BEFORE THE STATE WATER RESOURCES CONTROL BOARD

WSID CDO/BBID ACL ENFORCEMENT ACTIONS

ENFORCEMENT ACTION ENF01949 DRAFT CEASE AND DESIST ORDER REGARDING UNAUTHORIZED DIVERSIONS OR THREATENED UNAUTHORIZED DIVERSIONS OF WATER FROM OLD RIVER IN SAN JOAQUIN COUNTY ENFORCEMENT ACTION ENF01951- ADMINISTRATIVE CIVIL LIABILITY COMPLAINT REGARDING UNAUTHORIZED DIVERSIONS BY BYRON-BETHANY IRRIGATION DISTRICT	WRITTEN REBUTTAL TESTIMONY OF NICHOLAS F. BONSIGNORE, P.E. Hearing Date: March 21, 2016 Hearing Officers: Frances Spivy-Weber, Tam Doduc

1. I, Nicholas F. Bonsignore, submit this written rebuttal testimony at the request of Byron-Bethany Irrigation District (BBID) and West Side Irrigation District (WSID) in the above referenced enforcement actions, hereinafter referred to as "the districts". I have personal knowledge of the facts stated herein and could testify competently thereto if called as a witness, except as to matters stated on my information and belief, and as to such matters, I am informed the same to be true.

2. I previously prepared written testimony and an expert report titled *"Analysis of Supply in the State Water Resources Control Board, Division of Water Rights' 2015 Methodology for Water Availability Analyses for the Sacramento-San Joaquin-Delta Watershed"*, both documents dated January 18, 2016. (WSID Exhibits 121 and 122) WSID Exhibit 121 included a summary of my experience and qualifications, and attached a copy of my professional resume.

3. At the request of the districts I have reviewed the written testimonies of Kathy Mrowka (WR-7), Brian Coats (WR-9), and Jeff Yeazell (WR-11), also referred to herein as the Prosecution Team. The following paragraphs are in rebuttal to certain statements set forth in WR-7, WR-9, and WR-11. Because these testimonies were written in narrative form, without paragraph numbers, it was necessary to create annotated versions of the testimonies with paragraph numbers for reference purposes as follows:

Annotated Mrowka - WSID Exhibit 170

Annotated Coats - WSID 171

Annotated Yeazell - WSID 172

4. Ms. Mrowka and Mr. Coats testify that the Prosecution Team's 2015 water availability methodology was based conceptually on an analysis of supply and demand by the Division in 1978 following the critical drought year of 1977, and Ms. Mrowka specifically refers to a "1977 template" that was adapted to "modern data processing capabilities". (Mrowka Paragraph 6 and Coats Paragraph 23) I disagree. The methodology used by the Prosecution Team in 2015 is vastly different both conceptually and technically from that used by the Division in 1977-78. While I do not necessarily concur with all of the methods and assumptions used in the Division's 1977-78 methodology, it is a more realistic approach to evaluating the water supply available to various levels of water right priorities in streams tributary to the Delta during a critical drought condition than the methodology used by the Prosecution Team in 2015. For the reasons expressed in my expert report, I do not concur with the Division's 1977-78 methodology with respect to its analysis of supply and demand in the Delta (WSID-0122 at Section 1.3).

5. The Prosecution Team's testimonies all make reference to the Division's Drought '77 Dry Year Program Report dated January 1978 (WR-152) and the Appendix to Drought '77 Dry Year Program Report dated March 1978 (WR-79, 1978 Appendix); see paragraph 4 herein, and Yeazell Paragraph 54. These documents are jointly referred to by the Prosecution Team as the "1977 report", a convention I adopt herein as well (I also use the terms "1977 analysis" and "1977 methodology").

6. In preparing my expert report and this rebuttal I reviewed WR-152 and WR-79. The Division's Drought '77 Dry Year Program Report dated January 1978 (WR-152), summarizes the Division's real-time analysis and actions during the critical drought year of 1977, and provides recommendations for future actions in the event of similar drought conditions in the future. The Appendix to Drought '77 Dry Year Program report (WR-79), which was prepared several months after WR-152, contains the technical basis for and analysis of the Division's 1977 drought evaluation.

7. The Appendix to Drought '77 Dry Year Program (WR-79) describes a site-specific methodology for making water availability determinations for water rights located on the Sacramento River, San Joaquin River, and their major tributaries. The 1977 method evaluated natural supply available to riparian diverters within these rivers, and also carefully evaluated the priority of appropriative diversions along each individual river and matched them to available supplies on that river. This is in stark contrast to the Prosecution Team's 2015 methodology, which assumed that riparians had priority without evaluating natural supply available within their respective tributary, and ignored the locations of individual appropriative diverters on individual rivers. Rather than using 1977 as a template, the Prosecution Team invented a new methodology in 2014 and 2015 that uses a "global" approach to quantify Supply and Demand for the entire Sacramento-San Joaquin-Delta watershed or large subsets thereof (Sacramento River watershed plus Delta, or San Joaquin River plus Delta) hereinafter referred to as "combined watersheds", without regard to where a particular Supply component accrues to the watershed and whether a particular diverter has access to that Supply component.

8. The Prosecution Team draws a distinction between a "drought supply and demand analysis", which staff says it conducted in 2014 and 2015, and a "site-specific" or "permitting" water availability analysis that is conducted for other Division actions. The Prosecution Team states that the last time a "drought supply and demand analysis" was conducted was in 1977. (Mrowka Paragraph 9 and Coats footnote 3)

The Prosecution Team does not provide any specific rationale explaining how or why a "drought" water availability analysis is or should be "fundamentally different" than any other type of water availability analysis.

9. Paragraphs 10 through 19 below provide a summary of the Division's 1977 methodology and demonstrate that the Prosecution Team's 2015 methodology bears little resemblance to the 1977 methodology. Paragraphs 20 through 37 below discuss additional deficiencies in the Prosecution Team's 2015 methodology, some of which include mistakes or misinterpretations in the Prosecution Team's reference to and reliance upon the 1977 methodology.

10. In WR-79 the Division conducted a systematic analysis of the water supplies and demands for the critical drought year of 1977. The analysis in WR-79 is presented in three steps.

First, forecasted natural unimpaired flows were used to determine water available for riparians. Second, natural flows remaining after riparians were satisfied as well as supplies from other sources (including return flows) were used to satisfy pre-1914 appropriators. Third, remaining natural flows and other supplies, including return flows, were used to satisfy post-1914 appropriators.

11. For analysis of riparian diverters in 1977, Table 5 of WR-79 sets forth available water supply for the Sacramento River and its major tributaries (Feather River, Yuba River, and American River), as well as riparian demand along these streams. Table 13 of WR-79 summarizes available water supply for the San Joaquin River and its major tributaries (Merced River, Tuolumne River, Stanislaus River, Calaveras River, Mokelumne River and Cosumnes River), as well as riparian demand along these streams.

12. WR-79 assumed that the supply available to Delta riparians was natural flow accruing to the Delta from the Sacramento and San Joaquin systems, i.e. rainfall and inflow from minor tributaries to the Delta was considered to be negligible. Riparian demand in the Delta was summarized in Table 14 of WR-79 and included estimates of irrigation demand, non-agricultural consumptive use, and Delta Outflow Index.

13. Because riparian water rights were deemed to be "co-equal" the 1977 analysis considered the Sacramento-San Joaquin Basins and the Delta as a "continuous system" for purposes of comparing available supply to meet demand. Thus for purposes of analyzing riparian rights the Division in 1977 used a "combined watershed" approach. However, the 1977 analysis recognized limitations on natural flows available to riparians based on their location, i.e. the 1977 analysis considered the spatial aspects of riparian supply and demand. Table 16 of WR-79 shows monthly "time frames" of deficiencies in natural supply available to meet riparian demand. The Sacramento River and Delta have the same monthly time frame (illustrated in Figure 4 of WR-79), while monthly time frames of riparian deficiency varied for the San Joaquin River system on a tributary basis (illustrated in Figures 5 through 11 of WR-79). Fundamentally, the Division's 1977 analyses recognized that there was a limitation on natural supply to meet riparian demand (Table 17 in WR-79 summarizes water shortage notices the Division sent to riparians in 1977). Conversely, in its Excel workbook supporting the June 12, 2015 curtailment

notice (WR-77), the Prosecution Team aggregated natural supply for the entire Sacramento-San Joaquin-Delta combined watershed and erroneously assumed that supply would be available to all riparians within the combined watershed regardless of whether sufficient natural supply was present within a particular tributary to supply riparians within that tributary.

14. With respect to water supply available to satisfy pre-1914 water rights, the Division's 1977 analysis evaluated residual natural supply after diversions by riparians, as well as return flows within the Sacramento and San Joaquin River systems. Table 27 in WR-79 summarizes the estimated monthly amounts of supply available to appropriators for the lower reach of the Sacramento River, Colusa Basin Drain, Sutter Bypass, Feather and Yuba Rivers, and American River. Table 27 also shows estimated supply available to appropriators for the San Joaquin River and its major tributaries (Merced River, Tuolumne River, Stanislaus River, Calaveras River, Mokelumne River, and Cosumnes River).

15. With respect to demand by pre-1914 diverters, the Division's 1977 analysis tabulated Statements of Water Diversion and Use for the Sacramento River and Delta "in order of their location from an upstream reservoir or point under consideration to the river mouth or end of stream reach under consideration." (WR-79 at page 21) The relative locations of pre-1914 rights are shown on Figure 12 of WR-79, and are tabulated in order from upstream to downstream on a "stream reach" basis in Table 28 in WR-79. The first page of Table 28 shows an estimated seasonal demand for BBID of 41,270 acre-feet (May through September). Figure 12 in WR-79 also shows the relative locations of pre-1914 statements in the San Joaquin River system. Table 29 in WR-79 tabulates estimated pre-1914 demand for pre-1914 statements in the San Joaquin River basin in order from upstream to downstream on a stream reach basis.

16. The 1977 supply and demand analysis for pre-1914 rights is described on pages 22 and 23, and shown in Tables 31 and 32, of WR-79. Per page 22 of WR-79, under the heading SUPPLY AND DEMAND ANALYSIS, "The supply available to satisfy pre-1914 demands, in order of their priority, is contributed by several tributaries as shown on Table 27 and Figure 3. The meeting of a specific pre-1914 demand depends upon (1) priority order, (2) relative location of point of diversion on the stream and (3) availability of water in the stream at the point of diversion. The relative location of the statements with their priority order is identified in Figure

12." [emphasis added] Table 30 in WR-79 arranges pre-1914 statements for the Sacramento-San Joaquin-Delta watershed in order of priority (BBID's diversion is shown near the bottom of the priority list; per Table 31 BBID is assigned priority number 27/28).

Table 31 in WR-79 shows, and pages 22 and 23 of WR-79 describe, a "running analysis of pre-1914 demands" for July 1977. Table 32 of WR-79 shows a similar running analysis for August 1977. Based on the priority and location of the right, Tables 31 and 32 evaluate water available to each individual right based on the source(s) of supply available to that right at its location within a tributary or within the Delta. If water is available to meet the demand, the demand is deducted from the supply within that tributary. For example, the first priority right listed in Table 31, which is located in "Sutter" (meaning Sutter Bypass), has an estimated July demand of 300 acre-feet (the first column of Table 31 is cut off so diverters are not identifiable by statement number, however, per Table 30 the first priority right is Statement 550 held by Wild Goose Club). Table 31 shows that the total supply for Sutter in July 1977 is 7,020 acre-feet. Because this amount is greater than the 300 acre-feet of demand associated with the first priority right, the demand for Statement 550 is satisfied, and 300 acre-feet is deducted from the Sutter supply resulting in a supply of 6,720 acre-feet available to the next lower priority right within Sutter (or the Delta as described below). Because Statement 550 is located in Sutter and only has access to supply from Sutter, Table 31 does not assign demand associated with Statement 550 to any of the other sources of supply that are listed in the top rows of Table 31. Tables 31 and 32 step through, diverter by diverter, a similar calculation for other pre-1914 diverters based on priority and location. For diverters located on a tributary for which there is no supply, Tables 31 and 32 assume that no demand is satisfied; for example see the entry in Table 31 for ninth priority right located within the Cosumnes River system.

The second column from the right in Tables 31 and 32 tracks supply available to, and demand attributable to, pre-1914 diverters in the Delta. Delta supply is assumed to be the sum of Sacramento and San Joaquin tributary supply after deducting higher priority tributary demand as described in the preceding paragraph herein. To the extent that tributary supplies accrue to the Delta, Tables 31 and 32 deduct Delta demand from those tributary supplies on a pro rata basis using factors developed earlier in the analysis.

The methodology used in Tables 31 and 32 shows that with regard to assessing water availability for pre-1914 right holders within tributaries the Division's 1977 analysis did in fact consider the relative locations of diverters and the availability of supply at the diverters' locations, much akin to a "site-specific analysis". For the Delta, while demand was based only on priority and not on location, the 1977 analysis allocated supply based on evaluation of remaining tributary supply after accounting for higher priority demand on the tributaries, i.e. there was a spatial component to the Division's 1977 analysis of supply. The Prosecution Team's 2015 analysis, which evaluated supply and demand on global "combined watershed" basis, is vastly different than the approach the Division used to evaluate water availability for the 1977 drought.

17. The Division's 1977 analysis used a similar running analysis approach to evaluating water available for post-1914 appropriators. Per page 24 of WR-79, "The residual supply left after satisfying pre-1914 demands, as shown in Tables 31 and 32, were made available to diverters under post-1914 appropriative water rights." The relative locations of post-1914 rights are shown on Figure 14 of WR-79 in order from upstream to downstream, and tabulated for various reaches and tributaries of the Sacramento and San Joaquin Rivers in Tables 35 through 39 of WR-79. Table 40 in WR-70 tabulates post-1914 Delta appropriators based on "service areas" (North Delta Water Agency, Contra Cost Water District, South Delta Water Agency, Central Delta Water Agency, and Excluded Areas). Table 41 of WR-79 arranges post-1914 appropriators within the entire Sacramento-San Joaquin-Delta watershed (up to Application 2286) in order of priority, with Application 138 of Carmichael Irrigation District having the highest priority right and Application 301 of WSID having the second highest priority. As shown, the estimated seasonal demand for WSID totals 18,069 acre-feet (May through August).

18. The Division's running analyses for post-1914 rights for July and August 1977 are shown on Tables 42 and 43, respectively of WR-79. The analysis of supply and demand in Tables 42 and 43 is the same as that used in Tables 31 and 32 for pre-1914 demands. For a particular diverter located within a particular tributary or reach, the demand is assumed to be satisfied only if there is sufficient supply in the tributary or reach. Demand in a particular tributary is satisfied only by supply in the tributary and not by supply in other tributaries which the diverter cannot access. For post-1914 diverters within the Delta, demand is met from prorated tributary supply accruing to the Delta.

19. Notwithstanding the Prosecution Team's assertions that it conceptually patterned its 2015 methodology on a 1977 template, the Prosecution Team's 2015 analysis of supply and demand within the Sacramento-San Joaquin-Delta watershed is vastly different than the Division's 1977 analysis of supply and demand within that watershed. Contrary to Prosecution Team's belief that a "drought supply and demand analysis" is "fundamentally different" than a "site-specific" supply and demand analysis (Mrowka Paragraph 9 and Coats footnote 3), the Division's approach in 1977 clearly show that location matters in the determination of natural and residual supplies available to various levels of water right priority. In my professional opinion the methodology used by the Division in 1977 is a more appropriate approach on a conceptual level than the Prosecution Team's 2015 global combined watershed methodology. While I do not necessarily concur with all of the methods and assumptions used by the Division in 1977, in particular as applied to the Delta, it is interesting to note that per Tables 31 and 32 of WR-79, the Division's 1977 analysis shows that sufficient supply was available to satisfy BBID's estimated demands in July and August of 1977, and Tables 42 and 43 show that sufficient supply was available to satisfy WSID's estimated demands in July and August of 1977.

20. Mr. Coats, in his testimony, acknowledges that "types of water" includes "abandoned water" and "return flows", including wastewater discharges, and the availability of such flows to appropriators. Mr. Coats testifies:

"Water can also be classified as "abandoned" and/or "return flow". Abandoned water is water that has been used for a purpose with the excess or unneeded amount released with no claim of ownership. Since the abandoned water has been used and no longer considered "natural," it is only currently available for diversion by appropriative diverters which include the pre-1914 and post-1914 classes of water rights. Abandoned water may also be a wastewater discharge from a water treatment plant where the discharger has abandoned its claim to the water. A similar class of abandoned water is called return flow which is excess flow that leaves the field following the application of irrigation water." (Coats Paragraph 10)

Embodied in this statement in the concept that there is a difference between the amount of water diverted and the amount of water consumed. Mr. Coats further testifies:

"While abandoned flows may be present, the Division would be double-counting those flows if the original source of water, prior to being classified as abandoned, was sourced from natural flow." (Coats Paragraph 11)

This statement is incorrect. To the extent that natural flow is diverted, used for a beneficial purpose, and some portion thereof returns to stream, the returned portion becomes part of the available supply for downstream diverters independent quantitatively of the originating natural supply. Hence, the consideration of abandoned water and return flows does not "double-count" natural flow in the context of a supply and demand analysis. Mr. Coats' testimony also conflicts with the Prosecution Team's consideration of agricultural return flows as an additional source of supply in its water availability analyses after the May 1, 2015 curtailment, albeit in a limited and deficient manner, as later described herein.

21. Mr. Coats cites WR-69 as providing a conceptual "starting point" for the Prosecution Team's 2014 and 2015 analyses. (Coats Paragraph 23) WR-69, which according to Mr. Coats, was prepared in 1977 alongside the 1977 report, is a hypothetical graph showing "supply" and "demand" over the course of the calendar year and identifying periods when supply was insufficient to support some or all of post-1914 appropriative demand. WR-69 graphically bears some resemblance to the Prosecution Team's 2015 supply and demand charts supporting the May 1, 2015 and June 12, 2015 curtailment notices (WR-47 and WR-48, respectively). While WR-69 does not identify what is included in "supply", based on the shape of the supply curve it presumably depicts natural supply. It should be noted that WR-69 does not appear in the Division's 1977 report (WR-152 or WR-79). Figures 4 through 11 in WR-79 show supply and demand curves for the Sacramento-San Joaquin-Delta combined watershed and for various tributaries of the San Joaquin River that resemble WR-69, but with an important difference – Figures 4 through 11 depict natural supply and riparian demand only. Unlike WR-69, Figures 4 through 11 do not include appropriative demand. This is likely because, as discussed in the above paragraphs 10 through 19, in 1977 the Division recognized that additional sources of supply (namely return flows) would be available to appropriators, which a graph like WR-69 does not capture. In this respect, WR-69 is substantively different from the Prosecution Team's 2015 supply and demand charts.

22. With reference to the Prosecution Team's reliance on the 1977 report, Mr. Coats testifies:

"The 1977 report and appendix describe and recommend that the Division conduct a water supply and demand analysis to determine water availability during severe drought conditions." (Coats Paragraph 23)

The Drought '77 Dry Year Program report made other long-term recommendations, including the formation of a "Water Management Section" to perform certain functions, including:

"1. Complete a comprehensive index of all diverters under riparian and pre-1914 water rights in the State and diverters who use well water, contract water, or combination of water from different sources.

2. Develop models for Colusa Drainage Basin and Sutter By-Pass Basin for prediction of available water supplies.

3. Initiate special studies to determine reservation of jurisdiction, water accretion and depletion, and compliance requirements." (WR-152 at report pages 27 and 28, exhibit pages 36 and 37)

The Prosecution Team's 2015 methodology included some but not all of the information recommended in item 1 above, and completely ignored the recommendations in the above items 2 and 3.

23. With regard to the Prosecution Team's 2014 methodology Mr. Coats testifies:

"Due to time constraints resulting from the urgency of the worsening drought conditions, Division staff in 2014 chose the watershed boundaries pertaining to the Sacramento River and San Joaquin River based on how they were defined in the 1977 Report. In the 1977 Report, the Sacramento River watershed boundary generally included the area upstream of Shasta along with the streams feeding the Sacramento River all the way down to the northern part of the Delta known as the Sacramento Delta. The San Joaquin River boundary, in 1977, was similarly mapped to include the remaining part of the Central and South Delta known as the San Joaquin Delta with the major tributaries of the Stanislaus, Merced, Tuolumne and San Joaquin serving as the boundaries." (Coats Paragraph 26)

I did not find any reference to a "Sacramento Delta" or a "San Joaquin Delta" in WR-152 or WR-79. As discussed in paragraph 13 herein, for purposes of evaluating riparian rights, the Division's 1977 analysis considered the Sacramento-San Joaquin-Delta combined watershed, i.e. it did not bifurcate the Delta into a "northern part" and a "remaining part". As discussed in paragraphs 14 through 18 herein, for purposes of evaluating pre-1914 and post-1914 appropriators in the Delta, the 1977 analysis assumed that tributary supplies from Sacramento River, San Joaquin River, and their tributaries would be available to all Delta diverters on priority basis.

24. In describing the supply parameter "full natural flow" (FNF), Mr. Coats testifies:

"Daily full natural flow data is a calculation, performed by DWR, which uses current stream gage values, known upstream diversions and reservoir data such as changes in storage and posted evaporation numbers, to arrive at the amount of available water for that day." (Coats Paragraph 34)

This statement is incomplete. The phrase "known upstream diversions" as used by Mr. Coats must not be confused with how this term is used in a water rights context. The Department of Water Resources (DWR) obtains data on certain measured diversions conveyed out of the FNF watershed as part of its full natural flow (FNF) computation, but that data does not identify a basis of water right for those diversions. Also, for some FNF stations DWR adjusts for "irrigation and consumptive use" upstream. While such irrigation and consumptive use may have a basis of water right, as explained by Mr. Stephen Nemeth, one of the Prosecution Team's witnesses, the values used by DWR are not based on "known diversions" in any given year; they are standard values that DWR uses for the same month every year regardless of hydrologic conditions. (Stephen Nemeth deposition transcript, December 8, 2015, starting on page 53, line 13)

25. In describing how the Prosecution Team compared DWR's daily FNF data with DWR's Bulletin 120 forecasted monthly FNF values to quantify supply, Mr. Coats testifies:

". . . daily FNF is, as the name suggests, a daily tracking tool we use to not only qualify the monthly B120 forecasts but also serves as a "backup" supply in the event the daily averaged monthly B120 forecast is less than the daily FNF. For example, let's say the monthly B120

forecast was 3,000 acre-feet for a particular 30-day month. On a daily basis, the 3,000 acre-feet monthly value works out to a daily-averaged 100 acre-feet per day. If the daily FNF values are higher than the 100 acre-feet value, we will use them since a higher water supply is of more benefit to water right holders such as BBID or WSID. In other words, when determining the "supply" side of the supply and demand analysis, the Division makes every assumption conservatively in favor of a greater estimate of supply, which is in the favor of diverters because more supply means water will be available for diversions for a longer period of time." (Coats Paragraph 34)

This is one of several instances where Mr. Coats mentions the Prosecution Team's comparison of daily FNF with forecasted monthly FNF to make decisions about water availability in 2015, but fails to recognize that the Prosecution Team made adjustments to DWR's Bulletin 120 *forecasted monthly* FNF data that increased estimated supply, but made no such adjustment to *daily* FNF data. For example, in the Prosecution Team's Excel workbook supporting the May 1, 2015 curtailment (WR-75) the Prosecution Team adjusted forecasted monthly FNF on the "Prorated Demand" tab to account for estimated contributions to supply from minor tributary streams, but made no adjustment to daily FNF. In the Excel workbook supporting the June 12, 2015 curtailment notice (WR-77) the Prosecution Team made adjustments to the forecasted monthly FNF values on the "FNF Adjustments" tab to account for minor stream contributions and certain return flows, but made no adjustment to daily FNF values. To the extent that the Prosecution Team compared the two parameters, it was comparing "apples and oranges".

Other places in testimony where Mr. Coats discussed supply without mentioning that adjustments were made only to monthly forecasted FNF supply and not to daily FNF supply are in Coats Paragraphs 45, 47, and 49. Mr. Yeazell testifies that "supplements" to supply were made to monthly forecasted FNF, but is silent as to why similar adjustments were not made to daily FNF (Yeazell Paragraphs 41, 54, and 55). To the extent that the Prosecution Team used daily FNF to make decisions about curtailments, the data it relied upon underestimated supply. None of the information provided by the Prosecution Team explains why daily FNF was not adjusted in the same manner as forecasted monthly supply.

26. In describing DWR's reckoning of daily FNF, Mr. Coats testifies:

"DWR's daily full natural flow calculations are less accurate than the monthly exceedance calculations because they are based on less data than is available at the completion of each month. Due to the time lag between the effect of upstream operations and downstream flow measurements, calculated daily full natural flow fluctuates from day to day." (Coats Paragraph 35)

The above quotation requires some elaboration to avoid misunderstanding. DWR's Bulletin 120 monthly forecast reports provide monthly FNF values for months that pre-date the forecast and are based on "measured flows". (WR-17 at page 6 and asterisked footnote on page 5) The Bulletin 120 reports also provide forecasts of future monthly FNF data. Mr. Coats' assertion that monthly exceedance calculations are more accurate than daily FNF data is only true in hindsight. It is not true for forecasted data. Data based on events that have occurred cannot be "less accurate" than events that haven't occurred.

It should also be understood that the primary reason that daily FNF fluctuates from day to day is because it is a computed value and is affected by the accumulation of errors in measured parameters that figure in to its computation and is within the margin of error of those measured values. This is why, particularly in the summer months when flows are low, daily FNF will fluctuate widely and sometimes is reported as a negative value.

27. Mr. Coats describes the Prosecution Team's consideration of agricultural return flows for the San Joaquin River in its 2015 methodology as follows:

"In addition to these Delta supplements, and following direction in the 1977 Dry Year Report, we added additional supply owing to return flows from the valley floor as specified in the 1977 report. Return flows are simply the excess flow not needed by the irrigated crop (also called irrigation runoff) that return to a stream system. Page 6 of the Appendix to the 1977 Drought report specifies varying percentages by month of return flow for the San Joaquin River watershed (see WR-79)." (Coats Paragraph 48).

The Prosecution Team misinterpreted the 1977 report with regard return flows for the San Joaquin River. In the Prosecution Team's Excel workbook supporting the June 12, 2015

curtailment notice (WR-77), the Prosecution Team assumed that return flows for the San Joaquin River would be 20 percent of senior demand in the months of March and April, 10 percent of senior demand in the months of May and June, and none in the months of July through September, and cites the 1977 drought report as the basis for this assumption. Page 6 of the 1978 Appendix (WR-79) does state the aforementioned April through June percentages, and they are used in Tables 6 through 12 of WR-79, but only in the context of riparian demand. As shown in Table 26 of WR-79, the Division's 1977 analysis accounted for return flows in the San Joaquin River system after June, and these flows were a significant source of supply to pre-1914 and post-1914 appropriators in the 1977 analysis. It should be noted that the Prosecution Team's Excel workbook calculation supporting the May 1, 2015 curtailment notice (WR-75), which was prior to the May 12, 2015 stakeholder meeting, did not consider any San Joaquin return flows, and to the extent that the Prosecution Team included San Joaquin return flows in its Excel workbook calculation supporting the June 12, 2015 curtailment notice (WR-77) return flows for the San Joaquin were only included as an additional source of supply to forecasted monthly FNF and not to daily FNF.

28. With regard to return flows for the Sacramento River system, Mr. Coats states:

"The 1977 Drought report did not allocate any return flows (see page 4 of WR-79) for the Sacramento River." (Coats Paragraph 48)

Here again, Mr. Coats misinterprets the Division's 1977 analysis. Within the discussion of "natural" supply available to riparians, the 1978 Appendix (WR-79) states:

"All measured return flows reported in the 1976 Survey were assumed to be not available for use by riparians during 1977." (WR-79 at report page 4, exhibit page 15)

This statement refers to a report prepared by DWR called *"Sacramento Valley Water Use Survey – 1976"* (WR-79 at page 3) and is specific to "measured" return flows being unavailable to "riparians". In 2015, the Prosecution Team apparently took this statement out of context and assumed that it meant that there were no return flows whatsoever in the Sacramento River system. Tables 18 through 22 in WR-79 evaluate return flow in various reaches and tributaries in the Sacramento River system and in fact contain the phrase "Estimation of Return Flows" or "Return Flows" in their titles. These return flows formed a significant source of supply for pre-

1914 and post-1914 appropriators in the Division's 1977 analysis. By failing to account for any return flows in the Sacramento River system, the Prosecution Team's 2015 methodology omitted a potentially significant source of supply in its analysis of the combined watersheds.

Also, as I noted in Section 3.3 of my expert report (WSID-0122), DWR prepared a report in October 1978 analyzing the 1977 drought year for the Sacramento River and Delta titled *"Sacramento Valley Water Use Survey 1977, Bulletin 168"*, dated October 1978. (WSID-0068) Return flows within the Sacramento River system were included in DWR's 1978 analysis.

29. In describing how the Prosecution Team quantified demand in its 2015 water availability analyses, Mr. Coats states:

"Using the reported demands for either 2014 for the informational order recipients or the 2010-2013 four-year average for all others, the State Water Board staff displays the demands graphically according to their respective priorities with the riparian rights at bottom, and the pre-1914 appropriative right demands added and depicted above the riparian demand since all the post-1914s were already advised they were curtailed." (Coats Paragraph 68)

In the context of the Prosecution Team's combined analysis methodology, this oversimplifies priorities by presuming that riparians always have priority over pre-1914s and ignores supplies that are available only to appropriators. For example, the Prosecution Team's Excel workbook calculation supporting the June 12, 2015 curtailment notice (WR-77) counts return flow of Delta senior demand as an additional source of supply (although only for the forecasted monthly FNF supply) that is available to all diverters, with riparians afforded the highest priority regardless of where they are located within the combined watershed. However, because these return flows are sourced in the Delta they are not available to riparians on tributary streams upstream of the Delta.

30. As evidence that the Prosecution Team made the correct decision that there was insufficient supply under BBID's priority in late June 2015, Mr. Coats refers to measured flows at Vernalis and points to a chart (WR-81) showing mean daily flow at Vernalis as the only sources of supply for various representations of prorated senior Delta demand:

"A separate analysis (see WR-81) was performed after issuing the BBID ACL, which compared the upstream flow at Vernalis, as measured by a gage, to the pro-rated downstream senior Delta demand which included the 1902 and earlier pre-1914 and riparian users. The Vernalis gage is a location just upstream of the Delta where water quality requirements are often measured. The significance of the Vernalis gage is that it can confirm whether there is enough measured flow (which is different than the full natural flow since measured flow may include storage releases) at its location to satisfy remaining downstream pre-1903 water right demands. [sic] which are senior to BBID's priority." (Coats Paragraph 71)

"In the WR-81 comparison, the Division used the same pro-rated percentage method of total Delta demand assigned to the San Joaquin watershed used in the April 23, 2015 notice and compared that demand with the available flow at Vernalis. This comparison shows that the measured flow at Vernalis was insufficient to service the pro-rated remaining senior demand for at least the June 13 through June 25 time period of the ACL Complaint. An additional demand line, seen as a red hashed line (on WR-81), was included in the comparison which displays the entire Central and South Delta demand (which was typically assigned to the San Joaquin watershed and used in the 2014 supply and demand analysis) vs. the substantially reduced prorated demand." (Coats Paragraph 72)

"This comparison shows that even under the best-case scenario of using the smaller prorated Delta demand, the available flow at Vernalis was needed by downstream senior right holders (riparian and pre-1914 rights with a priority before 1902) and was not available for BBID's diversion during the June 13 through June 25 time period set forth in the ACLC." (Coats Paragraph 73)

There are multiple issues with Mr. Coats' reference to WR-81.

First, apart from WR-81, I have not seen any other charts or supporting Excel calculations showing that the Prosecution Team considered measured flows, including "storage releases", to quantify supply. In order to be consistent in its evaluations of water availability in the Delta, measured flows from the Sacramento River and other tributaries should also be included.

Second, Mr. Coats does not identify the Excel workbook that supports WR-81. Mr. Coats refers to a methodology akin to that used for the Prosecution Team's April 23, 2015 curtailment, however, he does not cite an Excel workbook supporting the April 23 analysis. Therefore, the analysis resulting in WR-81 cannot be independently verified. Notwithstanding the unavailability of supporting documentation, the April 23, 2015 curtailment notice (WR-33) pertained to post-1914 appropriators in the San Joaquin River and says nothing about Delta diverters or demand, prorated or otherwise. BBID is located in the Delta, so it is unclear how the April 23, 2015 analysis would figure in to conclusions about availability of water to BBID.

Third, Mr. Coats' characterization of Central and South Delta demand as being "typically assigned to the San Joaquin watershed" is not supported. As, if by "typically assigned" Mr. Coats is referring to the 1977 Drought Report, he is mistaken. As I noted in paragraph 23 above, the Division's 1978 Appendix (WR-79) did not bifurcate Delta demand.

Fourth, Mr. Coats' characterization of WR-81 as a "best-case scenario" is based on the false premises described above and does not consider Delta hydrodynamics in the evaluation of supply available to BBID.

31. In characterizing harm caused by BBID's alleged unauthorized diversions, Mr. Coats states:

"These unauthorized diversions likely reduced or threatened to reduce the amount of water available for downstream water right holders during an extreme drought emergency. Moreover, BBID's diversions likely reduced the water available for instream resources and riparian habitat within the Delta during an extreme drought emergency." (Coats Paragraph 81)

The term "likely", used in two places in this passage, is not conclusive. "Downstream water right holders" are not identified and Mr. Coats provides no evidence that instream resources and riparian habitat were adversely affected by BBID's actions.

32. Ms. Mrowka testifies to a purported distinguishable difference between Old River flows and tidal flows (Mrowka Paragraphs 40 to 42). Since it is well established that Old River is tidally influenced at WSID's point of diversion, it should be clear that Old River water is comingled with other sources of water that comprise tidal flow. As support for her contention

that Old River water is distinguishable from tidal flows, Ms. Mrowka cites "review, analysis and conclusions" that are purportedly rooted in letter by the State Water Commission dated May 8, 1917 (WR-175). (Mrowka Paragraph 40) However, the State Water Commission's 1917 letter merely documents an "informal conference" among representatives of the Commission, WSID as Applicant for Application 301, and East Contra Costa Irrigation Company as protestant to Application 301. The Commission's very brief letter states "It was agreed that all present indications point to an ample supply for both projects and it was explained that the protest of East Contra Costa Irrigation Company had been filed so that there would be no question as to its priority." The letter then concludes by stating that WSID's Application 301 is approved "with the usual condition prescribed by statute that such approval is subject to all existing rights." The Commission's May 1917 letter does not describe or imply any "review, analysis and conclusions" differentiating Old River flows from tidal flows. Instead, the parties merely had a conversation. This is simply a case of a senior right holder protecting its priority notwithstanding the availability of abundant supply "for both projects", and the junior applicant agreeing to recognize the senior right holder's priority for the same reason.

33. Ms. Mrowka refers to a subsequent letter by the Commission dated July 24, 1917 (WR-176), as a basis for concluding that "only the waters of Old River, and not Delta tidal flows, were considered in determining whether to issue a permit leading to License 1381 (Application 000301)". (Mrowka Paragraph 40) However, WR-176 provides no basis to conclude that the Commission did not recognize the fact that the Old River channel is tidally influenced at WSID's point of diversion. All water rights granted or claimed within the Delta identify a channel from which water is diverted but due to the hydrodynamics of Delta flows, water within those channels may originate from several sources. Old River is no different. The Commission's use of the phrase "to appropriate the waters of Old River" in its July 1917 letter refers to the unappropriated water that exists in the Old River *channel* irrespective of its origins.

34. Ms. Mrowka cites the "reasonable use doctrine" as "lending weight" to the Commission's purported determination that it considered only Old River flows and not tidal flows in its issuance of a permit on Application 301. (Mrowka Paragraph 41). This is a curious citation as the reasonable use doctrine was the result of an amendment to the California state constitution in 1928, occurring some 11 years after the Commission granted a permit on Application 301.

35. Ms. Mrowka testifies "Assignment of Old River flows to the permit on West Sides' application, and not tidal waters, is consistent with the reasonable use doctrine. Requiring West Side to use lower quality tidal waters when fresher, higher quality Old River water was available would have been inconsistent with the reasonable use doctrine." (Mrowka Paragraph 42) WSID's permit did not "assign" Old River flows to WSID. It granted WSID a right to divert unappropriated water from the Old River channel. Given the commingling of water from various sources that occurs within all Delta channels, it is highly doubtful that the Commission in 1917 gave any thought at all to "assigning", "requiring" or in any way distinguishing "higher quality Old River water" from "lower quality tidal waters".

36. Ms. Mrowka's differentiation of Old River flows and tidal flows in the context of Application 301 and the Commission's action in 1917 is at odds with her previous recognition of comingle waters within Old River as a result of treated wastewater discharges by the City of Tracy and WSID's agricultural return flows (Mrowka Paragraphs 37 and 38).

37. With regard to City of Tracy wastewater discharges, Ms. Mrowka states "West Side cannot rely on License 1381 to divert Tracy's wastewater flows during periods in which the State Water Board staff has determined that no water is available under License 1381." (Mrowka Paragraph 48) While the disposition of the City's wastewater discharges is a matter of legal argument, the Prosecution Team's determination is based on an analysis that does not consider all sources of supply. The Prosecution Team did not account for treated effluent discharges as additional sources of supply. The Prosecution Team also insufficiently accounted for agricultural return flows, or omitted them entirely, as additional sources of supply. If all potential sources of supply have not been included in the analysis, then the determination of unavailability is inadequately supported.

38. In conclusion, based on the discussion in paragraphs 4 through 19 herein, I disagree with the Prosecution Team's contention that it based its 2015 water supply and demand analysis on the Division's 1977 methodology/template. The Division's 1977 methodology used a systematic approach to quantifying supply and demand in the streams tributary to the Delta that considered spatial elements for determining the availability of supply to individual rights at their priority. While I do not concur with all of the methods and assumptions the Division used in its 1977

analysis, particularly as regards the Delta, I find it to be a much more rational and realistic conceptual approach to evaluating supply and demand than the Prosecution Team's 2015 global combined watershed methodology.

Paragraphs 20 through 37 herein identify numerous other deficiencies and unexplained or poorly supported elements in the Prosecution Team 2015 methodology.

The Prosecution Team's testimonies do not alter my opinion as set forth in my expert report (WSID-0122) that the Prosecution Team's 2015 water supply and demand methodology is not the correct tool for evaluating Delta water availability.

I declare under penalty of perjury under the laws of the state of California that the foregoing is true and correct.

Executed this 21st day of February, 2016, in Sacramento, California.

NICHOLAS F. BONSIGNORE, P.E.