2 or 3 percent of the time at maximum of three feet at -- near

the Sacramento River at Rio Vista? Am I reading that correctly?

WITNESS LEAHIGH: Yeah, my interpretation of this chart is that the WaterFix in all of the scenarios would have essentially no impact whatsoever to water levels at this location. All the scenarios are essentially right on top of one another.

MR. VAN ZANDT: Right. So my question is how is this information derived here? Removing a significant amount of water out of the river so it's not passing by Ryer Island anymore, how do we keep the levels of the water up so high when we're reducing the volume of water that's flowing in the river?

WITNESS LEAHIGH: This is probably best answered by the modeling group, but my understanding is that the draw-down effects on water levels due to the new intakes when they're being used would be fairly localized in terms of its effects on the water levels. And this particular graph shows that Rio Vista would be outside the bounds of that influence of any draw-down from the new intakes.

And the modelers might be able to expand on the answer there.

MR. VAN ZANDT: So it's a sphere-of-influence type of analysis? Is that what you're --

WITNESS LEAHIGH: That's my understanding, yes.

MR. VAN ZANDT: Go to DWR-221, please.

And DWR-221 is a table of existing water diversions at the proposed cfs intake sites.

Mr. Leahigh, do you know if there was any analysis of any of the other diversions in the area between the North Delta and South Delta diversions along the -- along the river, just to determine if there was going to be any impacts from the California WaterFix facilities and use of those facilities?

WITNESS LEAHIGH: I'm sorry. I need clarification on what locations you're talking about.

MR. VAN ZANDT: Well, figure I'm talking about Ryer Island. So the diversions at Ryer Island are not listed in this exhibit. These are the ones that were presented or being presented to the Board as the versions that were being considered by California WaterFix as being impacted, I assume, from whatever project activities you have underway.

And my question is, from an operational standpoint, have you looked at any of the diversions along the river between the north diversion -- North Delta diversion, South Delta diversion to see if there's any potential impact from your activities on

those other diversions, in particular, at Ryer Island?

WITNESS LEAHIGH: Yes. I have not for myself specifically looked at that. I did not have any input into the development of this particular exhibit. This is part of the modelers's group. So perhaps they would have a better -- they'd be in a better place to address your question.

MR. VAN ZANDT: Okay. That's all I have.

CO-HEARING OFFICER DODUC: Thank you, Mr. Van Zandt.

Ms. Meserve?

Mr. Minton?

MR. MINTON: Jonas Minton -- Jonas Minton with the Planning and Conservation League.

If it pleases the Hearing Officers, my questions are less than ten minutes and would follow nicely upon the foundation from the previous cross-examiner. And I would be willing to quickly go through those, if it is the pleasure of you.

CO-HEARING OFFICER DODUC: Ms. Meserve, do you have any objections?

MS. MESERVE: (Shakes head from side to side)

CO-HEARING OFFICER DODUC: All right. Mr. Minton, go ahead.

And you are Group 33. Okay.

CROSS-EXAMINATION BY MR. MINTON

MR. MINTON: Jonas Minton, representing the Planning and Conservation League, Friends of the River, and Sierra Club.

Mr. Baker, would you please project Exhibit DWR-61, Mr. Leahigh's testimony, and move down to Page 8, Lines 3 through 8.

MR. BAKER: Sorry. Which page?

MR. MINTON: That would be Page 8, Lines 3 through 8.

And may I draw your attention to those lines, and quoting, "To the extent that recent drought conditions suggest future SWP/CVP operations may require relaxing water quality standards to avoid exceedances, my testimony shows that historical hydrology over the last several drought years are truly unprecedented.

"Such extraordinary circumstance are best managed in the context of temporary adjustments as occurred pursuant to the Water Board's authority as delegated to the Executive Director to approve Temporary Urgency Change Petitions, TUCPs." Do you recall that as your testimony?

WITNESS LEAHIGH: Yes.

MR. MINTON: Do I correctly understand that

you believe the drought conditions such as those in years 2014 and 2015 were extraordinary?

WITNESS LEAHIGH: Yes, that is my understanding.

MR. MINTON: Now for the easiest question you get of the day. Do you consider DWR to be a credible source of water management expertise?

WITNESS LEAHIGH: Yes, I do.

MR. MINTON: Mr. Baker, would you please project the cover page that I provided you in the thumb drive?

And while he's doing that, Mr. Leahigh, I will ask you if you're familiar with the report California Climate Science and Data for Water Resources Management published by your California Department of Water Resources in June 2015?

WITNESS LEAHIGH: It's possible I may have looked at this. I -- I will also look to other panel members to see if they're familiar with this document.

WITNESS ANDERSON: I am familiar with this document.

MR. MINTON: Thank you.

Mr. Baker, could you project Page 5 of that document.

And for purposes of the record, perhaps we

could identify this as PCL-2 for identification purposes.

CO-HEARING OFFICER DODUC: It is so identified.

(Planning & Conservation League Exhibit PCL-2 marked for identification)

MR. MINTON: And I draw your attention to Page 5, the upper portion, for those of you looking at the screen. It's kind of showing two pages, so it's the one on the right, "Temperature Projections."

And it reads, as I'm looking at it, "Temperature Projections." "Future projections of temperatures across California by Scripps Institute of Oceanography indicate that by 2016 to 2069, mean temperatures will be 3.4 to 4.9 degrees Fahrenheit higher across the state than they were in the period 1985 to '94. Seasonal trends indicate a greater increase in the summer months, 4.1 to 6.5 degrees Fahrenheit, than in winter months, 2.7 to 3.6 degrees Fahrenheit by 2016."

The next paragraph reads, "Precipitation projections." "Climate change will lead to a number of hydrologic impacts to California. More intense dry periods are anticipated."

Does it appear that I've read that correctly?

WITNESS LEAHIGH: Yes.

MR. MINTON: Thank you. Mr. Leahigh, if the projection in DWR's report is correct, would that make dry-year conditions such as those experienced in 2014 and 2015 less extraordinary?

WITNESS LEAHIGH: I'm going to refer your question to the expert on the -- Mr. Anderson, who probably has most expertise in this area, would be most qualified to answer.

WITNESS ANDERSON: All right. So understanding whether the extreme we experienced in the past few years would be an extreme in the future, my understanding in conversations with the scientists at Scripps is yes, the extreme we experienced now would continue to be an extreme in the future climate.

MR. MINTON: Could it be more common in the future?

WITNESS ANDERSON: We would expect to see more observations that were below average but not necessarily to the extreme that we observed in the past two years.

MR. MINTON: Could it be to the extreme that we have observed in the past several years?

WITNESS ANDERSON: In the sense that any extreme could be observed.

MR. MINTON: Mr. Leahigh, I now return to your testimony at Page 8, if we could. So that's DWR-61, Page 8. And I would return to that same section, which was Lines 3 through 8, and in particular, Lines 5 through 8. Again, I will read it, "Such extraordinary circumstances are best managed in the context of temporary adjustments as occurred pursuant to the Water Board's authority as delegated to the Executive Director to approve temporary urgency change petitions, TUCPs."

If the projection in DWR's report is correct and there are more intense dry periods, does that mean that the best management in those more frequent drought periods would be more frequent TUCPs?

WITNESS LEAHIGH: In the hypothetical, that could be possible, yes.

MR. MINTON: Thank you. To a different line, but just it will be one question, and then I will be done.

Generally speaking, with WaterFix, would there be some difference in flows in any channels in the Delta at some times than there would be without WaterFix?

WITNESS LEAHIGH: That question's a little bit vague. I need more specificity.

MR. MINTON: It's intentionally rather broad. Without specifying, could there be any change in flow in the Delta if you were operating with WaterFix compared to not having WaterFix? Could there be a difference in the flow, say, for instance, between the North Delta diversion point and points in the South Delta adjacent to Clifton Court? Could there be difference of flows with or without the operation of the WaterFix diversion facility?

CO-HEARING OFFICER DODUC: Is that assuming that all other factors are the same?

MR. MINTON: Yes.

WITNESS LEAHIGH: Well, certainly if we're diverting from a different location, very localized -- there would be very localized change certainly in flows near those diversion points.

MR. MINTON: Thank you.

WITNESS LEAHIGH: To the extent they were lower -- greater or less than they are without the WaterFix.

MR. MINTON: Thank you. That's a very good qualifier of the localized impacts.

Your testimony indicates that you consider a variety of factors when you make your operational decisions; is that correct?

WITNESS LEAHIGH: That's correct.

MR. MINTON: Do you currently give any consideration to the presence or potential presence of microcystis the waterways of the Delta?

WITNESS LEAHIGH: As part of my responsibilities, we don't look at that directly, no.

MR. MINTON: Thank you.

I have no further direct cross-examination questions, so I'm on time. I would hope that at the appropriate time, we can enter PCL-2 that was marked for identification into the record.

CO-HEARING OFFICER DODUC: At the conclusion of Part 1A.

MR. MINTON: Thank you very much.

CO-HEARING OFFICER DODUC: Thank you.

As Ms. Meserve is getting ready, let me remind her that our recording equipment is shut off at 5:00 o'clock. And assuming that you'll be more than 25 minutes for your cross-examination, I will ask you to consider a good break-off point for today in your line of questioning.

MS. MESERVE: Yes, I'd be happy to. I did bring a pointer today. I don't want to hit anybody with it. Do people sometimes do that? If I'm careful --

CO-HEARING OFFICER DODUC: As long as you're careful.

CROSS-EXAMINATION BY MS. MESERVE

MS. MESERVE: Good afternoon. My name is Osha Meserve, Group 19, Local Agencies of the North Delta, local vineyards -- Lange Twins and Elliot Farms and others.

So I'm going to start with I would like to look at -- I have some things on the disk and then some are just in the exhibits. So I'll just try to refer to those, DWR-3, Slide 9 is the testimony that I'd like to look at briefly if that could be brought up.

And what I'd like to touch on first with Mr. Leahigh, is what Slide 9 refers to is that the diverted water during operations would be unregulated flow would be available to legal users and would not be diminished. And there's quite a few different definitions in there. So I'm wondering if you could define for me what you mean by unregulated flow in that context, please?

WITNESS LEAHIGH: Well, this is not my exhibit. This is for the water rights panel, which will be the panel following the modeling panel.

MS. MESERVE: You're right. My mistake. I must have gotten confused on the numbering. I think at

one time it was coming first.

Well, what I will get at at least for purposes of operations, would you agree that it would be stored water that would be diverted out of the new intakes if they were to be constructed and operated?

WITNESS LEAHIGH: No. Actually, my testimony is quite to the contrary. That the majority of the water that we would expect to be diverted out of the new intakes would be unregulated excess flows in the system.

MS. MESERVE: And how do you determine what is excess flows?

WITNESS LEAHIGH: So excess flows would be flows that are in excess of all other in-basin needs. So those again would include other legal users of water plus flows necessary to meet all of the D1641 requirements.

MS. MESERVE: In terms of the inflows to the reservoirs operated by the State, are there gauges on all the inflows into those reservoirs?

WITNESS LEAHIGH: No, there's not -- there's not gauges on all of the inflow streams or tributaries into all of the reservoirs. We generally use storage changes -- a mass balance calculation to get at what the inflows are into the reservoir. We measure

indirectly.

MS. MESERVE: Is it possible that some of the inflows into the reservoirs aren't accounted for then?

WITNESS LEAHIGH: Generally, through the mass balance process, we are able to deduce what the -- get a good approximation of what the inflows are.

MS. MESERVE: Just going to the storage -- and I understand you've corrected my prior statement. With respect to diversions from storage from the proposed intakes, if your estimates of storage releases, if they were higher than they -- could they possibly be higher than they should be if the inflow into the reservoirs wasn't properly accounted for?

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

MS. MESERVE: Yes. Would your estimates of storage releases belonging to the State Water Project be higher than they should be if inflow to the reservoirs was not properly accounted for?

WITNESS LEAHIGH: There's always a possibility of -- because it is an estimated value, that there will be some minor difference in the actual amount of stored water.

MS. MESERVE: And with respect to, I believe, earlier in your testimony, you spoke about the problems

with -- or the complexities with estimating in-Delta use. And you mentioned -- you mentioned evaporation for one thing, in the Delta. Why didn't you mention seepage onto the islands?

WITNESS LEAHIGH: I don't know if I mentioned it or not, but it would be part of the entire picture as far as trying to gauge what the net Delta -- the over all net Delta consumptive use was. So it would be a combination of seepage, evaporation, transpiration, other groundwater depletion secretions. So there's a number -- any of the other losses that might occur. All of this combined would fit within that category of Delta consumptive use.

MS. MESERVE: Do you feel that you're able to accurately estimate Delta consumptive use?

WITNESS LEAHIGH: We have estimates. Based on various factors, the land use, I'm not an expert on how -- we do have estimates. I'm not an expert on how those were developed. So I would hesitate to give a -- an opinion on that.

MS. MESERVE: Fair enough.

I'll touch on that further with the modeling panel.

Okay. On operations, there's a slide from DWR-1, Slide 9 that I believe relates to operations

that I'd like to ask a couple of questions about.

And as they look for it -- I should have given some lead time. The slide I'm getting at explains the dual conveyance concept. And the first thing that it states on the slide at the bottom is that the project under operations would reinstate a more natural direction of river flows in the South Delta by 46 to 160 percent. Would this --

CO-HEARING OFFICER DODUC: Ms. Meserve, what page would that be on?

MS. MESERVE: I'm sorry. DWR-1, Slide 9.

CO-HEARING OFFICER DODUC: Which could be 10?

MS. MESERVE: Oh, I'm sorry.

CO-HEARING OFFICER DODUC: Not your fault. We're working from the errata.

MS. MESERVE: It's the one that shows three little pictures at the bottom and says "Dual Conveyance Concept" at the top I believe it's the next one. On mine, it was right next to the alternative comparison.

CO-HEARING OFFICER DODUC: Perhaps you could show Mr. Baker what that slide looks like.

MS. MESERVE: Yes, sorry.

(Sotto voce discussion between Ms. Meserve and Mr. Baker)

MS. MESERVE: Okay. We'll come back to that.

Let's see. Let's go to DWR-515, Page 4. It relates to the operation of the intakes. This is the North Delta diversion bypass flows sheet. And the point I'm interested in is regarding low-level pumping and understanding what that would mean.

On the slide they'll be pulling up, under the initial -- yes. It says "Low-level pumping under initial pulse protection will be maintained throughout the initial pulse period."

Would you please describe what is meant by "low-level pumping," Mr. Leahigh?

WITNESS LEAHIGH: So I wasn't involved directly in developing this criteria. There are folks on the modeling panel that are -- were directly involved in the development of this criteria. They're probably better ones to respond to this. But I think the low-level pumping, if I recall correctly, is the 300 cfs per intake.

MS. MESERVE: So just so I understand, the low level is considered to be 300 cfs. So times three, it is 900 for the entire project being proposed; is that correct?

WITNESS LEAHIGH: Under the low-level pumping category, yes.

MS. MESERVE: Yes. And just in terms of what

is low level, are you aware of the diversion capacity of the Freeport facilities upstream from the project?

WITNESS LEAHIGH: Not exactly. I think it's somewhere actually in the same general magnitude as this number.

MS. MESERVE: Correct. My understanding is 285, so the -- what's considered low-level pumping in the operational criteria, then, would be about three times the Freeport facility, if I understand correctly.

Now, can you explain under "Operations" when, if ever, the so-called low level pumping would not occur?

WITNESS LEAHIGH: It's been a while since I've looked at this in detail, but presumably we would always have the ability to completely shut down the diversion if necessary. So as the need arose, we would have that capability to shut down the bypass -- I'm sorry -- to shut down the intakes.

MS. MESERVE: Do you know -- I mean, I think I'm asking the right panel this question. We're trying to understand what the operation of the project is. So you think that it would always be 300 at each intake, but they could be shut down sometimes; and when would that be?

WITNESS LEAHIGH: Well, they could be -- well,

for maintenance activities certainly they could be shut down but also to respond to some sort of event in the Delta. So one of my examples was salinity intrusion event on the Sacramento River, lower Sacramento River.

If it was extreme, you know, perhaps we would have to take that step in completely shutting down those diversions to try to maximize the amount of bypass past these new intakes further downstream to help repel the salinity.

MS. MESERVE: And when you say "shut down," would that occur operated from the Clifton Court Forebay pumps? Is that where the shutdown would occur? Or would it be physically happening from the northern diversions?

WITNESS LEAHIGH: No, I would presume it would be at the actual diversion location.

MS. MESERVE: Can you estimate the -- here's what I'm -- what I'm wondering, and I thought this table should say and I couldn't understand it, so I was hoping you could. So most of the time will there be at least 900 cfs diverted through these intakes?

WITNESS LEAHIGH: Well, so there was certain assumptions in the modeling. And I'm not completely sure what the assumption there was on how often the -- at least the low-level pumping was occurring.

But I would note, based on my experience in actual operations now, that, you know, should the need arise, we can -- we'd be able to shut down a diversion location just as we do Clifton Court, for example.

MS. MESERVE: But would it be the goal of the project to keep it going as much as possible, correct?

WITNESS LEAHIGH: Yes, the goal would be to ensure there's enough water in the system to at least divert the minimum low-level pumping level. That would be the -- that would be the planned operation.

MS. MESERVE: Are any of the -- do any of the scenarios that are shown on that slide, when we were looking for the one that I wanted that shows the alternatives comparison range, if I was to look further at one of those operational scenarios, would I be able to determine when or if they were ever shut down altogether?

WITNESS LEAHIGH: I'm not entirely sure. Unfortunately, I think I would have to defer to the -- unless one of the other panelists knows. But otherwise, I'd have to defer to the modeling folks in order to provide an answer to you.

MS. MESERVE: Certainly. Do you expect that, if the project is built, that you or someone like you would be operating the project?

WITNESS LEAHIGH: Yes, I think that's the assumption, that I am a project operator, would be operating this project.

MS. MESERVE: Do you have any idea about the frequency of maintenance that you mentioned before as far as what will be necessary for the sake of the pumps themselves or the diversion baffles or other parts of the facilities?

WITNESS LEAHIGH: Well, typically for our existing facilities, there's usually redundancies that exist in terms of multiple units at a pumping plant, excess capacity. And it's just through the planning process, we know there will be certain periods of time where we would not be utilizing the full capacity and we would schedule maintenance activities to the extent that they would not interfere with the planned operations. So I would imagine that would be the case with the new facility as well.

So, for example, perhaps maintenance activity could be occurring on one of the diversion locations while the other two are running. That might be an example when we weren't fully utilizing the full 9,000 cfs capacity of the entire set of diversions.

MS. MESERVE: I'm not sure if you were here for this, but during the engineering panel, Ms. Suard

showed a pipe that was half full. And the engineering staff corrected her that it would never be half full.

And I don't know if you can answer the question, but I'm curious if you were in fact diverting less than the full capacity of the intakes, how is it that the pipe -- that the tunnels, the two 40-foot tunnels would never be less than completely full?

WITNESS LEAHIGH: Well, my understanding is that the tunnels -- yes, they would always be full. This is an engineering question. But my understanding is that, even when we were not diverting, the tunnels would be full unless there was some type of maintenance activity.

WITNESS MILLIGAN: They are 700 feet underground, so they will fill with water, and you have to push the water out with a pump. So you wouldn't have air stuck in there at that level. I think, too, this table -- because I have looked at this before. I had to read it two or three times to reacquaint myself. But the way I read this is that in the low-level pumping category -- so that's the operational protocol that we're told to operate to -- the 300 per intake is a maximum under that circumstance.

For example, in the flow in Sacramento River was 10,000 cfs, then only 6 percent of that would be

diverted. So that would be less than 300. And it -- never would we let total flow past the three diversions be less than 5,000, would be how I read this table. And as I recall, that's how this was modeled.

MS. MESERVE: So if the bypass flow is less than 5,000, then nothing would be -- I mean, well, let's say if the flow of the river is less than 5,000, then there would be no diversions at all, and you would go to zero?

WITNESS MILLIGAN: Correct. 5,000 cfs was the flow in the Sacramento River at this point at the first diversion, there would be no diversion below 5,000 allowed to go through.

If it's 10,000 cfs coming to the diversion, up to 6 percent of that could be diverted.

MS. MESERVE: Thank you for clarifying. Yes, there's been -- I was also -- is it true -- I was told in the past when trying to understand the operations that it's not possible to shut down the pumps all the way, and that for mechanical reasons, they need to always be running to some extent. But sounds like you're -- and that was, like, a while back during the proceedings.

WITNESS MILLIGAN: I'll let the engineering folks clarify that. But I think in terms of what you

see in the modeling and the operations, I think there are probably periods where there is zero.

MS. MESERVE: Let's see. I think I have a couple quick questions we can get in before 5:00.

Could you go to on my folder please there's a figure, DWR-212, Figure 19-2.

And what I'd like to ask about is operationally what's the power demand for the project? And this is a figure -- sorry -- from the CER that shows the transmission line layout and size that's proposed, this latest proposal that I know of. And I discussed it with engineering as well.

WITNESS LEAHIGH: I take it you didn't get a response from the engineering panel or --

MS. MESERVE: We didn't go into operations. So I'm asking the operations panel.

WITNESS LEAHIGH: As far as the -- yeah, I do not know what the power requirements are at this particular facility.

MS. MESERVE: Would it surprise you to know according to the R-DEIRS it would take 1400 gigawatt hours per year to operate the project? Do you --

MR. LEAHIGH: Doesn't seem surprising.

MS. MESERVE: Does seem surprising?

WITNESS MILLIGAN: It does not.

MS. MESERVE: Does not. Okay. So I guess, yeah, I'm not sure. Perhaps Mr. Milligan knows the answer. But I'm just trying to find out, because of the interference with other water rights and other issues whether you believe that the power demand -- do you believe that the power demands of the project can be met without that lateral transmission line shown in green?

MR. BERLINER: Objection, assumes facts not in evidence.

CO-HEARING OFFICER DODUC: We'll strike the first part of your question where you made an assumption and just leave the rest.

Could the power demand be met without the green transmission line, is your question. Correct, Ms. Meserve?

MS. MESERVE: Yes, thank you.

WITNESS MILLIGAN: That's probably a good question for some of the engineering folks, but my assumption in having looked at this in the past is you would need some pretty high voltage lines to come into the -- to be able to supply that kind of power.

MS. MESERVE: Correct.

WITNESS MILLIGAN: If this was the only location for that transmission line. I'm not sure. I

think I'd seen some other options associated with that. But this is probably the one that's rising to the top.

MS. MESERVE: Is it your understanding that the green line shown on the map from the CER is meant to provide operational power?

WITNESS MILLIGAN: It's meant to supply power to the -- to operate the -- particularly the pumps at the diversion point.

MS. MESERVE: Okay. A little confusing because I was told that those transmission lines would be removed after construction. So I'm -- do you know, would they be removed or are they permanent?

WITNESS MILLIGAN: Well, there are some for -- that are necessary to supply the power because these are electric power tunnel boring machines that they're contemplating, so there are probably some towers there that are temporary. But there are obviously some lines that are going to be needed to supply the energy to the pumping plant.

MS. MESERVE: And you believe that we think it would be around 1400 gigawatt hours per year and -- I guess what I'm getting at is, you know, in order to -- we're having a hard time assessing injury without knowing what the project is. But does this look like the final -- and you said, I guess, Mr. Milligan, that

no, this may not be the final plan; is that correct?

WITNESS MILLIGAN: I did not say that. I said I've seen in the planning process other alignments for transmission.

MS. MESERVE: Okay. Do you know when the alignment would be selected?

WITNESS MILLIGAN: I think that wouldn't be completed until the EIS/EIR is completed.

MS. MESERVE: Is it planned that the EIS would be final in September?

WITNESS MILLIGAN: I'm not sure when. I'm not familiar with the timing on the finalization of the environmental documents.

MS. MESERVE: Okay. I think I'll leave it there for now, and we can commence tomorrow morning.

CO-HEARING OFFICER DODUC: Thank you, Ms. Meserve.

We do have another reminder to anyone who has conducted cross-examination, if you have not provided the material you used just for identification purposes for now, please do so either by giving it to Mr. Baker in the morning or by e-mailing it to the California WaterFix Hearing mailbox.

And for those who will be conducting cross-examination in the future, any documents that you

will be using, please provide it at the time that you are conducting your cross-examinations.

With that, thank you. And we'll resume at 9:00 o'clock tomorrow.

(Whereupon, the proceedings recessed at 4:58 p.m.)

STATE OF CALIFORNIA)
) ss.
COUNTY OF MARIN)

I, DEBORAH FUQUA, a Certified Shorthand Reporter of the State of California, do hereby certify that the foregoing proceedings were reported by me, a disinterested person, and thereafter transcribed under my direction into typewriting and is a true and correct transcription of said proceedings.

I further certify that I am not of counsel or attorney for either or any of the parties in the foregoing proceeding and caption named, nor in any way interested in the outcome of the cause named in said caption.

Dated the 18th day of August, 2016.

DEBORAH FUQUA

CSR NO. 12948