BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

CALIFORNIA WATERFIX WATER RIGHT CHANGE PETITION HEARING	)))

JOE SERNA, JR. BUILDING

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

COASTAL HEARING ROOM

1001 I STREET

SECOND FLOOR

SACRAMENTO, CALIFORNIA

PART 1 - SURREBUTTAL

Thursday, June 22, 2017

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Pages 1 - 269

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Division of Water Rights

Board Members Present:

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

Staff Present:

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Conny Mitterhofer, Supervising Water Resource Control Engineer
Kyle Ochenduszko, Senior Water Resources Control Engineer

PART I REBUTTAL

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The U.S. Department of the Interior:

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David Aladjem

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David Aladjem

For City of Antioch:

Matthew Emrick

For The City of Stockton:

Kelley Taber

For County of San Joaquin, San Joaquin County Flood Control and Water Conservation District, and Mokelumne River Water and Power Authority:

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Jonathan Salmon

For State Water Contractors:

Stefanie Morris

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PROCEEDINGS

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CO-HEARING OFFICER DODUC: Good morning, everyone. It is 9:30.

Welcome back to the Water Right Change Petition hearing for the California WaterFix Project.

I am Tam Doduc. I expect we'll be joined shortly by Board Chair and Co-Hearing Officer Felicia Marcus, and then sitting to the Chair's right will be Board Member Dee Dee D'Adamo. To my left are Dana Heinrich, Conny Mitterhofer and Kyle Ochenduszko. We're also being assisted today by Mr. Hunt and Mr. Long.

Since I think I see some new faces in the room, we will go through the usual three general announcements.

First of all, please take a moment and locate the exit closest to you. In the event of an emergency, an alarm will sound. We will evacuate taking the stairs, not the elevators, down to the first floor and meet up in the park across the street.

If you are not able to use the stairs, please flag down one of us or any orange-garbed person standing in the hallway and you'll be directed into a protected area.

Second announcement is: This is being

recorded, Webcasted, so please speak into the microphone when you provide your comments or questions today, and begin by identifying yourself and stating your affiliation.

We have our court reporter Candace back with us today. And the transcript will be made available on our website as soon as possible after the conclusion of Part 1. If you would like to have it sooner, please make your arrangements with her.

And, as always, the most important announcement, even more important than emergency, because it will be an emergency if I hear a noise, is: Please take a moment right now and put your phones and any other noise-making device on silent, vibrate, or off. Even if you think they are that way, please take a moment and check, as I am doing right now.

All right. Before we get to today's business, I have a couple things to -- actually, one thing to address.

First of all, thank you all for -- for meeting the deadlines that were specified last week for -- earlier this week for various filings of motions and responses, including you, Miss Womack. Hope you had a great Father's Day with your father.

As part of what was received was Group 7's

motion to -- well, actually they concluded their presentation of testimony on June 16th and, at that time, Group 7 requested to submit in writing a motion to move their surrebuttal testimony and exhibits into evidence. I granted their request and closed the window for further objections to admissibility of evidence.

Since there are no outstanding objections to moving Group 7's surrebuttal testimony and exhibits into evidence, I hereby accept them. They are SVWU-300 through SVWU-306 inclusive, SCWA-200 through SCWA-205 inclusive, CITYSAC-36 and CITYSAC-37.

(Sacramento Valley Waters Users' Exhibits 300-306 received into the record)

(Sacramento County Water Agency's Exhibits 200-205 received into the record)

(City of Sacramento's Exhibits 36 & 37 received into the record)

CO-HEARING OFFICER DODUC: Are there any other housekeeping matters?

If not, today, we are going to start -- and I see -- thank you, Mr. Aladjem -- you're already in place.

Oh. Miss Womack.

MS. WOMACK: Yes. I had housekeeping as far as

when will we have an idea about the Clifton Court ruling?

CO-HEARING OFFICER DODUC: Thank you for reminding me of that, Miss Womack.

We are reviewing everything that's been submitted. We -- There will be a break after this week, and I would expect we will issue a ruling sometime between the break -- sometime during the break.

MS. WOMACK: Okay. That's wonderful.

So I won't be needed today or tomorrow, then; right?

CO-HEARING OFFICER DODUC: Not unless you wish --

MS. WOMACK: Unless I wanted to cross.

CO-HEARING OFFICER DODUC: -- to conduct cross.

MS. WOMACK: Okay. Great. Thank you so much.

CO-HEARING OFFICER DODUC: All right. Thank you, Miss Womack.

All right. We have Groups 10, 22, 27, at least to begin with today, and then, this afternoon, we will have DWR's, and Miss -- Ms. Spaletta and Mr. Mizell have been coordinating on the presentation of the spreadsheets that we required and the cross-examination to be conducted on that.

So we have a full day. I expect that we will try to have a shorter day tomorrow. We -- We may start a

little bit earlier, depending on how things go today, but I would like to end tomorrow no later than 1 o'clock, working through lunch.

Okay. With that, not seeing any other issue, Mr. Aladjem, you're here on behalf of Group 10, the various Delta Flood Control Groups.

MR. ALADJEM: That is correct, Hearing Officer Doduc.

Good morning, Hearing Officer Doduc, Chair Marcus, Member D'Adamo, staff.

David Aladjem, Downey Brand, on behalf of Delta Flood Control Group. Our witness this morning is Gilbert Cosio.

GILBERT COSIO, JR.

called as a witness by the Delta Flood Control Group, having previously been duly sworn, was examined and testified as follows:

DIRECT EXAMINATION BY

MR. ALADJEM: Mr. Cosio.

WITNESS PAULSEN: Good morning.

MR. ALADJEM: Could you please state your full name and spell it for the record.

WITNESS PAULSEN: Gilbert Cosio, Jr., and Cosio is spelled C-O-S-I-O.

MR. ALADJEM: And Mr. Cosio, have you taken the

oath in these proceedings?

WITNESS PAULSEN: Yes, I have.

MR. ALADJEM: Is Delta Flood Control Group 20 a true and correct copy of your surrebuttal testimony that was submitted on behalf of the Delta Flood Control Group to the State Water Board earlier in these proceedings?

WITNESS PAULSEN: Yes, it is.

MR. ALADJEM: Have you had an opportunity, Mr. Cosio, to review your surrebuttal testimony since it was submitted to the State Water Board?

WITNESS PAULSEN: Yes, I have.

MR. ALADJEM: Would you like to make any changes to your surrebuttal testimony at this time, sir?

WITNESS PAULSEN: Not at this time, no.

MR. ALADJEM: Mr. Cosio, in your surrebuttal testimony, you referred to Delta Flood Control Group 21, which is an excerpt from the Final EIS/EIR for the California WaterFix Project; is that correct?

WITNESS PAULSEN: Yes.

MR. ALADJEM: Is DFCG-21 a true and correct copy of the excerpted pages from the Final EIS/EIR?

WITNESS PAULSEN: Yes.

MR. ALADJEM: And Mr. Cosio, as a Professional Engineer, do you regularly use and rely upon environmental documents like the Final EIS/EIR in

evaluating projects from an engineering perspective?

WITNESS PAULSEN: Yes, I do.

MR. ALADJEM: Mr. Cosio, in your surrebuttal testimony, you referred to DFCG-22 through 25.

Are those technical reports, Corps engineering standards, the type of documents that you would normally use as a Professional Engineer?

WITNESS PAULSEN: Yes, they are.

MR. ALADJEM: And are those exhibits, Mr. Cosio, correct copies of the documents themselves?

WITNESS PAULSEN: Yes.

MR. ALADJEM: Mr. Cosio, could you please summarize your surrebuttal testimony for the Board.

WITNESS PAULSEN: Yeah, just -- just briefly.

In the rebuttal testimony of Mr. John Bednarski, the Department of Water Resources has stated that the concerns raised by me in my testimony in these proceedings will be addressed and the modifications incorporated into the project simply by using accepted engineering standard practice and as directed by the Corps of Engineers through the Section 408 permitting process.

In support of its position, the Department lists a number of projects that have been constructed successfully in and around the Delta.

In my testimony, I raise concerns with the Delta's -- the Department's position since Mr. Bednarski did not present any data to demonstrate similarity between the modifications to the standard engineering practices that were incorporated into these successful projects and the local conditions of the Delta levees around the WaterFix construction sites.

In addition, Mr. Bednarski did not present any data indicating whether the projects received input from multiple professionals or whether the projects were reviewed by an independent panel of experts.

When subject to input from local experts, and an independent panel of experts, features are often included in the design of projects in the Delta to counter concerns raised by local or independent expert input.

In addition, although the regulatory permit processes -- Although the regulatory Permit processes of the Corps of Engineers' design requirements provide a backstop by recommending input from local experts and independent panel of experts, there's no requirement that this is mandatory.

For a project that is as important to the State of California as WaterFix, this type of independent review and oversight should be mandatory.

It's my professional opinion that: One, there must be an independent review and input into the design and construction of the projects by local engineers with experience in the Delta; and, two, there must be independent review and oversight of the design and construction of the project by a board of national experts as allowed under the Corps of Engineers' engineering circular cited in my written testimony.

And that concludes the summary of my testimony this morning.

MR. ALADJEM: Chair Doduc, Mr. Cosio's available for cross-examination.

CO-HEARING OFFICER DODUC: Thank you.

May I ask all parties who plan to conduct cross-examination of Mr. Cosio to please come up, identify yourself and give me a time estimate.

Miss McGinnis.

MS. McGINNIS: Good morning, Robin McGinnis for California Department of Water Resources.

20 minutes, please.

CO-HEARING OFFICER DODUC: All right.

And I think you're it, Miss McGinnis, so please come on up.

CROSS-EXAMINATION BY

MS. McGINNIS: Good morning, Mr. Cosio.

WITNESS PAULSEN: Good morning.

MS. McGINNIS: Thank you for being here today.

I just have a couple areas: Accepted engineering practices, and Urban Flood Risk Reduction Program.

So, on Page 3, Lines 2 to 5 of your testimony, you state that the conceptual design of the project provides no details on the accepted engineering practices that will be used in performing the work with regard to the protection of levees; correct?

WITNESS PAULSEN: Yes.

MS. McGINNIS: Isn't it true that DWR released Conceptual Engineering Reports submitted as DWR-212, which addresses accepted engineering practices?

WITNESS PAULSEN: I'm not sure exactly what it addressed.

MS. McGINNIS: Okay. Are you aware that Section 15 of that report is entitled "Levees"?

WITNESS PAULSEN: Yes.

MS. McGINNIS: And are you aware that Appendix B supports Section 15 with additional conceptual level construction sequencing details?

WITNESS PAULSEN: Yes.

MS. McGINNIS: All right. I understand you reviewed Mr. Bednarski's rebuttal testimony; correct?

WITNESS PAULSEN: Yes, I have.

MS. McGINNIS: Isn't it true that Mr. Bednarski provided detailed engineering practices in his rebuttal testimony?

MR. ALADJEM: Objection: Misstates the testimony.

Mr. Bednarski's testimony was conceptual as Miss McGinnis just said. This misstates his testimony.

CO-HEARING OFFICER DODUC: Miss McGinnis, perhaps you could be a little bit more clear, more specific in terms of "engineering practices."

MS. McGINNIS: Sure.

So if we could have DWR-75, which is Mr. Bednarski's rebuttal testimony.

(Document displayed on screen.)

MS. McGINNIS: And on Page 13, Lines 3 to 16.

(Document displayed on screen.)

MS. McGINNIS: So on Line 3, it starts (reading):

"DWR will be implementing well accepted engineering practices . . ."

Do you see that.

WITNESS PAULSEN: Yes.

MS. McGINNIS: And in the next sentence, it says . . . Oh, sorry. "The projects" -- He discussed

(reading):

"The projects identified above collected subsurface data and performed geotechnical engineering analyses . . ."

And further on, in the next sentence (reading):

"Detailed settlement monitoring programs were implemented before and during the construction . . ."

Correct?

WITNESS PAULSEN: Yes.

MS. McGINNIS: So if in that first sentence he's saying that DWR will implement these well accepted engineering practices undertaken for those other projects, isn't it true that he provided these details?

MR. ALADJEM: Objection: Misstates the testimony.

The testimony says very clearly that DWR will and do assert analyses without specifying the analysis.

CO-HEARING OFFICER DODUC: Miss McGinnis, where in Mr. Bednarski's rebuttal testimony might the specific approaches and practices be identified to which you are questioning Mr. Cosio?

MS. McGINNIS: Well, I thought those were specific measures, but . . .

In the next paragraph, it says (reading):

"DWR . . . committed to . . . perform detailed engineering analyses, including geotechnical studies, to determine the appropriate pile types and installation methods during design for the proposed CWF facilities."

CO-HEARING OFFICER DODUC: That's what it says. And your question to Mr. Cosio is?

MS. McGINNIS: So does that change his opinion that -- in his testimony that no details on the accepted engineering practices were provided.

WITNESS PAULSEN: No, it does not.

CO-HEARING OFFICER DODUC: Mr. Cosio, let me pursue this line of questioning.

What additional technical engineering analysis and studies would you have liked to see in order to change your answer?

WITNESS PAULSEN: Well, every one of those projects was different --

CO-HEARING OFFICER DODUC: Yes, it is.

WITNESS PAULSEN: -- so every one of them has different conditions, soil conditions, so you can't -- it's not a cookie-cutter type approach. Its accepted engineer practices is really not defined anywhere and so each project is different.

One project on Mr. Bednarski's list I'm

familiar with was the Contra Costa County Water District project.

And that one had come to a certain conclusion using accepted engineering practices and then, when they went to get their permits from the levee District to build the project on their levee, they're hit with all sorts of additional conditions.

And the reason I'm familiar with that is because we worked for Contra Costa and they called me to ask, "Are these requests from the Reclamation District reasonable?"

And my answer was yes, because these problems that were not anticipated in the design using accepted engineering practices have -- have occurred.

And so they ended up implementing a lot more of the monitoring that went on during construction to satisfy the local experts' concerns.

CO-HEARING OFFICER DODUC: Miss McGinnis, back to you.

MS. McGINNIS: Great.

So, are you aware that the Final EIR/EIS for the California WaterFix has an Appendix 3B entitled "Environmental Commitments"?

WITNESS PAULSEN: Yes.

MS. McGINNIS: And Section 3B.2.1.1 is entitled

"Geotechnical Investigations"?

WITNESS PAULSEN: Yes.

MS. McGINNIS: And the next section is entitled "Settlement Monitoring and Response Program"?

WITNESS PAULSEN: Yes.

MS. McGINNIS: Last one: Section 3B.2.2 is entitled "Conform with Applicable Design Standards and Building Codes."

Does that sound right?

WITNESS PAULSEN: Yes.

MS. McGINNIS: Okay.

(Pause in proceedings.)

MS. McGINNIS: And just to confirm: Your understanding's that this project is at the conceptual design phase; correct.

WITNESS PAULSEN: Yes.

MS. McGINNIS: Okay. Okay. Are you aware that there are no urban levees associated with the WaterFix Project?

WITNESS PAULSEN: As far as the levees I've looked at, they are not urban levees, yes.

MS. McGINNIS: Okay. One minute while I gather my thoughts.

That's all. Thank you.

CO-HEARING OFFICER DODUC: Thank you,

Miss McGinnis.

Any other cross?

Not seeing --

Any redirect, Mr. Aladjem?

MR. ALADJEM: Just one question.

REDIRECT EXAMINATION BY

MR. ALADJEM: Mr. Cosio, Ms. McGinnis asked you whether the Building Code applies to levees.

Do you recall that question?

WITNESS PAULSEN: Yes, I do.

MR. ALADJEM: The California Building Code does not apply to levees; isn't that correct?

WITNESS PAULSEN: That's correct.

MR. ALADJEM: Thank you.

No further questions.

CO-HEARING OFFICER DODUC: Any recross?

All right. Not seeing any, thank you, Mr. Cosio.

(Witness excused.)

CO-HEARING OFFICER DODUC: All right. I will now ask City of Brentwood to come up and -- with Dr. Paulsen.

My understanding is that Brentwood and then Stockton, then we'll follow by Antioch is the order.

Miss Taber.

MS. TABER: Hi. Good morning. Actually, we would like to propose that Antioch go after Brentwood. Antioch has a very short opinion and that would be more efficient.

CO-HEARING OFFICER DODUC: All right. We will switch that order.

MR. ALADJEM: Chair Doduc, before we begin with Dr. Paulsen, on behalf of the Delta Flood Control Group, I'd like to move -- offer and move DFCG-20 through, I believe it is, 25 -- Mr. Hunt, is that the right -- are those the right numbers? -- into evidence.

And we will be submitting a formal letter offering these into evidence with the Exhibit Identification Index which I believe is already submitted. We'll submit it again tomorrow.

CO-HEARING OFFICER DODUC: Okay. I think, to follow our usual practice in accepting exhibits from groups, even though it's a formality in this case, let's wait until the City of Brentwood finishes your surrebuttal and then we'll move exhibits for both parties -- both groups -- I guess one group, both parties, at the same time.

MR. ALADJEM: That will be fine.

CO-HEARING OFFICER DODUC: You may begin.

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SUSAN PAULSEN,

called as a witness for the Delta Flood Control Group, having been previously duly sworn, testified further as follows:

DIRECT EXAMINATION BY

MR. ALADJEM: Good morning, Dr. Paulsen.

WITNESS PAULSEN: Good morning.

MR. ALADJEM: Could you please state your full name for the record and spell your last name.

WITNESS PAULSEN: My name is Susan Paulsen, P-A-U-L-S-E-N.

MR. ALADJEM: And, Dr. Paulsen, have you taken the oath in these proceedings?

WITNESS PAULSEN: I have.

MR. ALADJEM: Dr. Paulsen, is Brentwood-120 a true and correct copy of the summary of your written surrebuttal testimony that was submitted on behalf of the City of Brentwood in these proceedings?

WITNESS PAULSEN: Yes.

MR. ALADJEM: Is Brentwood-121 a true and correct copy of a report you prepared for the City of Brentwood in the surrebuttal proceedings?

WITNESS PAULSEN: Yes.

MR. ALADJEM: Did you prepare that report, Dr. Paulsen?

WITNESS PAULSEN: Yes, I did.

MR. ALADJEM: Do you -- Does that report reflect your professional opinion as to the subjects contained therein?

WITNESS PAULSEN: Yes, it does.

MR. ALADJEM: So, Dr. Paulsen, is it the case that the conclusions you offered in Brentwood-120 and your oral testimony this morning are based on the technical analyses and discussions set forth in Brentwood-121?

WITNESS PAULSEN: Yes.

MR. ALADJEM: So, in that regard, Brentwood-121 contains your testimony regarding the technical analysis you performed for -- about the California WaterFix Project.

WITNESS PAULSEN: Yes.

MR. ALADJEM: Would you say, Dr. Paulsen, that Brentwood-121 supplements and explains the opinions offered in your written summary of testimony and your oral testimony you'll give this morning?

WITNESS PAULSEN: Yes, I would.

MR. ALADJEM: And do you affirm that the statements contained in Brentwood-121 are correct to the best of your knowledge?

WITNESS PAULSEN: Yes.

MR. ALADJEM: Dr. Paulsen, is Brentwood-122 a PowerPoint presentation that was submitted to the State Water Board in these proceedings?

WITNESS PAULSEN: Yes.

MR. ALADJEM: And, Dr. Paulsen, are all of the figures contained in Brentwood-122 taken from Brentwood-121?

WITNESS PAULSEN: Yes, they are.

MR. ALADJEM: Did you make any modifications to the figures shown in Brentwood-122 from the way that they were depicted in Brentwood-121?

WITNESS PAULSEN: No. They should match.

MR. ALADJEM: Okay. Have you had a chance, Dr. Paulsen, since Brentwood-120 through 122 were submitted to the State Water Board, to review those exhibits?

WITNESS PAULSEN: Yes.

MR. ALADJEM: Would you like to make any changes to those documents this morning?

WITNESS PAULSEN: No.

MR. ALADJEM: Dr. Paulsen, could you please briefly summarize the key points of your surrebuttal testimony.

WITNESS PAULSEN: Sure.

Would it be possible to bring up the

PowerPoint, which is Brentwood-122, please.

(Document displayed on screen.)

WITNESS PAULSEN: Thank you.

All right. I would like to offer three surrebuttal opinions in response primarily to Dr. Nader-Tehrani's rebuttal testimony, and I'd like to use those slides to walk through those opinions.

Next slide, please.

(Document displayed on screen.)

WITNESS PAULSEN: The first opinion that I'd like to offer is in response to Dr. Nader-Tehrani's rebuttal testimony that the DSM-2 model results evaluating compliance with D-1641 objectives were not real.

I disagree with that conclusion.

DSM-2 is a well-understood, well-established model. It's regularly used to simulate hydrodynamics in salinity within the Delta and we use it regularly in planning exercises. So we rely upon DSM-2 to evaluate and compare alternative management scenarios or alternative projects.

And, in addition, we've compared the input files that were used in the modeling exercise that we're looking at here and, for the most part, those are identical. The same hydrologic sequence is simulated in

all of the simulations, the same title sequence, the same meteorological parameters, et cetera.

The main differences, in addition to climate change and sea-level rise, which is in the NAA and project scenarios but not in the Existing Condition Scenario, the main differences are the exports, the diversions, and the Delta inflows. And those all come from the WaterFix simulations directly, so those are a function of the WaterFix Project, or the lack thereof.

Dr. Nader-Tehrani offered four potential explanations for why the model results were not real in terms of assessing D-1641 objective exceedance -- objective exceedances, and to illustrate why I disagree with that, I'd like to refer to this figure.

This figure was originally presented in Brentwood-102 as Figure 4, and it shows the daily average chloride concentrations from DWR's DSM-2 simulation results at Pumping Plant 1 which is also Brentwood's primary intake location for Water Years 1978 and 1979.

Dr. Nader-Tehrani first stated that modeled exceedances can be the result of, quote, "a stressed CVP/SWP system under extreme operational conditions," end of quote. But extreme operational conditions occur during drought years and critical years. And the years that are shown on this figure are above-normal and

below-normal years, so extreme conditions don't explain these exceedances.

And then next he explained that there were three modeling limitations that could result in exceedances.

The first of those was transitions in water quality standards either within or between months. But the 250-milligram chloride objective does not transition between months; rather, it applies to every single day every year. So I conclude that that doesn't explain these exceedances.

The second explanation was related to the downscaling of monthly CalSim model output into the daily time series that's used in DSM-2.

And, in my opinion and experience, that explanation can't explain exceedances that last for very long periods of time. On this graph, you can see exceedances that last for up to 85 consecutive days, so that downscaling shouldn't be responsible for that kind of exceedance.

And then, third, Dr. Nader-Tehrani asserted that the Artificial Neural Network, the ANN, can cause days of exceedance at a time when CalSim II shows that standards will be met but DSM-2 does not.

Again, this explanation doesn't appear to

describe the kinds of exceedances that we see here, again, for up to 85 days at a time, not for a shorter time period.

In summary, because DSM-2 is a well-accepted and widely-used modeling tool, and because Dr. Nader-Tehrani's explanations don't appear to me to explain the exceedances that we see in DWR's model results, I conclude that the model results do provide a real indication of the likely rate of exceedance of water quality objectives.

I think we can skip the next slide.

(Document displayed on screen.)

WITNESS PAULSEN: And next.

(Document displayed on screen.)

WITNESS PAULSEN: Thank you.

The second opinion that I'd like to offer has to do with the methods that DWR used to evaluate water quality objective exceedances.

And, specifically, Dr. Nader-Tehrani said that probability exceedance diagrams, such as the one shown here, were the best way that he knew to assess compliance with water quality objectives.

MR. ALADJEM: Dr. Paulsen, what slide is this?

WITNESS PAULSEN: Oh, I apologize. I don't think the slide has a number, but this is Slide 4 in

Brentwood-122. And this figure is Figure 3 from Brentwood-121 which in turn was copied from DWR-513, Figure C5.

What this figure shows is the probability of meeting the D-1641 250-milligram per liter chloride objective at Pumping Plant No. 1. And you can see where those lines cross above the red dashed line. Those are days in which the objective would not be met.

I disagree that this is the best way to evaluate compliance with those objectives, and I'd like to show you why.

First, the thing to note with this is, this is a probability diagram for the entire 16-year period.

The next slide shows the data from which this diagram was derived.

(Document displayed on screen.)

WITNESS PAULSEN: This is a plot of the --

MR. ALADJEM: Hold on.

WITNESS PAULSEN: I'm sorry.

MR. ALADJEM: Again, can you please identify the slide.

WITNESS PAULSEN: Sure. This is Slide 5 in the sequence. This is Brentwood-121 Figure 4.

This slide shows the daily average chloride concentrations that were simulated by DSM-2 for the NAA,

the No-Action, and the Boundary 1 scenarios. And this, again, is the same information that was shown in cumulative probability format on the prior slide but already provides a lot more detail in terms of when these exceedances are expected to occur.

We can also break this information into year types and use cumulative probability diagrams for individual hydrologic year types to evaluate these exceedances.

In the interest of time, I think we can also skip the next two slides.

(Document displayed on screen.)

WITNESS PAULSEN: And one more.

(Document displayed on screen.)

WITNESS PAULSEN: This is Slide 8 in the sequence. This is from Brentwood-121, Figure 7.

And this slide shows the probability exceedance diagram for chloride at Pumping Plant No. 1 for dry years -- for dry years in the 16-year period.

I was initially quite surprised that the highest level of exceedances were simulated to occur in normal and dry-year types, but maybe I shouldn't have been. Because in wet years, there's plenty of water and we generally have fewer exceedances, and in critical years we know that the WaterFix Project will divert less

water in the future than it would without the Project. So we see the greatest impacts in dry and normal years.

So this graph shows the exceedance diagram for dry years, and it's shown in terms of the absolute value of chloride. So you can see a dashed line, the top dashed line and the 250-milligram-per-liter chloride line.

What this diagram shows is that the Boundary 1 scenario exceeds the 250-milligram-per-liter chloride threshold about 10 percent of the time, or roughly 37 days per year on average in dry-year types. And that's about 37 percent more frequently than for the 16-year simulation period as a -- as a whole.

The next slide --

(Document displayed on screen.)

WITNESS PAULSEN: -- which is Brentwood-121 Figure 8, shows the cumulative probability diagram for normal years. And normal years were above-normal and below-normal years. There are three of those year types in the 16-year simulation period.

What we see is that the Boundary 1 scenario exceeds the 250-milligram-per-liter threshold about 15 percent of the time, or about 55 days per year on average. So in normal year types, the rate of exceedance for the Boundary 1 scenario is approximately double that

for the 16-year simulation period as a whole.

Again, because DWR's presented a lot of this information in the form of probability exceedance diagrams for the full 16-year period, you can't really discern this level of detail from that information.

The next slide is for wet-year types, and I think we can skip that.

(Document displayed on screen.)

WITNESS PAULSEN: And then, finally, this slide shows Brentwood-121 Figure 10.

And what I showed in the probability exceedance diagrams that we just looked at is that the exceedance rate in some year types is greater in those year types than for the 16-year period as a whole.

What we can do is then tabulate the number of days in the dry and the normal year types to see how frequently the 250-milligram-per-liter threshold will be exceeded. And what we see here is the number of days on average that it would be exceeded in dry-year types -- those are the bars of the left -- and in Normal Water Year types on the right. The NAA is shown as blue and the Boundary 1 scenario is shown in red.

So what this diagram shows is that the Boundary 1 scenario would exceed the 250-milligram-per-liter chloride threshold about 19 days

more per year than the No-Action Alternative in dry years, and about 17 days per year more than the NAA in normal year types.

And the reason this is important is because, in the 16-year period of record, dry and normal year types occur about 44 percent of the time, but in the historical record, they occur about 55 percent of the time.

So, what these model results show is that we can expect this magnitude, a substantial increase in the number of days of non-compliance of the 250-milligram-per-liter threshold, about 55 percent of the time.

As I discussed in the first opinion, I do believe that DSM-2 is the appropriate tool to evaluate the question of water quality objective exceedances but that DWR could have provided additional information that would have been very useful in understanding when those exceedances are expected to occur and what they would mean for drinking water operators within the Delta.

Next slide, please.

(Document displayed on screen.)

WITNESS PAULSEN: Thank you.

The last opinion has to do with the EC-to-chloride conversion factor.

This shows Brentwood-121 Figure 11.

In his rebuttal testimony, Dr. Nader-Tehrani expressed doubt about the EC-to-chloride conversion factor that we, exponent, used in our analysis of the DSM-2 results. And he seemed to imply that we might have used an incorrect conversion factor or that our choice of conversion factor might have biased our conclusions.

The conversion factor that we used was derived by Guivetchi, and it can be found in a memo on DWR's DSM-2 website.

Guivetchi calculated conversion factors for different locations in the Delta using measured chloride and EC levels at those locations. And he did that because the conversion factor isn't uniform throughout the Delta, because the composition of water changes throughout the Delta. In contrast, it appears that DWR used a fixed conversion factor at all locations within the Delta. And so we constructed this graph to compare the two conversion factors.

What you can see is, on the left-hand side of the diagram, below a concentration of about 92 and a half milligrams per liter, those lines are pretty close. But to the right of that level, you can see DWR's conversion factor in red and the conversion factor that we used in blue.

And you can see that DWR's conversion factor

yields a higher chloride concentration than the conversion factor that we used at levels above about 92 milligrams per liter.

Because the conversion factor that we used yields a lower chloride concentration than the conversion factor used by DWR, our calculated chloride concentrations are actually lower across most of the range than those calculated by DWR, and so I conclude that there are small differences in these conversion factors but they don't at all change our conclusions or analysis in this matter.

Thank you.

MR. ALADJEM: Chair Doduc, Dr. Paulsen's available for cross-examination.

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

Parties, please come up, identify yourself, and give me a time estimate for cross-examination.

And since I only see the Department, Mr. Mizell, you might as well take a seat.

(Pause in proceedings.)

MR. MIZELL: Thank you.

Tripp Mizell, Department of Water Resources.

I will be focusing on the compliance with D-1641 indicated by DSM-2, which I believe is identified

as Opinion 2 in Dr. Paulsen's testimony, and modeling anomalies, which I believe is identified as Opinion 1 in Dr. Paulsen's testimony.

I would expect to question 45 minutes at the outside, but I believe I can make that shorter.

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

Please proceed.

CROSS-EXAMINATION BY

MR. MIZELL: Dr. Paulsen, good morning.

WITNESS PAULSEN: Good morning.

MR. MIZELL: I'd like to just review what I think you were just summarizing for the Board with regards to your Opinion 2, and maybe I can shortcut some of the foundational questions I was going to ask.

And I'm going to do this without any intention to try and trap you. I just want you to explain if I have the -- have the basis of it correct.

So just to review: Your verbal testimony reviewed the graphs on Brentwood-121 Figures 6 through 9, and based on those figures, you're focused on normal and dry years and the Boundary 1 scenario; is that correct?

WITNESS PAULSEN: Sorry. You said Brentwood-121 Figures . . .

MR. MIZELL: Six through nine.

CO-HEARING OFFICER DODUC: Dr. Paulsen, please make sure your microphone is on.

WITNESS PAULSEN: Oh, I'm sorry. I think it is.

CO-HEARING OFFICER DODUC: Okay. Move it closer to your face.

WITNESS PAULSEN: Sure.

We -- We did two things: In evaluating the model anomalies for extreme conditions --

MR. MIZELL: Um-hmm.

WITNESS PAULSEN: -- we looked at the model output. I think we focused on the Figure 1 from Brentwood-121.

MR. MIZELL: Okay.

WITNESS PAULSEN: But I --

MR. MIZELL: That wasn't what I asked you. The question was what you had reviewed with the Board.

If we could just bring up Brentwood-121 and I believe it's Pages 15 and 16.

(Document displayed on screen.)

MR. MIZELL: I guess that would be one more page.

(Document displayed on screen.)

MR. MIZELL: There you go.

These are the chloride graphs for each of the

Water Year types; is that correct?

WITNESS PAULSEN: Yes.

MR. MIZELL: Okay. And you just reviewed these in your verbal testimony?

WITNESS PAULSEN: Yes. They had been copied into the PowerPoint.

MR. MIZELL: Correct.

And so what I thought I understood from your summary is that the critical years -- and if we go to the next page -- the wet years --

(Document displayed on screen.)

MR. MIZELL: -- show that the scenarios are equal or better water quality than the No-Action Alternative.

And so your focus was, instead, on the dry years and the normal years where the Boundary 1 scenario appeared to have a worse water quality.

Is that a fair assessment?

WITNESS PAULSEN: The -- We did focus on the Boundary 1 scenarios. Obviously, other scenarios are shown on these plots.

MR. MIZELL: Okay. So if we could . . .

I think I can skip those.

So I would like to look at Page 11, which I suppose may be .pdf Page 12.

(Document displayed on screen.)

MR. MIZELL: And in the middle of the main paragraph, you describe Figure 3 as having a 7 percent exceedance rate. It's just to the left of where the cursor is.

Do you see that, middle of the paragraph?

WITNESS PAULSEN: Yes.

MR. MIZELL: And you agree with the statement that Figure 3 shows a 7 percent.

WITNESS PAULSEN: Yes. It's hard to read directly off of that but, yes, we looked at that. It's 410 days.

MR. MIZELL: And if we could go to Figure 5 of this exhibit.

(Document displayed on screen.)

MR. MIZELL: And your Figure 5 also shows a 7 percent exceedance rate for Boundary 1.

WITNESS PAULSEN: Yes.

MR. MIZELL: And for the No-Action Alternative?

WITNESS PAULSEN: They look to be a little bit different but they're similar.

MR. MIZELL: Now, your Figure 5 here is meant to so -- show the same information that's found in Table 5 from Exhibit Brentwood-102; is that correct?

WITNESS PAULSEN: (Examining document.)

Let me make sure I have the right . . .

(Searching through document.)

Yes.

MR. MIZELL: Okay. If we could pull up DWR-956.

(Document displayed on screen.)

MR. MIZELL: Is there a way to get the whole page on the screen?

(Document displayed on screen.)

WITNESS PAULSEN: I should probably clarify that, obviously, different scenarios are shown one to the other. The table doesn't include the numerical information for all the scenarios that are depicted in the figure.

MR. MIZELL: Good clarification.

I'll be focusing on Boundary 1. Can we agree that Boundary 1 is shown on both the table and the figure?

WITNESS PAULSEN: Yes.

MR. MIZELL: So it's your intention that these show the same data.

WITNESS PAULSEN: Yes.

MR. MIZELL: Okay. Okay. If we could bring up DWR-957.

(Document displayed on screen.)

MR. MIZELL: And 957 is now showing your Figure 3 and your Figure 5.

And is it the case that these two figures show the same data with regards to Boundary 1?

WITNESS PAULSEN: They're presented with a different Y-Axis but, yes, they are intended to show the same information.

(Pause in proceedings.)

MR. MIZELL: And if we could bring up Brentwood-121, Page 14, again.

(Document displayed on screen.)

MR. MIZELL: Sorry, .pdf Page 15.

(Document displayed on screen.)

MR. MIZELL: Sorry. Scroll to the top of the page, please.

(Scrolling up document.)

MR. MIZELL: All right. Your first full paragraph on this page describes what I believe is the data that is in your Figures 3, 5 and intended to be in Table 5 as well; is that correct?

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

The first paragraph?

MR. MIZELL: Right. The paragraph that starts, "Additional useful information."

WITNESS PAULSEN: Okay.

MR. MIZELL: The data within that paragraph, the numbers within that paragraph showing a 7 percent exceedance 27 days per year, 410 days in the simulation period. That's intended to summarize the data behind Figure 5 -- your Figure 5 --

WITNESS PAULSEN: Yes.

MR. MIZELL: -- and your Figure 3?

WITNESS PAULSEN: I didn't prepare Figure 3. That's a DWR figure.

MR. MIZELL: I understand. But we just --

WITNESS PAULSEN: Yes.

MR. MIZELL: -- described that they have the same dataset, so characterized in a slightly different matter but same data.

So this would also summarize Figure 3?

WITNESS PAULSEN: Yes.

MR. MIZELL: And it was intended to also summarize Table 5?

WITNESS PAULSEN: They were intended to be consistent.

(Pause in proceedings.)

MR. MIZELL: Could we bring up DWR-958, please.

(Document displayed on screen.)

MR. MIZELL: I'll give you a chance to review

the text.

WITNESS PAULSEN: (Examining document.)

MR. MIZELL: So, in the highlighted text on DWR-958, you list that approximately 55 days per year for normal Water Years was the exceedance rate; is that correct?

WITNESS PAULSEN: Yes.

MR. MIZELL: And if we scroll up to Figure 10, under normal Water Years --

(Scrolling up document.)

MR. MIZELL: -- is your graph showing an exceedance rate of 71 days instead?

WITNESS PAULSEN: It is. I agree that there's an inconsistency.

MR. MIZELL: And would that inconsistency be driven potentially by a calculation error that is contained in Table 5?

WITNESS PAULSEN: I don't know. Clearly, there is an inconsistency. I would need to track down exactly how that happened. It shouldn't have.

MR. MIZELL: And just for my own sake, so that I'm not missing my own point here:

Table 5 is the basis of your Table 6, which is the basis of Figure 10; is that correct?

WITNESS PAULSEN: Table 5 from . . .

MR. MIZELL: From your Exhibit 102.

WITNESS PAULSEN: From 102 is the basis for again?

MR. MIZELL: Table 6, Brentwood-102.

WITNESS PAULSEN: (Examining document.)

Yes, that is intended to be the summary -- I mean, Table 6 is intended to summarize by Water Year type the information contained in Table 5 of Brentwood-102.

MR. MIZELL: And then Figure 10 is based upon Table 6 of Brentwood-102.

WITNESS PAULSEN: And, again, this is Figure 10 of Brentwood --

MR. MIZELL: 121.

WITNESS PAULSEN: -- 121.

MR. MIZELL: Correct.

WITNESS PAULSEN: They are intended to be consistent.

MR. MIZELL: Okay. Great.

So if we could go to Brentwood-102 Table 5 --

(Document displayed on screen.)

MR. MIZELL: -- which I believe is Page 59.

(Document displayed on screen.)

MR. MIZELL: And I don't want to -- I don't want to belabor this point, so maybe I'll try something creative here and you can ask me for a calculator if

I'm -- if I botch it.

The column under B1 of Table 5, Brentwood-102, according to the text you've included in Brentwood-121 should total to 410 days in the simulation period.

Is that your understanding?

WITNESS PAULSEN: I can see that it totaled more than that --

MR. MIZELL: Okay.

WITNESS PAULSEN: -- but it was the intention for these numbers to be inconsistent.

MR. MIZELL: Thank you. I think that's all I have to do on there. I don't need to have you total them up unless you want to.

WITNESS PAULSEN: I can tell by eyeballing them, I think they'll be greater.

MR. MIZELL: Okay. I'd like to move on to your Opinion 1, which is the modeling anomalies.

So, in your verbal testimony just now, when you were describing your first opinion on modeling anomalies, you indicated that Dr. Nader-Tehrani stated that there's a modeling anomaly in DSM-2.

WITNESS PAULSEN: I think he called it model limitations. I apologize if I got the terminology wrong.

MR. MIZELL: Okay. Do you have a citation for where Dr. Nader-Tehrani explains that DSM-2 as a modeling

limitation or modeling anomaly?

WITNESS PAULSEN: I believe I do. Just a moment.

At, let's see, DWR-79 on Page 36, I believe that that testimony states (reading):

". . . The modeled exceedances of all the scenarios presented during (sic) the hearing, including the NAA, are a result of: (1) limitations of the modeling process used in analyzing the CWF scenarios, or (2) a stressed CVP/SWP system under extreme operational conditions."

And I believe that he also said at DWR-79, Page 45, that, quote (reading):

". . . The modeled exceedances in D-1641 agricultural, municipal, and industrial water quality objectives are not real, and occur mainly due to a difference in the assumptions in DSM-2 and CalSim II, including a difference in the size of the time-step in the two models."

So I guess it's the first of those two quotes that uses the modeling limitation language.

MR. MIZELL: Thank you.

And that first quote doesn't specify that it is DSM-2 that we're talking about, so it could be CalSim ANN module; is that correct?

WITNESS PAULSEN: It talks about the modeling process, and I assume by that he means the CalSim and DSM-2 analysis, that together, you know, was used to generate the model results.

MR. MIZELL: Okay. Thank you for that clarification. That's helpful.

And your first opinion, if I can, again, try to attempt to encapsulate it, is that modeling anomalies -- and I'll use that term to be both the limitation language you talked about and the anomaly language in your testimony -- that those modeling anomalies cannot persist beyond one month; is that correct?

MR. ALADJEM: Objection: Misstates the testimony.

WITNESS PAULSEN: Yeah. I didn't --

MR. MIZELL: I'm happy to take her summary of it.

CO-HEARING OFFICER DODUC: Dr. Paulsen, please state what your intention was with that statement.

WITNESS PAULSEN: My intention was to talk about the difference in the time-step between the two models and that CalSim II uses a monthly time-step whereas DSM-2 simulates hydrodynamics in salinity within the Delta on a 15-minute time-step and to talk about the . . . sort of how the model responds to the step

function, if you will, in the CalSim results.

Did I answer your question? I've forgotten your question.

MR. MIZELL: It's good -- good reference material.

I was looking to see if you drew a conclusion as to whether or not a modeling anomaly could persist longer than one month.

WITNESS PAULSEN: Well, I drew the conclusion that the high daily chloride concentrations up to 85 days at a time should not result from the three explanations that Dr. Nader-Tehrani presented.

MR. MIZELL: If we could bring up Brentwood-121.

(Document displayed on screen.)

MR. MIZELL: I believe it's Page 9.

(Document displayed on screen.)

MR. MIZELL: And on to 10.

(Document displayed on screen.)

MR. MIZELL: Okay. At the top of Page 10, please.

(Document enlarged on screen.)

MR. MIZELL: And this -- this statement that begins with "however" at the top of Page 10 on Brentwood-121 is what you were just explaining to us,

that it's not your opinion that modeling anomaly would result in a chloride objective exceedance for a full month or more, and you used the 1978 85-day exceedance as an example.

WITNESS PAULSEN: I think I rephrased it slightly. I didn't say it quite that way.

(Pause in proceedings.)

WITNESS PAULSEN: Would you like me to explain?

MR. MIZELL: Well, how about we just focus on: Do you believe the modeling anomaly could result in a water quality exceedance longer than one month?

WITNESS PAULSEN: The third model limitation that Dr. Nader-Tehrani discussed was that . . . even when the ANN predicts -- and I'm quoting his language (reading):

"In some cases, even though the ANN predicts that the objective would be met on a monthly average basis, it can be an imperfect predictor of compliance on the time-step, (for example, daily standard) and averaging basis (for example 14-day running average) that these objectives need to be met. Thus when using the CalSim II results in such cases, the DSM-2 results may indicate an exceedance of a salinity standard, when CalSim II does not."

So my understanding is that CalSim II operates on a monthly time-step and that I think what he was saying is that CalSim may show that the salinity standard is met but DSM-2, using the CalSim output as input, does not.

So that's how I interpret that statement.

And it seems inconsistent to me to have a DSM-2 model result with an exceedance that's pretty large and extends for a long time, certainly longer than a month timeframe, that that could be explained by that explanation, if I said that clearly. That wasn't very clear.

MR. MIZELL: Okay.

WITNESS PAULSEN: Am I making sense?

MR. MIZELL: I think I've got it.

So you would disagree with the following statement: A water quality exceedance that persisted longer than one month is explained by a modeling anomaly.

MR. ALADJEM: Objection.

WITNESS PAULSEN: I didn't say that.

MR. ALADJEM: Objection: This is unintelligible.

CO-HEARING OFFICER DODUC: Mr. Mizell, I'm not sure that I follow in terms of taking what Dr. Susan -- Dr. Paulsen said in her testimony, written and verbal,

and expanding it to such a generalized statement is helpful.

MR. MIZELL: I will do my best to -- to bring it back to the testimony on the page.

Dr. Paulsen, your statement here reads that (reading):

". . . Simulated exceedances of the 250 milligrams per liter chloride objective that persist for a full month or more . . . do not appear to be consistent with ANN model results indicating that the objective would be met on a monthly average basis and therefore cannot be explained by 'imperfect' ANN prediction."

Is the "imperfect ANN prediction" synonymous with "modeling anomaly" as you used the term in your testimony?

WITNESS PAULSEN: Say that last bit -- Say the question part one more time.

MR. MIZELL: Is "modeling anomaly" as you used it in your testimony synonymous with "imperfect ANN prediction" as described here in this paragraph -- in this statement?

MR. ALADJEM: Objection: Misstates the testimony.

She's already said there are a number of

different elements that go into a modeling anomaly.

WITNESS PAULSEN: I think Dr. Nader-Tehrani's testimony was about three specific model limitations.

And what I did was to try to look at the simulated -- the DSM-2 results for daily chloride at this location over the timeframe that we looked at in the figure to see if those three explanations, in my experience, could explain that lengthy period of pretty high chloride concentrations.

MR. MIZELL: Um-hmm.

WITNESS PAULSEN: And, in my experience, they don't appear to.

MR. MIZELL: Okay. I think you have given me -- Yes, so I will move on.

WITNESS PAULSEN: I don't think I'd call that a "yes."

MR. MIZELL: I'll just --

WITNESS PAULSEN: I would stick with my explanation, please.

MR. MIZELL: Very good.

WITNESS PAULSEN: Thank you.

MR. MIZELL: Brentwood-121, Page 7, please.

(Document displayed on screen.)

MR. MIZELL: This would be Figure 1.

(Scrolling down document.)

MR. MIZELL: There we go.

So, Dr. Paulsen, would you state that it is possible for water quality effects from a spike in chloride to last longer than one month, as indicated in your Figure 1?

WITNESS PAULSEN: What do you mean by "effects"?

MR. MIZELL: As in, would it remain above the 250-milligram standard for longer than one month?

MR. ALADJEM: Objection: Vague and ambiguous.

What is a spike in chloride? How long -- What do we define it as, et cetera?

CO-HEARING OFFICER DODUC: No. I'm going to overrule you on that because I want to know the answer to this one.

She -- She said in her testimony that she believes these results are real, and I believe that's where Mr. Mizell is exploring -- or at least I think that's what he's exploring.

MR. MIZELL: Trying my best.

CO-HEARING OFFICER DODUC: All right.

WITNESS PAULSEN: What this figure shows is the DSM-2 model output for the simulated daily chloride concentration at this location over the time period.

MR. MIZELL: And has it been your testimony you

believe these exceedances above the 250-milligram standard are expected to be real exceedances?

WITNESS PAULSEN: Yeah. I tried to be really clear about that in the report.

And, in my opinion, what I mean by "real" is that these model results provide a real indication of the likely rate of exceedance for these scenarios. That's what I mean by "real."

MR. MIZELL: Thank you.

And in Figure 1, there are two portions of the chart that show Boundary 1 having a chloride concentration above the 250-milligram-per-liter threshold of longer than one month; is that correct?

WITNESS PAULSEN: Yes.

MR. MIZELL: Isn't it true that the model does not distinguish between a modeling anomaly and what you've characterized as likely -- Or how did you just say it? Likely to be real? Yeah.

WITNESS PAULSEN: The model is the model. It doesn't make judgments.

MR. MIZELL: So it would treat both those instances the same. It's up to the analysis -- the person performing the analysis to distinguish between what they believe is a modeling anomaly and what they believe is a real output.

WITNESS PAULSEN: I'm not sure what you mean by both those instances, but certainly as people who take the model output and interpret it or use it to draw conclusions.

MR. MIZELL: Right.

So the model's not going to flag one and say "This is a modeling anomaly" and not flag another leading the model --

WITNESS PAULSEN: To my knowledge -- I'm sorry.

MR. MIZELL: No. Go ahead.

WITNESS PAULSEN: I was going to say, to my knowledge, the model doesn't make a judgment call and flag anything.

MR. MIZELL: Thank you.

So, just to put a last point on it:

If the model cannot distinguish between what is a model anomaly and what is a true result -- my words, not yours -- isn't it possible that the model could result in a -- could result in chloride concentrations going above the 250 threshold as a -- as an output of an anomaly?

WITNESS PAULSEN: I've tried to be pretty clear.

In my opinion, exceedances that are this large and last for this long really cannot be explained by the

model limitations that Dr. Nader-Tehrani posited.

MR. MIZELL: Just give me a sec to collect my thoughts, and I think I might be able to wrap up.

(Pause in proceedings.)

MR. MIZELL: I think I'll conclude my cross.

Thank you.

CO-HEARING OFFICER DODUC: Mr. Aladjem, any redirect?

(Pause in proceedings.)

MR. ALADJEM: Excuse me, Hearing Officer Doduc. No redirect.

CO-HEARING OFFICER DODUC: Thank you.

And not seeing any other cross-examiner, I think this concludes Brentwood's surrebuttal as well.

At this time, now you may move both parties' exhibits.

MR. ALADJEM: Thank you, Madam Chair.

On behalf of the Delta Flood Control Group, I'd like to move and offer into evidence and move into evidence Delta Flood Control Group Exhibits 20 through 25 and, on behalf of the City of Brentwood, Exhibits 120 through 122, inclusive.

CO-HEARING OFFICER DODUC: Thank you.

And with no objection, those exhibits are accepted into the record.

(Delta Flood Control Group's Exhibits 20-25 received into the record)

(City of Brentwood's Exhibits 120-122 received into the record)

MR. ALADJEM: Thank you very much.

CO-HEARING OFFICER DODUC: Thank you.

Let's go -- Since Dr. Paulsen is still on the hot seat, let's go ahead and take a short break and we'll return at 10:55 for the next round.

(Recess taken at 10:40 a.m.)

(Proceedings resumed at 10:55 a.m.:)

CO-HEARING OFFICER DODUC: All right. It is still 10:55 and we are back in session.

I see Mr. Emrick already up here so please begin, Mr. Emrick.

MR. EMRICK: Thank you. Matthew Emrick for City of Antioch, and we are presenting today Dr. Susan Paulsen to present surrebuttal on behalf of the City.

SUSAN PAULSEN,

called as a witness for the City of Antioch, having been previously duly sworn, testified further as follows:

DIRECT EXAMINATION BY

MR. EMRICK: I guess I would have Dr. Paulsen, state your name just for the record.

WITNESS PAULSEN: Susan Paulsen.

MR. EMRICK: And this testimony will be for the City of Antioch, your surrebuttal testimony?

WITNESS PAULSEN: Yes.

MR. EMRICK: And you've been previously sworn?

WITNESS PAULSEN: Yes, I have.

MR. EMRICK: And you have prepared some written surrebuttal testimony on behalf of the City of Antioch; is that correct?

WITNESS PAULSEN: Yes.

MR. EMRICK: And Exhibit 400 is a true and correct copy of that written surrebuttal?

WITNESS PAULSEN: Antioch-400, yes.

MR. EMRICK: Yes.

And you previously stated your qualifications; correct?

WITNESS PAULSEN: Yes.

MR. EMRICK: If I can ask you now maybe to have Antioch-400 -- Exhibit 400 brought up.

(Document displayed on screen.)

MR. EMRICK: Thank you.

And ask you to summarize your surrebuttal testimony.

Thank you.

WITNESS PAULSEN: All right. Thank you. And

I'll try to keep this brief.

My testimony on behalf of the City of Antioch focuses on two opinions:

One concerns the relationship between San Joaquin River flows and San Joaquin River salinity or EC; and the second has to do with D-1641 compliance. And both of these are provided in response to Dr. Nader-Tehrani's rebuttal testimony.

First, Dr. Nader-Tehrani asserted that San Joaquin River water will be present at -- a large fraction of the water at Antioch's intake only when San Joaquin River flow rates are high.

Dr. Nader-Tehrani also testified that salinity, or EC, in the San Joaquin River water is low when San Joaquin River flows are high.

As a result, he asserted that -- and here's a quote (reading):

"There is no correlation between an increase in San Joaquin River volumetric contribution at Antioch and any significant increase in EC at Antioch."

In response, I'd like to make a few points:

First, it appears that Dr. Nader-Tehrani may have compared monthly average flow rates and the source fraction, the fraction of water at Antioch's intake that originated from the San Joaquin River, for the same

month, and yet there is a travel time. Water that enters the Delta from the San Joaquin River at Vernalis typically takes a month or more to travel to Antioch or to the outlet of the Delta.

And it's not exactly clear, but I believe that he may have plotted the San Joaquin River inflows and the source fraction of Antioch for the same month; thus, not considering that lag.

But even if that's the case and it were corrected, this analysis -- his analysis of that is not really relevant to my assessment of water quality at Antioch.

One thing that's interesting about the Delta:

I've previously looked at the fate of San Joaquin River water in the Delta for historical conditions in critical dry and below-normal years, and that analysis shows that only a small fraction of San Joaquin River flows into the Delta actually leave the Delta via Delta outflow. It's typically about a percent or less. The rest is either diverted or exported from the Delta.

I wanted to know if that was likely to be true as well for the WaterFix scenarios since the Point of Diversion will change, at least in part. So we did an analysis looking at the fate of San Joaquin River water

for Alt 4A and found that 2 percent or less of the San Joaquin River water that enters the Delta at Vernalis during the February to June 1987 timeframe, which is a dry year, less than 2 percent of that water actually leaves the Delta as Delta outflow.

So I do conclude that that is consistent.

A third point is that the WaterFix Project would add new Points of Diversion on the Sacramento River. And we've previously discussed at length the fact that more Sacramento River water would be exported from the system with the WaterFix Project than without as a result of the location of those intakes.

We also know that Sacramento River water has lower salinity, is higher quality than San Joaquin River water, and the fingerprints generated using DWR's DSM-2 model show that, after implementation of the WaterFix, particularly for some model scenarios, there will be a decrease in the fraction of Sacramento River water at Antioch's intake and, in addition, largely made up for by an increase in a fraction of San Joaquin River water, so that change in the composition of water does affect water quality at Antioch's intake.

I think, however, maybe the most important point is that the relationship between salinity and flow in the San Joaquin River is built into the DSM-2 model.

So, in other words -- And -- And Figure 5 of the testimony shows this.

(Document displayed on screen.)

WITNESS PAULSEN: It shows that the EC, or salinity, of San Joaquin River water is typically high when San Joaquin River water -- San Joaquin River flows are low, and vice versa. The salinity is low when the flows are high.

That's incorporated into the DSM-2 model already, and was already incorporated into the model results upon which we based our conclusions. We didn't adjust or alter any of the input files.

And so I conclude that the relationship between San Joaquin River flow and San Joaquin River salinity is already fully incorporated into our analysis.

So, in summary, Dr. Nader-Tehrani is right in noting that the salinity and the flow of the San Joaquin River are inversely related to each other but, in my opinion, his testimony is somewhat misleading in implying that that relationship somehow negates or represents the model results of salinity at Antioch or wasn't considered by us.

The second opinion that I'd like to offer addresses Dr. Nader-Tehrani's rebuttal testimony when he said that -- the quote is (reading):

"The frequency of days CWF scenarios exceeded D-1641 salinity requirements are mostly similar or lower compared to the NAA."

As we showed in Antioch-202, the Boundary 1 scenario exceeds the 250-milligram-per-liter chloride objective more frequently, particularly in dry and normal years, than the NAA.

For example, in 1979, the Boundary 1 scenario exceeds this threshold for about 64 days, which is an increase in 47 days, or about 250 percent, relative to the NAA.

And I will say that it appears there's an inconsistency, as pointed out during cross, in the tables. And I think I know the reason for that. It does not at all change the conclusions, and we would look forward to the opportunity to fixing those numbers.

I would also like to correct something that I said in the last hearing. I testified that we were unable to reproduce DWR's analysis of the exceedances of the 150-milligram-per-liter chloride threshold.

Our initial analyses were unable to reproduce that, but we did work with it more and, in the end, we were able to reproduce their results, which is a relief since we're relying on the exact same model output.

The real point, though, is that even when the

150-milligram-per-liter chloride threshold is met, there will be a significant loss in the number of days of usable water at Antioch's intake.

For example, in Water Year 1979, salinity would be below the 150-milligram-per-liter threshold at Pumping Plant 1 for about 338 days in the existing condition, for 311 days in the No-Action Alternative, but for only 178 days in the Boundary 1 scenario.

So that's a loss of about 150 days relative to the existing condition and about 133 days relative to the No-Action Alternative in that particular water year.

Further, those impacts are caused by WaterFix and not by climate change or sea-level rise.

And that concludes my rebuttal -- surrebuttal testimony.

Thank you.

MR. EMRICK: Okay. Ready for cross.

CO-HEARING OFFICER DODUC: Yes. Conducting cross, I expect the Department.

Anyone else?

All right. Please come up, Mr. Mizell and Miss McGinnis.

(Pause in proceedings.)

MR. MIZELL: Thank you. Tripp Mizell, DWR.

I'll be focusing only on the Opinion 1 in terms

of the predicted change in source water found in Dr. Paulsen's testimony. I would expect no longer than 30 minutes.

CO-HEARING OFFICER DODUC: Please proceed.

CROSS-EXAMINATION BY

MR. MIZELL: Dr. Paulsen, isn't it true that your testimony, both the direct, the rebuttal and the surrebuttal, for Antioch focuses exclusively on comparisons between the No-Action Alternative and/or EBC2 baselines and the Boundary 1 scenario for the CWF?

WITNESS PAULSEN: I don't remember if it's exclusively, but we did focus on those scenarios.

MR. MIZELL: To the best of your recollection, can you point us to any portion of your testimonies that would compare the H3, the H4 or the Boundary 2 scenarios?

WITNESS PAULSEN: I don't recall whether that's there. I can look for it if you like.

MR. MIZELL: No, I don't think -- It's not necessary unless you recall.

WITNESS PAULSEN: Well, there is some information on some of the other scenarios in the supporting information.

For example, we looked at the CCWD Settlement Agreement. We talked about that last time. There were some model results in there for Alt 4A.

We looked at Alt 4A in terms of the fate of San Joaquin River water in this surrebuttal testimony.

So I don't think it's right to say that it's entirely present.

We also in the rebuttal testimony, I believe, looked at a bunch of the scenarios that were evaluated as part of the FEIR/EIS.

MR. MIZELL: And this would be in which part of your testimony?

WITNESS PAULSEN: Just a moment.

(Searching through document.)

WITNESS PAULSEN: You can find references to those scenarios in Antioch-300 in a number of different locations, for example. I don't know if that's all of it but that's one place.

MR. MIZELL: Okay. I'd like to bring up Antioch-202 errata, please.

(Document displayed on screen.)

MR. MIZELL: And page .pdf 41, which should be report Page 33.

(Document displayed on screen.)

MR. MIZELL: Yeah, that's -- that's the correct one.

WITNESS PAULSEN: And, I'm sorry, did you say we're in Antioch 202?

MR. MIZELL: That's correct.

WITNESS PAULSEN: Okay. And, I'm sorry, what report page? I can't see it on the screen.

MR. MIZELL: This would be report Page 33, which is .pdf 41.

WITNESS PAULSEN: All right. I'm with you.

MR. MIZELL: So, the paragraph starting with "The fingerprinting analysis."

WITNESS PAULSEN: Yes.

MR. MIZELL: In this first sentence, you state that (reading):

". . . For nearly all water year types and months the fraction of Sacramento River water at the City's intake will be lower . . ."

Is that still your understanding?

WITNESS PAULSEN: That is specifically for the Boundary 1 scenario relative to the other two conditions.

Those changes are -- appear to be most pronounced in certain months of dry, normal and wet water years. There are a few months where the source fractions are relatively or less changed.

So we do see months where the Boundary 1 scenario, the fraction of Sacramento River water present in the City's intake for the Boundary 1 scenario falls and is lower than either the NAA or the EBC2.

MR. MIZELL: So that I'm not putting words into your mouth, was that a yes, you believe that your statement in the first sentence of that paragraph remains true, in your opinion?

WITNESS PAULSEN: My statement is that it certainly is true in all year types for at least some months.

MR. MIZELL: Thank you.

And at the bottom of that paragraph, you mention an increase from a 20 percent to a 40 percent fraction of San Joaquin River water.

Do you see that sentence?

WITNESS PAULSEN: Yes, specific to March of a Normal Water Year.

MR. MIZELL: Is that the degree of increase that is most concerning to you in your analysis?

WITNESS PAULSEN: I'm not sure I understand that question.

MR. MIZELL: What is the significance in your mind of an increase from 20 percent to 40 percent?

WITNESS PAULSEN: It's a change in the composition of water at the City's intake as a direct result of the Project.

MR. MIZELL: Is there anything in particular special about 40 percent?

WITNESS PAULSEN: It's an example, showing an example of the model results.

MR. MIZELL: So would a percentage somewhere between 20 and 40 percent change any conclusions in your testimony?

WITNESS PAULSEN: I'm not sure I understand that question.

MR. MIZELL: Are you saying that 40 percent is simply a summary of the modeling results, so if that -- in a hypothetical scenario, if that percentage had been from 20 percent to, say, 32 percent, would that change any of the conclusions in your analysis?

WITNESS PAULSEN: I don't know how to answer that because that's not what the model shows, and our intention was to look at the model results, to look at both the change in the water source composition and the change in chloride concentrations.

MR. MIZELL: Right. I recognize that the model does not show that lower percentage.

I'm asking you: If the model had shown a lower percentage in the example I gave, say, 32 percent, would that change any of the conclusions in your analysis?

WITNESS PAULSEN: I don't know how to answer that because the model didn't show that.

I'm sure that there are certain time periods

where maybe the result was closer to 30 percent. I mean, it looks like we hit 32 percent a couple of different times in the Normal Water Year, in the wet water year.

I guess I'm not understanding your question.

MR. MIZELL: That's fine. I'll move on.

If we could go to .pdf Page 41, please. Oh, we are there.

So the last sentence in that same paragraph that begins with the "Fingerprinting analysis shows," the last sentence that reads (reading):

"The increase in the fraction of San Joaquin . . . water results in degraded water quality at the City's intake."

Is that still your opinion?

WITNESS PAULSEN: Yes.

MR. MIZELL: Mr. Hunt, if we could bring up DWR-955, please.

(Document displayed on screen.)

MR. MIZELL: So if I could focus you on the lower left graphic at the bottom of the page there.

Just on the Normal Water Year graph and the Boundary 1 scenario, the months of higher San Joaquin River water percentages as compared to the other scenarios are the months of March and April; is that correct?

WITNESS PAULSEN: I would say February as well, but yes.

MR. MIZELL: February, March and April?

WITNESS PAULSEN: Yes.

MR. MIZELL: Okay. If we could, then, go to the top of this page, please.

(Document displayed on screen.)

MR. MIZELL: And is it true that the chloride concentration for the months of February, March and April show that the Boundary 1 scenario is some of the lowest chloride concentrations out of that year?

WITNESS PAULSEN: It does look like the chloride concentration in the Boundary 1 scenario starts to rise in April and is higher than the EBC2. Otherwise, those lines do appear to fall nearly on top of each other.

MR. MIZELL: And if we go back down to the bottom left corner, please, or if we want to zoom out we can look at it all statement.

(Document reduced on screen.)

MR. MIZELL: April is when the percentage of San Joaquin River starts to drop; is that not correct?

WITNESS PAULSEN: It may even start in the beginning of -- Sorry.

Yes, you're right. In April, it starts to fall

from the high point to a lower level.

MR. MIZELL: Okay. So going to the top graph, please.

(Document displayed on screen.)

MR. MIZELL: So as the percentage of San Joaquin River water is rising, EC is falling -- or chloride concentration is falling; and when San Joaquin River percentage is falling, chloride concentration is rising.

Is that what these graphs demonstrated?

WITNESS PAULSEN: Yes. And they show that because the fraction of water from the Bay is increasing markedly. If you look at the next series of figures, you can -- you can see that in that time period.

So salinity arrives at Antioch's intake from multiple sources. Often the Bay is the strongest source. But replacing Sacramento River water with San Joaquin River water does change the composition and quality of water at the City's intake.

MR. MIZELL: All right. I'd like to move to the modeling anomalies -- Or -- sorry -- that was my last -- Let's see.

Fingerprinting analysis. If we could bring up Antioch-400, please.

(Document displayed on screen.)

MR. MIZELL: And at Page 5.

(Document displayed on screen.)

MR. MIZELL: In the middle of that paragraph, Line 15 and onward, you state that (reading):

"Volumetric fingerprinting analysis (sic)" --

"Volumetric fingerprinting results were used to track the volume and fraction of tagged San Joaquin River inflow . . ."

Is that correct?

WITNESS PAULSEN: Yes.

MR. MIZELL: Did you submit the fingerprinting analysis as an exhibit in this hearing?

WITNESS PAULSEN: Which fingerprinting analysis?

MR. MIZELL: The one referenced in your testimony here.

WITNESS PAULSEN: The fingerprinting -- There is fingerprinting analysis that was submitted as referenced in -- if you scroll up -- Line 10.

(Scrolling up document.)

WITNESS PAULSEN: Those are for historical model simulations.

We did not submit the detail of the modeling analysis for the new simulation, the Alt 4A simulation, that we conducted.

MR. MIZELL: So the results for the Alt 4A analysis are not submitted for this hearing's consideration.

WITNESS PAULSEN: Well, they're summarized in Figure 1, which is on the bottom of Page 6, so I would argue that they are in evidence.

MR. MIZELL: Okay. This has been the practice, I think, throughout this hearing, and it's been made a great deal of. The data behind these summaries has often been provided, and it hasn't been provided here.

DWR would request that analysis behind the summary be provided.

CO-HEARING OFFICER DODUC: Mr. Emrick?

MR. EMRICK: We don't have any objection to doing that.

CO-HEARING OFFICER DODUC: All right.

MR. MIZELL: That concludes my cross.

CO-HEARING OFFICER DODUC: And just to wrap this up, you'll provide that within 24 hours.

WITNESS PAULSEN: That may be pushing it, honestly, because I'm not in the office right now, but we can provide it soon.

CO-HEARING OFFICER DODUC: All right. By, we'll say, Monday noon.

WITNESS PAULSEN: We will endeavor to do that.

MR. EMRICK: Thank you.

CO-HEARING OFFICER DODUC: All right. Any redirect, Emrick?

MR. EMRICK: Not at this time, thank you, no.

CO-HEARING OFFICER DODUC: All right. So at this time, would you like to move the City of Antioch's exhibits?

MR. EMRICK: I would. I'd like to move Dr. Paulsen's surrebuttal testimony, Antioch-400, into evidence.

And do I need to follow up with a written?

CO-HEARING OFFICER DODUC: No.

MR. EMRICK: Okay. Thank you.

CO-HEARING OFFICER DODUC: With no objections outstanding, it's been accepted into the record.

MR. EMRICK: Thank you.

CO-HEARING OFFICER DODUC: Thank you.

(City of Antioch's Exhibit 400 received into the record)

CO-HEARING OFFICER DODUC: All right. City of Stockton.

(Pause in proceedings.)

CO-HEARING OFFICER DODUC: What I would like to do is complete the City of Stockton's surrebuttal so that we may dismiss Dr. Paulsen before we take our lunch

break.

MS. TABER: I'll just stay here if that's okay.

(Pause in proceedings.)

MS. TABER: Good morning. Kelley Taber on behalf of the City of Stockton.

The City has two witnesses to present today: Dr. Susan Paulsen and Robert Granberg. We'd like to begin with Dr. Paulsen and then follow with Mr. Granberg.

CO-HEARING OFFICER DODUC: And has Mr. Granberg taken the oath?

MS. TABER: He has. He appeared before.

SUSAN PAULSEN & ROBERT GRANBERG,

called as witnesses for the City of Stockton, having been previously duly sworn, testified further as follows:

DIRECT EXAMINATION BY

MS. TABER: Dr. Paulsen, could you please just state your name for the record.

WITNESS PAULSEN: Sure. Susan Paulsen.

MS. TABER: Thank you.

And, Dr. Paulsen, is Exhibit Stockton-47 a true and correct copy of your written surrebuttal testimony?

WITNESS PAULSEN: Yes.

MS. TABER: And is your testimony based on the written report that has been submitted as Stockton Exhibit 48?

WITNESS PAULSEN: Yes.

MS. TABER: And is Stockton-48 a correct copy of the technical report that you prepared for surrebuttal?

WITNESS PAULSEN: Yes.

MS. TABER: And is Exhibit Stockton-49 a true and correct copy of your PowerPoint presentation summarizing your technical report?

WITNESS PAULSEN: Yes.

MS. TABER: Thank you.

Dr. Paulsen, at this time, could you please summarize your surrebuttal testimony.

WITNESS PAULSEN: Sure.

Could we please use Stockton-49.

(Document displayed on screen.)

WITNESS PAULSEN: Thank you.

If we could go to Slide 3, please.

(Document displayed on screen.)

WITNESS PAULSEN: Can you hear me? Apologies.

We have five major opinions to offer. Rather than reading through them here, I'll just talk about them as we go through. They address hydrodynamics and velocity, plus the water quality constituents of salinity, which includes both EC and chloride, bromide, organic carbon and microcystis.

Next slide, please.

(Document displayed on screen.)

WITNESS PAULSEN: The first opinion addresses involvement in the hydrodynamics in the Delta.

DWR's rebuttal reports, DWR-652 and DWR-653, presented information on velocity in the Delta including within the City of Stockton's intake.

In my opinion, the presentation of velocity in these reports missed key features of Delta flows; most notably, the sloshing nature of flows throughout the Delta and, as a result, in my opinion, DWR arrived at some unsupported conclusions regarding water quality impacts.

Next slide, please.

(Document displayed on screen.)

WITNESS PAULSEN: Velocities in the Delta are strongly influenced by the tides, and tidal forcing in the Delta will not change, of course, as a result of the WaterFix Project. Rather, WaterFix will result in changes to Delta channel velocities that are relatively small in magnitude compared to the velocities called by tidal dynamics.

And next slide, please.

(Document displayed on screen.)

WITNESS PAULSEN: To illustrate this, we've

prepared three figures. These figures show channel velocities in the vicinity of Stockton's intake for Water Year 1987, which is a dry water year.

And what you see here is the 15-minute velocities which are in gray, and you can see that they extend from well above zero to below zero.

And then each of these scenarios shows the daily average velocity as a colored line through the middle of that gray band, if you will.

We're showing here on the bottom the No-Action Alternative and the EBC2 Existing Condition Scenario.

In the middle on the left is Alternative H3, on the right is Alt 4A, and we don't show the 15-minute velocities here because we couldn't find them in DWR's model output for this scenario, but they would be very similar.

And then at the top are the velocities for the Boundary 1 and Boundary 2 scenarios.

So the 15-minute velocities here exhibit a relatively uniform range in envelope, if you will, from about 1.6 feet per second negative in the upstream direction to about 1.8 feet per second positive in the downstream direction, and you can see that flow sloshes back and forth in -- at Stockton's intake.

But the daily average velocities, the small

colored lines, exhibit a much narrower range, from about .1 feet per second in the upstream direction to about .25 feet per second in the downstream direction.

And then the next graphic presents the same information for a single month.

Next slide, please.

(Document displayed on screen.)

WITNESS PAULSEN: This is August 1987, again a dry year, and this shows the 15-minute velocities.

And, here, you can see the -- the lines and the way they go up and down roughly four times a day.

And in the next slide just --

(Document displayed on screen.)

WITNESS PAULSEN: -- zooms in a little bit further on a six-day period in August of 1987.

And what you can see is, the involvement changes direction or passes through zero about four times per day on average. You can also see that the peak velocities persist for relatively short periods of time, on the order of a few hours before the flow direction -- before the flow slows and the flow direction reverses.

In contrast, the daily average velocities are much smaller. They're near zero in this time period. And that indicates that there's very little net movement of water away from Stockton's intake.

So you've got large sloshing flows in both directions, but the net movement, the net average movement, is very slow.

So water sloshes back and forth but it only moves a short distance downstream and in that. And in the sloshing, the water will pass the same location multiple times.

The next slide --

(Document displayed on screen.)

WITNESS PAULSEN: -- shows one of the two ways that DWR-652 and 653 presented velocity information.

This shows a probability of exceedance for the daily maximum velocity over the 16-year period. And the range in values here is from a low of about 1.1 feet per second to a high of about 1.8 feet per second all in the downstream direction.

And you can see that the daily maximum velocity shown here is similar for each of the scenarios presented. There's not much variability in that quantity.

This method of looking at velocities does not capture the sloshing nature of the flows and it certainly doesn't include values that reflect the daily net velocity at this location.

The next slide shows --

(Document displayed on screen.)

WITNESS PAULSEN: -- the second way that DWR presented velocities. This is the probability of exceedance of absolute values of daily velocities on a 15-minute time-step.

And I believe what they did here is to take the absolute value of the 15-minute velocity output over the 16-year period and then to create probability exceedance diagrams for that.

So all of the velocities, when you take the absolute value, of course, are positive, and so, again, you don't see the sloshing nature. And these lines fall virtually on top of each other, so the range in these 15-minute velocities is between zero and 1.8 feet per second.

So here, again, you don't see the low daily average velocity and you don't see the sloshing that occurs as a result of tidal forcing.

Tidal forcing is a result of the gravitational pull of the sun and the moon on the earth and, of course, no one's suggesting that the WaterFix Project will change that.

(Laughter.)

WITNESS PAULSEN: Okay.

CO-HEARING OFFICER DODUC: Is that your

professional opinion, Dr. Paulsen?

WITNESS PAULSEN: That is. I'm very firm on that one.

CO-HEARING OFFICER MARCUS: That may top, what was it, was it tester kind of --

CO-HEARING OFFICER DODUC: (Nodding head.)

WITNESS PAULSEN: DWR also provided testimony stating that quote (reading):

"Channel velocity also dictates residence time within a channel because velocities dictate the flushing rate for each Reach."

But residence time and flushing are a function of the net velocity, meaning the velocity with the tidal forcing or the sloshing removed. Residence time and flushing are not a function of either the daily maximum velocity or the absolute values of 15-minute velocities.

And as we saw on prior slides, the daily average velocity is on the order of .25 feet per second or less. So the daily average velocity is lower than all but about 7 or 8 percent of the values that are shown on this plot and well below all of the daily maximum velocities that are shown on the prior plot.

So, in summary, both of these methods of displaying velocity output from the DSM-2 model fail to capture the tidal sloshing nature of flows and, in my

opinion, fail to provide a meaningful indication of flushing within the Delta for that reason.

As we would expect in the strongly tidal system such as the Delta, both the daily maximum flow velocities and the frequency of 15-minute flows are relatively unchanged from one scenario to the next.

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WITNESS PAULSEN: Thank you.

-- is from our rebuttal testimony and shows Table 5 from Stockton-26. This is our calculation of the residence times of inflows to the Delta in a dry water year.

DWR-653, DWR's Rebuttal Report, stated that other experts did not provide information to support claims of increased residence time within the Delta.

But we did present this information at the same time in our Rebuttal Report. And what it shows is that all of the WaterFix scenarios will increase the residence time of the water in the Delta significantly compared to both the existing condition and the No-Action Alternative.

So, for example, in August of dry years, you could see the residence time in the existing conditions about 23 days and, in the No Actions, just under 27 days,

but it would increase to around 31 days for Boundary 1, around 32 days for Boundary 2, and, again, around 31 days for the Alt 4A scenario.

So the residence time is predicted to increase on the order of 37 percent for the boundary scenario -- Boundary 2 scenario relative to existing conditions and about 19 percent for the Boundary 2 scenario relative to the No-Action Alternative.

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WITNESS PAULSEN: The reason this is important is because, as residence time increases, flushing within the Delta decreases and some water quality constituents, including chloride, EC, bromide and organic carbon, are present in high concentrations in sources within the Delta; for example, in the agricultural return waters. We'll show you that. And they can build up within the Delta as residence time increases and flushing decreases.

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WITNESS PAULSEN: Opinion 2 concerns the salinity impacts that are shown in DWR's modeling at the location of Stockton's intake.

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WITNESS PAULSEN: Thank you.

In their case in chief, DWR presented information on water quality at Buckley Cove and asserted that the impacts to water quality at Stockton's intake could be ascertained by reviewing model results from Buckley Cove.

We dealt with that in the rebuttal testimony. We showed that the composition and the chloride contents of water at that location is pretty different.

In their rebuttal testimony, DWR-652, DWR did present an analysis of salinity at Stockton's intake location, and I'd like to focus on that, but they also continued to state that the FEIR/EIS analysis of water quality impacts show water quality impacts would be less than significant and not adverse at Stockton's intake location and, in addition to pointing to the Buckley Cove location, they pointed to the Prisoner's Point location.

In response, we evaluated water quality at Prisoner's Point to see if it was, in fact, representative of water quality at Stockton's location. We can probably skip over the details here, but, in summary, in our opinion -- in my opinion, it's closer but it's still not representative of water quality at Stockton's intake, mainly because the chloride concentrations at Prisoner's Point reach higher levels

than at Stockton's intake.

So I think we can skip the -- the next slide.

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WITNESS PAULSEN: DWR's Rebuttal Report DWR-652 presents an analysis of salinity at Stockton's intake location. It does that both in terms of chloride and in terms of EC.

So, focusing on chloride, we have three primary concerns:

First, DWR did not use the chloride threshold of 110 milligrams per liter, which the City has stated is its relevant operational threshold.

Second, DWR has presented results as monthly mean chloride concentrations, which, again, doesn't provide the level of detail that a drinking water operator needs to understand impacts to his operations.

And, third, DWR has not evaluated a representative existing condition. Rather, they refer everything to the baseline NAA, future No-Action scenario, so it's difficult for the City to understand impacts relative to its current operations.

As we detailed in Stockton 26, our analysis of the same model results shows a significant increase in the number of days that would exceed the 110-milligram-per-liter threshold both for the period as

a whole and for certain individual year types.

Next slide.

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WITNESS PAULSEN: In DWR-652, at Page 8, DWR asserts that the primary source of chloride in the Delta is seawater intrusion.

We agree with that statement but only in certain portions of the Delta and not at Stockton's intake.

At Stockton's intake, other sources of salinity can at times be much more important than Bay water.

And if we look at the next slide --

(Document displayed on screen.)

WITNESS PAULSEN: -- this helps explain why.

This is some information from DSM-2 model input files that shows the chloride and EC concentration of San Joaquin River inflows to the Delta at Vernalis from November 1977 to April 1978. It's just a sample period.

And what it shows is that the chloride concentrations that are simulated in the inflow to the Delta from the San Joaquin River, chlorine concentrations can be as high as about 133 milligrams per liter. So the chloride concentration in the San Joaquin River itself can be higher than the City's operational threshold.

In addition, if we look at the next slide.

(Document displayed on screen.)

WITNESS PAULSEN: This is model input data from the DICU, the consumptive use module within DSM-2, and it shows chloride concentrations in ag drainage in model nodes that are located near Stockton's intake.

And you can see a chloride concentration up to just under 300 milligrams per liter, well in excess of the City's 110-milligram-per-liter threshold.

That also explains why a low residence time and high flushing is important to water quality in the interior Delta.

And then, finally, the next graphic --

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WITNESS PAULSEN: -- shows some DSM-2 model results that show, in the dash lines, where the water originates from and, in the solid bluish line, the chloride concentration that's simulated at Antioch's intake.

And what you see in the beginning of February 1978 is a chloride concentration that exceeds 110 milligrams per liter even though the concentration of Bay water is very low, less than .1 percent at the City's intake.

So, on that basis, I conclude that it's not correct to assume that Bay water is the primary source of

salinity throughout the Delta or at Stockton's intake location.

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WITNESS PAULSEN: We've already discussed briefly the EC-to-chloride conversion factor. We anticipated that it would be raised for Stockton's intake location and so addressed it in our surrebuttal testimony as well.

Just to reiterate, I understand from DWR-652 that DWR in that report used the same conversion factor that it used at other locations in the Delta to compute chloride from the EC that's the DSM-2 model output.

In contrast, the conversion factors that we used were developed from empirical data and evaluated the conversion from EC to chloride by location within the Delta.

The next slide.

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WITNESS PAULSEN: This will look somewhat familiar. This shows the two conversion factors. The one in gray is the one that was used by DWR, and the one in the orangey color is the one that was used by us for Stockton's location.

What we see is, above, a chloride concentration

of about 65 milligrams per liter. The conversion factor used by exponent results in lower chloride concentrations. It's conservative with respect to the conversion factor used by DWR. That's because the composition of water at Stockton's intake is different than it is in the Western Delta. Had we used DWR's conversion factor, we would have calculated even higher chloride concentrations.

So we've considered carefully DWR's rebuttal testimony regarding the conversion factor and it has not changed our analysis or conclusions with respect to the water quality impacts at Stockton's intake.

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WITNESS PAULSEN: DWR-652 also presented an analysis of EC.

I don't want to belabor the point except our concerns for the EC analysis are very similar, which is that they should have been based on a threshold relevant to the City's operations.

Had that been done, the 110-milligram-per-liter threshold would translate to an EC of about 587 microsiemens per centimeter using the conversion equation of Guivetchi that we use, or about 561 microsiemens per centimeter using DWR's conversion.

We also believe that the model results would have been more useful to a drinking water operator had they been presented not as monthly long-term averages and had they been compared to existing conditions.

So I stand by the prior conclusions regarding salinity impacts.

Next slide, please.

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WITNESS PAULSEN: All right. I'd like to switch to bromide now.

And with regard to bromide, DWR performed two different kinds of analyses: One focused on a mass balance analysis, where they calculated source fractions and then used the average bromide concentration associated with each of those sources to compute a bromide concentration at a specific location; and the second used a relationship between EC and bromide.

The next slide --

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WITNESS PAULSEN: Thank you.

-- shows the variability that we see in bromide concentrations in the San Joaquin River near Vernalis. You can see that the concentration is highly variable and it's probably a function of flow much like EC is.

This goes to DWR's first method where they used

that mass balance approach, multiplying the source water fingerprints by the average bromide concentration for each source. That analysis failed to consider the variability that we see in this graph associated with those.

And we can see that San Joaquin River water flowing into the Delta can have bromide concentrations as high as about 600 microsiemens -- sorry -- 600 micrograms per liter.

We also know that the concentrations of bromide in and near ag drains, agricultural drains, have been reported at much lower levels, up to two orders of magnitude higher than the levels shown here.

So, although DWR recognized the relationship between flow and EC in San Joaquin River water inflows, it doesn't appear that the fingerprinting method recognized the same kind of correlation that exists between flow and bromide.

The second relationship, the EC-to-bromide conversion, did consider this relationship, at least in part, but it's difficult for us to evaluate because we don't have the relationship between EC and bromide that was used by DWR. And it appears that they used a single relationship rather than one that would be variable.

There is information that's provided in the

testimony that indicates that the relationship probably isn't constant and may vary by source, so that's one concern.

If we move to the next slide.

(Document displayed on screen.)

WITNESS PAULSEN: We also have a few concerns with how the bromide analysis results were summarized in DWR-652.

This plot is copied directly from DWR-652 and shows the simulated monthly average bromide concentrations at Stockton's intake for below-normal years. And this particular method was -- This graph was calculated using that EC-to-bromide relationship.

I'd like to focus on two results. The NAA, the No-Action Alternative, is the black line, and the Boundary 1 scenario is shown in green.

What you can see is that, for bromide levels about -- above about 150 micrograms per liter, so the left half of the graph, the Boundary 1 scenario shows bromide concentrations that are higher than the No-Action Alternative by as much as about 100 micrograms per liter.

The figure indicates that about half the time in below-normal years, the Boundary 1 concentration will be between about 40 and 100 micrograms per liter higher than the No-Action Alternative.

And it shows that the simulated concentrations for the Boundary 2 scenario, which is the orange color, are also higher than concentrations for the No-Action Alternative some of the time.

However, the text of DWR-652 characterizes these results as showing, quote (reading):

". . . Similar or lower mean monthly bromide concentrations . . . relative to the NAA."

It appears to me that the text of the report doesn't fairly characterize these results and that the graph actually shows monthly mean bromide concentrations that are significantly higher for the WaterFix scenarios than for the No-Action alternatives.

And if we could move to the next slide.

(Document displayed on screen.)

WITNESS PAULSEN: This shows DWR's presentation of the bromide analysis using the EC-to-bromide relationship for dry water years, and a very similar concern here.

DWR-652 characterized these results as showing, quote (reading):

". . . Similar or somewhat higher mean monthly bromide concentrations at the site in dry years, relative to the No-Action Alternative."

But what we see is that the black line, the

No-Action Alternative, is well below all of the WaterFix scenarios that are shown here over the majority of the probability range.

In the range of about, I don't know, 6 percent to 55 percent probability, the bromide concentrations for the WaterFix scenarios would be higher. The Boundary 2 and the Alt 4 scenarios, which are orange and red, would be higher between about 33 and 150 micrograms per liter than the No-Action Alternative. So it seems like a significant increase to me.

And the last of the slides.

(Document displayed on screen.)

WITNESS PAULSEN: And the bromide section here shows the results in -- presented in DWR-652 for critical years.

DWR characterized these as showing similar or somewhat higher monthly mean bromide concentrations. But, again, the graph here appears to show substantially higher bromide concentrations for all of the WaterFix scenarios relative to the No-Action Alternative.

For example, at the 20 percent exceedance probability, the Boundary 2 scenario shows a bromide concentration that's higher than the No-Action Alternative by about 100 micrograms per liter.

So my concern with DWR 652's analysis of

bromide is that it doesn't quite appropriately summarize the results that are shown in the graphs in the report. And based on the graphs, we're concerned that the impacts on bromide concentrations that would be caused at the City's intake by the WaterFix Project would be substantial.

Thank you.

Next slide.

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WITNESS PAULSEN: Opinion 4 addresses DWR's rebuttal testimony regarding organic carbon.

DWR's Rebuttal Report, DWR-652, doesn't present the methodology that was used to assess organic carbon and, again, presents the results in the form of long-term monthly averages.

We've poured through DWR's model input files. We were able to identify model input files for organic carbon. They showed that the DSM-II assumes that the San Joaquin River inflows to the Delta at times will have organic carbon concentrations as high as about 11 milligrams per liter, and that's higher than the significant threshold of 4 and 7 milligrams per liter that were evaluated in DWR-652.

But we haven't identified model output for organic carbon, so we haven't evaluated DWR's DSM-2

results for shorter time periods.

Nonetheless, DWR concluded that, quote (reading):

". . . Long-term average DOC concentrations for some interior Delta locations are predicted to increase by as much as 0.2 milligrams per liter."

And we would expect short-term increases in concentration of even greater magnitude than the long-term average, of course.

And we would expect that the organic carbon concentrations at the City's intake would rise as a result of the WaterFix Project.

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WITNESS PAULSEN: All right. This last opinion concerns microcystis and harmful algal blooms within the Delta. We focused on microcystis, as DWR-653 did.

We hadn't addressed microcystis in detail in our prior rebuttal opinion, but we've done a pretty in-depth literature review since then. And many of the conclusions that we have regarding microcystis tie directly back to Opinion 1, the velocity and the residence time analysis that we performed using DWR's model results.

Next slide.

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WITNESS PAULSEN: The first opinion is that -- regarding microcystis addresses the multiple factors that interact, and they have to come together in order to promote the formation and sustaining of microcystis blooms.

Next graphic, please. Next slide.

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WITNESS PAULSEN: Thank you.

This graphic is copied from the literature and it shows some of the factors that are most important to microcystis formation and accumulation.

Although DWR's rebuttal report, DWR-653, acknowledges many of these factors, that rebuttal testimony appears to treat velocity as the primary controlling factor and fails to address changes in residence time, as we already discussed in Opinion 1.

Overall, multiple factors are required for a bloom, and each of these factors could -- can be limiting in a particular circumstance.

So, in our analysis, we focused on changes in Delta hydrodynamics that have the potential to remove a limiting factor. For example, an increase in residence time can result in an increase in the accumulation of microcystis, and that would in turn increase the

likelihead -- likelihood of a microcystis bloom.

An increase in residence time won't result in a bloom occurring all of the time that that increase in residence time occurs because other factors may be limiting, but it does increase the likelihood of a bloom.

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WITNESS PAULSEN: DWR asserted in DWR-653 that, quote (reading):

"Insufficient residence time (due to high channel velocities) results in what cells are being produced being flushed from the area before a 'bloom' can form, and high velocities result in turbulent, well-mixed channel flows where cyanobacteria generally cannot outcompete green algae or diatoms."

DWR further described velocity as being important "regardless of direction of flow, because it is not the volume of water" -- And, I'm sorry, this is a quote again (reading):

". . . Regardless of direction and flow . . . because it is not the volume of water moving through a channel, but rather the velocity with which the water moves that most affects the ability of cyanobacteria to outcompete other algae . . ."

As discussed in Opinion 1, DWR's presentation of Slide -- of velocity information doesn't characterize or capture the sloshing nature of flows within the Delta.

And I think we showed in Opinion 1 as well that the overall velocity regime is -- velocity regime in the Delta, the sloshing nature of flows, isn't likely to change substantially in the future because it's driven by tidal forcing, and that won't be affected by WaterFix.

Because the net daily average or tidally average velocity in the channel near Stockton's intake is low, residence times in that part of the Delta will be high. And, further, residence times are expected to increase as a result of the WaterFix Project, particularly in warmer months such as August in dry years, which is the example that I showed earlier, when blooms are most likely to occur because that's also when water temperatures are highest.

So the opinion here is that the increase in residence time is important because it can lead to increased accumulation of microcystis and, again, increasing the likelihood of microcystis bloom formation in the future.

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WITNESS PAULSEN: To summarize this point

briefly, DWR relied upon published literature regarding the effect of velocity on microcystis, but the two primary studies that they relied upon were not conducted in a tidal estuary and had characteristics that were substantially different than those in the est -- in our estuary in the Delta.

One study was in a fresh water river system where velocities are uniformly in the downstream direction and it evaluated blooms of anabaena, not microcystis.

The conclusions of that study appear to be related primarily to the effects of velocity on suppressing thermal stratification within the water body. And that study found that velocities needed to be higher to disrupt an already-formed bloom and to suppress bloom formation.

The second study was conducted in mesocosms, in close chambers, within a lake, and used submerged pumps to circulate water within those mesocosms.

Obviously, that's a very different circumstance. And there was concern within that study that that setup, the pumps, may have caused the effects that were observed.

Those two studies differed from the Delta in some pretty important ways. They weren't tidally

influenced. The high velocities there persisted for relatively long periods of time. And the velocities were associated at least in part with thermal disruption.

In contrast, we know flows in the Delta are strongly tidal; high velocities persist for short periods of time on the flood and ebb tides; and thermal stratification typically isn't a major issue within the Delta.

So, on this basis, we conclude that the concept of critical velocities may really not be relevant within the Delta. After all, the velocity regime that we'll see in the future will be very similar to the velocity regime that we see today, and that velocity regime hasn't suppressed microcystis formation in the past.

So, in other words, we have microcystis blooms now on occasion with the same velocities that we will have in the future.

So, on that basis, we conclude that velocity really may not be the key factor. It may not be the sole key factor within the Delta.

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(Timer rings.)

WITNESS PAULSEN: -- I'm almost done.

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WITNESS PAULSEN: DWR's rebuttal testimony

appears to deemphasize the role of increased residence time on the formation of microcystis in the Delta.

DWR-653 does acknowledge that residence times may increase in parts of the southern and South Delta, but DWR focused on other factors, such as velocity and mixing.

We've already discussed that many of these factors, including velocity and mixing, are expected to occur in the future within the same general range that we currently observe. But residence time is expected to increase substantially, as much as 37 percent for the Boundary 1 scenario as compared to existing conditions.

We've detailed in our report that we expect this increase in residence times to increase the likelihood of microcystis blooms in the Delta, both where they already occur but also potentially in locations where they do not currently occur. And we believe that this conclusion is consistent with the literature regarding microcystis blooms in the Delta as well.

And last slide.

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WITNESS PAULSEN: Thank you.

We agree with DWR-653 that temperature is an important and at times controlling factor for microcystis bloom formation and growth.

But we're concerned that DWR's temperature analysis lacks sufficient detail and prevents us from drawing conclusions regarding the impact of potential temperature changes on microcystis blooms.

Specifically, DWR presented only long-term monthly average simulated temperature information and only for two scenarios, the No-Action Alternative and the preferred alternative, Alt 4A.

We haven't found information indicating that DWR simulated temperatures for either the Boundary 1 or the Boundary 2 scenarios or for the additional scenarios that were evaluated in the FER -- FEIR/EIS, and we haven't found information on temperature analysis for the location of Stockton's intake.

Despite these shortcomings, DWR's analysis clearly indicates that monthly average temperatures will increase under certain conditions for the WaterFix alternative relative to the No-Action Alternative.

For example, DWR-653 indicates that, for the full 82-year simulation period, period mean temperatures at Prisoner's Point would be up to .18 degrees Fahrenheit higher for Alt 4A than for the No-Action Alternative in the months of May through October; and in September, that the maximum mean monthly temperature for WaterFix would be about .6 degrees Fahrenheit higher on average for the

WaterFix alternatives than for the No-Action Alternative.

And, again, increases in water temperature on shorter time scales and for certain year types will probably be higher than these long-term mean.

So, in summary, the increases in residence time and the potential increases in temperature are both expected to increase the likelihood of microcystis blooms as a direct result of the implementation of the WaterFix Project.

Thank you.

CO-HEARING OFFICER DODUC: Thank you, Dr. Paulsen.

Miss Taber.

MS. TABER: Thank you.

Mr. Granberg would require approximately five minutes to summarize his testimony. Shall we proceed with his summary?

CO-HEARING OFFICER DODUC: Please do.

MS. TABER: Thank you.

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

WITNESS GRANBERG: Robert Granberg, G-R-A-N-B-E-R-G.

MS. TABER: And you've taken the oath in these proceedings; is that correct?

WITNESS GRANBERG: Yes, I have.

MS. TABER: Can you please refresh everyone's recollection as to your position with the City of Stockton.

WITNESS GRANBERG: I'm Assistant Director of Utilities for the City of Stockton.

MS. TABER: Thank you.

Is Exhibit Stockton-39 a true and correct copy of your written surrebuttal testimony?

WITNESS GRANBERG: Yes, it is.

MS. TABER: Thank you.

At this time, Mr. Granberg, could you please summarize your surrebuttal testimony.

WITNESS GRANBERG: Yes. Good morning.

My testimony today will rebut the testimony of Dr. Michael Bryan and show DWR and the Bureau of Reclamation have not proven that the California WaterFix Project will not injure Stockton as a legal user of water.

Dr. Bryan's testimony report failed to address water quality changes that affect the City's ability to divert water from the Delta under its Water Rights Permit and the City's ability to treat water at its Delta Water Treatment Plant and to meet all reg -- applicable regulatory standards with current technology.

This presentation of data in the form of long-term monthly averages masks substantial increases in various constituents, as you've heard, that will render the City's water right unusable at times in light of the City's unique circumstances, which include its drinking water treatment facility, its distribution system, its wastewater discharge constraints, and its customer base.

I'd first like to talk about chloride and specific conductance.

In offering its opinion that the Project-related changes in chloride and specific conductance at the City's intake will not result in adverse impacts to the municipal beneficial use, Dr. Bryan relies on the 250-milligram-per-liter chloride threshold, which is a secondary drinking water standard level deemed acceptable to consumers.

However, when the chloride concentration rises past 110 milligrams per liter, Stockton will incur significant injury in two ways.

First of all, whenever salinity concentration of water at the intake increases above 110 milligrams per liter, the City is faced with a decision to forego its diversions under its Delta water right for drinking water purposes because that water diverted ultimately is discharged through the sanitary collection system and

treatment at the City's Wastewater Treatment Plant which is ultimately discharged into the San Joaquin River.

As part of the City's effort to control source water salinity, the City procured and incorporated its water right in -- into its water supply and obtained corresponding reduction in effluent salinity from the Wastewater Treatment Plant.

Increasing salinity in Delta source water for municipal and industrial use due to the Project would threaten to cause NPDES violations and force Stockton to purchase replacement water, use groundwater, or implement additional treatment, such as reverse osmosis.

Second, Stockton's water customers are accustomed to and expect a high-quality and wholesome drinking water supply currently delivered by the City.

Increased surface water salinity due to the WaterFix Project would erode that customer confidence and cause economic impacts if current industrial water users were forced to invest in on-site treatment or choose to leave the City for other -- other water service providers that offer better water quality.

Now I'll talk about disinfection byproducts which include bromate -- bromide, bromate and trihalomethanes.

Dr. Bryan testified that there will be no

impact to Stockton from increased bromide levels, yet Dr. Bryan's report showed that average bromide concentrations will be significantly higher than the No-Action Alternative in all scenarios and substantially increase the frequency of concentrations above 200 milligrams per liter at the City's intake.

Stockton implements ozone as a pretreatment step in its treat -- water treatment process to control taste and odors that are found in the Delta water.

When source water bromide concentrations reach 200 milli -- micrograms per liter, Stockton must employ pretreatment processes using chloramines in conjunction with ozones to control bromate formation. This pretreatment process consumes ozone very quickly, which requires an increasing ozone dose in response.

Increase in the ozone dose results in an increase in operating costs as ozone is the most power-consuming process at the Water Treatment Plant.

This will cause the City significant injury by forcing it to employ pretreatment chloramines and incurring hiring operating costs due to increased ozone doses.

Dr. Bryan's testimony that the WaterFix Project will not have an adverse impact on Stockton from bromide or disinfection byproduct precursors ignores the fact

that higher concentrations than predicted will occur at Stockton's drinking water intake and will cause Stockton to incur significant increases in operating costs or the costs to install additional treatment process -- processes or finding alternative water sources.

For total organic carbon, Dr. Bryan also concluded the City would not experience an impact from increased TOC, but this opinion was based on long-term monthly average data, as previously described.

Similar to bromide, rising TOC concentrations would require Stockton to invest in additional treatment process -- processes or alternative water supplies in order to control disinfection byproducts formation from increased TOC.

Dr. Bryan's presentation of model results in the form of long-term averages ignores day-to-day operation and monitoring of Stockton's Drinking Water Treatment Plant and does not provide sufficient information to demonstrate that the California WaterFix Project would not cause injury to Stockton from increases in TOC.

Relative to mi --

(Timer rings.)

WITNESS GRANBERG: Relative to microcystis, it is the likely -- it is likely that even a slight increase

in the harmful algal bloom in microcystis will have an impact on the City as a legal user of water due to the effect of Stockton's ability to treat Delta water with current treatment technologies.

Stockton's use of ozone can break apart algae cells and release toxins which could create an unreasonable health risk to Stockton's drinking water customers unless additional treatment such as Granular Activated Carbon is employed.

Therefore, even a slight increase in HABs or microcystis will injure the City as a legal user of water by increasing the costs and complexity of its water treatment process and potentially rendering the source water unusable at times to avoid a risk to public health.

In conclusion, Stockton's Delta water right is a critical water source that solves many of the City's issues with previous supply sources.

DWR and the Bureau of Reclamation have not proven that the California WaterFix Project will not injure Stockton as a legal user of water.

WaterFix Project jeopardizes its critical surface water supply and erodes Stockton's ability to adequately meet current water supply demand, to meet current and future water quality regulations, and to provide its customers with a safe and high-quality

potable water supply.

Thank you.

MS. TABER: Thank you.

That concludes Stockton's surrebuttal testimony.

CO-HEARING OFFICER DODUC: Thank you.

Cross-examination.

Anyone in addition to the Department of Water Resources?

MR. KEELING: Yes. Tom Keeling on behalf of the San Joaquin County Protestants.

I will have approximately 15 to 20 minutes for Mr. Granberg.

CO-HEARING OFFICER DODUC: Okay. Miss Meserve.

MS. MESERVE: Osha Meserve for LAND.

I will have about 15 minutes as well.

CO-HEARING OFFICER DODUC: All right. And Mr. Mizell, Miss McGinnis, how much time do you anticipate needing?

MR. MIZELL: Tripp Mizell, DWR.

We have approximately 15 minutes for Dr. Paulsen and 45 minutes for Mr. Granberg.

CO-HEARING OFFICER DODUC: All right. Let's do this, then:

Let's focus on Dr. Paulsen first, since I

believe you will be returning to Southern California, while Mr. Granberg is a little bit closer.

So let's focus on cross-examination for Dr. Paulsen, and then we will take a lunch break and, when we return, we'll finish up with Mr. Granberg before we get to whomever it is that's testifying on behalf of DWR on the spreadsheets.

Any concerns?

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

Just a clarification from the Chair:

If I was following the schedule you were just laying out, DWR would come on approximately 1:30, 2 o'clock?

CO-HEARING OFFICER DODUC: That would be a good guess.

MR. ALADJEM: Thank you very much.

CO-HEARING OFFICER DODUC: All right. So I anticipate about 30 minutes of cross-examination in total for Dr. Paulsen and then we'll take our lunch break. We'll return approximately at 1:30-ish or so to finish up with Mr. Granberg, which should be about another hour or so, and then we'll get to the DWR spreadsheet issue.

Please begin for -- begin your cross-examination for Dr. Paulsen.

MR. MIZELL: Thank you.

If we could bring up Stockton Exhibit 49, please.

CO-HEARING OFFICER DODUC: Before you do, I need a clarification from Miss Meserve.

Your 15 minutes, was that directed to Dr. Paulsen or to Mr. Granberg?

MS. MESERVE: Paulsen.

CO-HEARING OFFICER DODUC: Paulsen, all right. So we'll have a little bit longer for Dr. Paulsen before we take the lunch break.

MR. MIZELL: If we could go to Slide 11, please.

(Document displayed on screen.)

MR. MIZELL: So my questions are going to focus exclusively on this chart, and this is the chart of residence times of inflows to the Delta under a dry water year identified as Table 5 that has been incorporated as Table 1 of Stockton's 49, Slide 11.

CROSS-EXAMINATION BY

MR. MIZELL: So, Dr. Paulsen, I was not able to tell from your testimony exactly what the calculations are behind the data presented in this chart.

So if you would humor me, if we could pick a month of your choice, and if you could walk us through

the calculations for each of the columns for that month and explain the calculations that you performed in order to reach those results, I would certainly appreciate it.

WITNESS PAULSEN: Sure.

The detail is provided in Stockton-26, and we described the methodology in Section 4.5, which is on Page 11 of that report.

Specifically what we did is, we assumed a volume of water within the Delta, and then we calculated the total monthly inflows to the Delta and divided the first quantity by the second to get an estimate of the residence time in those months.

MR. MIZELL: Very good.

So can you pick one of these months, and you can walk us through the numbers and the calculations, please.

WITNESS PAULSEN: Sure.

So, if we -- We looked at the row of August. What we calculated was a monthly average residence time for the EBC2 existing scenario of 23.2 days. That would have been the volume of the Delta divided by the mean -- the monthly inflow, mean monthly inflow for that month, and then so on for the other values.

MR. MIZELL: And those -- those values that you divided in order to reach the 23.2 in the EBC2 column

were sourced where?

WITNESS PAULSEN: They're directly from the DSM-2 model files.

MR. MIZELL: The DSM-2 model files?

And so each of these is a Division of the inflow -- I'm sorry. I'm losing it.

Each of these is a division of the total volume of water by the inflow?

WITNESS PAULSEN: Yes.

MR. MIZELL: Each of the columns.

WITNESS PAULSEN: Yes.

MR. MIZELL: Including the percentages?

WITNESS PAULSEN: The percentages look at the change from one value to the next.

(Pause in proceedings.)

MR. MIZELL: And this chart is meant to represent a gross estimate for the entire Delta and not a specific location in the Delta; is that correct?

WITNESS PAULSEN: Yes. It's the residence time -- the estimated residence time of inflows to the Delta for a dry water year type.

MR. MIZELL: And so for this information to be informative, you would have to assume a consistent hydrodynamic circumstance for every location in the Delta; is that correct?

WITNESS PAULSEN: No.

MR. MIZELL: Very well. Let's walk through that.

How would a gross estimate of residence time as calculated in your Table 5 apply to a specific location within the Delta?

WITNESS PAULSEN: It is an estimate for the Delta as a whole.

MR. MIZELL: I understand. I don't think that answers my question.

How would you apply it to a specific location in the Delta?

WITNESS PAULSEN: Well, again, it's not specifically applicable to a specific location. It is an estimate for the Delta as a whole.

(Pause in proceedings.)

MR. MIZELL: So if I were trying to apply the information in your Table 5, it would be inappropriate of me to apply it to a specific location in the Delta; is that correct?

MS. TABER: Objection: I think that incorrectly states her testimony.

CO-HEARING OFFICER DODUC: I'm sorry. I would like to understand that concept, so if Dr. Paulsen could explain.

WITNESS PAULSEN: I'm not sure I understand the concept behind the question.

This is an estimate of residence time for the Delta as a whole, so it's an estimate that we computed using the volume of water within the Delta, which has -- is a volume, divided by the inflow flow rates to the Delta which, as you know, it's a volume per time.

When you divide volume by volume per time, you get an estimate in terms of time, in terms of days, for how long the inflows to the Delta will remain in the Delta before being flushed out.

CO-HEARING OFFICER DODUC: So it's not applicable to any specific point.

WITNESS PAULSEN: It's generally applicable to the Delta as a whole. I would say certainly downstream of the North Delta Diversion Points because we did not include the inflows that were diverted at the North Delta Diversions if that is part of the confusion. I'm not sure.

MR. MIZELL: If it's not applicable to a specific location in the Delta, why would it be applicable to a spot just downstream of the North Delta Diversion Points?

WITNESS PAULSEN: No, that's not what I said.

What I said is that we did not include the

volume of water that is diverted in the North Delta Diversion Points in the estimate of residence time.

MR. MIZELL: Okay. So it's meant to summarize net or gross Delta residence times in a non-Project scenario?

MS. TABER: Objection: I'm not sure -- the question asks for net or gross.

MR. MIZELL: I don't know the answer. I'm an attorney.

WITNESS PAULSEN: Could you repeat the question?

MR. MIZELL: Certainly.

I'm trying to understand the importance of the last statement you made regarding the fact that you did not remove the inflows at the North Delta.

So --

WITNESS PAULSEN: No, no, no, we did. Apologies.

For the EBC2 and NAA scenarios, there are no diversions at the North Delta locations, obviously, because those are not Project scenarios.

So those calculated residence time using all of the inflows to the Delta, including the total inflow from the Sacramento River.

For the other scenarios, where water is

diverted at the North Delta Diversion locations, we subtracted the volume of water -- the flow rate of water that's diverted at those locations from the Delta in -- Sacramento River flowing into the Delta upstream because that's water that's diverted at the North Delta locations and will not enter the Central Delta.

MR. MIZELL: Excellent. Thank you for the clarification.

And so if this is a -- and I'll try and get my terms here -- gross estimate of residence times for the entire Delta, it is not necessarily applicable to the San Joaquin River from the stretch of Vernalis to Old River -- Head of Old River; is that correct?

WITNESS PAULSEN: I don't understand that question.

MR. MIZELL: Again, I'm going back to whether or not I can take the data in your Table 5 and use it for locations within the Delta.

WITNESS PAULSEN: This estimate would be generally applicable to the Delta as a whole.

If I were to calculate residence time for . . . That stretch would be a little bit less influenced by tidal action. That I might think about differently.

But I think of this as a general estimate that is valid generally throughout the Central and the South

Delta.

MR. MIZELL: And if it cannot be used to look at a specific location, how is it generally applicable to locations in the Delta?

WITNESS PAULSEN: Again, I believe that this estimate is generally applicable throughout the Central and the South Delta.

There are other methods for computing residence time. To my knowledge, DWR hasn't used them to evaluate the residence time impacts of this Project, so we performed a -- an analysis, as I described, to estimate how the residence time would change in the future.

MR. MIZELL: So you would agree that residence times in the Delta would vary by location given the complexity of the Delta estuary.

WITNESS PAULSEN: They will vary somewhat, but I continue to believe that this is an accurate representation, or at least an accurate estimate of how residence times will change from one scenario to another.

MR. MIZELL: That concludes my cross-examination.

CO-HEARING OFFICER DODUC: Thank you.

Miss Meserve, Mr. Keeling, let me make sure I'm correct.

Your cross-examination is for Mr. Granberg.

MR. KEELING: That is correct.

CO-HEARING OFFICER DODUC: All right. So Miss Meserve has about 15 minutes of cross-examination for Dr. Paulsen.

MS. MESERVE: Good morning -- Or good afternoon. Osha Meserve for LAND, et al.

I have a couple of questions for Dr. Paulsen about the representative water quality issue for Stockton, as well as the chloride conversion, and a couple of questions about the HABs portion of her testimony on velocity and temperature.

CROSS-EXAMINATION BY

MS. MESERVE: For this first question, it would be helpful, I think, to look at the Nader-Tehrani, which has a visual in it, on DWR-932, Page 9, if that could be done.

Thank you.

(Document displayed on screen.)

MS. MESERVE: It's -- This is -- Dr. Paulsen, in your surrebuttal report on Pages 10 through 13, you addressed the assertion that water quality at Prisoner's Point is representative of water quality at Stockton's intake.

And you discuss how Prisoner's Point -- neither Prisoner's Point or Buckley Cove is representative for

the City's intake. And you include fingerprints, which has come up earlier, in your appendix for the Prisoner's Point but not Buckley Cove.

Now, this figure here -- Maybe if you zoomed out a little bit. It's hard to see on the screen.

So 16 -- Is it correct, Dr. Paulsen, that 16 is Prisoner's Point and 17 is Buckley Cove?

WITNESS PAULSEN: Yes. Roughly, yes.

MS. MESERVE: Okay. Why is the water at City -- the City's intake not well represented by the fingerprinting from Buckley Cove?

WITNESS PAULSEN: Buckley Cove is located closer to the point where the San Joaquin River enters the Delta, and water at Buckley Cove is comprised mostly of San Joaquin River water. And we showed that in detail -- And I forgot the exhibit number, but in the rebuttal testimony.

The chloride concentration there is also different. So both the source composition and the salinity of water at Buckley Cove is different from what we see at the City of Stockton's intake location.

MS. MESERVE: And are there any sources of water to Stockton that you -- to Stockton's intake or to Buckley Cove that you omitted from your fingerprinting analysis?

WITNESS PAULSEN: Oh, this may get to questions that were asked earlier.

The fingerprinting included Sacramento River, San Joaquin River, east side streams, Martinez and at Greenwich.

In the report, we didn't show the east side streams but they were included in, you know, the DSM-2 model runs conducted by DWR and by us. So they weren't depicted but they were shown.

And if it helps to clarify, too: After that testimony, we went back and double-checked our results, and we're confident that the remainder that isn't shown was from the east side streams.

MS. MESERVE: And so would that -- So this omission doesn't impact your water quality comparisons, then?

WITNESS PAULSEN: No. No. It's just that we didn't show it in the plots. It was fully present in the modeling.

MS. MESERVE: Thank you.

Now, in Section 2.4 of your surrebuttal report, Stockton-48, you discussed the EC-to-chloride conversion equations, and that came up a bit earlier.

Can you clarify what your decision-making was for choosing the specific conversion equation for

Stockton's intake?

WITNESS PAULSEN: Yeah. We looked at the results in the Guivetchi memo which were for those various locations, and we looked at the compositional water at the different locations, and concluded that Station 16 was the station that was nearest Stockton's intake in terms of the water composition there. It's not a perfect match but it's closer than any of the other equations that we found in Guivetchi.

MS. MESERVE: Now, with respect to your HABs discussion in 5.3 of Stockton-48, you discuss velocity.

Do you have any -- As a person experienced with Delta hydrodynamic modeling, do you have any reason to believe that the modeling for the CWF scenarios might underestimate velocity?

WITNESS PAULSEN: Velocity at Stockton's intake?

MS. MESERVE: As an example, sure.

WITNESS PAULSEN: There's been a fairly extensive calibration exercise for DSM-2, and part of that, as I recall -- I don't remember all the exact locations where they conducted the calibration, but part of that was comparing measured quantities to modeled quantities, and the model captures velocity reasonably well.

Is that responsive? I'm not sure --

MS. MESERVE: Yes.

WITNESS PAULSEN: -- exactly where you're going.

MS. MESERVE: I was curious about Stockton's intake.

For Stockton's intake, that wasn't part of the velocity information presented that you were concerned with, it sounds like.

WITNESS PAULSEN: Oh, no. I think that the DSM-2 model probably does quite a good job of simulating velocity.

I was more concerned with the way in which DWR presented that velocity information in DWR-652 and 653. So, they did a cumulative probability diagram, two different kinds. One was based on the daily maximum velocity that was simulated; and the other, I believe, took the absolute value of all of the 15-minute velocity output from the model, took the absolute values to convert the multiposited values and entered a probability distribution on those.

So, the point I was trying to make -- And I'm sorry if I wasn't clear. The point I was trying to make is not that we don't trust the model results of velocity. We do.

It was, rather, that the way in which DWR took those data and depicted them in the plots and used them as the basis for their conclusions didn't fully consider the sloshing nature of the flows, or the net flow, and flushing, and residence times that occur in that part of the Delta, or in the Delta as a whole.

MS. MESERVE: Now, with respect to temperature model -- temperature.

You noted in your testimony, Stockton-48, that there was no temperature modeling for other scenarios besides the proposed action and the No-Action Alternative.

Could you explain what it is about the B1 scenario that -- if you think that would have a greater impact on Stockton's temperature at the intake.

WITNESS PAULSEN: The Boundary 1 scenario in general will result in the export of more water from the Delta, I believe, than all the other scenarios, certainly than the others that were presented here in the WaterFix proceeding. That has the impact of increasing residence times. We looked at that.

And the concern is that if water is present in the Delta for longer and subject to heating and staying present -- staying in the Delta for longer, that the temperature increases may be higher for that scenario

than they would be for other scenarios.

MS. MESERVE: Just now, you said -- you referenced other scenarios than were presented here.

Isn't it true, Dr. Paulsen, that the Petitioners are requesting a permit here from the Board that would allow for operations under Boundary 1?

WITNESS PAULSEN: We've reviewed that testimony in detail. That's my understanding.

MS. MESERVE: Thank you.

And just -- So it sounds like you do have a concern regarding Boundary 1, but do you also have a concern about temperature with respect to Alternative 4A and the increase in formation of harmful algal blooms?

CO-HEARING OFFICER DODUC: Hold on a second.

Mr. Mizell.

MR. MIZELL: Yes. I'm going to object as to further explanations about other scenarios under 4A as being beyond the scope of her surrebuttal testimony, although I'm willing to allow her to show us where she may have addressed that and I will withdraw my objection.

CO-HEARING OFFICER DODUC: How generous of you, Mr. Mizell.

Miss Meserve.

(Pause in proceedings.)

MS. MESERVE: On temperature . . .

So, let me understand the nature of the objection.

I guess -- It looks like Dr. Paulsen's testimony on Page 37 and 38 is discussing the results that were provided in the BA which were for the EAA and the NAA. So I'm simply -- And a lot of her other testimony goes into concerns she had about B1. So she already answered my question on that.

And then I believe the question I just asked is actually about Alternative 4A, which is definitely the subject matter of Pages 37 and 38.

CO-HEARING OFFICER DODUC: I see that.

So, Mr. Mizell, are you withdrawing your objection?

MR. MIZELL: And I believe in response to some questions we asked, she indicated that she was only focusing on Boundary 1 so --

WITNESS PAULSEN: No.

CO-HEARING OFFICER DODUC: No. She mentioned both.

So, overruled.

Miss Meserve, proceed.

MS. MESERVE: Okay. So it's a relatively -- I'll just reask the question, if that would be helpful.

WITNESS PAULSEN: Thank you.

MS. MESERVE: Sorry.

Dr. Paulsen, you've explained how you would be concerned about -- why you would also be concerned about B1 though you weren't able to see outputs for that for temperature.

But you are also concerned, just to clarify, about the 4A alternative that you saw temperature output for; is that correct?

WITNESS PAULSEN: Yes. We've included a couple of quotes on Page 38 that are from DWR-653 where they characterize -- where DWR-653 characterizes increase in the long-term average monthly mean temperatures for some circumstances for the preferred alternative, or the PA -- I always forget what that stands for -- relative to the NAA.

MS. MESERVE: Right. And -- And, in your experience, temperature is one of the factors leading to increased algal blooms; correct?

WITNESS PAULSEN: Yeah. The literature is very clear on that, both for the Delta and for other systems.

MS. MESERVE: Thank you.

No further questions.

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

Any redirect, Miss Taber?

MS. MESERVE: None.

CO-HEARING OFFICER DODUC: Thank you, Dr. Paulsen.

(Witness Paulsen excused.)

CO-HEARING OFFICER DODUC: We will take our lunch break.

We will return at 1:30 for the Department of Water Resources and Mr. Keeling's cross-examination of Mr. Granberg.

(Luncheon recess was taken at 12:31 p.m.)

Thursday, June 22, 2017 1:30 p.m.

PROCEEDINGS

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CO-HEARING OFFICER DODUC: It is 1:30. We are back in session.

I was about to waive DWR's cross-examination but here they come.

MS. TABER: While they're setting up, may I ask a procedural question?

CO-HEARING OFFICER DODUC: Please.

MS. TABER: It's been a couple of -- well, a month and a half maybe since we've had an update from Petitioners on the status of the EIR certification and the Biological Opinions. And, as I recall, the most recent representation was they expected the EIR to be certified June 23rd, and so I wonder if DWR will be able to give an update today on the schedule.

CO-HEARING OFFICER DODUC: Let's do that tomorrow at the start of our session.

MS. TABER: Thank you.

CO-HEARING OFFICER DODUC: Mr. Mizell, you got that request?

MR. MIZELL: (Nodding head.)

CO-HEARING OFFICER DODUC: All right. Since DWR made it back in time, barely, they will now begin

their cross-examination of Mr. Granberg.

CROSS-EXAMINATION BY

MS. McGINNIS: Good afternoon, Mr. Granberg. I hope you had a nice lunch.

WITNESS GRANBERG: Yes, I did. Thank you.

MS. McGINNIS: Great. So I'm just going to go over a few items from your surrebuttal.

First is a question about a reference you had, and I want to talk about EC levels and MCLs and then some of your information you provided about pretreatment -- pretreatment processes.

So, in your testimony, you reference the 1998 report from the California Urban Water Agencies; correct?

WITNESS GRANBERG: Yes.

MS. McGINNIS: And, to your knowledge, were the changes proposed in the 1998 report implemented?

WITNESS GRANBERG: I do not know that.

MS. McGINNIS: Okay. And are you aware of any pending regulations by the State Board's Division of Drinking Water or U.S. EPA that will implement the standards that were proposed in the 1998 report?

WITNESS GRANBERG: No, I'm not aware.

MS. McGINNIS: Okay. So, going to your testimony, which is Stockton-39, and then on Page 9.

(Document displayed on screen.)

MS. McGINNIS: Lines 20 to 24.

(Document displayed on screen.)

MS. McGINNIS: Right there.

So, the sentence begins, "the 1998 . . . Water Quality Evaluation referenced" by Dr. Bryan. I'm paraphrasing obviously.

So it says the (reading):

". . . Report concluded less than 3 milligrams per liter of total organic carbon would be necessary to allow water users the flexibility to incorporate either enhanced coagulation or ozone disinfection to meet the potential long-term regulatory scenario for the treatment of Delta source water."

So that potential long-term regulatory scenario, do you know if that was implemented?

WITNESS GRANBERG: I'm trying to think if this has to do with the enhanced -- I'm sorry -- the . . . source water treatment removal, if I'm not mistaken. I can't quote the -- the exact citing of that but I think that's what it has to do with, when the total trihalomethanes and HA5s were reduced to a lower level, so more difficult for treatment plants to achieve compliance.

MS. McGINNIS: Okay. So were those changes implemented?

WITNESS GRANBERG: Yes, they were.
MS. McGINNIS: Okay. Is Stockton's NPDES compliance for electrical conductivity based on a Calendar Year annual average?
WITNESS GRANBERG: Yes, it is.
MS. McGINNIS: Okay. And in your testimony, on Page 5 --
(Document displayed on screen.)
MS. McGINNIS: -- at the very bottom, Line 27, you note that (reading):
"The recommended level for specific conductance for drinking water is 900 microsiemens per centimeter."
Correct?
WITNESS GRANBERG: Yes.
MS. McGINNIS: And then on the next page, on Line 3, you mention the 1600 microsiemens per centimeter maximum; correct.
WITNESS GRANBERG: That's what it says, yes.
MS. McGINNIS: Okay. And then I understand those figures come from California Code of Regulations Title 22, Section 64449; correct.
WITNESS GRANBERG: That sounds correct.
MS. McGINNIS: Okay. So I'm going to give you DWR-960.

(Document displayed on screen.)

MS. McGINNIS: So does this look like Title 22 California Code of Regulations Section 64449 to you?

WITNESS GRANBERG: Yes, it does.

MS. McGINNIS: Okay. So on Page 2 of DWR-960, it's the -- it shows the -- Actually, the Title for the table is on Page 1, but on Page 2, it says the recommended MCL for specific conductance is 900; correct?

WITNESS GRANBERG: Correct.

MS. McGINNIS: And the upper secondary maximum -- sorry -- Up -- The secondary MCL for specific conductance is 1600; correct?

WITNESS GRANBERG: Correct.

MS. McGINNIS: And on the line below specific conductance, it shows chloride in milligrams per liter; correct?

WITNESS GRANBERG: Correct.

MS. McGINNIS: So are these equivalent levels of salinity, the 900 microsiemens per centimeter and the 250 milligrams per liter?

WITNESS GRANBERG: As it -- As it says so on this table.

MS. McGINNIS: Okay.

WITNESS GRANBERG: That's -- That's what I would go off of, yes.

MS. McGINNIS: And I assume that's the same with the 600 microsiemens per centimeter and the 500 milligrams per liter.

WITNESS GRANBERG: I would assume. It uses the same conversion, yes.

MS. McGINNIS: Okay. Thank you.

So, Dr. Paulsen's testimony showed that daily averages for chloride for Alt 4A don't exceed 125 milligrams per liter daily average in dry years; is that right?

WITNESS GRANBERG: I assume so. I don't recall that.

MS. McGINNIS: Okay.

WITNESS GRANBERG: If that was in her testimony . . .

MS. TABER: Well, if you can answer, if you know.

WITNESS GRANBERG: I assume so, yes.

MS. McGINNIS: Okay. So if we could go to Stockton-26.

(Document displayed on screen.)

MS. McGINNIS: At .pdf Page 45, that Figure 10.

(Document displayed on screen.)

MS. McGINNIS: It shows chloride concentrations at Stockton's intake in dry years, and they're daily

averages. I believe that's what the title across the top means, daily averages.

So the various lines here are the different scenarios she analyzed. And I'm wondering, did any of the scenarios here go above 150 milligrams per liter?

WITNESS GRANBERG: No. Boundary 2 gets very close --

MS. McGINNIS: Agreed.

WITNESS GRANBERG: -- in February.

MS. McGINNIS: Okay. Thank you.

WITNESS GRANBERG: Um-hmm.

MS. McGINNIS: So, also in your testimony, you stated that (reading):

"If concentrations of bromide in the City's source water exceed 200 micrograms per liter, Stockton would not be able to use water under its existing ozonation pretreatment process to control taste and odor compounds."

Correct?

WITNESS GRANBERG: Correct.

MS. McGINNIS: But you also state in your testimony that (reading):

"When bromide concentrations reach 200 micrograms per liter, the City must employ a pretreatment process using chloramines in

conjunction with ozone."

WITNESS GRANBERG: Correct.

MS. McGINNIS: Correct?

So does that mean the City of Stockton already treats water with ozone factors of 200 micrograms per liter?

WITNESS GRANBERG: I believe so. I don't have the plant data in front of me.

MS. McGINNIS: So, your testimony that, "When bromide concentrations reach 200 micrograms per liter, the City must employ a pretreatment process using chloramines in conjunction" --

Oh, sorry. That's chloramines.

Yeah. I think I've got my constituents mixed up.

No, no. Sorry. Scratch that. Let me start over.

So your testimony where it says, "When bromide concentrations reach 200 micrograms per liter, the City must employ a pretreatment process using chloramines in conjunction with ozone," is that just reflecting the capability of the treatment plant, then?

WITNESS GRANBERG: Yes.

MS. McGINNIS: Okay. Thank you.

Okay. Also in your testimony, you state that

(reading):

"In the recent drought, Stockton experienced dissolved organic carbon volumes in the 5 to 11 milligrams per liter range."

Is that right?

WITNESS GRANBERG: Yes.

MS. McGINNIS: And you discussed Dr. Bryan's testimony that shows the current dissolved organic carbon range is 3.4-4.8 milligrams per liter; is that right?

WITNESS GRANBERG: Yes, I see that, um-hmm.

MS. McGINNIS: Okay. So will the City need to invest in additional treatment processes since you have treated Delta water with higher dissolved organic carbon than the current average range?

WITNESS GRANBERG: Yes. If we see that consistently, yes, we would either have to find other sources of water or -- and shut down the intake or add additional treatment.

MS. McGINNIS: Okay. And did Stockton provide any evidence of the Project's -- Or did you provide any evidence of the Project increasing those concentrations?

WITNESS GRANBERG: I believe it's in Dr. Paulsen's report, but I --

MS. McGINNIS: Okay.

WITNESS GRANBERG: Again, I don't have that in

front of me.

MS. McGINNIS: That's good.

And, actually, that is the end of my questions. Thank you.

CO-HEARING OFFICER DODUC: Thank you.

Mr. Keeling.

(Pause in proceedings.)

CO-HEARING OFFICER DODUC: Before you begin, Mr. Keeling.

Mr. Ruiz.

MR. RUIZ: Yes. Good afternoon. Dean Ruiz with South Delta Water parties.

I just want to ask a question.

This moved quicker than I thought, but I have --

CO-HEARING OFFICER DODUC: So did I.

(Laughter.)

MR. RUIZ: I have Mr. Burke en route. He'll be here shortly. I know we've got a little -- some more time with this and then East Bay MUD's.

After Mr. Burke, I could have, if need be, Dr. Leinfelder-Miles and Terry Prichard.

Do you think that we'll be getting to them? Should I --

CO-HEARING OFFICER DODUC: Well, let me ask.

In addition to Miss Spaletta, who else wished to ask questions of DWR's spreadsheet witness?

No one else. So just Miss Spaletta.

How much time do you anticipate you need, Miss Spaletta?

MS. SPALETTA: 30 minutes to an hour, hopefully closer to 30.

CO-HEARING OFFICER DODUC: Okay. So, then, Mr. Bray. Is Mr. Bray here for EBMUD?

(Pause in proceedings.)

CO-HEARING OFFICER DODUC: Mr. Burke is on his way.

MR. RUIZ: He is.

CO-HEARING OFFICER DODUC: And next I have . . .

I really don't want to get started on them.

Let us stop with Mr. Bray and Mr. Burke for the day.

MR. RUIZ: Okay. Thank you very much for that.

CO-HEARING OFFICER DODUC: Mr. Keeling.

MR. KEELING: Good afternoon. Tom Keeling for the San Joaquin County Protestants.

CROSS-EXAMINATION BY

MR. KEELING: Good afternoon, Mr. Granberg.

WITNESS GRANBERG: Good afternoon.

MR. KEELING: I have just a few questions about water treatment facility operations and operational variations in response to water quality changes, operational time scales, and water quality monitoring, as well as the responses to changes in the -- or increases in certain constituents all referenced in surrebuttal.

CO-HEARING OFFICER DODUC: Okay.

MR. KEELING: Mr. Granberg, in your surrebuttal testimony, you described various treatment processes used by the City of Stockton at its Drinking Water Treatment Plant, and you stated that the City's water treatment facilities were designed and operated based on the salinity levels that had been typical at Stockton's intake.

And I'd like to ask you a couple questions about that.

Did the City rely on long-term average water quality data in designing the plant?

WITNESS GRANBERG: Yes, we did.

MR. KEELING: Am I correct in understanding that not all Water Treatment Plants operate in the same fashion?

WITNESS GRANBERG: Generally, they do, but treatment plants vary on the unit processes that they -- that they incorporate into that overall Treatment Plan,

so -- But generally it's -- it's -- You want to separate the solids and then disinfect the water before we put it out in the distribution system.

MR. KEELING: Those are objectives, but are there different types of treatment plants?

WITNESS GRANBERG: Yes, there are.

MR. KEELING: Does the type of treatment plant make a difference in how the City operates, or how it might operate in response to changing source water quality conditions?

WITNESS GRANBERG: Yes.

MR. KEELING: Can you expatiate on that?

WITNESS GRANBERG: Well, it's dependent upon the water quality, which we monitor real-time. We can make immediate changes in the process.

For instance, adding -- you know, changing the chemical dosage to respond to, you know, whatever we're trying to remove from the water. That's typically the day-to-day operation of the Water Treatment Plant, is, making those real-time changes in your, for instance, chemical dosage to respond to that incoming water quality to achieve an outgoing water quality that meets regulatory standards.

MR. KEELING: Thank you.

What kind of Drinking Water Treatment Plant

does Stockton use for the Delta water intake?

WITNESS GRANBERG: Sure. It's a -- It's a T5 plant, which is the highest level of certification for a treatment plant that's permitted through the State. It implements preozonation, flocculation, sedimentation, membrane filtration, and then disinfection using chlorine and additional chloramines for residual disinfection in the distribution system.

MR. KEELING: Does the City divert directly to the treatment plant?

WITNESS GRANBERG: Yes, it does.

MR. KEELING: On what time scale is a T5 Water Treatment Plant operated? And by that, I mean, is it monthly? Hourly? Daily?

WITNESS GRANBERG: It's -- It's operated 24/7/365 full-time operation with Certified Operators, certified through the State.

And, again, they're responding to water quality changes in real-time because that's the -- the level of monitoring that we employ in the Water Treatment Plant itself.

MR. KEELING: So measurements in a larger increment, say, daily, wouldn't be of much use to you in that operation?

WITNESS GRANBERG: It would if we see trends

going -- you know, worsening over time. Then we have essentially time to make those decisions, but -- And we're monitoring that real-time so we can see that trend. We monitor trends through our -- what we call SCADA System, and we can track and monitor those trends over time.

MR. KEELING: What was the name of the data system?

WITNESS GRANBERG: SCADA. It's Supervisory Control and Data Acquisition System.

MR. KEELING: How often is the water quality at Stockton's Delta water intake monitored?

WITNESS GRANBERG: For some constituents, it's monitored real-time; for instance, pH, EC, temperature. Those are direct analyzers at the intake itself. Through the treatment process, there are other parameters that we're monitoring. And then the Operators take daily -- they do daily testing to optimize the chemical dosage through the treatment process.

MR. KEELING: Do you also conduct quarterly water quality monitoring of the water that is delivered to customers?

WITNESS GRANBERG: We do, yeah. We're required by State and Federal regulations -- drinking water regulations to do a number of -- take a number of samples

for analysis.

MR. KEELING: Is quarterly water quality monitoring for secondary contaminants sufficient to maintain water quality for Stockton's customer base?

WITNESS GRANBERG: Sufficient to meet the regulations, but it's not sufficient for a utility that's supplying the water, because we have a customer base that we're, you know, supplying and serving, and we're watching that water quality more frequently so that we can ensure that the water we deliver is consistent with, you know, our objectives.

MR. KEELING: What happens if quarterly water quality monitoring shows a trend of repeated exceedances of regulatory thresholds?

WITNESS GRANBERG: If they're primary drinking water standards, then if we exceed the -- the regulations, then we have to put out a notice to our customers.

If they're secondary standards, we would inform our customers of a change in the water quality, but it's -- it's not a regulatory requirement.

MR. KEELING: Well, if a very high concentration of chloride or other constituent came into the City's intake, how long would it take for your customers to notice a difference in water quality?

WITNESS GRANBERG: Oh. Because we divert directly through the treatment plant and into the distribution system, I would say less than 24 hours, the customer would receive that water that was diverted from the river.

MR. KEELING: Could I have Exhibit Stockton-039 up, Page 8, starting at Line 6.

(Document displayed on screen.)

MR. KEELING: Mr. Granberg, if you'd take a look at that sentence beginning at Line 6 of Stockton-039, which is your testimony. It discusses MIB and geosim.

Is that how you pronounce it?

WITNESS GRANBERG: Right.

MR. KEELING: Geosim.

WITNESS GRANBERG: Geosim.

MR. KEELING: In this testimony, you mention MIB and geosim as compounds that affect the taste and odor of treated water.

Are these constituents common?

WITNESS GRANBERG: Yes, they are.

MR. KEELING: What does Stockton's Water Treatment Plant do to treat these?

WITNESS GRANBERG: Well, we implement ozonation as a pretreatment prior to flocculation, sedimentation,

and it will neutralize those compounds so that they're not carry through to the distribution system.

MR. KEELING: You recall that you testified for the City of Stockton in its -- I believe its direct case in chief sometime ago. I think that's right.

Since that time and now, how many times has DWR contacted you to learn more about the operations of the Water Treatment Plant at Stockton?

WITNESS GRANBERG: I've never been contacted by DWR either before or after my testimony.

MR. KEELING: I think that's all.

CO-HEARING OFFICER DODUC: Mr. Mizell is about to object to that.

MR. MIZELL: Yes. I'd like to object to that as beyond his surrebuttal testimony; ask that it be stricken.

CO-HEARING OFFICER DODUC: Sustained.

MR. KEELING: Thank you very much.

WITNESS GRANBERG: You're welcome.

CO-HEARING OFFICER DODUC: Any redirect, Miss Taber?

MS. TABER: None.

CO-HEARING OFFICER DODUC: All right. Thank you, Mr. Granberg.

(Witness excused.)

CO-HEARING OFFICER DODUC: At this time, Miss Taber, do you wish to move the City of Stockton's surrebuttal exhibits?

And I emphasize that because there are some outstanding objections to your cross-examination exhibits that was used, and at this time we're not accepting cross-examination exhibits, anyway.

So please move your surrebuttal exhibits.

MS. TABER: Thank you.

Yes, I would like to move into evidence Stockton's Exhibits 39 through 50 as identified on the City's Exhibit Identification Index we filed on June 9th.

We do have an updated one that we provided to the Hearing Team in association with the opposition to the motion to strike, but those exhibits I referenced are not part of that motion or cross-examination issues.

CO-HEARING OFFICER DODUC: Thank you.

So since you brought it up, let's go ahead and address it and get it in the record right now.

In conducting your cross-examination and . . . you made references to Stockton-41, 43 and 44, which then were objected to, but those exhibits are actually 51, 52 and 53; correct?

MS. TABER: I believe the objection was only to the exhibits that were the EcoRestore documents, so not

all three of the cross-examination exhibits of the City's were subject to the objection, as I recall the hearing.

The other one was a page from the -- The one I refer to as Document 51 was the Final EIR/EIS.

CO-HEARING OFFICER DODUC: We're looking at it right now, and so 51, 52, 53 are up there.

Could I get a clarification, Mr. Mizell? I understood you to object to 41, 43 and 44, which are now 51, 52 and 53.

MR. MIZELL: So, the basis of our objection was going into projects other than the Project Petition before the Board for the purpose of exploring the subject of habitat restoration.

If the Final EIR/EIS citation contained in --

I believe you said, 50 . . .

CO-HEARING OFFICER DODUC: 51.

MR. MIZELL: -- 51 is unrelated to the line of questioning on habitat restoration, then I'd be happy to file something removing that from the objection.

But when I went through the transcript, it was my understanding that those exhibits were used in the objectionable line of questioning and so I was objecting to their use at that time.

CO-HEARING OFFICER DODUC: All right. I just want to get into the record, we're not moving those

exhibits in today, so you have some time to address that with Mr. Mizell.

MS. TABER: Thank you.

CO-HEARING OFFICER DODUC: And at this time, though, we will accept into the record your Exhibits . . .

Help me out.

MS. TABER: 39 through 50.

CO-HEARING OFFICER DODUC: 39 through 50.

MS. TABER: Thank you.

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

(City of Stockton's Exhibits 39 - 50 received into the record)

CO-HEARING OFFICER DODUC: All right. Thank you, Mr. Granberg.

(Witness excused.)

CO-HEARING OFFICER DODUC: Now we are turning to Mr. Mizell and Miss McGinnis and I only have Miss Spaletta conducting questioning of this witness.

Let's begin with you, Mr. Mizell or Miss McGinnis, to identify your witness. I need to administer the oath.

MR. MIZELL: Yes.

CO-HEARING OFFICER DODUC: And then he needs to

validate whatever was submitted.

MR. MIZELL: Okay.

CO-HEARING OFFICER DODUC: Yes.

MR. MIZELL: This is Mr. Aaron Miller.

CO-HEARING OFFICER DODUC: Miller.

MR. MIZELL: Yes. And he works with Mr. Leahigh in the operations component of the Department of Water Resources.

And, yes, he does need to take the oath.

CO-HEARING OFFICER DODUC: All right. Mr. Miller, if you would please stand and raise your right hand.

AARON MILLER,

called as witness for the Petitioners, having been duly sworn, was examined and testified as follows:

CO-HEARING OFFICER DODUC: Thank you. Be seated.

And as someone who tried to play with your spreadsheet, let me express my great admiration. It even boggled my mind, in a good way.

MR. MIZELL: I suppose the first question is whether or not Mr. Hunt and Mr. Long have the spreadsheets to reference this afternoon. If not, I have a USB drive that contains them.

CO-HEARING OFFICER DODUC: It took my computer

quite a while to open it. State-issued computer, I want to emphasize.

(Document displayed on screen.)

MR. MIZELL: So one aspect of these two spreadsheets that Miss Spaletta and I have not yet coordinated on is what do we call them when referring to them today.

And I would make the suggestion now that we refer to one as the Piechart Spreadsheet, because I believe that's in the title, and the other, Historical Use Spreadsheet because I also believe that is in the title. Let's see.

CO-HEARING OFFICER DODUC: And so which one is it that we're looking at here?

WITNESS GRANBERG: This is the piechart one.

CO-HEARING OFFICER DODUC: Okay. And the other one is the historical.

MS. SPALETTA: For the record, this is Jennifer Spaletta representing San Joaquin parties and North San Joaquin Water Conservation District.

I think it would be appropriate to go ahead and give these spreadsheets an exhibit number and title, if that's okay with the Hearing Officers.

CO-HEARING OFFICER DODUC: Any objection, Mr. Mizell?

MR. MIZELL: None.

CO-HEARING OFFICER DODUC: Then let's go ahead and do that.

MS. SPALETTA: I think that we ended somewhere in the 200 and teens for San Joaquin County, so why don't we label this first exhibit, which is the Excel spreadsheet that was produced on June 16th, we'll call that San Joaquin -- SJC-220.

CO-HEARING OFFICER DODUC: That would be the piechart.

MS. SPALETTA: Yes.

MR. MIZELL: (Nodding head.)

CO-HEARING OFFICER DODUC: 220.

(County of San Joaquin, San Joaquin County Flood Control and Water Conservation District, and Mokelumne River Water and Power Authority's Exhibits 220 & 221 marked for identification)

MS. SPALETTA: And just to be clear for the record, that is the Excel spreadsheet that supports DWR Exhibits 903, 904 and 905.

Correct, Mr. Mizell?

MR. MIZELL: That's correct.

MS. SPALETTA: And then the second spreadsheet

that was produced on June 20th will be Exhibit SJC-221, and that is the DWR spreadsheet regarding historic use that supports DWR Exhibit 906.

Is that correct?

MR. MIZELL: That's correct.

CO-HEARING OFFICER DODUC: All right. Mr. Mizell.

MR. MIZELL: Thank you.

So it's our understanding that we're here producing Mr. Miller to speak to the data that sits behind the exhibits that were generated by Mr. Leahigh for his testimony, Exhibits DWR-903 through 906, and that was the extent of what we were here to talk about.

These spreadsheets were produced for that purpose and Mr. Miller can speak to these spreadsheets. And I'll have him authenticate the spreadsheets now.

CO-HEARING OFFICER DODUC: Thank you.

WITNESS MILLER: Okay. I was wondering if we could take a look at Bar Chart -- Sheet Bar Chart A Export. I'm having trouble actually reading those but I think that one right there is.

CO-HEARING OFFICER DODUC: You need to speak into the microphone and perhaps slow down a little bit for the court reporter.

WITNESS MILLER: I apologize.

DIRECT EXAMINATION BY

MR. MIZELL: Mr. Miller, if you could, please, first start out by simply describing whether or not you created the spreadsheets and if they were utilized for the creation of DWR Exhibits 903 through 906.

WITNESS MILLER: Okay. I worked with staff in our office to create -- I think it's now SJC-220. That's this one; right?

MS. SPALETTA: (Nodding head.)

WITNESS MILLER: And we initially built this spreadsheet to create Exhibit 8 -- DWR-850 and 851, and those should be in these orange tabs. So it would be the tab to the right of this one.

(Document displayed on screen.)

WITNESS MILLER: So this is the Exhibit DWR-850.

MS. SPALETTA: For the record, can you please state the name of the tab that relates to DWR Exhibit 850?

WITNESS MILLER: Yes. It's Bar Chart Export Water Volume, and this is consistent with DWR-850.

If we can take a look at Bar Chart Volume. That would be two tabs to the --

(Document displayed on screen.)

WITNESS MILLER: There we go.

And this would be the ones -- This would be what DWR-851 was -- oh, sorry -- created. So this does look like the right spreadsheet.

I guess that was the question; right?

MR. MIZELL: To be clear, Mr. Miller, we're here to discuss the data behind DWR Exhibits 903, 904, 905 and 906.

Can you explain which portions of the spreadsheets relate to those exhibits specifically, please.

WITNESS MILLER: So, DWR-903 would be the tab all the way to the left, and it would be Data 2011.

(Document displayed on screen.)

WITNESS MILLER: DWR-904 would be Data 2012.

(Document displayed on screen.)

WITNESS MILLER: And DWR-905 would be Data 2015.

(Document displayed on screen.)

MR. MIZELL: Thank you.

Can we now turn to SJC-221, the Historic Use Spreadsheet.

(Document displayed on screen.)

MR. MIZELL: And, Mr. Miller, can you explain how this relates to DWR Exhibit 906.

WITNESS MILLER: Yeah. This -- This table was

created into a .pdf which became DWR-906.

MR. MIZELL: And the tab you're referring to is Sum-4-Chart 3?

WITNESS MILLER: That's correct.

CO-HEARING OFFICER DODUC: All right. Miss Spaletta, your turn.

MS. SPALETTA: Great. Thank you.

CROSS-EXAMINATION BY

MS. SPALETTA: Let's go back to the first spreadsheets, SJC-220.

(Document displayed on screen.)

MS. SPALETTA: And my purpose today is just to understand how you put these various tabs together that ended up resulting in the exhibits that you just described.

WITNESS MILLER: (Nodding head.)

MS. SPALETTA: So I did spend some time with these spreadsheets, and I'm hoping I can make this shorter by telling you what I understand. You tell me if I'm correct, and then it would maybe go a little bit faster.

So what I understood about this spreadsheet was that the three tabs that are labeled Data'11, Data'12 and Data'15 contain essentially raw data and all of the other tabs contain some manipulation or post-processing of that

raw data; is that correct?

WITNESS MILLER: The -- Right. The Data apostrophe some number would be where the raw data is, and then it's further processed from there.

MS. SPALETTA: Okay. So let's go ahead and start, then, with the first tab, which is Data'11. And I'm just going to ask you some questions to figure out where this data came from.

So we'll start with Column A, and that's simply the date; correct?

WITNESS MILLER: Correct.

MS. SPALETTA: And then the next column is "FRSA." And Mr. Leahigh testified that that was Feather River Service Area.

Is that your understanding as well?

WITNESS MILLER: Feather River Services Area. Is that -- or Service.

MS. SPALETTA: Is that correct?

WITNESS MILLER: Yes.

MS. SPALETTA: Okay. And where do the numbers that appear in Column B come from?

WITNESS MILLER: The numbers from Column B can be found on our website.

MS. SPALETTA: On DWR's website?

WITNESS MILLER: Yes.

MS. SPALETTA: Okay. Is that CDEC numbers?

WITNESS MILLER: It's -- There's an Operations Control website.

MS. SPALETTA: Um-hmm. And do you understand how those numbers were generated, like if it's measured at a particular point and then posted to the website?

WITNESS MILLER: These -- So this particular number is a summation of four numbers, and they're from the four Service -- or Feather River Service Area contractors that worked at the afterbay, and so that would be Western Canal, Sutter Mutual, Ridge Vail and . . . another one. I --

MS. SPALETTA: Okay. So the numbers that we see in Column B are the sum of the diversions to those four groups of water users.

WITNESS MILLER: Correct.

MS. SPALETTA: And the water that gets diverted by those four groups, where does it come from?

WITNESS MILLER: Out of the afterbay.

MS. SPALETTA: Okay. And how does it get into the afterbay?

WITNESS MILLER: From Oroville.

MS. SPALETTA: And how does it get into Oroville? Is it all stored water that's released into the afterbay or could it be some combination of natural

flow that is bypassed through?

MR. MIZELL: I'm going to object at this point. This is beyond the scope of what we're here to talk about today. We're here to investigate how the exhibits were created from the spreadsheet, not whether or not the data within the spreadsheet is or is not related to operations of Lake Oroville, natural flow, or any other source of water. That goes well beyond the scope of the exhibits we're here to discuss.

CO-HEARING OFFICER DODUC: Miss Spaletta.

MS. SPALETTA: Well, I think the whole point of these charts was to have Mr. Leahigh draw a conclusion about stored and unstored water.

And so I'm trying to understand the data that underlies those charts to understand whether the numbers in any particular column that ended up appearing on his charts included stored or unstored water.

CO-HEARING OFFICER DODUC: To what extent, Mr. Miller, are you familiar with that?

WITNESS MILLER: Well, this particular analysis doesn't look at whether the water is stored or unstored. It just looks at Feather River Service Area and releases to the river.

CO-HEARING OFFICER DODUC: So that might be a shortcut to -- to that question.

MS. SPALETTA: So you don't know the answer to the question, then.

WITNESS MILLER: This spreadsheet doesn't look at that.

MS. SPALETTA: Okay. Is there another spreadsheet that's maintained at DWR that does look at that?

MR. MIZELL: Objection: Beyond the scope of what we're here to discuss.

CO-HEARING OFFICER DODUC: Sustained.

MS. SPALETTA: I'll just note for the record that to the extent Mr. Leahigh is allowed to produce evidence and express an opinion about percentages of the use of stored and unstored water of the Project, that it is important that the stakeholders understand the basis for those opinions and for that evidence.

CO-HEARING OFFICER DODUC: So noted.

MS. SPALETTA: Okay. Let's move on, then, to Column C, which is blue numbers with the title Total Oroville Release.

Where do these numbers come from?

WITNESS MILLER: These numbers can also be found on our website. So this is the total release from the Oroville complex to the river, Feather River.

MS. SPALETTA: Is that from some type of a

measurement device?

WITNESS MILLER: Yes.

MS. SPALETTA: And I think that I understand that the total amount of water coming out of Oroville is actually a combination of this Total Oroville Release plus the FRSA deliveries.

Am I understanding that correctly?

WITNESS MILLER: Can you ask that one again?

MS. SPALETTA: Sure.

WITNESS MILLER: Sorry.

MS. SPALETTA: My understanding, after looking at these sheets, was that the total amount of water coming out of Oroville was a combination of the numbers in Column C and the numbers in Column B.

WITNESS MILLER: Yeah. Yes.

MS. SPALETTA: Okay. All right. And then the numbers in Column D, where do those come from?

WITNESS MILLER: So these numbers are determined . . . are determined by looking at the 1983 Department of Fish & Game Agreement.

So they're calculated essentially on the fly, and it changes seasonally, and there's a couple different levels that -- that -- that is specified in an agreement.

MS. SPALETTA: Okay. So if I'm understanding correctly, the numbers that are put in here are straight

out of an agreement or is it a measurement of an amount of water?

WITNESS MILLER: It -- It would be based on a measurement.

MS. SPALETTA: On a measurement.

And where is that measurement taking place?

WITNESS MILLER: So, this looks -- The agreement looks at the unimpaired flow into Oroville April through July as one measurement.

MS. SPALETTA: Okay. I think we're getting confused.

The number -- Let's just give this some very specific parameters. Let's look at January 1st.

If you could scroll up to the top.

(Scrolling up document.)

MS. SPALETTA: And the first number in Column D for January 1st is 1,275.

WITNESS MILLER: Yes.

MS. SPALETTA: And where did that number come from?

WITNESS MILLER: That was based on the agreement. And so one would look at that agreement and where we were in storage and the unimpaired runoff from April through July.

MS. SPALETTA: Okay. So you're saying that you

put in here the numbers that the agreement told you should be released based on the hydrologic conditions during this time period.

WITNESS MILLER: That is correct.

MS. SPALETTA: Okay. So this is not a number that came from a measurement device specifically, like a flow rate measurement device.

WITNESS MILLER: Yeah. I may have misunderstood what you were asking me.

MS. SPALETTA: Okay.

WITNESS MILLER: Yes.

MS. SPALETTA: And then the next two columns are E and F and they both have the Numbers 50 in them.

Where do those numbers come from and what do they represent?

MR. MIZELL: And unless Miss Spaletta objects, can we take it column-by-column --

MS. SPALETTA: Sure.

MR. MIZELL: -- in order to be very specific here?

MS. SPALETTA: So Column E is entitled "Ag" and the numbers are 50, at least for the month of January.

So what does that represent?

WITNESS MILLER: Yes. So this represents a -- like, a buffer on top of the -- on top of the fish

requirement.

So we would -- During operations, rather than using 1275, we would release 1325. So we would add a 50 cfs buffer onto whatever the requirement is.

MS. SPALETTA: And this is just a number that gets typed in here for a buffer as opposed to being measured at a particular location; right?

WITNESS MILLER: Yes. This is not measured.

MS. SPALETTA: And so then let's go to Column F which has the same title "Ag" and the same numbers.

What does Column F represent?

(Document displayed on screen.)

MS. McGINNIS: Objection: Vague.

Do Columns E and F have the same title?

CO-HEARING OFFICER DODUC: Yeah.

WITNESS MILLER: They do.

MS. McGINNIS: I stand corrected.

MR. MIZELL: Mr. Miller, is Column E actually entitled "Min Ag"?

WITNESS MILLER: I don't know. Can we --

MS. SPALETTA: We can get --

WITNESS MILLER: -- click on the cell?

MS. SPALETTA: Yeah. If you look at the cell for D, just highlight "F.R. Min."

(Column highlighted on screen.)

MS. SPALETTA: There you go.

WITNESS MILLER: So, yeah, I guess there is -- There's a greater category, "Feather River Min," that includes fish and ag.

MS. SPALETTA: Okay. So under the heading F.R. Min, there are two subheadings. One is "Fish" and one is "Ag"?

WITNESS MILLER: Yes.

MS. SPALETTA: I see. Thank you.

Okay. Then moving on to Column F, which is entitled "Ag."

What does that represent?

WITNESS MILLER: So, the Column E would be a -- maybe a target. So we would target a buffer of 50, but when we actually are releasing water, it may not have a 50 cfs buffer. It might have something a little bit smaller so that F is an adjustment to that.

So it has a formula in it that looks at . . . basically takes that difference and -- So I don't think it rarely goes below 50 but it just tracks it if it does.

MS. SPALETTA: Okay. So, if we could have -- Who's over there controlling things?

MR. HUNT: Mr. Hunt.

MS. SPALETTA: Mr. Hunt.

If we could have Mr. Hunt put the cursor on the

first cells so we can see the formula.

(Cell opened on screen.)

MS. SPALETTA: I see.

Okay. So there's some type of a formula embedded in here. And the purpose of the formula is to compute what the exact buffer is on any given day?

WITNESS MILLER: Yes.

MS. SPALETTA: Okay. Then the next, Column G.

Can you tell us what the title of that column is and what it represents.

WITNESS MILLER: So this is Banks Pumping, so this is a pumping plant in the Delta.

MS. SPALETTA: Um-hmm.

WITNESS MILLER: And this is data from the daily -- daily flow.

MS. SPALETTA: And so this is measured data?

WITNESS MILLER: This is measured.

MS. SPALETTA: Also available on DWR's website?

WITNESS MILLER: Right.

MS. SPALETTA: And then the next, Column H?

WITNESS MILLER: So H is a flag for when the Delta is either in excess conditions or in balanced conditions. So "Y" would represent periods when the Delta was in excess.

MS. SPALETTA: And who put the Ys or the Ns in

here?

WITNESS MILLER: Who did?

MS. SPALETTA: Yes.

WITNESS MILLER: I'm not sure who but . . .

MS. SPALETTA: Where did you get the Ys and the Ns that are in this column?

WITNESS MILLER: It's -- It's all mine as well. I don't know if we have that necessarily on our website, but Reclamation does.

MS. SPALETTA: And then the next, Column I, entitled "Any Flood Rel?" It has Ys or Ns.

What does this represent and where did the information come from?

WITNESS MILLER: So, this -- this is any flood release. So, this -- this is another flag.

And so a user would put a "yes" for -- during periods where we're in some sort of flood control operation.

MS. SPALETTA: And where did the information that's depicted in the column come from, the Ns or the Ys?

WITNESS MILLER: A user.

MS. SPALETTA: I'm sorry?

WITNESS MILLER: Whoever put the numbers in here.

MS. SPALETTA: Okay. I thought you prepared the spreadsheet.

WITNESS MILLER: This is prepared by me, staff and . . . staff.

MS. SPALETTA: Are there people named "Staff" or is there someone else that works with you?

WITNESS MILLER: I'm sorry?

MS. SPALETTA: Who is -- Who put the numbers in Column I, and where did they get the information?

WITNESS MILLER: Oh, this would be -- The information would have come from what -- what our thoughts were in terms of whether we were in operating -- operating to flood control or not.

MS. SPALETTA: So if I wanted to get that same information, where would I go today to get it?

WITNESS MILLER: You would ask us, I guess. There's . . .

One could potentially look at the flow control storage in -- in Oroville, which is on CDEC and CORE and . . .

So during those periods where we're operating in a flood space, we would certainly have a -- a Y in that -- in that column.

There could be other periods as well. For example, in 2011, we were trying to get down to flood

control late in the summer or -- or flood control in the fall.

MS. SPALETTA: And so I told you that I looked at all of these sheets and I looked at the formulas. And the reason I thought this information in Column I is in the data sheet is because whether there's a "Y" or an "N" in that column actually affects the post-processing of the data in the subsequent sheets; is that correct?

WITNESS MILLER: That's correct.

MS. SPALETTA: So some decision was made by you or your staff to put an "Y" or an "N" in Column I for the Data'12 sheet and the Data'15 sheet.

WITNESS MILLER: Correct.

MS. SPALETTA: Okay. And, then, looking at Column J, which is entitled "2011" and has, at least for January, the word "ok" in the cell, what does that represent?

WITNESS MILLER: So, Column J is a relic, and it's really not used -- I mean, it's in the spreadsheet but it's not relevant to the exhibit.

MS. SPALETTA: Okay. All right. So, then, what I want to talk to you about is how you took the information that you just described to me in this Data'11 sheet and what you did to it in the next sheet, which is Data 2011, which I think you testified

previously is the same as what DWR produced as DWR Exhibit 903; correct?

MR. MIZELL: Objection: Misstates the testimony.

It is the basis on which DWR-903 is created but it is not necessarily the same.

MS. SPALETTA: Okay. Well, that actually is an important distinction.

What is it about what I'm looking at in Data 2011 that is different from Exhibit 903?

WITNESS MILLER: One's a spreadsheet and one's a .pdf.

MS. SPALETTA: Other than that, are there any substantive differences?

WITNESS MILLER: I think the data's all the same.

MS. SPALETTA: All right. So, then, let's go ahead and go through this and hopefully you can answer my questions.

Some of this was already addressed by Mr. Leahigh or by you and so I'm just going to skip to the things that I still have questions about.

So let's go to . . . Let's go to look at the columns that are hidden, because some of the columns in this spreadsheet are hidden.

Mr. Hunt, do you know how to unhide the columns?

(Hidden columns displayed on screen.)

MS. SPALETTA: Okay. So the first column that Mr. Hunt has unhidden is Column H, and it looked to me like Column H was simply the sum of all of the in-stream requirement releases that were in Columns D through G; is that correct?

WITNESS MILLER: That's correct.

MS. SPALETTA: And then the next set of columns that were hidden are Columns, I think, N through S, and so I want to find out what is in these columns and how it affects what we actually saw on Exhibit 903.

So let's talk about Column N first.

WITNESS MILLER: Column N is what we were looking at on the previous sheet, so it should be linking to that previous sheet.

MS. SPALETTA: So I think that's the same for Column O as well; right? These are simply the hard-entered numbers from the previous sheet for fish and for ag?

WITNESS MILLER: Yeah.

MS. SPALETTA: So, then, Column P is simply the total of those two columns?

WITNESS MILLER: Yes.

MS. SPALETTA: And then what's Column Q?

WITNESS MILLER: Column Q is a representation of the Banks exports, and I believe this column tries to adjust for transfers. I think that one's linking to -- Can we look at the -- the cell on that one?

(Cell displayed on screen.)

WITNESS MILLER: Yes. That's looking at something off on the right-hand side.

MS. SPALETTA: Do you need more information to answer the question?

WITNESS MILLER: Oh, I think it was linking to something off the right-hand side so . . .

MS. SPALETTA: We need to scroll over?

WITNESS MILLER: We do.

MS. SPALETTA: Can we scroll over, please?

(Scrolling over on document.)

MS. SPALETTA: Okay. So what is happening here in Column Q?

WITNESS MILLER: I'm having trouble seeing the formula.

MS. SPALETTA: Do you have a screen in front of you?

WITNESS MILLER: No.

So, in one of those columns, export columns, it adjusts for transfers. 2011 didn't have any transfers,

so essentially it would be the same as on the previous sheet and the same as Column N.

MS. SPALETTA1: So that was kind of my question.

If Mr. Hunt could put the cursor on January 1st of Column N, which is the SWP export.

(Displaying Column N cell.)

MS. SPALETTA: That's actually a formula that adds up what's in Column Q minus what's in Column R minus what's in Column S. So it's not actually the measured exports, it's the measured exports with a couple of adjustments; correct?

WITNESS MILLER: In 2011, there would be no adjustments.

MS. SPALETTA: In the whole year, or in this particular day?

WITNESS MILLER: In the whole year.

MS. SPALETTA: But in other years, there are, particularly 2015; correct.

WITNESS MILLER: That's correct.

MS. SPALETTA: And what are those adjustments? So what is happening -- What are the numbers that are in Column R? What do they represent?

WITNESS MILLER: Column R would be the water transfer -- dry year -- dry-year water transfer or -- or

code water. So it would be water that originated from somewhere else besides Oroville.

MS. SPALETTA: That got exported?

WITNESS MILLER: Typically, yes.

MS. SPALETTA: And then what does Column S represent?

WITNESS MILLER: Column S is CVC water, so that's Cross Valley Canal water.

MS. SPALETTA: So that's water that's pumped at Banks and ultimately delivered through the Cross Valley Canal to a Bureau contractor?

WITNESS MILLER: Yes.

MS. SPALETTA: So, essentially what's happening here, then, is, you're taking the measured exports at Banks in Column Q and then reducing that amount by any transfers or any water pumped at Banks that was ultimately delivered to a CVP contractor through the Cross Valley Canal. And the result, then, of that mass is landing in Column M called "SWP Export"?

WITNESS MILLER: I believe I followed that, yes.

So Q is adjusted by transfers and it ultimately ends up in -- in M.

MS. SPALETTA: Okay. Yeah. Got it.

All right. Now, scrolling over to Column Y,

which is the Exported Unstored Flow.

(Scrolling over on document.)

MS. SPALETTA: If we could highlight that cell with the first Number 7343.

(Document highlighted on screen.)

MS. SPALETTA: Okay. So this is a -- a process number.

And can you describe to me how you get to this number.

WITNESS MILLER: So this analysis in general splits up Oroville releases into different components. It also splits up exports into different components, as shown in 850 and 851.

So this calculates the component that came from -- during certain conditions and certain flow or flood control releases. So it's the -- kind of that category.

MS. SPALETTA: Okay. Is there any way to tell from what's in Column Y whether this unstored flow came from the Feather River versus the Delta channels?

WITNESS MILLER: No.

MS. SPALETTA: And is that information kept by DWR somewhere else?

MR. MIZELL: Objection: Goes beyond the scope of this spreadsheet.

CO-HEARING OFFICER DODUC: Miss Spaletta.

MS. SPALETTA: Well, I think Mr. Leahigh was making an analysis based on Oroville, and so I'm trying to understand if this unstored water, if I can tell how much of that came through Oroville versus how much of it came from other places.

CO-HEARING OFFICER DODUC: Overruled.

Mr. Miller, do you have an answer for that?

WITNESS MILLER: This spreadsheet doesn't look at water that was stored or unstored other than at the Banks Pumping Plant. It just -- If we're in excess conditions, water's coming from somewhere all over and that's what's categorized here.

MS. SPALETTA: For purposes of separating out DWR's direct diversion right and its storage right, is this essentially what DWR considers its direct diversion of water under its water right?

MR. MIZELL: Objection: Neither the spreadsheet nor Mr. Leahigh's testimony speaks to whether or not the charts produced for 903 and 906 addressed water rights in particular. That's completely silent.

We haven't had any evidence to date to try and challenge the existing water rights. And, in fact, I believe the words "previous notice" has indicated that this hearing's not a referendum on the existing water

rights or existing operations of the State Water Project.

So I would object based upon beyond the scope of the case in chief, rebuttal, surrebuttal and this spreadsheet.

CO-HEARING OFFICER DODUC: Miss Spaletta.

MS. SPALETTA: I have no intention of challenging the water rights with that question. I truly am trying to understand how this number is the same or different than what gets reported by DWR on its Reports As Permittee as the amounts that are directly diverted.

And so I'm -- I'm just trying to figure out if I can look at this number that says Exported Unstored Flow and kind of put that in a category of, okay, that's everything that DWR's directly diverting so I should be able to match that up with what's on DWR's Reports of Permittee for direct diversion. I'm trying to figure out if it's in the same category.

MR. MIZELL: And then --

CO-HEARING OFFICER DODUC: Mr. Mizell.

MR. MIZELL: Yeah. Again, I would indicate, the reports filed by the Department for purposes of water rights reporting are not data that was relied upon by Mr. Leahigh or by Mr. Miller. They relied upon the data sources that Mr. Miller has just indicated populate the spreadsheet.

It's a different category of accounting process that goes on. It's not germane to this process. And it's intended to, I mean, ultimately lead to a challenge of the existing water rights.

CO-HEARING OFFICER DODUC: Whatever its intention, I -- I -- I would hope that Miss Spaletta is attempting to put the data in context, which is what I'm trying to understand as well.

Mr. Jackson.

MR. JACKSON: Well, I certainly agree with that, but I also wanted to add the fact that one of the issues that -- that the WaterFix hearing is about is whether or not this is a new source of water for a new water right or whether it's essentially the same water right.

CO-HEARING OFFICER DODUC: I think that's definitely beyond Mr. Miller's area of expertise as -- as a Modeler in a spreadsheet.

But, Mr. Mizell, I'm going to overrule your objection, but I will keep a close eye on Miss Spaletta and where she goes with this question.

As long as it's to put the information in the appropriate context in order to understand how the data was analyzed and provided to us, I will allow you to proceed, Miss Spaletta.

MS. SPALETTA: So, my question was aimed at trying to understand whether what I'm seeing in Column Y that is entitled Exported Unstored Flow is essentially the same thing as what DWR calls what it's directly diverting under its water rights.

WITNESS MILLER: I -- I don't know if it's the same.

I could further explain how this analysis was done regarding this column, but I don't know how -- how it compares to, say, what our SWAP (phonetic) folks do.

MS. SPALETTA: Okay. So this is not something you've been involved in and are not able to speak to that issue?

WITNESS MILLER: No.

MS. SPALETTA: Let's go ahead, then, and look at . . .

We'll look at the green tab called Data 2015.

(Document displayed on screen.)

MS. SPALETTA: And I think that Mr. Mizell already asked you this, but everything that you've just described to me about how you took the data from 2011 and post-processed it in the sheet called Data 2011, do all those same rules and methods apply to how you post-processed the data from 2012 and the data from 2015?

WITNESS MILLER: It should be. Yeah, it should

be, but there could be some odd formula things. It transfers in this 2015 at . . . some issues.

MS. SPALETTA: Okay. And that's what I wanted to try and clear up, because I know that, previously, Mr. Leahigh attempted to describe this but without having the spreadsheet in front of him, it was a little tricky.

So if we could ahead and unhide the Columns M through S again in this spreadsheet entitled Data 2015.

(Columns unhidden on screen.)

MS. SPALETTA: And can we scroll down -- scroll down to I think it's July when we started seeing the negative numbers in the export column.

(Scrolling down document.)

MS. SPALETTA: And maybe you could help us walk through what this means.

So, on Exhibit 905, there were negative numbers in the Export column beginning, I think, July 2nd. So if we could look at July 2nd.

(Document displayed on screen.)

MS. SPALETTA: Okay. So there we have the negative numbers in the export column and, again, we have a cell highlighted here on July 2nd that shows us the same formula that we just looked at when we went over the 2011 spreadsheet, which is, you took the total measured exports which is Column Q and then subtracted out

information from Column R and Column S.

So we now have Column R and Column S and Column Q unhidden and we see the numbers in there. And let's just use this July 2nd, 2015, as an example.

If you could explain to us how we got to a negative number for SWP Exports in Column M, please.

WITNESS MILLER: Okay. I think we've -- On the previous sheet, we were looking at Columns R and S as being transfers in CVC. We also have a Z -- Column Z and Column AA which are also transfers in CVC.

So what -- what happened in this case is that the transfers were included twice, essentially. So essentially in this case they're double-counted. However, it really has very little effect on the overall analysis, talking about 30,000 cfs or -- sorry -- 3,000 acre-feet.

MS. SPALETTA: 30,000 acre-feet for the entire year?

WITNESS MILLER: Yes.

MS. SPALETTA: Okay. And what was -- Which total was off by 30,000?

WITNESS MILLER: So, it would be -- column-wise or graphically?

MS. SPALETTA: Column-wise.

WITNESS MILLER: It would be Column M.

MS. SPALETTA: And was it 30,000 too high or 30,000 too low?

WITNESS MILLER: The Column M would have been 30,000 too low.

MS. SPALETTA: Okay. And then my next question is: I think you testified that Column R represents transfers and Column Z also represents transfers.

What I see is two different sets of numbers in Column R and Column Z. So can you explain to me why they are different?

WITNESS MILLER: One is a schedule and the other one is actual.

MS. SPALETTA: So the totals at the end should be pretty darn close.

WITNESS MILLER: Yes.

MS. SPALETTA: Got it.

And then Column AA, that's the pumping through the Cross Valley Canal?

WITNESS MILLER: Yes.

MS. SPALETTA: And is that also a schedule?

WITNESS MILLER: I'm not sure.

MS. SPALETTA: Okay. I don't think I have any more questions about how you put these together. That was very helpful for me.

Thank you.

So let's turn to the next spreadsheet, which is SJC-221.

(Document displayed on screen.)

MS. SPALETTA: And you previously testified that this was the workbook or set of spreadsheets that supports DWR-906.

And we've got one sheet in this spreadsheet highlighted, which is entitled "Sum_4_Chart3."

And does this have substantively the same information that actually appeared on Exhibit 906?

WITNESS MILLER: Yes.

MS. SPALETTA: And then which of the charts in this Excel workbook is the same chart that appeared in DWR Exhibit 10, Page 10, which is the one that Leahigh used, the ultimate one he testified about, because there's three or four different ones here.

WITNESS MILLER: Yes, there's a few iterations.

So "Chart_No_Store_JPOD" is the -- is where the original chart was.

MS. SPALETTA: If we could go to that, Mr. Hunt, please.

(Document displayed on screen.)

WITNESS MILLER: And so what happened, since it doesn't look the same, is that when the table for DWR-906 was created, the -- some of the -- just the data that was

really relevant to Mr. Leahigh's testimony was shown.

So if we could go back to that --

(Document displayed on screen.)

WITNESS MILLER: -- and just unhide all columns.

(Columns unhidden on screen.)

WITNESS MILLER: And then go back to that chart.

(Document displayed on screen.)

WITNESS MILLER: Yes.

Some of the labels are still not consistent but those got changed also with the tab Sum_4_Chart3.

MS. SPALETTA: Okay. So substantively the -- the numbers that go with the lines on the chart are the same but the formatting and the appearance essentially is different.

Is that what you're saying?

WITNESS MILLER: Yes.

MS. SPALETTA: Okay. That's what I surmised, but thank you for explaining it.

Okay. Then there's another chart here that's right next to the one you're talking about, and the only difference is, it's got an f2 at the end of it. Chart_No_Store_JPOD_f2.

What is this chart and how is it different than

the one we just looked at?

MR. MIZELL: I'm going to object as beyond what was used for Mr. Leahigh's testimony.

Mr. Miller's just finished explaining that it was the Chart_No_Store_JPOD tab that was used for testimony. We're getting into other draft work products that ultimately were abandoned and not used.

CO-HEARING OFFICER DODUC: Miss Spaletta.

MS. SPALETTA: I'm just curious if there's any substantive difference in the way that the JPOD pumping was treated.

And this goes to, you know, the whole reason for requesting the charts is to make sure that you see the data in context and that you understand what the subjective decisions are that are made before data is presented.

CO-HEARING OFFICER DODUC: Just a little leeway there, Miss Spaletta.

MS. SPALETTA: Thank you.

CO-HEARING OFFICER DODUC: Overruled.

Please answer, Mr. Miller.

WITNESS MILLER: I think -- I don't remember what "f2" stands for but I'm thinking it's "format 2."

So I think the unmet demand might be a little lighter or darker in this one, and I think the title size

changed.

MS. SPALETTA: So it was just a formatting change. There was no difference in the numbers as far as how you were representing the pumping for the Joint Point of Diversion.

WITNESS MILLER: That's correct. It should be pointing to the same data.

MS. SPALETTA: Okay. All right. Now, let's go back to the chart, which is the Sum_4_Chart3 -- I'm sorry -- the table Sum_4_Chart3.

(Document displayed on screen.)

MS. SPALETTA: There we go.

Okay. And I had a couple questions about the columns.

For Column L, that's simply the pumping at Jones that you had hidden when we saw Exhibit 906?

WITNESS MILLER: Yes. It should just be the pumping at Jones -- It should be total pumping at Jones.

MS. SPALETTA: Okay. And then the next, Column M, what does that represent?

WITNESS MILLER: So that is the -- the pumping of Joint Point of Diversion that was done at Banks.

MS. SPALETTA: So that's water pumped for the State Water Contractors through Banks?

WITNESS MILLER: This would be CVP water pumped

at Banks --

MS. SPALETTA: Oh, I'm sorry.

WITNESS MILLER: -- through the Joint Point of Diversion.

MS. SPALETTA: And then what's Column N?

WITNESS MILLER: That would be Cross Valley Canal pumping done at Banks.

MS. SPALETTA: And Column O?

WITNESS MILLER: These are the transfers from those -- those years.

MS. SPALETTA: And then Column -- Let's scroll over to Column Y.

(Scrolling over on screen.)

MS. SPALETTA: And that is just the Total Exports column. So if we could highlight the first number in there, the 1912.

(Document highlighted on screen.)

MS. SPALETTA: So that is the sum of basically Column K through L, and it does not include Columns M, N and O; right?

WITNESS MILLER: That's right.

MS. SPALETTA: Okay. And so there was basically an effort, then, to try to separate those out in what was presented in Exhibit 906?

WITNESS MILLER: I don't know why . . .

You're talking about the columns, why they were hidden?

MS. SPALETTA: So, then, this is my next question:

There's this Total Annual Unmet Demand in Column J.

So if you'd go there and highlight the 1103.

(Document displayed on screen.)

MS. SPALETTA: So if demand was met with a transfer, was it still included in the Unmet Demand column?

WITNESS MILLER: The transfers, even though they're sitting here in this spreadsheet, were not part of the analysis, so the total unmet demand looks at allocation only.

MS. SPALETTA: So what someone has requested under their allocation, and what you have actually delivered under the contract, regardless of whether they received a transfer.

WITNESS MILLER: That's right.

MS. SPALETTA: Okay. Have there been any changes made to either the spreadsheet we're looking at now, which we marked as San Joaquin County Exhibit 221, or the spreadsheet that we earlier looked at and was San Joaquin County Exhibit 240 since you originally

prepared them for the purposes of generating the charts for Mr. Leahigh?

WITNESS MILLER: Are you talking about the graphical charts over the -- the tables?

MS. SPALETTA: Either one.

WITNESS MILLER: Yeah. Datewise, no, but there were some formatting changes when the tables were -- were developed.

MS. SPALETTA: And when you say "formatting," are we just talking about colors and labels, or are we also talking about the formulas in the cells?

WITNESS MILLER: It would just be colors and labels and loss of labels.

MS. SPALETTA: I don't have any further questions for you about the charts, and I truly appreciate you putting them together and explaining them.

WITNESS MILLER: Thank you.

CO-HEARING OFFICER DODUC: Thank you, Miss Spaletta. I truly appreciate your questions. They shed some light for me as well.

All right. Thank you. I think that completes this portion.

Mr. Miller, thank you again for coming in and thank you for your effort on the spreadsheet.

WITNESS MILLER: Thank you.

(Witness excused.)

CO-HEARING OFFICER DODUC: Why don't we take a break before we turn to EBMUD for their surrebuttal.

We will resume at 3:10.

(Recess taken at 2:54 p.m.)

(Proceedings resumed at 3:10 p.m.:)

CO-HEARING OFFICER DODUC: All right. It's 3:10. We are back. And before we get to EBMUD, I have some housekeeping but I note Miss Spaletta is also up.

What's up?

MS. SPALETTA: I just want to make sure I formally requested that the spreadsheets we marked be moved into evidence. That's SJC-221 and SJC-21.

CO-HEARING OFFICER DODUC: That's right. Because you're not presenting surrebuttal, or are you?

MS. SPALETTA: Well, there's a pending request for a variety of exhibits we marked which are DWR and the Bureau's Reports of Permittee for a certain time period.

CO-HEARING OFFICER DODUC: Um-hmm.

MS. SPALETTA: We've marked them as exhibits.

And there was one exhibit which was the written testimony of Russell Frink simply to authenticate those reports were pulled off the State Board website.

I met and conferred with Petitioners and they agree that those can be moved into evidence without the

need for Mr. Frink to actually appear in person, so we wanted to save some time at the hearing.

They do have some objections to the relevance, and so we submitted a letter earlier today proposing that we simply move them into evidence through that letter without the need for a live witness and that, if they object to them, they can file an objection and we can respond to it, and we'll go from there.

Other than that, I don't have any other witnesses or exhibits for surrebuttal, but I do know that Mr. Keeling has some coming up.

CO-HEARING OFFICER DODUC: Mr. Mizell.

MR. MIZELL: Thank you. Tripp Mizell, DWR.

Just a quick clarification: Our position isn't that the exhibits Miss Spaletta's referring to should be moved into evidence. We do object to them. It's, if they're found to be relevant, that we do not believe Mr. Frink needs to authenticate them, but we still have an objection to the relevance of the documents.

And we would actually request that Miss Spaletta provide a written offer of proof as to why they're relevant to this hearing and that a point for us to object be allowed, and we would put that objection in writing as well.

CO-HEARING OFFICER DODUC: I would prefer that

as well.

MS. SPALETTA: All right. Then I will take that as direction.

So I've already moved in evidence as SJC-220 and 221, and for the remainder of the exhibits, I will make a written offer of proof, petitioners can respond to it, and then we'll await a ruling from the Hearing Officers.

CO-HEARING OFFICER DODUC: And you will make that offer of proof by Monday noon?

MS. SPALETTA: I think I can do that. Thank you.

CO-HEARING OFFICER DODUC: And Mr. Mizell, you will have till Tuesday to respond.

And are there any objections to taking into the record 220 and 221?

Not hearing any, those are now in the record.

(County of San Joaquin, San Joaquin County Flood Control and Water Conservation District, and Mokelumne River Water and Power Authority's Exhibits 220 & 221 received into the record)

CO-HEARING OFFICER DODUC: We have -- I would like to get through with EBMUD and Mr. Burke today.

What is the anticipated cross-examination for Mr. Bray?

MR. MIZELL: Tripp Mizell, DWR.

We would anticipate 20 minutes, no more than 20 minutes, and we'll do our best to trim that down.

CO-HEARING OFFICER DODUC: And for Mr. Burke?

MR. MIZELL: We're going to approximate 30 minutes at this time.

CO-HEARING OFFICER DODUC: Okay. It looks like we will -- Whoop. I see Miss Meserve coming up.

MS. MESERVE: I have a few questions for Dr. Bray, and I may have a question or two for Dr. Burke -- or Mr. Burke.

CO-HEARING OFFICER DODUC: We're talking five to 10 minutes?

MS. MESERVE: Correct.

CO-HEARING OFFICER DODUC: Okay. So, then, tomorrow, then, we will begin with -- Oh, Miss Meserve, please don't leave.

Now, you had requested that for your out-of-town witnesses to come back in July. I remember having that discussion with you.

MS. MESERVE: (Nodding head.)

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

MS. MESERVE: That's Dr. Michael Brett.

CO-HEARING OFFICER DODUC: Okay.

MS. MESERVE: And he requested to go in Slot 24, so I believe that will probably work.

CO-HEARING OFFICER DODUC: I think it will work.

So let me confirm: I, then, am expecting tomorrow in order Number 11, Group 19 and 21, Dr. Leinfelder-Miles, and Prichard, Terry Prichard, to be here and, then, if we get to him, Mr. Jeffrey Michael.

At this time, what is the estimated cross-examination for Dr. Leinfelder-Miles and Mr. Prichard?

MS. McGINNIS: Robin McGinnis for California Department of Water Resources.

For Dr. Leinfelder-Miles, I think about a half an hour.

And for Mr. Prichard, I'm going to say 15 minutes --

CO-HEARING OFFICER DODUC: Okay.

MS. McGINNIS: -- maybe less.

CO-HEARING OFFICER DODUC: While you're up there, how about for Mr. Jeffrey Michael?

MS. McGINNIS: 15 minutes.

CO-HEARING OFFICER DODUC: Okay. So we are

deferring Mr. Brent -- Brett -- I'm sorry -- until July.

So Mr. Frink?

MS. SPALETTA: So we won't need any time if we resolve this issue.

CO-HEARING OFFICER DODUC: That's right.

So I'm moving to Miss Des Jardins, who's not here.

Miss Des Jardins, please be advised that you may be required to appear tomorrow. It looks like we're moving very quickly.

Miss Suard -- What is the time estimate, actually, I should say for cross-examination for Miss Des Jardins?

MS. McGINNIS: About 10 minutes.

CO-HEARING OFFICER DODUC: And for Miss Suard?

MS. McGINNIS: I don't think any, but I'll reserve 10 minutes just in case, if I may.

CO-HEARING OFFICER DODUC: All right. You know what? Let's do this.

Since I'm in a very generous mood and tomorrow is going to be a shortened day, anyway, let's just focus on getting Dr. Leinfelder-Miles, Mr. Prichard and Mr. Michael completed tomorrow and then we will resume in July with Mr. Brett and go on from there.

Any objections to that, knowing that my

Co-Hearing Officer has wholeheartedly agreed with that?

CO-HEARING OFFICER MARCUS: Yes.

CO-HEARING OFFICER DODUC: All right. That's the plan, then. Thank you all for your assistance with that planning.

Now, with that, then, Mr. Salmon, EBMUD.

Do you have an opening statement?

MR. SALMON: No, we do not.

CO-HEARING OFFICER DODUC: Okay. Please proceed.

MR. SALMON: Good afternoon. My name is Jonathan Salmon. I'm attorney for East Bay Municipal Utility District.

Today, East Bay MUD is presenting the surrebuttal testimony of Dr. Benjamin Bray, who will be responding to rebuttal testimony provided by Dr. Nader-Tehrani.

DIRECT EXAMINATION BY

MR. SALMON: Dr. Bray, please state your full name for the record.

WITNESS BRAY: Benjamin S. Bray, B-R-A-Y.

MR. SALMON: Have you previously taken the oath in this proceeding?

WITNESS BRAY: Yes, I have.

MR. SALMON: Did you previously submit a

Statement of Qualifications in this proceeding?

WITNESS BRAY: Yes. My Statement of Qualifications was admitted into the record as Exhibit 1 -- EBMUD-127.

MR. SALMON: And you previously submitted case in chief testimony; correct?

WITNESS BRAY: Correct. My case in chief testimony was admitted into the record as Exhibit EBMUD-101 and Exhibit EBMUD-152.

MR. SALMON: Is Exhibit EBMUD-154 a correct copy of the written surrebuttal testimony you prepared for this hearing?

WITNESS BRAY: Yes.

MR. SALMON: Is Exhibit EBMUD-103 a true and correct copy of the PowerPoint summary of your surrebuttal testimony?

WITNESS BRAY: Yes.

MR. SALMON: Your surrebuttal testimony refers to an October 2009 report prepared for the Department of Water Resources entitled "DSM-2 Recalibration," which has been admitted into the record in this proceeding as Exhibit Brentwood-105.

As an expert in water resources modeling, is Exhibit Brentwood-105 the kind of information you rely upon to form professional opinions in your field of

expertise?

WITNESS BRAY: Yes, it absolutely is.

MR. SALMON: Okay. With that, if we could please display on screen exhibit EBMUD-103 --

(Document displayed on screen.)

MR. SALMON: -- which is Dr. Bray's PowerPoint summary of his testimony.

And, Dr. Bray, please proceed to summarize your surrebuttal testimony.

WITNESS BRAY: Good afternoon, Hearing Officer Doduc, Chair Marcus, Board Member D'Adamo, State Board staff.

My name is Benjamin Bray and I'm here today to respond to three main points that were made by Dr. Nader-Tehrani in his rebuttal testimony.

May I please have the next slide.

(Document displayed on screen.)

WITNESS BRAY: Thank you.

The three main points in summary are: That he is not aware of any systematic DSM-2 model bias at Freeport;

Secondly, that he did not know the model version and the time period that I used for my bias correction of the DSM-2 model;

And, finally, that he believes my bias

correction methodology improperly introduced new systematic under- and overprediction.

Next slide, please.

(Document displayed on screen.)

WITNESS BRAY: I'll summarize my surrebuttal testimony first and then I will expand upon these points.

First, the DSM-2 model Version used by Petitioners for this hearing -- and this is Version 8.0.6 -- didn't accurately predict minimum velocities at Freeport.

Because of this, Petitioners' modeling -- Petitioners' modeling significantly underestimated significant reverse flow events at Freeport. And significant reverse flow events, as I described in my case in chief testimony, are pertinent to the operation of the Freeport Regional Water Project intake.

Therefore, it was necessary and appropriate to develop a bias correction of the Petitioner modeling to remove the underestimation of SRFEs and, importantly, improve the comparative analysis of Project defects.

Next slide, please.

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WITNESS BRAY: The DSM-2 version that I used to develop my bias correction offset was Version 8.1.2 and it was the best-available choice for reasons I will

describe shortly.

It included a benefit of a longer historical simulation with that model that allowed me to use some more recent low-flow periods.

My use of Version 8.1.2 to develop the offset did not introduce any additional new bias; to the contrary, it removed bias.

Also, Dr. Nader-Tehrani raised the issue of Liberty Island as a consideration with respect to my bias correction procedure.

I looked into this issue and I found Liberty Island flooding appears to have no significant effect on the tidal hydrodynamics at Freeport during the low-flow periods when reverse flows and significant reverse flows are expected to occur, or do occur.

So now I'm going to delve into the details.

May I have the next slide, please.

(Document displayed on screen.)

WITNESS BRAY: So I'll begin with the first issue which is systematic model bias at Freeport.

DSM-2's upstream boundary condition, which is coincident with the City of Sacramento, is in close proximity to the Freeport Regional Water Project and to the City of Freeport where the Freeport intake is located.

At this boundary condition, the model assumes positive downstream flow at all times. This constant flow boundary caused DSM-2 to systematically underpredict reverse flows during low flows when tidal influence extends upstream Freeport.

Next slide, please.

(Document displayed on screen.)

WITNESS BRAY: And I want to take a moment -- This is an important slide. I want to take a moment to describe this chart.

MR. SALMON: Can you clarify which slide we're looking at here?

WITNESS BRAY: Sure. This is Slide Number 6 in EBMUD-103.

So what's depicted on this slide is model error. And my convention for defining model error is to take the gage measurement and subtract the DSM-2 model.

And in this case, the red line is depicting a systematic bias in the minimum velocity where it is consistently overpredicted. And by that, I mean the DSM-2 model is relatively more positive than gage data.

And the red line in this chart is depicting the error for Version 8.0.6, which is the version that Petitioners are using for this hearing. The reason why it's negative is because of my convention to use the gage

and subtract the model.

Now, by applying my offset correction, I would obtain a curve like the blue curve. I would actually obtain the blue curve shown on this chart.

Where the blue curve, the sum of error, is roughly minimized. It's close to zero. And there is a balance between an over- and underprediction. There is no bias or no systematic prediction one way or another after the bias correction.

Moving on to the next slide.

(Document displayed on screen.)

WITNESS BRAY: We can also depict this bias by looking at a time series. And this should look familiar. This is a familiar eight-day period of February of '91.

And what I'm showing here, again, in the red lines is DSM-2 model Version 8.0.6. And what you should notice is that dashed red line. What you should notice is a consistent and systematic overestimation of the minimum daily velocity at Freeport as compared to the historical gage, which is shown in blue.

Also important to notice is the tidal amplitude is dampened in the model; that is, the maximum-to-minimum velocity as represented by the gage is larger than as represented by the model.

Note the model's failure to indicate any

reverse flows in this eight-day period, whereas the gage shows four events that cross the axis of -- the zero axis and indicate a negative or reverse flow event occurring at the gage.

This is illustrative of what I found in my set of low-flow months that I used for my bias correction.

Next slide, please.

(Document displayed on screen.)

WITNESS BRAY: So why does this happen?

As I alluded to earlier, this is because of a model deficiency, and this model deficiency, the Petitioners are aware of. It was documented in their DSM-2 Recalibration Report. Again, this has been entered into evidence as Exhibit Brentwood-105. For the record, I also believe it's an appendix to the EIR/EIS.

DWR's 2009 DSM-2 recalibration attempted to address this issue but with limited success, as they acknowledge in the report.

Next slide, please.

(Document displayed on screen.)

WITNESS BRAY: So in Section 2.2.2 of the Recalibration Report is where this deficiency is described.

Essentially, we can see that the tidal amplitude is dampened and it's due to the close proximity

to the upstream boundary on the Sacramento River which is located at the City of Sacramento in the DSM-2 model.

And there was also an issue here noted on the bottom that deals with reflection of tidal effects. And, again, this is a model artifact where, in the real world, in low flows, the tide can extend upstream. There is no artificial boundary condition.

I would like to demonstrate this briefly, and I apologize for those reading the transcript. But I have a -- Oh. Lost my mic here.

I have a broken rubber band. And this is representing a one-dimensional channel. And this is an imperfect analogy, but I think it helps to understand what this issue is for the non-Modelers.

My right hand I'm going to represent to you is my seawater boundary and it's going to move up and down (indicating) as the seawater stage moves up and down and, of course, we know we have two tidal sides a day.

My left hand represents a specified downstream flow (indicating). That flow is fixed, constant in a downstream direction.

So as I move my right hand up and down (indicating), you'll notice that, as you move from my right to my left (indicating), the amplitude of that signal is dampened. It is less. And as I approach the

boundary (indicating), of course, it's zero. It's held constant in tension.

That's -- That's the modeling artifact we're speaking about here.

And the issue here is that the Freeport location is in close proximity to this boundary condition.

May I please have the next slide.

(Document displayed on screen.)

WITNESS BRAY: So, in the Recalibration Report, one of the ways they attempted to address this issue was to extend DSM-2's boundary northward. However, the recalibration only slightly improved the model's tidal representation at Freeport despite significant improvements in tidal representation downstream such as at Rio Vista.

And I want to acknowledge that's most likely due to other changes, such as the inclusion of Liberty Island representation in the DSM-2 model.

Next slide, please.

(Document displayed on screen.)

WITNESS BRAY: The third point is that the recalibrated model actually did a slightly worse job if you look at the model performance in the calibration year, Water Year 2002 for Freeport.

So, in particular, if you look at the low-flow month, October of 2001, which was the first month of the Water Year used in the recalibration, we see a slight degradation in model performance, and, in fact, we see a slight increase in RMSE, root mean square error, and I provide the reference there.

The fourth point that I'd like to make is that the underprediction problem, this dampening of tidal effects, is most severe during low flows when tidal influence is at its maximum at Freeport. Yet, the recalibration did not consider extreme low-flow periods and, therefore, evaluate the performance and fully correct this error.

And so the bottom line is, this error persists. This error was only partially addressed, and it continues to be a problem in Version 8.0.4, 8.0.6 and 8.0.2.

May I have the next slide, please.

(Document displayed on screen.)

WITNESS BRAY: Next is model versions.

Dr. Nader-Tehrani testified on rebuttal that he did not know the model version I used to develop by bias correction offset. I used Version 8.1.2, which was most appropriate, as I'll describe here shortly.

First, it was the most up-to-date version. And, in fact, as I mentioned earlier, it included a

longer historical simulation where I could use more recent low-flow periods to develop the offset, the bias correction offset to be clear. It's also more conservative.

8.1.2 is relatively less biased than Version 8.0.6 and, therefore, it yielded a more conservative or less aggressive offset than Version 8.0.6 would have.

May I have the next slide, please.

(Timer rings.)

CO-HEARING OFFICER DODUC: Let's give Dr. Bray five more minutes to wrap up.

(Document displayed on screen.)

WITNESS BRAY: So Petitioners use Version 8.0.4 for all their BDCP modeling, and as the Project evolved into the WaterFix, Version 8.0.6 was used. It was used for the Final EIR/EIS; it was used for this hearing.

In the case of the Biological Assessment, both versions 8.0.6 and 8.0.2 were used.

And the versions are available on DWR's website. I provide the URL here.

Version 8.0.6 was released in November of 2010 and that model comes with a historical simulation from 1990 to 2006. There -- In that case, I would have been limited to low-flow periods in the period from 1990

through 1994.

In the case of Version 8, Opinion 1.2, which was released in 2013, several years ago, this model comes with the historical simulation of 1990 through 2012. So this afforded me a longer historical simulation and a greater dataset.

So be -- The next thing I wanted to do was compare how these two versions performed.

May I have the next slide.

(Document displayed on screen.)

WITNESS BRAY: So the degree of bias is plotted here.

So, again, this is error, once again, gage minus the model. Version 8.0.6 is the red curve shown, and the green dashed line is Version 8.1.2.

So what I found was, 8.1.2 did a better job representing tidal amplitude; however, it still exhibited a bias. So, therefore, by developing my bias correction using 8.1.2, I knew that it would remove some but not all of the bias inherent in Version 8.0.6.

Next slide, please.

(Document displayed on screen.)

WITNESS BRAY: With respect to the months that I used, I just wanted to point out that I did document in my case in chief testimony the period I used for my bias

correction, and here you can see the excerpt from Page 9 through Page 10, Footnote 7 actually lists the months I used for the bias correction.

And I want to be clear, these are low-flow months. They were intentionally selected from the full set of available monthly average flow at Freeport. And reverse flows occur in each of these months.

Next slide, please.

(Document displayed on screen.)

WITNESS BRAY: The last issue I'll touch on -- Actually, I have two. I'll be brief. First is the Liberty Island.

Dr. Nader-Tehrani speculated that Liberty Island flooding could have affected Delta hydrodynamics and was an important consideration for my bias correction in terms of the period I used.

He did not present any evidence for this, and I actually looked into this effect using my dataset of low-flow months.

May I have the next slide.

(Document displayed on screen.)

WITNESS BRAY: So I looked at two months with similar low monthly average flows, one before the Liberty Island failure and one after.

So the top panel is August of 1992, and the

bottom panel is December of 2008.

And what I found was, the tidal range was consistent and, importantly, during the spring tides where the tidal amplitude is maximum, we see the daily minimum flows are consistent, ranging between a negative 2000 to a negative 4,000 cfs.

Next slide, please.

(Document displayed on screen.)

WITNESS BRAY: Finally, Dr. Nader-Tehrani expressed concern that my methodology was, quote, "not the appropriate way," end quote.

The -- Again, the methodology I used to develop the bias correction offset was a minimization of the sum of square error. This is also known as the least square minimization. It's a commonly-used approach for parameter identification, and the intent, as I display here, is to remove the bias.

And, again, what that -- The result of that is that the error has a near zero mean. It's minimized.

I also looked at other possible objective functions, such as minimizing absolute error, and I would have achieved the same bias correction offset.

Last slide, please.

(Document displayed on screen.)

WITNESS BRAY: And, in conclusion, Petitioners'

modeling included a significant systematic bias: DSM-2 consistently overpredicted minimum velocities at Freeport and, therefore, underpredicted SRFEs due to a boundary condition deficiency known and documented in the Recalibration Report circa 2009.

Using DSM-2 Version 8.1.2 to calculate a conservative bias correction offset using the least squares minimization method is appropriate. And this offset improved without entirely eliminating the bias inherent in Petitioners' modeling using Version 8.0.6 and, importantly, improved the comparative analysis of the Project effect.

Thank you. That concludes my summary of my written testimony.

CO-HEARING OFFICER DODUC: Thank you.

DWR, and then Miss Meserve.

MS. McGINNIS: Robin McGinnis for California Department of Water Resources.

CROSS-EXAMINATION BY

MS. McGINNIS: Hello, Dr. Bray.

WITNESS BRAY: Good afternoon, Miss McGinnis.

MS. McGINNIS: Thank you for being here.

WITNESS BRAY: Sure.

MS. McGINNIS: So jumping right in:

Do you agree what is important is whether the

proposed operation of the North Delta Diversions for the various WaterFix scenarios increases the frequency of SRFEs relative to the No-Action Alternative?

CO-HEARING OFFICER DODUC: Miss McGinnis, for my sake, could you repeat the question?

WITNESS BRAY: Yeah.

MS. McGINNIS: Sure.

The question is: Do you agree that what is important to East Bay MUD is whether the proposed operation of the North Delta Diversions for the various WaterFix scenarios increased the frequency of SRFEs relative to the No-Action Alternative?

WITNESS BRAY: Well, what's important is how the Proposed Project will impact the frequency of SRFEs but also at what times those -- the changes in SRFEs due to the Project.

So, correct. But I do want to make it clear, and I did this in my case in chief, that timing is also very important, so . . .

MS. McGINNIS: Understood.

So, in your testimony, you reference the 2009 Recalibration Report; correct?

WITNESS BRAY: Correct.

MS. McGINNIS: And did this report document deficiencies in the then-current version of DSM-2?

WITNESS BRAY: Correct. It documented deficiencies in the then-current DSM-2, but it also evaluated the performance of the recalibration effort. So it was -- it was more than just documenting the prior version, which I believe was Version 6; it also evaluated the performance under the recalibration.

MS. McGINNIS: You also stated that the deficiencies had implications for the accuracy of DSM-2's simulation of tidally-influenced low-flow conditions at Freeport; right?

WITNESS BRAY: Correct.

MS. McGINNIS: So, would your concern about the increase in frequency of SRFEs be alleviated if the North Delta Diversions were operated to avoid increasing the magnitude, frequency and duration of flow reversals in the Sacramento River at the Georgiana Slough junction compared with the No-Action Alternative?

WITNESS BRAY: I believe that was the intention of the bypass flow criteria; however, that does not apply year-round.

So the bypass flow criteria clearly is not enough to prevent increases in reverse flows at certain times of the year, and that's what I found in my case in chief testimony.

MS. McGINNIS: Okay. So, going to your

PowerPoint, which is East Bay MUD-103, Slide 15, which we looked at just a minute ago.

MR. OCHENDUSKO: Slide 15?

MS. McGINNIS: 15.

(Document displayed on screen.)

MS. McGINNIS: This is the slide where you explain that you chose data for 15 months: 13 months were in the 1990s, and two months were post-2000; correct?

WITNESS BRAY: Correct.

MS. McGINNIS: And you discussed whether flooding of Liberty Island affected reverse flows at Freeport; correct?

WITNESS BRAY: In my surrebuttal testimony and in my summary, I do, yes.

MS. McGINNIS: So if we could have Slide 17.

(Document displayed on screen.)

MS. McGINNIS: And stretch it out so that there's no gray space on the sides.

(Document modified on screen.)

MS. McGINNIS: Yeah. Okay. Great.

So please humor me.

On this slide, is it correct that you were trying to show whether the Liberty Island flooding affected reverse flows at Freeport?

WITNESS BRAY: No. The intent of this slide was to examine before and after Liberty Island flooding whether there was an effect on the tidal range.

So the peak flows where we see in the spring tides, where the tidal amplitude is maximum, peak flows are right at about 14,000 cfs in both charts. But more importantly, to reverse flows is the minimum -- the daily minimums of those spring tides which are in between negative 2,000 and negative 4,000 cfs in both cases.

And we can see the spring tide cycle on or around August 6th in the top panel and on or around December 13th of the bottom panel.

MS. McGINNIS: Okay. So you chose two months with similar flows. The top figure shows the month of August 1992 representing the period before Liberty Island flooding, and the bottom figure is for December 2008, which was after Liberty Island flooding; right?

WITNESS BRAY: Correct.

And let's be clear: Liberty Island flooded multiple times. Liberty Island first flooded in 1995 and flooded again later in '97, '98 permanently. So, correct, 1992 is prior to those events; 2008 is post-those events.

MS. McGINNIS: Thank you.

And all the data you're showing in this slide

is based on observed data from CDEC; is that right?

WITNESS BRAY: Correct. This is Freeport Gage Hourly Discharge CDEC Station IVFPT.

MS. McGINNIS: Thank you.

WITNESS BRAY: You're welcome.

MS. McGINNIS: So, in your testimony, you found no effect on reverse flows related to Liberty Island; is that correct?

(Pause in proceedings.)

MS. McGINNIS: Well --

WITNESS BRAY: Could you restate the question? I'm not sure I --

MS. McGINNIS: Sure. I could just ask you instead about your statement on the bottom of Slide 16.

(Document displayed on screen.)

MS. McGINNIS: So maybe it's a little more complicated than what I stated.

Your third bullet there says (reading):

"I found no effect during low-flow months."

Right?

WITNESS BRAY: During low-flow months comparing pre- and post- with similar monthly average flows.

And, again, you know, you can -- I put the monthly average flow on there. They're not exactly equivalent but those are the two closest months I could

find before and after.

MS. McGINNIS: Okay. So back to 17. Sorry.

The reverse flows on these two plots are represented by negative values of flow below zero; right?

WITNESS BRAY: Reverse flows by definition are flows from Freeport toward Sacramento. Those are with a convention of a negative sign, correct.

MS. McGINNIS: Okay. So can you please count the number of reverse flow events in the top plot. And you don't need to count the times when the flow barely touches the zero line.

WITNESS BRAY: It's hard for me to tell at this scale what is a zero versus what is a very small negative number. So it would be difficult without actually looking at the data.

I could -- I could . . .

MS. McGINNIS: So even if we blew this up, would you not be able to count the number of times the plot goes below zero?

WITNESS BRAY: Well, the -- As you can see, in the latter half of August, there are several flows that look like they are close to reversing or not. It's very difficult to tell based on the scale.

MS. McGINNIS: Well, I don't want you to count the ones where they're close to reversing, only the ones

that are clearly reversing.

WITNESS BRAY: I also could point out --

MS. McGINNIS: Or you could count them -- You could count them both ways. That would be fine.

WITNESS BRAY: Well, I'm not sure that this would be valid, because if you look at the end-of-December 2008, obviously the flow is picking up.

So if -- if we looked at a daily average flow -- right? If we averaged out the tide, we would see an uptick toward the end of December.

And so I'm very just -- I'm only just focusing on the spring tide cycle earlier in the month. And, again, that's where I'm seeing basically a consistency in the tidal range.

Now, these are very different months of the year, December and August. The tidal cycle obviously is affected by the solar and the lunar cycle, but these were the only two months I could get similar monthly average flows for and, therefore, that's why I used this comparison.

MS. McGINNIS: Thank you for that explanation.

So what I'm trying to understand is the statement on Slide 16 where you said you found no . . . effects on reverse flows related to liberty.

(Reading):

"I found no effect during low-flow months."

And the comparison of those two months is meant to illustrate that.

WITNESS BRAY: Correct.

MS. McGINNIS: So it would be helpful for me to understand your statement and your slide with the two plots if you would count the number of reverse flows.

MR. SALMON: I'm going to object to this request for counting on grounds of relevance and that it's outside the scope of the testimony.

CO-HEARING OFFICER DODUC: I can --

MR. SALMON: Dr. Bray --

CO-HEARING OFFICER DODUC: I can count as well as anyone. And it's pretty obvious, if you looked at -- I think the point Miss McGinnis is trying to get at, is, there are fewer points below the zero line in the second lower chart.

MS. McGINNIS: Correct.

And if we went through the exercise of counting, it would show that there are about 60 percent fewer.

CO-HEARING OFFICER DODUC: And it is his chart and it's data, so the objection is overruled.

Let's just get through this, people.

MS. McGINNIS: Okay. So maybe Mr. Baker could

increase -- zoom in on the top plot.

(Document enlarged on screen.)

CO-HEARING OFFICER DODUC: I got 21 on the top chart, just so you know.

WITNESS BRAY: One, two, three, four, five, six, seven -- Again, I don't -- I think the latter half of October is -- there's a change in flow that occurs, so . . . I'm not -- I don't know if including the whole month would be valid, but . . . I'll -- I'll go through your exercise.

One, two, three, four, five, six, seven . . . I get 21.

CO-HEARING OFFICER DODUC: Good answer, Dr. Bray.

MS. McGINNIS: I'm sorry. For the second one?

WITNESS BRAY: I count 11.

MS. McGINNIS: Okay. So 21 compared to 11. Is that roughly half?

WITNESS BRAY: Correct.

MS. McGINNIS: That's -- That's enough.

WITNESS BRAY: One --

MS. McGINNIS: Thank you.

So going back to SRFEs for a moment.

Are you aware that there's a year-round Georgiana reverse -- Georgiana Slough reverse flow

operational criteria?

WITNESS BRAY: I have reviewed the bypass flow criteria which I believe has the Georgiana Slough component. However, it's been some time since I reviewed that, so . . . I am familiar but --

MS. McGINNIS: Okay. So maybe we could pull up SWRCB-104 and go to .pdf Page 100.

MR. BAKER: What chapter?

MS. McGINNIS: Oh, I'm sorry. It's Page 3-98, so Chapter 3.

(Document displayed on screen.)

MS. McGINNIS: And .pdf Page 100.

(Document displayed on screen.)

MS. McGINNIS: I'll -- So I'll find it myself on the page.

Yes. Second bullet from the bottom, it says (reading):

"Operations will be managed at all times to avoid increasing the magnitude, frequency, or duration of flow reversals . . ."

WITNESS BRAY: Yes, I see that.

MS. McGINNIS: Okay. So, if the North Delta Intakes do not increase Georgiana reverse flows, it will not increase SRFEs; is that correct?

WITNESS BRAY: I don't have enough information

to make that statement, no.

MS. McGINNIS: Okay. That's all. Thank you.

WITNESS BRAY: Okay.

CO-HEARING OFFICER DODUC: Miss Meserve.

MS. MESERVE: Good afternoon. Osha Meserve for LAND, et al.

I just have a few questions regarding the DSM-2 velocity issue and the --

CO-HEARING OFFICER DODUC: I'm sorry, Miss Meserve. The what issue?

MS. MESERVE: DSM-2 velocity.

CO-HEARING OFFICER DODUC: Velocity.

MS. MESERVE: Which I think is most of what we were discussing.

And then the flooding at liberty.

CROSS-EXAMINATION BY.

MS. MESERVE: Good afternoon, Dr. Bray.

WITNESS BRAY: Good afternoon.

MS. MESERVE: Just to clarify: On Page 2 of your testimony, you're talking about comparing scenarios and the -- in your estimation, the underpredicting of the significant reverse flow events.

Which all scenarios were you looking at?

WITNESS BRAY: I'm sorry. Can you give me the reference again?

MS. MESERVE: Certainly.

WITNESS BRAY: Page 2 . . .

MS. MESERVE: Page 2 of East Bay MUD-154.

WITNESS BRAY: Line number, please?

MS. MESERVE: I believe it's the lower half of the page.

What I was just trying to clarify is what scenarios you were looking at -- for instance, 4A, B1, B2 -- and maybe this is back in your original rebuttal testimony.

WITNESS BRAY: Well, I -- I think the point is, it's specific to the version. So Version 8.0.6 still has this systematic bias and 8.0.6 is the version that's used for this hearing. It was a version used for the Final EIR/EIS. And both Version 8.0.6 and 8.1.2 are used in the Biological Assessment modeling.

I have reviewed all of that. However, my case in chief is based on the modeling that was done for this hearing.

MS. MESERVE: And so your testimony, does it speak to the underprediction, in your estimation, of the significant reverse flow events for Alternative 4A and for Boundary 1 scenario, or is it only focused on one of the scenarios, the operational scenarios?

WITNESS BRAY: So, Alternative 4A is the --

Let's just be clear that -- Because there's an Alternative 4A for the Final EIR/EIS. That's based on a different version of CalSim.

That version of CalSim then drives Version 8.0.6, so there's that Alternative 4A.

There's an Alternative 4A for the Project action for the Biological Assessment, and that's a different version of CalSim.

It's -- In that case, they're using 8.0. -- 8.0.6 as well as Version 8.1.2 in some cases; for example, for the temperature modeling.

MS. MESERVE: Focusing on the operational scenario, however, that -- because there's a range of operational scenarios being proposed for approval by this Petition.

WITNESS BRAY: Correct.

MS. MESERVE: Did you -- And I understand what you're saying about there's different models applied to different scenarios.

WITNESS BRAY: Yes.

MS. MESERVE: And that may be another level of detail beyond where I'm actually asking.

Did you -- When you were looking at the issue of significant reverse flow events, did you examine the full range of operational scenarios?

WITNESS BRAY: Yes, ma'am.

MS. MESERVE: So, did you find, for instance, that there would be additional significant reverse flow events for both 4A and for Boundary 1?

CO-HEARING OFFICER DODUC: I'm going to insert myself here and ask Miss Meserve:

I don't recall in Dr. Bray's testimony that he distinguishes between the various scenarios and alternatives.

MS. MESERVE: And that's the reason for my question, is, I'm trying to understand how to place -- And I believe it may be within here or maybe within one of the graphs, but I'm trying to understand which scenario -- to which scenario his opinion applies.

CO-HEARING OFFICER DODUC: So, Dr. Bray, how do you answer that without going beyond the scope of your surrebuttal testimony, which did not distinguish between the various scenarios?

WITNESS BRAY: Again, I tried to answer that by explaining it's specific to the version and that those versions -- that version is used for all of the scenarios for this hearing, including the No-Action. So it's the full range for this hearing.

MS. MESERVE: And to clarify: You believe that DWR underpredicted significant reverse flow events across

the board because of the issues you found with DSM-2, not just for one operational scenario.

WITNESS BRAY: I would . . . I would say the DSM-2 model is underrepresenting significant reverse flow events. The Petitioners are using that model, so, yes.

MS. MESERVE: Are you aware, Dr. Bray, that velocity, or flow, is one of the factors that can lead to harmful algal blooms?

WITNESS BRAY: I do not have expertise in harmful algal blooms.

CO-HEARING OFFICER DODUC: And I would caution you to not go beyond that. It is outside the scope of his rebuttal testimony.

MS. MESERVE: You discuss in your testimony the -- on Page 6, the different versions of the models used by Petitioners. If you -- You appear to be critical perhaps of the selection.

If you were going to select the -- what you would think the appropriate version of DSM-2 -- to use for determining velocity at Freeport, what version do you think would be appropriate?

MS. McGINNIS: (Grazing microphone.)

CO-HEARING OFFICER DODUC: Is that an objection?

(Laughter.)

MS. MORRIS: Outside the scope.

CO-HEARING OFFICER DODUC: It is, but I'm curious.

WITNESS BRAY: My answer is, this is not my Project. I mean --

CO-HEARING OFFICER DODUC: Okay.

WITNESS BRAY: -- this isn't my decision. I'm left with working with the Petitioners' modeling.

In my opinion -- Well --

CO-HEARING OFFICER DODUC: No. Let's stop there.

WITNESS BRAY: Thank you.

I would like to say, however, I did address this in my case in chief testimony.

MS. MESERVE: On Page 9 of your testimony, Lines 11 and 12, you discuss the Liberty Island issue that was raised in Dr. Nader-Tehrani's testimony.

Can you just explain in simple terms why the flooding of Liberty Island would affect the tidal dynamics up at Freeport.

MR. SALMON: Objection: I believe the witness testified that they do not, or that he did not find evidence that it did affect tidal dynamics at Freeport.

CO-HEARING OFFICER DODUC: Objection sustained.

That's my understanding, Miss Meserve.

MS. MESERVE: If you were looking at . . .

Would you think that -- If you were trying to understand -- trying to test veracity of a comparative model, would you want to know what kind of open water habitat would be created elsewhere in the vicinity of the Project?

CO-HEARING OFFICER DODUC: I hear an objection coming.

MR. SALMON: Objection: Outside the scope.

CO-HEARING OFFICER DODUC: Sustained.

MS. MESERVE: Thank you.

No further questions.

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

Any redirect, Mr. Salmon?

MR. SALMON: Just a little bit, yes.

CO-HEARING OFFICER DODUC: On what particular area?

MR. SALMON: Going back to Slide 17, was it, that --

(Document displayed on screen.)

MR. SALMON: Yes, that one.

CO-HEARING OFFICER DODUC: Ah, yes. Let's do that.

///

REDIRECT EXAMINATION BY

MR. SALMON: Dr. Bray, you were asked on cross-examination to count the number of peaks below the zero mark on the left-hand axis; is that correct?

WITNESS BRAY: Yes, sir.

MR. SALMON: In your opinion, is it adequate -- is such a count an adequate means of identifying significant reverse flow events?

WITNESS BRAY: It is the magnitude that is important. Again, recall that there is a threshold. So it's the strength of the reverse flow that's important here in terms of the criteria governing a shutdown. Small or lesser minor reverse flows are not crossing that threshold. They're not of interest.

So it is really these low, low minimum velocities occurring when the spring tides occur and the tidal amplitude is maximum that is the key of -- or -- excuse me -- that's of import to significant reverse flow events.

MR. SALMON: And the minimum magnitudes represented on each graph are fairly similar.

Would you agree with that?

WITNESS BRAY: Yes. And, again, I would focus on the first half of December, because, again, as I see it, the flow picks up a little bit late in the month

and -- and, therefore, the tidal cycle, you know, gets dampened.

So it's really that spring tide, as I mentioned before, on or around December 13th on the bottom and on or around April 6th on the top.

MR. SALMON: And is it fair to say that those minimum velocities during those spring tides was an important factor in you forming your opinion that the Liberty Island flooding did not have a significant effect on minimum tides at Freeport and with flows?

WITNESS BRAY: Absolutely, yes.

MR. SALMON: No further questions.

CO-HEARING OFFICER DODUC: Thank you.

Recross?

MS. McGINNIS: No.

CO-HEARING OFFICER DODUC: All right. Thank you, Dr. Bray.

(Witness excused.)

CO-HEARING OFFICER DODUC: At this time, Mr. Salmon, do you wish to move your exhibits into evidence?

MR. SALMON: Yes, please.

East Bay MUD moves to admit Exhibit EBMUD-103 and Exhibit EBMUD-154 into evidence in this proceeding.

CO-HEARING OFFICER DODUC: And without any

objections outstanding, we hereby accept them into the record.

(East Bay Municipal Utility District's Exhibits 103 & 154 received into the record)

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

MR. SALMON: Thank you.

CO-HEARING OFFICER DODUC: -- Mr. Bray.

Mr. Mizell, I forgot to ask -- well, actually, Miss Aufdemberge is not here but I assume you may do so her behalf -- for Petitioners to move their exhibits into evidence, recognizing there are still some outstanding objections that we need to rule on. But I would like you to at least go through that motion so I can close the door on objections.

MR. MIZELL: Certainly. If you'll give me five minutes, I'll compile the listing.

CO-HEARING OFFICER DODUC: All right. Let's do -- Let's take a short five-minute break before we get to Mr. Burke. Everyone can stretch.

And we will return at -- we'll make it 4:15.

(Recess taken at 4:08 p.m.)

(Proceedings resumed at 4:15 p.m.:)

CO-HEARING OFFICER DODUC: All right. It is

4:15. We're back in session.

Mr. Mizell, do you have the list of exhibits?

MR. MIZELL: I do have the Department's ready. I'm still trying to determine what the Department of the Interior would want, so . . .

CO-HEARING OFFICER DODUC: In that case, Mr. Mizell --

MR. MIZELL: I think I can --

CO-HEARING OFFICER DODUC: -- might it be better for you guys to coordinate and submit something in writing by Monday at noon?

MR. MIZELL: I can certainly do that if you prefer.

CO-HEARING OFFICER DODUC: Let's do that rather than try to do it on the fly.

And with the same, I guess, caveat that we can for -- was it the American River Group?

I'll close the door to additional objections on admissibility. If there are any obvious errors in what you submit on Monday, obviously, we will want to be notified of that by the other parties.

There are outstanding objections from American River Water -- well, ARWA and from Miss Des Jardins, I believe.

Any others? I think it's just those two; right?

MS. HEINRICH: I think.

CO-HEARING OFFICER DODUC: Okay. Mr. Mizell.

MR. MIZELL: Just so I don't confuse things, when I submit the list of exhibits for admission into evidence, would you prefer that I include those that I've requested official notice of or exclude those, with the understanding that if official notice is granted, they would be moved into evidence?

CO-HEARING OFFICER DODUC: We have not granted anything.

Miss Heinrich, I'll defer to you on that sort of legal aspect.

MS. HEINRICH: Well, I don't know if it's legal so much as housekeeping.

Your request for official notice is on the record. I don't know you need to include that. But you could with a notation that they're the subject of a request for official notice.

MR. MIZELL: Maybe that's the best. I'll note them as being the subject of the official notice request.

MS. HEINRICH: Okay. Thanks.

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

Now we'll return to Mr. Ruiz and Mr. Burke.

And I believe the Department had estimated about 20 minutes of cross-examination.

Miss Meserve had indicated a few questions.

So we'll try to get you out of here by about 5 o'clock; if not 5:00, a few minutes after, Mr. Burke.

MR. RUIZ: Good afternoon, Hearing Officers and staff. Dean Ruiz on behalf of the SDWA parties Group 21.

THOMAS BURKE,

called as a witness for the Central Delta Water Agency, South Delta Water Agency (Delta Agencies), Lafayette Ranch, Heritage Lands Inc., Mark Bachetti Farms and Rudy Mussi Investments L.P., having been previously duly sworn, testified further as follows:

DIRECT EXAMINATION BY

MR. RUIZ: Mr. Burke, you've been sworn in this case in this matter before; correct?

WITNESS BURKE: Yes, I have.

MR. RUIZ: Mr. Burke, did you prepare surrebuttal testimony as part of your work in this matter?

WITNESS BURKE: I did.

MR. RUIZ: And is SDWA-261 a true and correct copy of that surrebuttal testimony?

WITNESS BURKE: It is.

MR. RUIZ: Since you've submitted that surrebuttal testimony, did you have a chance to review it?

WITNESS BURKE: Yes, I did.

MR. RUIZ: Did you note a few changes to your testimony, essentially typos?

WITNESS BURKE: Yeah. There was two small typos that were made in developing the rebuttal testimony.

The first was on Page 5, Line 22. I mistakenly put Mr. Munévar's name down rather than Dr. Tehrani's name as a reference for that section.

And the same occurred on Page 5, Line 24. Mr. Munévar's name was used rather than Dr. Tehrani's name for that reference.

MR. RUIZ: Thank you, Mr. Burke.

At this time, can you please summarize your surrebuttal testimony.

WITNESS BURKE: I basically have nine points that I would like to briefly make that respond to the rebuttal testimony of Dr. Tehrani and, to a lesser extent, of Mr. Munévar.

The first pertains to the use of monthly or long-term monthly averages and analyzing the model results for the Cal~WaterFix Project.

Dr. Tehrani testified that the output from the DSM-2 model should be used to compare WaterFix scenarios by only using the monthly or long-term monthly average of whatever parameter that you're trying to evaluate.

I disagree with this opinion.

Using a monthly or a long-term monthly average masks the impact from the different scenarios.

The long-term average might be appropriate for a water supply evaluation when you're looking at long-term deliveries, but it's incorrect when you're evaluating impacts to the Delta based on a change in flow characteristics, because the flow characteristics that occur in the Delta are based on the tidal response in the Delta to these changing flow patterns.

The DSM-2 model was developed and calibrated on a 15-minute time-step. It's been in use for over 20 years and has gone through numerous refinements over that 20-year period to ensure that the response of the model on that 15-minute time-step is as accurate as you can get with a physically-based model.

It's impossible to evaluate the changes to a tidal bay system by eliminating the effects of the tide from the analysis, which is basically what's happening when you go to monthly or long-term monthly average analyses.

When used in a comparative fashion, the scenario results are comparable on a short timeframe basis because all the basic characteristics that drive each of these scenarios are on the same equal footing.

The second element that I'd like to discuss is the use of the short time-step in chronological order or in an exceedance analysis that Dr. Tehrani has recommended that all these analyses be based on.

When you're looking at an exceedance analysis, what you're doing is taking all the data you've got and sorting it from high to low.

When you look at the data in a chronological basis, you're taking that same exact data and you're just looking at it in chronological order.

I believe that the most appropriate way to look at that data is not an exceedance analysis but looking at it chronologically, because that helps you to identify when and where and at what duration and extent is occurring when you're looking at a change in flow characteristics that may or may not be an impact.

The third point that I'd like to make in terms of responding to the rebuttal testimony from Dr. Tehrani was looking at the statistics based on long-time water year and averages based on model results.

And based on the two previous points I made, I

feel that this is an inappropriate way of looking at the model results. The long-term averages mask all the impacts that occur within a tidally-based system, which is not going to allow you to really see what impacts are occurring to the flow or water quality characteristics that you're evaluating.

The fourth element that I'd like to respond to was the inclusion of X-2 and the Head of Old River Barrier impacts in evaluation of the Cal WaterFix Scenarios.

Each of the scenarios are made up of multiple different elements, X-2 being a component -- or -- or the lack of X-2 being a component in B1, and the Head of Old River Barrier being a variety of components in the other WaterFix scenarios.

In repeated testimony and cross-examination, Dr. Tehrani and Mr. Munévar responded that the impacts that are seen are a result of the lack of an X-2, or because the operations of the Head of Old River Barrier that are changed and, therefore, shouldn't be looked at as valid impacts to the system because they aren't directly related to diversions that are occurring in the North Delta Diversion.

We feel like that's an inappropriate way of evaluating the impacts in the scenario because each

scenario is made of multiple different components that have to be evaluated as a system.

When they put forth these different scenarios and try to -- and approached the original Board to get a Water Rights Permit for operating within these different scenario ranges, they put these together for a specific purpose.

You can't start picking and choosing which elements in each of these scenarios are appropriate to evaluate or may or may not have valid impacts.

The fifth element or point that I'd like to respond to is the requirements in the No-Action Alternative and the B1 scenario for the X-2.

Now, in the B1 scenario, the X-2 requirement was removed, and Dr. Tehrani has repeated on several occasions that the B1 scenario -- the X-2 scenario that is not included in B1 is not appropriate to evaluate the results from the B1 scenario to the No-Action Alternative, because if the X-2 scenario were to be eliminated as a requirement for Delta flow characteristics, it would have been eliminated in the No-Action Alternative as well as the B1 scenario.

And we don't feel that that's appropriate, that because of the benefits to be gained in the WaterFix Project by not having to meet X-2, that there are

pressures being put on the system that may change the -- whether or not the X-2 actually removed its requirement for flows in the Delta.

The sixth element that I'd like to respond to relates to the assertion that CalSim II is unable to model extreme conditions because the model relies on general rules.

Now, it's true that the model does rely on general rules. These rules were developed by DWR and the Bureau of Reclamation over multiple years looking at Model Operators' response to different conditions, taking the model and running it through the 82-year period of record, trying out different types of rules, and finding out which types of rules give them the best response for the different hydrologic conditions that occurred over that 82-year period.

They then finalized those rules, but now those rules are being applied equally to all the different scenarios, for B1, B2, H3, H4, the preferred alternative.

Since all the rules are being applied equally to all those different models, the response of each of these different models under extreme conditions, whether it be wet or dry conditions, is a valid way of comparing the changes in hydraulic characteristics in -- hydrologic characteristics in the Delta to each of the different

changes that are composed of -- that are integral to each of the different WaterFix scenarios.

And you have to remember, what we're trying to evaluate is not trying to predict exactly what's going to happen in any particular year, because these are generalized rules.

But given these generalized rules, what is changing between each of these different scenarios? Are things improving? Are things getting bet -- worse? Are water levels changing? Is water quality changing?

It's the change from one scenario to the next they're trying to evaluate, not the absolute conditions, which makes it totally valid to evaluate how these different scenarios are operating and responding in extreme events.

The seventh item that I'd like to respond to from the rebuttal testimony is the change in river flow conditions for high-flow years.

And Dr. Munévar -- Or Mr. Munévar has responded that the diversion of flows through the North Delta Diversions will not make high-flow years act like low-flow years, given the diversions -- the volume of diversions being conducted on an annual basis.

I totally disagree with that statement.

The North Delta Diversion would remove a

significant portion of flow in the Sacramento River, especially in the late summer period.

To evaluate that, I took the Petitioners' DSM-2 model output and determined what the flow changes would be downstream of the North Delta Diversions in multiple years.

I'd like to bring up SDWA-261, Page 10, if we could, to take a look at several plots that I developed from that analysis.

(Document displayed on screen.)

WITNESS BURKE: At the top of Page 10, I have a Figure D1.

What this is, is the Sacramento River downstream of the North-of-Delta diversions, and it provides the mean July flow rate for that location.

I've got two plots on this graph. I've got one in blue, which represents the No-Action Alternative, and I've got another plot in red, which represents scenario B1.

And this plot goes from 1975 through 1991. And on the Y-Axis, we have the flow in the Sacramento River.

As you can see, going from the blue line to the red line, you're getting a decrease in water flow rates in Sacramento River for all of these different years -- or most of these different years except for 1977 and

1988.

And what's happening is, the flow rate's dropping from what typically would be a high-flow period through many of these years now to what's more commonly experienced in a dry or critically dry period.

If you go to the next plot, D2, at the bottom of Page 10, we're now looking at August, moving one month further down through the summer.

Again, the blue line represents the flow in the Sacramento River under the No-Action Alternative, and the red line represents the flow corresponding to scenario B1.

Here, you can see that same process is even more exaggerated. Almost all years are showing flow rates that are experienced typically only in dry and critically dry years under the No-Action Alternative, but now all years are looking closer to being a dry or critically dry year.

If we go to Page 11 at the top of the page --

(Document displayed on screen.)

WITNESS BURKE: -- we have the third and final graph showing this process as we move to the month of September.

Here, if you look at the blue line again which represents the No-Action Alternative and moving down to

the red line which represents B1, you can see that the flow rate for B1 alternative has almost flatlined at almost critical conditions for all years, except for 1983, which was an extraordinarily wet year.

And we feel that this change in flow rates downstream of the North Delta Diversions is creating a drought condition that's going to be experienced most every year after the diversions are begun.

Not only do we see this in the flow rate but we also see this same type of process of turning high-flow years into low-flow years in water quality characteristics as well.

If we bring up SDWA -- looks like Page 11, also the bottom of the page.

(Document displayed on screen.)

WITNESS BURKE: What we have here is a figure that we've taken out of Dr. Tehrani's testimony, DWR-79, Page 7, his Figure 2.

And what we've got plotted there is four years, 1984 through 1987. And what's interesting and nice about these particular set of years is, it represents two wet years and two dry years.

The first line that we see there is the blue line, which represents the No-Action Alternative, and on the Y-Axis we have the chloride concentration, which

represents the salinity in the system at Antioch.

And we've got -- If you follow that blue line, you can see through the first year where it's a wet year in 1984, and the salinity levels are fairly low.

If you go to the next year, 1985, it was a dry year and the salinity levels are fairly high.

And then if you go back to 1986, then you see a dry year -- a wet year. Again, the salinity levels for the blue line representing the No-Action Alternative are fairly low. And then, again, going back to a dry year, '87, they become dry again.

Now, if you look to the red line, this is Boundary Condition B1 -- or scenario B1, and in the wet year where the blue line is normally low, suddenly you get that -- the salinity increases to the level that you only experience typically in dry years.

If you follow that red line to a dry year, it matches up with what the No-Action Alternative would be.

Now, as you're moving into 1986 under a wet year, when we typically had low salinity levels, now suddenly we've got high salinity levels again.

And then as you move to '87, which was a dry year, the blue line and the red line match again.

So, basically, what we've done is, we've turned the wet years into dry years. So we've got continual

drought conditions in terms of salinity levels at this location.

And that is a major change and concern, I think, for the water quality characteristics at this point and is in contrast to what Dr. Tehrani has testified to -- I'm sorry -- what Dr. Munévar -- Mr. Munévar testified to.

The eighth point that I'd like to make in terms of rebutting the testimony presented by the Petitioners was, the monthly CalSim boundary -- CalSim II boundary conditions for DSM-2 prohibit accurate sub-monthly analysis of DSM-2 results.

And what we have here is, CalSim II produces a monthly output. These monthly outputs become the boundary conditions to the Delta for the DSM-2 model.

Now, the DSM-2 model takes these monthly outputs and disaggregates that down to a 15-minute time-step for each of the different inflow points to the Delta.

Now, that is not going to allow you to produce accurate results if you want to compare it to real conditions, because the CalSim II model cannot necessarily accurately produce 15-minute data on a day-by-day basis.

But this disaggregation process for the

CalSim II output at the model boundary is done identically for all the different scenarios.

So all the scenarios are on the same footing, so they can be compared to each other even though they may not be able to be predicting reality for any particular day or week. But it allows us to use the DSM-2 model on much shorter time-steps to compare the model results to see whether or not there's a change or an impact from either water quality or stage.

(Timer rings.)

WITNESS BURKE: I've got one last element, if I could.

CO-HEARING OFFICER DODUC: Okay.

WITNESS BURKE: The last element, Number 9, was the effects of the WaterFix scenarios on water level.

It's been stated by Dr. Tehrani that my analysis of water level as a result of the North Delta Diversions and the WaterFix scenarios were limited to just a single 15-minute time-step that produced a 4-foot drop in water elevation.

And this representation of my analysis is incorrect.

The drop in water level we get from the North Delta Diversions, specifically for Scenario B1, are not only extensive, going down to as much as 4 feet, but

extend throughout a whole month rather than a single 15-minute value.

I'd like to bring up Figure D-4 from SDWA-261, which is on Page 13.

This is a plot showing the stage downstream of the North Delta Diversions between 1984 -- or for 1984 and looking at the change in state between B1 scenario and the No-Action Alternative.

As we can see, the top line there showing the tidal cycle in the Delta -- in the Sacramento River downstream of the North Delta Diversions, and you can see the high and low tides for the No-Action Alternative.

The red line below that shows the tidal change for the B1 alternative or the B1 scenario. And, as you see, there's a much greater range because the water levels are being -- are dropping more in the low tides than they are previously in the No-Action Alternative.

I also plotted on this plot the difference between the No-Action Alternative and the B1 scenario, and that's that bottom blue line, the darker line, showing the change in stage between those two scenarios.

And you can see that the change in stage ranged between 2 and 4 feet for the whole month of September. It's not just a single one 15-minute time-step change but, rather, a long stage duration that's causing these

water levels to drop.

And that was the last of my rebuttal.

CO-HEARING OFFICER DODUC: Thank you very much.

DWR?

(Pause in proceedings.)

CO-HEARING OFFICER DODUC: Is this a joint cross-examination?

MS. MORRIS: (Nodding head.)

CO-HEARING OFFICER DODUC: All right.

MS. MORRIS: Good afternoon.

The subjects that I will be cross-examining on are calibration of DSM-2, and the use of DSM-2 --

Oh, am I not supposed to do that now?

CO-HEARING OFFICER DODUC: No. Just identify yourself for the record.

MS. MORRIS: I'm out of practice.

Stefanie Morris for the State Water Contractors. Sorry.

The areas that --

CO-HEARING OFFICER DODUC: And we have Mr. Mizell for DWR.

MR. MIZELL: Yes. Tripp Mizell for DWR.

MS. MORRIS: The areas that we'll be cross-examining on today are a calibration of DSM-2 and use of DSM-2 output, inclusion or removal of Fall X2

requirement in modeling scenarios, modeling of extreme conditions, impacts on Sacramento flows during high-flow years and impacts on water levels.

CO-HEARING OFFICER DODUC: Okay.

CROSS-EXAMINATION BY

MS. MORRIS: Good afternoon, Mr. Burke.

WITNESS BURKE: Good afternoon.

MS. MORRIS: On your testimony, SDWA-261, Page 2, Line 16 through 18, you testified that Dr. Nader-Tehrani stated in his testimony that output from the DSM-2 model should only be used to compare CWF scenarios by using a long-term monthly average; is that correct?

WITNESS BURKE: That's correct.

MS. MORRIS: And can you look at DWR-513, Page 9, which is Figure C5.

(Document displayed on screen.)

MS. MORRIS: So C5, not --

CO-HEARING OFFICER DODUC: What page?

MS. MORRIS: Nine of the .pdf.

(Document displayed on screen.)

MS. MORRIS: Thank you.

Isn't it true, on this graph, it shows Boundary 1, Boundary 2, NAA, H4 and H3 and, in parens after each one, it says "(Daily Average)"?

WITNESS BURKE: My evaluation was based on Dr. Tehrani's rebuttal testimony even though it conflicts with their own presentation in the primary case.

MS. MORRIS: That's not the question I asked you, so thank you.

Can I move to strike that answer?

And the question, again, is --

MR. RUIZ: I'd just like to object at this point:

Mr. Burke's surrebuttal testimony was responsive specifically to the rebuttal testimony, and now we're getting back into -- Dr. Tehrani's rebuttal testimony was DWR-79 and that's specifically what Mr. Burke was responding to.

CO-HEARING OFFICER DODUC: Miss Morris.

MS. MORRIS: I have three questions and two graphs, and that's it.

And it really is to go to show that Dr. Nader-Tehrani did use daily in two different plots, one for water quality chloride and one for water levels, which are directly related to the surrebuttal testimony.

CO-HEARING OFFICER DODUC: It is.

Overruled.

WITNESS BURKE: Please repeat the question, please.

MS. MORRIS: Sure.

Looking at DWR-513, Page 9, Figure C5, if you look at the legend on the top, doesn't it say after each line that's identified there "(Daily Average)"?

WITNESS BURKE: Yes, it does.

MS. MORRIS: So do you agree that this plot does not utilize long-term averages to show chloride objective at Contra Costa Canal pumping plant?

WITNESS BURKE: My surrebuttal didn't respond to the -- what was in this plot, but I agree that what -- that this plot is not using long-term averages.

MS. MORRIS: You would agree.

WITNESS BURKE: That's correct.

MS. MORRIS: Thank you.

And if I could turn to same -- DWR-513, Page 15, looking at Figure W5.

(Document displayed on screen.)

MS. MORRIS: And this, again, is looking at water levels, and this -- this figure is entitled, "Probability of Exceedance for Daily Minimum Stage at Old River at Tracy Road."

Do you see that.

WITNESS BURKE: I do.

MS. MORRIS: So, is it your understanding that each curve in this figure, being Figure W5, is assessing

the daily minimum stage over 500 -- 5,844 days, or 16 years?

WITNESS BURKE: I do.

MS. MORRIS: You agree?

WITNESS BURKE: I agree that this is daily data.

MS. MORRIS: Okay. And that it's looking at daily data for 5,844 days.

WITNESS BURKE: I'll take your word on the number.

MS. MORRIS: Fair enough. Never trust a lawyer to do math.

So, again, doesn't this demonstrate that Dr. Nader-Tehrani was not just relying on long-term averages in his analysis?

MR. RUIZ: I'm just going to object again. It's the same objection as before:

He's responding -- His surrebuttal testimony is responding to the rebuttal testimony, not delving back into case in chief testimony.

MS. MORRIS: I have the same response.

CO-HEARING OFFICER DODUC: Same -- Yes, the same ruling.

Overruled.

MS. MORRIS: Okay.

WITNESS BURKE: Could you repeat the question again?

MS. MORRIS: Sure.

Doesn't this demonstrate that Dr. Nader-Tehrani was relying not just on long-term averages when evaluating water level changes?

WITNESS BURKE: Yes, it does.

MS. MORRIS: Thank you.

Okay. And then I'd like to look at Page 5 of your testimony, SDWA, Lines 22 to 26.

(Document displayed on screen.)

MS. MORRIS: You state that, in your opinion, the CWF North Delta Diversions put significant pressure on the agencies to have the X-2 requirement removed if they are allowed to operate at Boundary 1.

Isn't it true that if they are operating at -- at Boundary 1 scenario, there is no Fall X2 requirement?

WITNESS BURKE: That's correct.

MS. MORRIS: Is it your understanding that Fall X2 -- the Fall X2 requirement is a regulatory requirement for the protection of fisheries that could change, independent of California WaterFix?

WITNESS BURKE: Yes, that's true.

MS. MORRIS: Couldn't the fishery agencies, in fact, change it at any point in time? "It" being

Fall X2. Sorry.

MR. RUIZ: I'm just going to object here: It calls for speculation.

CO-HEARING OFFICER DODUC: Miss Morris.

MS. MORRIS: I mean, if he knows.

WITNESS BURKE: I'm not familiar with the protocol that would be required to change that.

CO-HEARING OFFICER DODUC: All right.

MS. MORRIS: Are you aware that there is significant scientific debate regarding Fall X2?

MR. RUIZ: Again, that's outside of the scope of his surrebuttal testimony.

CO-HEARING OFFICER DODUC: He brought up X-2, so to the extent that he has information with respect to X-2 and can answer her question, he should answer them.

WITNESS BURKE: I've never followed the scientific discussions concerning X-2.

MS. MORRIS: So you don't know?

WITNESS BURKE: No, I don't.

MS. MORRIS: Great. Thanks.

On Page 6 of SCWA-261, you discuss how Modelers --

(Document displayed on screen.)

MS. MORRIS: -- can use models to come up with rules to get through extreme conditions; is that correct?

WITNESS BURKE: Oh, what lines are you looking at?

MR. RUIZ: Can you just slow down a minute? What lines are you referring to.

MS. MORRIS: Page 6, Lines 8 through 26.

Specifically, if you want me to read it to you, it says, from your testimony (reading):

"Based on the observed response of the operations model to those year types, one can then make changes to the operations model, and rerun the model, with those changes, to evaluate the new response."

WITNESS BURKE: That's correct.

MS. MORRIS: Okay. So you state that such operational rules, if in some years an acceptable response is not possible, the model would indicate where reduced deliveries or operational curtailments would be necessary; correct?

WITNESS BURKE: If they built in rules detailed enough to show those particulars, it could.

MS. MORRIS: Is it your opinion that, under circumstances when there is not sufficient water in the system to meet all obligations, that Modelers should speculate regarding how regulatory agencies such as the State Water Resources Control Board would act or which

water rights might be curtailed in such circumstances?

WITNESS BURKE: Could you repeat that question, please?

MS. MORRIS: Sure.

Is it your opinion that, under circumstances when there's insufficient water in the system to meet all obligations, that Modelers should speculate regarding how regulatory agencies such as the State Water Resources Control Board would act or which water rights might be curtailed in such circumstances?

MR. RUIZ: I'm just going to object: The question's compound two or three times.

MS. MORRIS: Do you understand the question?

WITNESS BURKE: I don't think that the Modelers should guess at what the regulatory response would be. That's what the whole purpose of making generalized rules is that they can be consistent between different scenarios when they evaluate these.

If there isn't sufficient water to be allocated to all the needs of the system, then the Modeler has to assume, within a certain priority of distribution, whether or not there are going to be changes and, you know, wheeling and dealing and horse trading at the end in order to balance things out.

The Modeler cannot assess that and it's not

built into any of the models or generalized rules.

MS. MORRIS: So you're suggesting that, for every single condition where there's insufficient water in the system, that there are generalized rules that can be applied to every single scenario in the same fashion?

MR. RUIZ: I'm going to object: That misstates his testimony.

CO-HEARING OFFICER DODUC: I will sustain that.

Rephrase that, Miss Morris.

MS. MORRIS: Are you -- Are you testifying that Modelers could apply general rules to each and every drought scenario?

WITNESS BURKE: No. That's the whole idea of the mean generals. They're not applicable to any particular drought scenario. They try to find the best response using typical Operator controls to respond in a drought condition.

MS. MORRIS: So -- And it's not your opinion that, for any specific time period when there's insufficient water in the system -- let's just call it drought -- that the Modelers can model that situation or that scenario.

MR. RUIZ: I'm just going to object: It's compound; and I don't know if -- it's an incomplete hypothetical.

CO-HEARING OFFICER DODUC: I had trouble following it as well, Miss Morris.

So slow down a little bit and perhaps break it down. Simplify your question a little.

MS. MORRIS: If a Modeler is applying a general rule, how can that possibly respond to a specific drought scenario that may differ from drought to drought?

WITNESS BURKE: It applies in a general way. And the way it's used in an evaluative and comparable mode, is that each scenario will show you how extensive that drought response may be.

How you accommodate that response in real-time may differ from one year to another year, but at least you can see from a relative perspective what the magnitude of change is going to be from one scenario to the other.

MS. MORRIS: So you're not testifying that you can bottle specific actions to cover all drought scenarios.

WITNESS BURKE: No, not all drought scenarios.

MS. MORRIS: Turning to Page 7 of your testimony, Lines 21 to 26, and that's SDWA-261.

(Document displayed on screen.)

MS. MORRIS: You state that (reading):

"The North Delta Diversions will remove a

significant portion of the flow in the Sacramento River . . . in late summer."

Correct?

WITNESS BURKE: That's correct.

MS. MORRIS: And you state that the (reading):

". . . Magnitude of diversion will remove much of the excess water during wet years, to a point where, in late summer, most all years will look like dry and critically dry years."

Is that correct?

WITNESS BURKE: That's correct.

MS. MORRIS: Are you saying that diversion of excess flows, which typically occurs in winter and spring months, would lower the Sacramento River flows in the summer?

WITNESS BURKE: I'm saying during the late summer, there is significant amount of water being diverted as a percentage of the Sacramento River flow that then affects the resulting flow within the river.

MS. MORRIS: But your testimony is related to excess -- excess flows.

WITNESS BURKE: What are you describing as an excess flow?

MS. MORRIS: Well, what do you mean by it? It's your testimony.

Why don't you tell me about it.

WITNESS BURKE: Can you bring up that section on the screen so I can take a look at it?

(Document displayed on screen.)

WITNESS BURKE: So which lines are you referring to?

MS. MORRIS: I was looking at Lines 19 through 26, and you -- in particular, Line 24, the (reading):

". . . Magnitude of diversion will remove much of the excess water during wet years, to a point where, in late summer, most all years will look like dry and critically dry years."

MR. RUIZ: So just so I'm clear, and for the record, what's the question?

MS. MORRIS: Well, I asked a question. There was confusion about what excess flows was. It's his testimony. I've now asked what does he mean by excess flows?

WITNESS BURKE: Yeah. I would say it was probably -- Looking at that statement, it would be inappropriate to put "excess" in there. It's -- If what it is, is removing a significant portion of the water, not necessarily differentiating between what might be considered excess or not excess.

MS. MORRIS: What do you think the source of

that water is during summer months?

WITNESS BURKE: Most of it is being released from the reservoirs.

MS. MORRIS: So it's stored water, not excess water; correct?

WITNESS BURKE: Yeah. "Excess" is inappropriate in that context.

MS. MORRIS: Okay. Since the No-Action Alternative -- And just so -- I guess I should probably -- I'm just going to give you what I'm looking at so I don't cause confusion and delay.

On SDWA-261, looking at Figures D1 and Figures D2.

(Document displayed on screen.)

MS. MORRIS: The No-Action Alternative doesn't include the North Delta Diversion; correct?

WITNESS BURKE: That's correct.

MS. MORRIS: And B1 does include the North Delta Diversion; correct?

WITNESS BURKE: That's correct.

MS. MORRIS: So wouldn't you expect that these lines would be different because there is no North Delta Diversion and all the water would be moving through -- some way through the Delta to the South Delta where it would likely be, some portion of it, exported?

WITNESS BURKE: Would you repeat the question?

MS. MORRIS: Since the No-Action Alternative doesn't include the North Delta Diversion, wouldn't you expect that the No-Action Alternative line would be higher than the B1 line?

WITNESS BURKE: I would expect it to be higher, that's correct.

MS. MORRIS: Wouldn't you also suspect that some of the water shown in B1 would be diverted at the South Delta pumps?

WITNESS BURKE: I think some of the water in all concerns is diverted at the South Delta pumps.

MS. MORRIS: Okay. But my question was specific to B1.

WITNESS BURKE: Okay. Yes, some of the water is diverted at the South Delta pumps.

MS. MORRIS: Thank you.

And your Figure D3 on Page 11 of SD-261 --

(Document displayed on screen.)

MS. MORRIS: -- you did an analysis comparing B1 and the No-Action Alternative to the mean September flow rate; correct?

WITNESS BURKE: That's correct.

MS. MORRIS: And, again, you are aware that part of the difference in flows between the No-Action

Alternative and Boundary 1 is the inclusion of Fall X2 in the No-Action Alternative and the exclusion of Fall X2 in Boundary 1.

WITNESS BURKE: Yes. That's what I was trying to evaluate.

MS. MORRIS: So, looking at your testimony, SDWA-261, Page 12, Lines 1 through 9.

(Document displayed on screen.)

MS. MORRIS: You appear to agree that the disaggregation process for incorporating CalSim II monthly output into DSM-2 means that the disaggregation flows will not necessarily match the flow pattern on any specific day in the future; correct?

WITNESS BURKE: That's correct.

MS. MORRIS: However, given the sub-monthly patterning is the same between the No-Action Alternative and the CWF scenarios, you are claiming that it could be used to compare sub-monthly results for these scenarios; correct?

WITNESS BURKE: I'm claiming that you can compare one scenario to another scenario using the same CalSim II input and DSM-2 model output.

MS. MORRIS: Isn't it true that sub-monthly flows under the CWF scenarios could vary from the No-Action Alternative in real-time because Operators may

respond to any changes in Delta conditions; for example, Delta salinity?

WITNESS BURKE: I wasn't evaluating any real-time operation changes. I was just evaluating the changes from one WaterFix to another.

MS. MORRIS: Okay. But wouldn't you agree that if changes were made by Operators that aren't modeled -- that aren't in the model because of the sub-monthly flow issue, that it could be different in the No-Action Alternative model versus what happens in reality?

WITNESS BURKE: I couldn't speculate what changes might be conducted by the Operators in real-time.

But by not including those and just looking at the generalized conditions, you're able to see from one scenario to the next what the magnitude of those changes might need to be for the Operators to respond to those changes in real-time.

MS. MORRIS: But you would agree that a potential change by -- in the No-Action Alternative in real-time could be different than the sub-monthly flow patterns that are shown in the modeling; correct.

WITNESS BURKE: I'm not sure if I understand the question.

MS. MORRIS: What don't you understand? What part?

WITNESS BURKE: The first part is changes that an Operator might make in real-time. The second part was something to do with changes to sub-monthly flow patterns, and I don't see how --

MS. MORRIS: All right. Let me go back. Let me try to make this clear.

You agree that the sub-monthly flow pattern in DSM-2 does not mimic what happens in real life; correct?

WITNESS BURKE: It mimics the best assessment that DWR can make looking at historic flow patterns that they can apply universally to each of the different flow scenarios, but it does not match what you might see in any one particular year.

But they're not trying to match any one particular year. They're trying to compare one scenario to the other. They want to make sure that comparison's on the same footing, so they provide that same disaggregation identically to each scenario.

MS. MORRIS: Okay. Thank you.

Isn't it -- Because I think you did answer my question even though you gave a lot of other commentary there to qualify your answer.

But isn't this -- this changes between the sub-monthly flow pattern and what happens in reality why one should be cautious when using sub-monthly outputs

from the models?

WITNESS BURKE: You need to be cautious when using sub-monthly outputs from the model if you're trying to compare the model results to a real-life criteria, like a D-1641 specification.

MS. MORRIS: Great. That's perfect. Now I don't have to ask that question.

Do you recall in Figure 2 on Page 11 of SDWA-261, which is the bottom figure, in your testimony, that you cite to in your testimony that Dr. Nader-Tehrani testified that the water quality changes in this particular example were due to the institution of X-2 in the No-Action Alternative but not in Boundary 1?

WITNESS BURKE: That's correct.

MS. MORRIS: And are you aware that Fall X2 has never been fully implemented?

WITNESS BURKE: I understand that it hasn't been implemented on a regular basis but that it is still a requirement for the system.

MS. MORRIS: Great. Thank you.

I have no further questions.

CO-HEARING OFFICER DODUC: Miss Meserve.

MS. MESERVE: No questions.

CO-HEARING OFFICER DODUC: Any redirect?

MR. RUIZ: No, no redirect.

CO-HEARING OFFICER DODUC: All right. I will ask you to wait until completion of all of Group 21's surrebuttal before moving your exhibit into the record.

With that, thank you, Mr. Burke.

(Witness excused.)

CO-HEARING OFFICER DODUC: And we are adjourned until tomorrow.

We will begin at 9:30 and I don't expect we will go much after the lunch hour.

Thank you all.

(Proceedings adjourned at 4:57 p.m.)

State of California)
)
County of Sacramento)

I, Candace L. Yount, Certified Shorthand Reporter for the State of California, County of Sacramento, do hereby certify:

That I was present at the time of the above proceedings;

That I took down in machine shorthand notes all proceedings had and testimony given;

That I thereafter transcribed said shorthand notes with the aid of a computer;

That the above and foregoing is a full, true, and correct transcription of said shorthand notes, and a full, true and correct transcript of all proceedings had and testimony taken;

That I am not a party to the action or related to a party or counsel;

That I have no financial or other interest in the outcome of the action.

Dated: June 29, 2017

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Candace L. Yount, CSR No. 2737