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8 BEFORE THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

9
10 HEARING IN THE MATTER OF
11 CALIFORNIA DEPARTMENT OF WATER
RESOURCES AND UNITED STATES
12 BUREAU OF RECLAMATION REQUEST
FOR A CHANGE IN POINT OF
13 DIVERSION FOR CALIFORNIA WATER
FIX

**CALIFORNIA DEPARTMENT OF
WATER RESOURCES' RESPONSE
IN OPPOSITION TO SACRAMENTO
VALLEY WATER USERS'
OBJECTIONS TO WRITTEN
TESTIMONY AND EXHIBITS
SUBMITTED BY PETITIONERS U.S.
BUREAU OF RECLAMATION AND
CALIFORNIA DEPARTMENT OF
WATER RESOURCES AND
JOINDERS**

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17 **I. INTRODUCTION**

18 California Department of Water Resources ("DWR") files this response to
19 objections filed by the Sacramento Valley Water Users (SVWU). SVWU objects to the
20 introduction of DWR's exhibits (114, 115, 116, 324, 513, 514, and 515) and U.S.
21 Department of Interior (Reclamation) Exhibit 5, and testimony of Jennifer Pierre,
22 Maureen Sergent, Armin Manevar, Parviz Nader-Tehrani, Ray Sahlberg, Ron Milligan,
23 and John Leahigh.

24
25 DWR opposes the objections on the grounds that the exhibits are relevant as to
26 matters detailed in the Petition. Petitioners' testimony and supporting exhibits not only
27 provide a description of current operations and the proposed project but also extensive
28

1 testimony regarding the effects of the proposed changes including on water quality,
2 water quantity, timing of diversion or use, and consumptive use. (See e.g., SWRCB-1
3 [Petition], SWRCB-2 [Addendum and Errata to Permit], SWRCB-[RDEIR/SDEIS], DWR-
4 051 [project description/operational guidelines]; DWR-057 [CWF design and construction
5 impacts], DWR-053 and DOI-04 [changes to water rights permit], DWR 061 and DOI-07
6 [current and anticipated operations of the SWP-CVP], and DWR-066 and 071 [analysis
7 of project changes in water supply, water quality, and water levels].

8
9 DWR reserves the right to provide additional responses to these objections and to
10 respond to other objections that may be raised later. DWR also refers to the Introduction,
11 page 3 of its Master Response previously submitted to the Board on July 20, 2016.

12 13 **II. ARGUMENTS**

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15 SVWU begins the objections by criticizing the lack of information despite the
16 Board's rulings. It acknowledges the Petitioners have provided the additional
17 information requested but claims it still is not enough, calling it an issue of improper
18 foundation. Petitioners' Master Response details the applicable procedures and
19 standards that apply to this administrative hearing.

20 Government Code section 11513 provides liberal evidentiary rules for
21 administrative hearings. Parties need not follow the technical rules of evidence used in
22 courts. The standard for determining admissibility for evidence in an administrative
23 hearing centers on relevancy. Specifically, Government Code section 11513,
24 subdivision (c), provides:

25 The hearing need not be conducted according to technical rules
26 relating to evidence and witnesses, except as hereinafter provided.
27 Any relevant evidence shall be admitted if it is the sort of evidence
28 on which responsible persons are accustomed to rely in the conduct
of serious affairs, regardless of the existence of any common law or
statutory rule which might make improper the admission of the

evidence over objection in civil actions.

To the extent a party wishes to oppose testimony, the party is entitled to “cross-examine opposing witnesses on any matter relevant to the issues even though that matter was not covered in the direct examination” (Gov. Code sec. 11513(b).)

A. Opinion Testimony does not require that all supporting materials considered be admitted into the record.

SVWU’s position that the underlying modeling data is required to be an exhibit is not supported by law and is impracticable. Modeling is one tool used by experts to evaluate past conditions and operations and possible impacts of future operations. The appropriate use of model results is important. Despite detailed modeled inputs and assumptions, the results may differ from real-time operations and therefore model results should only be an indicator of water supply conditions under that given model run and should not necessarily be understood to reflect literally what would occur in the future. For a complete description of the limitations please see Appendix 5A of the BDCP Public Draft EIR/EIS (released December 2013).

SVWU acknowledges, “[t]he assumptions and results of the computer modeling are presented in the testimony of Armin Manevar (DWR-71), graphs purporting to show simulated deliveries to various water users (DWR-514, Figures 2 through 10), and exceedance probability charts of simulated exports and carryover storage (DWR-514, Figures 11 through 15).” SVWU then, without legal support or details of how any of the alleged information is necessary, claim technical memorandums, assumptions, and data tables as end of month storage levels should have been included. This information is publicly available and need not be submitted separately into evidence to be used by SVWU or others. Within the modeling data linked to the hearing website is the data necessary for SVWU to create a table to suit its needs but the Petitioners are not required to include it.

1 The presentation of contrary evidence or challenges to the sufficiency of evidence
2 is the function of cross examination and rebuttal testimony in which Protestants are
3 afforded the opportunity to challenge the weight of the evidence provided.

4 The modeling data (model assumptions that describe input and results that
5 describe output) is part of Petitioners' case in chief, which was served on all parties on
6 May 31, 2016. (DWR-5, DWR- 66, and DWR-71.) The modeling assumptions for
7 conveyance alternatives were provided in the 2013 BDCP public EIR/EIS, see Chapter 5
8 and Appendix 5A. Additional modeling analysis was provided in the 2015
9 RDEIR/SDEIS, see Appendix B – Supplemental Modeling for New Alternatives. The
10 Board has acknowledged much of the underlying technical information is available,
11 posted additional information requested by parties,¹ and has within its expertise and
12 purview to review the “scientific” evidence submitted to determine whether such
13 testimony is the sort of information on which a responsible person would rely and the
14 proper weight to afford such evidence.

15 One example of this acknowledgement is in the February 11, 2016 Ruling:

16 The CEQA/NEPA documents do contain a significant amount of detailed
17 information about proposed operations associated with the petition. (See,
18 e.g., section 4.1.2.2 (Water Conveyance Facility Operations) [Table 4.1-2
19 cross-referencing Tables 3-16 in the Draft EIR/EIS and 3.4.1-2 in the
20 BDCP Public draft for North Delta bypass flows].) Further, petitioners
submitted a post pre- hearing conference letter stating that additional
CALSIM and DSM2 hydrologic and water quality modeling data prepared

21 ¹ Please note that the below files are very large and have been placed on the Water Board FTP server for
22 download. On the FTP server the files are located in directory 'WaterFix' and have the same names as
listed below. To access the FTP server please click on the below URL link and use the listed user name
and password. <https://ftp.waterboards.ca.gov/>

23 User name: Web_Shared

Case sensitive password: Web_Download

- 24 ▪ Alternative H3 with Fall X2 (ZIP file size: 3.7 GB)
- 25 ▪ Alternative H4 with Fall X2 (ZIP file size: 3.7 GB)
- 26 ▪ Boundary 1 without Fall X2 (ZIP file size: 3.7 GB)
- 27 ▪ Boundary 2 with Fall X2 (ZIP file size: 3.7 GB)
- 28 ▪ No Action with Fall X2
- CALSIM (ZIP file size: 18.6 MB)
- DSM2 (ZIP file size: 4.5 GB)

1 for the biological assessment for the WaterFix ESA processes are
2 available upon request. We encourage petitioners to post this information
3 on their WaterFix website.

4 * * * * *

5 Petitioners pointed out that the biological assessment is also publicly
6 available. We appreciate petitioners' supplemental information and
7 direction to where parties can locate relevant information, but also
8 understand the difficulty parties face sorting through voluminous
9 documents to decipher relevant details necessary to assess whether the
10 petition will cause injury. The available information lacks clarity in several
11 ways, including whether operational criteria are intended to constrain
12 project operations or are identified for modeling purposes only, areas
13 where a specific operational component or mitigation measure is not yet
14 chosen or identified, operational parameters that are not defined and
15 deferred to an adaptive management process, and lack of clarity
16 concerning some mitigation measures.

17 * * * * *

18 We recognize that not all of these uncertainties need to be resolved for a
19 satisfactory project description. Indeed, precisely what mitigation
20 measures should be required and what flow criteria are appropriate,
21 should the State Water Board approve the petition, are issues that will
22 comprise a significant portion of the issues to be decided on the hearing
23 record. At a minimum, however, petitioners should provide the information
24 required by section 794, subdivision (a) of our regulations.

25 The Ruling also agreed with some of the parties that,

26 absent a *more complete and succinct* submittal of information by petitioners,
27 project opponents will not be able to fully-develop their cases in chief, and much
28 substantive content will be deferred to the rebuttal stage of the hearing. The
petitioners' cases in chief must, to the extent possible, contain the information
required by section 794 of our regulations in a *succinct and easily identifiable*
format. The other parties will then be able to more accurately assess whether the
proposed changes would cause injury. This staggered approach allows the
hearing to move forward while focusing the hearing issues and capturing
efficiencies from the protest resolution process that normally precede a Board
hearing.

29 In response to this direction, the Petitioners prepared its testimony. In fact, the
30 SVWU requested more time to file its case in chief, and only after the Petitioner's case in
31 chief was completed. Despite getting that advantage, SVWU objects to the testimony

1 and evidence submitted in a succinct and identifiable format, stating more modeling data
2 is needed, without acknowledging the voluminous modeling data available.

3 Besides the modeling data in the 2013 Public Draft EIR/EIS, 2015 RDEIR/SDEIS,
4 and DRAFT Biological Opinion, additional model packages have been made available
5 and are linked to the SWRCB Hearing website for the this proceeding. SVWU will have
6 the opportunity to ask Petitioners' experts about the modeling and make arguments
7 regarding what weight should be given to the experts' conclusions based on their own
8 evidence.

9
10 DWR and Reclamation have proposed an operational range for the project at this
11 point in the hearing, permitting parties to evaluate impacts for any operational scenario
12 within that range. That does not make the testimony irrelevant or ambiguous. Instead,
13 this provides a meaningful method to evaluate a range of impacts, and allows the
14 SWRCB and parties to access the different operational scenarios. Petitioners' experts
15 summarized their testimony, consistent with the procedural rulings in this case.²
16

17 i. **Based on lack of foundation SVWU objected to DWR's testimony attached**
18 **as Attachment A and Petitioners' Exhibits as follows:**

- 19 1. Most of the Modeling PowerPoint (DWR-5) – this power point will be used to
20 explain the modeling and assists the Hearing Officers and parties to understand
21 the proposed project.
- 22 2. Alternative Comparison Figure (DWR-114) – this figure provides a clear
23 comparison to assist with understanding complex and voluminous modeling data
24 results.

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26
27 ² The order of presentation for this hearing allows Protestants to follow the Petitioners' case in
28 chief, all to the advantage of SVWU as requested.

- 1 3. Table of Operating Criteria (DWR-116) – a table of operating data, explained in a
2 concise manner as requested by the parties and Board.
- 3 4. Modeling results and tables (DWR 513-515) – summaries of modeling results and
4 assumptions tables, again requested by parties and Board and used by lead
5 witnesses to explain modeling.

6 ii. **The Modeling testimony is clear and SVWU has the opportunity to ask for**
7 **clarification.**

8 Petitioners filed a Master Response to Objections on July 20, 2016. In that
9 Master Response, DWR provides Protestants a detailed response to the objections to
10 the modeling testimony and testimony that references the proposed project operations.³
11 (See Sections E and F of the Master Response).

12
13 **B. Expert opinions can include their understanding of the legal framework**

14
15 1. Petitioner addressed the issues raised by SVWU related to allegation of
16 “Legal Conclusions” as testimony in the Master Response, see Section H.

17 2. SVWU also challenges the boundary analysis presented in Petitioners’
18 testimony as speculative. The modeling analysis is a tool and the purpose of this
19 hearing is to define project operations within an adaptive range. See Master Response,
20 Section F. With regard to the necessity of proposed permit terms raised in SVWU
21 objections, the Petitioners replied with those presented in D-1641 and provided analysis
22 for operational boundaries. SVWU continues in section B of its objections to challenge
23 the modeled scenarios as unrealistic, specifically H4. The Board and others have
24 demanded a “high” outflow scenario and in response, the Petitioners provided
25

26 ³ Challenges to the specific operations of “adaptive management” is a factual argument and not a
27 legal objection, it is adaptive. Of course the proposed project will include adaptive management. The
28 Draft EIR/EIS and RDEIR/SDEIS detail adaptive management and real time operational constraints, and
the Final EIR/EIS will as well.

1 boundaries to include higher flows that may not be accomplished consistent with the
2 Coordinated Operations Agreement. There is sufficient evidence in the environmental
3 documents to support the H4 analysis as within SWP's water rights and facilities.

4 3. SVWU objects to testimony on the basis that additional outflow for
5 Boundary 2 is not identified. Petitioners have clearly stated that the proposed project will
6 operate under its water rights only. Please refer to Maureen Sergent's testimony.

7
8 4. SVWU then objects to Petitioners' power point presentations for Water
9 Rights (DWR-3), Operations (DWR-4), and Modeling (DWR-5) based on the above
10 arguments, as well as the summary of alternatives (DWR 114) and Map of Channel
11 Margin habitat (DWR 115). The summary of alternatives and map provide content to the
12 evidence presented by the witnesses.

13 5. SVWU also objects to testimony shown in Attachment A.

14 **C. The Secondary Evidence Rule Does Not Bar Testimony by Maureen Sergent**

15 SVWU challenges the testimony of Maureen Sergent on the grounds that such
16 testimony constitutes "oral testimony to prove the content of a writing" pursuant to
17 Evidence Code section 1523. Protestants challenge the testimony copied into
18 Attachment A by reference to page and line number, quoting one sentence in its
19 objection, "[w]ater stored in Lake Oroville is stored exclusively under DWR's water
20 rights."
21

22 i. **Evidence Code section 1523 does not apply to administrative**
23 **hearings.**

24 Evidence Code section 1523 does not apply to administrative hearings.
25 Adjudicative proceedings before the State Water Resources Control Board are governed
26 by the rules set forth in Government Code section 11513 (23 CCR § 648.51).

27 The only sections of the Evidence Code applicable to administrative proceedings
28

1 before the State Water Resources Control Board are Evidence Code sections 801-805
2 (23 CCR §648, subd. (b)). Thus, the only requirement for admission of Ms. Sergent's
3 testimony in this proceeding is that such testimony be (1) relevant and (2) the sort of
4 evidence on which responsible persons are accustomed to rely in the conduct of serious
5 affairs.

6 Here, Ms. Sergent's testimony regarding her understanding of the Feather River
7 settlement agreements provides one of the bases for her expert opinion that the new
8 points of diversion will not injure other legal users of water. As such, this evidence is
9 clearly relevant to the proceedings. In addition, the testimony of a qualified expert
10 regarding the writings and reasoning supporting her ultimate opinion is the type of
11 evidence upon which reasonable persons routinely rely in the conduct of serious affairs.
12 *See Big Boy Liquors, Limited v. Alcoholic Beverage Control Appeals Bd.* (1969) 71
13 Cal.2d 1226, 1229-1230 (rejecting petitioner's argument that the Department of Alcoholic
14 Beverage Control failed to introduce the "best evidence" of the petitioner's violations,
15 and the Alcoholic Beverage Control Appeals Board failed to consider the lack of this
16 "best evidence," on the grounds that the Board was not required to consider Evidence
17 Code presumption that weaker evidence be viewed with distrust).

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19
20 ii. **Ms. Sergent's testimony is expert opinion testimony that is not**
21 **proffered to "prove the content of a writing"**

22 Even if the Board were to apply Evidence Code section 1523, the section would not
23 mandate the exclusion of Ms. Sergent's testimony because the testimony that
24 protestants seek to exclude does not "prove the content of a writing" as contemplated by
25 the statute. Rather, as expressly permitted by Evidence code section 802, the disputed
26 testimony provides the factual foundation for Ms. Sergent's expert opinion. An expert
27 witness testifying in the form of an opinion is expressly permitted to state on direct
28

1 examination the reasons for her opinion and the matter upon which it is based (including,
2 in the case of an expert, her special knowledge, skill, experience, training, and
3 education), unless she is precluded by law from using such reasons or matter as a basis
4 for his opinion. (Evid. Code § 802).

5 Page 11:10-13 of Ms. Sergent's testimony does not mention the Feather River
6 settlement agreements at all. Pages 17:23-18:4 of Ms. Sergent's testimony, which do
7 refer to the Feather River settlement agreements, make clear that Ms. Sergent's
8 testimony explains her understanding of the cumulative effect of the agreements and
9 how that supports her opinions regarding effects of the project on legal users of water.
10 Thus, the testimony makes clear that Ms. Sergent is not testifying as to what the
11 contents of the writing are, but instead as to how those writings provide some of the
12 bases for her expert opinion.
13

14 **iii. Evidence Code section 1523 expressly permits testimony of the**
15 **general result of numerous writings**

16 In addition, Ms. Sergent's testimony summarizes the general effect of multiple
17 different settlement agreements affecting the Feather River Services Area in support of
18 her opinions and conclusions. Evidence Code section 1523, subsection (d), specifically
19 permits such testimony. It states:

20 (d) Oral testimony of the content of a writing is not made inadmissible by
21 subdivision (a) if the writing consists of numerous accounts or other writings that
22 cannot be examined in court without great loss of time, and the evidence sought
23 from them is only the general result of the whole. (Evid. Code §1523(d)).

24 Here, Ms. Sergent's testimony summarizes the cumulative effect of multiple
25 different settlement agreements, and how this effect supports her overall opinions and
26 conclusions. As such, it is admissible pursuant to Evidence Code section 1523.
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III. CONCLUSION

DWR opposes SVWU's requests on the grounds that DWR's written submissions demonstrate that these witnesses are qualified experts, may give opinion testimony, and have submitted relevant testimony based on the issues identified in the Notice of Petition for hearing by the SWRCB on October 30, 2015. To the extent SVWU has questions about this testimony and the exhibits, it will have the opportunity to cross-examine these witnesses about their testimony and the exhibits. DWR reserves the right to provide additional written and oral responses to these and to respond to other objections that may be raised later.

Dated: July 22, 2016

CALIFORNIA DEPARTMENT OF WATER
RESOURCES



Robin McGinnis
Office of the Chief Counsel

ATTACHMENT A

DWR-51 (Jennifer Pierre)

Pg. 10: 8-16

Since the BiOp has not been issued, and DWR and Reclamation do not know the initial operational criteria the analytical framework presented for Part 1 is a boundary analysis. The boundary analysis will provide a broad range of operational criteria and the initial operating criteria will fall within this range. These boundaries are sufficiently broad so as to assure the State Water Board that any operations considered within this change petition proceeding has been evaluated with regard to effects on legal users of water. These boundaries are described below as boundary 1 and boundary 2. Exhibit DWR-114 provides an overview of this analytical framework¹⁰. However, these boundaries do not represent the proposed project.

This statement represents a succinct statement as required by the procedural ruling for this Hearing.

Pg. 13:17-14:9

B. BOUNDARY 1

Boundary 1/Existing Outflow, represents an operational scenario with most of the existing regulatory constraints, Alternative 4A criteria presented in the RDEIR/SDEIS (Chapter 4, Table 4.1-2), but does not include additional spring Delta outflow, additional OMR flows, existing I/E ratio, and the existing Fall X2 flow requirement imposed in the

existing BiOp for Delta Smelt. (Exhibit SWRCB-3.) The purpose of Boundary 1 is to demonstrate a scenario similar to existing conditions with the CWF in place. Fall X2 is an area of active investigation in a multi-agency collaborative group, and its future implementation might be adjusted based on the outcome of those investigations so this scenario excluded it from Boundary 1. (Exhibit DWR-11612.) C. BOUNDARY 2

Boundary 2/High Outflow, represents an operational scenario with significant increase in outflows and is similar to the scenario presented in Appendix C of the RDEIR/SDEIS, which was developed in coordination with State Water Board staff. This scenario is based on the Alternative 4A H3 scenario but includes additional OMR flow requirements, additional Delta outflow, and water quality compliance at Emmaton and excludes BDCP Conservation Measure 4 (65,000 acres of tidal wetlands restoration). The purpose of this boundary is to demonstrate a scenario that has more restrictive Delta biological regulatory requirements. (Exhibit DWR-116.)

This testimony explains the use of an existing conditions scenario that is more restrictive, a range necessitated by legal arguments.

DWR-53 (Maureen Sergent)

Pg. 8: 17-19

Under the boundary analysis, Mr. Munévar's shows that average annual diversion would be increased by 1.2 maf (Boundary 1) or decreased by 1.2 maf (Boundary 2) as compared to the NAA.

This testimony provides an expert opinion based on modeling results, all of which have been available through the environmental review process and published on SWRCB website.

Pg. 11:20-12:16

Further, as stated in the testimony of Mr. Munévar, "Boundary 1 and Boundary 2 scenarios result in the highest carryover storage levels due to greater flexibility in operations (Boundary 1) and substantially reduced export capability (Boundary 2), while scenarios H3 and H4 are more similar to the [No Action Alternative] NAA." (Exhibit DWR- 71, section III.C.) The modeling demonstrates that changes in carryover storage levels from the four CWF scenarios would be higher or similar to storage levels in the NAA. This information demonstrates a continued ability to meet contractual obligations. Also as stated in Mr. Munévar's testimony, "Water deliveries to CVP and SWP contractors, including Settlement Contractors, Exchange Contractors, Refuge Level 2, and Feather River Service Area Contractors, are provided at the same level as the NAA under all CWF scenarios." (Exhibit DWR-71, section IV.) This modeling demonstrates that CWF operations would result in insignificant changes to water deliveries to these contractors and refuges and thus, would not cause injury to legal users of water. The modeling conducted for this proceeding demonstrates that, at times, operating the proposed North Delta Diversion (NDD) facilities will result in some minor changes to water quality at some locations within the Delta. (see Exhibit DWR-66, sections IV-VI.) As stated by Dr. Nader-Tehrani, "Delta Water quality (based on EC and chloride) results are mixed. During the period which Agricultural D-1641 water quality objectives for

Western and Interior Delta applies (April through August) water quality at most locations in the Delta are somewhat similar amongst all operational scenarios.” (Exhibit DWR-66, section VIII.)

Results for all operational scenarios including the NAA show modeled exceedances in D-1641 water quality objectives (agricultural, municipal, and industrial). . . . However, . . . the exceedances are mostly a result of differences in model assumptions. . . . In reality, . . . SWP/CVP project operators have been able to meet their regulatory obligations to prevent most exceedances. (Exhibit DWR-66, section VIII.)

This Testimony is relevant to show no injury to other legal water users and the Petitioners’ ability to meet the set standards.

DWR-71 (Testimony- Armin Munévar)

Pg. 2: 19-23

To ensure that any operations considered within this change petition proceeding have been evaluated with regard to effects on legal users of water, the modeling uses a boundary analysis; specifically Boundary 1 and Boundary 2, representing the outer range of regulatory and operational conditions within which the CWF could conceivably operate in the future.

This testimony describes the modeling purpose and analysis in a succinct identifiable manner as requested in the Board’s ruling.

B. CWF CHANGE IN POINT OF DIVERSION BOUNDARY SCENARIOS

As described in Ms. Pierre's Testimony, two boundary scenarios were developed for purposes of disclosing effects under a wide range of operational and regulatory assumptions. (Exhibit DWR-51.) These boundary scenarios should not be considered as the proposed operational range of the CWF, but reflect bookends to illustrate the effects on other legal uses of water. Boundary 1 reflects a condition of less regulatory restriction on operations than the NAA. In this scenario, Delta outflow objectives are set per the D-1641 requirements. The Fall X2 and San Joaquin River inflow-export components from the Biological Opinions are not included in this scenario. Conversely, Boundary 2 reflects a condition of significantly increased delta outflow targets and increased restrictions on south delta exports as compared to the NAA. The assumptions for this scenario were guided by SWRCB staff. In this scenario, Delta outflow targets are significantly increased throughout the year, but particularly during winter and spring. More restrictive requirements were set for Old and Middle River (OMR) flows throughout the year that limit south Delta pumping substantially during January through June, and also impose further restrictions during July through December. In addition, modeling for Boundary 2 includes a fully-closed Head of Old River Gate during spring months which further reduces the amount of San Joaquin River water entering Old and Middle Rivers.

Similarly as stated above this testimony explains the purpose of the modeling and the assumptions used.

DWR-66 (Parviz Nader-Tehrani)

Pg. 2: 10-11

I rely on testimony provided by Mr. Munévar, specifically the CalSim II output that feeds into the DSM2 model.

It is permissible to reference another expert's analysis.

Pg. 4:23-7:21

In general, H3 and H4 operational scenarios result in very similar water quality results as measured in EC or chloride at most locations, and the EC values are typically (but not always) somewhere in between the results for Boundary 1 and Boundary 2 scenarios. Where these results do not fall within the boundary analysis, I explain why below. Because Boundary 2 has an operational scenario that results in higher outflow this generally results in lower EC and chloride. It should be noted that Boundary 1 does not include Fall X2 in its operational assumptions, and in general may reflect higher EC results, especially for the months of September through November, and mostly for areas in the Western and Central Delta. Exhibit DWR-513, Figures EC1- EC4 show the monthly average EC concentrations at Sacramento River at Emmaton, San Joaquin River at Jersey Point, South Fork Mokelumne River at Terminous, and San Joaquin River at San Andreas Landing. D-1641 water quality objectives at these locations are specified April 1 to August 15, with actual EC thresholds varying depending on water year types. CalSim II prioritizes meeting the D-1641 water quality objectives for all

scenarios, and therefore it is no surprise that the water quality results for all alternatives at these locations are similar during the period in which the SWP/CVP operate to meet their responsibilities for D-1641. For the months of April through June, the monthly average EC values for all scenarios are very similar to the NAA for all locations shown. For all scenarios except Boundary 2, in the months of July and August there is an increase in EC at Emmaton of about 18-19 percent when compared to the NAA. (Exhibit DWR-513, p. 1, Figure EC1.) DWR-EC values for Boundary 2 are higher than those for NAA for the month of July by about 5 percent and are lower than those for NAA for the month of August by about 19 percent. (Exhibit DWR-513, p. 1, Figure EC1.) At Jersey Point (see DWR-513, p. 1, Figure EC2), there is a reduction of EC for the months of July (19%-34%) and August (5%-41%) when compared to the NAA, with Boundary 2 scenario resulting in the lowest EC. At San Andreas Landing (see Exhibit DWR-513, p. 2, Figure EC3), there is a reduction of EC for the months of July (10%-15%) and August (7%-26%) when compared to the NAA, with Boundary 2 scenario resulting in the lowest EC. At Terminous, the EC results are very similar for all alternatives and are well below the D-1641 water quality objectives.

Figure EC5 shows the simulated EC results for Old River at Tracy Road. (Exhibit DWR-513, p. 3.) The D-1641 South Delta agricultural water quality objective (based on 30-day running average) is 700 EC for the months April through August and 1000 EC for all other months. For all months except March through May, EC results are very similar to those for the NAA. For the months of March through May, Boundary 2 scenario results in higher EC than all alternatives, while all other scenarios result in similar EC compared to the NAA. (Exhibit DWR-513, p. 3.) It is my opinion that the increase in EC for

Boundary 2 is most likely due to the assumption that there will be full closure of Head of Old River through the operable gate for the months of March through May. Figure EC6 shows the simulated EC results for San Joaquin River at Brandt Bridge. At this location the EC results for all scenarios are very similar to the NAA. (Exhibit DWR-513, p. 3.) V. Delta Water Quality (Chloride) For chloride, this water quality assessment applies a relationship between EC and chloride that were developed based on historical water quality data to the DSM2 output for EC. This relationship was developed based on data at Mallard Island, Jersey Island, and Old River at Rock Slough. (Exhibit DWR-509.) The relationship was: $Cl = \max(0.15 * EC - 12 \text{ and } 0.285 * EC - 50)$. In the equation above, Cl is the chloride concentration in mg/L, and EC is in $\mu\text{S}/\text{cm}$. The chloride regression method was developed using data for the west Delta and is thus valid for that area. (Exhibit DWR-509.) The chloride regression method has not been validated for other areas of the Delta.

Exhibit DWR-513, Figures CL1 to CL3 show the simulated chloride concentrations at Contra Costa Canal, Old River near Clifton Court, and Barker Slough/ North Bay Aqueduct. (Exhibit DWR-513, pp.4-5.)

At all these locations there is year round D-1641 chloride concentration objective to be at or below 250 mg/l. Model results show that the monthly average chloride concentrations for all alternatives at these locations stay below this threshold. At Contra Costa Canal the results are mixed. (Exhibit DWR-513, p. 4, Figure CL1.) For Boundary 1, chloride concentrations are higher than those for the NAA for the months of October through March, while for other months the chloride concentrations are similar or lower than the NAA. In fact, for the months of April through May, Boundary 1 results in the

lowest chloride concentration among all alternatives. It is my opinion that this is most likely due to the higher negative Old and Middle River (OMR) flows assumed under this scenario. Chloride concentration for alternatives H3 and H4 are similar or lower than the NAA for all months except June. (Exhibit DWR-513, p. 4, Figure CL1.) Chloride concentration for Boundary 2 is similar or lower than the NAA for all months except February through April and June. (Exhibit DWR-513, p. 4, Figure CL1.) Boundary 2 results in the lowest chloride concentration among all scenarios for the months of August through January. (Exhibit DWR-513, p. 4, Figure CL1.) Surprisingly, Boundary 2 results in the highest chloride concentration among all scenarios for the months of March and April. It is my opinion that this is most likely to due to the lower South Delta diversions assumed under this scenario. There is a relationship between bromides and chlorides and there is a formula that calculates bromides based on chloride concentration. The chloride to bromide relationship is approximately the same in many areas in the Delta, (Contra Costa Water District 1997). (Exhibit DWR-5094.) The relationship used is $Br=0.0035*Cl$. There are three municipal diversion locations where bromides may be of concern. Two of which DWR has contracts that address SWP operations. (Exhibits DWR-303, DWR-310, DWR-304.) The third point is the North Bay Aqueduct at Barker Slough. Based on the chloride results shown in Figure CL-3 which show little to no change in chloride, it is my opinion there will be no change in bromide. (Exhibit DWR-513, p. 5.)

This testimony provides the details of the modeling analysis related to water quality impacts, relevant to the elements required in the Petition.

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Exhibit DWR-513, Figures C1 through C5 show the modeled probability of meeting D-1641 water quality objectives at Emmaton, Jersey Point, San Andreas Landing, Terminous, and Contra Costa Canal. (Exhibit DWR-513, pp. 5-9.) The information shown is based on DSM2 water quality analysis. Based on the model results, in general all scenarios including the NAA meet D-1641 water quality objectives most of the time. The data shows a similar or an increased ability for all operational scenarios (compared to the NAA) to meet D-1641 water quality objectives at all locations except Emmaton. At Emmaton there is only a slightly lower ability to meet D-1641 water quality objectives. At San Andreas Landing (see Exhibit DWR-513, p. 7, Figure C3) all scenarios (except the NAA) meet the D-1641 water quality objectives at all times. At Terminous (see Exhibit DWR-513, p. 8, Figure C4) all scenarios meet the D-1641 water quality objectives at all times. Exhibit DWR-513, p.10, Figure C6 shows the number of days in a year meeting the 150 mg/l mean daily chloride concentration at the Contra Costa Canal Intake. DSM2 Results indicate that Boundary 2 meets D-1641 water quality objectives for all water years. All other scenarios (including the NAA) meet D-1641 for all years except 1977. It should be noted that in general, all scenarios except Boundary 1 meet the 150 mg/l mean daily chloride concentration for a greater number of days, beyond what is required, compared to the NAA. Exhibit DWR-513, p. 10, Figure C6 does not reflect actual chloride experienced in 1977 drought. Due to severe drought conditions, barriers were installed at six different locations in the Delta in 1977, in order to help reduce

ocean salinity intrusion and to raise water levels. These barriers are not reflected in the modeled results. (Exhibit DWR-5106.)

VII. Water Levels

Exhibit DWR-513, pp. 11-15, Figures W1 through W5 show the probability of exceedance for daily minimum water levels for locations throughout the Delta. For example, the 10% exceedance represents the top 10% minimum daily water levels, which most likely occur during high flow periods. Similarly, the 90% exceedance represents the bottom 10% minimum water levels, which most likely occur during low flow periods. Results show in general that all scenarios (except the NAA) result in a similar frequency distribution for water levels.

As expected, the largest changes in water levels occur in the vicinity of the proposed intakes along Sacramento River. Figure W1 shows the probability of exceedance for daily minimum water levels at Sacramento River downstream of the proposed intakes. (Exhibit DWR-513, p. 11.) The results show the maximum reduction of about 1.0-1.2 ft, occurring at the 0-10% exceedance levels (highest changes expected during high flow periods periods). This is consistent with the highest changes occurring at times when the three proposed NDD are utilized at or near maximum capacity (9,000 cfs), typically occurring at high flow periods. At highest probability levels (i.e., lowest range in water levels), the results show the reduction in water levels is about 0.5 ft. This is consistent with the lowest changes in water levels occurring during low flow periods when the total flow diverted through the three proposed NDD is at its lowest range. On average, the minimum water levels in the vicinity of the proposed NDD drop below the lowest minimum water level under the NAA only during less than 5 days in a year.

Furthermore, the minimum water levels occur only for a short period of time throughout the day. DSM2 results show that under the lowest minimum water levels the tidal range at Sacramento River downstream of the proposed intakes is between 2 to 4 ft. Which means for most of the day, the water level would be well above the minimum value. During low flow periods, the total amount of water diverted from the proposed NDD is much lower than the 9,000 cfs capacity. Modeled results were not refined on an hourly basis for meeting specific water elevations. For this reason, the modeled results are showing a more conservative outcome. Similarly, Figure W2 shows the probability of exceedance for daily minimum water levels at Sacramento River downstream of Georgiana Slough. (Exhibit DWR-513, p. 12.) The results show the highest changes of about 0.9 ft, occurring at the 0-10% exceedance levels, and the lowest changes of about 0.3 ft occurring at 90-100% exceedance levels. As expected, the results show smaller changes in water levels at locations that are farther from the three proposed NDD. In fact, according to Figures W3 to W5, there is very little change in water levels at Sacramento River at Rio Vista, Mokelumne River at Terminous, and Old River at Tracy Road. (Exhibit DWR-513, pp. 13-15.) It is my opinion that for all of these reasons there will not be negative effects to legal users of water due to these water level changes.

VIII. SUMMARY

Delta Water quality (based on EC and chloride) results are mixed. During the period which Agricultural D-1641 water quality objectives for Western and Interior Delta applies (April through August), water quality at most locations in the Delta are somewhat similar amongst all operational scenarios. (Exhibit DWR-513, pp. 1- 5.) In general, the EC

values overall are expected to be higher at Emmaton for all alternatives except for Boundary 2, and lower or similar for most other locations. (Exhibit DWR-513, pp. 1-5.) This is as expected since Boundary 2 operational scenario has the highest Delta outflow among all alternatives which results in lower EC. Results for all operational scenarios including the NAA show modeled exceedances in D-1641 water quality objective (agricultural, municipal, and industrial). (Exhibit DWR- 513, 5-10.) However, as explained earlier, the exceedances are mostly a result of differences in model assumptions, such as the time-step issue described previously. In reality, and as testified to by Mr. Leahigh, SWP/CVP project operators have been able to meet their regulatory obligations to prevent most exceedances. (Exhibit DWR-61.) The largest reduction in water levels is expected to occur in the vicinity of the NDD and mostly during high flow periods. (Exhibit DWR-513, p. 11.) However, during low flow periods, the expected reduction in daily minimum water levels is about 0.5 ft near the three intakes and are much smaller at other areas farther from the three intakes. On average, the minimum water levels in the vicinity of the proposed NDD drop below the lowest minimum water level under the NAA only during less than 5 days in a year, and only for a short period of time during the day. Furthermore, the modeled results are showing a more conservative outcome. It is my opinion that for all of these reasons there will not be negative effects to legal users of water due to water level changes. The modeling shows the expected changes to water quality and water levels within the Delta for the operational scenarios as compared to the NAA. Any changes that occur, either structurally or operationally, within the Delta affects areas throughout the Delta. Through careful planning and analysis, many areas of the Delta benefit and any negative water

quality and water level changes have been minimized. It is my opinion that the modeling cannot completely mimic operational decisions but it does show that D-1641 water quality objectives can be met.

This Testimony provides the level of detail needed to explain modeling results as applied to the Proposed Project. Protestants object that there is not enough detail, yet asked to exclude detailed testimony.
