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LOS ANGELES COUNTY WATERWORKS
DISTRICT NO. 40

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF LOS ANGELES – CENTRAL DISTRICT

ANTELOPE VALLEY GROUNDWATER CASES Included Actions: Los Angeles County Waterworks District No. 40 v. Diamond Farming Co., Superior Court of California, County of Los Angeles, Case No. BC 325201; Los Angeles County Waterworks District No. 40 v. Diamond Farming Co., Superior Court of California, County of Kern, Case No. S-1500-CV-254-348; Wm. Bolthouse Farms, Inc. v. City of Lancaster, Diamond Farming Co. v. City of Lancaster, Diamond Farming Co. v. Palmdale Water Dist., Superior Court of California, County of Riverside, Case Nos. RIC 353 840, RIC 344 436, RIC 344 668	RELATED CASE TO JUDICIAL COUNCIL COORDINATION PROCEEDING NO. 4408 **DECLARATION OF JOSEPH SCALMANINI RE REBUTTAL TESTIMONY** **PHASE 3 TRIAL**

DECLARATION

I, Joseph Scalmanini, do hereby declare and state as follows:

I. BASE PERIOD REBUTTAL TESTIMONY

A. Rebuttal of Bachman Base Period

1. Criteria for selection of an appropriate base period were developed by the State Department of Water Resources (DWR) in the 1960's and 1970's. They were discussed and are summarized in Exhibit 80 to my direct testimony. The first criterion in selecting a base period is that it reflect the long-term mean water supply. Another factor is to minimize changes of groundwater in storage in the zone of aeration, meaning the unsaturated zone above the water table. In my over 30 years of experience in analyzing groundwater conditions throughout California, I am unaware of any professional literature providing base period or study period selection criteria based on changes of groundwater storage in the saturated zone, meaning below the water table, or in confined aquifers.

2. Dr. Bachman fails to properly select a base period that reflects an equivalent to long-term mean water supply. In his base period selection for the Antelope Valley, Dr. Bachman makes a number of observations including that the "climatic signature varies by area." (Ex. B-21.) In doing so, he appears to acknowledge that "climate" is a factor, which is interpreted with his inclusion of broad horizontal, or near horizontal, arrows on his Exhibit B-23 to mean that he is trying to satisfy that fundamental criterion that his two selected base periods (1976-1992 and 1985-2005) reflect long-term mean water supply.

3. It is clear that the Bachman analysis has natural recharge originating as precipitation in the mountains, and becoming recharge as a combination of runoff and subsurface flow from the mountain block to the alluvial basin beneath the Valley. Thus, the appropriate indicators of "long-term mean water supply" in the form of natural recharge are precipitation in the mountains and runoff into the Antelope Valley. One of the Bachman indicators is precipitation on the Valley floor itself (precipitation at Palmdale) which produces no runoff or subsurface inflow to the Valley, and thus minimal or no natural recharge. By the same token, another of the Bachman

indicators is precipitation at the Tejon Rancho gage, which is located across the Tehachapi Mountains in the San Joaquin Valley, at an elevation well below that of the Antelope Valley, where precipitation produces no runoff or subsurface inflow to the Antelope Valley. Thus, both of those indicators are inappropriate for inclusion in "a series of measuring stations" (Exhibit B-21) to examine long-term mean natural recharge supplies to the Antelope Valley groundwater basin.

4. Disaggregation of Dr. Bachman's exhibit B-23 reveals that, with one exception, all the individual "climatic" indicators in that exhibit show predominant "wet" trends, i.e. upward slopes of the lines connecting the end points of the respective base periods. As such, they belie the implication presented by the horizontal, or near horizontal, broad arrows shown on Dr. Bachman's Exhibit B-23 that his two base periods generally reflect long-term mean water supply for natural recharge to the Antelope Valley Groundwater Basin ("Basin"). Most notable among the disaggregated indicators of climatic conditions from Exhibit B-23 is the plot of gaged runoff in Big Rock Creek; that separate plot shows Dr. Bachman's base periods to both be significantly "wet." (Ex. Scalmanini-152.) Similarly, examination of the other disaggregated indicators of climatic conditions from exhibit B-23 (*See* Ex. Scalmanini-153 through Ex. Scalmanini-156) show all but one of them to reflect predominantly wet conditions for both of Dr. Bachman's base periods. Thus, the Bachman base periods fail the fundamental criterion that the base period reflect long-term average water supply. The effect of this flaw is that Dr. Bachman's base periods have an inherent bias that will produce higher estimates of natural recharge, and therefore a higher safe yield, than by using a properly selected base period.

B. <u>Rebuttal Of Sheahan's Base Period</u>

5. Mr. Sheahan's base period also fails the fundamental criterion that it reflect long-term average water supply, and like Dr. Bachman's base period, is biased to produce high estimates of natural recharge to the basin, and therefore a higher safe yield.

6. In Mr. Sheahan's slides 92 and 96, he shows that he believes it is best for him to select a base period with minimum change in groundwater storage. As discussed above, change in

groundwater storage is not a criterion used in the profession for the proper selection of a base period. Thus, it cannot be deemed to be a priority criterion.

7. Despite the fact that precipitation in the mountains, and its fate as runoff and infiltration to form natural recharge, are the purported bases for Mr. Sheahan's estimate of natural recharge, he failed to use any available indicators of precipitation in the mountains or gaged stream flow as factors to decide to applicability of his base period. Beginning with his slide 18, it is clear that Mr. Sheahan's entire natural recharge analysis derives "the source of all water for mountain front recharge is precipitation falling on the mountain front area." Despite the fact that precipitation in the mountains, and its fate as runoff and infiltration to form natural recharge, are the basis for his estimate of natural recharge, Mr. Sheahan fails to consider the most applicable data for both long term run-off and precipitation as indicators of whether those sources reflect long-term average water supply for recharge.

8. The primary factor in base period selection is that it should reflect long-term mean (average) water supply. In considering whether the base period reflects long-term average water supply, it is important to recognize that the pattern and trend of precipitation in the mountains may differ from the pattern and trend of precipitation on the valley floor, as it certainly does in this case.

9. The best indicator of long-term runoff into the Antelope Valley is the gaged record for Big Rock Creek. Scalmanini Exhibit-157 is a cumulative departure curve for the entire record of gaged Big Rock steam flow. Reflected on that figure is the Sheahan base period of 1971 –1997, which has a notable positive (upward) slope showing the period to have experienced a total of about 60,000 acre-feet of total stream flow above long-term average. The best indicators of long-term precipitation as a source of natural recharge are precipitation records in the mountains surrounding the Antelope Valley, and not those on the Valley floor as discussed above. Examination of Mr. Sheahan's slides 134 and 136 clearly show notably positive (upward) slopes of lines connecting the end points of the 1971-1997 period, thus indicating the period to have experienced predominantly above-average precipitation, and thus water supply for natural

recharge. Examination of all appropriate indicators for assessment of the Sheahan base period show it to have an inherent bias that will produce higher estimates of natural recharge, and therefore a higher safe yield, than by using a properly selected base period.

II. REBUTTAL OF MR. SHEAHAN'S OPINION TESTIMONY

A. Bedrock Infiltration

10. There is no such thing as a "landscape coefficient" for native vegetation. Consequently, the subsequent calculation of evapotranspiration by native vegetation (slide 42) is fundamentally flawed. The use of a "landscape" coefficient developed for artificially irrigated ornamental landscaping is invalid for purposes of estimating consumptive use by native vegetation. And the subsequent use of the calculated amount of consumptive use by native vegetation in computing bedrock infiltration (slides 42 and 45) underestimates the amount of water used by native vegetation and overestimates Mr. Sheahan's bedrock infiltration, which in turn results in an overestimate of his natural recharge and safe yield.

11. Beginning with exhibit C-9, slide 24, Mr. Sheahan reaches runoff quantification equal to 45,700 afy, a value which is in fairly close agreement with the 48,200 afy estimated by the Public Water Suppliers. His analysis then proceeds to estimate consumptive use of precipitation by native vegetation in the watershed, noting on slide 36 that, in equation form, $ET_{nv} = ET_o * K_{nv.}$

12. Mr. Sheahan applies that conventional relationship, but simplified for purposes of analyzing evapotranspiration at the scale of an entire watershed, by utilizing a constant reference evapotranspiration (ETo) imported from two distant CIMIS stations, with the constant equal to an average of the reference evapotranspiration from those stations throughout the watershed. It is contrary to all proper understanding of reference evapotranspiration to think that there is a sudden differentiation between measured reference evapotranspiration on a valley floor, in this case approximately 66 inches per year, and a constant smaller value of approximately 51 inches per year throughout the entire mountain front, from immediately above the valley floor to the peak of the surrounding mountain ranges.

13. Disregarding the preceding misunderstanding, however, the bigger issue with the

Sheahan approach is his improper utilization of a so-called crop coefficient (Knv) in the preceding equation. Beginning with slide 38 and continuing through slide 41, Mr. Sheahan describes and develops a "landscape coefficient" for native vegetation, which he describes as being calculated from University of California Cooperative Extension methodology and by an individual at the California Department of Water Resources[1]. The latter analysis is supposedly established by an email from Mr. Fastenau to Gene Nebeker; a copy is attached as Scalmanini Exhibit 158. In that email, Mr. Fastenau is clear that he relied on the document "Guide to Estimating Irrigation Water Needs of Landscape Plantings in California," which is the University of California and Department of Water Resources (WUCOLS III) document noted in Sheahan slides 38-40; Mr. Fastenau is also clear that he relied specifically on Chapter 2 in that document. Copies of the cover of that document and pertinent pages of Chapter 2 are attached as Scalmanini Exhibit 159. On his slide 40, Mr. Sheahan claims that factors were determined by DWR (Fastenau, 2007) from a "UC Coop. Extension Method **for Mountain Front Native Vegetation (WUCOLS III)"** (emphasis added). This is a misrepresentation of the referenced document. It is not for mountain front native vegetation, but is actually for artificially irrigated landscape plantings as its title indicates. It does not contain reference material for native vegetation.

14. Ultimately, Mr. Sheahan concludes (slide 41) that the so-called landscape coefficient for native vegetation (Knv) is 0.14. He then uses this landscape coefficient to compute the evapotranspiration by native vegetation. In doing so, he computes a relatively small value for water use of precipitation by native vegetation, 172,000 afy, which in turn allows him to compute a relatively large amount of bedrock infiltration, 62,200 afy shown on slide 45. It is this latter amount of substantial bedrock infiltration, as a component of natural recharge, which fundamentally differentiates the Sheahan analysis of natural recharge from that developed by the Public Water Suppliers.

15. A fundamental flaw in Mr. Sheahan's analysis is that there is no comparison between native vegetation in a watershed and artificially irrigated landscaping in an urban or suburban

[1] Fastenau, 2007

setting. This is because native vegetation relies on precipitation, and associated soil moisture, whenever it happens to occur, in contrast to landscape irrigation that is artificially irrigated to keep the plants alive and attractive for landscaping purposes. The unique attribute of native vegetation, of course, is that it can survive in a dormant state for long periods of time in the absence of precipitation, and then thrive during periods of precipitation. The reference material improperly relied upon by Mr. Sheahan and the analysis attributed to the Department of Water Resources (Fastenau, 2007) both focus on artificially irrigated landscaping, and thus provide no insight to crop coefficients for native vegetation.

16. In fact, where Mr. Sheahan lists an equation on slide 39 to express the crop coefficient (Knv), he lists the equation from the two sources to be $K_{nv} = k_s * k_d * k_{mc.}$ As shown in the attached copies of the UC/DWR reference. However, no such equation exists in the foundational reference cited by Sheahan or relied upon by Mr. Fastenau. Instead, the UC/DWR reference introduces a relatively new concept called a landscape coefficient (K_L), which has the same components which Mr. Sheahan lists his slide 39. In equation form, the expression in the UC/DWR reference (pg. 10 in the attached Ex. Scalmanini-159) is $K_L = k_s * k_d * k_{mc.}$ In effect, both Mr. Sheahan in his slide 39 and Mr. Fastenau in his referenced email changed the equation from what is in the foundational University of California and DWR reference publication. Instead of recognizing that a landscape coefficient cannot be used for native vegetation, they improperly changed the equation to say that the three factors multiply together to produce what they call a crop coefficient for native vegetation.

17. In the professional literature, appropriate values of crop coefficients for native vegetation can be found to vary between approximately 0.5 and 0.8, depending on the amount of available moisture which varies through the year as a function of the timing of precipitation (see, for example, Groundwater Hydrology and Hydraulics by McWhorter and Sunada, Professors of Agricultural and Chemical Engineering, and Civil Engineering, respectively at Colorado State University). Page 55 from their text, including Table 2-4 of estimated plant water use coefficients Kco for native vegetation, is included as Scalmanini Exhibit 160. Applications of those

coefficients, adjusted as indicated on that page for available water in accordance with precipitation availability in the Antelope Valley area, results in a proper year-around crop coefficient for native vegetation closer to 0.4.

18. The net effect of using the proper crop coefficient for native vegetation would be that approximately three times as much precipitation would be consumed by native vegetation than reported by Mr. Sheahan, and his reported amount of bedrock infiltration would be substantially reduced or eliminated, and thereby substantially reducing his estimated natural recharge and safe yield.

B. Improper Validation For Fraction of Mountain Front Recharge

19. In slide 61, Mr. Sheahan attempts to validate his fraction of mountain front recharge by showing that it is within a range of published data, which he reports to be 14 to 38 percent of total precipitation. However, Mr. Sheahan then changes his own definition of mountain front recharge for purposes of the calculation and utilizes only his bedrock infiltration component as a fraction of total precipitation. On his slide 26, Mr. Sheahan defined mountain front recharge to be a combination of runoff and bedrock infiltration but, in this case (slide 61), he uses only the bedrock infiltration component for purposes of his validation. To be consistent with his own definition of mountain front recharge, the calculation reflected on slide 61 should have been (45,700 + 62,200) / 279,000 * 100 = 38.9%. The resultant fraction of that calculation, mountain front recharge equal to nearly 39 percent of precipitation, is extremely high in all arid settings, and slightly outside (above) the range which Mr. Sheahan reports to have been published.

C. Lag Time Sensitivity Analysis Using Dr. Grismer's Opinion

20. In his slides 85 through 90, Mr. Sheahan criticizes the Public Water Suppliers' selection of lag time and concludes that a conservative value for lag time is five years or less. The Public Water Suppliers conducted sensitivity analyses on lag time by assessing the impact of various lag times, including a short lag time, three years, on their estimates of natural recharge. The net effect of that sensitivity analysis is summarized in the attached Scalmanini Exhibit 161; the quantitative result is that the natural recharge estimated with a three year lag time is about 63,000

afy. That value when considered with all the other independent estimates of natural recharge, would still result in the rounded value of 60,000 afy used by the Public Water Suppliers in their safe yield estimates. Thus, when using a shorter lag time as suggested by Dr. Grismer, in a proper base period, it results in insignificant differences, which have no material impact on the estimates of natural recharge or safe yield.

D. <u>Mr. Sheahan Presented An Incorrect Equation To Estimate Natural Recharge</u>

21. The mathematical expression (equation) to express natural recharge on slides 176, 180 and 182 is incorrect and fails to satisfy the fundamental conservation of mass. The equation is stated to be: NR = TO – TI + CS, where the terms are defined in slide 180 as: NR is natural recharge, TO is total outflows, TI is total inflows, and CS is change in groundwater storage

22. Because total inflows (TI) include natural recharge, the inclusion of natural recharge on both sides of the equation would result in, if the mathematical expression were used as displayed, a double counting of natural recharge. Stated another way, if that equation was used to calculate a value of natural recharge, the result would be a number that is actually twice the value of natural recharge. Regardless of how Mr. Sheahan proceeded with his calculations, his mathematical expression for natural recharge on his slides 176, 180 and 182 is flawed, and should not be considered as an accurate or reliable expression for the relationship between natural recharge and a balance of the total inflows, total outflows, and change in groundwater storage in a basin.

23. The mathematical expression for safe yield on slide 189, when combined with the expression for natural recharge on slides his 176, 180 and 182, leads to confusion. If one substitutes the expression for natural recharge from Mr. Sheahan's latter slides into the equation on slide 189, the result is that safe yield is a combination of artificial recharge (AR), plus total outflows (TO), minus all inflows except natural recharge, plus change in storage (CS). In other words, the combination of the two Sheahan mathematical expressions results in an expression for safe yield that is independent of natural recharge. It is not possible for the safe yield of a groundwater basin to be independent of the natural recharge. In fact, the native safe yield of a

groundwater basin is simply its natural recharge plus any return flows associated with the pumping and use of that natural recharge. (Ex. Scalmanini-92.)

E. Mr. Sheahan's Temporary Surplus Analysis Is Flawed

24. The overall treatment of "temporary surplus" by Mr. Sheahan is fundamentally flawed. Regardless of what fraction of a very grossly estimated total storage capacity remains in place (slide 198), it is wrong to claim that the basin's groundwater depletion "temporary surplus." "Temporary surplus" is a term which recognizes that, in order for a groundwater basin to be operated in a safe state, there needs to be some water removed from native storage to allow groundwater recharged to occur. However, continued removal of water from storage beyond temporary surplus is considered overdraft. At the scale of any estimate of natural or other recharge rates in the Antelope Valley, the removal of 5.5 million acre-feet since 1951 as estimated by the Public Water Suppliers, or the removal of more than 8.3 million acre-feet from about 1915 through 1995 as estimated by the U.S. Geological Survey, are a quantified depletion of the resource and cannot be "temporary surplus" under any reasonable analysis.

25. Continued removal of water from storage beyond temporary surplus is considered overdraft. It is unreasonable of to think that it takes ongoing removal of groundwater from storage, now in total over 8 million acre-feet, to "allow collection of natural recharge and storage of water by current and future artificial recharge", as claimed by Mr. Sheahan on his slide 197.

F. Subsidence Is An Undesirable Effect

26. Acceptance of an undesirable effect does not invalidate it. Undesirable results have been delineated for purposes of defining safe yield and overdraft. In simple summary, safe yield has been defined for decades as being an average annual amount of pumping, under prevailing cultural conditions that can be extracted from a groundwater basin without causing an undesirable result. And overdraft is defined as the occurrence of such undesirable results as a result of extracting groundwater in excess of a basin's safe yield. Whether or not anyone "accepts" an undesirable result is immaterial.

27. The undesirable results speak for themselves, and they begin with the earliest technical

definition of safe yield (Ex. Scalmanini-7) that safe yield means limiting pumping so there is no chronic lowering of the water table. Approximately a century of ongoing technical, as well as subsequent legal, definitions of overdraft have perpetuated the same concept. Overdraft has been "accepted" in many basins (and still is "accepted" in some basins) until efforts were undertaken, via adjudications, to halt it and preserve the resource in a sustainable fashion for current and future generations.

G. Mr. Sheahan Did Not Test His Safe Yield Number

28. In his slides 301 – 303, Mr. Sheahan appears to conclude that the application of his "simple equation for safe yield" (slide 301) results in a set of safe yield estimates that he believes generally support his estimated value of current safe yield, 171,000 afy. Interestingly, he excludes any test of his current safe yield via the same methodology: apparently, because he considers the recent historical period, e.g. 1998 – 2008, to have questionable agricultural pumping estimates (slide 301). A fundamental test of a safe yield value derived from historical periods is that it be applicable to the time period in question. In this case, the questions are not what the historical safe yield might have been, and whether the basin might have historically been in overdraft; rather, the proper questions are what the safe yield is now, and whether the basin is now in overdraft.

29. It is unclear how Mr. Sheahan discounts the 1998 – 2008 period due to "questionable" agricultural pumping estimates. As discussed with regard to the testimony of Dr. Kimmelshue, his estimates of agricultural water requirements and those of the Public Water Suppliers are essentially the same over the last 15 years. While Dr. Kimmelshue did not directly estimate agricultural pumping, Dr. Bachman took Dr. Kimmelshue's estimates of agricultural water requirements, subtracted non-groundwater supplies, and arrived at estimates of agricultural pumping which are essentially the same as those of the Public Water Suppliers. (Ex. Scalmanini-167.)

30. Again, a fundamental test of a safe yield value derived from one or more historical periods is that it be applicable to the time period in question, which is the present. The safe yield

concluded by Mr. Sheahan, from an overly wet base period of 1971 – 1997, is 171,000 afy. When compared to average pumping stresses over the subsequent time period through the present, about 152,000 afy, Mr. Sheahan's safe yield value suggests that the basin should recently be in "surplus", i.e. accruing storage, at a notable rate. Instead, as shown on Mr. Sheahan's slide 302, which appears to be a graphical summary of all the change in storage numbers in his tabulation on slide 303, the basin has been losing groundwater in storage at an average rate of more than 50,000 afy from 1998 through 2008. Mr. Sheahan's safe yield of 171,000 afy, derived from his wet base period of 1971 – 1997, produces an overly optimistic estimate of safe yield that fails the fundamental test of producing a change in groundwater storage that is consistent with what is actually happening in the basin subsequent to his base period, i.e. from 1998 to the present.

III. COMPARISON OF DR. KIMMELSHUE AND PWS INDEPENDENT ESTIMATES OF WATER REQUIREMENTS AND PUMPING

31. Dr. Kimmelshue provided testimony on agricultural water requirements and return flows from 1962 through 2005, and returns flows to the basin from municipal irrigation from 1975-2005. Although there are some differences between the Kimmelshue estimates of agricultural water requirements and those prepared by the Public Water Suppliers, the notable differences lie in the absence of Kimmelshue estimates prior to 1962, and in the years from the late 1960s through the early 1980s. From 1985 to 2005, the two estimates are practically identical. (Ex. Scalmanini-162.)

32. Dr. Kimmelshue's estimates of agricultural return flows as compared with estimates prepared by the Public Water Suppliers are practically identical over the entire period of corresponding time. (Ex. Scalmanini-163.) If there is a difference in estimates of return flows that might influence other calculations, e. g. an estimate of natural recharge, it lies in the generally consistent difference between Dr. Kimmelshue's estimates of municipal and industrial irrigation return flows, which are consistently *higher*, than those prepared by the Public Water Suppliers. (Ex. Scalmanini-164.)

33. Regarding the municipal return flows, Dr. Kimmelshue estimates are high because his analysis produces municipal and industrial return flows based on amounts of landscape water use in the range of 80 percent to 140 percent of total municipal water use. Landscape water use fractions above 80 percent are unrealistic and, fractions above 100 percent are impossible. Ignoring those facts and combining Dr. Kimmelshue's estimates for return flows from municipal irrigation with estimates prepared by the Public Water Suppliers' experts estimates of return flows from municipal septic systems, as was done by Dr. Bachman, the estimates of total municipal return flows prepared by Drs. Kimmelshue and Bachman are consistent with those prepared by the Public Water Supplier experts. (Ex. Scalmanini-165.) Likewise, combing the respective estimates of agricultural and municipal return flows, the estimates of total return flows prepared by Drs. Kimmelshue and Bachman are consistent with those prepared by the Public Water Suppliers. (Ex. Scalmanini-166.)

34. Such as there is any "disagreement" between the respective estimates that use Dr. Kimmelshue's work and affect natural recharge estimates, the slightly higher estimates by Dr. Kimmelshue would tend to cause a lower estimate of natural recharge than prepared by the Public Water Suppliers; in turn, such a lower estimate of natural recharge would result in lower estimates of native and total safe yield.

35. Dr. Kimmelshue did not separately estimate agricultural pumping or total pumping in the basin. Rather, Dr. Bachman, using a combination of Dr. Kimmelshue's agricultural water requirements with Public Water Supplier data to estimate historical agricultural pumping. As with the Kimmelshue and the Public Water Suppliers' estimates of agricultural water requirements (Ex. Scalmanini-162), the respective estimates of agricultural pumping are different in earlier years, but practically identical since 1985. (Ex. Scalmanini-167.) Since Dr. Bachman utilized a combination of the previously described estimate of agricultural pumping and the historical record of municipal and industrial pumping reported by the Public Water Suppliers to estimate total pumping, the respective estimates of total pumping in the basin reflect the same differences in earlier years, but are practically identical estimates since 1985. (Ex. Scalmanni-

168.)

36. In particular because the Phase 3 trial is focused on safe yield and overdraft in the basin under current conditions, and not on conditions several decades ago, the notably comparable estimates of total pumping in the basin over a 20 to 25 year period since the mid-1980s are used in this rebuttal to discuss the basin's yield, and whether it is an overdraft, in the context of testimony submitted primarily by various landowner experts.

IV. REBUTTAL OF DR. WILSON'S MOUNTAIN FRONT RECHARGE

37. Dr. Wilson concluded that most likely the natural recharge in the Antelope Valley groundwater basin is 163,000 afy. He did not offer any analysis or opinions about the safe yield of the basin based on his natural recharge estimate, on the status of the basin with regard to overdraft.

38. In order to evaluate the natural yield number suggested by Dr. Wilson, it is necessary to estimate a safe yield using Dr. Wilson's natural recharge number. This necessitates looking at the issue of return flows. As estimated by both Dr. Kimmelshue and the Public Water Suppliers, the return flow fractions of applied agricultural water were practically identical, 24 and 25.5 percent, respectively (Ex. Scalmanini-163). As discussed above, the return flow fractions for municipal and industrial water use by Dr. Kimmelshue were slightly higher than those estimated by the Public Water Suppliers.

39. Recognizing that native safe yield or safe yield is a combination of natural recharge plus return flows from the use of that natural recharge (Ex. Scalmanini-78), and that total return flow fractions from both Dr. Kimmelshue and the Public Water Suppliers are in the range of about 25 to 30 percent, Dr. Wilson's "most likely" natural recharge equates to a native safe yield of more than 220,000 afy.

40. Further recognizing that the use of supplemental water, e.g. imported SWP water, augments natural recharge and thus augments native safe yield (Ex. Scalmanini-79), and that the only estimates of that supplemental safe yield were provided by the Public Water Suppliers, the addition of that supplemental safe yield to the native safe yield derived from Dr. Wilson's natural

recharge would result in a total safe yield of about 250,000 afy.

41. Scalmanini Exhibit 169 is a graphical presentation of total pumping histories in the basin, both as presented by the Public Water Suppliers and as separately interpreted by Dr. Bachman from the Kimmelshue estimates of agricultural water requirements. Also reflected on Scalmanini Exhibit 169 is the approximate total safe yield of 250,000 afy derived from the Wilson estimate of most likely natural recharge; the latter is reflected only for the time period from 1995, five years before the filing of the adjudication, to the present. Over the entire period from the mid-1990s, the Wilson-based safe yield far exceeds the pumping stresses, by an average of nearly 100,000 afy. Such a condition would imply that the basin should be in significant surplus, and accruing increased storage at an unprecedented rate of tens of thousands of acre-feet per year over that entire 15-year period. No evidence is been presented by anyone to support such a condition, i.e. where the basin has recently been, and is now, in "surplus" and accruing storage at such a rate.

42. If we were to calculate a change in storage based on groundwater pumping in the basin for the period 1998 through 2009 and the total safe yield of 250,000 afy derived from Wilson's natural recharge opinion, the storage accrued by 2009 would be on the order of 1.2 million acre-feet, which greatly differs from the cumulative change in storage by 2009 calculated from measured groundwater levels, a decline of approximately 640,000 acre-feet, as offered in testimony by the Public Water Suppliers.

V. <u>BACHMAN REBUTTAL</u>

A. <u>Natural Recharge</u>

43. In his summary table of Basin Yield (Ex. B-96), Dr. Bachman includes a table listing his natural recharge estimates for his two base periods, 1976-1992 and 1985-2005. That table includes his calculation of natural recharge using the "Purveyors Data," from spreadsheets produced by him in deposition. Those numbers, 66,925 afy and 57,902 afy, were developed by Dr. Bachman, and are not reflective of natural recharge estimates by the Public Water Suppliers. More importantly, the other values for natural recharge presented in Dr. Bachman's exhibit B-96

were calculated by Dr. Bachman using a collection of data from the "purveyors" and from Dr. Kimmelshue, with a constraint that the calculated recharge from the mountain block could not fall outside the range of natural recharge developed by Dr. Wilson. In other words, Dr. Bachman took the "80 percent probability" that Dr. Wilson placed on his range of natural recharge, and used the range as if it were 100 percent probable.

44. Irrespective of the preceding constraint, Dr. Bachman concludes that for one of his base periods 1976-1992, total average annual natural recharge is 105,088 afy, while for his other base period 1985-2005, total average annual natural recharge is 86,078 afy. Total average annual natural recharge is supposed to be a representation of exactly what the term says an average amount of natural recharge that the basin has experienced, and can be expected to experience for purposes of estimating safe yield and managing the basin in accordance with a safe yield. Within Dr. Bachman's two base periods, there are eight common years, 1985 through 1992. It is not possible for a single period of years to experience one amount of natural recharge within one "base period", for example 105,088 afy through the 1976-1992 base period, and for the same period of years to experience another substantially different amount of natural recharge within another overlapping "base period", for example 86,078 afy through the 1985-2005 base period.

45. Of course, the different amounts of natural recharge for the two wet Bachman base periods, in part constrained by the range of natural recharge simulated by Dr. Wilson, also result in a fairly wide range of possible safe yield, 140,000 to 165,000 afy. Even if the wet base period bias in Dr. Bachman's calculated results is ignored, the large range in safe yield values, 25,000 afy, provides nothing definitive about the basin or its condition. When considered with the independent estimates of total pumping prepared by the Public Water Suppliers, and by Dr. Kimmelshue/Dr. Bachman, Dr. Bachman's concluded range of safe yield estimates indicate that the basin "might be" in overdraft (pumping in recent years exceeds the lower end of his range), or it "might be" in surplus (pumping in recent years is below the lower end of his range). Either way, but more notably for his earlier 1976-1992 base period which ends well short of the present, Dr. Bachman provides no updated analysis of groundwater storage to support whether the basin is

overdraft under present conditions.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed on March 29, 2011 at Woodland, California.

Joseph Scalmanini

LAW OFFICES OF
BEST BEST & KRIEGER LLP
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PROOF OF SERVICE

I, Patricia Alshabazz, declare:

I am a resident of the State of California and over the age of eighteen years, and not a party to the within action; my business address is Best Best & Krieger LLP, 400 Capitol Mall, Suite 1650, Sacramento, California 95814. On March 29, 2011, I served the within document(s):

DECLARATION OF JOSEPH SCALMANINI RE REBUTTAL TESTIMONY

- [x] by posting the document(s) listed above to the Santa Clara County Superior Court website in regard to the Antelope Valley Groundwater matter.
- [ ] by placing the document(s) listed above in a sealed envelope with postage thereon fully prepaid, in the United States mail at Irvine, California addressed as set forth below.
- [ ] by causing personal delivery by ASAP Corporate Services of the document(s) listed above to the person(s) at the address(es) set forth below.
- [ ] by personally delivering the document(s) listed above to the person(s) at the address(es) set forth below.
- [ ] I caused such envelope to be delivered via overnight delivery addressed as indicated on the attached service list. Such envelope was deposited for delivery by Federal Express following the firm's ordinary business practices.

I am readily familiar with the firm's practice of collection and processing correspondence for mailing. Under that practice it would be deposited with the U.S. Postal Service on that same day with postage thereon fully prepaid in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

I declare under penalty of perjury under the laws of the State of California that the above is true and correct.

Executed on March 29, 2011, at Sacramento, California.

[signature]
Patricia Alshabazz