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DWR-1213

BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

HEARING IN THE MATTER OF CALIFORNIA DEPARTMENT OF WATER RESOURCES AND UNITED STATES BUREAU OF RECLAMATION REQUEST FOR A CHANGE IN POINT OF DIVERSION FOR CALIFORNIA WATER FIX	**TESTIMONY OF GWENDOLYN BUCHHOLZ**

I, Gwendolyn Buchholz, do hereby declare:

I. INTRODUCTION

I am an expert regarding the California WaterFix project ("CWF") and have previously been recognized as an expert in these proceedings. A true and correct copy of my statement of qualification has previously been submitted as DWR-32.

II. OVERVIEW OF TESTIMONY

In this rebuttal testimony, I am responding to issues related to groundwater impacts and monitoring raised by Dr. Mehl and Mr. Lambie in Part 2.

III. CWF GROUNDWATER MONITORING IS ADEQUATE

Issue Raised: Dr. Mehl alleges that operation of CWF intakes would reduce freshwater flows from the Sacramento River which would affect groundwater supplies in Sacramento County Water Agency (SCWA), Zone 40 Service Area (Zone 40). These issues were introduced in Exhibit SCWA-302 and discussed by Dr. Steffen Mehl on behalf of SCWA at the State Water Resources Control Board (SWRCB) hearing on March 15, 2018 [pages 203-211 and 235-243 of volume 16 of the transcript]. On this allegation, he asserts monitoring should be more distributed. As explained below, I disagree and believe the monitoring extent is appropriate.

Response: As presented in Exhibit SCWA-302 and discussed in oral testimony, Dr. Steffen Mehl discussed the collection and analysis of groundwater monitoring data in accordance with Mitigation Measure GW-1 within an approximately 4-mile wide corridor (about 2 miles on either side of the river). The assertions of Steffen Mehl that “groundwater monitoring data (such as groundwater levels) should be collected in a more distributed way around the Sacramento River, but also within Zone 40” are not supported by the evidence.

As described in Exhibits DWR-80, DWR-800, DWR-801, DWR-803, and DWR-804 presented in Part 1 Rebuttal; and in Exhibit SCWA-302 presented by Dr. Steffen Mehl, the Zone 40 wells are located to the east of Interstate 5; and groundwater within Zone 40 is affected by changes in groundwater flows from multiple sources, including flows from the Sacramento, Cosumnes, and American rivers and groundwater flows from the areas located to the east of Interstate 5. As show in information presented in Exhibit DWR-80 in Part 1 Rebuttal, the portion of the groundwater aquifer that could be affected by changes in Sacramento River flows in the vicinity of the proposed CWF intakes is located to the west of Interstate 5 based upon groundwater contours presented in Exhibits DWR-800, DWR-801, DWR-803, and DWR-804.

As described in Exhibit DWR-80, the groundwater analysis results presented in BDCP/CWF EIR/EIS, based upon the results of the CVHM-D model that uses hydrogeological information compiled by the U.S. Geological Survey, indicate that the area of significant influence of changes in the Sacramento River flows extends approximately 2 miles on either side of the Sacramento River. Within Sacramento County in the vicinity of the CWF intakes, this area is located to the west of Interstate 5 where the groundwater flows are not the primary source of groundwater recharge to Zone 40 wells.

Therefore, based upon the information presented in the reports cited in Exhibit DWR-80 in Part 1 Rebuttal and the results of the groundwater model that uses hydrogeological information compiled by U.S. Geological Survey (as presented in the BDCP/CWF EIR/EIS), the groundwater area of significant influence related to changes in Sacramento River flows due CWF operations occurs in Sacramento County west of Interstate 5 and within approximately 2 miles of the Sacramento River.

IV. ALLEGED IMPACTS OF CWF OPERATIONS ON GROUNDWATER AQUIFERS

Issue Raised: Mr. John Lambie alleges that operation of California WaterFix (CWF) intakes would reduce groundwater storage by up to 14,500 acre-feet and 36,300 acre-feet in the South American Groundwater Subbasin over 20 years and 50 years, respectively, of intake operations; and 6,000 acre-feet and 15,000 acre-feet in the Eastern San Joaquin Groundwater Subbasin over 20 years and 50 years, respectively, of intake operations. These issues were introduced in Exhibit SJC-223 and discussed by Mr. John Lambie on behalf of San Joaquin County and San Joaquin County Flood Control and Water Conservation District at the State Water Resources Control Board (SWRCB) hearing on March 15, 2018 [pages 179-202 of volume 16 of the transcript] and March 16, 2018 [pages 5-52 and pages 198-203 of volume 17 of the transcript]. The methodology for the analysis conducted by Mr. John Lambie is inaccurate and therefore not appropriate as explained below.

Response: As presented in Exhibit SJC-223 and discussed in oral testimony, Mr. Lambie discussed the reduction in groundwater storage in the South American Groundwater Subbasin and Eastern San Joaquin Groundwater Subbasin. Information related to changes in Sacramento River flows, wetted perimeter along the Sacramento River, and groundwater conditions was available based upon the CalSim II, DSM2, and CVHM-D model results provided as part of the BDCP/CWF EIR/EIS. However, the information presented in Exhibit SJC-223 and associated oral testimony was calculated separately through a comparison of historical Sacramento River flows and CalSim II model results for CWF Alternative 4A H3 (not Alternative 4A H3+), and subsequent comparisons of historical groundwater contours and rating curves from the C2VSim model to describe groundwater-surface water interactions.

The analytical approach presented in Exhibit SJC-223 is inappropriate because it compares historical Sacramento River flows to simulated CalSim II model results for CWF Alternative 4A H3 that also include climate change and sea level rise conditions. The analysis presented in Exhibit SJC-223 also includes incorrect assumptions related to operation of the Delta Cross Channel (DCC) gates in the CalSim II model; and therefore, increases the effects of the DCC operations as compared to the CalSim II model assumptions.

The analyses of changes in groundwater storage presented in Exhibit SJC-223 used the calculated surface water flows from the analysis which compared historical conditions to CalSim II model output instead of analyzing the CVHM-D model results presented in the BDCP/CWF EIR/EIS.

A. Comparison of CalSim II Model Results to Historical Conditions is Improper

Comparison of historical conditions to CalSim II model results is not feasible. Although the CalSim II model uses historical hydrology between 1922 and 2003, the operations of the SWP and CVP are based upon operational criteria and not historical SWP and CVP operations. For example, the SWP was not operational until 1967. However, CalSim II model results for 1960 are based upon the hydrology in 1960 and not the water resources facilities level of development in 1960. The CalSim II model runs also include assumptions for non-SWP/CVP facilities that did not exist historically, such as diversions for the Freeport Regional Water Authority intake which was not operational until 2010.

Comparison of historical conditions to the CalSim II model runs for Alternative 4A H3 also is not feasible because this CalSim II model run includes changes in river flows compared to the simulated existing conditions to reflect climate change in 2030 with less snow and more rain; and changes in river flows due to changes in SWP and CVP operations to accommodate sea level rise and continue to meet Delta water quality criteria. Climate change and sea level rise will cause the SWP and CVP to modify reservoir release patterns and Delta diversion patterns because the reservoirs will not refill in late spring as the snow melts and more water will need to be released to maintain Delta water quality in the spring and fall as required by the SWRCB.

CalSim II model results must only be compared to results from another CalSim II model run to determine potential changes in conditions based upon changes in hydrology due to climate change, SWP or CVP operations criteria, or changes in diversions. Therefore, results from the CalSim II model or any other models that rely upon CalSim II model output (e.g., DSM2 or CVHM-D) cannot be compared to historical observed information to correctly determine potential impact analyses.

B. The Analysis of Sacramento River Flows Near the Delta Cross Channel Gates is Inaccurate

In addition to use of calculated values based upon historical observed information, the analysis presented in Exhibit SJC-223 included incorrect assumptions related to operations of the DCC gates. The analysis presented in Exhibit SJC-223 included changes in DCC gate closures to determine changes in flows from the Sacramento River to the Mokelumne River. However, the analysis used results from CalSim II model runs for CWF Alternative 4A H3 which already incorporated DCC gate closures. Therefore, the analysis increased the frequency of DCC gate closures in the development of the calculated flows from the Sacramento River to the Mokelumne River.

The DSM2 results presented as part of the BDCP/CWF EIR/EIS and described in Exhibit DWR-1015, Figure W-4, indicate that there were no changes in Sacramento River elevations at the DCC gates under CWF Alternative 4A H3 as compared to the No Action Alternative. Both of these model runs included the same climate change and sea level rise assumptions.

C. Analysis of Changes in Groundwater Recharge Along the Sacramento River in the South America Groundwater Basin Are Extremely Small

As part of the BDCP/CWF EIR/EIS, changes in surface water elevations were determined using the calibrated DSM2 model results. There were changes in the surface water elevations along the Sacramento River adjacent to the South American Groundwater Subbasin between the CWF intakes and Walnut Grove, as described in Exhibit DWR-1015, Figures W-1 and W-2. The South American Groundwater Subbasin boundaries were determined based upon information presented in Exhibit DWR-800, previously included in Part 1 Rebuttal.

Changes in Sacramento River flows were evaluated in the BDCP/CWF EIR/EIS using the CVHM-D model to determine effects on groundwater elevations along the Sacramento River due to CWF operations. As discussed in Exhibit DWR-80 in the Part 1 Rebuttal, based upon the results of the CVHM-D model results presented in the BDCP/CWF EIR/EIS, the reduction in groundwater elevation is projected to occur within 2 miles to east of the Sacramento River from the CWF intakes to Rio Vista due to the operations of the CWF as compared to the No Action Alternative. In the South American Groundwater Subbasin, the projected groundwater elevation changes with CWF operations as compared to the No Action Alternative would extend approximately 17 miles along the Sacramento River and approximately 2 miles to the east of the Sacramento River, or approximately 21,800 acres.

Information presented in Exhibit SJC-223 stated that CWF operations would result in a loss of groundwater storage in the South American Groundwater Subbasin of 14,500 acre-feet over 20 years and 36,300 acre-feet over 50 years, or long-term average of approximately 725 acre-feet/year. For the purpose of this rebuttal, these values were evaluated to determine the potential changes that would occur in the South American Groundwater Basin from the CWF intakes to Walnut Grove and within the area where groundwater elevations are projected to change, as presented in the BDCP/CWF EIR/EIS. A long-term average annual reduction of 725 acre-feet/year, as presented in Exhibit SJC-223, could result in a long-term average loss of approximately 0.03 feet/year in this area of significant groundwater influence. These results are extremely small compared with the overall groundwater budget analyzed in the CVHM-D model and are consistent with CVHM-

D model results presented in the BDCP/CWF EIR/EIS.

D. Analysis of Changes in Groundwater Recharge Along the Sacramento River in the Eastern San Joaquin Groundwater Subbasin Are Extremely Small

As part of the BDCP/CWF EIR/EIS, changes in surface water elevations were determined using the calibrated DSM2 model results. There were changes in the surface water elevations along the Sacramento River adjacent to the Eastern San Joaquin Groundwater Subbasin downstream of Walnut Grove, as described in Exhibit DWR-1015, Figures W-1 and W-2. However, there were no changes in surface water elevations at Rio Vista, as described in Exhibit DWR-1015, Figure W-3. The Eastern San Joaquin Groundwater Subbasin boundaries were determined based upon Figure ES-1 of Exhibit SJC-241.

The DSM2 model results indicated that there were no changes in water elevations in the Mokelumne River with the CWF operations as compared to the No Action Alternative (as described in Exhibit DWR-1015, Figure W-4); and therefore, there were no changes in wetted perimeter.

Changes in Sacramento River flows were evaluated in the BDCP/CWF EIR/EIS using the CVHM-D model to determine effects on groundwater elevations along the Sacramento River due to CWF operations. As discussed in Exhibit DWR-80 in the Part 1 Rebuttal, based upon the results of the CVHM-D model results presented in the BDCP/CWF EIR/EIS, the reduction in groundwater elevation is projected to occur along within 2 miles to east of the Sacramento River from the CWF intakes to Rio Vista due to the operations of the CWF as compared to the No Action Alternative. In the Eastern San Joaquin Groundwater Subbasin, the projected groundwater elevation changes with CWF operations as compared to the No Action Alternative would extend approximately 14 miles along the Sacramento River and approximately 2 miles to the east of the Sacramento River, or approximately 17,900 acres.

Information presented in Exhibit SJC-223 stated that CWF operations would result in a loss of groundwater storage in the Eastern San Joaquin Groundwater Subbasin of 790 acre-feet/year. For the purpose of this rebuttal, these values were evaluated to determine the potential changes that would occur in the Eastern San Joaquin Groundwater Subbasin from Walnut Grove to Rio Vista and within the area where groundwater elevations are projected to change, as presented in the BDCP/CWF EIR/EIS. A long-term average annual reduction of 790 acre-feet/year, as presented in Exhibit SJC-223, could result in a long-term average loss of approximately 0.04 feet/year in this area of significant groundwater influence. These results are extremely small compared with the overall groundwater budget analyzed for this groundwater basin in the CVHM-D model and are consistent with CVHM-D model results presented in the BDCP/CWF EIR/EIS.

Based upon the DSM2 and CVHM-D model results presented in the BDCP/CWF EIR/EIS, there were no changes in river elevations or associated groundwater elevations along the Mokelumne River due to CWF operations as compared to the No Action Alternative. As described above, the calculated values of changes in the Mokelumne River flows, as presented in Exhibit SJC-223, are inconsistent with results presented in the BDCP/CWF EIR/EIS. This discrepancy could be caused by the comparison of CalSim II results to observed flows, and to the inclusion of DCC gate operations both in the CalSim II model run results and in the equations used in Exhibit SJC-223 to calculate changes in Mokelumne River flows. As stated above, there were no changes in river elevations in the DSM2 model results along the Mokelumne River due to CWF operations as compared to the No Action Alternative; and therefore, there were no changes in groundwater elevations in the CVHM-D model results for this groundwater basin.

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Executed on this 6th day of July, 2018 in Sacramento, California.

Gwendolyn Buchholz

Gwendolyn Buchholz