PALO VERDE IRRIGATION DISTRICT

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November 1, 2012

California Energy Commission
Dockets Unit, MS-4
Docket No.11-AFC-04
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Palo Verde Irrigation District's comments on Rio Mesa Solar Electric Generating Facility Preliminary Staff Assessment Part A issued Sept. 2012. (11-AFC-04)

Dear Energy Commission:

Thank you for the opportunity to comment on the Rio Mesa Solar Electric Generating Facility Preliminary Staff Assessment Part A issued Sept. 2012. The following comments are provided:

1. Page 1.1-4, 4th line down: Correct road name is Rannells Blvd. For the valley, avenues are roads running east/west.

2. Page 3-12,13 Storm Drainage System:

a) The amount of rain in a 100 year, 24 hour storm event is not indicated. One gets a different amount depending on whose rain event tables are being used.

b) Presently runoff from the storms that reaches the valley flows into our Hodges Drain. Due to the increased impervious area created by the solar panels, Palo Verde Irrigation District (PVID) expects more damage to it's Hodges Drain to occur. What steps will the project take to reduce the damage to our facility?

3. Page 4.9-7 Hydrogeology 2nd paragraph vs page 4.10-5 last paragraph above Surface and Groundwater Beneficial Uses: On page 4.9-7, in the description for the PVMGB, the typo error for the boundary between the mesa and valley was corrected from "Palo Verde Mesa to the east" to "Palo Verde Valley to the east" yet on page 4.10-5, the typo error was retained. PVID considers the boundary to be the center of the various drains along the toe of the mesa and the low area at toe of mesa between the sections of drains. Valley ground generally slopes southwesterly dropping about 1.5 feet per mile. The mesa slopes easterly to a sharp drop off of about 40 to 60 feet into the valley. PVID maintains a system of gravity drains along the toe of the mesa whereby groundwater from the valley flows into the drain thru the east and south banks and groundwater from the mesa flows into the drain thru the west and north banks. The drain's water surface is the low point for the two groundwater basins. However, based on the way this report is written, the erroneous boundary line lying in the valley between the two basins was used. This erroneous boundary line has almost half of the valley in the Mesa Groundwater Basin.

4. Page 4.9-7, 3rd line from bottom: "Historically, because of agricultural development, groundwater consumption exceeded groundwater recharge..." is backwards. Groundwater consumption was very limited due to poor water quality. The groundwater at 30th Avenue and Rannells Blvd in 1913 was obtainable by well at a depth of 16 feet.(USDA Soil Survey of the Palo Verde Area California by Kocher printed 1926, field data 1922, page 621). After the surrounding area began being irrigated, by 1922, water had risen to about 7 feet below the ground surface. As irrigation developed the valley area, a series of drainage channels was required to remove excess groundwater to prevent crop damage by high groundwater. In the late 1950's, the average depth to groundwater for the valley was about 5 feet with many locations less than 2 feet. In the 1960's while the River was being re-channelized south of the County Line, PVID re-channelized its main drain and all the drains south of Hobsonway so that in the 1980's, the valley average depth to groundwater was 10 feet. Irrigation water is obtained from the River not from groundwater. Presently the City of Blythe pumps most of the groundwater used in the valley.

5. Page 4.9-10, Water Supply Table 2: Four wells are on the mesa in the Mesa ground water basin. The remaining 3 wells are in the Valley Groundwater Basin. However the water surface for Hodges Drain which is the boundary between the two basins is not shown. The water in the Hodges Drain is visible groundwater seeping thru the banks of the drain. The USGS information web site for wells provided the well #, latitude, longitude, and other data used in Table 2 for these 7 wells. On October 29th, they had data Table 2 didn't use.

For the four wells on the mesa, going from west to east, the following information was obtained:

a. Well 008S021E28P001S---On March 23, 2010, water surface for this well was 214.4 feet above NGVD29. This was almost 10 feet below the water surface level in Hodges Drain at 225.2 feet NGVD29, about13,100 feet to the east of the well. This well water level was 2 feet higher than in 2006 indicating some recharge may have occurred. Why would the water level be that much lower than the valley? Is someone pumping water from this well already?

b. Well 008S021E28R003S---Since 2000, water surface has been dropping in this well from 223.84 to 223.55 feet NGVD29 which is lower than the water level in Hodges Drain 11,400 feet to the east.

c. Well 008S021E28R002S---Since Nov. 2000 water in this well has been dropping from 225.23 down to 224.94 feet NGVD29. This is near the water surface elevation in Hodges Drain 11,300 feet to the east.

d. These three wells indicate there may be a cone of depression around Well 008S021E28P001S already. How was this handled in the model?

e. Well 008S021E34R001S---The water level in this well has been steadily dropping since 2001 from over 300 feet NGVD29 down to its present level of 291.09 feet NGVD29 which is still almost 70 feet above the water level in Hodges Drain 6,700 feet to the east. This must be a perched water table separated from the water table under the mesa to the north of the well.

For the three wells in the valley east of Hodges Drain:

f. Well008S021E25N001S---Data used only went thru May, 2006. PVID's monthly data was not used. This well lies between Hodges Drain and a pumped drain which kept the water table stable. As of March 8, 2011, this became a gravity drain flowing into Hodges Drain.

g. Well008S021E24C001S---This well is in next drainage area to the east of Hodges Drain's drainage area lying east of C03 Canal in the Palo Verde Drain drainage area.

h. Well008S021E24H001S--- This well is in next drainage area to the east of Hodges Drain's drainage area lying east of C03 Canal in the Palo Verde Drain drainage area.

For this area, the top of the mesa is mostly covered by desert pavement. During a rain event, water sheet flows off into adjacent desert washes rather than infiltrating into the ground. Thus natural recharge would be occurring from the floor of the desert washes. No wells were in the desert washes to indicate what was happening to the ground water under the washes. Text indicates well 008S021E34R001S is in a wash yet when plotted using Google Earth, it is on the mesa between two washes.

6. Page 4.9-10, USBR Accounting Surface: last sentence needs correcting. Of the 7 wells in Water Supply Table 2, three are in the Valley Groundwater Basin so they don't apply to the Mesa Groundwater Basin. Of the remaining four mesa wells: well 008S021E34R001S may be in a perched water table; well 008S021E28R003S is at the accounting surface elevation; 008S021E28R002S is less than 3 feet above the proposed accounting elevation, and well 008S021E28P001S is about 10 feet below the proposed accounting elevation before the solar project even starts.

7. Page 4.9-14, last paragraph, reference to AECOM 2010 model: There are numerous basic data errors in AECOM's interpretation of PVID's data. PVID was not able to review AECOM's Report until mid-October 2012. See attached 5 page Comment letter dated 10/26/12.

8. Page 4.9-16, Water Supply Table 5: Over what time frame does this table represent? AECOM indicated 1993 thru 2009 but only used 9 years of the 17. Due to the PVID data interpretation errors and Bulletin 118's typo error in defining the Palo Verde Mesa Groundwater Basin boundary within the Palo Verde Valley Groundwater Basin, this table needs to be corrected for AECOM's errors. Normally, I would round off values to 100 acft, but in the following comments, I am retaining the units for clarification purposes to keep track of which numbers are being referenced. See Table before **Comment 10**.

a) Underflow from Parker Valley: This was for a River balance. There is no underflow from Parker Valley west of the River. This should be zero.

b) Discharge from Colorado River: This is the recharge to the Valley groundwater from the river flowing under the Valley. USBR estimates that for this stretch of river bank along the Palo Verde Valley, the net effect of flow from the river going under the valley and flow from valley back to river is a gaining stretch where more water returns to the river than leaves it. The value for this line should be 0. See Comment **8.h**.

c) Irrigation canal seepage: The irrigation canal leakage value of 125,000 acft was Bookman Edmonston's estimate in 1976. Since then we have abandoned 42 miles of problem laterals and lined 56 miles of canal to greatly reduce that seepage loss value. This could be on the order of 30,000 acft now instead of 125,000 acft.

d) Irrigation Return Flow: In AECOM's table on page 28 and in Table 2, summing their listed values yielded a value of 57,000 acft not the 67,000 acft shown. For the 17 year average 1993 to 2009, (using PVID data) the net diversion less operational spills less canal pumped to mesa was 893,612 acft-133,008 acft -11,070 acft pumped to mesa or 749,534 acft of water for irrigation of valley crops. At a weighted average crop water use rate of 4.95 acft per acre (due to the large percentage of alfalfa) for the 17 year average valley farmed acreage of 81,058 acres, one gets a valley average crop use of 401,237 acft. Thus that portion of the irrigation water not used by the valley crops that was deep percolated is 348,297 acft (749534-401237= 348,297 acft).

e) The 17 year average of canal water pumped to mesa was 11,070 acft. The 17 year average (1993 to 2009) cropped acreage using canal water pumped onto the mesa was 1,515 acres. Using a water use rate of 5 acft per acre, canal crop water use on mesa would have been 7,575 acft. The difference (11070-7575=3,495 acft) is 3,495 acft that deep percolated to mesa groundwater. For the 17 year average, 643 acres of crop and 97 acres of golf course were irrigated by deep wells: if water use was 5 and 7 acft per acre, respectively, water use by mesa crops and golf course would be 3,894 acft; due to poor quality water, a leaching requirement factor of 25% for citrus and 5 % for golf course would require an additional 838 acft being pumped from the mesa aquifer that was returned as deep percolation. The combined 17 year average deep percolation for the mesa crops would be 4,333 acft (3495+838=4333 acft).

f) Public owned treatment works return: For the most part, this value comes from the City of Blythe's treatment plant in that what is not evaporated is deep percolated to the Valley Groundwater Basin. In a 2007 LAFCO Report for Eastern Riverside County, the City of Blythe's plant processed an average daily flow of 1.2 mgd or 1,346 acft. With other treatment facilities and the Mesa Verde area on septic systems, the deep percolation of 750 acft seems low but it's a starting point.

g) Groundwater extraction: The combined amount for valley and mesa should be the net loss between what was pumped and what was deep percolated: If mesa crops used 3,894 acft, domestic wells pumped 4,500 acft and Blythe Energy 1 pumped 3,300 acft, this adds up to 11,694 acft.

h) Discharge to Colorado River: This is the underflow of groundwater from the Valley back to the River such that the net effect is the USBR's unmeasured return at 5.6% of PVID's diversion as a gaining stretch of River. USBR estimates that for this stretch of River bank along the Palo Verde Valley, the net effect of flow from the river going under the valley and flow from valley back to river is 5.6% of our diversion. For a 17 year average 1993 to 2009, this would be a net gain of 50,040 acre feet.

i) Transpiration (native vegetation): PVID has not been able to pin USBR down as to where this native vegetation water use is at in PVID. Some of it, if not most, is in the river backwater channels and its water use should be charged to the River ---not to PVID nor to its groundwater basin. PVID believes this value would be closer to 4,250 acft.

j) Discharge to PVID drains: For the 17 year average, Outfall Drain returned 365,356 acft, Olive Lake Drain returned 1,568 acft. Of that, 43,000 acft was operational spillage to Outfall and 206 acft was operational spillage to Olive Lake Drain. The net 17 year average groundwater portion of the measured return flow was 323,718 acft (365356+1568-43000-206 = 323718 acft).

k) Neither column accounts for evaporation, rain, or storm water runoff entering drain and canal system. By combining basins, the overall net underflow from mesa groundwater to valley drains is masked.

L) Using the above comments I get 389,380 acft of Inflow to groundwater and 389,702 acft Outflow from groundwater. That's 322 acft of more outflow than inflow. It would be easy to increase the return from water treatment & septic systems by 322 acft to balance this column. Using any combination of adjustments, this budget can be easily balanced for the model to work on. This averages to 389,541 acft instead of 424,600 acft.

I expected the groundwater model to evaluate the impact of the project on the area of the mesa groundwater between 28th Avenue and County line and west of Hodges Drain. The current volume of inflow to Hodges Drain from the west would be reduced by the project's net use. Hodges Drain was left completely out of the picture. Not even the current average flow rate in Hodges Drain was mentioned. Water quality data for the drain water might indicate the ratio or volume of water coming in from the west. But this method was not even tried.

9. Page 4.9-21, first paragraph, Water Supply -4 Condition: Baseline should include monitoring water levels in Hodges Drain at the same time as wells to the west of Hodges Drain are monitored. All should be on USGS NVGD29 datum. Some observation wells should be installed in the desert washes west of Hodges Drain also. Wells east of Hodges Drain would be monitoring the valley's groundwater basin and not needed.

	Water Supply Table 5	Preliminary Staff Assessment Part A		
	Rio Mesa Solar 11AFC-04	9/28/2012		
		pg 260 of 686		
			PVID's Comment	See
Budget Component AF/y	BSPP from AECOM	applicant	letter 11/1/12	Comment #
Recharge (inflow)				
Precipitation mountain front	5,000	5,300	5,000	
precipitation valley floor	0	0	0	
Underflow Chuckwalla	1,000	1,000	1,000	
Underflow Parker Valley GWB	3,500	1,200	0	8a
Discharge from River	225,850	230,550	0	8b
Canal leakage	120,000	125,000	30,000	8c
Return flow irrigation PV Valley	67,000	57,000	348,297	8d
Return flow P V Mesa	3,500	3,800	4,333	8e
Public treatment return	750	750	750	8f
bedrock	0	0	0	
Total inflow	**426,600**	**424,600**	**389,380**	8L
Discharge (Outflow)				
Underflow PVV & Cib Valley GWB	0	0	0	
Groundwater extraction	11,100	9,100	11,694	8g
Discharge to River	50,000	50,000	50,040	8h
Transpiration (native veg)	8,500	8,500	4,250	8i
Discharge to drains	357,000	357,000	323,718	8j
Total Outflow	**426,600**	**424,600**	**389,702**	8L
Budget Balance (inflow- outflow)	**0**	**0**	**-322**	8m
		average =	389,541	
Note: no lines for evaporation, rain, storm runoff into drains, or inflow to valley drains from mesa groundater				8k

10. Page 4.9-21, Water Flow in the Colorado River: Staff needs to be aware that it is not the amount of water being used as much as it is a legal right to use it. The private land on the mesa that is within PVID's special Boundary for the San Diego Gas & Electric nuclear power plant proposed in the late 1970's has a right to use Colorado River water. The BLM portion of this project does not have a right to use Colorado River water. If the groundwater is classified as tributary water, then its use is governed by California groundwater law.

Valley groundwater flows into Hodges Drain along its east bank. If the groundwater for the mesa is higher than the drain, water flows into Hodges. If groundwater under the mesa is lower than the water level in Hodges Drain, water flows from the drain west under the mesa. This is where the change in flow occurs, not at the River. By reducing the return flow in the drain, the net effect is to increase the use on the River (PVID's Use = diversion less total return). If this project starts using water that does not reach the drain, the project has increased our use of Colorado River water since our return was reduced. For example, in 2011 (USBR data): PVID's diversion was 810,260 acft; Measured return was 444,798 acft; Unmeasured return was 45,374 acft; and Use was 320,088 acft (810260-444798-45374=320088 acft). If this project had been in place and prevented Hodges Drain from receiving a flow of 224 gallons per minute for the full year, that's a reduction of 362 acft for the year. PVID's measured return would have been reduced to 444,436 acft and our use increased to 320,450 acft. Thus the demand on the river increased by 362 acft such that a lower priority user wouldn't have been able to use that amount. Any 'conservation method' or other proposal needs to carry thru the accounting system on the River with USBR & USGS that shows the net effect on PVID's use was not increased.

11. Page 4.9-30 Groundwater Basin Balance and Colorado River Flow:

a) 1st paragraph: In the 1980's jojoba farming on the mesa dropped the mesa groundwater table significantly. Lack of farming on the mesa using deep wells, pumping canal water from the valley to the mesa crops south of McCoy Wash and natural recharge on the slopes and in washes to the west are what restored the mesa's groundwater to present levels. There is no direct net recharge to the mesa from the River. For this stretch of River there is a net gain of groundwater being returned to the River from both Arizona and California banks. For the California side, recharge is from the area between the River and first canal to the west where irrigation water percolating to groundwater forms a plume that the River recharge can't overtop. The net result is estimated by the USBR at 5.6% of our diversion. On both the mesa and valley, application of Colorado River water by irrigation and applying extra water (leaching requirement) to keep salts from building up in the soil is what recharges the groundwater basins.

b) 2nd paragraph: The agriculture ventures mentioned were on the mesa. The valley was not affected. Valley groundwater is high and we spend a lot of money trying to keep it at an acceptable level.

c) 3rd paragraph: See Comment 10 above and modify wording accordingly.

12. Page 4.9-39, Water Supply -4: See Comment # 10 regarding inclusion of water surface elevation data monitoring for Hodges Drain at same time wells to the west are monitored.

13. Page 4.9-40, first paragraph: I request that the baseline Report include water surface elevations for Hodges Drain.

14. Page 4.9-44, Water Supply-6: PVID requests to be notified if this Condition is revised, changed, or modified.

15. Page 4.10-5, second paragraph: See Comment #3.

16. Page 4.10-5, third paragraph, 4th line: See Comment #4.

17. Page 4.10-10, last line of first paragraph: 'Hodges Canal' is wrong. Hodges Drain was constructed and maintained as a gravity drain to control the ground water table.

18. Page 4.10-11, Section on Surface Water Features: Water runoff is under characterized. When it rains on this project area, if it rains enough, the water sheet flows to the washes and flows into the valley breaching the west bank of Hodge Drain or Outfall Drain. Once things dry up enough, PVID has to restore the west bank and remove debris and mud from the drainage channel.

19. Page 4.10-12, second paragraph:

a. What was the amount of rain falling for the different 24 hour and 2 year storm events? Something is wrong with the numbers since our drainage system has to carry the flow when theses washes reach the valley. I don't believe the drain receives these flow rates, more water infiltrates the floor of the wash on its way to the valley than estimated in model.

b. Reference should be to Figure 2. Figure 1 shows the general area, 2 shows the washes.

20. Page 4.10-17, 6th line from bottom: See Comment # 17.

If you have any questions regarding these comments, please call.

Thank you,

Roger Henning

Roger Henning
Chief Engineer

Attachment: Comment letter AECOM model 10/26/12

PALO VERDE IRRIGATION DISTRICT

180 WEST 14TH AVENUE • BLYTHE, CALIFORNIA 92225

TELEPHONE (760) 922-3144

October 26, 2012

Mr. Carl Lindner
AECOM Project Manager
1220 Avenida Acaso
Camarillo, CA 93012

Re: Blythe Solar Power Project (09-AFC-6C) Riverside County, CA, Numerical Groundwater Flow Model of the Palo Verde Valley and Palo Verde Mesa (Soil & Water-16) dated October 2010.

Dear Mr. Lindner:

I tried finding the Report "Blythe Solar Power Project (09-AFC-6C) Riverside County, CA, Numerical Groundwater Flow Model of the Palo Verde Valley and Palo Verde Mesa (Soil & Water-16) dated October 2010" on the California Energy Commission web site. They placed it on the site October 15th, 2012. I began reviewing it October 16th, 2012 and was shocked to see our data misinterpreted so badly. Comments made to Riverside County on June 26, 2012 and to BLM on June 26th 2012 seem to have been ignored. Interpretations of our data created errors that were not corrected after those comments were made. I don't understand why the model included the Valley Groundwater Basin. If the Palo Verde Mesa Groundwater Basin boundary was correctly defined as the lowest area along west side of the Valley Groundwater Basin centered on the valley drains which collect mesa groundwater thru the west and north banks, the impact to the mesa groundwater basin would not be distorted by Valley activities. I request:

A. The data be corrected in the model and reran using correct Palo Verde Irrigation District (PVID) data at no charge to PVID;

B. The new report indicate that it supersedes the old report; and

C. The new report submitted to the California Energy Commission for the Blythe Solar Power Project (09-AFC-6C) as soon as possible.

The following comments are provided to help clear up the misinterpretation:

1. At numerous locations throughout the report, it indicates that data was for 1993 thru 2008 which covers 16 years or 1993 thru 2009 which covers 17 years. Yet in Appendix E, Table E-1, footnote 1, it indicates years 1994, 1995, 1999, 2000 thru 2004 PVID's data were not used. That is 8 years of data not getting used. I was not notified there were problems with the data sent your agency nor given a chance to correct or supply missing data. Today, I reviewed the years sent you and found only the recap for 1995 in error but the monthly values were provided. The other years had complete data as far as we were concerned. The unmeasured return was not reported by the USBR in their reports until 2003's Provisional Report. For the prior years, it would be easy to calculate at 5.6% of diversion and then include it and revise appropriate values. I don't understand why 1995 wasn't reassembled from monthly data and the other years used. If nothing else, the report should not have mis-lead the reader into thinking 16 or 17 years of data were used. Regarding the data, if it looked odd, please be aware that from August 1992 thru July 31, 1994 we had a trial fallowing program going in which about 20,215 acres were fallowed. It took a while for the fields to come back into production when that program ended. In 2002 we had high water diversions due to cropping patterns. In 2003, June 20 thru Dec 20, we had a water transfer program with Coachella Valley Water District to fallow 17,109 acres. Then in the fall of 2004, in anticipation of starting the MWD Fallowing Program, farmers began reducing farmed acreage. Since 2005, we are in a 35 year Fallowing Program where fallowing acreage could change each August 1st.

2. Page 20, Section 3.4.2.1 first paragraph, Page 27, Section 3.7.1.2 and Table 2 at line for "Underflow from Parker Valley": This is a mis-interpretation of Metzger's data. He was doing a balance on the River below Palo Verde Diversion Dam. His underflow value was for that portion of the Parker Valley east of the River and south of the Palo Verde Diversion Dam which returns groundwater to the River from under Colorado River Indian Tribe irrigated property and from land having desert washes flowing onto it east of the River. There would be no underflow from the River west under our Main Canal. Seepage from our Main Canal would create a groundwater divide such that field irrigations to the east would have excess water reaching groundwater at an elevation higher than the River thus flowing east into the River as a part of our "Unmeasured Return". Sandra Owen-Joyce's 1984 data for the northern part of the valley was the result of the jojoba irrigations on the mesa where large cones of depressions were created with some causing underflow from the valley.

3. Page 28, Section 3.7.1.3 and Table 2, at line for 'agricultural return valley' and column 'Basis for Estimate': It has "the average of PVID diversions to the Valley (1993-2008) 743,000 acre feet". This is wrong. The 743,000 acre feet value from Appendix E Table E-1's summary line represents the 'Delivered to Farm' value. Using the indicated deductions, one gets 57,000 instead of the 67,000 shown in Table 2. From Appendix E Table E-1, PVID's Diversion average was 852,007 ac ft. Using the deductions listed, the value shown should have been 166,000 acft, that's 99,000 acft more or 248% higher. As a side note, the "Delivered to Farm" value in practicality already includes the deductions for operational spills, seepage, and evaporation so these values are being deducted twice. For the 16 years, 1993 to 2008, PVID's average PVID diversion was 902,905 acft; for the 17 years, 1993 to 2009, PVID's average PVID diversion was 893,612 acft. USBR's data for PVID's diversions was 890,410 acft and 899,386 acft respectively. Also, PVID's average consumptive use is not 420,000 acft: for 16 years, 1993 thru 2008 it was 392,705 acft; for 17 years, 1993 thru 2009, it was 386,641 acft, both PVID data.

4. Page 28, Section 3.7.1.3 in both Recharge subsections and Table 2, at line for 'Irrigation Canal Leakage", 120,000 : Why would one deduct evaporation loss from seepage loss? They are two different losses to the canal water. The 125,000 ac ft. of seepage was based on a 1976 report with 282 miles of canal in our system. By 1993, we had reduced the canal system to about 249 miles of which 40.5 miles were concrete lined. We abandoned problem laterals or concrete lined them to reduce seepage losses. By 1999, we had 244.2 miles of canal of which 50.95 miles were lined. By January 2001, we reached the current values of 244.23 miles of canal of which 56 miles are concrete lined. The reduction in seepage shows up in Appendix E Table E-1 as the difference between the "PVID Diversion" minus "Total Operational Spill" columns and the "Delivered to Farm" column in the column labeled "Loss or (-) Gain" where a gain has a negative value. Likewise, by reducing length and width of canals, we reduced evaporation losses from canals. Canal evaporation amount is lower since the flowing cold water no longer stagnates in large stretches of dead end canals.

5. Page 29, Section 3.7.1.4 and Table 2, at line for "River Discharge to Groundwater (Losing Condition)" also page 31, Section 3.7.2.4 Groundwater Discharge to Surface Water (Unmeasured Return) and Table 2, Unmeasured Return (Gaining Condition): This 226,000 acft value (or 225,850acft) is grossly exaggerated. Compare this statement to Table C-1 in Appendix C which indicates a net monthly gain on this stretch of River. For the River, the net change between underflow under Palo Verde Valley and outflow from Palo Verde Valley to the River is what matters, not each component.

- USBR River Operations are using a net gain on this stretch of River from Palo Verde Diversion Dam to Cibola for scheduling releases from Parker Dam. PVID's portion is calculated as 5.6% of our diversion. USBR calls this the "Unmeasured Return" and is what's needed for their River operations & scheduling after taking in to account our operational canal spillage to the River. For the 17 year average, 1993 thru 2009, the Unmeasured Return averaged 49,863 acft using USBR values or 50,041 acft using PVID values. The line in the inflow section should be omitted and only the 50,000 acft of Unmeasured Return line retained in Table 2. In addition to PVID's Measured and Unmeasured Returns, there are surface returns and underflow returns from Arizona's irrigated lands and desert washes and from California's desert washes north of Cibola.

6. Page 31, Section3.7.2.3, Page 37, Section 3.7.2.3, Discharge from PVID Drains and Table 2, at line for "Groundwater Discharge", 357,000 acft: The flow in Outfall Drain includes "operational spillage to drains" so that amount should be deducted from the drain's flow for the title to be correct. The 17 year average 1993 to 2009 measured return flow from drains was 323,923 ac ft after deducting operational spillage. This value included Olive Lake Drain's groundwater flow. After deducting Olive Lake Drain's groundwater flow of 1,154 acft, Outfall Drain's 17 year average groundwater portion of the flow was 322,769 acft, 34,231acft less than that used in model.

7. Page 1, bottom 2nd paragraph: "The model was calibrated to steady-state conditions from 1980 to 2009..." Where is the pre 1993 data listed? See Comment #1 regarding use of 1993 to 2008 and 1993 to 2009 time frames being mentioned. In Appendix C Table C-1, that appears to be USGS data since they stopped using the Cibola Gage in October 1988. Where is the data from 1988 thru 2009 for the River? Whose data is being used: PVID, USBR, or USGS? Was elevation data converted from each agency's datum to a consistant datum? References to any data pre 1970 should be deleted due to the drastic changes made to groundwater, drains, and the River system in the early 1960's.

8. Page 2, 2nd bullet, 2nd to last sentence: Perhaps with these corrections, the model's drain flows won't be so far off from measured amounts.

9. Page 17, part 3.4: No mention that water surface elevations in our drains represent the surfacing of groundwater (like continual seeps). The contour lines for groundwater in various figures do not indicate groundwater flowing in the drains.

10. Page 20, section 3.4.2.1 second paragraph: Contours in Figures 9, 11, and 12 ignore fact that drains are intercepting flows from both sides of the drains, that irrigation deep percolation to groundwater and seepage from canals would create high plumes on the ground water preventing lower water from the river flowing very far under the valley. This was omitted from this discussion. Also, if water is flowing under the valley as mentioned, why is this stretch of river a 'gaining' stretch as shown in Appendix C Table C-1?

11. Page 27, Section 3.7.1, Recharge: I think your position should be modified. Since the mid 1980's, the only things that restored the ground water under the mesa to present levels was natural recharge and deep percolation of pumped irrigation water from valley canals. Those areas upgrade from the farm land irrigated by pumped canal water was naturally recharged. From experience, when we see a storm drop over an inch of rain in a short time and hang over the mesa area, we start checking McCoy Wash to see if it's flowing. Instead of using the average precipitation for the year, using each actual large rain event to estimate recharge amounts could provide the natural rain conversion to ground water recharge for modeling purposes. Small rain events are evaporated away before any runoff is created. I've reviewed several of these proposals with one site proposing a weather station setup to collect rainfall amounts on the mesa. If so, that data could generate desert runoff amounts over the life of the project.

12. Page 30, Section 3.7.2.1, Municipal, ... section, and Table 2, Discharge, Municipal ...:

a. In text portion, it has Mesa Ranch Well #3 & PVC Well #2 combined to pump 260 afy. In Table 2, Mesa Ranch #3 provided 230 afy while PVC #2 provided 260 afy. Which section is correct?

b. 2nd paragraph of text and Table 2 has Airport Well #7 supplying Mesa Verde Community (CSA #62) on the mesa pumping 47 afy. The CSA # is wrong, on the mesa, it is CSA #122 and it's well is located barely on the mesa east of the extension of 16th Avenue and Keim Blvd, almost 2 miles southeast of the community. In Eastern Riverside County, LAFCO's 2007 report has this well providing 275 afy in 2006 to an all septic system. In this same report, CSA #62 for Ripley pumped 107 afy from valley groundwater basin in 2006. CSA's # 122 and #62 pumpage of 382 afy was left out of model.

13. Page 30, Section 3.7.2.2, Consumptive Use Native Vegetation: We challenged the USBR's LCRAS reports regarding native vegetation water use and their acreages. The USBR have not identified the vegetation site locations nor indicated which areas were using valley groundwater and which were using River water. Vegetation water use along River and in its backwaters should be charged to the River system not against Palo Verde Valley's drain or ground water use values.

14. Figure 1: The Palo Verde Mesa and Valley Groundwater Basins is more correctly shown than in Figure 6a. Figure 1 does not use the typo error in the State's Bulletin 118 for Hydrologic Region 7-39. Region 7-38's definition for west boundary line is fine.

15. Figure 5: It indicates most of PVID's Drains. That portion of Northend Drain lying north of Upper C Canal west of Highway 95 is not shown. It collects groundwater north of the canal and any storm water runoff from the desert north of it. Richins Drain and the extension of Olive Lake Drain to the north to K02 Canal and Johns Drain east of the Main Canal collects groundwater in that area. Rannells Drain ends about ¼ mile west of Arrowhead Blvd on 8th Avenue, about 2 miles northeast of where the figure has it ending. This would collect ground water from the mesa and desert storm runoff. Palo Verde Drain was left off completely. It runs along the Range 21/22E line almost to 22nd Avenue and collects mesa groundwater underflow from Chuckwalla Valley and desert storm runoff. Hodges Drain ends about ¼ mile north of 28th Avenue and is about 1.5 miles shorter than drawn on Figure. Hodges Drain flows into Outfall Drain but the first half mile was not shown. Keim Drain was left off. It enters Rannells Drain from the east at 26th Avenue and runs northeasterly to 22nd Avenue. Lovekin Drain enters Eastside Drain ½ mile west of Lovekin Blvd. Lower Borrow Pit Drain ends about ½ mile south of 30th Avenue at Defrain Blvd. Browns Drain flows west 1 mile to Outfall Drain at ½ mile south of 30th Avenue. 20th Avenue, Fisher, 5th Avenue and several internal drains are not shown. PVID's D10-13 and F spill is the same spill at east end of 18th Avenue--- the name was changed in the 80's to fit canal nomenclature. PVID's Anderson Drain was pumped until the mid 80's it was abandoned and no longer was used due to the local water table dropping to a satisfactory level.

16. Figure 6a: It needs comment that boundary line between Valley and mesa is misinterpreted as shown. Boundary line should be moved west to the low area along toe of mesa and where an open gravity drain exists, boundary line would be in the center of that drain.

17. Figure 9: Well 6/22-24D1 has water level dropping due to domestic pumping. Nearest drain is east of A Canal about a ½ mile. Well 6/23-35E1 lies along an abandoned drain with water used by domestic pumping and phreatophytes. The River is almost 1.5 miles due east of D10-13 Canal at an average water level about 2 feet lower than at this well. Well 7/22-19K1 lies northeast of the end of Palo Verde Drain about ¾ of a mile whose water surface averaged about 1 foot below the well's water surface.

18. Figure 10: Well 6/22-32R1, 2006 water surface was 246.1 feet USGS, while water surface in Rannells Drain 2 miles due south of well was around 237.5 feet USGS.

19. Figure 11: The cone of depression north of Blythe between 8th and 10th Avenues and between C&D Blvd and Lovekin Blvd is the water level in a pumped drain surrounded by fish ponds. The contour lines where they connect to the river are in error. At Interstate 10's bridge, the average river elevation is around 252 feet, 3 feet lower (USGS). The river at about 24th Avenue is also about 3 feet lower (USGS) than shown. At 6th Avenue, the River is almost 5 feet lower (USGS) than shown.

20. In Figures 11 & 12: There is only one groundwater surface elevation for the water table at each location whether a shallow or deep well was being used. River water surface would be the same whether using shallow or deep wells. In both figures, the effect of the drains collecting groundwater is not shown.

21. Figure 13 shows the improvements in boron concentrations under the mesa where deep percolation of canal pumped water has improved the quality of groundwater under the mesa. It would indicate how large an area was recharged by River water pumped from the canal.

22. Figure 16: The USBR river transects don't indicate: the river's water surface elevation; the date the transect were made; nor which datum—NAD83, NGVD88, or USBR. In the high river flows of 1983 thru 1987 and 1997-1998, flow line of river bed was scoured deeply.

23. Figure 17: The bottom of drain elevations indicated don't fit with our average water surface elevations less flow depth even after accounting for the different datums . Some elevations are above our average water surface elevation. Over what time frame are they representing?

24. Table 2: Without making any Comment changes, (see Comment #3) a simple math error exists in the water balance. The value for Recharge, Ag Return Valley of 67,000 from the table on page 28, Section 3.7.1.3 should be 57,000 acft. Thus Table 2 has 10,000 acft more outflow than recharge before modeling even starts. Therefore, no mesa groundwater is available for this project.

25. Appendix C, Table C-1: In left half of Table, 'Summary Flow & Spill Data' should indicate they are monthly averages.

26. Appendix D: Please add footnote that: PVID's elevation data needs .75 feet added to get onto USBR's NGVD 29 datum; PVID's elevation data needs 1.0 feet added to get onto USGS's NGVD 29 datum.

27. Appendix E, Table E-1: Should be revised to include all 17 years of data, 1993 thru 2009.

Please use these comments to revise and improve your groundwater model.

Sincerely,

Roger Henning

Roger Henning
Chief Engineer

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